Department for
Business, Energy
& Industrial Strategy

8th National Communication

August 2022

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Business, Energy
& Industrial Strategy

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Ministerial Foreword

The Rt Hon Kwasi Kwarteng MP

The Rt Hon Alok Sharma MP

The UK is committed to tackling climate change. In our COP Presidency year, we are at the forefront of galvanising international action to combat this urgent global issue.

In November 2021 the UK hosted COP26, the crucial UN climate change conference. 197 Parties from around the world agreed the Glasgow Climate Pact - an historic agreement which keeps alive the possibility of limiting the rise in global temperature to 1.5°C.

COP26 helped to close the ambition gap, with net zero commitments now covering 90% of the world's economy – up from 30% when the UK took on the COP26 Presidency.

But we know that we must all do more to keep 1.5°C alive.

The devastating impacts of climate change are already being felt around the world. If we do not keep the possibility of limiting the rise in global temperature to 1.5°C within reach, we risk many of these impacts intensifying. The window of time we have left to act is closing fast.

This is all the more pressing given the current context of rising global energy prices, provoked by surging demand after COVID-19 and the Putin regime's illegal, brutal and unprovoked invasion of Ukraine. These crises should increase, not diminish, our determination to deliver on what the world agreed in Glasgow and to double down on domestic energy security.

The UK has ambitious climate targets. We were the first major economy in the world to legislate to reach net zero by 2050. Our Nationally Determined Contribution (NDC) pledges to reduce greenhouse gas emissions by at least 68% by 2030 on 1990 levels. And last year we set the UK's world-leading sixth Carbon Budget into law, for the period from 2033 to 2037 and including international aviation and shipping, which will take the UK more than three quarters of the way to reaching net zero by 2050.

Our 25 Year Environment Plan also sets out a range of goals and commitments for nature which can help us mitigate and adapt to climate change, including a commitment to creating or restoring 500,000 hectares of wildlife-rich habitat in England, for example. We have also committed to increasing tree planting rates from 13,290 hectares across the UK in 2020/21, to 30,000 hectares each year by the end of this Parliament (2024).

But commitments and ambition are not enough. Real world action must follow.

That's why in our Net Zero Strategy we set out policies and proposals to decarbonise all sectors of the UK economy to meet our 2050 net zero target. For example, we will end the sale of new petrol and diesel cars by 2030, and from 2035, no new gas boilers will be sold.

The British Energy Security Strategy, published earlier this year, builds on this plan. By 2030, we could see 95% of our electricity come from low carbon sources as we aim to accelerate our deployment of wind, solar, nuclear and hydrogen. This could amount to £100 billion of private sector investment into new British industries including offshore wind and supporting around 480,000 clean jobs.

We are also supporting developing countries and have doubled our International Climate Finance Commitment to £11.6 billion between 2021-2025, which also includes a commitment of at least £3 billion to climate change solutions that protect and restore nature and biodiversity. At COP26 the UK made several further climate finance commitments, including the Clean Green Initiative (CGI), which will help to scale up public and private investment in quality, sustainable infrastructure globally.

The UK also launched the Breakthrough Agenda, a commitment to work together internationally this decade to accelerate the development and deployment of the clean technologies and sustainable solutions needed to meet our Paris Agreement goals, ensuring they are affordable and accessible for all.

We know we are already making good progress. Between 1990 and 2019, we grew our economy by more than three-quarters and cut our emissions by over 44%, decarbonising faster than any other G7 country.

But we also know we must build on the success of COP26 and keep up momentum at home and abroad to deliver on our commitments.

So we will continue to monitor and report on our progress.

Our response to the Climate Change Committee's 2022 progress report later this year will form part of our commitment to update annually on our progress to net zero, and as we conduct the first Global Stocktake of the Paris Agreement, this communication will contribute to a common understanding of progress to date and the road we still have to travel.

It has never been clearer that net zero means security, prosperity and a cleaner, safer future for all.

The Rt Hon Kwasi Kwarteng MP, Secretary of State for Business, Energy and Industrial Strategy & The Rt Hon Alok Sharma MP, COP26 President

Executive Summary

Introduction

The UK is committed to meeting its reporting obligations under the United Nations Framework Convention on Climate Change (UNFCCC) and places huge value on transparency and accountability. Showcasing the positive action that countries are taking to fight climate change builds trust, and honest appraisals of progress highlight where more needs to be done. This is critical to driving increased ambition and meeting our shared goals under the Paris Agreement.

This report constitutes the UK's Eighth National Communication and Fifth Biennial Report under Article 12 of the UNFCCC, Article 7 of the Kyoto Protocol and decision 2/CP.17 of the Conference of the Parties. It provides an overview of action to address climate change in the UK – including progress made at home and abroad to reduce greenhouse gas emissions and adapt to the effects of a changing climate, covering the period between 1990 – 2020.

The UK has been leading the way in tackling climate change. We played an important role in securing the historic Paris Agreement in 2015, and in November 2021 the UK hosted COP26, resulting in 197 Parties agreeing the Glasgow Climate Pact to limit the rise in global temperature to 1.5°C. 90% of the world's economy is now covered by net zero commitments.

The UK is also world-leading in its ambition. The UK's Nationally Determined Contribution (NDC) commits the UK to reduce greenhouse gas emissions by at least 68% by 2030 on 1990 levels and we are actively considering how to revisit and restrengthen our NDC, in line with the Glasgow Climate Pact. The UK also has legislated to reach net zero by 2050 and last year the UK put into law a world-leading target to reduce greenhouse gas emissions (including international aviation and shipping) by approximately 77%[1] by 2035 compared to 1990 levels. The devolved administrations of Scotland, Wales and Northern Ireland contribute to the UK's overall climate objectives and have their own targets, as outlined throughout this report.

The UK is making good progress. In 2020, UK greenhouse gas emissions were 49.5% lower than 1990 levels. The UK over-achieved against the first (2008-12) and second (2013-17) carbon budgets by 36 MtCO2e and 384 MtCO2e respectively. Performance against the third carbon budget (2018-22) will be assessed in 2024, though latest reporting shows emissions

[1] Our ambitious future targets for carbon emissions have not changed - Carbon Budget 6 remains as it was set in law in 2021, with a limit on emissions of 965MtCO_2e over 2033-37. At COP26, an international decision was taken on which set of Global Warming Potentials (measures of the global warming effect of each greenhouse gas) would be adopted going forwards. This decision has the effect of changing our backwards-looking emissions figures compared to our previous assumptions, which means the percentage reduction between 1990 and 2035 has changed slightly, from 78% to approximately 77%.

below the average level required in each year from 2018 to 2020. The devolved administrations of Scotland, Wales and Northern Ireland contribute to the UK's overall climate objectives as outlined throughout this report.

The main body of this report – the Eighth National Communication - is structured into 8 chapters which are summarised below. The UK's fifth Biennial Report is attached in Annex 1 and presents information on the UK greenhouse gas inventory, covering emissions estimates for the period 1990-2020, and the national system established to produce and quality assure the inventory. The related Common Tabular Format is provided in Annex 2. By prior agreement, Annex 3 will be submitted later in 2022 and will comprise of the UK Report on national activities with respect to the Global Climate Observing System Implementation Plan. Annexes 4-6 contain summary reports of greenhouse gas inventory tables, mapping between inventory and projections sectors and global warming potentials. A summary table outlining the location of supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol within this National Communication is provided in Annex 7.

Chapter 1: National circumstances

Chapter 1 presents a brief description of the UK's national circumstances and how changes in national circumstances affect greenhouse gas (GHG) emissions over time. In summary:

- The UK population was 67.1 million in 2020, which was 9.8 million (17%) more than in 1990. The UK population is predicted to rise to 71 million by 2045-46.
- The UK has a maritime, moist, temperate climate which is heavily influenced by the Atlantic Ocean and the Atlantic jet stream. UK national temperature records show a clear increasing trend in temperatures in all seasons over the last 140 years, which evidence shows is overwhelmingly a result of human activities, in particular emissions of greenhouse gases.
- UK GDP fell by 9.3% in 2020. The economy has since returned to growth, with GDP in Q1 2022 0.7% above pre-Covid levels.
- Final energy demand in 2020 was met almost entirely by petroleum (39%), natural gas (34%) and electricity (20%).
- In 2020 43% of total production came from primary oil, 30% from natural gas, 1% from coal, 10% from other renewables (bioenergy and waste) and 15% from primary electricity.

Chapter 2: Greenhouse Gas Inventory

Chapter 2 presents information on UK GHG emissions and the National System established to produce and quality assure the UK GHG inventory. In particular:

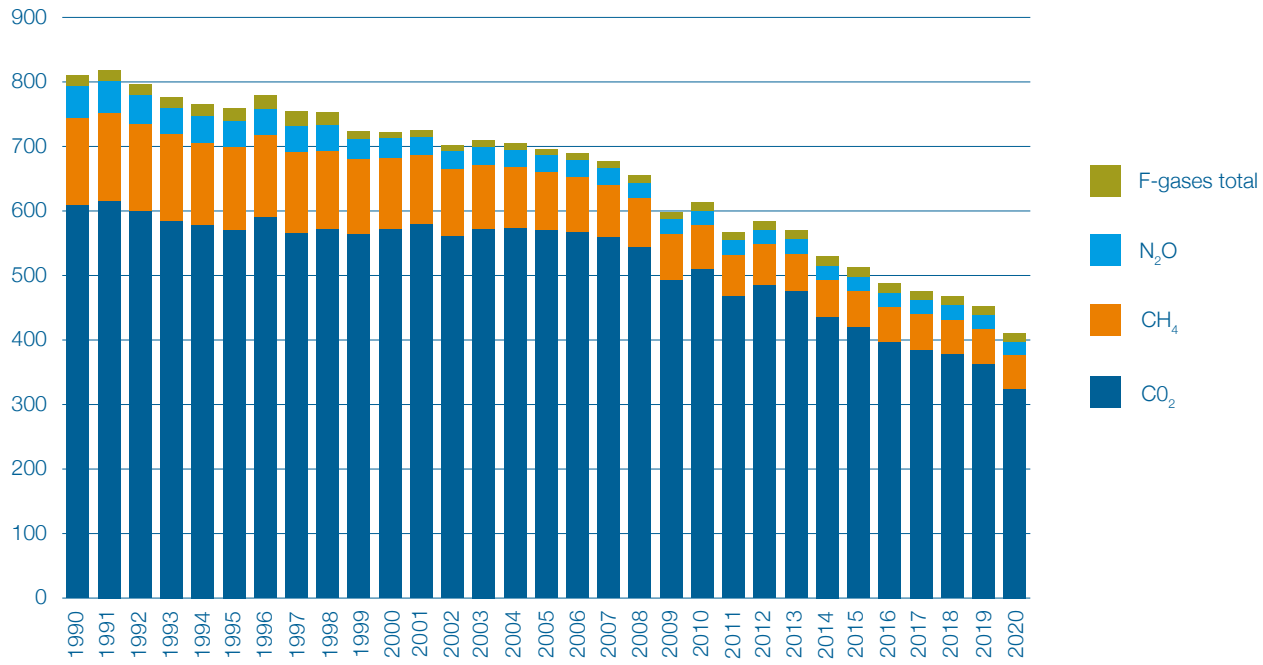
- In 2020, UK greenhouse gas (GHG) emissions on a UNFCCC basis[2] were 409.5 million tonnes of carbon dioxide equivalent ($MtCO_2e$) – 49.5% lower than 1990 levels.[3]

[2] The UK's ratification of the UNFCCC has been extended to the Overseas Territories of Bermuda, the Cayman Islands, the Falkland Islands and Gibraltar; and the Crown Dependencies of Guernsey, the Isle of Man and Jersey and the UK reports an inventory on this basis.

[3] Greenhouse gas emissions are expressed throughout this document as million tonnes of carbon dioxide equivalent ($MtCO_2e$). Gases other than CO_2 are expressed in terms of carbon dioxide equivalent by multiplying their emissions by their global warming potential (GWP). GWPs are taken from the 4th Assessment Report of the IPCC.

- Between 1990 and 2020, carbon dioxide emissions including land use, land use change and forestry (LULUCF) fell by 46.8%. Methane emissions fell by 61.6% and nitrous oxide emissions fell by 57.6%.
- Between 1990 and 2020, emissions of fluorinated gases (hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride and sulphur hexafluoride) fell by 25.9%.

Figure 2.2: Total emissions of GHGs, 1990–2020, $MtCO_2e$



Source: UK GHG Inventory, 1990-2020.

Chapter 3: Policies and measures

Chapter 3 sets out policies and proposals in place to deliver on our climate targets, including measures set out in the Net Zero Strategy and the British Energy Security Strategy.

- In October 2021, the UK **published its Net Zero Strategy**[4] - a cross-economy strategy which keeps us on our path to net zero, including the action we will take to keep us on track for meeting carbon budgets and our Nationally Determined Contribution (NDC)[5].

4 https://www.gov.uk/government/publications/net-zero-strategy

5 https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc

- **Several sectoral strategies** have been published between 2018 and 2021, including the Energy White Paper[6], the North Sea Transition Deal[7], the Industrial Decarbonisation Strategy[8], the Transport Decarbonisation Plan[9], the Hydrogen Strategy[10], the Heat and Buildings Strategy[11] and the 25 Year Environment Plan[12].
- The **British Energy Security Strategy**,[13] published in April 2022 builds on the 2020 **Prime Minister's Ten Point Plan**[14] for a Green Industrial Revolution and the 2021 **Net Zero Strategy**, in light of rising global energy prices, provoked by surging demand after the pandemic as well as Russia's invasion of Ukraine. This will be central to reducing Britain's dependence on fossil fuels and will boost our diverse sources of homegrown energy for greater energy security in the long-term.
- In April 2022, the UK Department for Education published its **Sustainability and Climate Change Strategy**[15], for the education and children's services systems.

Chapter 4: Projections

Chapter 4 presents information from the most recent full update to the UK's GHG Energy and Emissions Projections (EEP) 2019, published in October 2020[16].

- These estimates of the future level of energy consumption and greenhouse gas emissions only include existing and planned policies deemed to be sufficiently quantified by August 2019, which was the cut-off point for inclusion in EEP 2019. They therefore represent a counterfactual, showing what the UK would expect to happen in the absence of further, more recent policies such as those included in the UK's Net Zero Strategy, published in October 2021, which sets out policies and proposals to keep the UK on track for meeting carbon budgets and the 2030 Nationally Determined Contribution. See Chapter 3 for information on more recent policies and measures not included in these projections.
- On this basis, the projections show that by 2030, UK emissions of the basket of the 7 greenhouse gases (GHGs) covered by the Kyoto Protocol[17] would be expected to be approximately 365 $MtCO_2e$, or 55% lower than the 1990 level; and by 2040, the projections show equivalent figures of 361 $MtCO_2e$ and 55% lower respectively. As new policies and measures are developed and implemented, the resulting emissions savings will be factored into future projections.
- The UK projects emissions of CO_2, CH4 and N2O of 52%, 68% and 60% respectively below 1990 levels by 2040.

6 https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future
7 https://www.gov.uk/government/publications/north-sea-transition-deal
8 https://www.gov.uk/government/publications/industrial-decarbonisation-strategy
9 https://www.gov.uk/government/publications/transport-decarbonisation-plan
10 https://www.gov.uk/government/publications/uk-hydrogen-strategy
11 https://www.gov.uk/government/publications/heat-and-buildings-strategy
12 https://www.gov.uk/government/publications/25-year-environment-plan
13 https://www.gov.uk/government/publications/british-energy-security-strategy
14 https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution
15 https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy
16 See https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019
17 We report LULUCF emissions in full to be consistent with Inventory Convention reporting. This scope is wider than that under Articles 3.3 and 3.4 of the Kyoto Protocol and includes estimates for all anthropogenic sources minus sinks.

- The UK projects that (joint) emissions of the fluorinated GHGs: HFCs, PFCs, SF6, and NF3 will be 83% below their 1990 levels by 2040.

Chapter 5: Vulnerability assessment, climate change impact and adaptation measures

Chapter 5 describes the ways the UK continues to develop its adaptation strategies and plans to deal with unavoidable impacts of climate change and their economic, environmental, and social costs.

- In 2008, the Climate Change Act created the legal framework for climate change adaptation in the UK.
- Since the UK's 7th National Communication in 2017, the UK government has delivered a full cycle of the adaptation requirements of the Act, including:
  - **Two comprehensive, nationwide Climate Change Risk Assessments** in January 2017 and January 2022, which set out 61 UK-wide climate risks and opportunities cutting across multiple sectors of the economy. The UK government's independent statutory and advisory body, the Climate Change Committee (CCC), produced the underpinning 2021 Independent Assessment of UK Climate Risk which identified eight priority risk areas for further action between 2021 and 2023.
  - **Our second National Adaptation Programme (NAP2) and the Third Strategy for Climate Adaptation Reporting** in July 2018. NAP2 sets out the key actions that the government and others will take to adapt to the challenges of climate change in the UK over 5 years in different UK sectors.
  - **Two statutory progress reports on the delivery of NAP2** in July 2019 and June 2021. These review progress in adaptation policy and action and are completed by the independent Adaptation Committee of the CCC.
- In addition, the UK has delivered:
  - **The UK's 2018 Climate Projections (UKCP18).** These provide an updated assessment of how the UK climate may change in the future.
  - **The first UK Adaptation Communication to the UNFCCC** in December 2020, updated in September 2021. This provides a comprehensive overview of domestic and international frameworks and support for adaptation.
- The UK is now preparing its third NAP, to be published in 2023. NAP3 will aim to shape a society which makes timely, far-sighted and well-informed decisions to address the risks and opportunities posed by a changing climate.

Chapter 6: Financial assistance and support tor technologies

Chapter 6 sets out the financial assistance the UK has provided to developing countries to support emissions reductions and increase the resilience of the most vulnerable countries to the impacts of climate change.

- The UK is committed to the collective target of mobilising US$100 billion climate finance a year for developing countries through public and private sources.
- The UK met its 2015 pledge to provide £5.8 billion in International Climate Finance (ICF) between 2016/17 and 2020/21. In 2019 the PM made a commitment to deliver £11.6 billion for the period 2021/22 to 2025/26. This commitment is additional to the £5.8 billion spent up to March 2021. British International Investment (BII) (formerly CDC) has also committed to a 30% climate target which is expected to deliver a further £2 billion climate finance over five years.
- As first outlined in the 2019 Green Finance Strategy and further reinforced in the Integrated Review of Security, Defence, Development and Foreign Policy, the UK Government has pledged to ensure that all UK Overseas Development Assistance (ODA) is aligned to the Paris Agreement, reflecting the government's commitment to tackling the causes of climate change and its impacts as a driver of future instability and poverty. In the 2021 Government response to the Dasgupta Review on the Economics of Biodiversity, the UK committed to integrate nature into its ODA, ensuring that all new UK bilateral aid spending does no harm to nature.
- The UK is one of the largest contributors to the major multilateral climate funds (Global Environment Facility, Green Climate Fund, Global Green Growth Institute, Climate Investment Funds, with £724 million provided over 2019 and 2020. At the G7 in 2019 the UK announced it will double its contribution to the GCF to £1.44 billion of new funding between 2020 and 2023, making the UK the largest contributor.
- At COP26 the UK launched the Clean Green Initiative (CGI) to help developing countries bridge the infrastructure gap, while supporting climate change and sustainable development goals, helping to scale up investment by the private sector. Bold commitments were made at COP26 around key themes:
    - **Protecting nature:** £1.5 billion new UK funding over five years for the Global Forest Finance Pledge (part of the £3 billion nature commitment);
    - **Phasing out coal:** the UK is the largest contributor to the Climate Investment Funds (CIFs) and further strengthened this position by committing an additional £200 million to the new Accelerating Coal Transitions programme and £150 million to the Renewable Energy Integration programme (announced at UNGA);
    - **Mobilising finance:** a new Climate Investment Fund (CIF) Capital Markets Mechanism expected to issue billions of green bonds in the City of London to support climate action;
    - **Net zero cities:** £27.5 million new funding to support the launch of the Urban Climate Action Programme (UCAP);

- **Access to finance:** The UK pledged £100 million to support the implementation of recommendations from the UK co-chaired Taskforce on Access to Climate Finance to make it faster and easier for developing countries to access finance for their climate plans[18]. COP26 also saw the launch of the International Just Transition Declaration[19] committing to working together to ensure no one is left behind in the transition towards net zero economies.

- Since 2011, UK ICF20 investments have helped 88 million people cope with the effects of climate change. Since 2011, UK ICF has also mobilised £8 billion in public and private finance in addition to our ICF spend commitments. Overall ICF provided from April 2011 to March 2021 is expected to avoid or reduce 960 million tonnes of carbon dioxide equivalent.

Chapter 7: Research and systematic observation

Chapter 7 presents information on the UK's activities in climate research and observations, including domestic and international activities, as well as information about the roles of government departments and agencies engaged with the climate research agenda.

- The UK has an extensive array of expertise, including the Met Office Hadley Centre, the National Centre for Atmospheric Sciences, the National Centre for Earth Observation, the British Antarctic Survey, world-leading UK university research departments and applied and policy-relevant research capabilities within the private sector. The UK also leads and engages in collaborative research efforts with partners across the world.

- Research highlights include:

  - Publication of the third UK Climate Change Risk Assessment;

  - Continued work under the world-leading Met Office Hadley Centre Climate Programme, improving the UK's climate modelling capability and applied services through an extensive programme of research;

  - UK involvement in the preparation of the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment (AR6) reports;

  - Collaborative projects with international partners, such as the Weather and Climate Science for Service Partnership (WCSSP) programmes and Future Climate for Africa (FCFA);

  - UK-funded programmes providing climate information services for domestic policy areas, such as the Climate Services for a Net Zero Resilient World (CS-N0W) programme;

  - Significant investment in UNFCCC priority areas including pioneering work on Greenhouse Gas Removal Technologies and their implications; and

  - Continued participation in the Global Climate Observing System (GCOS), led by the UK Met Office and involving a wide range of UK-based organisations.

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[18] https://committees.parliament.uk/publications/8476/documents/85843/default/#:~:text=Co%2Dchaired%20by%20Fiji%20and,supported%20by%20coherent%2C%20programmatic%20finance

[19] https://ukcop26.org/supporting-the-conditions-for-a-just-transition-internationally/

[20] https://www.gov.uk/government/publications/uk-climate-finance-results-2021/2021-uk-climate-finance-results

- Between 2015 and 2021, the UK invested approximately £3 billion in research, development and demonstration of low-carbon energy, transport, agriculture and waste.

Chapter 8: Education, training and public awareness

Chapter 8 covers actions supported by the UK government, Devolved Administrations and local government in relation to education, training, public awareness and communications on climate change.

- In April 2022, the UK's Department for Education published its Sustainability and Climate Change Strategy for education and children's services, setting out how policies in England can support the vision for the UK education sector to be world leading in sustainability and climate change by 2030.
- In 2021, the UK Government published the Net Zero Strategy, which included clear principles on how we will engage the public and support them to make green choices.
- Ahead of COP26, the UK Government launched the 'Together for our Planet' campaign which used storytelling, high impact visuals and partnerships to demonstrate to the public the positive impact of tackling climate change.
- In December 2020, the UK Government launched the MacKay Carbon Calculator, a simple, user-friendly model of the UK's energy system. Its purpose is to engage the public by helping them explore the full range of options for reducing greenhouse gas emissions by 2050.

Chapter 1 National Circumstances

1.1 Introduction

The UKs 8th National Communication and 5th Biennial Report detail the action the UK is taking to fulfil its commitments under the United Nations Framework Convention on Climate Change and the Kyoto Protocol. This chapter presents a brief description of the UK's national circumstances and how changes in national circumstances affect GHG emissions over time.

The first commitment period of the Kyoto Protocol required that UK GHG emissions were reduced by 12.5% below base year levels over the 2008-12 period, which the UK achieved. Under the second commitment period (2013-2020), the EU and its Member States (which at that time included the UK), Iceland and Norway have a collective target to reduce emissions by 20% relative to base year levels. The UK left the European Union on 31 January 2020. Under the terms of the Withdrawal Agreement, the UK remains committed to its shared targets and reporting with the EU under the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

Information on legal entities authorised to participate in mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol can be found on the UK Emissions Registry website in the Kyoto Protocol Public Reports.

In June 2019, the UK Government became the first major economy to set a legally binding target to achieve net zero greenhouse gas emissions by 2050. In December 2020, the UK announced a Nationally Determined Contribution (NDC) under the Paris Agreement which commits to reducing greenhouse gas emissions by at least 68% by 2030 on 1990 levels.

1.2 Key developments

The following outlines key developments and trends in national circumstances since publication of the UK's 7th National Communication. More details are in the rest of this chapter.

- **Population profile:** The UK population was 67.1 million in 2020, which was 9.8 million (17%) more than in 1990. The UK population is predicted to rise to 71 million by 2045-46.
- **Climate profile:** The UK has a maritime, moist, temperate climate which is heavily influenced by the Atlantic Ocean and the Atlantic jet stream. UK national temperature records show a clear increasing trend in temperatures in all seasons over the last 140 years, which evidence shows is overwhelmingly a result of human activities, in particular emissions of greenhouse gases.

- **Economy and industry profile:** UK GDP fell by 9.3% in 2020. The economy has since returned to growth, with GDP in Q1 2022 0.7% above pre-Covid levels.
- **Energy profile:** In 2020 43% of total production came from primary oil, 30% from natural gas, 1% from coal, 10% from other renewables (bioenergy and waste) and 15% from primary electricity. Final energy demand in 2020 was met almost entirely by petroleum (39%), natural gas (34%) and electricity (20%).
- **Transport profile:** Demand for transport had continued to increase steadily across many modes until 2019. This was followed by a steep decline in 2020 and 2021 due to restrictions introduced during the pandemic. Reflecting the UK's drive towards net zero, in December 2021, over a quarter of all new cars sold in the UK were battery electric vehicles, comparing to just 2% in 2019. Electric vehicle (EV) charging infrastructure is also becoming more widely available, with around 29,600 public charge points in the UK.
- **Building stock and urban structure profile:** In 2020, there were around 29 million dwellings in the UK, 23.5 million of which in England, 2.65 million in Scotland, 1.4 million in Wales, and around 800,000 in Northern Ireland. There were an estimated 27.8 million households in the UK in 2020, an increase of 5.9% over the last 10 years.
- **Waste profile:** In 2019 households in the UK produced 26.4 million tonnes of waste, a reduction of 1% since 2015. In 2019, 46.2% of waste from households was recycled in the UK; this is an increase from the rate of 44.5% achieved in 2015.
- **Agricultural profile:** The UK covers over 24 million hectares. In 2021 around 71% of this is used for agricultural use.
- **Forestry profile:** The area of woodland in the UK at 31 March 2021 is 3.2 million hectares. Of this total, 1.5 million hectares (46%) is in Scotland, 1.3 million hectares (41%) is in England, 0.3 million hectares (10%) is in Wales and 0.1 million hectares (4%) is in Northern Ireland.

1.3 Government profile

The UK Government is the central government of the United Kingdom (UK). The UK Government has responsibility for developing and implementing policy and for drafting laws. The UK consists of England, Scotland, Wales and Northern Ireland, with aspects of government devolved to the democratically accountable governments within each, namely the Scottish Government[1], the Welsh Government[2] and the Northern Ireland Executive[3].

The UK Government has overall responsibility for implementation and delivery of the UK's climate commitments under the UNFCCCC, the Kyoto Protocol, and the Paris Agreement, as well as our targets for net zero by 2050, our domestic carbon budgets, and our 2030 Nationally Determined Contribution. However, all the Devolved Administrations will play a part in this process. The approach taken by each administration will differ, drawing on the range of policies at their disposal. Ministers from all four nations meet bi-monthly at the Inter-Ministerial Group for Net Zero, Energy and Climate Change, to share updates on progress towards delivering climate objectives, and collaborate in areas of shared interest.

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[1] https://www.gov.scot

[2] https://gov.wales

[3] https://www.northernireland.gov.uk/

The UK Government is split into 23 ministerial departments and 20 non-ministerial departments. Each department focuses on a different aspect of government policy, including:

- The Department for Business, Energy and Industrial Strategy (BEIS) which works to make sure the UK has secure, clean, affordable energy supplies and promote international action to mitigate climate change.
- The Department for Environment, Food and Rural Affairs (Defra), which is the UK Government department responsible for policy and regulations on environmental, food and rural issues including domestic adaptation.
- Her Majesty's Treasury (HMT), which is the UK Government's economic and finance ministry, maintaining control over public spending, setting the direction of the UK's economic policy and working to achieve strong and sustainable economic growth.

The Prime Minister chairs the Climate Action Strategy Committee (CAS) which determines the UK's overarching climate strategy, both domestically and internationally. The Climate Action Implementation Committee (CAI) is chaired by the COP President and supports the CAS Committee to operationalise the Government's climate strategy. This includes delivery of the UK's COP Presidency, the Net Zero Strategy, and building the UK's resilience to climate impacts. The Government Priorities Delivery Committee (GPDC) is chaired by the Prime Minister and oversees the progress made on all of the Government's priorities, including net zero delivery.

These Cabinet Committees are supported by a senior official-level climate governance group. This group ensures a whole-of-government approach to climate policy. It brings together the full range of domestic and international policy areas that impact or are impacted by climate.

Further information about the UK Government can be found at: https://www.gov.uk.

1.3.1 Northern Ireland Executive

The Northern Ireland Executive's 'New Decade, New Approach' includes a commitment to tackle climate change head-on using a coordinated and strategic approach. The Department for Agriculture, Environment and Rural Affairs (DAERA) has been leading the development of the Green Growth Strategy, on behalf of the NI Executive, collaborating with other departments, local government and key stakeholders from across the business, voluntary and community sectors. The Green Growth Inter-Ministerial Group chaired by the Minister for Agriculture, Environment and Rural Affairs, oversees this work, thus helping to embed Green Growth within future Government policies.

The Green Growth Strategic Oversight Group, a group of senior officials from all nine Northern Ireland (NI) Government departments, provides overall strategic direction for the Executive's Green Growth initiative. The group resolves any concerns or ambiguity around Green Growth and its fit within the broader suite of Northern Ireland Civil Service policies and strategies ensuring Green Growth messages are clearly articulated and providing leadership for the dissemination of those messages across all NI Government Departments.

The Climate Change Act (Northern Ireland) 2022[4] received Royal Assent on 6 June 2022, committing the region to net-zero greenhouse gas emissions by 2050.

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[4] https://www.legislation.gov.uk/nia/2022/31/contents/enacted

While the Act includes an overall net-zero target for 2050, an amendment agreed by the Assembly at Further Consideration Stage means the level of methane emissions reductions required does not have to be more than 46% lower than the 1990 baseline by 2050.

The Act requires the establishment of an independent Northern Ireland Climate Commissioner, whose office will be responsible for oversight and reporting on the operations of the Act. The Act also mandates for the establishment of a Just Transition Commission with responsibility for oversight of the implementation of the "just transition" elements of the Act and provision of advice to Northern Ireland departments on how to ensure that proposals, policies, strategies and plans required under the Act comply with the just transition principle.

The Act sets a requirement on all Northern Ireland Executive departments to consider how policies and strategies can deliver towards the legislative targets set under the Act and to exercise their functions in a manner consistent with achieving those targets whilst taking account of social, economic and environmental considerations. This includes the risk of carbon leakage, when developing policies and proposals to be included in five yearly climate action plans. The climate action plans also have to include targets on soil quality and biodiversity as well as annual greenhouse gas and air quality targets.

Northern Ireland departments must also develop and publish sectoral plans setting out how the emissions reduction targets for 2030, 2040 and 2050 will be achieved by various sectors. These sectoral plans must include policies and proposals to ensure the emissions reductions targets are achieved, and in addition, the Act also sets specific 2030 targets for renewable electricity consumption and waste.

1.3.2 Scottish Government

The Scottish Government is the devolved government for Scotland and has a range of responsibilities, including climate change policy. The Scottish Parliament passes laws on devolved matters, which includes a statutory framework for Scotland's approach to tackling climate change.

Climate change is embedded across the Scottish Government through a robust ministerial and corporate governance framework. Accountability for climate action is held primarily at Cabinet, led by the Cabinet Secretary for Net Zero, Energy and Transport and supported by the Cabinet Sub-Committee for the Climate Emergency which provides cross-Government leadership, assurance and coordination of efforts.[5]

At a corporate level, oversight and assurance of climate policy delivery is provided by the Global Climate Emergency (GCE) Board of senior officials, with responsibility to ensure a whole-systems approach to delivering a just transition to statutory emissions reduction targets and strengthening climate adaptation. The GCE Board is overseen by the Scottish Government's Executive Team and Corporate Board[6]. Both the GCE Board and Corporate Board include non-executive directors as members.

The Scottish Government's domestic and international response to the climate emergency is coordinated within the Energy and Climate Change Directorate (DECC). DECC, in conjunction with other policy areas such as transport or housing, works to deliver a low carbon society, with sustainable economic growth and reduced greenhouse gas emissions.

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[5] https://www.gov.scot/about/who-runs-government/cabinet-and-ministers/

[6] https://www.gov.scot/collections/corporate-board-minutes/

Independent advice on climate change policy in Scotland is also provided through key external bodies, including the UK Climate Change Committee[7], the Just Transition Commission[8], and Scotland's Climate Assembly[9].

1.3.3 Welsh Government

The Welsh Government is split into 7 ministerial portfolios, each focusing on a different aspect of government policy, including the Minister for Climate Change

Overseeing all policy and delivery related to the climate change agenda is Cabinet, where throughout the year they meet to focus on climate change, supported by the senior-official level cross-government Climate Change Portfolio Board. The Portfolio Board has overseen the development and production of the Net Zero Wales plan, published in October 2021 for the Welsh Carbon Budget 2.[10] It is beginning to consider the development of the third Welsh decarbonisation plan (for Carbon Budget 3, 2026-2030) whilst working on delivering Net Zero Wales. Sectors will continue to work collaboratively to develop policies and proposals for emissions reductions that tackle existing inequalities, maximise benefits and minimise costs.

The Welsh Government has laid the legislative foundations for a cleaner, fairer, stronger Wales, including through the Well-being of Future Generations (Wales) Act 2015 (WFG Act) and the Environment (Wales) Act 2016. Wales has consistently followed the science, starting in 2016 with a target for an 80% reduction in our emissions by 2050. The Senedd became the first Parliament in the world to declare a climate emergency in 2019. In March 2021, the Senedd agreed to set a legally binding net zero target. Choosing to base its ambition on the evidence as Wales tackles the climate emergency, making Wales' fair contribution to the UK's obligations under the Paris Agreement.

Climate change is at the heart of the Programme for Government[11], which sets out the ambitious and radical commitments the Welsh Government will deliver over this Senedd term in order to tackle the challenges faced, set the foundations for future decarbonisation and improve the lives of people across Wales.

The Welsh Government will deliver a joined-up system and integrate work, continuing to seek multiple benefits from every action, embedding its response to the climate and nature emergency in everything it does. The Sustainable Development principle in the WFG Act will continue to steer policy responses, looking to the long term; involving people in the decisions that affect them; collaborating with partners to deliver; integrating thinking to drive multiple benefits; and seeking out opportunities to address the underlying causes of change.

1.4 Population profile

This section discusses demographic characteristics of the UK, to provide context on the population-related drivers that affect the UK's GHG emissions. Unless stated otherwise, the following statistics have been produced from data collected by the Office for National Statistics, who produce the official population estimates for the UK and its constituent countries.

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7 https://www.theccc.org.uk/

8 https://www.gov.scot/groups/just-transition-commission/

9 https://www.climateassembly.scot/

10 https://gov.wales/net-zero-wales

11 https://gov.wales/sites/default/files/publications/2022-01/programme-for-government-update-december-2021.pdf

The total population of the UK was estimated to be 67.1 million in mid-2020, which was 9.8 million more (17% more) than in mid-1990. Table 1.1 shows that the population of the UK is increasing and ageing with the median age in the UK increasing from 35.8 in 1990 to 40.4 in 2020. The population aged greater than 64 years increased from 15.7% in 1990 to 18.6% in 2020. The male to female ratio of the UK population has remained broadly steady between 1990 and 2020 at approximately 49% to 51%, though within these broad percentages the gap is narrowing.

Table 1.1: Mid-year population estimated, UK 1990-2020

	Total population (thousands)	Male population (thousands)	Female population (thousands)	Median age (years)	Percentage of population aged under 16	Percentage of population aged 16 to 64 years	Percentage of population aged 65 or over
1990	57,237	27,819	29,419	35.8	20.2	64.0	15.7
2000	58,886	28,690	30,196	37.6	20.3	63.9	15.8
2010	62,759	30,805	31,954	39.5	18.8	64.8	16.4
2015	65,110	32,074	33,036	40.0	18.8	63.3	17.8
2019	66,797	32,978	33,819	40.3	19.0	62.5	18.5
2020	67,081	33,146	33,936	40.4	19.0	62.4	18.6

Source: Office for National Statistics, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2020

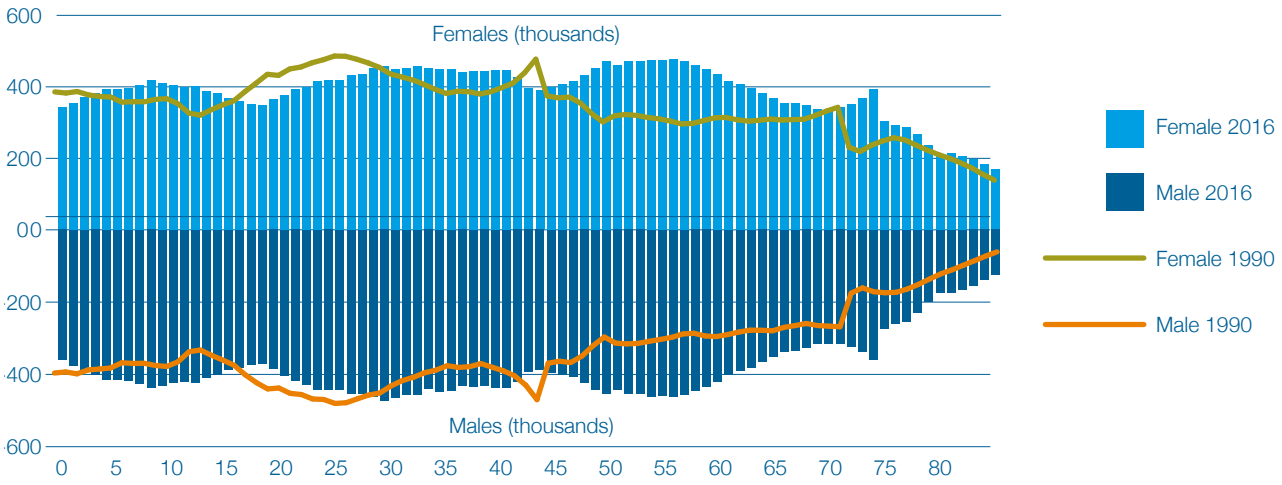
According to ONS projections, the UK is expected to see a continued growth in population, as shown in Table 1.2. The population is projected to increase to 71.0 million by 2045-46, an increase equivalent to an average annual rate of growth of slightly over 0.2% between 2020-21 and 2045-46. Assumed net migration accounts for the projected increase over the next 25 years, with projected annual deaths higher than births for most of this period. ONS note that the projections do not attempt to predict the impacts of the UK leaving the EU or the lasting effects of the coronavirus pandemic.

Table 1.2: Population projections in the UK by country, 2020-2046 (in millions)

	2020-21	2025-26	2030-31	2035-36	2040-41	2045-46
United Kingdom	67.1	68.3	69.2	69.9	70.4	71
England	56.6	57.7	58.5	59.2	59.8	60.3
Wales	3.2	3.2	3.3	3.3	3.3	3.3
Scotland	5.5	5.5	5.5	5.5	5.4	5.4
Northern Ireland	1.9	1.9	1.9	1.9	1.9	1.9

Source: Office for National Statistics, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2020basedinterim

Figure 1.1: Population pyramid for the UK, mid-2020 (blue bars) compared with mid-1990 (green and orange lines)



Source: Office for National Statistics

Each line in Figure 1.1 represents a single year of age. The length of the line relates to the number of people of that age in the population. The size and composition of the population is determined by the pattern of births, deaths and migration which have taken place in previous years. The main details illustrated by the pyramid for mid-2020 include the following:

- The peaks and wide areas of the pyramid reflect the high numbers of births in the years after the Second World War (around age 70 to 73) and during the baby boom of the 1960s.
- The sharp narrowing of the pyramid for people aged between 15 and 20 years is a consequence of low numbers of births just after the turn of the century. There followed an increase in birth rates peaking around 2008 to 2012. Since 2016, birth rates have fallen more rapidly.
- Females outnumber males at older ages, reflecting the higher life expectancy of females, though the gap has narrowed since 1990.

1.5 Geographic profile

The UK lies between latitude 49ºN and 61ºN and longitude 8ºE and 2ºW, positioned in north-western Europe. The United Kingdom, Crown Dependencies and Overseas Territories together form one undivided realm. The three Crown Dependences (Jersey, Guernsey and the Isle of Man) and the fourteen Overseas Territories (listed below) are not part of the UK and are all self-governing.

- Anguilla
- Bermuda
- British Antarctic Territory
- British Indian Ocean Territory
- Virgin Islands (commonly known as the British Virgin Islands)
- Cayman Islands
- Falkland Islands
- Gibraltar

- Montserrat
- Pitcairn Islands
- Saint Helena, Ascension and Tristan da Cunha
- South Georgia and the South Sandwich Islands
- Sovereign base areas of Akrotiri and Dhekelia
- Turks and Caicos Islands.

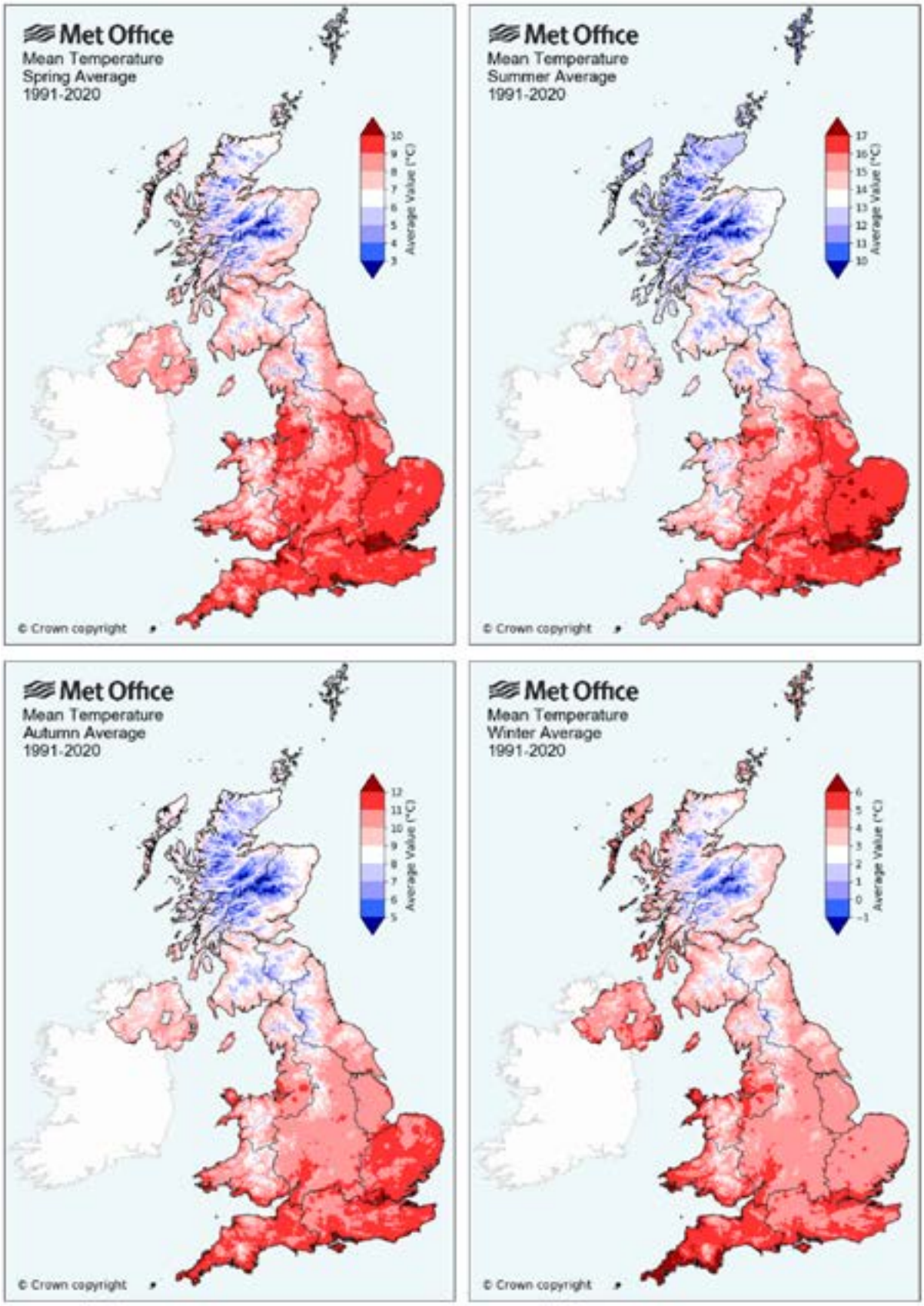
1.6 Climate profile

The UK's climate is maritime, moist and temperate, with a winter mean temperature of 4.1 °C and summer mean temperature of 14.6 °C. The influence of the Atlantic Ocean means that the UK's annual temperature range is smaller than for more continental countries at the same latitude. Average annual precipitation in the UK typically ranges from approximately 800 mm to 1400 mm, but with significant regional variations with western upland regions experiencing in excess of 2000mm and parts of low-lying south-east England less than 600mm. The UK climate is heavily influenced by its proximity to the Atlantic Ocean and the Gulf Stream/ North Atlantic Drift which brings warm water into high northern latitudes. Prevailing winds are westerly, and UK regional climates vary with distance from the Atlantic as well as with local topography. Continental influences are most strongly seen in the southeast of the country.

Variations in the strength and position of the jet stream strongly influence UK weather. Sometimes the jet stream is directed close to or over the country, bringing extended periods of stormy, wet weather. At other times, a blocked pattern steers the jet stream away to the north or to the south, bringing generally settled, dry conditions, either warmer or colder than average. Space heating is required in most buildings throughout the winter months and the use of air conditioning in the summer months is increasing. In the UK, GHG emissions are strongly influenced by weather conditions. In winter, cooler-than-average temperatures increase demand for space heating; and in summer, warmer-than-average temperatures increase demand for space cooling. Figure 1.2 shows the average daily mean temperature for the UK by season[12].

[12] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averagest Office

Figure 1.2: Average (1991-2020) daily temperature (°C) by season, UK



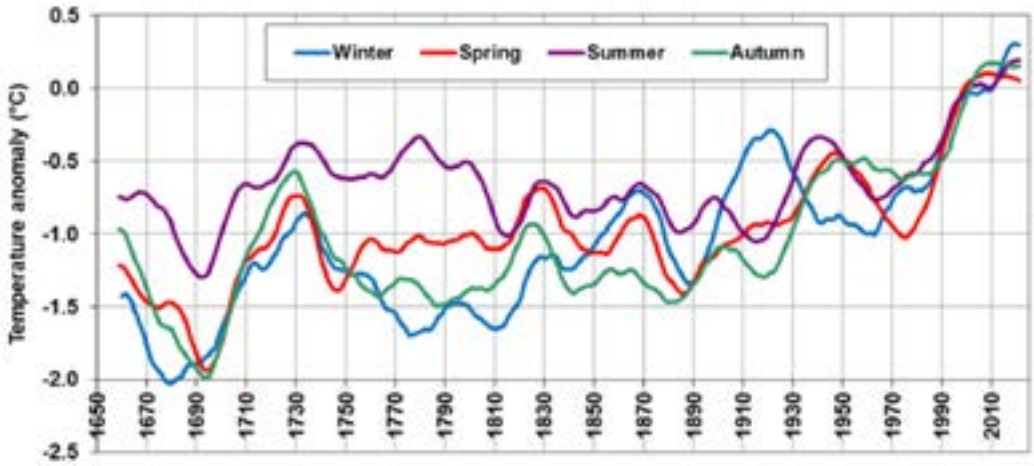
Source: Met Office

1.6.1 UK climate trends[13]

1.6.1.1 Temperature

The Central England Temperature (CET) series is the longest-compiled instrumental temperature record in the world, beginning in 1659. Figure 1.3 shows that the CET for the early 21st century has been warmer than the previous three centuries for all seasons of the year.

Figure 1.3: Seasonal Central England Temperature Anomaly series, 1650 to 2021, relative to 1991-2020 average



Source: Met Office: State of the UK Climate 2021

The UK-wide national temperature series begins in 1884, showing an increase in temperature from the 1970s to the 2000s with the most recent decade (2012-2021) on average 0.2 °C warmer than the 1991-2020 average and 1.0 °C warmer than 1961-1990. All of the ten warmest years recorded for the UK have been since 2002. Evidence from attribution science shows that the increasing trend in temperatures is overwhelmingly a result of human activities, in particular emissions of greenhouse gases.

Cold years are still observed despite the warming trend, but they are less frequent and less severe than in the historical record: 2010 was the coldest year recorded since 1986 and the 22nd coldest in the UK series since 1884.

1.6.1.2 Precipitation

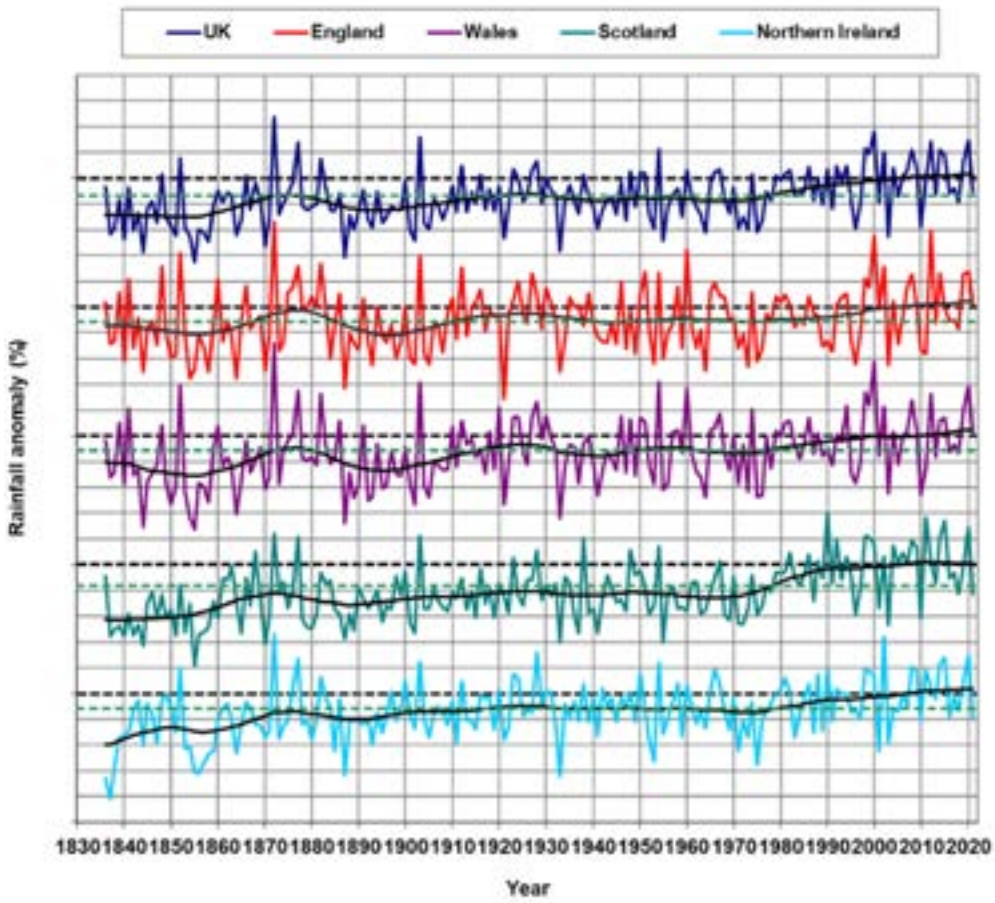
Precipitation data for the UK show a slight increase from the 1970s onwards (Figure 1.4) that is most pronounced for Scotland. The most recent decade (2012–2021) has been on average 10% wetter than 1961–1990 and 2% wetter than 1991-2020. Five of the ten wettest years for the UK have occurred since 2000, in a series beginning in 1836.

The largest increases in rainfall have been during the winter season, with the most recent decade (2012-2021) having winters 26% wetter than 1961-1990. This period includes the two wettest winters on record in 2013-2014 and 2015-2016, with winter 2019-2020 as the fifth wettest in a series from 1836. Summers of the most recent decade (2012-2021) have also been 15% wetter than 1961-1990 including the third wettest summer on record in 2012.

[13] https://www.metoffice.gov.uk/research/climate/maps-and-data/about/state-of-climate

This changing trend in rainfall in the UK is a result of both human influence and large-scale natural variability in the climate system, which can occur over time periods of decades.

Figure 1.4: Annual precipitation, UK, 1836–2021, as a percentage of 1991-2020 averages



Source: Met Office: State of the UK Climate 2021

1.6.1.3 Sea level

Since 1900 sea level around the UK has risen by about 16.5 cm when corrected for vertical land movement, which is comparable to global sea level rise estimate of 20 cm. There is evidence from the observational records that the rate of sea level rise is increasing from a long-term estimate of 1.5 mm/yr, with the period 1993-2019 increasing by closer to 3.6 mm/year.

Sea surface temperatures around the UK for the most recent decade (2012-2021) have been on average 0.1 °C warmer than the 1991-2020 average and 0.7 °C warmer than 1961-1990.

1.6.2 climate projections

The 2018 UK Climate Projections (UKCP18) provide the most up-to-date assessment of how the UK climate is projected to change in the future. The climate information provided summarises key results, reports on the latest science reports and gives users advice and guidance, all underpinned by a suite of climate data products:

- Probabilistic projections including extremes
- Modelling projections for three spatial resolutions (60 km, 12 km and 2.2 km)
- Projections of sea level rise, storm surge and waves.

One strand of the modelling projections is UKCP Local; the first time a climate model with a resolution similar to weather forecasting models has been used to explore national climate scenarios. This is a step forward in the ability of the climate model to simulate small-scale behaviour seen in the real atmosphere, particularly for the representation of the heavy rainfall associated with showers that affect flooding in summer. Continuing research and development of UKCP products includes provision of derived projections based on global warming levels, additional variable analysis (such as soil moisture) and climate indices (such as static weather patterns). In this section, UKCP information is used to summarise the projected effects on UK climate, both in terms of averages and extremes, and then goes on to be used in impact metrics. UKCP were used in the most recent UK Climate Change Risk Assessment and are being applied by the more than seven thousand registered users to quantify and manage physical climate risks.

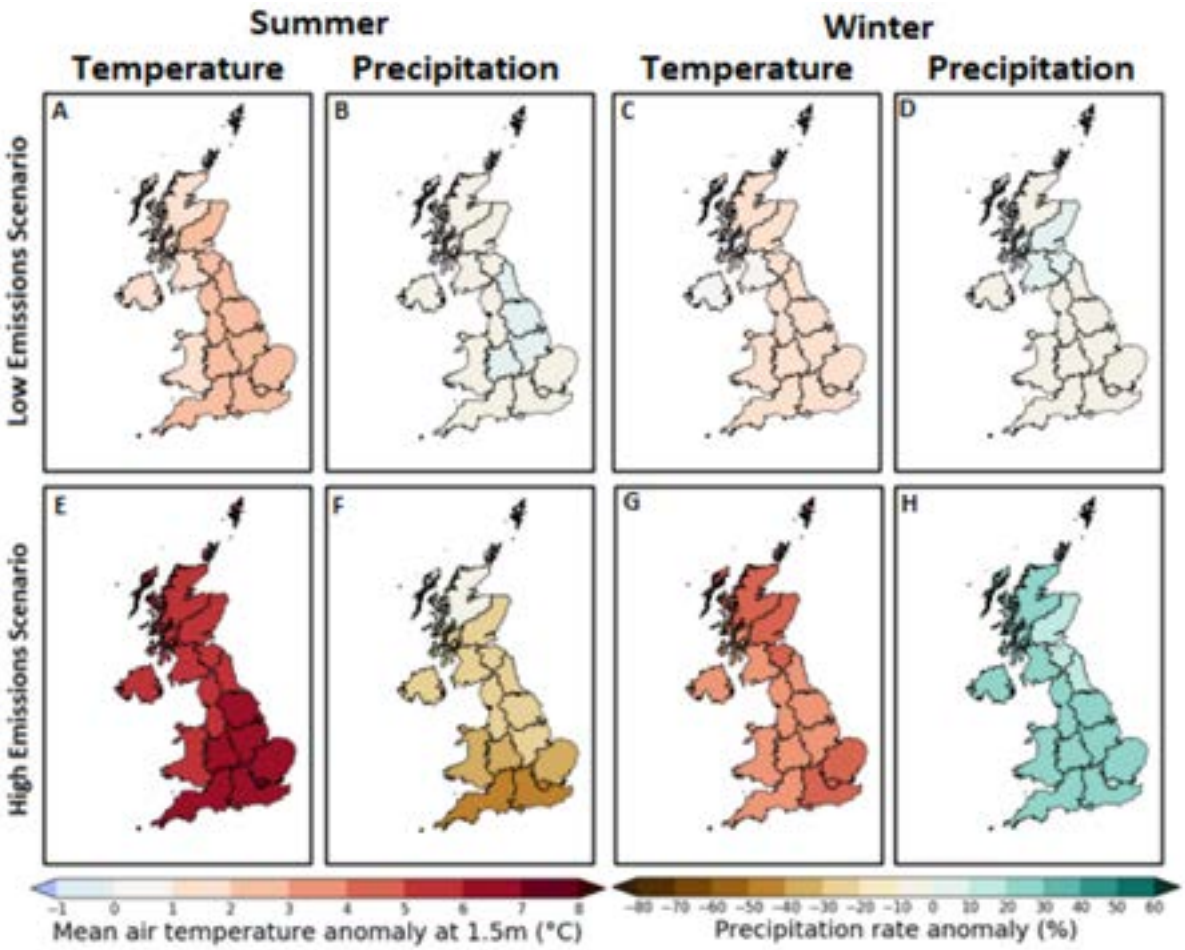
1.6.2.1 UK future climate overview

The headline findings of UKCP18 state that future UK climate change will result in warmer, wetter winters and hotter, drier summers. Annual temperatures for the UK using the 50th percentile (10th and 90th ranges) for a medium emissions scenario (RCP 4.5) from the UKCP Probabilistic Projections suggest warming of 2.3°C (1.1°C to 3.6°C) by the 2090s (2080-2100) compared to the 1981-2000 baseline period. Warming is projected to be greater in summer (3°C; 1.3°C to 4.8°C) than in winter (2°C; 0.6°C to 3.5°C). UK-wide, summer precipitation decreases are expected to be -19% (-36% to -2%) while winter precipitation is projected to increase 10% (-2% to 25%) by the 2090s.

The probabilistic projections provide a broad picture on uncertainties in future UK changes. However, many user applications are conducted using the ensembles of global (60km), regional (12km) and local (2.2km) climate model projections, provided to support detailed impacts studies. The global projections show similar ranges of change to the probabilistic projections and are available for the RCP2.6 and RCP8.5 scenarios. Results are provided below as anomalies to the 1981-2000 baseline period for the median ensemble member, with the spread of outcomes shown (in brackets) using the second lowest and second highest ensemble members. For the low emissions scenario, the median UK annual temperature increase by the 2090s is 1.7°C (0.6°C to 2.4°C) while for the high emissions scenario it is 4.2°C (2.4°C to 5.3°C). Summer warming is also greater than winter warming for both emissions scenarios in the UKCP global ensemble. In the low emissions scenario, summer temperatures increase by 2.2°C (0.5°C to 3.0°C) compared to 1.2°C (0.0°C to 2.0°C) in the winter. Stronger trends occur in the high emissions scenario with summer temperatures (5.5°C; 2.4°C to 6.6°C) increasing more than winter temperatures (3.4°C; 2.1°C to 4.4°C). Consistent with the UK overview, average summer precipitation decreases in summer and increases in winter in both scenarios. Under the high emissions scenario for the 2090s, summer decreases are projected to be -27% (-49% to -2%) and winter increases projected as 19% (7% to 31%). For the low emissions scenario these changes are for summer -5% (-13% to 8%), and for winter 4% (-5% to 12%).

The regional variation in these changes in shown in Figure 1.5. Notable UK-wide features, such as warming being greater in the summer compared to the winter are projected to occur across all regions of the UK for both emissions scenarios. Similarly, the majority of UK regions are projected to experience a decrease in summer precipitation and an increase in winter precipitation; however, this signal is stronger in the high emissions scenario. Across both seasons and emissions scenarios, regional variations are generally modest within each metric, with differences usually within 1°C or 10%, the high emissions scenario winter precipitation showing the greatest spread between regions.

Figure 1.5: Change in summer and winter temperature (°C) and precipitation (%) for the 2090s compared to the 1990s for the low emissions scenario RCP 2.6 (a-d) and the high emissions scenario RCP 8.5 (e-h) using the median ensemble member from UKCP Global.



Source: Met Office.

Sea level is projected to rise around the UK compared to a 1981-2000 baseline period although the amount of sea level rise is higher in the south and increases with higher emissions scenarios. For the medium emissions scenario (RCP4.5), the UKCP Marine Projections give 50th percentile (10th and 90th ranges) rises of 0.55 m (0.40 m to 0.75 m) in London compared to lower values of 0.33 m (0.18 m to 0.53 m) in Edinburgh in 2100. Based on exploratory results to 2300, sea levels continue to increase beyond 2100 even with large reductions in greenhouse gas emissions. For the same medium emissions scenario sea level is projected to rise for London by 1.42 m (0.93m to 2.23 m) and 0.77 m (0.28 m to 1.6 m) for Edinburgh by 2300. However, the uncertainty around post-2100 simulations remain large due to gaps in understanding related to the role of the large ice-sheets.

1.6.2.2 UK future climate extremes

For day-to-day extremes, UKCP18 extends the Probabilistic Projections to include extremes in terms of return periods (the average time between events) for maximum temperatures and heavy rainfall. These results project increases in both the values and spread over the course of the 21st century.

The 50th percentile values of high temperature and heavy rainfall expected to occur once every 50 years are projected to increase in all seasons under an illustrative high emissions scenario (RCP8.5). For example, by 2070 with a high emissions scenario, the daily maximum temperature of a 1-in-50-year event is projected to be 2.5°C (winter) to 3.7°C to 4.3°C

(spring, summer, autumn) warmer than in 1990. For rainfall, the 50th percentile for a 1-in-50-year event is expected to have 5mm to 10mm (daily rainfall) or 9mm to 13mm (5-day accumulated rainfall) more rainfall in 2070 than in 1990 in autumn, winter or spring, with smaller increases expected in summer.

The spread of values also increases; for example, UK averages of the 10th and 90th percentiles for 1-in-50-year events by 2070 under RCP8.5 are: 32.0°C and 39.9°C for maximum daily temperature in summer; 40mm and 58mm for daily rainfall in winter; and 102mm and 142 mm for 5-day accumulated rainfall in autumn.

UKCP Local models have better representation of how rainfall varies day-to-day and hour-to-hour. For hourly rainfall that is expected to occur once every two years, UKCP Local projects that this will be 29% heavier in the summer under a future climate with a high emissions scenario (2060-2080, RCP8.5). Similar increases are projected for rarer events and in the autumn, with smaller increases projected in spring and winter.

1.6.2.3 UK climate impact metrics

UK Climate Projections data has also been translated into metrics that quantify the expected future impacts of weather on society. Projections show increases for temperature metrics related to hot events, accompanied by reductions in metrics related to cold events. These are quantified as the projections for the UK, with the range illustrating the effect of selected global average temperature increases above the pre-industrial level, known as the Global Warming Levels (GWLs).

The numbers quoted show the effect of GWLs from 1.5°C (consistent with a low emissions scenario by 2100) to 4°C (consistent with a high emissions scenario by 2100). For example, the number of hot days (over 25°C) in the UK is projected to increase by between 5 days to 39 days per year. This could mean increased hospital admissions for those vulnerable to heat and increased transport disruption, for example from railway track buckling.

The projections show an increase in an indicator of the energy demand for cooling (known as cooling degree days) of 134% to 627%. Increases are also projected in an indicator of the energy available for plant growth over a year (growing degree days) of 19% to 60%. Occurrences of tropical nights, when the temperature falls no lower than 20°C, are rare in the current climate but become more frequent in a warmer climate, particularly in southeast England and in urban areas.

Conversely, the projections show a reduction of the number of frost days (below 0°C) of between 10 days to 49 days per year. Decreases are also found in an indicator of energy demand for heating (known as heating degree days) of 11% to 32%, implying a decrease in the adverse effects of cold weather.

Impacts related to rainfall include projected increases in heavy events that could cause flooding and increases in average drought severity. The projections show an increase in occurrence of high-impact levels of daily rainfall from 1 day to 8 days per year. Average drought severity is projected to increase at most GWLs but with a small decrease possible with a low 1.5°C GWL, with changes of between -3% to 19% for 12-month drought duration, and for 36-month drought between -2% to 54%.

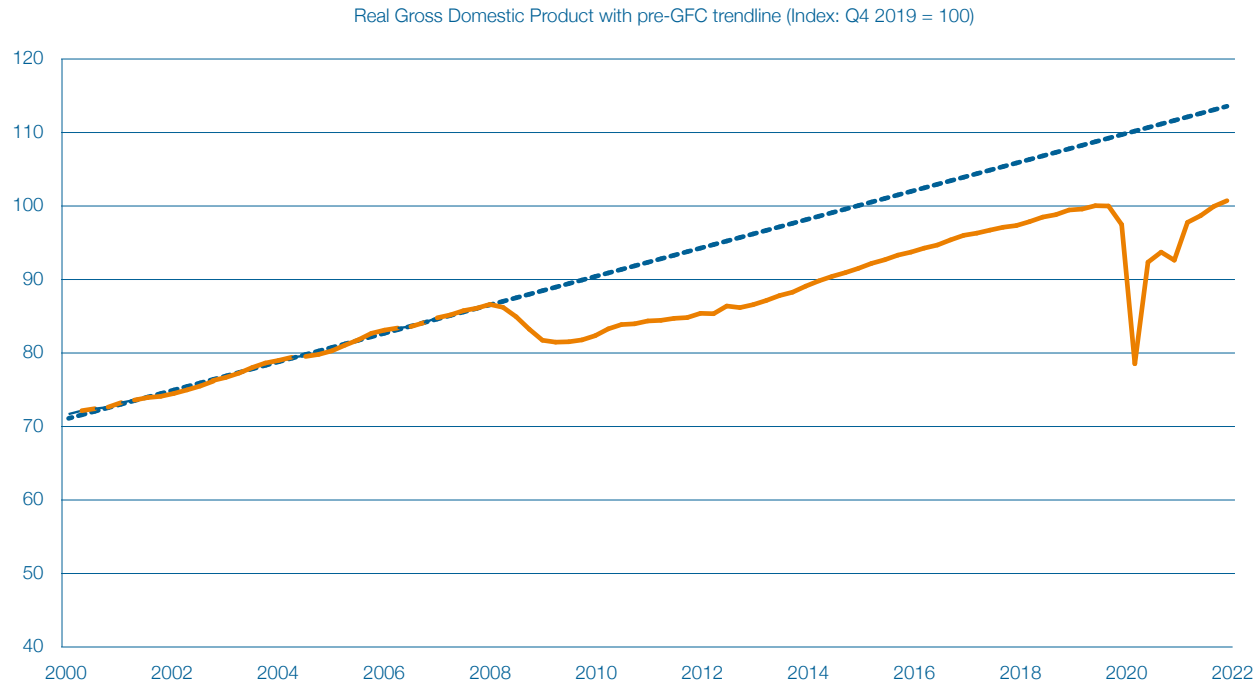
1.7 Economy and industry profile

In 2021, the UK had a Gross Domestic Product (GDP) of $3.2 trillion, making it the world's 5th largest economy.[14] It is the 14th largest exporter of goods ($468 billion in 2021) and second largest exporter of services ($342 billion in 2020).[15] The growth rate of real GDP has fallen since the Global Financial Crisis (GFC) as shown in Figure 1.6.[16] Real GDP fell by 4.2% in 2009, in line with the average for European Union countries. Economic growth resumed towards the end of 2009 but at a slower rate than the period prior to 2008.

In 2020, the policies put in place during the coronavirus (Covid-19) pandemic, such as lockdowns, resulted in a 9.3% fall in GDP. This was followed by a 7.4% increase in GDP in 2021. This increase was due to a stronger and faster than expected recovery from the pandemic (both in the UK and elsewhere) thanks to rapid deployment of vaccines and reopening of economies from lockdowns. The level of real GDP in Q1 of 2022 was 0.7% higher than in Q4 of 2019,[17] broadly in line with other G7 countries. Up until the GFC, the rate of growth in UK real GDP had exceeded the rate of population growth – leading to rising GDP per capita. However, since then the rate of increase of GDP per capita has slowed, and fell as a result of Covid-19, mirroring the fall in GDP. As of 2021, GDP per capita remained 3.6% below 2019 (pre-Covid) levels.

As of April 2022, the IMF[18] forecast growth in the UK to be 3.7% in 2022. Growth forecasts for other developed nations are 3.7% for the USA, 2.1% for Germany, 2.9% for France, 2.3% for Italy, and 2.4% for Japan.

Figure 1.6: UK GDP Growth



Source: Office for National Statistics

[14] https://www.imf.org/en/Publications/WEO/weo-database/2022/April

[15] https://unctad.org/statistics

[16] https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/ihyp/pn2

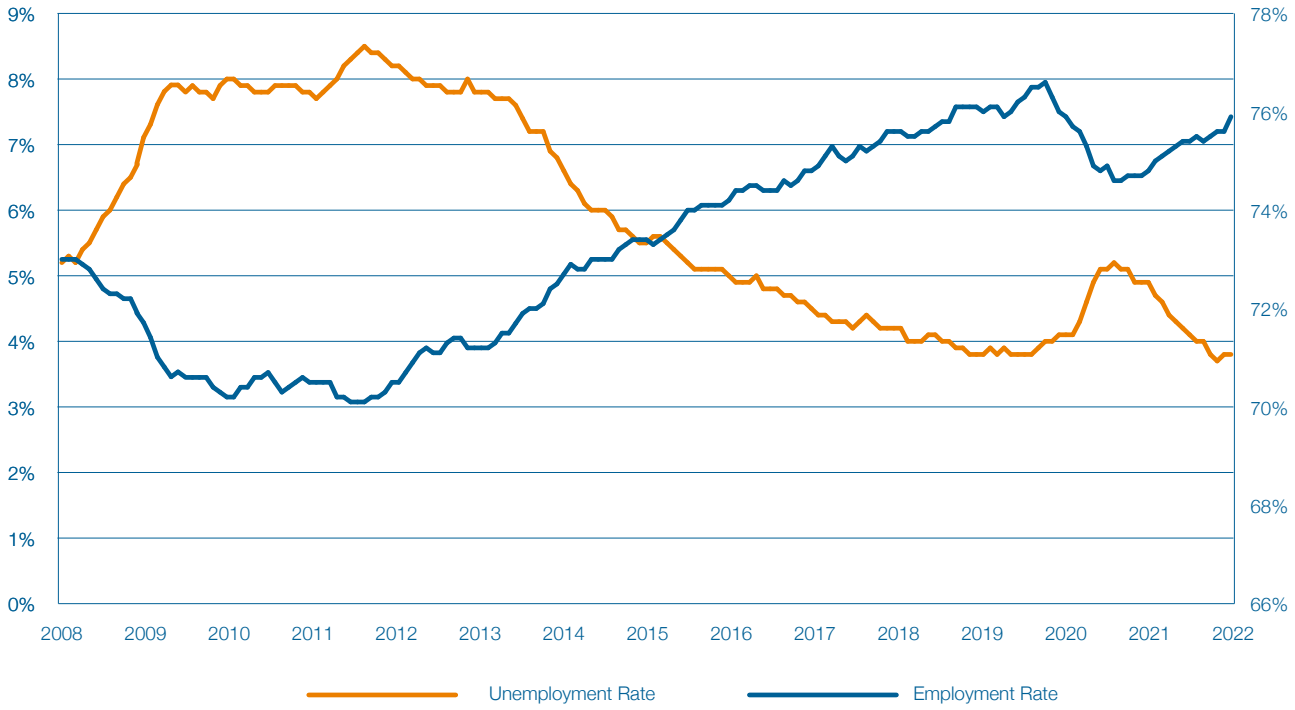
[17] https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/quarterlynationalaccounts/januarytomarch2022

[18] https://www.imf.org/en/Publications/WEO

The last decade has been characterised by high employment and low unemployment, and stagnant wage growth. The employment rate peaked at 76.6% in the three months to February 2020 which was the highest rate since comparable records began in 1971.[19] Similarly, the unemployment rate dropped to 3.8% in autumn 2019, the lowest since 1974.[20] Due to the furlough scheme and other interventions the impact of the Covid-19 pandemic on employment and unemployment was relatively limited. Since the start of 2010, annual real regular pay growth has averaged just 0.3%[21] and UK wage growth since the financial crisis has been the slowest of the G7 nations.

As shown in Figure 1.7, the (relatively small) rise in unemployment as a result of the Covid-19 pandemic has largely unwound. However, employment remains over 200,000 workers lower than its pre-Covid peak – this is in part due to inactivity, which has increased since the start of the pandemic. There is also a degree of tightness in the labour market, due to record high vacancies– job vacancies reached 1,294,000 in April to June 2022 - a near record.[22]

Figure 1.7: Unemployment rate (left hand axis) and employment rate (right hand axis)



Source: Office for National Statistics

Productivity declined sharply in 2009 during the economic downturn and has not recovered its pre-crisis trend rate of growth. In the decade to 2019Q4 output per hour worked grew by just 7.2% compared to 19.5% in the decade to 2008Q1.[23] Output per hour fluctuated during the pandemic and was elevated from Q3 2020 onwards, but this was mainly due to

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19 https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/timeseries/lf24/lms

20 https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment/timeseries/mgsx/lms

21 https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/averageweeklyearningsingreatbritain/july2022

22 https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/jobsandvacanciesintheuk/march2022

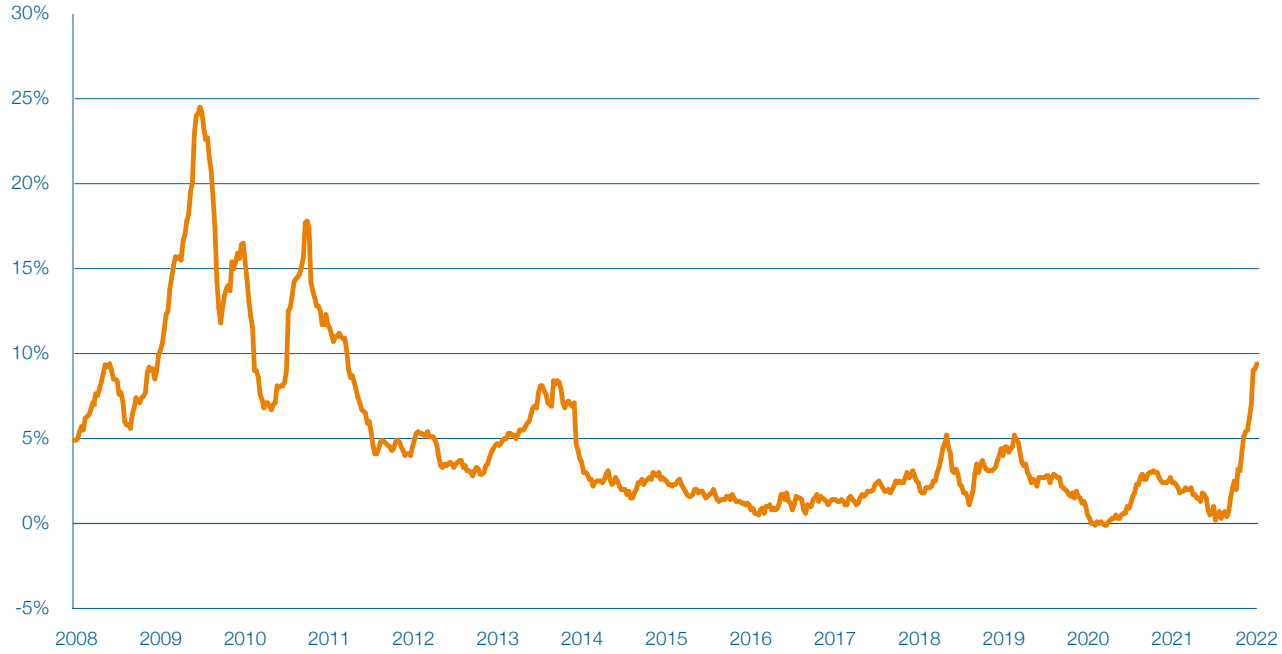
23 https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/timeseries/lzvb/prdy

compositional effects as close-contact businesses and sectors closed (such as retail and hospitality), meaning that lower productivity workers were often the first to be furloughed.

Prior to the Covid-19 pandemic, the UK had generally enjoyed low and stable inflation, broadly in line with the Bank of England's 2% target. Since summer 2021 however, the UK like other developed nations, has experienced a rapid rise in inflation driven by a number of mostly external factors. These include high prices for energy and other commodities, exacerbated recently due to the war in Ukraine, a mismatch of global supply and demand, as well as base effects – abnormally low inflation in 2020 due to the pandemic.

Consumer Price Index (CPI) inflation reached 9.4% in June 2022. This is the highest level of price inflation in the UK fo`r more than 40 years. As a result, real pay growth has recently returned to being negative for the first time since 2017.

Figure 1.8: CPI Annual Inflation (%)[24]



The UK economy is dominated by the service sector (80% of GVA and 82% of employment).[25] Prior to the Covid-19 pandemic, the fastest growing sector in the economy since the global financial crisis was the information and communication sector, which grew by around 130% between Q3 2009 and Q4 2019, largely as a result of technological progress within the sector.

Since the onset of the pandemic, the human health and social work sector has been growing fastest, with output in the sector in Q1 2022 being 14.5% larger than in Q4 2019.[26] Human health and social work activities sectors have overtaken financial and insurance activities sectors in importance to the UK's GDP since 2016. In 2021, human health and social work activities sectors contributed £189 billion in gross value added (GVA) to the UK economy,

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[24] https://www.ons.gov.uk/economy/inflationandpriceindices/datasets/consumerpriceinflation

[25] https://commonslibrary.parliament.uk/research-briefings/sn02786/#:~:text=The%20service%20industries%20accounted%20for,employment%20in%20April%2DJune%202021.

[26] https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/quarterlynationalaccounts/octobertodecember2021

around 9% of the UK's total GVA.[27] However, much of the growth in the sector since the start of the pandemic has been driven by the UK Government's Test & Trace and Vaccine programmes, and it is likely that this temporary boost to the sector will unwind as these programmes are stepped down.

Looking at the most recent data, GDP grew by 0.8% in Q1 2022, with growth across all main output sectors. Services grew by 0.6% on the quarter, and is now 1.5% above pre-pandemic (Q4 2019) levels. Construction grew by 0.8%, and is 0.3% above pre-pandemic levels, while production grew by 1.3%, but remains 1.7% below pre-pandemic levels.

UK Government consumption after consumption add: and investment are the only expenditure component of GVA (the others being household consumption, business investment and net exports) that has risen since the start of the coronavirus pandemic, largely driven by health spending, and mirroring the growth seen in the health sector on the output measure. UK Government consumption has grown by 7.1% since the start of the coronavirus pandemic. Conversely, private consumption (-0.6%), business investment (9.2%) and net trade have all detracted from GDP growth since Q4 2019.

Table 1.3 gives a broad overview of the number and type of industrial enterprises in the UK for 2019, 2020 and 2021.[28] In all three years, the professional, scientific and technical sector accounted for the largest number of businesses, although this has fallen by 4% between 2019 and 2021. The largest growth in number of businesses came from a 4.7% growth in the Construction sector.

Table 1.3: Number of VAT and/or PAYE enterprise by broad industrial grouping, UK, 2019-2021

Nearest Thousand

	2019	%	2020	%	2021	%
Agriculture, forestry and fishing	150	5.5	149	5.4	141	5.1
Production	152	5.6	153	5.6	155	5.6
Construction	344	12.6	351	12.8	360	13
Motor trades	77	2.8	77	2.8	79	2.9
Wholesale	103	3.8	101	3.7	107	3.9
Retail	209	7.7	209	7.6	221	8.0
Transport and storage (inc. postal)	111	4.1	123	4.5	138	5.0
Accommodation and food services	157	5.8	162	5.9	167	6.0
Information and communication	226	8.3	226	8.2	213	7.7
Finance and insurance	60	2.2	62	2.3	61	2.2
Property	100	3.7	102	3.7	105	3.8
Professional, scientific and technical	472	17.4	468	17.0	453	16.4
Business administration and support services	229	8.4	236	8.6	230	8.3
Public administration and defence	8	0.3	8	0.3	8	0.3
Education	44	1.6	45	1.6	45	1.6
Health	102	3.8	103	3.8	105	3.8

[27] https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation

[28] https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation

Arts, entertainment, recreation and other services	174	6.4	176	6.4	177	6.4
TOTAL	2,718	100	2,750	100	2,765	100

Source: Office for National Statistics

1.8 Energy Profile

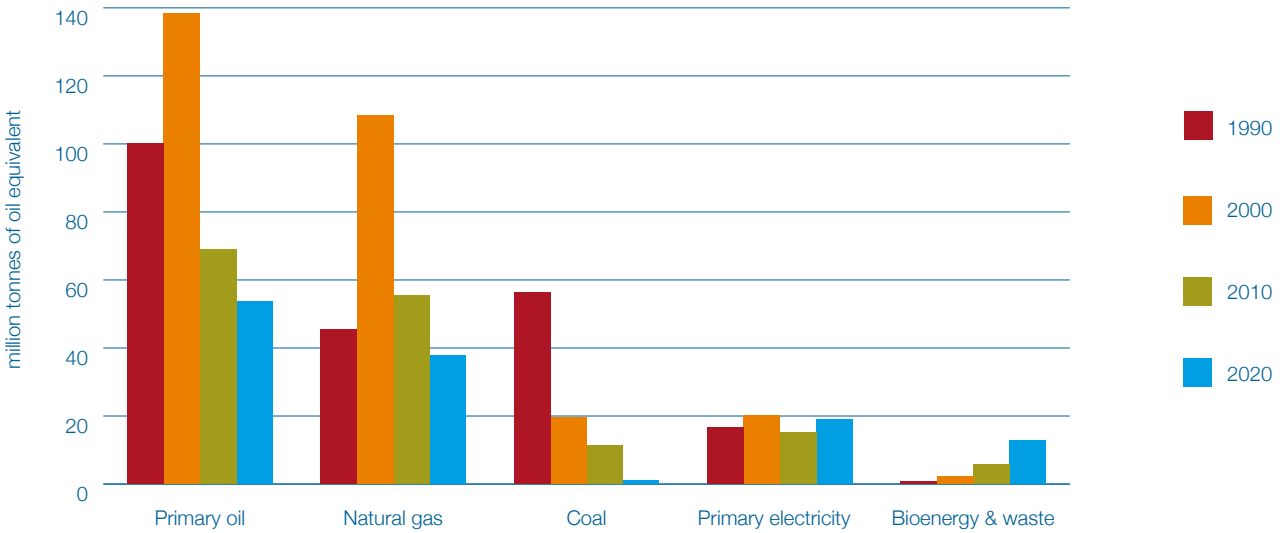
1.8.1 Energy production

This section provides a summary of the UK energy system looking at trends in production, consumption, imports and exports, and the price of energy. Energy supply accounted for around 21% of the UK's GHG emissions in 2019 which fell 44% between 1990 and 2019.[29]

Total UK energy production increased rapidly between 1990 and 2000, mainly due to the growth of oil and gas. Production in 2000 was at record levels for natural gas, whilst in 1999 it was at record levels for overall energy and petroleum. Production has since been on a general decline, however production levels have increased since 2014 until the fall in 2019, as new oil fields have opened, combined with the growth in output from bioenergy and waste and the increased capacity of wind and solar technologies. Production in 2020 was 58% lower than its peak in 1999. Since 2000, oil and gas production together have fallen by an average of 5.1% per year[30]. In 2020 UK coal production fell to an all-time low of 1.7 million tonnes, 35% lower than in 2019. In 2020 surface mine production fell by 37% to a new record low of 1.6 million tonnes. This was a result of mine closures and falling demand for coal for electricity generation.

In 1990, primary oil (crude oil and natural gas liquids) accounted for 46% of total production, natural gas 21%, coal 26%, with primary electricity (consisting of nuclear, wind, natural flow hydro and imports) a further 8%. In 2020 43% of total production came from primary oil, 30% from natural gas, 1% from coal, 10% from other renewables (bioenergy and waste) and 15% from primary electricity.

Figure 1.9: Production of primary fuels, UK, 1990-2020



Source: UK Energy in Brief, BEIS (adapted)

[29] UK Greenhouse Gas Inventory – Latest year for which data is available at the time of writing is 2019

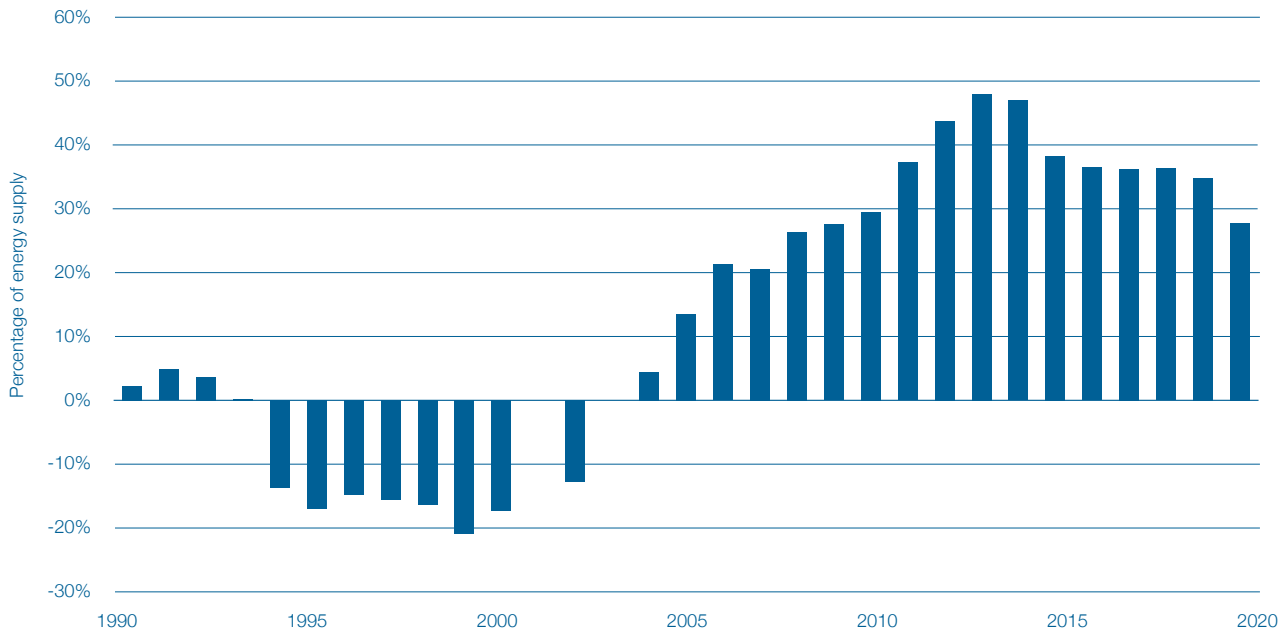
[30] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1032260/UK_Energy_in_Brief_2021.pdf

1.8.2 Import dependency

Import dependency is calculated by dividing net imports by primary supply (adjusted for energy supplied to marine bunkers). UK import dependency is shown in Figure 1.10[31].

In the 1970s the UK was a net importer of energy. Following development of oil and gas production in the North Sea, the UK became a net exporter of energy in 1981. Output fell back in the late 1980s following the Piper Alpha disaster, with the UK regaining a position as a net exporter in the mid 1990s. North Sea production peaked in 1999, and the UK returned to being an energy importer in 2004. In 2013 imports of petroleum products exceeded exports following the closure of the Coryton refinery; the UK is now a net importer of all main fuel types, although in 2020 it became a net exporter of primary oils for the first time since 2004, as well as remaining a net exporter of some petroleum products such as petrol and fuel oil. In 2020, 28% of energy used in the UK was imported, down sharply from the 2019 level due to the impact of the Covid-19 pandemic as the UK imported less fuel to meet reduced demand.

Figure 1.10: UK import dependency, 1990 – 2020



Source: UK Energy in Brief, BEIS

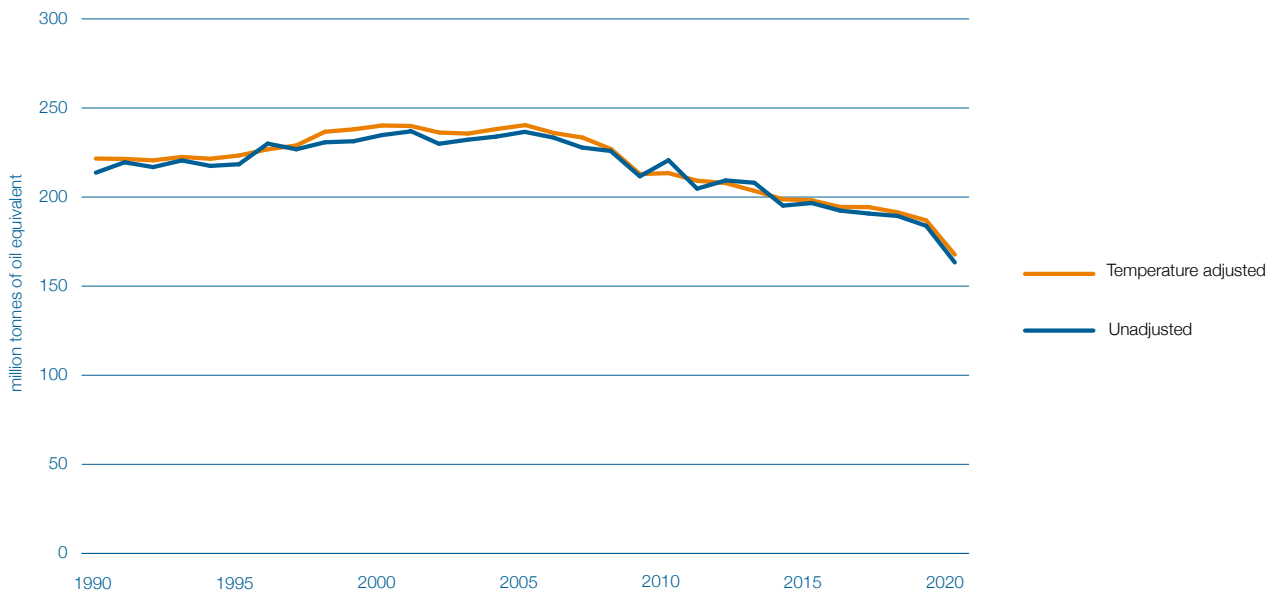
1.8.3 Primary energy consumption

In 2020, the total UK level of primary energy consumption (fuels obtained directly from natural sources rather than being produced by transformation) was 163 million tonnes of oil equivalent (mtoe) excluding non-energy use. The level of primary energy consumption in 2020 was 18% lower than in 1990. On a temperature-corrected basis (to remove the impact a hot or cold year has on energy consumption) primary energy consumption in 2020 was 24% lower than in 1990 with a slight rise to 2005 followed by a decrease.

[31] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1032261/UK_Energy_in_Brief_2021_dataset.xlsx

Figure 1.11 shows how primary energy consumption has changed in the UK since 1990 for both the unadjusted and temperature corrected series[32].

Figure 1.11: UK total primary energy consumption unadjusted and temperature corrected 1990 to 2020



Source: Energy Consumption in the UK 2021 – Primary Consumption, BEIS (adapted)

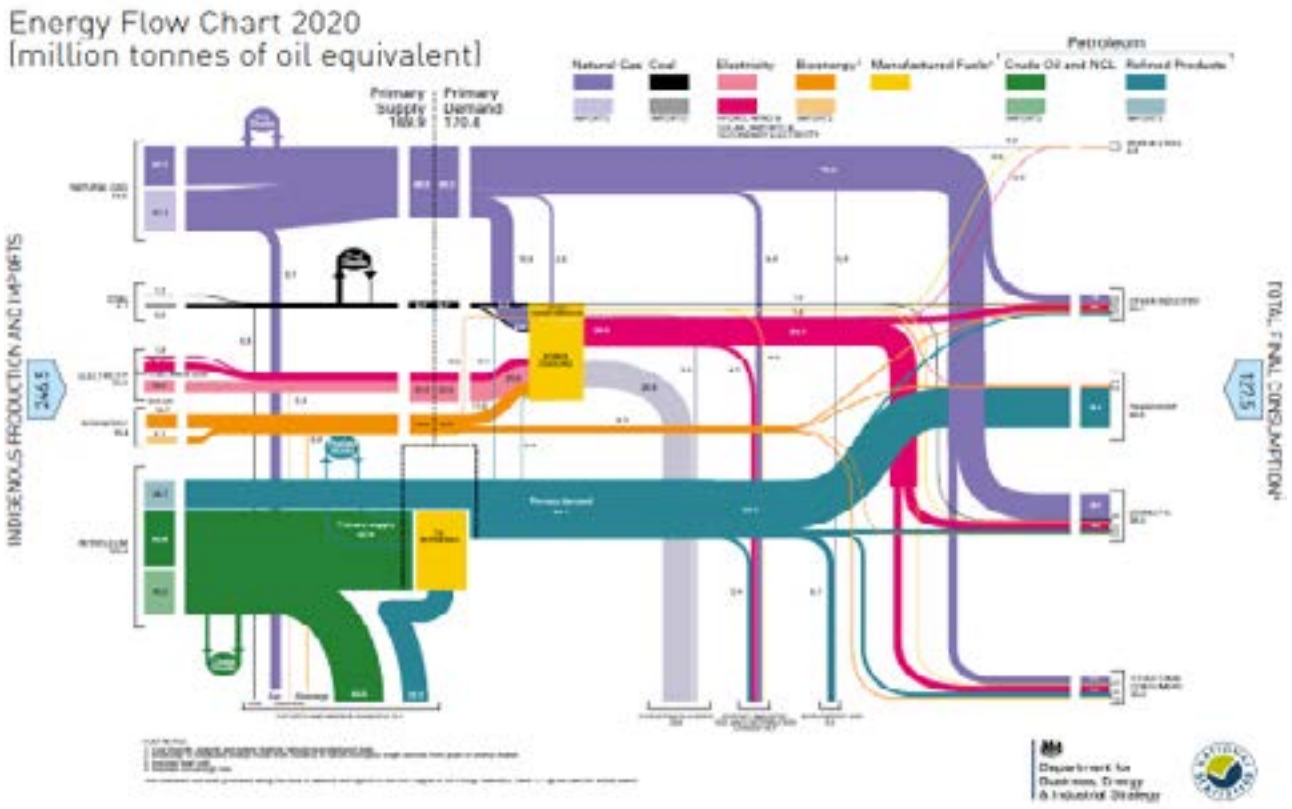
1.8.4 Energy transformation

The energy flow chart for 2020 in Figure 1.12 illustrates the flow of primary fuels from the point at which they become available from home production or imports to their eventual final uses[33]. They are shown in their original state and after conversion into different types of energy by the secondary fuel producers. The flows are measured in million tonnes of oil equivalent, with the widths of the bands approximately proportional to the size of the flow they represent.

[32] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1021842/2021_Primary_Energy_Tables.xlsx

[33] https://www.gov.uk/government/statistics/energy-flow-chart-2020

Figure 1.12: Energy Flow Chart, UK, 2020



Source: Energy Flow Chart, BEIS

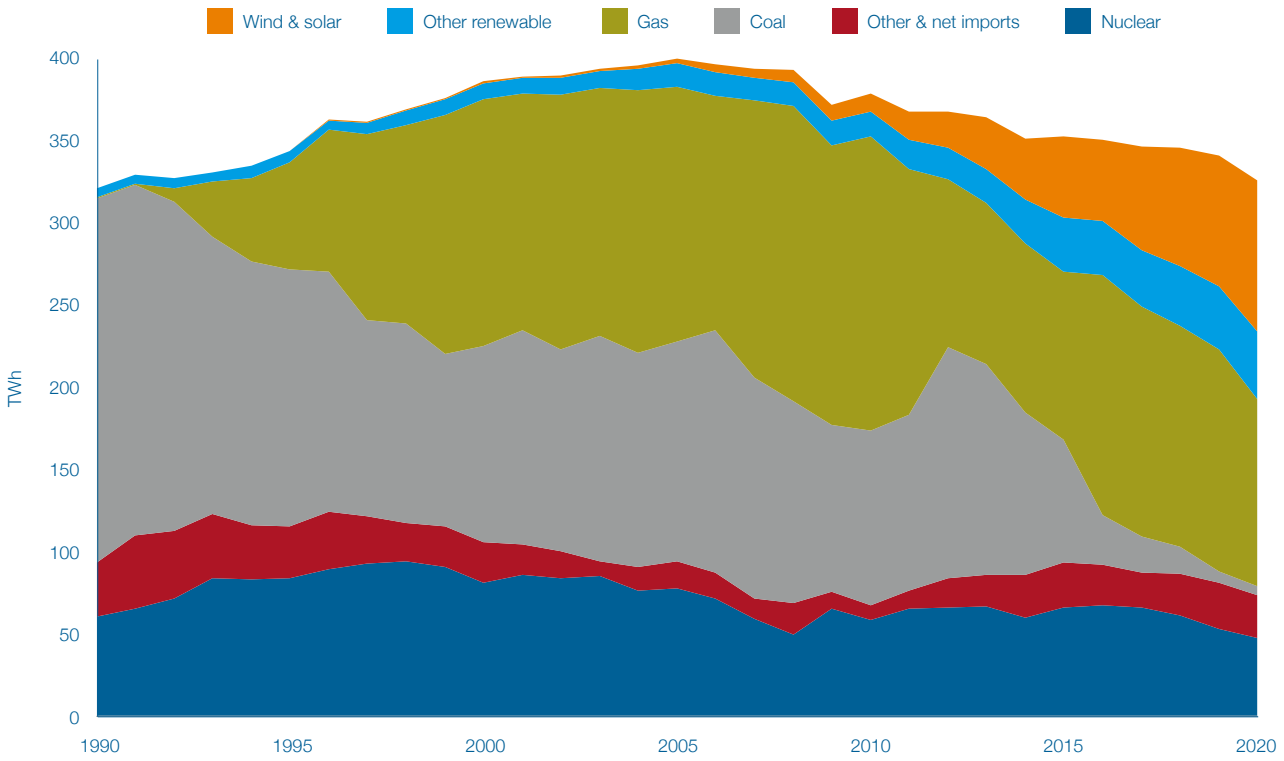
A number of transformations occur to get from primary energy sources to usable fuel with crude oil refined into various petroleum products. In 2020, around 15% of primary supply was used to generate electricity.

1.8.5 Electricity

Electricity supply rose from 309 TWh to 385 TWh between 1990 and 2005 but has since fallen. In 2019 electricity supply was 328 TWh and in 2020 it was 314 TWh. The contribution of gas generation has increased from 0.1% in 1990 to 35% in 2020. Net imports of electricity averaged were 21 TWh in 2019 and 18 TWh in 2020 compared to 12 TWh in 1990. Figure 1.13 shows electricity supplied by fuel for 1990 and 2020, to show how the fuel mix in electricity supplied has changed[34].

[34] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1032261/UK_Energy_in_Brief_2021_dataset.xlsx

Figure 1.13: Electricity supplied by fuel type, UK, 1990 and 2020



Source: UK Energy in Brief, BEIS

1.8.6 Energy consumption

Table 1.4 shows inland energy consumption 1990 – 2000. Between 1990 and 2020, primary energy consumption fell 24% to 163 mtoe, this was driven by a 92% (61 mtoe) fall in coal consumption and a 34% (25 mtoe) reduction in petroleum consumption[35]. However, a large share of the reduction in petroleum consumption can be attributed to travel restrictions imposed as a result of the Covid-19 pandemic. Petroleum consumption in 2019 was 13% below 1990 levels. The average temperature in 2020 was 0.3 degrees Celsius warmer than in 2019; on a temperature corrected basis, primary energy consumption was 10% lower than in 2019.

Table 1.4: Inland energy consumption (mtoe) – 1990 – 2020

Fuel	1990	1995	2000	2005	2010	2015	2020
Coal	66.9	48.9	38.5	39.9	32.6	25.1	5.6
Oil	77.2	75.4	76.7	78.2	70.2	67.4	50.9
Gas	51.2	69.2	95.9	94.3	93.5	68.1	68.4
Primary electricity	17.7	23.1	21.4	19.8	15.4	21.9	20.5
Bioenergy & waste	0.7	1.7	2.3	4.2	7.6	12.5	18.0
Total	**213.6**	**218.4**	**234.8**	**236.3**	**219.3**	**195.1**	**163.3**

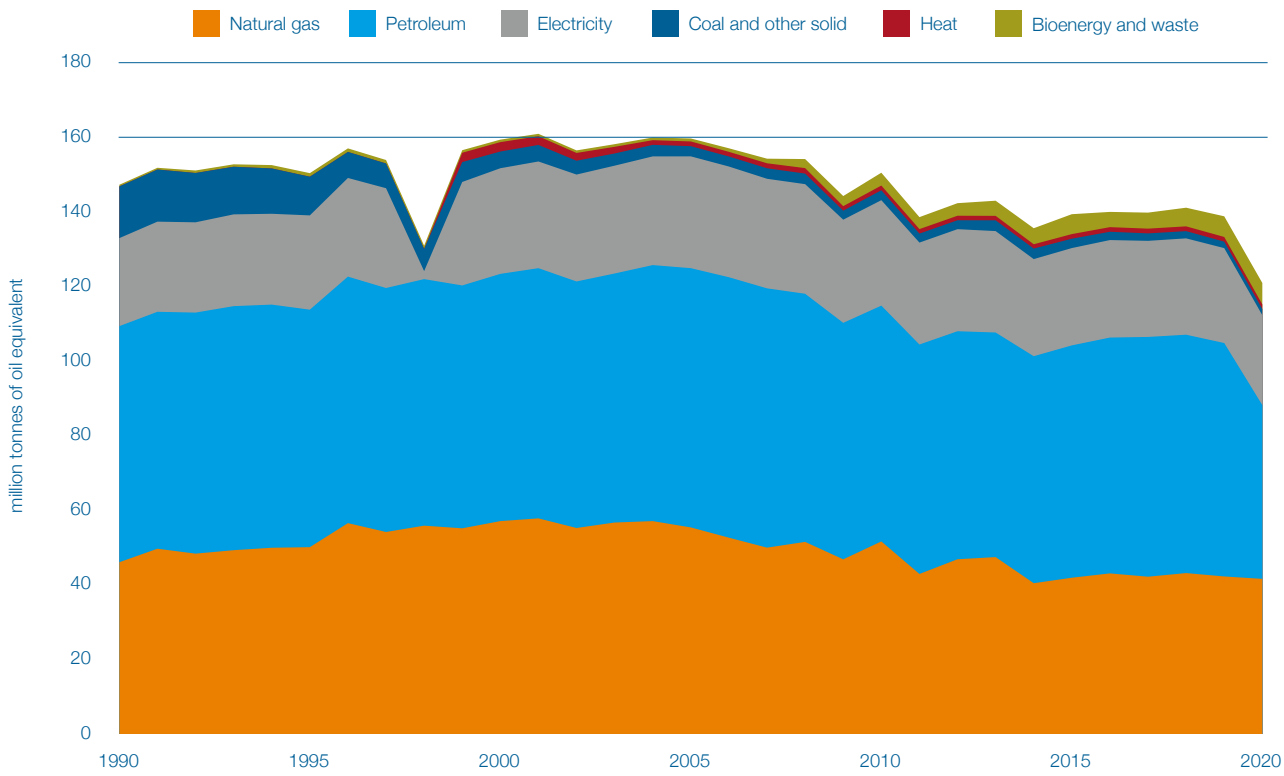
Source: UK Energy in Brief, BEIS

[35] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1032261/UK_Energy_in_Brief_2021_dataset.xlsx

Figure 1.14 shows final energy consumption in the UK from 1990 to 2020 by fuel type[36]. Between 1990 and 2019, final energy consumption in the UK decreased by 6%, from 147 mtoe to 139 mtoe. In 2020 final energy consumption was 18% below 1990 levels at 121 mtoe though this is well below trend, reflecting the impact of Covid restrictions in place. From 2005, a general declining trend in final energy consumption was driven by improvements in energy efficiency.

In 1990 final consumption from petroleum was 43% of total final energy consumption in the UK. By 2019 this had risen to 45% though 2020 saw a reduction to 39% owing to temporary travel restrictions. The share of final consumption met by electricity increased was 16% in 1990 increasing to 20% by 2020. Natural gas increased from 31% to 34%. Increases in the contribution from bioenergy and waste have been steep over the last 15 years from 0.5% in 2005 to nearly 5% in 2020.

Figure 1.14: Final energy consumption by fuel, UK, 1990 – 2020



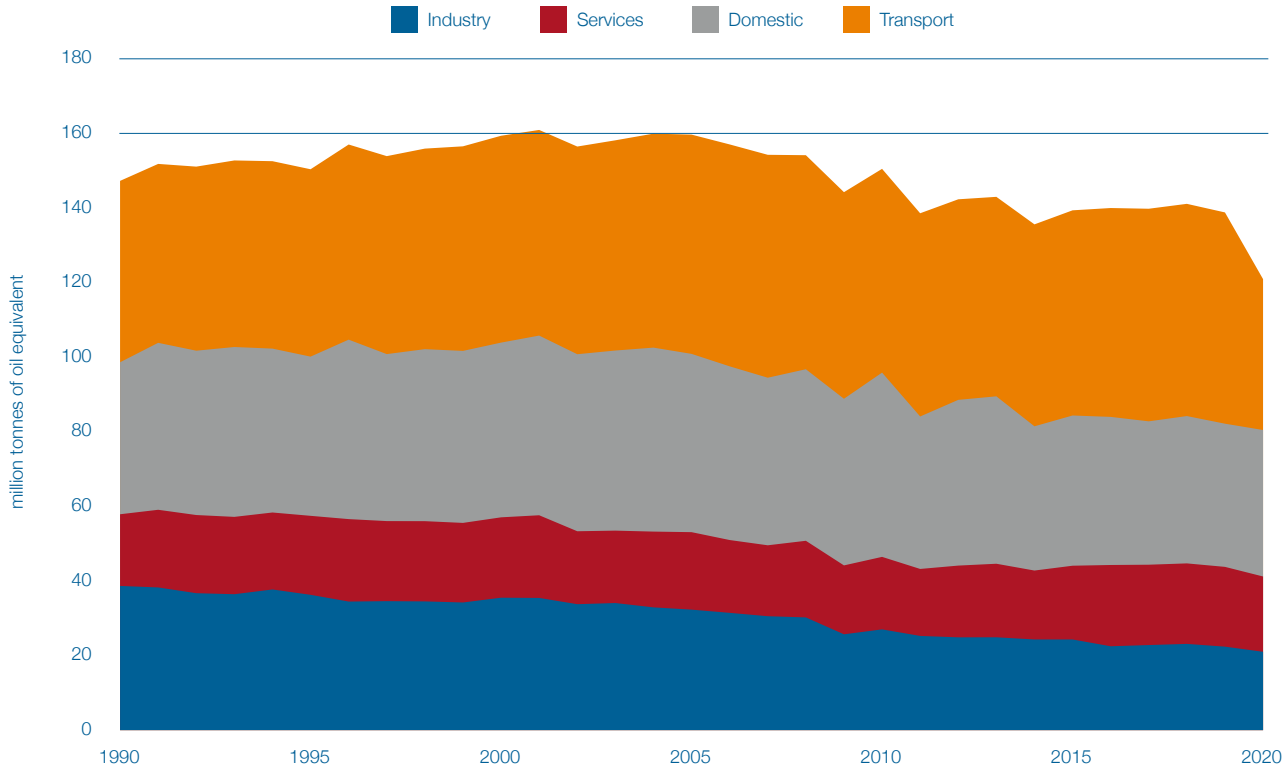
Source: Energy Consumption in the UK 2021 – Consumption Tables, BEIS

Figure 1.15 shows the changing levels of energy consumption (including non-energy use) in the UK by sector[37]. In 1990 the transport sector was responsible for 33% of final energy consumption, the domestic sector a further 28% with industry responsible for 26% and 13% coming from services. By 2019 the share of final demand attributable to transport was 41% and industry was down to 16%. In 2020 the share attributed to transport reduced to 33%, reflecting restrictions in place to curb the Covid-19 pandemic.

[36] https://www.gov.uk/government/statistics/energy-consumption-in-the-uk-2021

[37] https://www.gov.uk/government/statistics/energy-consumption-in-the-uk-2021

Figure 1.15: Final energy consumption by sector, UK, 1990 – 2020



Source: Energy Consumption in the UK 2021 – Consumption Tables, BEIS

1.8.7 Energy and carbon ratio

The relationship between energy consumption and economic activity at the aggregate level can be gauged by comparing a country's temperature corrected inland primary energy consumption with its gross domestic product (GDP). The energy ratio is calculated by dividing temperature corrected primary energy consumption by GDP at constant prices. The carbon ratio is calculated similarly by dividing carbon dioxide emissions by GDP.

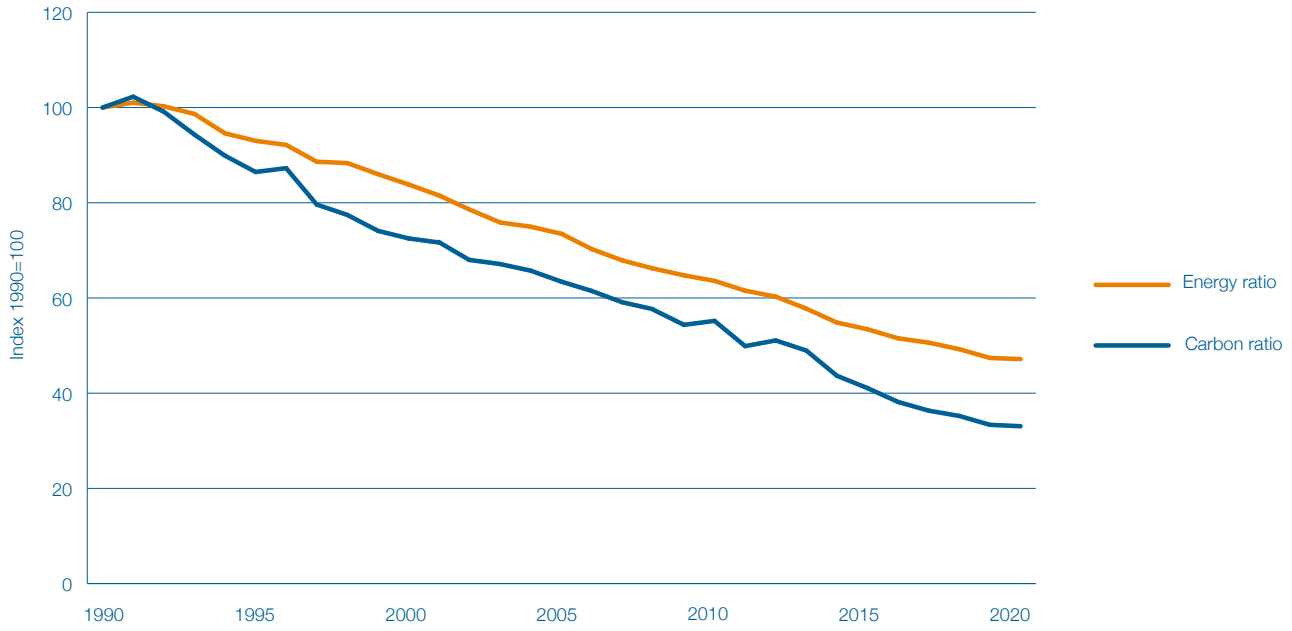
Both ratios have fallen steadily, with the energy ratio declining by around 2.5% per year and the carbon ratio declining at a faster pace of around 3.5% per year as shown in Figure 1.16[38].

The downward trends are due to a number of factors, with improvements in energy efficiency and the decline in the relative importance of energy intensive industries affecting both ratios. The carbon ratio has been improved further by the increased use of more carbon efficient fuels and renewables.

The reduction in the carbon ratio in 2020 is primarily due to the large reduction in the use of road transport during the Covid-19 pandemic lockdowns, with CO_2 emissions from transport falling 20% in 2020.

[38] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1032261/UK_Energy_in_Brief_2021_dataset.xlsx

Figure 1.16: UK Energy and Carbon ratio 1990 – 2020



Source: UK Energy in Brief, BEIS

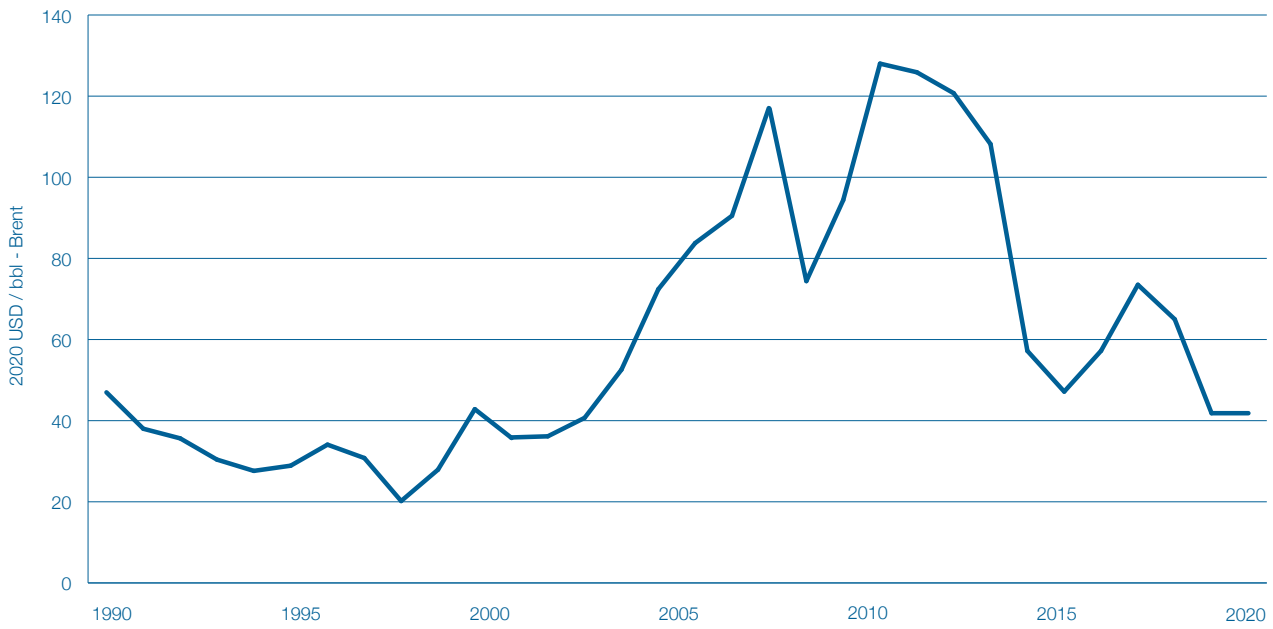
Latest International Energy Agency data for 2019 shows that the energy ratio is falling in all G7 countries. The UK is estimated to have the lowest energy ratio in the G7[39]. UK energy prices are influenced by a number of factors, both local and global. Prices of primary fuels (gas, coal, oil) will obviously affect the price of secondary fuels (electricity, road fuels), but can also themselves be affected by the price of the other primary fuels.

Figure 1.17 shows the Brent dated prices from 1990 to 2020 in 2020 USD using the US consumer price index (CPI) to rebase nominal prices. There were peaks in oil prices in 2008 and 2012 but in 2020 prices dropped to 41.84 USD/bbl compared to a 1990 price of 46.98 USD/bbl[40] as the Covid-19 pandemic reduced demand.

[39] Based on data from the IEA World Energy Balances

[40] https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/xlsx/energy-economics/statistical-review/bp-stats-review-2021-all-data.xlsx

Figure 1.17: Brent dated, 1990 – 2020 (2020 USD)



* 2020USD (deflated using the Consumer Price Index for the US)

Source: BP Statistical Review of World Energy 1965 – 2020

1.9 Transport Profile

Domestic transport accounted for 24% of all UK greenhouse gas emissions in 2020, almost entirely through carbon dioxide emissions. The main source of emissions comes from the use of petrol and diesel fuels in road transport. Between 2019 and 2020, transport emissions fell by 19%, attributable to the impact of the COVID-19 pandemic as people were instructed to stay at home for large periods of time[41].

Road transport makes up the largest proportion of domestic transport emissions at 91%. Cars and taxis account for the bulk of this figure at 52% of emissions, with HGVs contributing 19%. Provisional estimates of carbon dioxide emissions from domestic transport in 2021 have risen, primarily due to the increase in the use of road transport as nationwide lockdowns were eased.

Demand for transport continued to increase steadily across many modes until 2019, before a steep decline in 2020 and 2021 due to restrictions introduced during the pandemic. For example, passenger kilometres travelled by cars, vans and taxis rose from 139 billion in 1960 to 738 billion in 2019. Distance travelled by rail rose from 40 billion passenger kilometres in 1960 to its all-time peak of 82 million passenger kilometres in 2018. However, distance travelled on buses and coaches has seen a long-term decline. Passenger mileage in 2019 was less than half of what it was in 1960[42].

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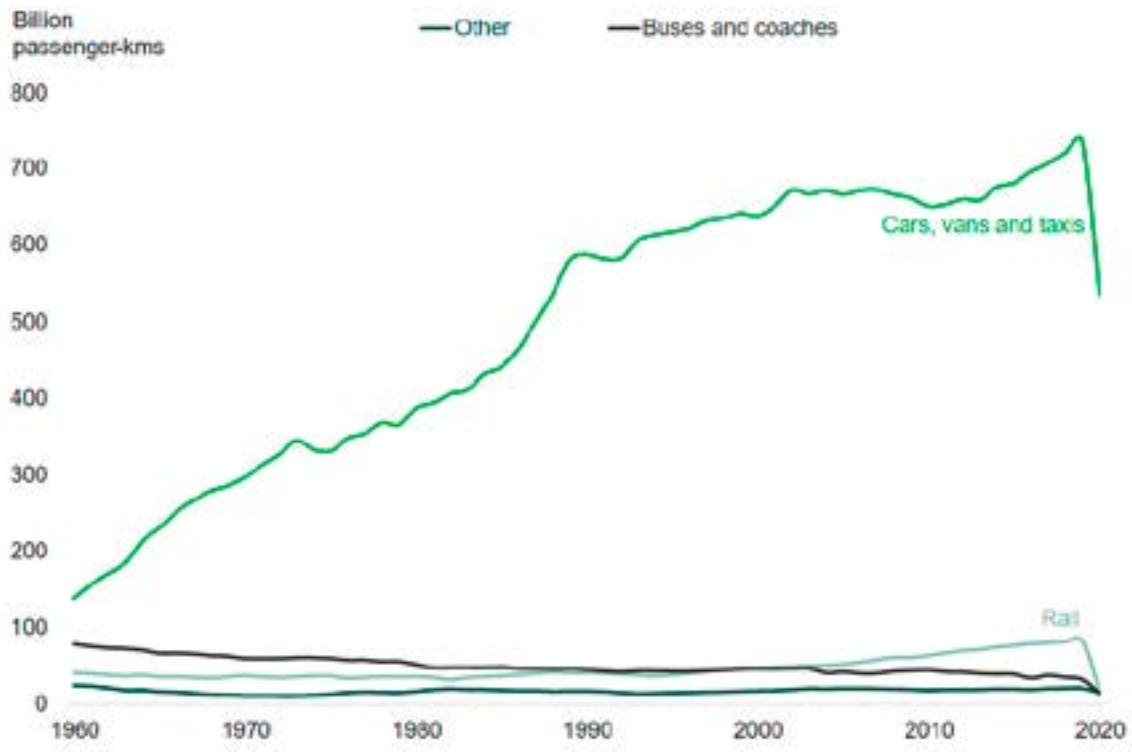
41 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1051408/2020-final-greenhouse-gas-emissions-statistical-release.pdf

42 https://www.gov.uk/government/statistics/transport-statistics-great-britain-2021/transport-statistics-great-britain-2021#freight-transport

Figure 1.18: Passenger Kilometres by mode, Great Britain, 1960 to 2020



Source: https://www.gov.uk/government/statistics/transport-statistics-great-britain-2021/transport-statistics-great-britain-2021#freight-transport

Public transport use was heavily impacted by COVID-19. Between 2019 and 2020 passenger kilometres travelled on buses and rail fell from 33 billion to 14 billion and 80 billion to 16 billion respectively. This has begun to recover although future trends are less certain as use of public transport has not yet reached pre-pandemic levels. In contrast, levels of active travel spiked significantly in 2020 when compared with previous years. Miles cycled and walked per person increased by 62% and 7% respectively to the highest levels seen since 2002[43].

The freight sector is vitally important for the UK, with 176bn tonne-kilometres (the weight of goods carried, multiplied by the distance) of domestic freight moved in 2020. Road freight made up the largest proportion of domestic freight being moved in the UK in 2022, accounting for 77%. Road freight remained relatively stable between 2000 and 2006. After which, goods moved by road declined to its lowest level in 2009, before a consistent increase from 2015 onwards. The COVID-19 pandemic interrupted this trend, with an 11% decrease in road freight traffic in 2020[44].

The maritime and aviation sectors both remain vital for UK transport. 51 major ports together handle at least one million tonnes of cargo annually[45]. At least 82,000 cargo vessels arrived at UK major ports during 2020, 14% less than in 2019. UK airports support connections to over 300 overseas destinations in more than 100 countries[46]. In terms of domestic emissions,

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43 https://www.gov.uk/government/statistics/walking-and-cycling-statistics-england-2020/the-impact-of-the-coronavirus-pandemic-on-walking-and-cycling-statistics-england-2020

44 https://www.gov.uk/government/statistics/transport-statistics-great-britain-2021/transport-statistics-great-britain-2021#freight-transport

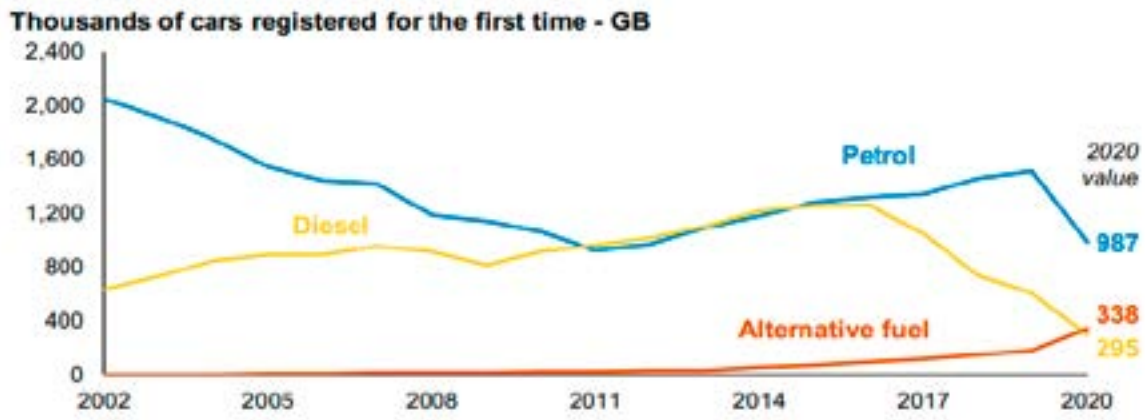
45 https://www.gov.uk/government/statistics/transport-statistics-great-britain-2021/transport-statistics-great-britain-2021#freight-transport

46 https://questions-statements.parliament.uk/written- xxxxxx

in 2019 aviation and maritime were responsible for 1% and 5% of the UK's emissions. The UK Government has announced that for Carbon Budget 6 (2033-2037), international aviation and shipping emissions will be counted within the UK total[47]. In 2019 these sectors were responsible for 37MtCO_2e and 8 MtCO_2e respectively. The COVID-19 pandemic led to an unprecedented decline in the number of terminal passengers at UK airports. In April 2020, passenger numbers dropped by 99% compared to April 2019 and remained low throughout the year.

Significant changes in the transport sector are taking place to reflect the UK's drive towards net zero. The UK Government has announced the end of sales of new petrol and diesel cars and vans in 2030, with a phase out of the sale of all types of new non-zero-emission vehicles by 2040. Figure 1.19 illustrates that, in 2020, there was continued decline in new diesel car registrations in Great Britain, falling by 51% compared to 2019. Over the same period, new petrol car registrations fell 35%. By contrast, new registrations of alternative fuel cars increased sharply by 87% in 2020 compared to 2019[48]. In December 2021, over a quarter of all new cars sold in the UK were battery electric vehicles, whereas the equivalent figure for 2019 was less than 2%[49].

Figure 1.19: Cars registered for the first time by fuel type, Great Britain, 2002 to 2020



Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/985555/vehicle-licensing-statistics-2020.pdf

Investment and development of electric vehicle infrastructure is also advancing at pace. There are around 29,600 public charge points in the UK and this infrastructure is serving around 750,000 plug-in vehicles (of which over half are pure battery electric). Of these, around 5,400 are "rapid" – able to charge an EV in around 30 minutes[50]. On average, 100 new rapid chargers were added to the UK network every month during 2021.

The Renewable Transport Fuels Obligation (RTFO) also forms part of the UK's strategy of reducing transport emissions. This sets an annual obligation on fuel suppliers to supply transport fuels derived from renewable energy sources. As of 2022, suppliers are required to

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47 https://www.gov.uk/government/statistical-data-sets/energy-and-environment-data-tables-env#greenhouse-gas-emissions-env02

48 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/985555/vehicle-licensing-statistics-2020.pdf

49 https://www.gov.uk/government/statistics/transport-statistics-great-britain-2021/transport-statistics-great-britain-2021#freight-transport

50 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1065576/taking-charge-the-electric-vehicle-infrastructure-strategy.pdf

redeem Renewable Transport Fuel Certificates (RTFCs) equivalent to 13.5% of the volume of fossil and unsustainable renewable fuel supplied. This percentage will rise to 21.1% by 2032[51]. As of 2020, renewable fuel made up 5.9% of total fuel supplied in the UK.

Furthermore, the proliferation of future green technology is also advancing due to increased investment in R&D across all modes of transport. In 2021-22, £20m was invested in Zero Emission Road Freight Trials (ZERFT) to support industry-led feasibility studies into developing cost-effective, zero-emission HGVs and their associated infrastructure. £180m is supporting the development of sustainable aviation fuels (SAF) plants to build on the progress made in previous advanced fuels competitions. In early 2022, it was also announced that a £206m R&D programme will be delivered through the new UK Shipping Office for Reducing Emissions (UK SHORE).

1.10 Building Stock and Urban Structure Profile

Despite the UK's long history of urbanisation, some areas are sparsely populated, including the highlands of Scotland, and parts of Wales and Northern England. In 2020, there were around 29 million dwellings in the UK, 23.5 million of which in England[52], 2.65 million in Scotland[53], 1.4 million in Wales[54], and around 800,000 in Northern Ireland[55]. Most common types of dwellings in England were terraced houses (27%) followed by semi-detached (25%), detached (18%), purpose-built flats (19%) and all other types of dwellings (12%)[56].

There were an estimated 27.8 million households in the UK in 2020, an increase of 5.9% over the last 10 years. The number of households in England is projected to increase by 1.6 million (7.1%) between 2018 and 2028, from 23.2 million in 2018 to 24.8 million in 2028. An estimated 95% of the projected increase in households by 2028 is attributable to one-person and multiple adult households without dependent children[57]. In Scotland the number of households is projected to increase by 5% between 2018 and 2028[58]. The total number of households in Wales is projected to be around 1.42 million by 2028, an increase of 4.4% between 2018 and 2028[59].

1.11 Waste Profile

In 2020 GHG emissions from waste contributed to 4% of total UK emissions, representing an emissions reduction of 73% since 1990. Approximately 89% of emissions from this sector are attributable to methane[60].

The UK Government and the Devolved Administrations have published their individual waste strategies aiming to reduce the quantity of waste produced and to increasingly recover value

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51 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974822/targeting-net-zero-rtfo.pdf

52 https://www.gov.uk/government/statistics/dwelling-stock-estimates-in-england-2020

53 https://www.nrscotland.gov.uk/statistics-and-data/

54 https://gov.wales/sites/default/files/statistics-and-research/2020-09/dwelling-stock-estimates-31-march-2020-828.pdf

55 https://www.communities-ni.gov.uk/publications/northern-ireland-housing-statistics-2020-21

56 English Housing Survey, 2020

57 ons.gov.uk

58 https://www.nrscotland.gov.uk/statistics-and-data/

59 https://gov.wales/subnational-household-projections-2018-based

60 https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2020

from it. The strategies set out ambitions to reduce the amount of waste sent to landfill and to increase the amount of recycling or composting. These ambitions will help reduce the level of emissions from the waste sector in the UK.

In 2019 households in the UK produced 26.4 million tonnes of waste, a reduction of 1% since 2015[61].

In 2019, 46.2% of waste from households was recycled in the UK; this is an increase from the rate of 44.5% achieved in 2015.[62] The UK commercial & industrial sectors generated 43.9 million tonnes of waste in 2018, of which 37.2 million tonnes (around 85%) was produced in England. By comparison, the 2016 UK commercial & industrial waste arisings figures was 41.0 million tonnes, of which 33.1 million tonnes was generated by England. Over two thirds of commercial & industrial waste is generated by the commercial sector, in both the UK and England[63].

Local authorities in England recycled, composted or reused 10.7 in 2020-21[64]. The amount of local authority collected waste sent to landfill and incineration in 2020-21 was 2.0 million tonnes and 12.5 million tonnes, respectively. Concerning landfill, it is a reduction from 4.1 million tonnes sent to landfill in 2016-17.

1.12 Agricultural Profile

In 2021, around 71% (17.2 million hectares) of the total UK land area was used for agriculture; Figure 1.20 shows UK land use data for the total agricultural area at June 2021[65]. About 4.5 million hectares of this was arable, of which around two thirds were under cereal production. 11.2 million hectares is currently under grass, (temporary, permanent and sole right rough grazing). The remainder was common rough grazing and land for outdoor pigs.[66] Total agriculture area saw a 0.8% decrease between 2016 and 2021, and total croppable area decreased by 0.3%. The biggest change in agricultural land use was seen in uncropped arable land which saw a 1% increase since 2016.

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61 https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management#full-publication-update-history

62 Presented recycling rates include incinerator bottom ash (IBA) metal.

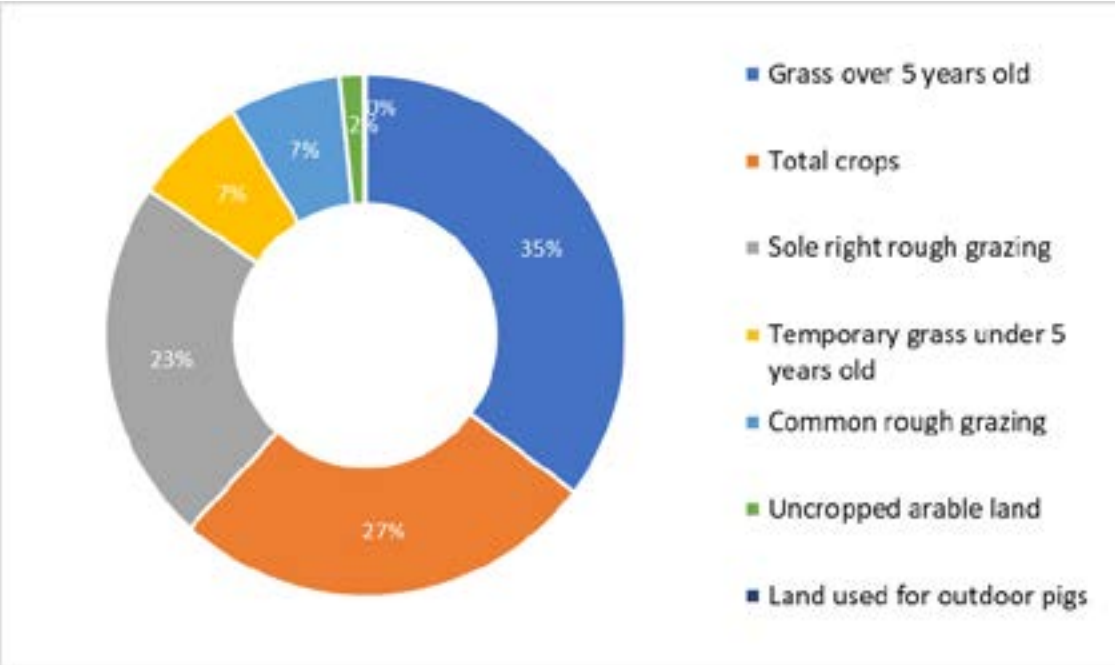
63 https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management#full-publication-update-history

64 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf

65 https://www.gov.uk/government/statistics/farming-statistics-final-crop-areas-yields-livestock-populations-and-agricultural-workforce-at-1-june-2021-uk

66 https://www.gov.uk/government/statistics/farming-statistics-final-crop-areas-yields-livestock-populations-and-agricultural-workforce-at-1-june-2021-uk

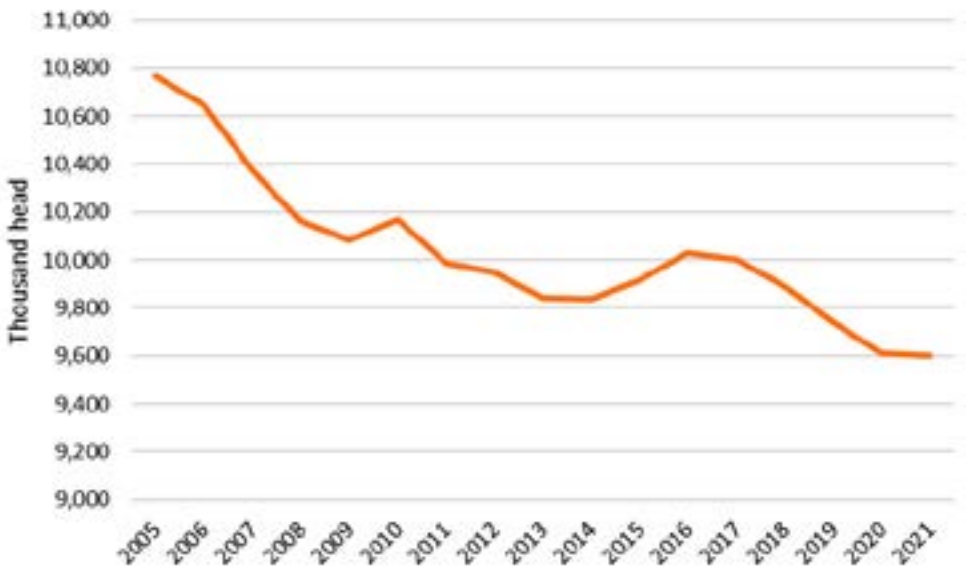
Figure 1.20: Agricultural land in the UK, 2021



Total agricultural area 2021 = 17,227 thousand hectares
Source: Agriculture in the UK 2021, Department for Environmental, Food and Rural Affairs

Livestock numbers have a negative impact on GHG emissions due several processes including enteric fermentation. The total number of cattle and calves in the UK saw a 4% decrease between June 2016 and June 2021, to around 9.6 million. There is a general downward trend of cattle numbers in June since 2005, although between 2013-2016 this trend has started to reverse slightly before continuing its downward trend in recent years. The UK's dairy herd remained static at 1.9 million although the UK's beef herd has decreased by 5% since 2016 down to 1.5 million. Total cattle and calf numbers in the UK during the period 2005-2021 are shown in Figure 1.21.

Figure 1.21: Total Cattel and Calves in the UK, 2005-2021



Source: https://www.gov.uk/government/statistical-data-sets/agriculture-in-the-united-kingdom

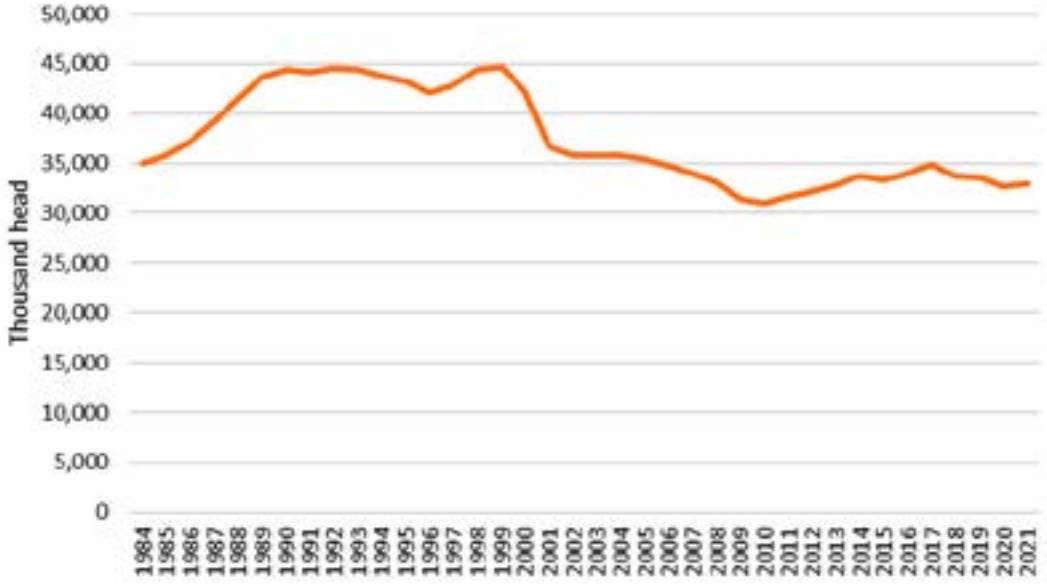
The total number of pigs in the UK increased in June 2021 by 9% since June 2016, to just above 5.3 million. There was a 0.4% increase in the total number of breeding pigs in the UK, to just over 500,000 animals in June 2016. Total pig numbers in the UK during the period 1992-2021 are shown in Figure 1.22.

Figure 1.22: Total Pigs in the UK, 1992 – 2021

Source: https://www.gov.uk/government/statistical-data-sets/agriculture-in-the-united-kingdom

The total number of sheep and lambs in the UK decreased by 3% between June 2016 and June 2021, to just below 33 million. The UK's female breeding flock decreased by 4% to 15.6 million over the same period. Smaller decreases were seen in other sheep and lambs for the UK falling 3%. These include lambs less than 1 year of age, rams and other sheep that are 1 year or older. Total sheep and lamb numbers in the UK during the period 1984-2021 are shown in Figure 1.23.

Figure 1.23: Total Sheep and Lambs in the UK, 1994 – 2021

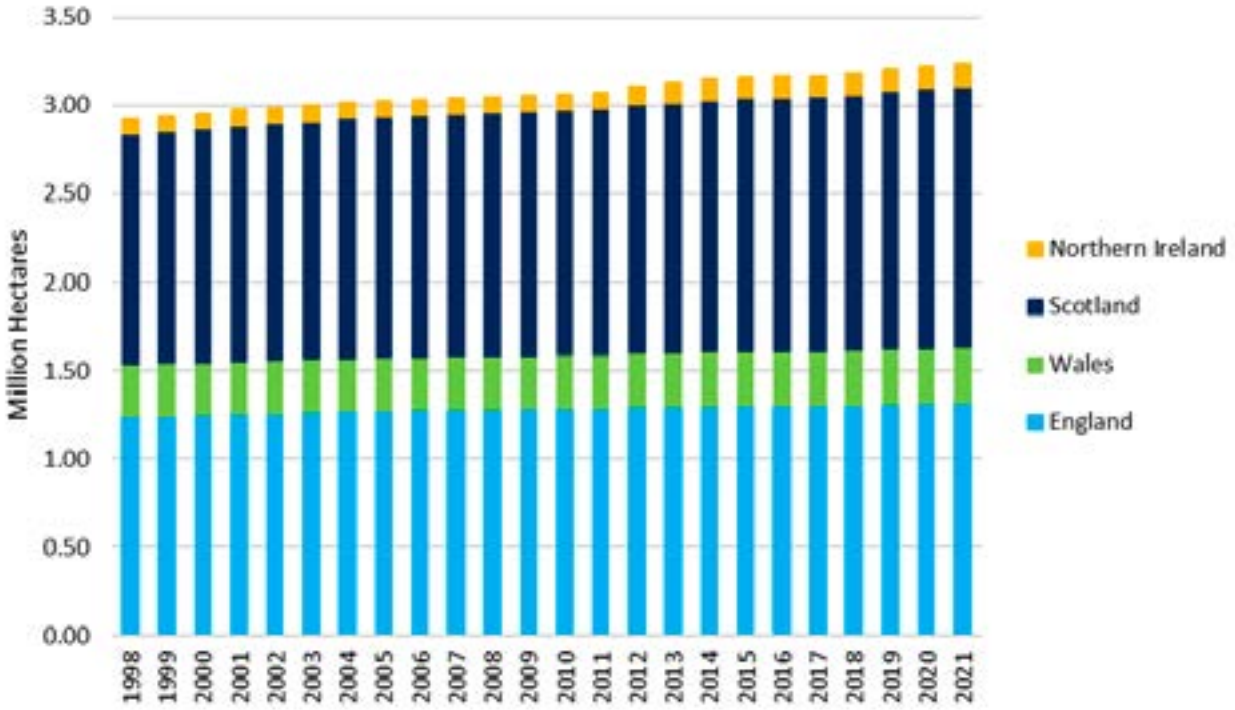


Source: https://www.gov.uk/government/statistical-data-sets/agriculture-in-the-united-kingdom

1.13 Forestry Profile

The area of woodland in the UK on 31 March 2021 is 3.2 million hectares. Of this total, 1.5 million hectares (46%) is in Scotland, 1.3 million hectares (41%) is in England, 0.3 million hectares (10%) is in Wales and 0.1 million hectares (4%) is in Northern Ireland. This has changed relatively little over the period 2007 to 2021 as can be seen in Figure 1.24. State forests still account for 0.9 million hectares.[67]

Figure 1.24: Area of woodland, 1998-2021?



Source: https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2021/

Around 1.6 million hectares of the total UK woodland is made up predominantly of conifer species, the remainder being broadleaved.

The total area of new planting and restocking in the UK was 27.4 thousand hectares in 2020-21. Restocking accounted for 51% of this total. Broadleaved species accounted for 45% of the new planting area but just 18% of the restocked area in 2020-21[68].

A total of 10.0 million green tonnes of softwood was produced in the UK in 2020 and accounted for 92% of removals from UK woodland. UK hardwood production totalled 0.8 million green tonnes in 2020. Softwood availability in Great Britain is projected to increase to an annual average of 17.4 million green tonnes over the five-year period 2022 to 2026 and 18.4 million green tonnes from 2027 to 2031[69].

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[67] https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2021/

[68] https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2021/

[69] https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2021/2-uk-grown-timber/

Apparent consumption of wood in the UK amounted to 54.8 million m3 wood raw material equivalent in 2020, made up of 10.4 million m3 UK production, 48.0 million m3 imports and 3.6 million m3 exports[70].

This sector can act as both a source and a sink for GHG emissions.

[70] https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2021/2-uk-grown-timber/

Chapter 2 Greenhouse gas inventory information

2.1 Introduction

This chapter presents information on UK GHG emissions and the National System established to produce and quality assure the UK GHG Inventory. A fuller description of this National System can be found in the UK's National Inventory Report (NIR), submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in 2022[1].

The UK is obliged to produce an annual GHG inventory, containing an estimate of all anthropogenic GHG emissions across the UK, in order to meet its commitments under the UNFCCC and the Kyoto Protocol; it will continue to do so to meet its commitments under the Paris Agreement. Data from the GHG inventory are also used to monitor progress against Carbon Budgets under the UK Climate Change Act 2008. For more information on the UK's domestic and international targets, see Chapter 3 of the UK's 5th Biennial Report, included as an Annex to this National Communication.

The GHG inventory covers the seven direct GHGs under the Kyoto Protocol. These are collectively known as the 'basket' of GHGs and are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). The last four gases are collectively referred to as fluorinated gases (F gases). In accordance with international reporting and carbon trading protocols, emissions from each of the gases are weighted by its global warming potential (GWP), so that total greenhouse gas emissions can be reported on a consistent basis. The GWP for each gas is defined as its warming influence in relation to that of CO_2 over a 100-year period. Greenhouse gas emissions are then presented in carbon dioxide equivalent units (CO_2e). Annex VI contains a list of GWPs for each gas.

The UK's base year for assessing emissions of CO_2, CH_4, and N_2O under the Kyoto Protocol is 1990. The UK has chosen to use 1995 as the base year for emissions of the fluorinated gases: HFCs, PFCs, SF_6 and NF_3. This is in line with most European states, and in accordance with Article 3.8 of the Kyoto Protocol. Land use, land-use change and forestry (LULUCF) emissions and removals are reported in the UK's GHG inventory in accordance with the rules for reporting this sector under the UNFCCC. The UNFCCC reporting basis includes an estimate of all anthropogenic sources minus sinks from the LULUCF sector. A narrower definition of LULUCF emissions and removals is used to assess progress against the Kyoto target which includes only activities under Article 3.3 and 3.4 of the Kyoto Protocol. For the

[1] UK Greenhouse Gas Inventory, 1990–2020, Annual report for submission under the UN Framework Convention on Climate Change, April 2022: https://unfccc.int/documents/461922

second commitment period of the Kyoto Protocol the UK elects Cropland Management, Grazing Land Management, and Wetland Drainage and Rewetting, as activities under Article 3.4. The UK does not elect Revegetation, as the eligible land area for Revegetation within the UK is estimated to be very small, and therefore the associated potential sink will also be very small.

In addition to the provision of a national inventory covering the whole of the UK and British Crown Dependencies and Overseas Territories, the UK also produces annual spatially disaggregated inventories to provide geographical breakdown to England, Scotland, Wales and Northern Ireland, and to the 374 local authorities that make up the UK[2].

This chapter shows trends in UK GHG emissions between 1990 and 2020, disaggregating overall emissions by gas and by source sector. More information on UK GHG emissions trends can be found in the Common Tabular Format Tables, included as Annex II.

2.2 Key developments

- In 2020, UK greenhouse gas (GHG) emissions on a UNFCCC basis[3] were 409.5 million tonnes of carbon dioxide equivalent ($MtCO_2e$) – 49.5% lower than 1990 levels.[4]
- Between 1990 and 2020, carbon dioxide emissions including land use, land use change and forestry (LULUCF) fell by 46.8%. Methane emissions fell by 61.6% and nitrous oxide emissions fell by 57.6%.
- Between 1990 and 2020, emissions of fluorinated gases (hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride and sulphur hexafluoride) fell by 25.9%.
- The reduction in GHG emissions since 1990 has been driven predominantly by a decrease in emissions from the energy sector, due to the move away from coal-fired generation towards the use of natural gas and renewable sources. Significant emissions reductions have also resulted from tighter regulation of landfill waste sites, increased utilisation of landfill methane in gas flares and engines, and abatement technology in adipic acid and nitric acid manufacture. In the transport sector, improved technology such as fuel efficiency has contributed to offsetting an increase in activity. In 2020, COVID-19 will have had a significant impact on greenhouse gas emissions in the UK, in particular from transport and from businesses.

2.3 National system for preparing the UK GHG inventory

This section provides a summary of the national system the UK uses for preparing its GHG inventory. Section 1.2 of the National Inventory Report presents the full details of the UK's institutional arrangements for inventory preparation.[5]

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[2] Local Authority is a designation of local government used in the United Kingdom.

[3] The UK's ratification of the UNFCCC has been extended to the Overseas Territories of Bermuda, the Cayman Islands, the Falkland Islands and Gibraltar; and the Crown Dependencies of Guernsey, the Isle of Man and Jersey and the UK reports an inventory on this basis.

[4] Greenhouse gas emissions are expressed throughout this document as million tonnes of carbon dioxide equivalent ($MtCO_2e$). Gases other than CO_2 are expressed in terms of carbon dioxide equivalent by multiplying their emissions by their global warming potential (GWP). GWPs are taken from the 4th Assessment Report (AR4) of the IPCC.

[5] 1990-2020 UK National Inventory Report (NIR): https://unfccc.int/documents/461922

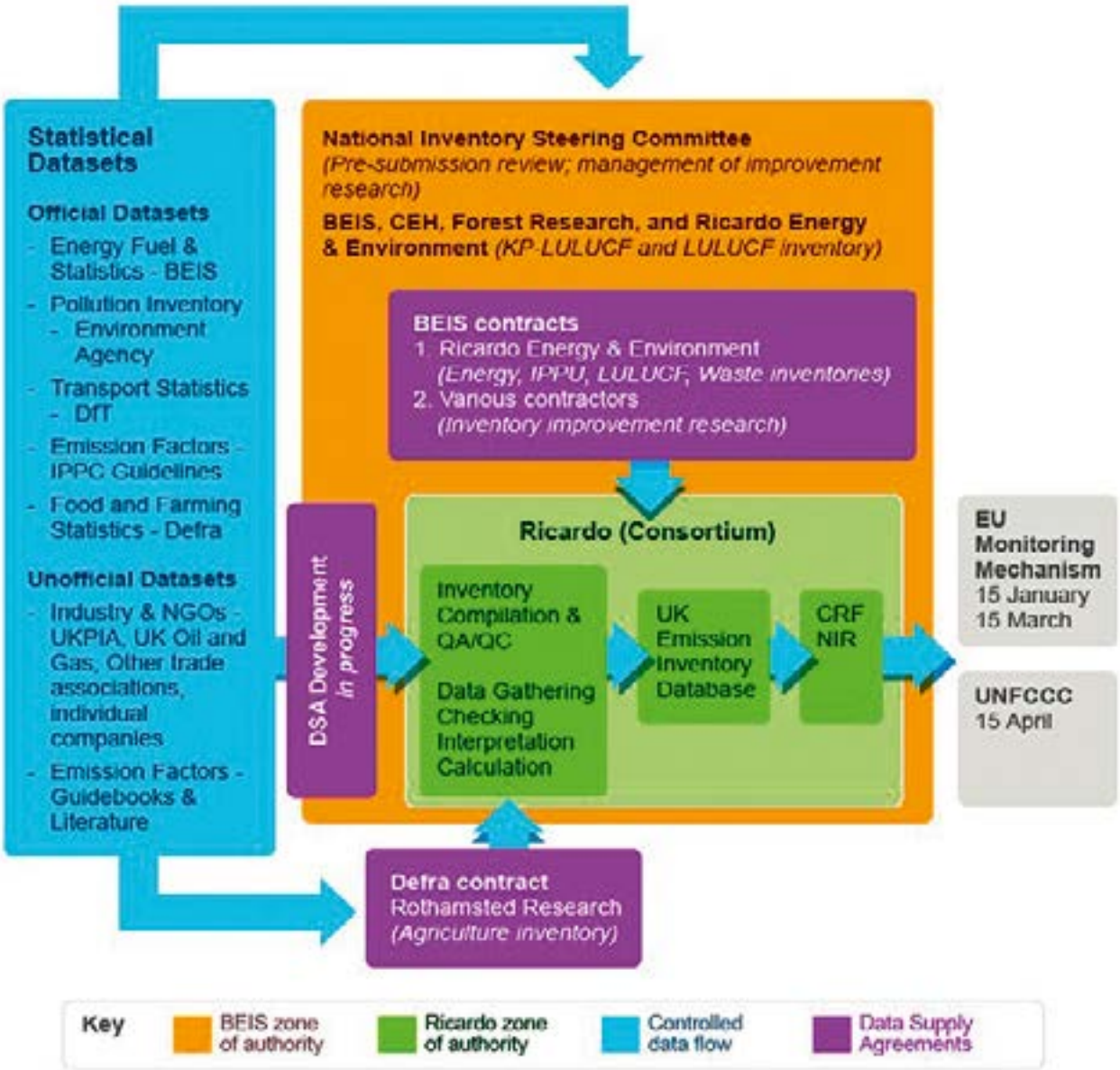
The UK's GHG inventory is compiled and maintained by a consortium led by Ricardo Energy and Environment[6] – the Inventory Agency – under contract to the Science and Innovation for Climate and Energy (SICE) Directorate in the Department for Business, Energy and Industrial Strategy (BEIS). Ricardo Energy and Environment is directly responsible for producing the emissions estimates for the following categories: Energy, Industrial Processes and Product Use (IPPU), and Waste. Ricardo Energy and Environment is also responsible for inventory planning, data collection, QA/QC and inventory management and archiving. Aether, a member within the consortium, is responsible for compiling emissions from railways and for the UK's Overseas Territories and Crown Dependencies. Gluckman Consulting advises on fluorinated gas (F-gas) emissions.

Forestry emissions and removals in the Land-Use, Land-Use Change and Forestry (LULUCF) sector are calculated by Forest Research and the remainder of the sector is calculated and compiled by the UK Centre for Ecology and Hydrology (UKCEH), both partners within the consortium. Agricultural sector emissions estimates are produced by Rothamsted Research, under contract to the UK Department for Environment, Food and Rural Affairs (Defra).

Figure 2.1 shows the main elements of the UK National Inventory System, including provision of data to the European Union under the terms of the Monitoring Mechanism Regulation. BEIS is the Single National Entity responsible for submitting the UK's GHGI to the UNFCCC.

[6] Ricardo Energy and Environment: https://ricardo.com/; email: enquiry-ee@ricardo.com.

Figure 2.1 Main elements for the preparation of the UK greenhouse gas inventory



Source: UK National Inventory Report, published 2022

The UK operates an established national system for GHG emissions estimation, reporting and archiving. Data are collected on an annual basis from national statistics, industry, trade associations and data associated with industrial pollution reporting and emissions trading. Historically, the acquisition of the data required has been based on a combination of existing environmental and energy legislation and informal arrangements with industry contacts and trade associations. At the end of each inventory cycle, all data, spreadsheets, databases and reports are archived, allowing all data to remain traceable, should it be needed in future years.

The GHG inventory is compiled annually according to international best practice with regard to the Intergovernmental Panel on Climate Change (IPCC) 2006 Guidelines[7] and the IPCC 2013 Wetlands Supplement[8]. The GHG emissions reported by the UK are estimated using

[7] 2006 IPCC Guidelines for National Greenhouse Gas Inventories: https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

[8] 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands. https://www.ipcc-nggip.iges.or.jp/public/wetlands/index.html

methodologies which mostly correspond to the sectoral Tier 2/3 methods in the IPCC Guidelines, with a higher level of detail than Tier 1 methods. The methodologies and data sources used to create the GHG inventory are summarised in Section 1.4 of the NIR. Each sector specific chapter of the NIR provides details of the process for the recalculation of previously submitted inventory data.

The NIR, including Common Reporting Format (CRF) tables, is reported to the EU and the UNFCCC each year by the deadlines set. The UK left the European Union on the 31 January 2020; under the terms of the Withdrawal Agreement, the UK remains committed to its shared targets and reporting with the EU under the Convention and the Kyoto Protocol. The inventory undergoes peer, expert and bilateral reviews, which are detailed in Section 1.6 of the NIR. In spring each year, BEIS and the Inventory Agency hold a review meeting, at which the findings of the EU and UN reviews, internal post-submission review and qualitative analysis of source categories are discussed in order to guide the development of the inventory. Chapter 10 of the NIR provides brief details of improvements to the NIR and the inventory in response to UNFCCC reviews.

The development of the inventory is driven through the National Inventory Steering Committee (NISC), and the inventory improvement programme. Methodological improvements take account of new data sources, updated guidance from the IPCC, and specific research programmes sponsored by UK Government Departments including BEIS, Defra and Department for Transport (DfT) together with the Devolved Administrations. All methodological improvements are applied back to 1990 to ensure a consistent time series. Section 1.7 of the NIR provides details of the uncertainty analyses; Section 1.5 provides a description of the key categories and the processes to identify them; and, Section 1.6 provides a description of the QA/QC system, and the inventory improvement programme.

The UK National Registry is operated and maintained by the Environment Agency on behalf of BEIS. The National Registry is represented on the NISC. All changes in the National Registry are reported in Chapter 14 of the NIR.

Since the UK submitted its Fourth Biennial Report in 2019, one major change to the UK's National Inventory System is that the NISC has been restructured from a single body to two groups, the Advisory Body and the Executive Body. The purpose of the Advisory Body is to advise on how proposed changes to the inventory should be prioritised and delivered, discussing any risks to the data supply chain as well as reviewing the inventory to identify any potential issues. The Executive Body reviews and discusses modifications to the inventory methodology and resulting recalculations, making recommendations as to whether these modifications should be accepted. It also advises the BEIS Greenhouse Gas Inventory Team on how improvements to the inventory should be prioritised. The Executive Body aims to ensure that a rigorous science and evidence base remains central to decision-making on the future of the inventory, and stakeholders remain up to date with any significant risks to the inventory.

2.4 Geographical coverage

2.4.1 Geographical coverage used for national and international reporting

The UK inventory provides data to assess progress of the UK's commitments under the Kyoto Protocol, the UK's contribution to the EU's targets under the Kyoto Protocol, progress towards the UK Government's own Carbon Budgets and to meet commitments as a Party to the UNFCCC. Under the terms of the Withdrawal Agreement, the UK remains committed to its shared target with the EU under the Kyoto Protocol. Geographical coverage for these four purposes differs to some extent, because of the following:

1. The UK Government Carbon Budgets apply to the UK only and exclude all emissions from the UK's Crown Dependencies and Overseas Territories.
2. Kyoto Protocol coverage. For the second commitment period, this includes the UK plus:
   a. Crown Dependencies (Guernsey, Isle of Man and Jersey)
   b. Overseas Territories (Cayman Islands, Falkland Islands and Gibraltar only. Other Overseas Territories are not included as they are not signed up to the Kyoto Protocol).
3. Monitoring Mechanism Regulation (MMR) coverage. The UK's commitments under the EU MMR, which has been set up to enable the EU to monitor progress against its Kyoto Protocol target, only includes the UK and Gibraltar, since the Crown Dependencies and other Overseas Territories are not in scope of the EU2020 target.
4. UNFCCC coverage. The UK's ratification of the UNFCCC has been extended to the Overseas Territories of Bermuda, the Cayman Islands, the Falkland Islands and Gibraltar; and the Crown Dependencies of Guernsey, the Isle of Man and Jersey and the UK reports an inventory on this basis.

Unless otherwise indicated, this report presents emissions estimates based on UNFCCC coverage. This is consistent with the geographical coverage of emissions projections presented in Chapter 4 of this report.

Table 2.1 shows the total GHG emissions estimates associated with the geographical coverages of the United Kingdom, Crown Dependencies and Overseas Territories including net emissions/removals from LULUCF. Together these total the overall emissions estimates submitted to the UNFCCC.

Table 2.1: UK GHG emissions by geographical coverage, $MtCO_2e$

	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
United Kingdom	806.3	755.4	718.2	692.3	608.6	507.9	483.1	471.6	463.5	447.9	405.5
Crown Dependencies	1.7	1.8	1.9	1.6	1.5	1.4	1.4	1.4	1.4	1.5	1.3
Overseas Territories	1.8	1.9	2.0	2.3	2.5	2.7	2.6	2.7	2.8	2.7	2.5
Aviation and shipping between UK and Crown Dependencies	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
Aviation and shipping between UK and Overseas Territories	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.1
Aviation between Crown Dependencies and Overseas Territories	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	810.2	759.5	722.6	696.7	613.1	512.5	487.5	476.2	468.1	452.5	409.5
Change from 1990 (%)		-6.3	-10.8	-14.0	-24.3	-36.7	-39.8	-41.2	-42.2	-44.1	-49.5

Source: UK GHG Inventory, 1990-2020.

Note: There are no shipping movements reported between the Crown Dependencies and Overseas Territories and so it is reported as 'Not Occurring' in the UK's GHG inventory.

2.5 GHG emissions trends

As shown in Table 2.1, total net emissions decreased by around 49.5% since 1990. The full time series can be viewed in Annex II, Table 1. The fluctuations in emissions between 2009 and 2012 are due to a number of one-off effects in the series – namely the 2008 recession, which reduced consumption and led to a reduction in emissions; and particularly cold weather in the UK in 2010 and 2012 that resulted in increased emissions from gas for heating. In 2020, the coronavirus (COVID-19) pandemic and the resulting restrictions introduced across the UK had major impacts on various aspects of society and the economy. As a result, COVID-19 will have had a significant impact on greenhouse gas emissions in the UK, in particular from transport and from businesses. Other factors such as warm weather and the continued decarbonisation of electricity generation will also have influenced the emissions reductions between 2019 and 2020.

Annex II contains tables summarising the UK's GHG emissions. More details can be found in the UK's annual GHG inventory, published in April 2022[9].

Unless otherwise indicated, percentages quoted relate to net emissions (i.e. accounting for carbon sinks in the LULUCF sector).

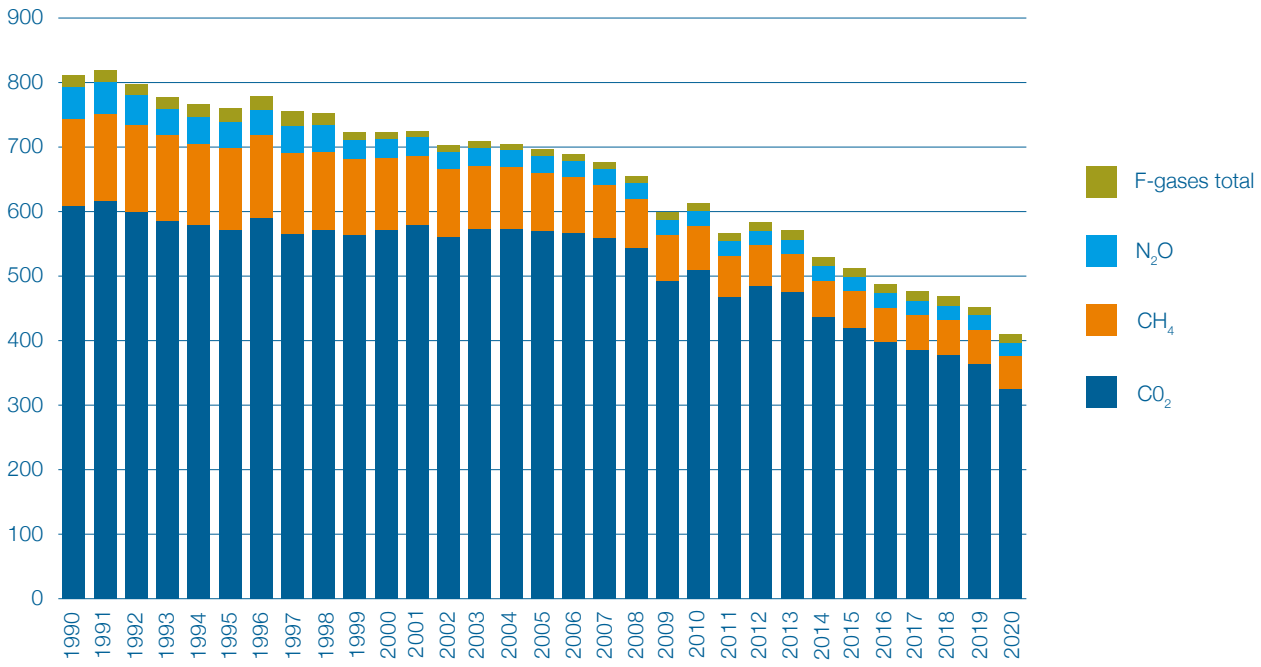
2.5.1 GHG emissions inventory by gas

Figure 2.2 shows the trend in emissions between 1990 and 2020 for the basket of seven GHGs covered by the Kyoto Protocol. The changes in emissions relative to a 1990 index are shown in Figure 2.3.

Table 2.2 shows historical data for CO_2 and the other GHGs. Total GHG emissions have fallen by approximately 49.5% over this period. Annex II, Table 1 shows more detailed data available for all years from 1990-2020. Please note the emissions estimates for CH_4 and N_2O in Annex II, Tables 1(b) and 1(c) are not weighted by GWP and therefore differ from the emissions estimates presented in this report and the emissions estimates in Annex II, Table 1 (Emissions trends: Summary)

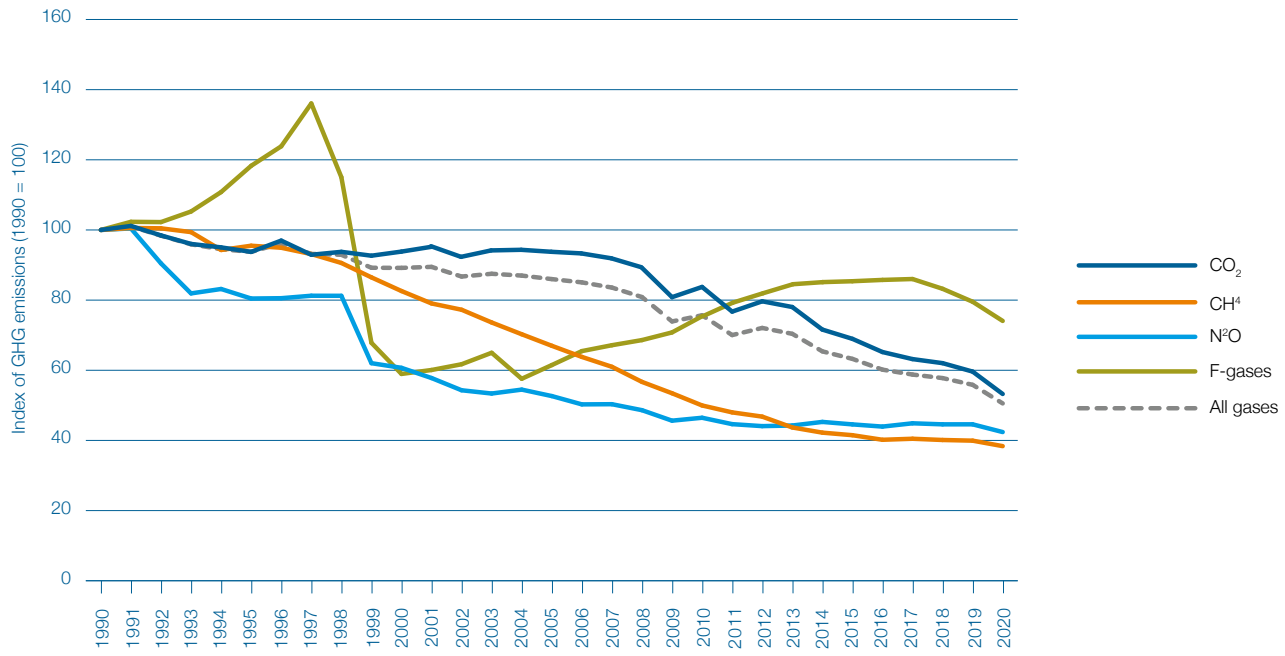
[9] 1990-2020 UK National Inventory Report (NIR): https://unfccc.int/documents/461922

Figure 2.2: Total emissions of GHGs, 1990–2020, $MtCO_2e$



Source: UK GHG Inventory, 1990-2020

Figure 2.3: Index of GHG emissions by gas, 1990-2020



Source: UK GHG Inventory, 1990-2020

Table 2.2: UK GHG emissions, $MtCO_2e$

Gas	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
Carbon dioxide (CO_2)	608.6	570.6	571.1	569.8	509.8	419.7	396.8	384.6	377.5	362.9	324.0
Methane (CH_4)	134.6	128.5	111.1	90.1	67.2	55.8	54.1	54.5	54.0	53.7	51.6
Nitrous oxide (N_2O)	49.7	40.0	30.2	26.2	23.1	22.2	21.9	22.3	22.2	22.2	21.1
Hydrofluorocarbons (HFCs)	14.4	18.6	7.8	9.2	12.1	14.1	14.1	14.0	13.7	13.0	12.2
Perfluorocarbons (PFCs)	1.6	0.6	0.6	0.4	0.3	0.3	0.3	0.4	0.1	0.2	0.2
Sulphur hexafluoride (SF_6)	1.2	1.2	1.8	1.0	0.7	0.4	0.4	0.4	0.5	0.5	0.4
Nitrogen trifluoride (NF_3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	810.2	759.5	722.6	696.7	613.1	512.5	487.5	476.2	468.1	452.5	409.5

Source: UK GHG Inventory, 1990-2020

The sections that follow summarise the main factors affecting the historical trend by gas. Percentages and data quoted in these sections refer to the full UNFCCC geographical coverage unless otherwise specified. Annex II has more detailed data available for all years from 1990-2020.

2.5.1.1 Carbon dioxide

Emissions of CO_2 are by far the largest component of total GHG emissions, making up 79.1% of the inventory in 2020. Net CO_2 emissions (all anthropogenic sources minus removals by sinks) in 1990 were estimated to be 608.6 $MtCO_2e$, or an estimated 75.1% of the UK's total emissions of GHGs. By 2020, CO_2 emissions estimates had been reduced by 46.8% to 324.0 $MtCO_2e$.

The main source of CO_2 is from combustion of fossil fuels, of which the largest sources are power generation and road transport. Emissions have reduced across the time series due to significant investments in renewable energy generation, fuel switching, and improvements in end-use efficiency. The strong link between gas and electricity use and CO_2 emissions means that short term trends can be dominated by UK temperatures. In cold years like 1996, 2010, and 2012 there was an increase in demand for gas and electricity for heating and in warm years like 2011 and 2014 there was a decrease.

2.5.1.2 Methane

The second largest source of greenhouse gases is CH_4, making up 12.6% of the inventory in 2020. CH_4 emissions in 1990 were estimated to be 134.6 $MtCO_2e$, or an estimated 16.6% of the UK's total emissions of GHGs. By 2020, CH_4 emissions estimates had been reduced by 61.6% to 51.6 $MtCO_2e$.

The main sources of CH_4 are agriculture, waste disposal, leakage from the gas distribution system and coal mining. Reductions in CH_4 emissions in the UK are driven by the increased utilisation of methane from landfills, a large decline in UK coal mining, investment in improvements to the natural gas supply infrastructure to reduce leakage and a reduction in livestock numbers.

2.5.1.3 Nitrous oxide

Emissions of N_2O have also reduced by over half since 1990. N_2O emissions made up 5.1% of the inventory in 2020. N_2O emissions in 1990 were estimated to be 49.7 $MtCO_2e$, or an estimated 6.1% of the UK's total emissions of GHGs. By 2020, N_2O emissions estimates had been reduced by 57.6% to 21.1 $MtCO_2e$.

Most N_2O emissions are generated from the agriculture sector. Agriculture sector N_2O emissions have decreased primarily due to reduced emissions from synthetic fertiliser application. N_2O is also released during the production of nitric and adipic acid, a significant source in 1990, contributing to approximately half of all N_2O emissions. Due to a decline in production together with the installation of abatement equipment, the Industrial Processes and Other Product Use (IPPU) sector now only contributes around 4% of N_2O emissions.

2.5.1.4 Fluorinated gases (hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride)

Emissions of the fluorinated or industrial gases (F-gases) are small in absolute terms, but their significance is increased by high Global Warming Potential (GWP) values, see Table 1(d), Annex VI. For the purpose of accounting under the Kyoto Protocol, the UK has chosen to use 1995 as the base year for emissions of HFCs, PFCs, SF_6 and NF_3. Comparisons for F-gases will therefore be made against both 1990 and 1995 emissions.

The smallest percentage reduction in emissions across the time series is for the F-gases. Together, F-gas emissions made up 3.1% of the inventory in 2020. F-gas emissions in 1990 were estimated to be 17.3 $MtCO_2e$, or an estimated 2.1% of the UK's total emissions of GHGs. F-gas emissions in 1995 were estimated to be 20.4 $MtCO_2e$, or an estimated 2.7% of the UK's total emissions of GHGs. By 2020, F-gas emissions had been reduced by 25.9% since 1990 and 37.4% since 1995, to 12.8 $MtCO_2e$.

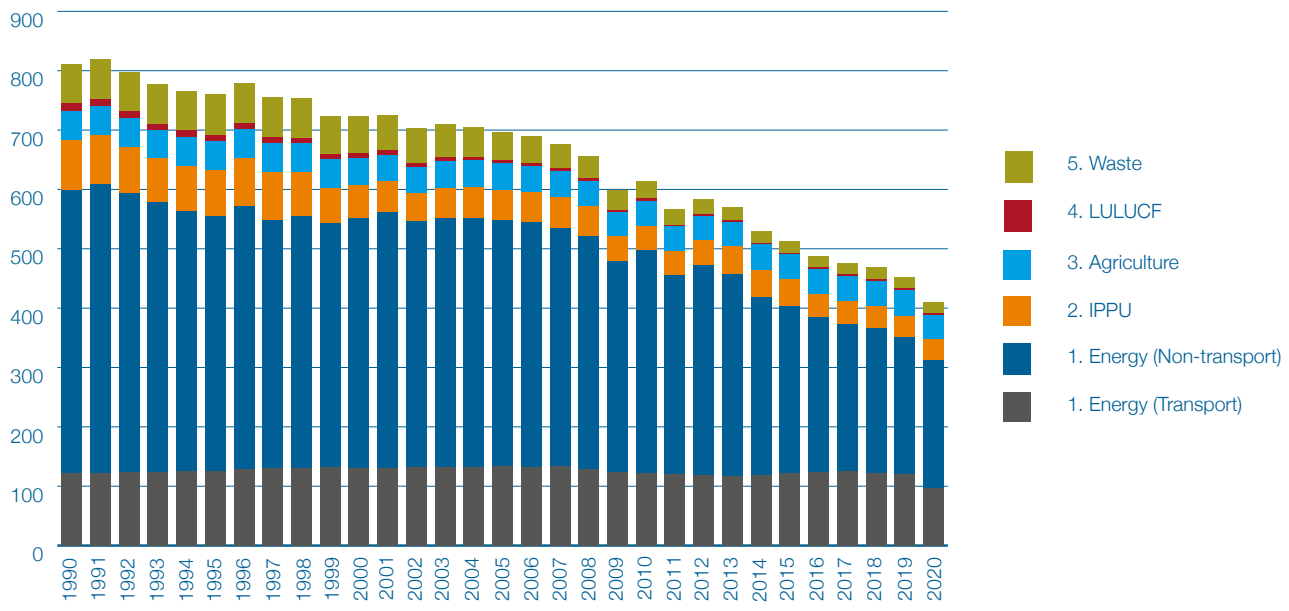
All F-gas emissions are accounted for under the IPPU sector. F-gas emissions have decreased since 1995, due mainly to the fall in F-gas manufacture in the UK and the installation of abatement equipment at two of the three UK manufacturers. These emissions reductions have been to some extent offset by the increases in the use of HFCs as substitutes for ozone depleting substances, particularly in refrigeration and air conditioning.

2.5.2 GHG emissions inventory by sector

Figure 2.4 shows the contribution to UK GHG emissions of different sectors by emissions source from 1990-2020. The changes in emissions relative to a 1990 index are shown in Figure 2.5.

Table 2.3 shows historical data on emissions trends by source category. The full time series is given in Annex II.

Figure 2.4. GHG emissions per source category, 1990-2020, $MtCO_2e$



Source: UK GHG Inventory, 1990-2020

The largest contribution to greenhouse gas emissions is from the energy sector. In 2020 this contributed 76.3% to the total net emissions. Emissions of CO_2, CH_4 and N_2O all arise from this sector, but CO_2 is the dominant gas consisting of 97.4% of emissions. Since 1990, emissions from the energy sector have declined by 47.8%. The energy sector GHG emissions are primarily CO_2 from fossil fuel combustion in power generation, transport, manufacturing and construction, and other stationary and mobile fuel combustion. Emissions from the Transport sub-sector (Figure 2.4; Table 2.3) are dominated by emissions from road transport, which peaked in 2007, but have declined since 2007, and by 2019 were just below 1990 levels. A large decrease can be seen in 2020 due to the effects of COVID-19, as there was a large fall in travel due to the pandemic.

The second largest source of greenhouse gases is the agricultural sector, contributing 9.9% in 2020. Emissions from this sector are mostly CH_4 and N_2O, contributing 61.3% and 35.8% respectively. Only a small amount of CO_2 is emitted in comparison. Since 1990, emissions from this sector have declined by 16.7%.

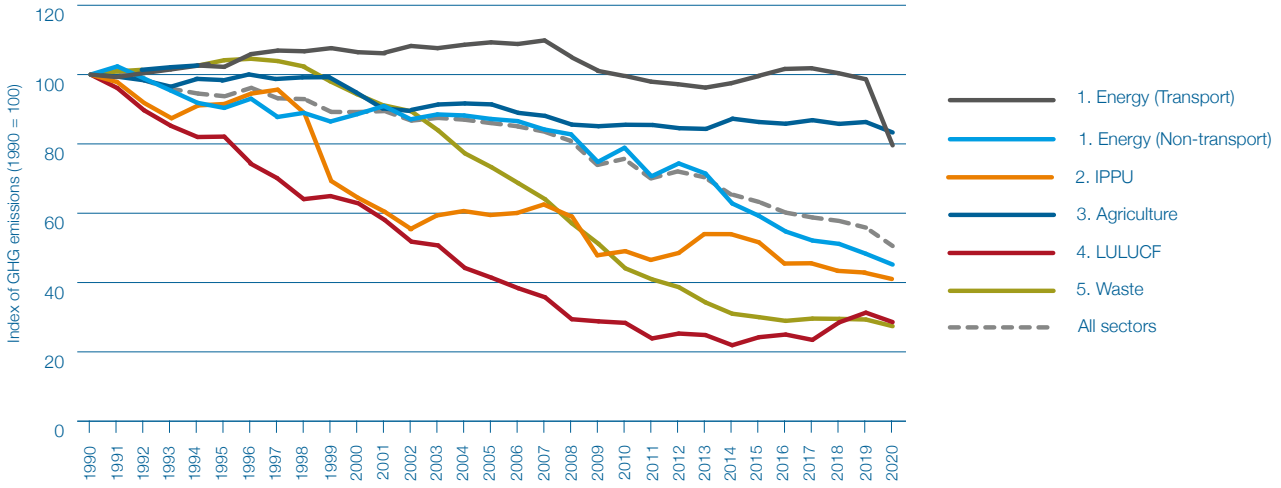
Industrial processes and product use make up the third largest sector for greenhouse gas emissions in the UK, contributing 8.5% to the national total in 2020. Emissions of all seven direct greenhouse gases occur from this sector. Since 1990, emissions from this sector have declined by 59.0%.

Land-Use, Land-Use Change, and Forestry (LULUCF) is the only sector which currently contains both sinks and sources of CO_2 emissions. Emissions from this sector occur for CO_2, N_2O and CH_4. The LULUCF sector is a net source of emissions in the UK, contributing 0.9% of the national total in 2020. Since 1990, net emissions from this sector have declined by 71.4%. This long-term fall has been driven by a reduction in emissions from grassland, cropland and settlements, and an increase in the sink provided by forest land, with an increasing uptake of CO_2 by trees as they reach maturity, in line with the historical planting pattern. There has also been some reduction in emissions since 1990 due to changes in agricultural practices.

The remaining sector that contributes to direct greenhouse gas totals is waste. In 2020 this contributed 4.4% to the national total. This sector leads to emissions of CO_2, CH_4

and N_2O, with emissions occurring from waste incineration, solid waste disposal on land and wastewater handling. CH_4 is the dominant gas consisting of 88.8% of all emissions from the waste sector. Emissions from this sector have declined and in 2020 were 72.6% below 1990 levels.

Figure 2.5. Index of GHG emissions per source category, 1990-2020, $MtCO_2e$



Source: UK GHG Inventory, 1990-2020

Table 2.3. Aggregated emission trends per source category, $MtCO_2e$

Sector	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
1. Energy	598.0	554.9	551.6	548.3	497.1	403.6	384.7	372.6	366.2	350.5	312.3
...Of which: A.3. Transport	122.5	125.2	130.4	133.7	122.0	122.0	124.5	124.7	123.0	120.9	97.5
...Of which: Non-transport	475.5	429.8	421.2	414.6	375.1	281.6	260.2	247.8	243.2	229.7	214.9
2. Industrial Processes and Product Use (IPPU)	85.0	77.8	54.8	50.6	41.7	43.9	38.7	38.8	36.9	36.5	34.9
3. Agriculture	48.9	48.1	46.5	44.7	41.9	42.3	42.0	42.5	42.0	42.3	40.7
4. LULUCF	13.2	10.8	8.3	5.5	3.7	3.2	3.3	3.1	3.8	4.1	3.8
5. Waste	65.1	67.8	61.5	47.7	28.7	19.6	18.9	19.3	19.2	19.1	17.9
Total	**810.2**	**759.5**	**722.6**	**696.7**	**613.1**	**512.5**	**487.5**	**476.2**	**468.1**	**452.5**	**409.5**

Source: UK GHG Inventory, 1990-2020

2.5.3 International aviation and shipping

International aviation and shipping refer to emissions associated with travel from a location within the geographic scope of the inventory to a location outside that scope. In line with the approach adopted by the UNFCCC, combustion emissions from these journeys are to be reported as 'memo items' but are not included in the UK's national totals presented in the inventory. Table 2.4 summarises emissions trends from international aviation and shipping from 1990 to 2020.

Table 2.4. Aggregated emission trends per source category (international aviation and shipping), $MtCO_2e$

Sector	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
International aviation	15.5	20.2	30.3	35.1	31.8	33.4	33.6	36.2	36.6	36.8	14.5
International shipping	9.0	8.8	8.3	9.0	11.7	10.8	11.4	10.9	10.6	9.9	8.6
Total (memo items)	**24.6**	**29.0**	**38.5**	**44.0**	**43.5**	**44.2**	**45.1**	**47.2**	**47.2**	**46.7**	**23.1**

Source: UK GHG Inventory, 1990-2020

2.6 Uncertainties

This section sets out the uncertainties associated with the 2020 emissions estimates, and percentage changes to emissions from 1990, presented in this report. The UK GHG inventory uses error propagation and Monte Carlo simulation methods to estimate uncertainties for GWP weighted emissions of all GHGs. The Monte Carlo uncertainty estimates are expressed as a 95% confidence interval and are summarised in Table 2.5.

Among the different greenhouse gases, estimated emissions of CO_2, which dominate GWP-weighted emissions, have the lowest uncertainty (around 2%). There are much larger uncertainties associated with emissions of other gases, but since the emissions are smaller, this does not have a significant impact on the overall uncertainty of total GHG emissions. Nitrogen trifluoride and perfluorocarbons emissions estimates are the most uncertain. LULUCF, waste and agriculture are the sectors with the highest uncertainty. The analysis of the uncertainties in the nitrous oxide emissions is particularly difficult because emissions sources are diverse, and few data are available to form an assessment of the uncertainties in each source.

Table 2.5: Summary of Monte Carlo uncertainty estimates for UK, CDs and OTs[5] GHG emissions, 1990-2020

Gas	1990 Emissions ($MtCO_2e$)[1]	2020 Emissions ($MtCO_2e$)[1]	Uncertainty[2] in 2020 emissions	Range of uncertainty in 2020 emissions		Percentage change between 1990 and 2020	Range of likely % change between 1990 and 2020[3]	
				2.5 percentile	97.5 percentile		2.5 percentile	97.5 percentile
CO_2[4]	608.6	324.0	2%	317.7	330.3	-47%	-48%	-46%
CH_4	134.8	51.6	15%	45.1	60.2	-61%	-71%	-50%
N_2O	49.8	21.2	17%	18.3	25.6	-57%	-70%	-42%
HFCs	14.4	12.2	10%	11.0	13.4	-15%	-29%	2%
PFCs	1.6	0.2	24%	0.1	0.2	-90%	-93%	-87%
SF_6	1.2	0.4	5%	0.4	0.4	-66%	-70%	-62%
NF_3	0.0	0.0	46%	0.0	0.0	227%	61%	513%
All GHGs	810.5	409.6	3%	399.6	420.8	-49%	-52%	-47%

Source: UK GHG inventory, 1990-2020

Notes:

[1] 1990 and 2020 emissions estimates, and the percentage change, are presented as the central estimate from the uncertainty model. These differ from the actual emissions estimates presented in other tables in this report.

[2] The uncertainty is expressed as a percentage relative to the mean value 2020 emissions. Calculated as 0.5*R/E where R is the difference between 2.5 and 97.5 percentiles and E is the mean.

[3] The range of the likely percentage change between 1990 and 2020 is equivalent to a 95% probability that the percentage change is between the two values shown.

[4] Carbon dioxide emissions are net emissions. Total emissions minus removals.

[5] Geographical coverage is UNFCCC coverage (see section 2.4.1). Uncertainties are not calculated for different geographical coverages but would be expected to be similar.

The table demonstrates the estimated uncertainties by GHG, as well as overall uncertainty on total UK GHG emissions, which is 3% in 2020. The likely percentage change between 1990 and 2020 lies between -47% and -52%, with a central estimate of -49%. Note that this is the central estimate from the uncertainty model and differs slightly from the actual emissions estimates presented elsewhere.

2.7 Comparison of Seventh and Eighth National Communications

Since the publication of the Seventh National Communication in 2017, which presented emissions estimates from the UK's 1990-2015 inventory, various updates and revisions to methodologies have been implemented in the UK GHG inventory that have impacted on the time-series of emissions. The most significant changes are highlighted in Table 2.6 below. Full details of changes can be found in the section 'Revisions to the UK's Greenhouse Gas Inventory' in the yearly Final UK greenhouse gas emissions national statistics publications[10] and in the UK's National Inventory Reports.

Table 2.6. Major revisions to the UK GHG inventory since publication of the Seventh National Communication

Change	Effect on inventory
Reporting of peatlands consistent with the IPCC 2013 Wetlands Supplement[11] (change implemented in 1990-2019 inventory, published in 2021).	Increase in estimates of emissions from the LULUCF sector, mainly in the cropland and grassland categories. Implementation of the Wetlands Supplement into the inventory converts the LULUCF sector of the UK inventory from a net greenhouse gas sink to a net source in all years where it was a net sink.
Implementation of new shipping emissions model (change implemented in 1990-2016 inventory, published in 2018).	Increase in shipping emissions estimates.
Methodological update to the land-use change activity data used in the LULUCF soils and non-forest biomass models, to assimilate a wider range of land use and land use change data sources to produce an annual time series (change implemented in 1990-2020 inventory, published in 2022).	Decrease in estimated emissions from the LULUCF sector.
Revisions to estimates of SF_6 from Airborne Warning And Control System (AWACS) to replace IPCC default emissions factor (change implemented in 1990-2020 inventory, published in 2022).	This marks a significant improvement to the accuracy and representativeness of the emissions estimates for this source and has led to a significant reduction in emissions estimates for all years.
Development of new emissions estimation models to make use of new and existing data sources for upstream oil and gas estimates (change implemented in 1990-2020 inventory, published in 2022).	Revisions to the time series of oil and gas emissions; improved time series consistency for earlier years.
Implementation of HFC Outlook model for estimating emissions from Refrigeration, Air Conditioning and Heat Pumps (RACHP) (change implemented in 1990-2019 inventory, published in 2021).	Revisions to the timeseries of HFC emissions.
Development of a new model used to estimate industrial wastewater emissions, including methane correction factors (MCFs) per treatment pathway instead of a single MCF (change implemented in 1990-2019 inventory, published in 2021).	Decrease in estimated emissions from industrial wastewater.
Changes to agriculture model as part of Defra's Smart Inventory, including a move to Tier 3 approaches for estimating enteric methane emissions for all cows and sheep and methane from manure management, using UK-specific data (change implemented in 1990-2016 inventory, published in 2018).	Decrease in agriculture emissions estimates.
Changes to estimates of emissions from landfill waste, to calculate Devolved Administration-specific emissions (change implemented in 1990-2016 inventory, published in 2018).	Slight increase in landfill waste emissions estimates later in the timeseries.

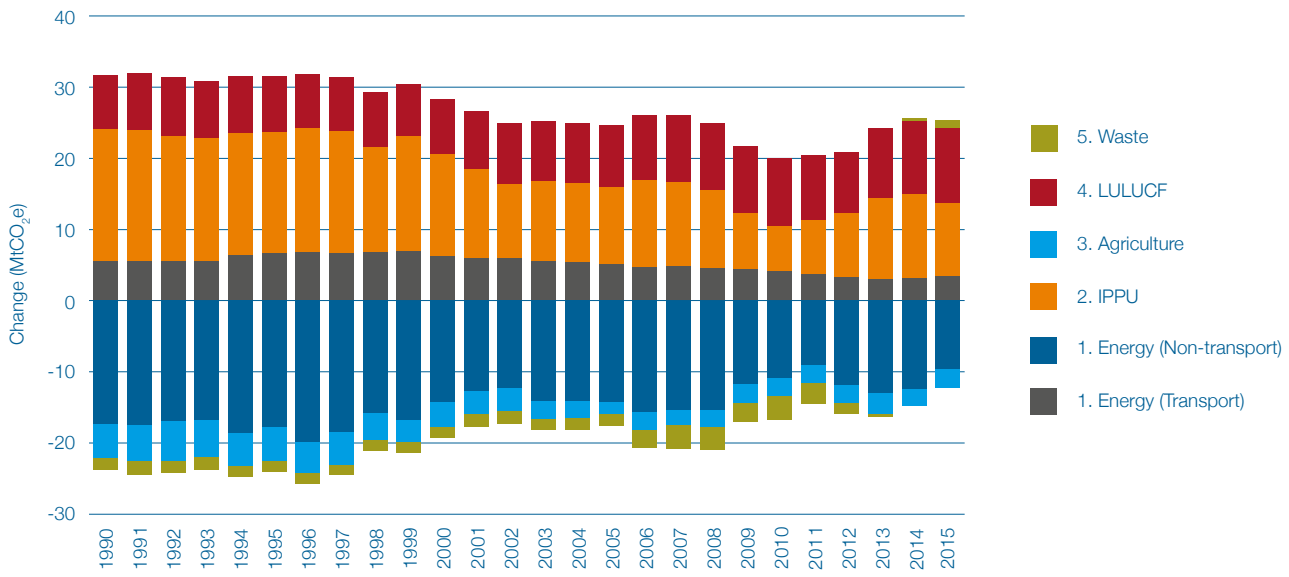
[10] Final UK greenhouse gas emissions national statistics. https://www.gov.uk/government/collections/uk-territorial-greenhouse-gas-emissions-national-statistics

[11] 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands. https://www.ipcc-nggip.iges.or.jp/public/wetlands/index.html

Change	Effect on inventory
Revision to lubricant activity data to use bottom-up estimates where available and otherwise directly using DUKES' (Digest of UK Energy Statistics) sectoral estimates (change implemented in 1990-2019 inventory, published in 2021).	Moderate increase in CO_2 emissions estimates.
Nitrogen balance approach: review of approach to accounting for nitrogen removed from wastewater in the form of sewage sludge (change implemented in 1990-2020 inventory, published in 2022).	Increase in N_2O emissions estimates.
Several revisions to the estimates of emissions from the manufacture of semiconductors following a general review of the model parameters (change implemented in 1990-2020 inventory, published in 2022).	A flatter trend in total CO_2e for 2001-10; removing the exponential growth previously assumed for 2010 onwards; some changes in the relative importance of each pollutant.
Changes to estimates of emissions from forest land including improvement of the forest carbon (CARBINE) model and changes to deforestation areas leading to changes in carbon stock values and emissions (change implemented in 1990-2016 inventory, published in 2018; subsequent improvements to CARBINE have also been implemented in subsequent years).	Decrease in LULUCF net emissions estimates.

How these and other changes have impacted on total emissions over the time series when compared to data presented in the 7th National Communication (1990-2015) is summarised, by sector, in Figure 2.6 below. The IPPU and LULUCF sectors have seen increases across all years due to the changes made to the inventory. In comparison, agriculture and energy now have lower emissions than previously reported.

Figure 2.6. Changes in emissions by source sector due to revisions to the UK GHG inventory since the 7th National Communication



Source: UK GHG Inventory, 1990-2020.

The inventory has a well-developed quality assurance and quality control (QA/QC) system, which is described in section 1.6 of the NIR. Quality assurance and quality control (QA/QC) activities comprise:

- Quality Control (e.g. raw data checks, calculation checks, output checks) to minimise the risk of errors within the available resources to deliver the inventory;
- Quality Assurance (e.g. peer reviews, bilateral reviews, expert reviews) whereby independent experts periodically review all or part of the inventory to identify potential areas for improvement;

- Verification, where alternate independent datasets are available to compare against inventory data and trends.

The current system complies with the Tier 1 procedures outlined in the IPCC Good Practice Guidance (IPCC, 2006) and also includes a range of bespoke sector specific QA/QC activities that comply with Tier 2. Ricardo Energy and Environment, the Inventory Agency, is also fully accredited to ISO 9001:2015 and ISO 14001:2015.

The UK inventory QA/QC system includes three core components:

- The QA/QC Plan is a document maintained by the GHGI's QA/QC manager (at Ricardo Energy and Environment) and defines the specific quality objectives and QA/QC activities required in undertaking the compilation and reporting of GHG estimates. The plan sets out source-specific and general (cross-cutting) activities to ensure that quality objectives are met within the required inventory reporting timeframe. The QA/QC plan also assigns roles and responsibilities for the Inventory Agency team and records the key outcomes from inventory QA activities in order to underpin a programme of continuous improvement.
- QA/QC Implementation includes the physical undertaking of the QA/QC activities throughout the data gathering, compilation and reporting phases of the annual inventory cycle and in accordance with the QA/QC plan.
- Documentation and Archiving. Documentation is embedded within the UK's compilation tools. The NIR transparently describes the data sources, methods, assumptions and QA/QC implementation used in producing the GHG inventory including records of activities undertaken, findings/issue logs, recommendations and any necessary actions taken or planned. Archiving ensures a complete backup and storage of all material used for the compilation of the estimates.

To verify the GHG inventory, BEIS has a monitoring and verification research programme that derives independent emission estimates for the UK using in-situ high-precision high-frequency atmospheric observations of the principal GHGs reported in the inventory, and a range of other trace gases, at the Mace Head Atmospheric Research Station on the west coast of the Republic of Ireland and at tall tower sites in the UK DECC (Deriving Emissions linked to Climate Change) Network[12]. The measured atmospheric concentrations are used to infer UK emissions estimates using an inversion modelling technique[13].

The verification programme identifies discrepancies between atmospheric concentrations and the inventory and helps to ensure the inventory is a reliable evidence base for informing policy decisions. Most recently a comparison of inventory estimates of HFC-134a with those from the verification programme has suggested that the inventory may be overestimating its HFC-134a emissions. Further analysis of the mobile air conditioning sector of the inventory, the main UK source of HFC-134a, has suggested several parameters with high uncertainty may be the source of the difference. Revisions to the refrigeration and air conditioning model of the inventory (to review assumptions following the implementation of the EU F-gas regulations) have been made, and the comparison between the inventory and verification approaches is now in better agreement.

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[12] http://www.bris.ac.uk/chemistry/research/acrg/current/decc.html

[13] Manning, A. J., O'Doherty, S., Jones, A. R., Simmonds, P. G., and Derwent, R. G. (2011): Estimating UK methane and nitrous oxide emissions from 1990 to 2007 using an inversion modeling approach, Journal of Geophysical Research: Atmospheres, 116, https://doi.org/10.1029/2010JD014763.

2.8 Indirect greenhouse gases

Table 2.7 lists the indirect greenhouse gases for which the UK has made emissions estimates which are not included in GWP-weighted GHG emissions totals. Nitrogen oxides (NO_x), carbon monoxide (CO) and Non-Methane Volatile Organic Compounds (NMVOCs) are included in the inventory and reported under the UNFCCC because they can result in an increase in tropospheric ozone concentration, increasing radiative forcing. Sulphur oxides (reported as sulphur dioxide, SO_2) are included because they contribute to aerosol formation.

Table 2.7 Indirect GHG emissions (Kt)

Gas	1990	1995	2000	2005	2010	2015	2020
NO_x	2923	2520	2024	1782	1268	1035	712
CO	7622	6289	4644	3099	1952	1601	1309
NMVOC	2787	2302	1713	1243	915	828	787
SO_2	3588	2545	1303	794	458	266	138

Source: National Inventory Report 1990-2020

Since 1990, emissions of all indirect gases have decreased. The largest source of emissions for NO_x, CO and SO_2 is the energy sector, with over 80% of emissions arising from activities within this sector. For NMVOCs, 58% of emissions are from the industrial processes and product use sector, with other significant contributions from the energy sector.

Chapter 3 Policies and Measures

3.1 Key developments

- In June 2019, following advice from the Climate Change Committee[1], the UK Government became the first major economy to **set a legally binding target to achieve net zero greenhouse gas emissions by 2050**. This will bring an end to the UK's domestic contribution to climate change.
- The UK's Sixth Carbon Budget[2] put into law a target to reduce greenhouse gas emissions to fewer than 965MtCO_2e between 2033-2037 – meaning emissions will be approximately 77% lower in 2035 than in 1990.[3]
- The UK over-achieved against the first (2008-12) and second (2013-17) carbon budgets, and the latest projections show that we are on track to meet the third (2018-22)[4].
- In October 2021, the UK **published its Net Zero Strategy**[5] – a cross-economy strategy which keeps us on our path to net zero, including the action we will take to keep us on track for meeting carbon budgets and our Nationally Determined Contribution (NDC)[6].
- **Several sectoral strategies** have been published in the past couple of years, including: the Energy White Paper[7], the North Sea Transition Deal[8], the Industrial

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1 https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

2 https://www.legislation.gov.uk/ukdsi/2021/9780348222616

3 Our ambitious future targets for carbon emissions have not changed – Carbon Budget 6 remains as it was set in law in 2021, with a limit on emissions of 965MtCO_2e over 2033-37. At COP26, an international decision was taken on which set of Global Warming Potentials (measures of the global warming effect of each greenhouse gas) would be adopted going forwards. This decision has the effect of changing our backwards-looking emissions figures compared to our previous assumptions, which means the percentage reduction between 1990 and 2035 has changed slightly, from 78% to approximately 77%

4 https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019

5 https://www.gov.uk/government/publications/net-zero-strategy

6 https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc

7 https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future

8 https://www.gov.uk/government/publications/north-sea-transition-deal

Decarbonisation Strategy[9], the Transport Decarbonisation Plan[10], the Hydrogen Strategy[11], the Heat and Buildings Strategy[12] and the 25 Year Environment Plan[13].

- The **Prime Minister's Ten Point Plan for a Green Industrial Revolution**[14], **published in December 2020**, sets out how the UK intends to build back better, greener, and faster. This means supporting green jobs, levelling up, accelerating our path to net zero, protecting our natural environment, and creating long-term advantage for the UK.
- The **British Energy Security Strategy**[15], published in April 2022 builds on the **Prime Minister's Ten Point Plan** and the **Net Zero Strategy,** considering rising global energy prices provoked by surging demand after the pandemic as well as Russia's invasion of Ukraine. This will be central to reducing Britain's dependence on fossil fuels, and boosting our diverse sources of homegrown energy for greater energy security in the long-term.
- In April 2022, the UK Department for Education published its **Sustainability and Climate Change Strategy**[16], for the education and children's services systems. It is centred on four strategic aims: 1) Excellence in education and skills for a changing world 2) Net Zero, 3) Resilience to Climate Change and 4) A better environment for future generations.

3.2 Introduction

This chapter sets out the policies and proposals as set out in the Net Zero Strategy and the British Energy Security Strategy, which accelerates this plan.

Chapter 4 sets out the UK's latest greenhouse gas emissions projections. These are based on the 2019 edition of the UK's Energy and Emissions Projections (EEP 2019, published October 2020), for which the policy cut-off point was in August 2019. They therefore represent a counterfactual, showing what the UK would expect to happen in the absence of further policies including those set out in the Net Zero Strategy and British Energy Security Strategy. Over time, future projections will include further measures from the Net Zero Strategy and British Energy Security Strategy as they progress to the impact assessment stage.

Some further policies introduced after EEP 2019 have been included in Annex 2, CTF Table 3, but these are not yet quantified.

3.3 Policy making process

Net zero and adaptation are at the heart of government decision-making, and this is driven, first and foremost, by the Prime Minister. Two Cabinet Committees[17] were established in

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9 https://www.gov.uk/government/publications/industrial-decarbonisation-strategy

10 https://www.gov.uk/government/publications/transport-decarbonisation-plan

11 https://www.gov.uk/government/publications/uk-hydrogen-strategy

12 https://www.gov.uk/government/publications/heat-and-buildings-strategy

13 https://www.gov.uk/government/publications/25-year-environment-plan

14 https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution

15 https://www.gov.uk/government/publications/british-energy-security-strategy

16 https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy

17 https://www.gov.uk/government/publications/the-cabinet-committees-system-and-list-of-cabinet-committees/list-of-cabinet-committees-and-their-membership

2020. The Prime Minister chairs the Climate Action Strategy Committee which considers matters relating to the delivery of the UK's domestic and international climate strategy. The COP26 President chairs the Climate Action Implementation Committee which considers matters relating to the delivery of the COP26 legacy, net zero and building the UK's resilience to climate impacts.

The Government Priorities Delivery Committee, also chaired by the Prime Minister, coordinates and drives progress and accountability on the delivery of his priority missions. Net zero is one of six priority missions, demonstrating the importance that the UK Government places on achieving its climate goals.

These committees are supported by well-established and robust governance at official level – including a cross-government Director General group to ensure a whole-of-government approach to climate policy. Chaired by the BEIS Director General for Net Zero Strategy and International, this group takes a whole system perspective, to support the delivery of significant climate action.

The UK Government's programme is supported by action taken by the Devolved Administrations in Scotland, Wales and Northern Ireland. While the UK Government has overall responsibility for ensuring that a programme is put in place to deliver the UK's NDC and its domestic carbon budgets, all the administrations will play a part in meeting these targets. The approach taken by each administration differs, drawing on the range of policies at their disposal. Policies and programmes specific to each Devolved Administration are included throughout this chapter.

The UK Government and the Devolved Administrations have established governance arrangements to ensure a joined-up and collaborative approach to addressing climate change. At the bi-monthly Net Zero, Energy and Climate Change Interministerial Group, UK Government ministers meet with Devolved Administration counterparts to discuss existing and emerging policies that will contribute to delivery of net zero targets across the UK. The group is supported by the official-level Net Zero Nations Board which meets on alternate months.

3.4 Domestic climate legislation and targets

3.4.1 UK

The Climate Change Act 2008[18] established the world's first legally binding framework in respect of national emissions targets and carbon budgets. Since the publication of the Seventh National Communication report, the UK has amended the Climate Change Act 2008 to require the net UK carbon account to be at least 100% lower than its 1990 baseline by 2050. In doing so, the UK became the first major economy to legislate for net zero emissions

The UK's carbon budgets impose legally binding limits on emissions across five-year periods. The UK set its Sixth Carbon Budget (2033-2037) in 2021 which, for the first time in UK carbon budgets, includes emissions from international aviation and international shipping.

Further information on carbon budget accounting and performance can be found in Chapters 3 and 4 of the UK's Fifth Biennial Report respectively.

[18] https://www.legislation.gov.uk/ukpga/2008/27/contents

3.4.2 Scottish Government

Scotland has its own distinct framework of statutory climate change targets, set under the Climate Change (Scotland) Act 2009[19] as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019[20]. This legislation includes targets for Scotland to reach net zero greenhouse gas emissions by 2045, and interim targets of 75% and 90% reductions in emissions by 2030 and 2040 respectively, relative to a 1990/1995 baseline.

To help ensure delivery of the long-term targets, the Scottish framework also includes statutory annual targets for every year to net zero. All of Scotland's statutory targets are economy-wide; including territorial greenhouse gas emissions across all sectors of the economy and a fair share of those from international aviation and shipping, as well as territorial removals (including from the land use sectors). The statutory framework sets a default position that the targets are to be met through domestic action alone, without any use of international offset credits.

Progress towards Scotland's devolved targets also contributes to achievement of UK-wide emissions reduction targets.

Under Scotland's statutory framework, a Climate Change Plan setting out policies and proposals to meet the emissions reduction targets must be published at least every five years, and prepared with reference to a set of statutory Just Transition and Climate Justice principles.

In March 2021, the Scottish Government finalised the update to its Climate Change Plan[21] (which should be read alongside the original 2018 Plan[22]), setting out over 200 policies and proposals to cut greenhouse gas emissions across all sectors of the Scottish economy over the period to 2032. The updated Plan reflects the increase in emissions reduction target ambition from the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019, made in response to the Paris Agreement.

3.4.3 Welsh Government

The Welsh Government has taken the first step towards a net zero pathway for 2050 in the Net Zero Wales plan[23], published in October 2021 and covering Wales's second carbon budget period 2021 – 2025. The plan focuses on the need to "outperform" this second carbon budget of 37% average reduction in emissions, in line with the Climate Change Committee's recommendation. This is because Wales's third carbon budget (2026 – 2030) requires an average reduction of 58%, reflecting the huge step change Wales needs to make here and now if its actions are to have time to take effect. It also looks beyond to start building the foundations for Wales's third carbon budget and 2030 target, as well as net zero by 2050. It contains 123 policies and proposals across all ministerial portfolios.

Delivering policies to ensure a fair and prosperous transition to net zero will be largely dependent on the Welsh Government's ability to identify and maximise connections between policies, so that the contribution towards the seven well-being goals of the Wellbeing of

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[19] https://www.legislation.gov.uk/asp/2009/12/contents

[20] https://www.legislation.gov.uk/asp/2019/15/enacted

[21] https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/

[22] https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/

[23] https://gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf

Future Generations Act 2015 can be maximised. The net zero pathway requires Wales to decarbonise across all sectors, and therefore it is important to make the most of every policy and action.

3.4.4 Northern Ireland Executive

The Climate Change Act (Northern Ireland) 2022 received Royal Assent on 6 June 2022. This provides a basis for setting targets for the reduction of emissions. The Act includes an ambitious target of 100% reduction in emissions by 2050, with an emissions target for 2030 to be at least 48% lower than the 1990/1995 baseline. The specific targets for 2030 and 2040 will be laid before the Northern Ireland Assembly within 24 months of the Act receiving Royal Assent.

The Act places a duty on the Northern Ireland Executive's Department of Agriculture, Environment and Rural Affairs to publish and lay a Climate Action Plan (CAP) before the Assembly by the end of the first year of a carbon budget period i.e. December 2023 for the first CAP. The plan will set out how interim targets and the overall net zero target will be achieved by 2050, with subsequent plans to be published within five years.

Furthermore, the Department of Agriculture, Environment and Rural Affairs has a responsibility under the Act to set a maximum total amount for the net Northern Ireland emissions account for each budgetary period. The budgetary periods will run from 2023 – 2027 and each succeeding period of five years.

3.5 International commitments

3.5.1 The Kyoto mechanisms

The Kyoto Protocol was adopted in 1997 as an international agreement in response to the threat of climate change. The first commitment period of the Kyoto Protocol was from 2008 to 2012. The UK left the European Union on the 31 January 2020; under the terms of the Withdrawal Agreement, the UK remains committed to its shared targets and reporting with the EU under the EU's Convention pledge to the UNFCCC and the Kyoto Protocol. A single European Union (EU) Kyoto Protocol reduction target for greenhouse gas emissions of -8% compared to base-year levels was negotiated for the first commitment period, and a Burden Sharing Agreement allocated the target between Member States of the European Union. Under this agreement, the UK reduction target was -12.5% on base-year levels. The UK met its emissions reductions target for the first commitment period of the Kyoto Protocol. The second commitment period of the Kyoto Protocol applies from 2013 to 2020 inclusive. For this second commitment period, the EU, the Member States and Iceland communicated an independent quantified economy-wide emission reduction target of a 20 percent emission reduction by 2020 compared with 1990 levels (base year) ("the EU2020 target"). The second commitment period of the Kyoto Protocol concluded in December 2020, but progress against the Kyoto target will not be finalised until the 'true-up' process, after final reporting of all emissions over the commitment period has taken place. However, the UK is on track to meet its target. For more information on the UK's progress towards its Kyoto Protocol targets, see Chapter 4 of the UK's 5th Biennial Report.

3.5.2 The UK's Nationally Determined Contribution (NDC)

Under the Paris Agreement, as well as seeking to limit warming to well below 2 degrees, and to pursue efforts to achieve 1.5 degrees, the UK is committed with other countries to achieve global net zero emissions in the second half of the century.

In December 2020, the UK announced a new Nationally Determined Contribution (NDC) which commits to reducing UK greenhouse gas emissions by at least 68% by 2030 on 1990

levels. It represents a significant step forward in our ambition to tackle climate change over the next ten years, as we accelerate towards meeting our legally binding commitment to net zero by 2050. The level of the NDC is consistent with advice from the independent Climate Change Committee, Carbon Budget 6 and our commitment to reach net zero by 2050.

3.6 Summary of policies and measures

Table CTF3: Progress in achievement of the quantified economy-wide emission reduction target: information on mitigation actions and their effects

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Building Regulations Part L (2002+2005/6)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Implemented	Building Regulations set minimum energy performance standards for new buildings and when people carry out controlled 'building work' to existing properties including extensions, conversions and certain categories of renovation and replacement windows and boilers.	2002	Department for Levelling Up, Housing and Communities (DLUHC)	10,014	7,704	5,117	2,736	394
Building Regulations 2010 Part L*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	Building Regulations set minimum energy performance standards for new buildings and when people carry out controlled 'building work' to existing properties including extensions, conversions and certain categories of renovation and replacement windows and boilers.	2010	Department for Levelling Up, Housing and Communities (DLUHC)	5,014	6,414	4,928	3,843	3,005
Building Regulations 2013 Part L*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Implemented	Building Regulations set minimum energy performance standards for new buildings and when people carry out controlled 'building work' to existing properties including extensions, conversions and certain categories of renovation and replacement windows and boilers.	2013	Department for Levelling Up, Housing and Communities (DLUHC)	73	102	101	90	82
Sustainable Energy-Using Products*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement of appliances (Energy consumption)	Regulatory	Implemented	Sustainable Energy-Using Product regulations operate by setting minimum performance and information requirements (respectively) for energy-using products. They aim to take the least efficient products off the market and to give consumers clear energy use-related information to guide their purchasing decisions. This was previously implemented through product-specific EU regulations, but is now operated through UK regulation.	2008	Department for Business, Energy and Industrial Strategy (BEIS)	4,010	4,024	2,821	1,197	242
Energy Performance of Buildings Directive (EPBD; UK transposition)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	Energy Performance Certificates (EPCs) are required when any building is sold, rented out or constructed, and sometimes after refurbishment work. EPCs give information on a building's energy efficiency in a sliding scale from 'A' (very efficient) to 'G' (least efficient).	2007	Department for Levelling Up, Housing and Communities (DLUHC)	497	447	395	347	319
Carbon Trust measures*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption), Efficiency improvement in services/ tertiary sector (Energy consumption), Efficiency improvement in industrial end-use sectors (Energy consumption), Demand management/ reduction (Energy consumption)	Information	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	The Carbon Trust provided a range of measures from general advice to in-depth consultancy and accreditation, to reduce emissions and save energy and money to businesses and public sector organisations of all sizes.	2002	Companies acting on advice from Carbon Trust	307	67	0	0	0
Small and Medium Enterprises (SME) Loans*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption), Efficiency improvement in services/ tertiary sector (Energy consumption), Efficiency improvement in industrial end-use sectors (Energy consumption), Demand management/ reduction (Energy consumption)	Economic	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	The Carbon Trust provided interest free loans of £3,000 – £400,000 for small and medium sized businesses to invest in energy efficiency equipment and renewable technologies. These loans were designed so that in most cases the forecast reduction in energy costs would be similar to the total repayment amount.	2004	Administered by the Carbon Trust, Department for Business, Energy and Industrial Strategy (BEIS)	70	31	0	0	0
Warm front*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Economic	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Warm Front installed heating and insulation measures to make homes warmer and more energy efficient for private sector households in England vulnerable to fuel poverty. The scheme offered a package of heating and insulation measures of up to £3,500 (or £6,000 where oil central heating or other alternative technologies are recommended).	2000	Carillion, Department for Business, Energy and Industrial Strategy (BEIS)	253	251	264	261	257
EEC1 (energy efficiency commitment), EEC2 (2002-2008) & Baseline Carbon Emissions Reduction Target (CERT) (2008-2010)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	EEC I: GB wide regulation that required all electricity and gas suppliers with 15,000 or more domestic customers to achieve a combined energy saving of 62 TWh by 2005 by incentivising their customers to install energy-efficiency measures in homes. EEC II – energy suppliers with more than 50,000 domestic customers required to deliver a total of 130 TWh lifetime energy use reductions in GB households, primarily through the promotion of energy efficiency measures. Carbon Emission Reduction Target (CERT) – GB regulation that required all domestic energy suppliers with a customer base in excess of 50,000 domestic customers to make savings in the amount of CO_2 emitted by householders.	2002	Office of Gas and Electricity Markets (Ofgem), Large domestic energy suppliers, Department for Business, Energy and Industrial Strategy (BEIS)	2,769	2,491	2,304	2,269	2,240

Name of Mitigation Action	Sectors affected	GHG affected	Objective and or activity affected	Type of Instrument	Status of implementation	Brief Description	Start Year of Implementation	Implementing Entity or Entities	Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)				
									2020	2025	2030	2035	2040
Carbon Emissions Reduction Target (CERT) Uplift and Extension (2010-12)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	CERT extension – increased the targets originally set under CERT by 20% and required domestic energy suppliers with a customer base in excess of 50,000 (later increased to 250,000) to make savings in the amount of CO_2 emitted by householders. The extension also refocused subsidy towards insulation measures and away from electricity saving measures such as low energy lighting – and introduced a super priority group (households in receipt of certain means-tested benefits) to make energy reductions in low income and vulnerable households.	2010	Office of Gas and Electricity Markets (Ofgem), Larger Energy Suppliers, Department for Business, Energy and Industrial Strategy (BEIS)	1,600	1,426	1,329	1,251	1,241
Community Energy Saving Programme (CESP)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Community Energy Saving Programme (CESP) – area based regulation that targeted households across Great Britain, in areas of low income, to improve energy efficiency standards, and reduce fuel bills. CESP was funded by an obligation on larger energy suppliers and also the larger, electricity generators.		Office of Gas and Electricity Markets (Ofgem), Larger Energy Suppliers, Department for Business, Energy and Industrial Strategy (BEIS)	92	73	65	56	48
Energy company obligation (ECO_1)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory, Economic	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	The Energy Company Obligation (ECO_1) was a statutory obligation on energy suppliers with over 250,000 domestic customers and delivering over a certain amount of electricity or gas to make reductions in carbon emissions or achieve heating cost savings in domestic households. ECO_1 focused on insulation measures, and also heating improvements to low income and vulnerable households. It ran until March 2017.	2013	Large Energy Suppliers, Department for Business, Energy and Industrial Strategy (BEIS)	640	624	602	583	571
Smart Metering*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Demand management/reduction (Energy consumption)	Information, Regulatory	Implemented	The smart metering programme will replace 53 million meters with smart electricity and gas meters in all domestic properties, and smart or advanced meters in smaller non-domestic sites in Great Britain by the end of 2020. Smart meters will deliver consumers with near-real time information on their energy consumption to help them control energy use, so avoiding wasting energy and money. It will deliver energy networks with better information upon which to manage and plan current activities. Smart meters will also assist the move towards smart grids which support sustainable energy supply and will help reduce the total energy needed by the system.	2014	Department for Business, Energy and Industrial Strategy (BEIS)	1,179	2,006	1,987	1,936	1,924
Renewable heat incentive (RHI)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Increase in renewable energy; switch to less carbon-intensive fuels	Economic	Implemented	The Non-Domestic Renewable Heat Incentive (RHI) provides financial incentives to increase the uptake of renewable heat by businesses, the public sector and non-profit organisations. Eligible installations receive quarterly payments for 20 years based on the amount of heat generated. The Domestic RHI is a government financial incentive to promote the use of residential renewable heat. Eligible installations receive quarterly payments for seven years for the estimated amount of renewable heat their system produces.	2011	Department for Business, Energy and Industrial Strategy (BEIS)	3,759	4,235	4,206	2,903	326
CRC (carbon reduction commitment) Energy Efficiency Scheme*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in services/ tertiary sector (Energy consumption)	Regulatory, Economic	Implemented	The CRC (formerly the Carbon Reduction Commitment) is a mandatory UK-wide emissions trading scheme (launched in 2010). It encourages the uptake of energy efficiency measures in large non-energy intensive private and public sector organisations that use energy not covered by the ETS or Climate Change Agreements. It covers 1,800-1,900 large users of energy across the business and public sector. The scheme is split into phases. Phase 1 ran from 1 April 2010 until 31 March 2014. Phase 2 runs from 1 April 2014 until 31 March 2019. In the 2016 Spring Budget, the Chancellor announced the closure of the CRC after Phase 2 (i.e. following the 2018/19 compliance year).	2010	Department for Business, Energy and Industrial Strategy (BEIS), Environment Agency (EA)	872	859	0	0	0
Climate Change Agreements (CCA)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in industrial end-use sectors (Energy consumption)	Regulatory, Economic	Implemented	Climate Change Agreements offer participating energy-intensive industries a discount from the Climate Change Levy in return for meeting targets for emission reductions. From 2013 these are a 90% discount for electricity and a 65% discount for other fuels. From 2019 this will increase to a 93% discount for electricity and 78% discount for other fuels. Target levels represent a cap on emissions if we assume compliance.	2013	Industry Associations, Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE
Energy Savings Opportunity Scheme (ESOS)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Demand management/reduction (Energy consumption)	Regulatory, Information	Implemented	A mandatory energy assessment scheme for all large undertakings (non-SMEs) in response to requirements contained Article 8 of the EU Energy Efficiency Directive (2012/27/EU). Organisations which employ 250 or more people, or employ fewer than 250 people but have both an annual turnover exceeding £38.9m and an annual balance sheet total exceeding £33.4m, must measure their total energy consumption and carry out audits of the energy used by their buildings, industrial processes and transport to identify cost-effective energy saving measures, by 5 December 2015 and every four years thereafter. It is estimated that around 10,000 organisations will participate in the scheme.	2014	Department for Business, Energy and Industrial Strategy (BEIS). Environment Agency	540	470	420	369	336

Name of Mitigation Action	Sectors affected	GHG affected	Objective and or activity affected	Type of Instrument	Status of implementation	Brief Description	Start Year of Implementation	Implementing Entity or Entities	Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)				
									2020	2025	2030	2035	2040
Energy Performance of Buildings Directive (EPBD) Recast 2010*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Adopted	Extension of the Energy Performance of Buildings Directive (EPBD) requirement for public buildings to display Energy Performance Certificates to include buildings over 250 metres squared from 9 July 2015.	2015	Department for Levelling Up, Housing and Communities (DLUHC)	NE	NE	NE	NE	NE
Private Rented Sector (PRS) Energy Efficiency Regulations*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in services/ tertiary sector (Energy consumption)	Regulatory, Economic	Adopted	From 1 April 2018 there is a requirement for any properties rented out in the private rented sector to have a minimum energy performance rating of E on an Energy Performance Certificate (EPC). The regulations came into force for new lets and renewals of tenancies with effect from 1 April 2018 and for all existing tenancies on 1 April 2020 (1 April 2023 for non-domestic properties). It will be unlawful to rent a property which breaches the requirement for a minimum E rating, unless there is an applicable exemption.	2018	Department for Business, Energy and Industrial Strategy (BEIS)	407	477	356	252	194
ECO Transition/ Help to Heat/Future Supplier Obligation*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	The 2015 Spending Review announced that ECO will be replaced with a new, lower cost scheme that will run for 5 years (to March 2022) and will tackle the root causes of fuel poverty. The 5-year extension took place in the two phases, with the ECO Extension (April 2017 – Sept 2018) acting as a bridge between the expired ECO_1 scheme and the new fuel poverty focused scheme, ECO 3, which ran from December 2018 to March 2022.	2017	Department for Business, Energy and Industrial Strategy (BEIS), Large Energy Suppliers	194	189	189	187	186
Public Sector Energy Efficiency Loans Scheme – 2014-2020*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in services/ tertiary sector (Energy consumption)	Economic	Implemented	The Public Sector Energy Efficiency Loans Scheme, managed by Salix Finance Ltd, provides interest-free loans in England to public sector organisations for energy efficiency schemes. These loans are intended to provide the capital cost of energy efficiency retrofit work and other measures to be installed. These loans have a payback period of five years (eight for schools) during which the repayments are met with the energy bill savings from the energy efficiency measures. Thus, once the loan has been paid off, the organisation continues to benefit from energy savings for the lifetime of those measures. This funding is then recycled: once it has been returned to the Scheme and it is loaned out once again. BEIS provides the largest amount of funding to the Scheme.	2014	Department for Business, Energy and Industrial Strategy (BEIS), Local government	159	350	347	232	86
Agricultural Action Plan*	Agriculture	Methane (CH_4), Nitrous oxide (N_2O)	Reduction of fertilizer/manure use on cropland (Agriculture), Improved animal waste management systems (Agriculture), Improved livestock management (Agriculture), Activities improving grazing land or grassland management (Agriculture), Improved management of organic soils (Agriculture)	Voluntary/ negotiated agreements	Implemented	The Agricultural Action Plan covers a range of resource-efficiency and land management measures to reduce emissions to meet UK carbon budgets.	2010	Department for Food, Environment and Rural Affairs (DEFRA), Industry Associations	1,174	1,507	1,841	1,974	1,974
Car Fuel Efficiency Policies*	Transport	Carbon dioxide (CO_2)	Efficiency improvements of vehicles (Transport)	Regulatory, Fiscal, Economic, Information	Implemented	EC Regulation 443/2009 sets fuel efficiency targets for new cars to be achieved by 2015 and 2020. The regulation translates a fleet average CO_2 tailpipe emissions target for new vehicles sold in the EU market into specific targets for individual manufacturers according to the mass of their fleet. Heavy fines are imposed for non-compliance. The 2021 target is for a fleet average of 95g CO_2/km across the EU, with a transition period where 95% of a manufacturer's fleet must meet the 95g target by 2020. Complementary measures are a collection of technologies that could improve 'real world' fuel efficiency of cars which wouldn't be fully captured by the new car CO_2 target and which could improve fuel efficiency in the existing fleet. These include gear shift indicators, tyre pressure monitoring systems, more efficient mobile air-conditioning, and low rolling resistance tyres. EC Regulation 661/2009 sets minimum requirements and introduces labelling for the rolling resistance, wet grip and external rolling noise of tyres. Measures to support the uptake of ultra low emission vehicles include the Plug-in Car and Plug-in Van Grants towards ultra-low emission vehicle (ULEV) cars and vans, as well as various tax incentives including lower rates for Vehicle Excise Duty and Company Car Tax. EV infrastructure is directly supported through the Workplace Charging Scheme grants for EV chargepoints for employees and fleets, the Electric Vehicle Homecharge Scheme grants towards home EV chargepoints and the On-street Residential Charging Scheme. Highways England have committed £15m to ensure EV chargepoints are available every 20 miles on the Strategic Road Network.	2012	Department for Transport	3,306	9,794	18,898	29,327	37,343
Forestry policies*	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Enhanced forest management (LULUCF), Sustainable forest management	Voluntary/ negotiated agreements, Economic	Implemented	Range of policies aimed at driving afforestation and reforestation. Policies whose mitigation impacts are included in this grouping are labelled with '[2]' in the 'Name of mitigation action' field.	Various	Forestry Commission, Department for Food, Environment and Rural Affairs (DEFRA)	-212	-93	115	399	658

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									2020	2025	2030	2035	2040
Van Fuel Efficiency Policies*	Transport	Carbon dioxide (CO_2)	Efficiency improvements of vehicles (Transport)	Regulatory, Fiscal, Economic, Information	Implemented	EC Regulation 510/2011 sets fuel efficiency targets for new Light Commercial Vehicles (LCV) to be achieved by 2017 and 2020. EC Regulation 661/2009 sets minimum requirements and introduces labelling for the rolling resistance, wet grip and external rolling noise of tyres. The regulation translates a fleet average CO_2 tailpipe emissions target for new vehicles sold in the EU market into specific targets for individual manufacturers according to the mass of their fleet. Heavy fines are imposed for non-compliance. The 2020 target is for a fleet average of 147g CO_2 /km and represents a reduction of 19% from the 2012 average. Measures include the car and van grants towards ultra-low emission vehicle (ULEV) cars and vans, as well as various tax incentives including lower rates for Vehicle Excise Duty and Company Car Tax. EV infrastructure is directly supported through workplace charging scheme grants for EV chargepoints for employees and fleets, the Electric Vehicle Homecharge Scheme grants towards home EV chargepoints and the On-street Residential Charging Scheme. Highways England have committed £15m to ensure EV chargepoints are available every 20 miles on the Strategic Road Network.	2012	Department for Transport	1,117	2,062	3,562	5,171	6,281
Heavy goods vehicles Fuel Efficiency Policies*	Transport	Carbon dioxide (CO_2)	Efficiency improvements of vehicles (Transport), Low carbon fuels/ electric cars (Transport)	Economic, Regulatory, Research	Implemented	EC Regulation 661/2009 sets minimum requirements and introduces labelling for the rolling resistance, wet grip and external rolling noise of tyres. Industry and Government are taking a range of actions to reduce freight emissions, including the Freight Transport Association's Logistics Carbon Reduction Scheme, which encourages members to record, report and reduce emissions from freight. The Mode Shift Revenue Support scheme encourages modal shift from road to rail or inland waterway where the costs are higher than road, and where there are environmental benefits to be gained. It currently helps to remove around 800,000 lorry journeys a year from Britain's roads. A similar scheme, Waterborne Freight Grant, can provide assistance with the operating costs associated with coastal or short sea shipping.	2012	Department for Transport, Transport Association	57	257	1,247	2,539	2,819
Public service vehicles Fuel Efficiency Policies*	Transport	Carbon dioxide (CO_2)	Low carbon fuels/electric cars (Transport), Efficiency improvements of vehicles	Economic	Implemented	The Green Bus Fund (GBF) allowed bus companies and local authorities in England to compete for funds to help them buy new low carbon emission buses. The four rounds of the fund, which ran from 2009- 2014, added around 1250 Low Carbon Emission Buses onto England's roads. The GBF has now been replaced by the Low Emission Bus Fund (LEBS) which offered £30m for bus operators and local authorities across England and Wales to bid for low emission buses and supporting infrastructure. This scheme funding is open from 2016-2019 and the successful bidders were announced in July 2016, adding more than 300 extra low emission buses to fleets.	2006	Department for Transport	136	199	291	297	295
Renewable Transport Fuel Obligation, (RTFO) – 5% by volume*	Transport	Carbon dioxide (CO_2)	Low carbon fuels/electric cars (Transport), Transport	Regulatory	Implemented	The RTFO set a 4.75% target for biofuel use by diesel and petrol suppliers to be achieved by 2014. Targets are by volume rather than by energy. Implemented the EU Renewables Directive (2009/28/EC).	2007	Department for Transport	2,986	3,051	3,134	3,202	3,270
Renewable Transport Fuel Obligation, (RTFO) – Increase target to meet RED*	Transport	Carbon dioxide (CO_2)	Low carbon fuels/electric cars (Transport), Efficiency improvement of vehicles	Regulatory	Implemented	This policy sets enhanced overall targets of 9.75% (by volume) for biofuel use by diesel and petrol suppliers by 2020 and at least 12.4% in 2032. It implements the EU Renewables Directive (2009/28/EC) as amended by the ILUC Directive (2015/1513).	2018	Department for Transport	2,899	3,594	3,743	3,619	3,361
Active travel spending*	Transport	Carbon dioxide (CO_2)				Committed active travel spending from 2011/12 onwards including from ring-fenced and non-ringfenced funds including the Local Growth Fund, Other Government Infrastructure Funds (e.g. the Housing Infrastructure Fund), Highways Maintenance Fund, Transforming Cities Fund, Integrated Transport Block, Local Sustainable Transport Fund and Cycling Ambition Cities Fund.	2011	Bids submitted to Department for Transport, Department for Transport	588	395	255	157	101
Rail Electrification*	Transport	Carbon dioxide (CO_2)	Improved transport infrastructure (Transport), Transport, Reduce travel times and costs	Other	Implemented	Major programme of rail electrification underway to replace older diesel trains with modern, low-emission electric trains. This means that operators are contractually obliged to meet emissions levels based on running modern electric rather than diesel traction. Trans Pennine Express (TPE) and Northern are examples where 11% and 17% reductions in CO_2e emissions per vehicle km respectively where contracted based on electrification schemes. Reducing costs: electric trains tend to be cheaper to buy, operate and maintain than diesels. They are also lighter so do less damage to the track. So whilst there is clearly a large capital cost associated with installing new electrification infrastructure, this can be compensated over time by the lower operational costs of electric trains. Increasing capacity and reliability and reducing journey times: electric trains tend to outperform equivalent diesels in terms of reliability, acceleration and carrying capacity. Reducing environmental impacts: electric trains are quieter and more carbon efficient than diesels and zero emission at point of use which helps with local air quality.	2013	Department for Transport, Network Rail	NE	NE	NE	NE	NE

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Renewables Obligation*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply)	Regulatory, Economic	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Set an annual obligation on electricity suppliers to produce a proportion of their generation from renewable sources. Targets can be met by renewable generation that accrue Renewable Energy Certificate (ROCs) or by paying a 'fine' into the RO Buy Out Fund, which is then redistributed to other energy suppliers who have met their obligation.	2002	Department for Business, Energy and Industrial Strategy (BEIS), Office of Gas and Electricity Markets (Ofgem)	IE	IE	IE	IE	IE
Feed-In Tariffs (FITs)*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply)	Regulatory, Economic	Implemented	Feed-in Tariffs (FITs) support organisations, businesses, communities and individuals to generate low-carbon electricity using small-scale (5 MW or less total installed capacity) systems. Electricity suppliers are obliged to pay the regulated tariffs to eligible generators.	2010	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Contract for Difference (2014-2020)*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic	Implemented	Offers Contracts for Difference (CfDs) in the electricity generation market for low carbon and renewable sources, CfDs will replace ROCs (which are due to be phased out to new capacity from 2017). Current policy offers CfD for new capacity through auctions should Government's choose to hold them. There is also a bilateral negotiation underway for Hinkley point C Nuclear plant.	2014	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Contract for Difference (2021-2035)†[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic	Planned	Planned continuation of Contracts for Difference (CfDs) for new low carbon capacity after 2020.	2021	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Carbon Price Floor*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Fiscal	Implemented	The Carbon Price Floor (CPF) is designed to further reduce the use of emission-intensive fossil fuels and increase the proportion of electricity generation and supply from low carbon sources	2013	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
EU Emissions Trading System*	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic, Fiscal, Regulatory	Implemented	It sets an emissions target (cap) for installations covered by the system (across the EU), with the carbon market determining the carbon price, and therefore where emissions can be reduced most cheaply. It guarantees that total emissions in the sectors covered will not exceed the cap set, and in doing so drives investments in low-carbon technologies, leading to cutting emissions of carbon dioxide (CO_2) and other greenhouse gases at least cost.	2005	European Commission, Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE
New Energy Supply policies*	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Regulatory, Economic, Fiscal	Planned/ Implemented/ Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Combined impact of electricity supply and decarbonisation policies. Policies whose mitigation impacts are included in this grouping are labelled with '[1]' in the 'Name of mitigation action' field.	2002	Department for Business, Energy and Industrial Strategy (BEIS), Office of Gas and Electricity Markets (Ofgem)	32,388	52,521	44,630	55,074	69,159
Woodland Carbon Code*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF)	Voluntary/ negotiated agreements	Implemented	Voluntary Code and associated carbon registry (2013) for UK domestic woodland carbon schemes to encourage private sector funding for woodland creation projects. Recognised as component of net GHG emissions reporting for businesses in Government's Environmental Reporting Guidelines.	2011	Forestry Commission	IE	IE	IE	IE	IE
Revised UK Forestry Standard*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Sustainable forest management	Regulatory, Information	Implemented	Revised (2017) national standard for sustainable forest management, previously revised in 2011 to include a new guideline on climate change, covering both adaptation and mitigation.	2011	Forestry Commission	IE	IE	IE	IE	IE
Grown in Britain*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Sustainable forest management	Voluntary/ negotiated agreements, Information, Education	Implemented	Industry-led action plan announced in Government's Forestry and Woodlands Policy Statement (2013) which aspires to encourage businesses to invest in woodland creation and sustainable forest management practice.	2013	Department for Environment Food and Rural Affairs (DEFRA)	IE	IE	IE	IE	IE
Rural Development Programme (2014)*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Sustainable forest management	Economic	Implemented	Woodland creation grants provided through EU co-financed Rural Development Programmes in England.	2014	Department for Food, Environment and Rural Affairs (DEFRA)	IE	IE	IE	IE	IE
Woodfuel Implementation Plan*[2]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production), Land use, land-use change and forestry	Carbon dioxide (CO_2)	Increasing biomass supply, primarily for small to medium scale heat applications.	Economic, Information, Education	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Initiative to develop supply chains, including through support for harvesting/processing and woodland access, to increase woodfuel supply from existing woodland.	2011	Forestry Commission	IE	IE	IE	IE	IE

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Nitrates Action Plan*	Agriculture	Nitrous oxide (N_2O)	Reduction of fertilizer/manure use on cropland (Agriculture)	Regulatory, Information	Implemented	This ensures improved compliance with the Nitrate Directive (91/676/EEC). Designated revised "Nitrate Vulnerable Zones" (NVC) established a range of mandatory measures to reduce nitrate pollution to water in each NVC. It includes also code of good practice for areas outside NVZs.	2013	Department for Food, Environment and Rural Affairs (DEFRA), Environment Agency (EA)	NE	NE	NE	NE	NE
Catchment Sensitive Farming*	Agriculture	Nitrous oxide (N_2O)	Activities improving grazing land or grassland management (Agriculture), Improved management of organic soils (Agriculture)	Economic, Information	Implemented	Delivers practical solutions and targeted support to enable farmers and land managers to take voluntary action to reduce diffuse water pollution from agriculture to protect water bodies and the environment.	2006	Department for Food, Environment and Rural Affairs (DEFRA), Rural Development Programme for England (RDPE), Environment Agency (EA), Natural England (NE)	NE	NE	NE	NE	NE
Soils For Profit*	Agriculture	Nitrous oxide (N_2O)	Activities improving grazing land or grassland management (Agriculture), Improved management of organic soils (Agriculture)	Education	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Provides on farm reviews and training on soils manures and nutrients. The programme closed in 2013.	2009	Natural England (NE)	NE	NE	NE	NE	NE
Countryside Stewardship*	Agriculture	Nitrous oxide (N_2O)	Activities improving grazing land or grassland management (Agriculture), Improved management of organic soils (Agriculture)	Economic	Implemented	Provides income foregone support under Pillar 2 of the CAP for farmers to undertake management options that benefit biodiversity, resource protection and water quality.	2005	Department for Food, Environment and Rural Affairs (DEFRA), Rural Development Programme for England (RDPE)	NE	NE	NE	NE	NE
Ozone depleting substances regulation*	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon)	Hydrofluorocarbons (HFC)	Reduction of emissions of fluorinated gases (Industrial processes), Installation of abatement technologies (Industrial processes), Replacement of fluorinated gases by other substances (Industrial processes), Improved control of fugitive emissions from industrial processes (Industrial processes)	Regulatory	Implemented	This regulation implements obligations under the Montreal Protocol and EU Regulation 1005/2009/EC on ozone depleting substances. With the exemption of some critical use exemptions, CFCs, HCFCs and halon use is banned. Most ozone depleting substances are potent greenhouse gases, so reductions in their use protects both the ozone layer and climate.	2009	Department for Environment, Food and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
F-gas regulation (2015)*	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), Other Sectors	Hydrofluorocarbons (HFC), Perfluorocarbons (PFC), Sulphur hexafluoride (SF6)	Reduction of emissions of fluorinated gases (Industrial processes)	Regulatory	Implemented	This introduced a 79% phase down in the quantities of hydrofluorocarbons that can be placed on the EU market and was delivered via a gradually reducing quota system; a number of bans on the use of certain F gases in some new equipment; a ban on the use of very high GWP HFCs for the servicing of certain types of refrigeration equipment; and some strengthening of obligations in the 2007 regulation relating to leak checking, repairs, F gas recovery and technician training.	2015	Department for Food, Environment and Rural Affairs (DEFRA)	3,638	7,491	11,072	13,267	13,764
Climate Change Levy (CCL)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Economic, Fiscal	Implemented	The Climate Change Levy (CCL) was introduced in 2001. It is levied on the supply of energy to business and public sector consumers to incentivise them to reduce energy consumption. Each of the four main groups of taxable commodities (electricity, gas, solid fuels, and liquefied petroleum gas [LPG]) has its own main rate per unit of energy. Eligible energy-intensive industries may pay reduced main rates of CCL through CCAs, or be exempt from the CCL (for mineralogical/metallurgical processes). Budget 2016 announced that CCL rates will increase from April 2019, moving to an electricity-to-gas ratio of 2.5:1 compared to the previous 2.9:1 ratio. In the longer term, the Government intends to rebalance the rates further, reaching a ratio of 1:1 by 2025. CCL rates to April 2022 were announced at Budget 2018, however changes between 2022 and 2025, as well as the rates from 2025 onwards, have not yet been announced.	2001	Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE
Energy Performance of Buildings Directive (EPBD) 2017 Cost Optimal Review and Nearly Zero Energy Buildings (NZEB) (2018 and 2020)	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture), Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory, Information	Implemented	The Government is required to report to the European Commission by June 2017 to demonstrate that UK building standards for energy performance remain 'cost optimal'. Cost-optimal energy performance means that the lifetime cost-benefit analysis is positive. Minimum energy performance requirements must be compared against calculated cost-optimal levels using the Comparative Methodology Framework.	2017	Department for Levelling Up, Housing and Communities (DLUHC)	NE	NE	NE	NE	NE
Additional Renewables in Generation (Renewable Energy Strategy)*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply)	Regulatory, Economic	Implemented	Increases Renewable Obligation (RO) targets in electricity supply so as meet the UK's overall renewables target for 2020 as set out in the Renewables Directive (RED, 2009/28/EC).	2009	Department for Business, Energy and Industrial Strategy (BEIS), Office of Gas and Electricity Markets (Ofgem)	IE	IE	IE	IE	IE
Capacity Mechanism*	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply)	Economic	Implemented	Part of the Government's Electricity Market Reform package, the Capacity Mechanism ensures security of electricity supply by encouraging investments in electricity generation capacity.	2017	Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE

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Heat Networks Investment Project*	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Switch to less carbon-intensive fuels (Energy supply)	Economic	Implemented	The heat networks investment project (HNIP) is a capital funding scheme across England and Wales to encourage the development of heat networks. The scheme will be open for applications from heat networks for up to three years and allocate commercialisation and construction funding through a competitive process. The key objective of the project is to build a sustainable market for heat networks to support the decarbonisation of heat in buildings, helping the UK reach the carbon budget targets.	2017	Department for Business, Energy and Industrial Strategy (BEIS)	0	-31	-32	68	103
Forestry Act Felling Licence Regulations and Environmental Impact (Forestry) regulations*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Prevention of deforestation (LULUCF)	Regulatory	Implemented	Strong regulatory framework that controls felling. It only allows deforestation for purposes of nature conservation and prevents the afforestation of deep peat. Legislation updated 1999 and 2017.	1999	Forestry Commission (FC)	IE	IE	IE	IE	IE
Natural England's Strategic Approach to the Restoration of Blanket Bog	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Restoration of degraded lands (LULUCF)	Information	Implemented	Natural England published the Strategy for the Restoration of Blanket Bog in England in 2015. The approach sets out the extent, nature and importance of the blanket bog resource across England and what is currently being done to conserve it, as well as setting out the required management and timeframe for delivery to achieve an improvement in site condition across the resource at a strategic level.	2015	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Natural Environment White Paper (NEWP) targets on horticultural peat	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Restoration of degraded lands (LULUCF)	Other, Information	Implemented	The Sustainable Growing Media Taskforce was set up to look at ways in which the barriers to the use of peat alternatives could be overcome. The Government published its response to the Task Force's report and draft roadmap in 2013 which set out where our resources will be focused.	2011	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Peatland Area Designations	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Restoration of degraded lands (LULUCF)	Regulatory	Implemented	According to the UK's draft integrated National Energy and Climate Plan (NECP), 3 out of 12 Nature Improvement Areas (NIA, 2012) are focussed on peatland restoration. 47% England's wetlands are protected by Sites of Special Scientific Interest (SSSIs).	2004	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Peatland Code	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Restoration of degraded lands (LULUCF)	Voluntary/ negotiated agreements, Information, Economic	Implemented	A UK Voluntary Code to encourage and support private sector funding for peatland restoration projects. Provides standards and robust science to give business supporters confidence that their financial contribution is making a measurable and verifiable difference.	2011	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Rural Development Programme (2007)*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Enhanced forest management (LULUCF)	Economic	Implemented	Woodland creation grants provided through EU co-financed Rural Development Programmes in England.	2007	Department for Food, Environment and Rural Affairs (DEFRA)	IE	IE	IE	IE	IE
CAP Cross Compliance*	Agriculture, Land use, land-use change and forestry	Carbon dioxide (CO_2)	Improved management of organic soils (Agriculture)	Regulatory	Implemented	Good Agricultural and Environmental Conditions in place to ensure minimum soil cover, to maintain soil organic matter and to minimise erosion. Implementation of the Nitrates Directive Retention of permanent pasture (up to 2014 – now under Greening measures)	2015	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Woodland Carbon Fund*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF)	Economic	Implemented	The Woodland Carbon Fund is an exchequer-funded grant to support the creation of large-scale productive woodlands which also enhance natural capital.	2016	Forestry Commission (FC)	IE	IE	IE	IE	IE
Woodland Creation Planning Grant*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF)	Economic, Regulatory	Implemented	Grant to support the planning of large-scale productive woodlands, compliant with the UK Forestry Standard.	2015	Forestry Commission (FC)	IE	IE	IE	IE	IE
Industrial Emissions Directive (as it applies to Large Combustion Plant Directive)*[1]	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O)	Improved control of fugitive emissions from industrial processes (Industrial processes), Efficiency improvement in industrial end-use sectors (Energy consumption)	Regulatory	Implemented	As transposed into UK law, the IED replaced the LCPD from 1 January 2016 with similar (although more stringent) provisions set out in chapter III of the Industrial Emissions Directive (2010/75/EU) (IED). Those provisions apply in respect to any plant newly permitted since 7 January 2013. Three compliance routes are available to generating plants; to abate emissions and comply with more stringent limits by 2020; to comply with less stringent limits but face a 1,500 hour per year load factor constraint; or to close by 2023.	2016	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Large Combustion Plant Directive*[1]	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O)	Efficiency improvement in industrial end-use sectors (Energy consumption)	Regulatory	Implemented	The Large Combustion Plant Directive (LCPD, 2001/80/EC) sets limits on emissions of sulphur dioxide, nitrogen oxides, and dust from combustion plants with a thermal capacity of 50 MW or greater. This has now been replaced by the Industrial Emissions Directive.	2007	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Common Agricultural Policy (CAP) Greening*	Agriculture, Land use, land-use change and forestry	Carbon dioxide (CO_2)	Activities improving grazing land or grassland management (Agriculture)	Regulatory	Implemented	Obtain consent before improving grassland that has not been cultivated for 15 years or more (Environmental Impact Assessment/ EIA). Select a range of Ecological Focus Area (EFA) measures to meet new standards: relevant actions include enhanced buffer strips, cover crops and growing N-fixing crops	2015	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE

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Amendments to Heat Networks Metering & Billing Regulations	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Planned	UK legislation requiring heat network operators to submit data on networks and to install heat meters/heat cost allocators in buildings on networks unless it is not cost-effective to do so. The amendments will revise the cost-effectiveness methodology and address ambiguities in the existing legislation	2020	Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE
Energy company obligation 3 (ECO 3)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	The 2015 Spending Review announced that ECO will be replaced with a new, lower cost scheme that will run for 5 years (to March 2022) and will tackle the root causes of fuel poverty. The 5-year extension will take place in the two phases, with the ECO Extension (April 2017 – Sept 2018) acting as a bridge between the expired ECO scheme and the new fuel poverty focused scheme, ECO 3, which will run from December 2018 to March 2022.	2017	Department for Business, Energy and Industrial Strategy (BEIS)	199	261	247	256	253
Boiler Plus (technical standards for domestic boiler installations)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	The policy objectives are to deliver additional energy and carbon savings from the domestic heating sector in England by lowering overall gas demand from domestic properties. It aims to do this by increasing the deployment of devices which increase the efficiency of domestic heating systems, through controls and measures to make gas boilers heat homes more efficiently. The policy instrument is a technical standard set through statutory guidance under the Building Regulations framework. This requires existing households in England to install an additional energy saving measure from a choice list at the point of installing a new or replacement combi gas boiler in an existing dwelling	2018	Department for Business, Energy and Industrial Strategy (BEIS)	147	391	635	586	342
Industrial Heat Recovery Support (IHRS)*	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2), Nitrous oxide (N_2O), Methane (CH_4)	Efficiency improvement in industrial end-use sectors (Energy consumption)	Information, Economic	Implemented	The policy aims to: increase industry confidence to invest in the technology potential to recover heat from industrial processes, and increase the deployment of such technologies across manufacturing and data centres in England and Wales. It establishes a fund for feasibility studies that examine the potential for industrial businesses to adopt heat recovery technologies and a fund to subsidise the deployment of heat recovery technologies.	2018	Department for Business, Energy and Industrial Strategy (BEIS)	118	115	91	10	0
Streamlined energy and carbon reporting framework for business (SECR)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in industrial end-use sectors (Energy consumption)	Information, Regulatory	Adopted	SECR is a reporting framework which obligates all large (as defined by the Companies Act 2006) UK registered companies to report their energy use and associated emissions relating to electricity, gas and transport in their annual reports. Companies will also be required to provide an intensity metric and disclose any energy efficiency actions undertaken during the reporting period. Quoted companies will in addition be required to report their global energy use and GHG emissions.	2019	Department for Business, Energy and Industrial Strategy (BEIS)	526	464	409	351	316
Waste policies†	Waste management/waste	Methane (CH_4)	Enhanced recycling (Waste), Reduced landfilling (Waste), Demand management / reduction (Waste), Enhanced CH_4 collection and use (Waste), Improved treatment technologies (Waste), Improved landfill management (Waste), Waste incineration with energy use (Waste)	Fiscal, Regulatory	Implemented (various, earliest 1996), Planned was added for EEP2019	There are a number of waste measures with the aim of increasing recycling/reuse and reduce harmful disposal. The Waste Framework Directive (2008/98/EC) is the general framework of waste management requirements and sets rules governing the separate collection of waste. The Landfill Directive (1999/31/EC) sets rules governing the disposal of waste to landfill. The UK Landfill Tax escalates tax on biodegradable waste sent to landfill. There are other waste measures targeting other waste streams, such as the Waste Incineration Directive (2000/76/EC). The overall effect is reducing environmental impacts of waste, such as landfilling biodegradable waste and its associated CH_4 emissions.	1996	Department for Food, Environment and Rural Affairs (DEFRA)	0	202	794	1,521	2,041
British Energy Security Strategy	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Regulatory, Economic, Fiscal	Planned/ Implemented/ Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	The 2021 Net Zero Strategy set out a clear vision for how we will transform the production and use of energy, in a decisive shift away from fossil fuels. The British Energy Security Strategy accelerates this plan to deliver a more independent, more secure energy system and support consumers to manage their energy bills. It includes ambitions including a potential five-fold increase in deployment by 2035 in solar energy; delivering up to 50GW of offshore wind by 2030, including up to 5GW of innovative floating wind; deployment of civil nuclear to up to 24GW by 2050 – 3 times more than now and representing up to 25% of our projected electricity demand; establishing the Future System Operator as soon as practicable to drive our overall transition and oversee the UK energy system	2022	Department for Business, Energy and Industrial Strategy (BEIS)	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	
New Nuclear	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic	Planned	Ambition to secure a final investment decision on a large-scale nuclear plant by the end of the 2019-2024 Parliament whilst taking measures to inform investment decisions during the following Parliament on further nuclear projects (including AMRs, SMRs). Setting up the Great British Nuclear Vehicle to support projects to get investment ready and through the construction phase. In 2022 we will launch the £120m Future Nuclear Enabling Fund competitive process, first announced in the Comprehensive Spending Review.	2022	Department for Business, Energy and Industrial Strategy (BEIS)	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	

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									2020	*2025*	*2030*	*2035*	*2040*
Carbon Capture Useage and Storage (CCUS) Programme – Dispatchable Power Agreement	Gas fired power decarbonisation.	Carbon Dioxide (CO_2)	Power CCUS to provide non-weather dependent, dispatchable low carbon generation capacity.	Economic	Planned	A private law agreement based on the Contracts for Difference (CfD) model to incentivise the deployment of at least one Power CCUS facility by the mid 2020's in line with the Net Zero Strategy.	2027	Department for Business, Energy and Industrial Strategy (BEIS)					
Future System Operator	Energy System (including governance, co-ordination, transformation and integration of electricity and gas systems)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Information, regulatory, economic	Planned	Establishing the Future System Operator as soon as practicable to drive our overall transition and oversee the UK Energy System. It will be an expert, impartial body with responsibilities across both the electricity and gas systems, to drive progress towards net zero while maintaining energy security and minimising costs for consumers.	2022	HMG, Ofgem, National Grid Plc and NGESO will each have a key role in ensuring that this vision is realised as swiftly and successfully as possible, noting that this will be subject to legislation when parliamentary time allows.					
Energy system flexibility	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic	Adopted	Deliver the actions in our recent Smart Systems and Flexibility Plan and Energy Digitalisation Strategy to maximise system flexibility. The plan sets out a suite of commitments to: support flexibility from consumers, remove barriers to flexibility on the grid, reform markets to reward flexibility and monitor flexibility across the system.	2021	Department for Business, Energy and Industrial Strategy (BEIS)	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	
Low Carbon Hydrogen Standard	Energy, Transport, Industry/Industrial Processes	Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), and sulphur hexafluoride (SF6	The Low Carbon Hydrogen Standard will initially help determine which hydrogen projects are eligible for government support through the Net Zero Hydrogen Fund and Hydrogen Business Model. It will be developed into a certification scheme by 2025. It may also be used by other government schemes wishing to define what is meant by "low carbon" hydrogen.	Information	Implemented	The Low Carbon Hydrogen Standard ('the standard') sets a maximum threshold for greenhouse gas emissions allowed in the production process for hydrogen to be considered 'low carbon hydrogen'. Compliance with the standard will help ensure new low carbon hydrogen production makes a direct contribution to the UK's carbon reduction targets.	2022	Department for Business, Energy and Industrial Strategy					
Hydrogen Business Model	Energy, Transport, Industry/Industrial Processes	Carbon dioxide (CO_2)	The hydrogen business model will unlock private investment in new low carbon hydrogen production by delivering revenue support funded by the Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme.	Economic	Planned	The hydrogen business model will provide revenue support to producers to overcome the operating cost gap between low carbon hydrogen and high carbon counterfactual fuels. The hydrogen business model is one of a range of government interventions intended to stimulate investment in low carbon hydrogen projects that will be necessary to meet Carbon Budget 6 and net zero targets.	We are aiming to finalise the business model in 2022, enabling the first contracts to be allocated from 2023.	Department for Business, Energy and Industrial Strategy					
Net Zero Hydrogen Fund	Energy, Transport, Industry/Industrial Processes	Carbon dioxide (CO_2)	To support the commercial deployment of new low carbon hydrogen production	Economic	Implemented	The Net Zero Hydrogen Fund (NZHF) will provide up to £240 million for government co-investment to support new low carbon hydrogen production out to 2025. The aim of the Fund is to support commercial deployment of new low carbon hydrogen production projects during the early 2020s, by helping to address barriers related to commercial risk and high upfront costs relative to fossil fuel alternatives, unlocking private sector investment in projects.	2022	Department for Business, Energy and Industrial Strategy	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated
UK Emissions Trading Scheme (UK ETS)	Energy supply, industrial processes and energy consumption.	Carbon dioxide (CO_2), Perfluorocarbons (PFC), Nitrous oxide (N_2O)	Reduction of emissions of covered gases in covered sectors in line with the emissions cap. Policy is neutral on the question of how the abatement is achieved and where it falls within the covered sectors/activities. This is market driven and abatement should happen where most cost effective.	Economic, Fiscal, Regulatory	Implemented	It sets an emissions target (cap) for installations covered by the system (across the UK, excluding NI power generators), with the carbon market determining the carbon price, and therefore where emissions can be reduced most cheaply. It guarantees that total emissions in the sectors covered will not exceed the cap set, and in doing so drives investments in low-carbon technologies, leading to cutting emissions of carbon dioxide (CO_2) and other greenhouse gases at least cost. It replaces the UK participation to the EU ETS.	2021	The UK ETS Authority, comprising BEIS, Welsh Government, Scottish Government, and NI Government, HMT, DfT.					
Industrial Energy Transformation Fund (IETF)	All eligible industrial processes.	Carbon dioxide (CO_2)	Energy Efficiency and Deep Decarbonisation improvements to industrial processes.	Grant Funding	Implemented	The Industrial Energy Transformation Fund (IETF) supports industrial sites with high energy use to transition to a low carbon future. The fund targets existing industrial processes, helping industry to: • cut energy bills by investing in more efficient technologies; and • reduce emissions by bringing down the costs and risks associated with investing in deep decarbonisation technologies. It is open to a broad range of industrial sectors and will support applicants based in England, Wales, and Northern Ireland, both within and outside of industrial clusters.	2020	Department for Business, Energy and Industrial Strategy (BEIS)					
National Design Guide 2019 & National Model Design Code 2021	Energy consumption, land use, energy supply	Carbon dioxide (CO_2)	Efficiency improvements of buildings, efficiency improvements of material supply and selection, increase in renewable energy	Information, Regulatory	Implemented	The National Model Design Code which builds on the 10 characteristics of well-designed places set out in the National Design Guide, provides tools and guidance to local councils for producing design codes. Design codes promote the use of high-quality design to shape and deliver environmentally responsive and sustainable places, with a consistent and high-quality standard of design. The National Model Design Code encourages the implementation of sustainable construction; that addresses climatic conditions, focuses on reducing embodied energy, embeds circular economy principles to reduce waste and is designed for disassembly and reuse.	2019 / 2021	Department for Levelling Up, Housing and Communities (DLUHC)					

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									2020	2025	2030	2035	2040
Home Upgrade Grant (HUG)	Homes, heat and buildings	Carbon dioxide (CO_2) The Clean Growth Strategy (2017) committed government to phasing out high carbon fossil fuel heating systems for off gas grid homes	The Home Upgrade Grant (HUG) scheme will upgrade the energy performance of the worst performing off-gas grid homes in England by installing energy efficiency measures and low carbon heating into low income households. £1.1 billion has been allocated to HUG for delivery from 2022 to 2025.	Economic	Implemented/planned	The Home Upgrade Grant provides grants to low-income households to upgrade the energy performance of the worst quality, off gas grid homes in England by installing multiple energy efficiency measures and low carbon heating. In the summer of 2021, the Government announced the launch of HUG Phase 1. This pot of money is worth over £200m. e Applications closed on 4 August 2021 with delivery forecast to complete by March 2023. This funding will deliver energy efficiency upgrades to low-income households off the gas grid. Homes with an EPC rating of D and below are eligible. Government announced an additional £950m at the Autumn '21 spending review, which will be delivered between 2023 and March 2025.	Dec 2021 – March 2023	UK Government (BEIS), Local Government					
Local Authority Delivery (LAD)	Homes, heat and buildings	Carbon dioxide (CO_2) The Clean Growth Strategy (2017) committed government to phasing out high carbon fossil fuel heating systems for off gas grid homes	The Local Authority Delivery Scheme (LAD) started as a £500m scheme that aims to support up to 50,000 low-income households that most need energy efficiency upgrades. The scheme is prioritising homes with low Energy Performance Certificate (EPC) ratings of D, E, F&G and targeted at households with a combined household annual low-income of no more than £30,000. A further £287 million has been allocated for a third phase of LAD funding to deliver energy efficiency measures to low-income households on the gas grid from early 2022 to March 2023.	Economic	Implemented.	The Local Authority Delivery Scheme (LAD) is focused on low-income households in homes that most need energy efficiency upgrades. The scheme is prioritising homes with low Energy Performance Certificate (EPC) ratings of D, E, F&G and targeted at households with a combined household annual low-income of no more than £30,000 who are most at risk of fuel poverty Phase 1 allocated £200m in grants to over 136 Local Authorities for delivery by March 2022, with a managed closure to September 2022. It is forecasted that up to 20,000 homes will be upgraded Phase 2, allocated £300m to the five Local Net Zero Hubs, who work with their regional Local Authorities to continue to deliver energy efficiency upgrades to up to 30,000 homes by June 2022. Phase 3, funding was allocated to successful LAs under the third phase of LAD (£287m) LAD Phase 2 is currently in delivery and BEIS will continue to work with the Net Zero HUBs to ensure that as many homes benefit from the scheme as possible.	Phase 1: Sept 2020- Sept 2022 Phase 2: March 2021 Phase 3: January 2022 – March 2023	UK Government (BEIS), Local Government					
Green Homes Grant Voucher Scheme	Homes, heat and buildings	Carbon dioxide (CO_2)	Scheme was designed to provide a short-term economic stimulus in response to the global pandemic, while tackling UK contribution to climate change. It aimed to help 600,000 households complete energy efficiency upgrades to their homes, saving up to £600 on their energy bills, while supporting jobs in green construction.	Economic	The scheme closed to new applications on 31 March 2021, with scheme closure date set at 30 November 2021.	Homeowners (both freehold and leasehold owner occupiers), and landlords could apply for vouchers of up to £5,000 towards the cost of installing energy efficient and low-carbon heating improvements in their homes. As of February 2022, the scheme had allocated £232 million through vouchers and has upgraded 43,400 homes with 49,500 measures. Some homeowners on income-based or disability benefits were eligible for vouchers covering the full cost of improvements, up to a value of £10,000. Scheme opened to applications on 30 September 2020. Initially £1.5 billion funding was available with the deadline of 31 March 2021 for vouchers to be redeemed, and home improvements to be completed. An extension to 31 March 2022 was announced in November 2020. It was subsequently announced the scheme would close to new applications on 31 March 2021.	2020	Department for Business, Energy and Industrial Strategy					
Energy Company Obligation (ECO_4)	Homes, heat and buildings	Carbon dioxide (CO_2)	The Energy Company Obligation (ECO) is a Government energy efficiency scheme for low income and vulnerable energy customers which aims to reduce bills and improve the least energy efficient housing stock occupied by low income and vulnerable households across Great Britain. It contributes towards Government's statutory target of improving as many fuel poor homes as reasonably practicable to EPC band C by 2030, with an interim milestone of band D by 2025. The scheme is energy supplier led with costs recouped from their domestic customers.	Regulatory	ECO_3 ended on 31 March 2022; ECO_4 commenced in 2022 and will run to March 2026, (the consultation response for the new scheme, ECO_4, was published on 1 April 2022). The scheme requires affirmative regulations to come into force.	The 2021 Sustainable Warmth strategy announced a continuation of ECO from 2022 – 2026 and an expansion in the value of the scheme from £640mn/annum to £1bn/annum. In Summer 2021, government consulted on the 4-year £4bn successor scheme (ECO_4) and published the consultation response in April 2022. The scheme focuses support by installing energy efficiency measures in low income and vulnerable and fuel poor households across Great Britain, living in energy inefficient homes. A minimum level of energy efficiency upgrade is required, for deeper improvements to homes.	ECO_3 2018 – 2022 ECO_4 2022 -2026	Department for Business, Energy and Industrial Strategy					
Off grid heat decarbonisation (domestic)	Homes, heat and buildings	Carbon dioxide (CO_2)	To phase out the installation of high carbon fossil fuel heating systems in homes off the gas grid in England	Regulation	We have consulted on our proposals and will respond to that consultation later this year (2022).	Proposed regulation to phase out the installation of high carbon fossil fuel heating systems in homes off the gas grid in England, bringing forward low carbon heat at the point of boiler replacement.	2026 proposed	Department for Business, Energy & Industrial Strategy					
Off grid heat decarbonisation (non-domestic)	Homes, heat and buildings	Carbon dioxide (CO_2)	To phase out the installation of high carbon fossil fuel heating systems in non-domestic buildings in England	Regulation	Planned. We have consulted on our proposals and will respond to that consultation later this year (2022).	Proposed regulation to phase out the installation of high carbon fossil fuel heating systems (e.g. oil, liquefied petroleum gas (LPG), coal) in buildings off the gas grid in England, bringing forward low carbon heat at the point of boiler replacement.	2024 proposed for large buildings >1000m2. 2026 proposed for smaller buildings <1000m2.	Department for Business, Energy & Industrial Strategy					

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									2020	*2025*	*2030*	*2035*	*2040*
Renewable Heat Incentive (RHI) (There are 2 RHI schemes, the Non-Domestic RHI (NDRHI) and Domestic RHI (DRHI)).	NDRHI scheme – industrial, commercial, public sector, agricultural and not-for-profit organisations – e.g. businesses, hospitals, and district heating schemes. DRHI – Domestic properties, primarily retrofit.	Carbon dioxide (CO_2)	To decarbonise the generation of heat in both industrial/commercial and domestic sectors. To develop a high quality supply chain that is able to carry out the mass deployment of low carbon heating systems in the 2020s and beyond. To contribute towards the UK's renewable energy and carbon targets.	Regulation	The NDRHI scheme launched in 2011 and closed to new applications in 2021, with final payments being made in 2041. The DRHI launched in 2014 and closes to new applications in 2022, with final payments being made in 2029.	The Non-Domestic Renewable Heat Incentive (RHI) provides financial incentives to increase the uptake of renewable heat by businesses, the public sector and non-profit organisations. Eligible installations receive quarterly payments for 20 years based on the amount of heat generated. The Domestic RHI is a government financial incentive to promote the use of renewable heat. Eligible installations receive quarterly payments for 7 years for the amount of renewable heat it is estimated their system produces.	NDRHI scheme launced in 2011. DRHI scheme launched in 2014.	UK government. Legislation is set by BEIS. Both DRHI and NDRHI schemes are administered by Ofgem.					
Consultation on improving boiler standards and efficiency	Homes, heat and buildings	Carbon dioxide (CO_2)	Reducing domestic gas consumption: lowering consumer bills and carbon emissions, and improving our energy security, by ensuring new boilers meet the highest standards of efficiency. Preparing for the energy transition: Ensuring new boiler installations prepare the ground for the future transition of homes to low carbon heating, including for a potential hydrogen conversion and exploring the role of hybrid heating systems.	Regulatory	Consultation to be published in due course.	This consultation sets out proposals aimed at improving the efficiency of newly installed gas boiler systems, through product standards and improved installation practices. The consultation will also test the case for requiring that all newly installed gas boilers are hydrogen-ready, to support any future transition of the gas grid. Finally, the consultation also explores the role of hybrid heat pumps as a transitional technology on the journey to Net Zero.	2026	Department for Business, Energy & Industrial Strategy					
Heat Pump Investment Accelerator Competition	Homes, heat and buildings	Carbon dioxide (CO_2)	This £30m competition aims to bring forward private sector investment in the UK heat pump industry, building up product diversity and supply chain resilience, and efficiency gains and cost reductions from innovation and economies of scale.	Economic	Business case being drafted in June. PIC expected to be end of July 2022. Launch Summer 2022. Awards Q1 2023	This scheme will provide up to £30m worth of grants to bring forward/attract additional heat pump manufacturing capacity to the UK. Funding will be provided to companies for eligible capital costs, driven by additionality and VfM. At least two major investments that would otherwise not be made in the UK within this Spending Review period should be secured this year. This will encourage meeting UK heat pump demand and targets, and also creating export opportunities. There is potential to attract more than £250m of private investment, create new, commercially sustainable jobs, reduce unit costs for UK consumers, and cut heat pump delivery times from up to six months to one month.	2023	Department for Business, Energy & Industrial Strategy	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated
Market Obligation for Retrofit HP Deployment	Homes, heat and buildings	Carbon dioxide (CO_2)	Expand deployment of low-carbon heat pumps in order to reduce direct carbon dioxide emissions from gas and oil boilers, and indirect emissions from the use of electric heating appliances that are less energy-efficient than heat pumps.	Regulatory	Planned. (Consultation response published May 2022. Enabling legislation as part of Energy Security Bill)	Plan to introduce an obligation on the manufacturers of fossil fuel boilers sold in the UK to meet targets for a rising standard for low-carbon heat pumps as a proportion of their overall sales mix, either directly or through acquiring credits from other heat pump manufacturers. This will stimulate investment throughout the heat pump supply chain, and help to make a heat pump a more attractive, affordable and simpler choice for more consumers.	2024	UK Government					
Operational Energy Ratings (internally known as PEERS)	Homes, heat and buildings	Carbon dioxide (CO_2)	To provide businesses with information on the in-use energy usage of their buidlings and promote action through disclosure of ratings.	Regulatory	Planned	An operational energy rating would fill a gap in information on how a building performs once it is operational. In large and complex buildings, information failure is a critical barrier to ensuring businesses are aware of and accountable for their carbon emissions.	TBC	UK Government					
Community trials of 100% hydrogen for heating	Homes, heat and buildings	Carbon dioxide (CO_2)	To support industry to deliver a neighbourhood trial by 2023, a village scale trial by 2025 in order to enable strategic decisions in 2026 on the role of hydrogen for heat	Research	The neighbourhood trial will be SGN's H100 Fife project in Levenmouth. Final decisions on the location of the village trial expected to be taken in 2023.	Trials of hydrogen heating will be key to evaluating the practicalities of converting to hydrogen. They will provide a wide range of evidence on costs, feasibility and the way in which consumers experience the conversion process and hydrogen for heating in their homes and workplaces.	2023	UK Government, Scottish Government, Ofgem, HSE, Gas network operators					
Hydrogen appliance testing	Homes, heat and buildings	Carbon dioxide (CO_2)	To determine the feasibility of hydrogen as a heating solution for various pruposes, specifically domestic heating and distribution appliances such as boilers and gas meters.	Research	Various appliances developed and under testing and review.	Numerous hydrogen devices developed and undergoing testing, with proposals from manufacturers regarding costs, production, and other technical factors.	2021	UK Government, regulators, arms length bodies as well as private manufacturers					
Social Housing Decarbonisation Fund Demonstrator	Homes, heat and buildings	Carbon dioxide (CO_2)	The Social Housing Decarbonisation Fund will upgrade a significant amount of the social housing stock currently below EPC C up to that standard, delivering warm, energy-efficient homes, reducing carbon emissions and fuel bills, tackling fuel poverty, and supporting green jobs.	Economic	The SHDF Demonstrator project was launched in 2020. It has awarded £61m of funding to social landlords across England and Scotland to test innovative approaches to retrofitting at scale.	Delivery in progress, expected to be completed by December 2022. The 2020 Summer Economic Update announced the SHDF Demonstrator project, launched in 2020, which has awarded £61m of funding to social landlords across England and Scotland to test innovative approaches to retrofitting at scale, seeing up to 2000 social homes improved to at least EPC band C and supporting up to 1,200 local jobs.	2020	UK Government (BEIS), Local Government, English & Scottish LA's					

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									2020	*2025*	*2030*	*2035*	*2040*
Social Housing Decarbonisation Fund	Homes, heat and buildings	Carbon dioxide (CO_2)	The Social Housing Decarbonisation Fund will upgrade a significant amount of the social housing stock currently below EPC C up to that standard, delivering warm, energy-efficient homes, reducing carbon emissions and fuel bills, tackling fuel poverty, and supporting green jobs.	Economic	Wave 1 of the SHDF was launched in 2021. It will provide around £179m of funding in financial year 21/22	The first wave of the Social Housing Decarbonisation Fund (SHDF) was launched in August 2021. It is providing around £179m of BEIS funding and around £187m of co-funding from Registered Providers, equalling a total investment size of around £366m in financial year 21/22. A further £800 million funding was announced in the Net Zero Strategy for Wave 2, the competition launch for Wave 2 is scheduled for Autumn/Winter 2022.	2021	UK Government (BEIS), Local Government. English LA's					
EPC Disclosure and Targets for Lenders	Homes, heat and buildings	Carbon dioxide (CO_2)	The aim of the proposals is to incentivise mortgage lenders to develop new low cost green products aimed at improving energy performance and to raise awareness among their customers. The policy would function as an enabler to achieving our wider net zero targets, such as getting as many homes as possible to be upgraded to Energy Performance Certificate (EPC) Band C by 2035.	Regulatory	We have consulted extensively on these proposals and will publish the Government Response in due course	We have consulted on the role that mortgage lenders in England and Wales can play in helping homeowners to improve the energy performance of their homes. The consultation proposed that lenders disclose information related to the energy performance of their portfolios and sign up to meet an improvement target. The target could be achieved by lenders offering low cost green finance products to customers (e.g. green mortgages, further advances), offering incentives (e.g. cashbacks), and providing information and advice to customers on the changes they can make.	TBC	UK Government					
Measures to improve the energy efficiency of social housing	Homes- heat and buildings	Carbon dioxide (CO_2)	All homes to EPC by 2035	Regulatory	Proposed. The Net Zero Strategy proposed tp considering setting a long-term regulatory standard to improve social housing to EPC Band C	Introduce standards to improve the energy efficiency of socially rented homes.	TBC	UK Government (Local Authorities in England and Wales)					
Measures to Improve the Energy Performance of Owner Occupier Homes (Domestic)	Homes, heat and buildings	Carbon dioxide (CO_2	All homes to EPC C by 2035	Regulatory	We commited in the HBS, NZS and Energy Security Strategy to develop proposals for consultation	Introduce minimum energy performance standards to improve the energy performance of owner-occupied homes linked to behaviour points where building upgrades are most likely	TBC	UK Government (Local authorities in Enland and Wales)					
PRS Minimum Energy Efficiency Regulations – Domestic	Homes, heat and buildings	Carbon dioxide (CO_2)	Amend PRS Regulations to require privately rented homes in England and Wales to reach EPC C by 2028	Regulatory	We consulted in the winter of 2020/21 and will publish a Government Response in due course	We committed in the Clean Growth Strategy to improve as many private rental homes as possible to EPC band C by 2030 where practical, affordable and cost effective. In the Net Zero strategy we committed to setting long-term regulatory standards to upgrade privately rented homes to EPC band C by 2028. The consultation proposed to apply to new tenancies from 1 April 2025 and to all tenancies by 1 April 2028.	TBC	UK Government (Local Authorities in England and Wales)					
Improve the Energy Performance of Owner Occupier Non-domestic properties	Homes, heat and buildings	Carbon dioxide (CO_2)	Improve the fabric energy efficiency of owner occupiers non-domestic properties	Regulatory	We commited in the HBS, NZS and Energy Secruity Strategy to develop proposals for consultation	Buyers of non-domestic buildings will need to upgrade the property's energy efficiency to EPC B within 24 months of purchase, with a 2030/2035 backstop.	TBC	UK Government (Local Authorities in England and Wales)					
PRS Minimum Energy Efficiency Regulations – Non Domestic	Homes, heat and buildings	Carbon dioxide (CO_2)	Amend PRS Regulations to require privately rented non-domestic in England and Wales to reach EPC B by 2030	Regulatory	We consulted in 2021 and will publish a Government response in due course	Rented non-domestic buildings will need to reach EPC B, with a 2030 backstop	TBC	UK Government (Local Authorities in England and Wales)					
Green Home Finance Innovation Fund (GHFIF)	Homes, heat and buildings	Carbon dioxide (CO_2)	The GHFIF competition was designed to encourage domestic energy efficiency retrofit amongst homeowners by promoting the establishment of green lending products and supporting lenders to overcome the barriers to innovation posed by high initial development costs in an untapped green finance market.	Economic	The three projects funded through the GHFIF competition completed end March 2022 (with two of the resulting 'green lending' products now continuing in a commercial capacity). Evaluation is currently underway and is due to be completed by March 2023.	Funded through the Energy Innovation Programme, the £1.8m GHFIF competition launched in September 2019, and awarded three organisations grant funding to support the initial development and piloting of green home finance products that aim to incentivise energy efficiency retrofit in homes. The funded projects were led by two retail lenders and one fintech company.	2019	Department for Business, Energy & Industrial Strategy (BEIS)					

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Green Home Finance Accelerator (GHFA)	Homes, heat and buildings	Carbon dioxide (CO_2)	The key objective of the GHFA programme is to drive innovation and diversification in the green lending market and support the establishment of a wide range of green finance products and services which incentivise domestic energy efficiency and low carbon heating retrofit amongst both owner occupiers and private landlords. A second objective is to support lenders to develop expertise in energy efficiency and low carbon heating, and build relationships with the energy efficiency installer supply chain, and with advice provision services to streamline and improve the consumer journey.	Economic	Due to launch in 2022	Up to £20m of innovation grant funding will be made available to support UK lenders to design, develop and pilot a range of innovative finance propositions, with a particular focus on non-mortgage related products. Through the GHFA competition, the range and depth of retrofit enabling green finance products and services available in the green finance market will be explored and developed to encourage and enable domestic energy retrofit and help a wide range of consumer segments meet future regulatory standards.	2022	Department for Business, Energy & Industrial Strategy (BEIS)					
Building Regulations 2021 Part L	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Coming into force June 2022.	An interim uplift to the 2013 building regulations will come into force in June 2022, when new homes and buildings constructed to this standard will be expected to produce significantly less CO_2, compared to those constructed to the 2013 standard. This applies to England.	2021	Department for Levelling Up, Housing and Communities (DLUHC)					
Future Homes Standard	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of domestic buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Planned	When it is implemented in 2025, we expect the Future Homes Standard will ensure new homes are built not with fossil fuel technologies, but with heat pumps or heat networks. The technical specifications of the FHS will be subject to further consultation in 2023. This will apply to England.	2025	Department for Levelling Up, Housing and Communities (DLUHC)					
Future Buildings Standard	Non domestic buildings (excluding industrial buildings)	Carbon dioxide (CO_2)	Efficiency improvements of non-domestic buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Planned	When it is implemented in 2025, the Future Buildings Standard will deliver highly efficient non-domestic buildings which use low-carbon heat, ensuring they are better for the environment and fit for the future. The technical specifications of the FHS will be subject to further consultation in 2023. This will apply to England.	2025	Department for Levelling Up, Housing and Communities (DLUHC)					
Decent Homes Standard	Homes, heat and buildings	Carbon dioxide (CO_2)	All homes to EPC C by 2035, Fuel Poor Homes to Band C by 2030 (Fuel Poverty)	Regulatory	Setting goal stage	Social Housing White Paper committed to review the Decent Home Standard (DHS) to consider how it can better support the decarbonisation and energy efficiency of social Hosing. Initially based on EER C by 2035 (modelled subject to a £10k cost cap) but we will update the figures based on the final level of ambition once the policy is agreed.		Department for Business, Energy and Industrial Strategy (BEIS) and Department for Levelling Up, Housing and Communities (DLUHC)					
Warm Home Discount	Homes, heat and buildings	Carbon dioxide (CO_2)	Reducing fuel poverty largely through requiring energy suppliers to provide rebates to low-income and vulnerable households.	Regulatory	Planned	The scheme obligates participating energy suppliers to provide rebates to low-income and vulnerable households. The scheme is being expanded to £475 milion per year from 2022/23 until 2025/26 least, providing £150 rebates to around 3 million households each winter, the majority automatically. Under the scheme, energy suppliers can also fund other measures such as energy advice, energy efficiency measures, and debt write-off. There will be separate WHD schemes in England and Wales and in Scotland. Government will shortly lay the regulations for England and Wales and publish a consultation for Scotland, which will be subject to separate regulations.	Current scheme: 2011-2022; Expanded scheme: 2022-2026	Policy owned by BEIS and implemented by BEIS, DWP and Ofgem					
Boiler Upgrade Scheme	Homes, heat and buildings	Carbon dioxide (CO_2)	Incentivise property owners to replace existing fossil fuel heating systems with low carbon heat alternatives, primarily heat pumps, to help grow demand for low carbon heat and build supply chains ahead of the introduction of regulations later in the decade.	Fiscal	The scheme has a confirmed budget of £450 million from April 2022 to March 2025 (£150 pa). The scheme will launch for account registration on April 11th 2022 and voucher applications will open from 23rd May 2022. Installations completed on or after 1st April will be eligible for support.	• The Boiler Upgrade Scheme will provide capital grants for the installation of low carbon heat technologies in domestic and small non-domestic properties. The grant model will help customers overcome the high upfront cost of low carbon technologies when replacing existing fossil fuel systems. BUS applies to England and Walse. • The BUS will provide grants of £5000 towards the installation and capital costs of air source heat pumps and biomass boilers, and grants of £6,000 for ground source heat pumps.	2022	BEIS The scheme will be delivered by Ofgem.					
Green Gas Support Scheme	homes, heat and buildings, industrial, commercial, public sector	Carbon dioxide (CO_2), Methane (CH_4)	The Green Gas Support Scheme is a tariff support scheme for biomethane (AD) injection to the gas grid (following closure of the Non Domestic RHI in March 2021). The length of the tariff will be 15 years, with applications starting Autumn 2021 until 2025.	Regulatory	The scheme is open to applicants in England, Scotland and Wales for four years from 30 November 2021.	Tariff support scheme for supporting new AD biomethane injection into the gas grid	2021	Department for Business, Energy and Industrial Strategy (BEIS)					

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Green Gas Levy	Homes, heat and buildings, industrial, commercial, public sector	Carbon dioxide (CO_2), Methane (CH_4)	The Green Gas Levy is the funding mechanism for the Green Gas Support Scheme. The levy charges fossil fuel gas suppliers to raise funding for the tariff support payments to biomethane production plants.	Regulatory	The first levy collection took place in April 2022 and will run through to 2040 when the tariff support payments under the Green Gas Support Scheme cease	The Green Gas Levy operates as a fixed charge levied against every gas meter that supplies fossily fuel gas for the purposes of heat. The levy is reviewed annually to match the forecast expenditure of the Green Gas Support Scheme.	2021	Department for Business, Energy and Industrial Strategy (BEIS)	N/A	N/A	N/A	N/A	N/A
Enablers – Public Engagement; SEA	Homes- heat and buildings	Enabler – no direct impact on GHGs	The Simple Energy Advice service launched in 2018, to provide homeowners with impartial and tailored advice on how to cut their energy bills and make their homes greener. This service has been accessed by over 1.8 million users	Information Fiscal	Implemented	Online advice service for homeowners to access correct information for energy efficiency measures which would suit their property type best	2019	Department for Business, Energy and Industrial Strategy (BEIS)					
Enablers- Consumer protection; Trustmark & PAS	homes	Enabler – no direct impact on GHGs	Drive forward industry led activity to stregthen and embed standards for retrofit, ensuring necessary protection is provided for consumers that have energy efficiency or heat measures installed, in accordance with the recommendations of the Each Home Counts review	Information Fiscal	Retrofit standards are in force, alongside an installer quality mark (TrustMark).	PAS 2035/PAS 2030:2019 came into force in November 2021. Installers must be certified to those standards and registered with TrustMark to particpate in government schemes. An small update to the standard was published in January 2022, taking into account lessons learned from implementation on the ground. A more substantial update is being considered for 2022/23.	2019	Industry activity with leadership (and funding for standards updates) from Department for Business Energy and Industrial Strategy					
Enablers- supply chain/ skills; home retrofit & capacity building	homes, heat and buildings	Enabler – no direct impact on GHGs	To reduce supply chain risk to our current delivery schemes and understand and plan for future strategic supply chain needs, supporting the supply chain to grow and upskill in the key trades needed both now and in the future.	Information Fiscal	An ongoing programme of work	An ongoing programme of work including skills funding, working with industry to help them make better use of existing avenues for capacity building/understand the issues with those (non fiscal measures), and improving our knowledge and understanding via research to inform future interventions.	2021	Department for Business, Energy and Industrial Strategy (BEIS)					
Energy-related Products Policy	Domestic and non-domestic buildings; manufacturing; retail.	CO_2	Sets minimum energy performance standards and implements energy labels for a range of energy-related products to increase the uptake of the most energy efficient products on the market, reduce energy bills and remove the least energy efficient products from the market. Since 2019, this has involved: - introducing ecodesign requirements for servers, power transformers and external power supplies - introducing an energy label for commercial refrgieration - updating ecodesign requirements for welding equipment, electric motors and variable speed drives, washing machines, dishwashers, refrigeration, commercial refrigeration, lighting products and electronic displays - rescaling the energy label for lighting products, electronic displays, washing machines, refrigeration and dishwashers to aid consumer understanding and reflect technological progress - introducing circular economy requirements for a range of products	Regulatory (implemented)	In force	These measures help save consumers money on their energy bills by incentivising them to purchase the most energy efficient products on the market and removing the least energy efficient products from the market. This in turn spurs innovation within the market. More recently, circular economy principles have been introduced to reduce material waste by supporting consumers to repair products, keeping them in use for longer.	2019	Department for Business, Energy and Industrial Strategy (BEIS)					
Heat Networks Market Framework	Domestic and non-domestic buildings; manufacturing; retail.	Carbon Dioxide (CO_2)	Deveop a regulatory framework for heat networks to protect consumers and support growth of the wider market	Regulatory	Government Response to consultation published in December 2021	Measures are intended to protect consumers by ensuring fair pricing and deliver growth in the sector. Examples of measures include: establishing a framework for consumer protections similar to those for gas and electricity customers, proposals for more transparent pricing and proposals for giving heat networks equivalent rights and powers to utilities.	Subject to parliamentary timetable for Energy Security Bill, regulations will be introduced as early as 2024	Department for Business, Energy and Industrial Strategy (BEIS) and Ofgem					
Heat Network Zoning	Domestic and non-domestic buildings; manufacturing; retail.	Carbon Dioxide (CO_2)	Introduction of heat network zoning in England, to help overcome barriers to deployment by identifying and designating areas where heat networks are the lowest cost solution for decarbonising heat.	Regulatory	Consulted on proposals in Autumn 2021- consultation results to be published late June 2022	Our proposals for heat network zoning involve central and local government working together with industry and local stakeholders to identify and designate areas within which heat networks are the lowest cost solution for decarbonising heat. Certain buildings within zones would be required to connect to the heat network. This will help accelerate the deployment of heat networks where they are most appropriate and help heat networks increase their contribution towards our net zero commitments.	2025	Department for Business, Energy and Industrial Strategy (BEIS)					

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Heat Network Transformation Programme	Domestic and non-domestic buildings; manufacturing; retail.	Carbon dioxide (CO_2)	Grow and decarbonise the UK heat network market, helping to overcome barriers to heat network market entry. £338M invested over 2022/23-2024/25. The Green Heat Network Fund has £328m invested (including £40m tail period in 2025/6).	Fiscal	An ongoing programme of work	Green Heat Network Fund is the largest element, providing grants for large district heat networks for low carbon heat sources (e.g. heat pumps and waste-heat recovery). It replaces the Heat Networks Investment Project (HNIP).	2022	Department for Business, Energy and Industrial Strategy (BEIS)					
Games Console Voluntary Agreement	Domestic and non-domestic buildings; manufacturing; retail.	Carbon dioxide (CO_2)	Reduce energy consumption of games consoles	Voluntary Agreement (non-regulatory)	Implemented	Aims to encourage manufacturers to increase the energy and resource efficiency of games consoles and provide consumers and repairers information on repair and spare parts.	2021	Department for Business, Energy and Industrial Strategy (BEIS)					
Measures to drive bus and coach decarbonisation	Transport	Carbon dioxide (CO_2)	Transition to zero emission road vehicles.	Regulatory, Fiscal	Adopted	Invest £3 billion in the National Bus Strategy, creating integrated networks, more frequent services, and bus lanes to speed journeys, and support delivery of 4,000 new zero emission buses and the infrastructure needed to support them. This will represent the replacement of nearly 12% of England's local operator bus fleet. This included £71m in 2021 to support 335 new zero emission buses in 5 areas and £198.3m in 2022 to provide 943 buses.	National Bus Strategy published in March 2021.	Department for Transport					
Changes to the RTFO	Transport	Carbon dioxide (CO_2)	Low carbon fuels.	Regulatory	Adopted	Maximise carbon savings from the use of low carbon fuels, including by increasing the main Renewable Transport Fuel Obligation (RTFO) target. We have increased the RTFO main obligation (the percentage of transport fuel in the UK that suppliers must show comes from renewable or sustainable sources) from 9.6% in 2021 to 14.6% in 2032.	RTFO originally came into force in 2008. Changes to the main obligation have been announced since.	Department for Transport					
Regulation to phase out non-zero emission cars and vans	Transport	Carbon dioxide (CO_2)	Transition to zero emission road vehicles.	Regulatory	Planned	End the sale of new petrol and diesel cars and vans from 2030; from 2035, all new cars and vans must be zero emission at the tailpipe. Introduce a zero emission vehicle mandate setting targets for a percentage of manufacturers' new car and van sales to be zero emission each year from 2024.	Cars and vans phase out dates – 2030. ZEV mandate – 2024.	Department for Transport					
Regulation to phase out all new non-zero emission road vehicles	Transport	Carbon dioxide (CO_2)	Transition to zero emission road vehicles.	Regulatory, Research	Planned	Take forward our pledge to end the sale of all new, non-zero emission road vehicles by 2040, from motorcycles to buses and HGVs, subject to consultation. At COP26, we announced that following consultation we will end the sale of new, non-zero emission HGVs less than or equal to 26 tonnes by 2035, and that from 2040, all new HGVs must be fully zero emission at the tailpipe.	From 2030, although we have announced different phase out dates for different types of non-zero emission vehicle.	Department for Transport					
Investment in charging infrastructure and the transition to electric vehicles	Transport	Carbon dioxide (CO_2)	Transition to zero emission road vehicles.	Regulatory, Fiscal	Planned	Ensure the UK's charging infrastructure network is reliable, accessible, and meets the demands of all motorists. We have published an EV infrastructure strategy, setting out our vision for infrastructure rollout, and roles for the public and private sectors in achieving it. Building on the £1.9 billion from Spending Review 2020, the Government has committed an additional £620 million to support the transition to electric vehicles. The funding will support the rollout of charging infrastructure, with a particular focus on local on-street residential charging, and targeted plug-in vehicle grants.	From 2030, although we have announced different phase out dates for different types of non-zero emission vehicle.	Department for Transport					
Further rail electrification	Transport	Carbon dioxide (CO_2)	Improved transport infrastructure	Fiscal	Planned	Electrify more railway lines as part of plans to deliver a net zero rail network by 2050, with the ambition to remove all diesel-only trains by 2040.		Department for Transport					
Investment in cycling and walking	Transport	Carbon dioxide (CO_2)	Increase the share of journeys taken by public transport, cycling and walking.	Regulatory, Fiscal	Planned	Invest £2 billion in cycling and walking, building first hundreds, then thousands of miles of segregated cycle lane and more low-traffic neighbourhoods with the aim that half of all journeys in towns and cities will be cycled or walked by 2030. As announced in the Transport Decarbonisation Plan, we will create at least one zero emission transport city.	£2bn announced in May 2020.	Department for Transport					
Launch of UK SHORE	Transport	Carbon dioxide (CO_2)	Tackle shipping emissions and advance the UK towards a sustainable shipping future	Research, Fiscal	Adopted	New unit, UK SHORE, to tackle shipping emissions and advance the UK towards a sustainable shipping future. £206 million new funding to accelerate research into and development of clean maritime technologies and create skilled jobs across the country.	UK SHORE launched in March 2022.	Department for Transport					
Measures to decarbonise the maritime sector	Transport	Carbon dioxide (CO_2)	Maritime decarbonisation	Regulatory, Fiscal	Planned	Plot a course to net zero for the UK domestic maritime sector, phase out the sale of new non-zero emission domestic shipping vessels and accelerate the development of zero emission technology and infrastructure in the UK. We will engage with industry to explore establishing a UK Shipping Office for Reducing Emissions (UKSHORE) to transform the UK into a global leader in the design and manufacturing of clean maritime technology.		Department for Transport					
Measures to decarbonise the aviation sector	Transport	Carbon dioxide (CO_2)	Aviation decarbonisation	Regulatory, Fiscal	Planned	Become a leader in zero-emission flight, kick-starting commercialisation of UK sustainable aviation fuels (SAF), and developing a UK SAF mandate, to enable the delivery of 10% SAF by 2030, and we will be supporting UK industry with a £180m funding to support the development of SAF plants.		Department for Transport					

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HS2 Woodland Fund	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF)	Economic	Implemented	Grant to support woodlands to create a green corridor of connected wildlife habitats alongside the railway and restore degraded ancient woodlands.	2017	Forestry Commission					
Nature for Climate Fund	Land use, land-use change and forestry	Carbon dioxide (CO_2), Nitrous oxide (N_2O), Methane (CH_4)	Afforestation, reforestation and restoration (LULUCF)	Economic	Adopted	2020 Spending review announced the Nature for Cliamte Fund which provides Grants to support woodland creation and peatland restoration over a 5 year period.	2020	Department for Food, Environment and Rural Affairs (DEFRA)					
The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020	Residential	Carbon dioxide (CO_2)	Reduction of particular fuels for domestic burning (Residential)	Regulation	Implemented	This regulation aims to regulate the sales, distribution and marketing of we wood (>20% moisture), Bituminous house coal and manufactured solid fuels with sulphur content over 2%	2022	Department for Food, Environment and Rural Affairs (DEFRA)					
Direct Air Capture and Greenhouse Gas Removal Programme	Cross-cutting (removals)	Carbon dioxide (CO_2), Methane (CH_4)	In the first phase of the competition, to produce designs for GGR Projects which are of high quality and represent proposals which, if implemented, would advance the development of GGRs in the UK. In the second phase of the competition, to apply the best of these designs to successfully construct, operate, test, refine and evaluate processes and technologies which can be used to remove GHGsfrom the atmosphere at scale.	Fiscal	Adopted	In the first phase of the competition, to produce designs for GGR Projects which are of high quality and represent proposals which, if implemented, would advance the development of GGRs in the UK. In the second phase of the competition, to apply the best of these designs to successfully construct, operate, test, refine and evaluate processes and technologies which can be used to remove GHGs from the atmosphere at scale.	2021	Department for Business, Energy and Industrial Strategy (BEIS)					
Greenhouse gas removal policy	Cross-cutting (removals)	All	UK government has an ambition of at least 5Mt of CO_2e removals by 2030 (announced in Net Zero Strategy). To support this ambition, government will consult on policy measures to incentivise investment in GGRs in spring 2022. BEIS launched a £70m innovation competition in 2021 for Direct Air Capture and other GGRs.	Government to consult on instruments	Planned	Ambition of 5Mt of CO_2e removals per annum by engineered GGRs by 2030 (announced in Net Zero Strategy) To support this ambition, government will consult on policy measures to incentivise investment in GGRs in spring 2022. BEIS launched a £70m innovation competition in 2021. In Phase 1 23 projects were supported up to £250,000 each and around 15 of these will be going forward to Phase 2 of the competition. Phase 2 applicants can recieve up to £5million each to build their demonstration project based on the feasibility and design from Phase 1. Phase 2 demonstration projects will need to demonstrate a removal rate of up to 1000t CO_2e/yr and indicate how costs of CO_2 removal can be reduced through scaling up to 50,000t CO_2e/yr removal by 2030.	2021	The national government set the ambition of 5Mt of CO_2e removals per annum by 2030. BEIS is responsible for developing policy to enable this ambition.					
Cross-government portfolio of innovation funding support (£1.5bn) over period to 2025, including £1bn Net Zero Innovation Portfolio	All	Carbon dioxide (CO_2)	Accelerate the commercialisation of low carbon technologies, systems and business models across the economy.	Economic	Implemented	Funding BEIS-led programmes on power, buildings and industry; DFT-led programmes across transport; and DEFRA-led programmes on natural resources, waste, and F_gases.	2021	Department for Business, Energy, and Industrial Strategy (BEIS); Department for Transport (DfT), DEFRA					
Net Zero Research and Innovation Framework	All	All	Sets out key research and innovation challenges for the next 5-10 years	Information	Implemented	Sets out critical net zero research and innovation challenges across the UK that require development over the next 5-10 years, and presents timelines of short, medium and longer-term priorities. Will help align current and future government funding around agreed priorities and to crowd-in effort and investment from the private sector and research communities by providing a clear signal on our areas of focus.	2021	Led by BEIS; contributions from DfT, Defra, UKRI					
Public Sector Decarbonisation Scheme	Public Sector	CO_2	A capital funding scheme for heat decarbonisation and energy efficiency improvements in public sector organisations.	Grant funding, implemented	Delivery (until 31 March 2025)	The Public Sector Decarbonisation Scheme offers grants to public sector bodies to fund energy efficiency and low carbon heat measures. The scheme has already made available over £1bn during 2020/21 and 2021/2, and will invest a further £1.425bn over 2022/23 to 2024/45. The scheme aims to support the decarbonisation of public sector buildings by 75% (against a 2017 basline) by the end of Carbon Budget 6. The quantitative impacts on emissions have been estimated using BEIS's non-domestic buildings model. It models the deployment of low carbon heat and energy efficiency measurest in the UK's non-domestic building stock.	2020	Overseen by BEIS and deliverd by Salix Finance Ltd, a BEIS non-departmental public body. The scheme is open to all public sector bodies in England and for public services that are reserved rather than devolved, funds may be spent anywhere in the UK.					
Public Sector Low Carbon Skills Fund	Public Sector	CO_2	The Public Sector Low Carbon Skills Fund provides grants for public sector bodies to access skills and expertise to unlock heat decarbonisation on their estate.	Economic	Delivery (until 31 March 2023)	Launched alongside the Public Sector Decarbonisation Scheme, providing funding to public sector organisations lacking the skills to develop and deliver decarbonisation projects. Investment of up to £32m for Phase 1 (2020/21); investment of up to £15m for Phase 2 (2021/2022); investment of up to £14m for Phase 3 (2022/23)	2020	Overseen by BEIS and delivered by Salix Finance Ltd. Geographical scope as for PSDS above.					

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Local Net Zero Programme	Local delivery of net zero	Carbon dioxide (CO_2)	Support local authorities and local actors across England to build capability and capacity to meet net zero.	Fiscal	Delivery ongoing	The Local Net Zero Programme supports local authorities and communities across England in build capability and capacity to meet net zero, and ensure they play a leading role in decarbonisation. The programme includes: The Local Net Zero Hubs to support all areas of England to reach net zero, including those lacking capacity and capability, or those facing unique challenges. The Hubs promote best practice and support local authorities to develop net zero projects that can attract commercial investment. Promoting best practice and support local authorities to develop net zero projects that can attract commercial investment. Increasing knowledge sharing to demonstrate and share successful net zero system solutions. Delivery of the Rural Community Energy Fund. This is a £10 million scheme which supports rural communities in England to develop renewable energy projects.	2017	Department for Business, Energy and Industrial Strategy (BEIS)					
Northern Ireland: Climate Change Act (Northern Ireland) 2022	All sectors	Carbon dioxide; methane; nitrous oxide; hydrofluorocarbons; perfluorocarbons; sulphur hexafluoride; nitrogen triflouride	Legislation will underpin all Northern Ireland Executive climate change policy going forward.	Primary legislation	Implemented Received Royal Assent 6 June https://www.legislation.gov.uk/nia/2022/31/contents/enacted	Climate change legislation for Northern Ireland which includes a 2050 Net Zero target for Northern Ireland.	Royal Assent June 2022	Northern Ireland Executive					
Northern Ireland: Green Growth Strategy	Energy, agriculture, transport, economy, industry, forestry, waste, land use, cross cutting across all sectors	Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), F-Gases	This Green Growth Strategy will set out a framework for a future where Northern Ireland transitions from being a high to a low emissions society; where NI can enjoy the longer term economic, social, health and environmental benefits that this brings	Other	Planned The strategy is currently in a redrafting stage following the public consultation exercise. The responses to the consultation are currently being analysed and, alongside the legislative requirements of The Climate Change Act (Northern Ireland) 2022, will inform the redrafting of the Strategy.	The Green Growth Strategy is the Northern Ireland Executive's multi-decade strategy, balancing climate, environment and the economy in Northern Ireland. It sets out the long-term vision and a solid framework for tackling the climate crisis in the right way.	Awaiting Executive Sign Off	Northern Ireland Executive					
Northern Ireland: Regional Development Strategy 2035 & Strategic Planning Policy Statement for Northern Ireland	Cross Cutting	Multiple, including Methane (CH_4) and Nitrous Oxide (N_{2O})	To provide key guiding principles for planning in Northern Ireland and both recognise the need to mitigate and adapt to climate change. To ensure existing planning strategy, policy and legislation continue to address the climate change challenge.	Regulatory and Economic	Implemented	The overall objective of the planning system is to further sustainable development. The Regional Development Strategy 2035 (RDS) and the Strategic Planning Policy Statement for Northern Ireland (SPPS) provide the key guiding principles for planning in Northern Ireland and both recognise the need to mitigate and adapt to climate change. Engaging with a range of stakeholders; and applying best practice will ensure that the planning system is fit for purpose; evolves to reflect key developments in respect of sustainable development and climate change and that existing planning strategy, policy and legislation continue to address the climate change challenge.	RDS – 2010, SPPS – 2015	Northern Ireland Executive					
Northern Ireland: Energy Management Strategy and Action Plan to 2030 for Northern Ireland Central Government	Cross Cutting	Carbon Dioxide (CO_2)	To lower the net energy consumption by 30% by 2030 (with 2016/17 as the baseline) and to establish effective energy management processes that unlock value	Strategy and Action Plan	Implemented	Central government is the largest aggregated energy consumer in Northern Ireland. The EMS offers the opportunity to: 1. provide leadership on energy efficiency; 2. drive downward pressure on costs; 3. improve decarbonisation efforts In a context of rising energy prices – in which maintaining the status quo will guarantee cost increases – embracing energy management is an imperative to ensure Government achieves value for taxpayers. Apart from the financial benefits, energy management also contributes to the draft Programme for Government (PfG) through reduction of greenhouse gas emissions and enhancing security of energy supply. In addition, it directly supports wider UK Government objectives on energy and climate action.	2019-2030	Northern Ireland Executive					
Northern Ireland: 80% Renewable Electricity Consumption target	Energy	CO_2, (CH_4, N_2O)	To increase renewable electricity generation and to reduce reliance on fossil fuel generation in Northern Ireland in the transition towards Net Zero carbon energy by 2050 (aim of the Energy Strategy for Northern Ireland).	Economic	Implemented Received Royal Assent 6 June https://www.legislation.gov.uk/nia/2022/31/contents/enacted	A revised renewable electricity consumption target for Northern Ireland of 80% by 2030, as defined by the Climate Change Act (Northern Ireland) 2022, soon to become legislation. The Article in relation to the target states: The Department for the Economy must ensure that at least 80% of electricity consumption from renewable sources by 2030.	2022	Northern Ireland Executive					

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Northern Ireland: Northern Ireland Renewables Obligation	Energy	CO_2, (CH_4, N_2O)	Until it's closure in March 2017, the NIRO was the Department for the Economy's (DfE) main policy instrument for incentivising renewable electricity generation.	Economic	Implemented. Closed to new applications since 31st March 2017. Projects already accredited will receive payments for 20 years from their accreditation date, or until 31st March 2037, whichever is earlier.	The Northern Ireland Renewables Obligation (NIRO) has been the main support mechanism for encouraging increased renewable electricity generation in Northern Ireland. It operates in tandem with the Renewables Obligations in Great Britain – the 'ROS' in Scotland and the 'RO' in England & Wales – in a UK-wide market for Renewables Obligation Certificates (ROCs) issued to generators under the Obligations.	2005	Northern Ireland Executive					
Northern Ireland: Biomethane injection into the natural gas grid in Northern Ireland	Energy/heat, transport, industrial processing, agriculture, waste/waste management.	Methane (CH_4)	To replace a significant proportion of natural gas used in the gas distribution network in Northern Ireland with locally produced biomethane to reduce emissions and dependence on imported fossil fuels.	Regulatory, economic (consideration of the need for financial support/ incentives for biomethane production), research, and education.	Planned Policy is at the planning/ development stage, with good progress on regulatory arrangements and research being taken forward in spring 2022 into the biomethane resource in Northern Ireland and completion of an economic assessment.	The aim of the policy is to utilise excess agricultural and other waste in Northern Ireland to produce biomethane for injection into the natural gas grid to support, primarily, the decarbonisation of heating and also transport.	2022	Northern Ireland Executive					
Northern Ireland: Rural-led Energy Transition (RULET) pilot	Energy, Power, Heat and Buildings	CO_2	To reduce or eliminate the risk of low-income households lagging behind in the energy transition.	Research	Implemented Commenced Winter 2021, and monitoring will continue over the next two heating seasons	A joint initiative between the Northern Ireland Housing Executive and Ulster University and an EU Funded project. Its focus is considering combining domestic electrical heating systems with energy storage, and determining if this could be delivered and operated at scale. Also considering combining high levels of wind penetration into the electric network. Northern Ireland is renowned for its wind energy, and when dispatched down, i.e, when generation exceeds demand, has the potential to benefit low income householders. In 2020 15% of available wind energy with a retail value of over £80m.	2021	Northern Ireland Executive					
Northern Ireland: Building Regulations Northern Ireland- Part F (Conservation of fuel and power) and related parts	Energy, other sectors and cross cutting	CO_2, CH_3 and NOx	Phased plan of uplifts with a view to reducing operational emissions from newly erected buildings by 75-80% by 2026/27. At this point new buildings should be 'net zero ready' with net zero operational emissions achieved over time, as the electrical grid decarbonises.	Regulatory	Phase 1 implemented to come into effect 30 June 2022. Subsequent phases are in planning stages	As an interim step to move towards net zero for 2050, phase 1 provides an uplift to new build standards to take effect from June 2022. A phase 2 discussion exercise will gather evidence, including whether an early introduction of requirements based on low carbon heating could be feasible for a phase 3 uplift in 2023. Full implementation of 'net zero ready' is anticipated no later than in 2026/27. These later phases will also take into account developments in other administrations to address standards for work to existing buildings and in related areas, such as ventilation, overheating and, potentially, in collaboration with the Department for Infrastructure, electric vehicle charge-point provisions. We will, meanwhile, continue to remain alert to emerging developments in areas such as embodied carbon, fuel price assumptions and grid impacts.	2022	Northern Ireland Executive					
Northern Ireland: Affordable Warmth Scheme (Department for Communities)	Those most at risk of fuel poverty in the owner occupied and private rented sectors	CO_2 emissions	Primarily a fuel poverty scheme which offers energy efficiency measures to improve the thermal comfort of a property.	Grant-based scheme as per the Domestic Energy Efficiency Grants Regulations (Northern Ireland) 2009 as amended 2014, 2016 and 2021	Implemented	The Affordable Warmth Scheme is the NI Executive's main fuel poverty scheme. It is a grant based scheme delivered in partnership between the Department for Communites, local Councils and the Northern Ireland Housing Executive. It has a targeted approach, aimed at private sector households most at risk of fuel poverty with an annual household income of less than £23,000. It provides a range of energy efficiency measures to improve thermal comfort.	2015	Northern Ireland Executive					

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									2020	*2025*	*2030*	*2035*	*2040*
Northern Ireland: Boiler Replacement Scheme (Department for Communities)	Those with old and inefficient boilers in the owner occupied sector.	CO_2 emissions	Primarily a scheme which offers an energy efficiency measure to improve the thermal comfort of a property	Grant-based scheme as per the Domestic Energy Efficiency Grants Regulations (Northern Ireland) 2009 as amended 2014, 2016 and 2021	Implemented	The Boiler Replacement Scheme is a grant based scheme funded by the Department for Communities and administered by the Northern Ireland Housing Executive. It assists privately owned households who meet the eligibility criteria to replace old and inefficient boilers that are more than 15 years old.	2012	Northern Ireland Executive					
Northern Ireland: Domestic Energy Efficiency scheme	Residential	CO_2, (CH_4, N_2O)	To improve the energy efficiency of building fabric across the Northern Ireland housing stock	Economic	Planned. Scheme is at the planning/ development stage with commitment to launch a pilot scheme in 2022.	Improving the energy efficiency of the Northern Ireland housing stock will seek to provide energy savings for households and support the reduction of carbon emissions.	2022	Northern Ireland Executive					
Northern Ireland: Housing Supply Strategy	Other sectors (Housing – residential and retrofit)	CO_2	The Strategy will provide a framework that can create better places to live and stronger communities through a housing system that can deliver up to 150,000 homes over its 15 year lifetime, if required.	Economic, Other	Planned. The draft Strategy is currently being reviewed following a public consultation exercise.	The overarching vision for the Strategy is that "Everybody has access to a good quality, affordable and sustainable home that is appropriate for their needs and is located within a thriving and inclusive community". The vision is supported by 5 key objectives and 16 long term policy commitments.		Northern Ireland Executive					
Northern Ireland: 300 Unit Low Carbon Programme	Housing, energy, power	CO_2	To deliver a thermal improvement and decarbonised heating programme.	Information, Economic, Other	Planned. The strategy is due to commence in winter 2022/23, complete installations by winter 2023/24 and monitor till late 2024.	The Housing Executive will collaborate with its sponsoring department Department for Communities, industry, academia, other government bodies, the regulator and householders to deliver a thermal improvement programme focused on improved energy efficiency measures, low carbon heating, electric tariff changes and improved householder education to effect behaviour change.	2022/23	Northern Ireland Executive					
Northern Ireland: Housing Executive New Build Pilot	Housing, Public, Local	CO_2	The scheme will explore if a building can produce net zero greenhouse gas emissions in use, known as 'zero carbon in use'. The standards explored in the pilot will far exceed current building regulations. The objective is that building to high energy standards now will futureproof new builds.	Research, Economic, Other	Adopted	The Housing Executive is undertaking the construction of a small development of new social housing units in North Belfast. This scheme will provide 6 semi-detached dwellings (2 bed, 3 person) and will incorporate Modern Methods of Construction (MMC), ultra-low energy building techniques and mechanical ventilation and heat recovery system with integral heat pump.		Northern Ireland Executive					
Northern Ireland: Hybrid Working Policy	Transport	Carbon dioxide (CO_2) and nitrous oxide (N_{20})	To enable departments to achieve their carbon reduction objectives with the associated environmental benefits. The contributing factors are expected to be reduced daily commuting and less staff travel.	Environmental	Adopted. A Hybrid Working policy will be implemented across the Northern Ireland Civil Service from June 2022 after the Covid guidance on working from home was lifted on 6th June 2022.	The COVID-19 response has demonstrated Northern Ireland Civil Service ' ability to successfully adapt and innovate and effective new ways of working and communicating have emerged.This will facilitate the majority of employees (c.75%) to adopt a mix of workplace-based and remote/home working. The Service is also proposing to launch in April 2022 a number of Connect2 hubs that will provide drop-in facilities in key locations for staff right across the Northern Ireland Civil Service. One of the many advantages of these new ways of working is that it enables departments to achieve their carbon reduction objectives with the associated environmental benefits. The contributing factors are expected to be reduced daily commuting and less staff travel.	Will be implemented in June 2022 after the Covid guidance on working from home has lifted.	Northern Ireland Executive					
Northern Ireland: Transport Decarbonisation	Transport and Energy	Carbon dioxide (CO_2) and nitrous oxide (N_{20})	Reducing the carbon impact of Transport by facilitating modal shift	Economic and Regulatory	Implemented	Hierarchical approach to achieving modal switch to walking, wheeling and cycling, investment in clean public transport, park and ride sites and the provision of infrastructure to support the electrification of transport.	ongoing	Northern Ireland Executive					
Northern Ireland: Waste & Circular Economy Package Targets	Waste	Methane, Carbon	Introduction of new recycling targets	Legislation	Ongoing	Incrementally increasing recycling targets (65% for municipal waste by 2035 with interim targets of 55% by 2025 and 60% by 2030). A target of a maximum of 10% of municipal waste going to landfill by 2035; and minimum requirements for extended producer responsibility schemes including shifting collection, recycling and disposal costs from the end user or councils to manufacturers and brand owners	2020	Northern Ireland Executive					
Northern Ireland: Household Waste Collaborative Change Programme	Waste	Methane, Carbon	To improve the quality and quantity of household recycling	Fiscal	Implemented. Fund is currently undergoing a review to ensure it is future proofed against waste policy direction	it provides assistance to Councils to transform kerbside recycling and Household Waste Recycling Centres infrastructure and services	2019	Northern Ireland Executive					

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Northern Ireland: Waste Prevention Programme	Waste	Methane, Carbon	To increase awareness of waste prevention	Information, Research	Implemented	Key waste prevention measures that have been undertaken include; the carrier bag levy and Prosperity Agreements as well as the extensive waste prevention initiatives undertaken by the third sector through Department of Agriculture, Environment and Rural Affairs funded projects.	2020	Northern Ireland Executive					
Northern Ireland: Climate Change Act (Northern Ireland) 2022 : Recycling target of 70%	Waste	Methane, Carbon	To increase recycling	Legislation	Implemented. Received Royal Assent 6 June https://www.legislation.gov.uk/nia/2022/31/contents/enacted	Climate change legislation for Northern Ireland which includes a 2050 Net Zero target for Northern Ireland.	Royal Assent June 2022	Northern Ireland Executive					
Northern Ireland: Forests for Our Future afforestation framework.	Agriculture and Forestry/LULUCF	CO_2 and CH_4 (by substitution)	Develop an afforestation programme to take forward Forests for Our Future commitments for 9,000 hectares of new woodland by 2030 contributing to forest strategy aim to achieve 12% forest cover by 2050.	Grant Aid	Implemented. Year 3 of a 10 year programme	Establishment of new woodland on land controlled by private individuals, businesses, charities and Councils	2020	Northern Ireland Executive					
Northern Ireland: Northern Ireland Peatland Strategy	Agriculture, Forestry/LULUCF	CO_2	The Vision of the Strategy is that our peatland habitats in Northern Ireland are protected, enhanced and managed sustainably, are recognised for their intrinsic value and for the benefits they provide – for wildlife, people and climate.	Voluntary Agreement, Regulatory	Planned. Draft Policy at this stage. Publication anticipated in 2022	Framework for conservation and restoration of peatlands in Northern Ireland.	2022	Northern Ireland Executive					
Northern Ireland: Soil Nutrient Health Scheme (SNHS)	Agriculture / LULUCF	CO_2, N_2O, CH_4.	To provide verifiable Northern Ireland baselines of: 1. Soil nutrient levels at field scale; 2. Estimates of carbon stored in soils & above ground biomass in the farmed landscape; 3. LiDAR based field & catchment level mapping of run-off risk areas.	Scheme provides mixture of instruments including information provision (to farmers & government), education (farmer training) and research (on soil carbon & phosphorus).	Implemented. The Soil Nutrient Health Scheme opened in March 2022 and will roll out in stages across Northern Ireland over the four year period 2022/23 to 2025/26. It is anticipated the scheme will cost up to £45m (depending on uptake) over the four years.	A new initiative aimed at verifiably baselining soil nutrient levels and estimating farm carbon stocks, right across Northern Ireland (NI). Farmers will have all their fields soil sampled and analysed by contractors. Results will be provided along with training, enabling farmers to match nutrient applications to crop need, thereby increasing efficiency, reducing excess nutrient run-off to watercourses and improving farm economic and environmental sustainability. Baseline carbon stocks in Northern Ireland's soils and above ground biomass (AGB) will be estimated at farm level for farmers and catchment/Northern Ireland scale for government. A full LiDAR scan of Northern Ireland will be carried out to assist in estimating AGB carbon stocks and field scale mapping of surface run-off risk areas. Additionally, baselines established through the Soil Nutrient Health Scheme will facilitate future monitoring and measurement of progress in managing nutrients and carbon, by farmers (at farm level) and government (at catchment / Northern Ireland wide level).	2022	Northern Ireland Executive					
Northern Ireland: The Fluorinated Greenhouse Gases Regulations (Northern Ireland) 2015 – https://www.legislation.gov.uk/nisr/2015/425/contents/made	F-Gases	F-gases – hydrofluorocarbons ("HFCs"), perfluorocarbons ("PFCs") and sulphur hexafluoride ("SF6")	To bring into Northern Ireland law the requirements of European Union laws on F-gases, to limit Northern Ireland emissions of greenhouse gases which exacerbate climate change.	Regulatory	Implemented. In place, but future European Union laws are anticipated in 2023/24, requiring legislative updates.	Northern Ireland is required to continue adhering to the requirements of future European Union laws on both F-gases and ODS because of the terms of the Northern Ireland Protocol.	2009	Northern Ireland Executive					
Northern Ireland: Ozone Depleting Substances ("ODS")	F Gases and ODS	chlorofluorocarbons (“CFCs”), halons, carbon tetrachloride, 1,1,1-Trichloroethane (methyl chloroform), Hydrochlorofluorocarbons (HCFCs)	To bring into Northern Ireland law the requirements of European Union laws on Ozone Depleting Substances, to help limit Northern Ireland's emissions of ODS, which can deplete the ozone layer.	Regulatory	Implemented. In place, but future European Union laws are anticipated in 2023/24, requiring legislative updates.	Northern Ireland is required to continue adhering to the requirements of future European Union laws on both F-gases and ODS because of the terms of the Northern Ireland Protocol.	2003	Northern Ireland Executive					
Northern Ireland: Carbon literacy for Northern Ireland	Education, Local Action	Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), F-Gases	The Carbon Literacy Project aims to raise awareness of climate change and the impacts of everyday actions on an individual, community and organisational basis to encourage action to tackle climate change.	Education	Implemented	In December 2020, the Department of Agriculture Environment and Rural Affairs (DAERA) initiated a project with Keep Northern Ireland Beautiful (KNIB) to develop and deliver carbon literacy training specific to Northern Ireland. building upon the pre-existing Carbon Literacy Project ran in other parts of the UK. Accredited carbon literacy courses are being delivered to teachers across Northern Ireland utilising the existing eco-schools network. It is also being made available to youth and community leaders via a train the trainer approach. Work has also been undertaken to develop a new Open College Network (OCN) Award in reducing carbon footprints through environmental action. Northern Ireland Housing Executive have also joined the partnership to provide awareness of the 2020/21 Schools' Energy Awareness Programme (SEEAP), including a 'Design an Eco-hero Competition'.	2021	Northern Ireland Executive					

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Northern Ireland: Climate Action Programme	Implemented	CO_2	Aims to help participating businesses build capacity, assist with net-zero planning and progress reporting to enable delivery of immediate and long-term climate action.	Policy	Implemented	The programme will involve 15 larger established businesses (Champions) engaging with SMEs (businesses employing less than 500) in their value chain and supporting them on a journey to net zero, with funding obtained from UK Community Renewal Fund by Business in the Community. It will also support increasing the number of businesses that have signed Climate Action pledges and is due for completion in June 2022. It is based on an initial micro pilot, co-developed by Business in the Community and Danske Bank, which was the first initiative of its kind in the UK or Ireland, and was designed to help companies understand their environmental impact and work towards implementing sustainable business strategies.	2021	Northern Ireland Executive					
Northern Ireland: Department of Justice Sustainability Strategy	Cross-cutting : Travel & Transport, Energy and Carbon emissions, Water management, waste management, procurement, biodiversity and ecosystem, corporate social responsibility	CO_2	To ensure that the Department is suffiently addressing it's role within the current climate emergency.	Policy	Planned. The DoJ Sustainability Strategy is currently under development. It is anticipated that the Strategy will be submitted to the DoJ Board for approval in late spring 2022.	Sustainability strategy covering: Travel & Transport, Energy & Carbon Emisssions(non-travel), Water Management, Waste Management, Procurement, Biodiversity & Ecosystem, Corporate Social Responsibility.	2022	Northern Ireland Executive					
Northern Ireland: To reduce the Governments Carbon footprint from Metered Electricity at no additional cost	Energy – Renewable Energy Sector, Public	CO_2	The current contract is sourced from 100% renewable electricity. This contract commenced on 1 April 2020 and expires 31 March 2022. The replacement collaborative contract commences on 1 April 2022, through to 2025. It will continue to be sourced from 100% renewable electricity.	Economic	Implemented. This is an established approach which is now considered business as usual.	This is curently being implemented as best practice but becomes regulatory under the terms of the Climate Change (Northern Ireland) Act 2022, which received Royal Assent on 6 June 2022	Apr-20	Northern Ireland Executive					
Northern Ireland: Scoring Social Value	Supply chain sectors involved in delivering government construction projects and outsourced services.	CO_2	The Executive has implemented a policy to enhance the delivery of social value from public procurement. The Policy includes themes and outcomes to target zero carbon in supply chains. From 1 June 2022 all public sector tenders for works and services must include a minimum weight of 10% for social value in assessing and awarding contracts. This 10% minimum will apply to contracts for services and works above the threshold where the Procurement Regulations apply. Measures, impacts and outcomes will be reported annually. The first report will be published in June 2023.	Policy	Implemented	The social value policy targets procurement strategies and specifications that: - Deliver additional environmental benefits in the performance of the contract including working towards net zero greenhouse gas emissions. - contract specifications that support environmental protection and improvement. - supply chains that minimise carbon footprint and emissions. - companies employ low or zero-carbon practices and/or materials. - assessing and minimising embodied carbon.	Jun-22	Northern Ireland Executive					
Northern Ireland: Department Of Health-Infrastructure Investment Directorate – Invest to Save Scheme	Public	CO_2	Invest to save schemes to upgrade heating and lighting sytems, including Electric Vehicle charging points to deliver carbon emissions savings across the Health Estate, especially in Health trusts.	Economic	Implemented	Upgrade heating and lighting systems, including Electric Vehicle charging points to deliver carbon emissions savings across the Health Estate, especially in Health trusts.	2020	Northern Ireland Executive					
Northern Ireland: Department for the Economy- Strategic Investment Board Energy Efficiency Scheme	Public	CO_2	Promoting energy efficiency across the Health estate which will make a contribution to the delivery of the central government emissions reduction	Economic	Implemented	Energy efficiency schemes being carried out to deliver carbon emissions savings across public services including the Health Estate, especially in hospitals	2021	Northern Ireland Executive					
Northern Ireland: A Long Term Water Strategy for Northern Ireland (2015-2040)	Cross -cutting	CO_2	Cross-Departmental strategy contains a long-term vision to manage flood risk and drainage in a sustainable manner, which will help to address the future risks from climate change	Regulatory and Economic	Implemented	Development of future policy on the introduction of more sustainable, environmentally friendly and green solutions to managing our water. Northern Ireland Water is undertaking an innovative Oxygen and Hydrogen Demonstrator Project that will deploy a state-of-the-art one megawatt electrolyser at wastewater treatment works; use of this technology can assist in addressing the climate emergency by cutting carbon emissions.	2016	Northern Ireland Executive					

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Northern Ireland: Northern Ireland Investment Fund	Energy, waste/waste management	CO_2	To contribute to economic regeneration through supporting private sector led development in key sectors of the Northern Ireland economy.	Economic	Implemented. Fund introduced in 2017. Initial size of Fund £100m. Around £80m has been invested to date, which includes approximately £25m recycled investments. Fund is due to last for 15 years. The Fund has yet to make its first investment in the Green space.	The Fund exists to provide debt or equity support to provide sector led developments in a number of key economic sectors within the Northern Ireland economy. The overarching Investment Strategy identifies the sectors which are eligible for support and includes energy efficiency, energy storage and generation projects, including heat networks, non-domestic and domestic energy efficiency, photovoltaic, wind and hydro energy generation and waste to energy projects	2017	Northern Ireland Executive					
Northern Ireland: Energy Efficiency in Social Housing Project	Energy, Homes	CO_2	The Energy Efficiency Social housing project is a multi-million pound investment programme to improve the energy performance of almost 2700 of its homes	Fiscal, Economic, research, other	Planned. The 6 year €45million programme is expected to be completed by September 2023.	This investment programme was to improve the energy performance of almost 1,900 homes. €23 million has been secured from the European Regional Development Fund (ERDF) through its Investment for Growth and Jobs Programme for NI 2014-2020, and a further €22 million invested by the NI Housing Executive. Several schemes have already been completed or are currently underway. The schemes include: no fines properties improving thermal efficiency in aluminium bungalows through the provision of external wall cladding, new double glazing and improved insulation measures.	2017	Northern Ireland Housing Executive					
Northern Ireland: Northern Ireland Housing Executive's Sustainable Development Strategy and Action Plan	Housing, transport and energy	CO_2	To secure a sustainable future, as a Strategic Housing Authority and as Northern Ireland's largest landlord. Policy in development to support a Vision of Green Growth and Healthier Households.	Regulatory, Fiscal, Economic	Planned. 5 year Action Plan, Guided by Policy, including the Northern Ireland Energy Strategy 'Path to Net Zero Energy'	It provides a framework for tackling environmental and social challenges over the next five years, including the climate emergency. This Strategy was approved by the Housing Executive's Board in March 2022 and will be launched publicly later in 2022 with a long term end-state to retrofit Housing Executive stock, and to support the social housing development programme to support sustainable communities. The social and economic effects of this investment will be long-lasting, create jobs and support innovation across the industry. Most importantly, it will reduce fuel poverty, improve energy resilience, and help tackle climate change.	Policy in development	Northern Ireland Housing Executive					
An accessible and digitised energy system where data provides value for consumers and system operation	Energy	CO_2	Carry out a cost benefit analysis of electricity and gas smart meters and other technologies in order to access half-hourly and daily consumption information	Information, Research	Planned	Data is at the heart of our future energy system. Gathering better quality data, and enabling appropriate access to it, will provide important benefits for consumers, network operation and market participants. It will also enable greater participation in the electricity system. Safely accessing this data will require the introduction of a range of technologies, regulation and consumer protection. Our approach to a digitised system will focus on consumer data, system data and accessibility and smart technologies.	TBD	Department for Economy and Utilty Regulator.					
Decentralised solutions that enable people and communities to be active participants in the energy transition	Energy	CO_2	Adopt policies that facilitate active consumers and energy communities	Regulatory, economic, information and education.	Policy development is in its early stage.	If individuals and communities have an active stake in the energy transition they can also access more of the value generated within the energy system and be rewarded for the services that they may provide such as demand flexibility or data. We will develop enabling frameworks for both active consumers and Citizen Energy Communities. These frameworks will enable them to engage in a range of energy services including generation, supply, consumption and aggregation and consider what financial support or access to new revenue streams can be provided.	TBD	Department for Economy and Utilty Regulator.					
The Path to Net Zero Energy Strategy	Energy	CO_2	Net zero carbon and affordable energy. - Placing the consumer at the heart of energy future - Grow the green economy through innovation, support and focusing on competitive strengths. - Set clear targets, standards and regulations that drive improvements in energy efficiency including consumer behaviour, supporting investment in building improvements. - Replace fossil fuels with renewable energy supported by sustainable renewable imports and using these to decarbonise heat, power and transport. - Create a flexible, resilient and integrated energy system that integrates renewables across heat, power and transport, creating value for consumers and enhancing security of supply.	Broad range of tools, including economic, fiscal, voluntary agreement, regulatory, information, education, research	Under implementation and at an early stage	Net zero carbon energy means that overall greenhouse gas emissions from energy are zero. It means reducing emissions from the energy we use for transport, electricity generation, industry and our build environment, as well as removing any remaining emissions with schemes that offset an equivalent amount from the atmosphere. We will improve our evidence base from all energy sectors to support monitoring of our policy impact. - Affordable energy – Energy provides value in enabling our comfort, leisure and basic needs. However, affordable energy can mean different things to different groups of consumers, for example energy bills can be a major concern for households on lower incomes, or help to ensure that businesses can be competitive in changing markets. We will review the drivers and definitions of energy affordability. This will include the balance of upfront investment and long-term energy bills as well as data development. Throuhg sustained engagement we will assess their impacts on our identified consumer 'Cross-Cutting Measures'	2022	This is a wide ranging strategy which will involve input from across the Northern Ireland Civil Service, local government, ALB's, academic institutions, businesses and consumers and others.					
Scotland: Supporting the development of a wide range of renewable technologies	Energy	CO_2, CH_4, N_2O	The electricity system will be powered by a high penetration of renewables, aided by a range of flexible and responsive technologies.	Research	Implemented.	The Scottish Governnment continues to maintain its focus on tackling barriers to development of renewables, such as aircraft and seismological radar issues, working in partnership with the industry and other stakeholders.	2018	Scottish Government					

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Scotland: Supporting improvements to electricity generation and network asset management that encourage the deployment and viability of renewables projects in Scotland.	Energy	CO_2, CH_4, N_2O	The electricity system will be powered by a high penetration of renewables, aided by a range of flexible and responsive technologies.	Other	Implemented.	The Scottish Government supports the development of technologies which can deliver sustainable security of supply to the electricity sector in Scotland and ensure that Scottish generators and flexibility providers can access revenue streams to support investments	2018	Scottish Government					
Scotland: Introduce new requirements for developers to include supply chain commitments when applying to the ScotWind leasing process run by Crown Estate Scotland	Energy	CO_2, CH_4, N_2O	Scotland secures maximum economic benefit from the continued investment and growth in electricity generation capacity and support for the new and innovative technologies which will deliver decarbonisation goals.	Other	Implemented.	Crown Estate Scotland announced the outcome of its application process for ScotWind Leasing, the first Scottish offshore wind leasing round in over a decade, in January 2022. As part of the bidding process, all applications had to submit a Supply Chain Development Statement outlining how they will deliver benefits to Scotland. The commitment made by developers secured investment in the Scottish supply chain of at least £1 billion for every gigawatt generated via ScotWind projects.	2022	Scottish Government					
Scotland: Develop and publish a Hydrogen Policy Statement and Hydrogen Action Plan	Energy	CO_2, CH_4, N_2O	The electricity system will be powered by a high penetration of renewables, aided by a range of flexible and responsive technologies	Other	Implemented	The Scottish Government's Hydrogen Policy Statement (December 2020) sets out Scotland's support for a strategic approach to the development of the hydrogen economy in Scotland, setting a 2030 5GW production capacity ambition, while the draft Hydrogen Action Plan (November 2021) articulates the actions that will be taken over the next five years.	2020	Scottish Government					
Scotland: Energy Transition Fund (ETF)	Industry	CO_2, CH_4, N_2O	As above.	Economic	Implemented.	Will provide support for a sustainable, secure and inclusive energy transition in the North East of Scotland. It is planned to invest £75m over a five year period to 2024/5.	2020	Scottish Government					
Scotland: Scottish Industrial Energy Transformation Fund (SIETF)	Industry	CO_2, CH_4, N_2O	As above.	Economic	Implemented	The SIETF provides grant funding to reduce energy costs and emissions through increased energy efficiency. Decisions on funding awards are weighted towards energy and/or carbon savings, therefore it is primarily aimed at businesses with high energy use.	2020	Scottish Government					
Scotland: CO_2 Utilisation Challenge Fund	Industry	CO_2	Technologies critical to further industrial emissions reduction (such as carbon capture and storage and production and injection of hydrogen into the gas grid) will be operating at commercial scale by 2030.	Economic	Implemented	The CO_2 Utilisation Challenge Fund will help businesses and organisations develop and commercialise the technology, which involves harnessing and converting CO_2 and using it to produce products such as synthetic fuels and proteins for use in aquaculture. The Fund will be administered by Scottish Enterprise and match-funded by industry, meaning over £10 million could be invested in the initiative over its two-year lifetime.	2022	Scottish Government					
Scotland: Energy Efficient Scotland Delivery Schemes	Energy	CO_2, CH_4, N_2O	The heat supply to Scotland's homes and non-domestic buildings will be very substantially decarbonised, with high penetration rates of renewable and zero emissions heating and, Scotland's homes and buildings will be highly energy efficient, with all buildings upgraded where it is appropriate to do so, and new buildings achieving ultra-high levels of fabric efficiency	Economic	Implemented	Area Based Schemes provide funding for whole house retrofits, zero/low carbon heating and microgeneration. Through Warmer Homes Scotland, the Scottish Government has made available renewable and micro generation heat measures and new insulation measures. Grant funding has also been increased to incentivise uptake on more expensive low carbon and renewable measures	2018	Scottish Government					
Scotland: Low Carbon Infrastructure Transition Programme (LCITP)	Energy	CO_2, CH_4, N_2O	As above.	Economic	Implemented	The LCITP supports investment in decarbonisation of business and the public sector. Launched in September 2020 the Green Recovery: Low Carbon Energy Project Capital Funding Invitation targeted £50 million of support for projects that demonstrate innovative low carbon heat solutions for buildings.	2015	Scottish Government					
Scotland: Develop the capacity of the electric vehicle charging network	Transport	CO_2, CH_4, N_2O	To phase out the need for new petrol and diesel cars and vans by 2030	Economic via funding, regulatory via ultra low emission zones	Implemented	Phase out petrol and diesel cars and vans by encouraging electric vehicle uptake and actions such as switching the public sector fleet. Draft vision on Scotland public charging network presented to Scottish Parliament, funding announced	2020	Scottish Government, Energy Saving Trust, public bodies, Scottish Enterprise, Scottish Cities Alliance					
Scotland: Majority of new buses purchases from 2024 are zero-emission	Transport	CO_2, CH_4, N_2O	To reduce emissions from buses by introducing significantly more zero-emission buses	Voluntary agreement, information, education, financial support and convening collaboration	Implemented	Established a Bus Decarbonisation Taskforce to co-design a pathway to zero emission buses, and developed Scotland's subsidy model to phase out as the market for zero emission buses becomes self-sustaining. Several large operators have committed to transition by particular dates, range of guides published, £113 million Scottish Government support awarded	2020	Scottish Government, local government, energy sector, bus operating sector, finance sector and enegy sector all working in collaboration					
Scotland: Decarbonised passenger rail services by 2035	Transport	CO_2, CH_4, N_2O	To make Scotland's rail passenger services carbon free by 2035 through increased electrification of the network and through alternative traction	Economic and regulatory through Scottish government funding	Adopted	Removal of diesel passenger trains and replacement with electric, battery or hydrogen trains by 2035. Development and delivery of rolling programme of electrification ongoing, with construction on some rail routes starting in 2023/4 and others in latter stages of business case development. International rail cluster has been established, with 900 members.	2020	Scottish Government, Network Rail, Scottish Engineering					

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									2020	*2025*	*2030*	*2035*	*2040*
Scotland: Zero Emission heavy duty vehicle programme	Transport	CO_2, CH_4, N_2O	To reduce emissions in the freight sector, and remove the need for new petrol and diesel heavy vehicles by 2035	Other	Planned	Phase out petrol and diesel heavy vehicles by encouraging uptake of zero emission vehicles, including public sector fleet heavy duty vehicles Reduce emissions from HGVs and HDVs by transitioning to zero emission vehicles. Project group established to connect activity with energy suppliers, manufacturers, finance etc. to incentivise/facilitate transition as technology permits	Preparatory work is underway, secotral analysis research etc. Transition, particularly in respect of HGVs, is largely dependent on manufacturers developing a viable alternative to diesel	Scottish Government, vehicle manufacturers, local authorities, logistics sector, finance sector and energy sector					
Scotland: To create the world's first zero emission aviation	Transport	CO_2, CH_4, N_2O	To decarbonise scheduled passenger flights within Scotland by 2040	Other	Implemented	Highlands and Islands Airports Limited, in partnership with a number of other organisations, have created a sustainable aviation test environment at Kirkwall Airport on Orkney. Ampaire successfully demonstrated their hybrid-electric aircraft there in August 2021, flying between Wick and Kirkwall.	2021	Scottish Government					
Scotland: Vessel replacement programme	Transport	CO_2, CH_4, N_2O	To increase proportion of low emission ferries in Scottish Government ownership to 30% by 2032	Other	Implemented	Continue to examine the scope for utilising hybrid and low carbon energy sources in the public sector marine fleet as part of Scottish Government's vessel replacement programme.	2021	Scottish Government					
Scotland: Bring forward Scottish Agriculture Bill	Agriculture	CO_2, CH_4, N_2O	A more productive, sustainable agriculture sector that significantly contributes towards delivering Scotland's climate change, and wider environmental, outcomes through an increased uptake of climate mitigation measures by farmers, crofters, land managers and other primary food producers	Regulatory	Planned	A new Scottish Agriculture Bill will be brought forward in 2023 to provide a replacement for the Common Agricultural Policy (CAP).	A consultation will run in 2022 to inform the introduction of a Scottish Agriculture Bill in 2023.	Scottish Government and local government working in partnership					
Scotland: Reducing Scotland's emissions from nitrogen fertiliser.	Agriculture	N_2O	Nitrogen emissions, including from nitrogen fertiliser, will have fallen through a combination of improved understanding, efficiencies and improved soil condition	Regulatory	Implemented	The Climate Change (Nitrogen Balance Sheet) (Scotland) Regulations 2022 came into force on 11 March 2022. The Scottish Nitrogen Balance Sheet will be reviewed and updated on an annual basis from 2023 onwards.	The Climate Change (Nitrogen Balance Sheet) (Scotland) Regulations 2022 came into force on 11 March 2022. The Scottish Nitrogen Balance Sheet will be reviewed and updated on an annual basis from 2023 onwards.	Scottish Government					
Scotland: Encourage improved emissions intensity from red meat and dairy	Agriculture	CO_2, CH_4, N_2O	Emissions from red meat and dairy will be reduced through improved emissions intensity	Other	Implemented	As part of the National Test Programme (announced October 2021), Scotland has put in place livestock data and performance systems to support collation of data and performance information for every cattle farmer.	The National Test Programme is expected to launch in Spring 2022. Initial evaluations for maternal performance in Beef Efficiency Scheme (BES) born animals may be available in Spring 2022.	Scottish Government					
Scotland: Improve the use and storage of manure and slurry	Agriculture	CH_4, N_2O	Emissions will be reduced from the use and storage of manure and slurry	Regulatory	Implemented	Amendments have been made to the Water Environment (Controlled Activities) (Scotland) Regulations 2011 which include improving controls on the storage of slurry and digestate to reduce leakage, and more targeted spreading to maximise the nutrient benefit and reduce emissions.The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2021 came into force from 1 January 2022.	Regulations came into force from 1 January 2022	Scottish Government and local government working in partnership					
Scotland: Explore how to increase planting of trees and hedgerows.	Agriculture, Forestry	CO_2	Carbon sequestration and existing carbon stores on agricultural land will help to increase and maintain Scotland's carbon sink	Research/ information	Implemented	The Scottish Government and Scottish Forestry launched the Integrating Trees Network to raise awareness of the multiple benefits that planting trees can bring to agricultural businesses. The Scottish Government also committed (July 2020) an additional £1.5 million to further support the integration of small woodlands on farmers and crofts across Scotland.	2020	Scottish Government					
Scotland: Enable at least 20,000 hectares of peatland restoration per year	LULUCF	CO_2, CH_4, N_2O	To enhance the contribution of peatland to carbon storage with an increase in the annual rate of peatland restoration	Economic	Implemented	Scottish Government will provide grant funding to support eligible land managers to deliver peatland restoration. The Scottish Government will undertake research to inform where restoration can deliver the greatest emission savings per hectare.	2018	Scottish Government					

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Scotland: Pilot Regional Land Use Partnerships	LULUCF	CO_2, CH_4, N_2O	To maximise the potential of land to help achieve net zero.	Research	Implemented	The pilots will begin development of their Regional Land Use Frameworks, which will be finalised by end-2023.	2021	Scottish Government					
Scotland: End landfilling of biodegradable municipal waste by 2025, reduce the percentage of all waste sent to landfill to 5% by 2025 and recycle 70% of all waste by 2025.	Waste management/waste	CH_4	A reduction in waste sent to landfill	Economic	Implemented	Route Map to reduce waste, and meet 2025 targets and beyond, has been under development, and a formal consultation will be published in May 2022. £70m Recycling Improvement Fund was launched in March 2021.	2021	Scottish Government and local government working in partnership					
Scotland: Accelerate Landfill Gas Capture and Landfill Legacy Management	Waste management/waste	CH_4 (with some CO_2 if captured CH_4 is burned)	A reduction in emissions from closed landfill sites	Regulatory	Planned	Scottish Government will work with SEPA and key industry partners to scale up the existing landfill gas capture programme to mitigate effects of landfill and environmental impact of closed landfill sites	2022	Scottish Government					
Scotland: Lead delivery of Scotland's landmark Food Waste Reduction Action Plan	Waste management/waste	CH_4, N_2O	A reduction in food waste	Economic.	Implemented	Scottish Government provided £200,000 of funding in 21/22 for FareShare's Surplus with Purpose scheme to support food redistribution. The programme works with farmers, growers and manufacturers to cover the additional costs involved with getting their unsold good-to-eat food	2019	Scottish Government					
Scotland: Measures to encourage more sustainable consumer purchasing.	Waste management/waste	CO_2, CH_4, N_2O, HFC, PFC, NF3, SF6	To reduce waste and establish a more circular economy, where goods and materials are kept in use for longer	Regulatory	Implemented	Regulations to increase carrier bag charge passed by Parliament and came into force on 1 April 2021. Further work is underway to consult on a minimum charge on single-use disposable beverage containers.	2021	Scottish Government and local government working in partnership					
Scotland: Climate Emergency Skills Action Plan (CESAP)	Energy transition (including oil and gas, on and offshore wind, hydrogen, electricity, carbon capture and storage), Construction (including the retrofitting of housing and non-residential properties), Transport (including road transport, railways, domestic aviation, shipping and aircraft support vehicles), Manufacturing (with a focus on engineering), Agriculture and land use management (including forestry).	CO_2, CH_4, N_2O, HFC, PFC, NF3, SF8	To create a future workforce that can support a Just Transition to a net zero economy.	Economic	Under implementation from 2020-2025. Funds for 22/23 – £3m within skills budget to deliver CESAP, including Green Jobs Workforce Academy, Green Jobs Skills Hub and Heat in Buildings.	The Climate Emergency Skills Action Plan sets out the government's plan to maximise the transition to net-zero for Scotland, ensuring that Scotland's workforce has the skills required to make the transition to net-zero a just transition, fair and inclusive to all. It focuses on both immediate action as well as the longer-term systemic change that will need to take place by 2045. It sets out a clear direction for the changes needed in the skills system, and signals the role that industry, communities and individuals across Scotland will play in achieving this.	2020	Scottish Government, Skills Development Scotland, Scottish Funding Council, Local Authorities, Private and Third Sector Organisations, Industry and Independent Experts.					
Scotland: Green Jobs Workforce Academy	Construction and built environment, Transport, Nature, Energy, Engineering, Life and Chemical Sciences.	CO_2, CH_4, N_2O, HFC, PFC, NF3, SF9	To help people take a greener approach to their careers, from accessing training and learning new skills, to finding a new green job.	Economic	Under implementation from 2020-2025. Funds for 22/23 – £3m within skills budget to deliver CESAP, including Green Jobs Workforce Academy, Green Jobs Skills Hub and Heat in Buildings.	The new Green Jobs Workforce Academy, delivered by Skills Development Scotland, will provide green Integrated Careers and Skills Assessments enabling individuals to draw on digital and appropriate face-to-face support; access to short, sharp industry certified course provision aligned to economic investment; development of a Skills Wallet providing access to targeted funding to individuals not in employment, those in low paid or insecure jobs and those in higher level jobs with the potential to progress; targeted and co-designed upskilling and reskilling measures and commitment to engagement with individuals, employers and skills providers from design stage.	2021	Scottish Government, Skills Development Scotland, Scottish Funding Council, Local Authorities, Private and Third Sector Organisations, Industry and Independent Experts.					
Scotland: Green Jobs Fund	There are 5 main sectors: energy, transport, manufacturing, construction, agriculture and land use.	CO_2, CH_4, N_2O, HFC, PFC, NF3, SF10	To secure and create jobs by supporting businesses and their supply chains to develop and grow.	Economic	Under implementation from 2021-2026. £14m has been allocated in 2021/22. £23.5m is available for 22/23.	The Green Jobs Fund will invest £50 million through Scottish Enterprise, Highlands and Islands Enterprise, and South of Scotland Enterprise to help businesses which provide sustainable and/or low carbon products and services to develop, grow and create jobs. A further £50 million will be invested to support businesses and supply chains across a range of sectors – such as manufacturing, tech, and land based organisations – to take advantage of public and private investment in low carbon infrastructure, and the transition to a low carbon economy in Scotland and beyond, boosting green employment.	2021	Scottish Government, Scottish Enterprise, Highlands and Islands Enterprise, South of Scotland Enterprise.					
Wales: Just Transition	All	Information not available	Over the period of Carbon Budget 2 we will work closely with our key partners such as the Well-being of Future Generations Office and Wales TUC to develop our evidence base and further improve our understanding around the transition.	Research	Implemented	We need to ensure the transition to a cleaner, fairer future in Wales is carefully managed. The changes driven by the need to decarbonise our economy will have impacts on industries, sectors of the workforce and socio-economic groups in different ways, depending on the pathways, policies and actions we choose. It could help to resolve existing inequalities, but there is a risk it could also exacerbate them.	2021	Welsh Government					
Wales: Nature Emergency	All	Information not available	Welsh Government will: • Act to tackle the drivers of biodiversity loss, including pollution, climate change and unsustainable consumption. • Restore the damage done to our protected sites, habitats and species, and future proof them against further decline. • Change behaviour at all levels to support more sustainable management of natural resources (e.g. Circular Economy).	Research, information, fiscal and regulatory	Implemented	This policy drives action across Welsh Government and also through Natural Resources Wales' area statements, which delivers the policy in a local context. Action to tackle biodiversity loss is taken across the Welsh Government, but rooted in the actions set out in the Nature Recovery Action Plan (NRAP), its National Biodiversity Strategy and Action plan.	2015	Welsh Government					

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Wales: The Clean Air Plan	All	Information not available	We will ensure air quality, decarbonisation and natural resources policies are closely integrated to achieve complementary outcomes, consistent with our well-being goals and our Sustainable Development and Socio-Economic Duty.	Research	Implemented	Significant and irreversible changes to our climate and weather patterns are predicted to continue to develop over the next few decades, even as we reduce greenhouse gas emissions. Welsh overnment recognises and will proactively manage the nterdependency between decarbonisation and managing climate risk.	2020	Welsh Government					
Wales: A Circular Economy	All	Information not available	Our ambition is to implement systemic change in consumption emissions and to make the circular economy a reality. This is set out Beyond Recycling (2021), which states we will increase resource efficiency across all sectors, moving away from high carbon, non-recyclable materials and continuing to reduce waste. By 2050, we aim to use only our fair share of the planet's resources and have 100% recycling (zero waste). The global biodiversity and climate systems will be the key beneficiaries, but the environment of Wales itself will also benefit, for example, from reductions in direct plastic pollution.	Regulatory	Implemented	We must address the unsustainable consumption of resources as a root cause. Given 45% of global emissions come from the goods and products made and used every day, we need an approach which keeps resources in use and avoids all waste: a circular economy. This means accelerating actions to increase resource efficiency, re-use, repair and re-manufacture across all sectors of the economy, seeking to retain and increase good quality jobs across Wales, and where appropriate, substitute high carbon, energy intensive materials with sustainable ones, including natural materials.	2021	Welsh Government					
Wales: A place based approach – Planning Policy Wales	All	Information not available	During Carbon Budget 2 Planning Policy Wales (PPW) will continue to facilitate decarbonisation through the planning system by providing an ambitious and comprehensive policy framework to address the causes and effects of climate change. It will help to shape development plans, including Future Wales, Strategic Development Plans and Local Development Plans, to ensure they are maximising the opportunities to decarbonise through a place based approach to sustainable development.	Regulatory, research	Implemented	Welsh Governments national planning policy is set out in Planning Policy Wales (PPW). It puts emphasis on people and places and ensures developments built today leave a legacy of well-designed, sustainable places which improve lives. PPW has a firm focus on 'placemaking' – an approach to development which ensures communities have all the services they need within easy reach and development is of high quality. This includes planning policies, which are designed to help Wales lower its carbon emissions at the same time as creating places where people can live well.	2018	Welsh Government					
Wales: Regional Economic Frameworks	All	Information not available	By 2025 all new City and Growth Deals will have carbon eduction at their core and will contain carbon reduction outputs as key metrics for monitoring and evaluation.	Regulatory, research	Implemented	Regional Economic Frameworks (REFs) are a key component of Welsh Governments approach to regional economic development and are being developed in partnership with key regional stakeholders, including local authorities. REFs are intended as a vehicle to help promote collaborative regional planning and delivery amongst public, private and third sector partners, setting a shared vision and a set of common economic development objectives in relation to their areas. Tackling climate change and decarbonisation is central to the ambitions of the REFs.	2021	Welsh Government					
Wales: Infrastructure Investment Strategy	All	Information not available	Welsh Governments new infrastructure investment strategy will be the successor to the current Wales Infrastructure Investment Plan, and will be published alongside our 2022-23 Draft Budget.	fiscal	Planned	The infrastructure investment strategy will set the framework for Welsh Government investment in infrastructure and will be designed around the four well being themes of economic, nvironmental, social and cultural well-being. At its heart will be the Welsh Government's response to the climate emergency, including the commitment to net zero and tackling the decline in biodiversity, and the strategy has been designed specifically to support the delivery of a net zero carbon economy.	2022	Welsh Government					
Wales: Skills Action Plan	All	Information not available	Welsh Government will develop a Net Zero Wales Skills Action Plan, which it intends to publish in spring 2022.	reseach, information	Planned	Government have an important part to play in ensuring that skills are a key enabler for net zero, promoting fair work alongside good and safe employment in social partnership with trade unions and employers.	2022	Welsh Government					
Wales: Innovation for a net zero economy	All	Information not available	Welsh Government will put the net zero challenge at the heart of a new Welsh Government Innovation Strategy, which it expects to launch in 2022.	reseach, information	Planned	This will sit alongside and complement the UK Government's innovation strategy launched in July 2021, which focuses on prosperity through innovation.	2022	Welsh Government					
Wales: Digital	All	Information not available	The Digital Strategy for Wales can support our journey to net zero.	reseach, information	Implemented	The Digital Strategy for Wales will: › Support remote working, reducing the need for travel › Support public sector organisations in delivering efficient services designed around the citizen › Promoting the use of modern and efficient digital cloud infrastructure › Promoting the effective use of data	2021	Welsh Government					

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Wales: International action to support decarbonisation at home and abroad	All	Information not available	Over the course of Carbon Budget 2 Welsh Governemnt will: › Deliver Priority Regional Relationships and Networks Action Plan › Share experience and learnings › Demonstrate and promote how a well-being of future generations approach can help drive positive action on the world's greatest problems › Deliver the Wales/Ireland action plan, with climate change and sustainability at its heart. › Continue to look at innovative ways to engage internationally	reseach, information	Implemented	Aligned with its International Strategy, Welsh Government have developed a series of action plans to set out how we will establish Wales as a globally responsible nation, which is making a fair contribution to tackling climate change.	2010	Welsh Government					
Wales: Reducing Emissions from the Combustion of Fuels for Electricity Generation	Electricity & Heat generation & Industry & Business	Information not available	Welsh Government aims to reduce carbon emissions from the power sector in Wales whilst maintaining security of supply in a high renewables system.	regulatory	Implemented	Later this year Welsh Government will publish its strategic policy position on combustion of fuels for electricity generation. It will set out a strong presumption against new fossil fuelled power plant, nor replacing current fleet of plant with alternatives which may themselves be the source of greenhouse gas emissions.	2021	Welsh Government					
Wales: Planning frameworks to restrict fossil fuel extraction	Electricity & Heat generation, Industry & Business, Cross cutting	Information not available	Wherever possible we must prevent further extraction of fossil fuels. Welsh Government have placed all forms of fossil fuels at the bottom of the energy hierarchy within our strategic planning document, Planning Policy Wales (PPW).	regulatory	Implemented	In December 2018, Welsh Government committed to not issuing any new petroleum licensing in Wales, or support applications for hydraulic fracturing petroleum licence consents. The continued extraction of all fossil fuels, including coal and petroleum, is not compatible with our challenging targets for decarbonisation.	2021	Welsh Government					
Wales: Reducing emission growth from new Energy from Waste plants in Wales	Electricity & Heat generation, Industry & Business, Cross cutting, waste, Public Sector, transport, Residential Buildings	Information not available	An updated strategic assessment shows, apart from a modest potential need for smaller scale energy from waste capacity for non-recyclable waste and to properly dispose of dangerous wastes such as clinical waste, the success of our recycling and the decrease in waste generated in Wales means no further large scale energy from waste plants are required.	regulatory	Implemented	Following the publication of Beyond Recycling in March 2021, Welsh Government have brought forward an immediate moratorium on any future large scale energy from waste developments, as laid out in the Written Statement from March 2021, together with the accompanying updated Strategic Assessment on the need for new energy from waste capacity across the three economic regions in Wales. As laid out in our Written Statement, small scale energy from waste plants (of less than 10MW) must also supply heat, and where feasible, be carbon capture and storage enabled or ready	2021	Welsh Government					
Wales: De-risking and Integrating Investment in Wales through Energy Planning	Electricity & Heat generation, Industry & Business, Cross cutting, waste, Public Sector	Information not available	The only way to deliver an affordable net zero energy system is by pursuing a joined-up whole-systems approach – and by ensuring full public engagement across the whole spectrum of actions needed.	fiscal, research, information	Implemented	Welsh Government have initiated, funded, resourced and supported our Regional Energy Strategies, which start to identify the scale of change needed to reach a low carbon energy system and establish regional priorities for a low carbon energy system. This work models future demand for power, heat and transport and contains an economic assessment of the impact of delivering the proposed ambitions.	2021	Welsh Government					
Wales: Planning the delivery of the electricity and gas grid we need for Wales	Electricity & Heat generation, Industry & Business, Cross cutting, Public Sector, transport, Residential Buildings	Information not available	The focus of this policy will be to achieve a joint view across all participants of the likely future energy needs in Wales to 2050, building on existing modelling. Bringing together thinking across the gas and electricity networks and across the transmission and distribution networks in this way, we aim to be the first country to have a joined-up approach to developing gas and electricity networks, enabling opportunities for additional prosperity in Wales	Research	Implemented	Welsh Government have established a project with all the energy network operators in Wales, and Ofgem, to develop a long term plan for the energy networks in Wales. It will look out to 2050 to understand what networks we need to support a net zero energy system and best serve the communities and places they support. The work will help to inform Future Wales, Wales' National Plan.	2021	Welsh Government					
Wales: Increasing renewable energy developments on land through our planning regime	Electricity & Heat generation, transport, residential buildings, industry & Business, Public Sector	Information not available	Our aim is to provide better certainty of outcomes for renewable energy developers in Wales, while also enabling decisions to be made within a statutory timeframe, and the potential to include other ancillary authorisations as part of a single consent. Our process will complement the BEIS Offshore Transmission Network Review.	research, regulatory	Implemented	Welsh Government will improve and unify the consenting of energy generation projects in Wales to provide a quicker and more roportionate consenting regime for energy infrastructure. It intends to introduce legislation that explores providing an integrated system for consenting devolved infrastructure projects, including low carbon and enewable energy projects, on land and offshore.	2021	Welsh Government					
Wales: Consenting storage projects to support a flexible and responsive energy system	Electricity & Heat generation, transport, residential buildings, industry & Business, Public Sector	Information not available	Changes have been made to the consenting of energy storage in Wales to provide a quicker and more proportionate consenting regime. Welsh Government have delegated all planning applications for the consenting of storage (with the exception of pumped hydroelectric schemes) to Welsh Local Planning Authorities.	regulatory	Implemented	The UK Government has made changes in relation to previously non-devolved projects, which have resulted in the full devolution of storage consenting (with the exception of pumped hydroelectric schemes) to Welsh Local Planning Authorities. These changes took effect in April 2019 and will impact on consenting during Carbon Budget 2 and into the future.	2019	Welsh Government					

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									2020	*2025*	*2030*	*2035*	*2040*
Wales: Marine evidence, planning and licencing: supporting offshore and marine renewable energy deployment	Electricity & Heat generation, transport, residential buildings, industry & Business, Public Sector	Information not available	By November 2022, Welsh Government will report on the effectiveness of the Welsh National Marine Plan, including progress being made towards securing plan objectives and the effects of the policies in the plan with respect to our support for marine renewable energy.	research, information, regulatroy	Planned	Natural Resources Wales (NRW) has a key role to play in advising on future opportunities for marine renewable energy and Welsh overnment are working with NRW to continue the Offshore Renewable Energy Programme (OREP). Its policy will be to streamline consenting herever possible, joining up regulatory processes and seeking win-win outcomes.	2021	Welsh Government					
Wales: Innovation in new renewable energy technology to drive faster and deeper decarbonisation and support the green economy	Electricity & Heat generation, transport, residential buildings, industry & Business, Public Sector	Information not available	In Wales, the Whole system Business Research Innovation for Decarbonisation (WBRID) scheme challenges businesses to help communities and the public sector adapt to the challenge of net zero on a whole system basis.	research, information,	Implemented	The Welsh Government PfG includes a commitment to further support innovation in new renewable energy technology, which will support the transformation of the energy system. Welsh Government have already supported Welsh businesses and academia to work together to build capability and develop solutions to drive forward net zero solutions. The increasing availability of "smart" data and use of data driven innovation techniques can ensure we better understand energy use and balance supply and demand on the local and national scale and we will pursue this with academic and business partners.	2022	Welsh Government					
Wales: Locally Owned Energy Developments to Secure an Economic Return for Wales	Electricity & Heat generation, cross cutting, public sector	Information not available	Welsh Government is on its our way to meetings its target for 1 GW of renewable energy generation capacity to be locally owned by 2030. By 2019, 825 MW of renewable energy generation capacity was locally owned. It also have a target to expand renewable energy generation by public bodies and community groups in Wales by over 100MW between 2021 and 2026. Together with its commitment to review the target for renewable generation in Wales Welsh Government will review its 1 GW target to ensure this still meets the scale of our ambition.	research, information	Implemented	Welsh Government will develop new approaches to support new generation it will: › Review the Welsh Government Energy Service, to consider the evolving needs of places, as we shape service provision beyond the existing four year service. › Explore new models connecting people and developments, so communities have a stronger relationship with them and can see benefits. › Support communities to explore partnerships with commercial developers. › Assess options for other innovative ways of funding locally owned low carbon generation, building on the strong track record of community share offers in Wales.	2020	Welsh Government					
Wales: Maximising Welsh benefit from Commercially Operated infrastructure projects in Wales	Electricity & Heat generation, cross cutting, public sector, industry & Business	Information not available	Welsh Government's aim is to ensure maximum possible benefit is retained in Wales from new energy generators.	research, information	Implemented	It will look for opportunities to work with the private sector to deliver local priorities in support of net zero, and support Welsh businesses to take up supply chain opportunities and build the necessary skills in Wales to generate local social and economic benefits.	2021	Welsh Government					
Wales: Scope out the challenges and opportunities around low-carbon heat	Electricity & Heat generation, Residential Buildings, Industry & Business, Public Sector	Information not available	Welsh Government will: › Consolidate these evidence bases with UK Gov, identify any gaps, and commission work where necessary to fill these evidence gaps. › Publish a heat strategy for Wales in 2023.	Reseach	Implemented	Welsh Government will explore heat networks in the most appropriate areas within Future Wales. It has also worked with regions to develop ambition in relation to low carbon heat through the emerging regional energy strategies and heat will be a key consideration for local area energy planning.	2023	Welsh Government					
Wales: Increase the use of Waste Heat and low carbon heat sources	Electricity & Heat generation, Cross cutting, Residential Buildings, Industry & Business	Information not available	Welsh Government will update the current national heat map for Wales to identify heat consumption and generation at sites across Wales. This will build on the work commissioned by the UK Government to update the National Comprehensive Assessment of heating and cooling published in September. In 2022, Welsh Government will also incorporate evidence from its work on Local Area Energy Planning.	Reseach	Implemented	Welsh Government need to identify sources of waste heat, which could be used to heat buildings. Welsh Government have supported the development of low carbon heat network projects in Cardiff and Bridgend, which have then secured UK Government funding.	2022	Welsh Government					
Wales: Drive Decarbonisation through the Manufacturing Sector	Industry & Business, cross cutting, electirity & Heat generation, Residential Buildings, waste	Information not available	In 2021, Welsh Government published a new Manufacturing Action Plan. Through the plan it will futureproof manufacturing in Wales, make use of new technologies and importantly, drive down emissions. Supporting manufacturers to export is an important part of the Manufacturing Action Plan, and the Export Action Plan sets out how it will be chieved. Export Clusters will help businesses transition from a reliance on sales to fossil fuel sectors overseas.	education, economic	Implemented	Welsh Government will work with its manufacturing companies to develop a true circular economy within Wales through support provided by Business Wales and Food & Drink Wales. Industrial decarbonisation clusters will play a key role in this effort.	2021	Welsh Government					
Wales: Increased resource efficiency in business and industry through regulation and funding	Industry & Business, electricity & Heat generation, waste	Information not available	Welsh Government will secure greater recycling in businesses through the introduction of the new Business Recycling Regulations in 2023 and the introduction of extended producer responsibility for packaging in 2024 (which will also secure an increase in the recycling of business-to-business packaging).	regulatory, fiscal	Planned	Remaining competitive, resource efficient and energy efficient are a key component of Welsh Governments business support programmes, including Business Wales, and Food and Drink Wales. Businesses will also be able to more closely monitor their wastes, helping them to reduce and recycle more, through the introduction of a mandatory waste tracking system, including the specific reporting of food waste by food businesses.	2021	Welsh Government					

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									2020	*2025*	*2030*	*2035*	*2040*
Wales: Business Wales – using our financial and advice services to encourage business emission reduction	Industry & Business, electricity & Heat generation, transport, waste	Information not available	Business Wales supports new entrepreneurs, micro-businesses and SMEs to embed sustainable development practices in the fabric of their venture.	fiscal, information	Implemented	This helps Welsh businesses exploit new opportunities and take proactive steps to realise the business benefits of resource and energy efficiency, as well as joining a growing community of forward-thinking organisations working towards a zero carbon uture.	2021	Welsh Government					
Wales: Economy Futures Fund (EFF)	Industry & Business, Electricity & Heat Generation, waste	Information not available	Welsh Government will seek to prioritise the decarbonisation all to action, where Welsh Government are looking for applications that enable more of the business base to become carbon light or free.	research, fiscal	Implemented	The Economy Futures Fund (EFF), which is discretionary and demand led, was established in May 2018 by consolidating a number of existing funding streams into one fund. As part of the EFF application process, businesses that wish to apply for support must set out how their investment proposal addresses one of the five Calls to Action outlined in the Economic Action Plan.	2018	Welsh Government					
Wales: The Optimised Retrofit Programme(ORP)	Residential Buildings, cross cutting, electricity & heat generation	Information not available	The ORP underpins Welsh Governments ongoing development of retrofit policy and practice across all sectors.	fiscal	Implemented	The ORP seeks to understand the best value combination of fabric, space and water heating improvements for individual properties and set out a route to net zero for each home. This draws on the principles set out in the Better Homes, Better Wales, Better World report	2018	Welsh Government					
Wales: Welsh Housing Quality Standard (WHQS) –. Improving energy efficiency for existing social homes	Residential Buildings, cross cutting, electricity & heat generation	Information not available	Welsh Government will continue to invest £108m per annum as a minimum, to support social landlords in meeting the new WHQS standard. Drawing on evidence from ORP the new WHQS 2022 standard will focus on Fabric First principles and seek to bring all social housing as close as feasible to EPC A or equivalent within a decade.	fiscal	Implemented	The new standard will require the achievement of both affordable warmth and decarbonisation of homes, with a target date of 2033. It will also andate a process and route map for each social landlord to achieve the standard. By 2023 a PAS 2035 survey (the Publicly Available pecification that lays out a consistent assessment for energy retrofit measures) and a clear plan for individual homes will be required.	2023	Welsh Government					
Wales: Part L Building Regulations	Residential Buildings, cross cutting, electricity & heat generation	Information not available	Part L of the Building Regulations provides guidance on the conservation of fuel and power. It is Welsh Governments primary tool for raising minimum standards for new build housing and conversions.	regulatory	Implemented	Welsh Government have published its response to the 2020 review of Part L for new homes setting out our decision to introduce a 37% reduction (compared with current standards) in carbon emissions for new dwellings from 2022. On 20th May Welsh Government implemented changes to Part L of the Building Regulations, which will come into force in November 2022 and will deliver a significant reduction in carbon emissions. Welsh Government will make further changes to energy efficiency in Building Regulations in 2025 raising the bar to require new homes to produce a minimum of 75% less CO_2 emissions than ones built to current requirements.	2022	Welsh Government					
Wales: Social Homes will lead by example being built to standards in excess of Part L	Residential Buildings, cross cutting, electricity & heat generation	Information not available	Welsh Government have made a commitment in its Programnme for Government (PfG) and it will build 20,000 low carbon, social homes during this government term.	fiscal	Implemented	Welsh Government consulted on new, higher DQR standards in 2020 and published the outcome of that consultation in July 2021. The revised standards will be effective from 1st October 2021 and will drive change beyond the social housing sector.	Unsure	Welsh Government					
Wales: Developing Innovative construction techniques and increasing the use of sustainable materials	Residential Buildings, cross cutting, electricity & heat generation, industry & business, waste	Information not available	While Part L sets the standard for what needs to be achieved in the construction of new build homes, Welsh Government have also invested £145m in the Innovative Housing Programme (IHP) over the last four years to work out how to best meet these standards.	fiscal	Implemented	Welsh Government are now mainstreaming the lessons learned in our affordable housing capital programmes to ensure the best practices identified becomes the default way we build future homes going forward.	Unsure	Welsh Government					
Wales: Incentivising energy efficiency of homes through our Help to Buy – Wales	Residential Buildings, cross cutting, electricity & heat generation	Information not available	Homes purchased using a Help to Buy Wales (HtBW) loan are market homes; they are not specifically developed for the scheme. this means builders will need to ensure all market homes meet new standards.	fiscal	Implemented	HtBW allows eligible purchasers to buy new-build homes with assistance from Welsh Government in the form of a shared equity loan. These homes must meet any terms and conditions set by the Welsh Government and so offer an opportunity to drive up standards and promote best practice in the wider housing market.	Unsure	Welsh Government					
Wales: Piloting Smart Flexible and Digitalised Systems to [maximise use of assets] and help reduce demand	Residential Buildings, cross cutting, electricity & heat generation, industry & business, Public sector	Information not available	The Welsh Government's Smart Living (SL) initiative provides early support to develop place-based and innovative solutions to supply flexible, digital development pathways across Wales.	research, information	Implemented	The SL inititaive aims to make life more efficient, more controllable, economically productive, integrated and sustainable by using smart technologies to reduce demand for energy and associated greenhouse gas emissions for low carbon heat.	Unsure	Welsh Government					
Wales: Develop behaviour change interventions alongside our wider programmes	All	Information not available	Welsh Government will continue to invest in specific behaviour change research relating to low carbon living	fiscal, research	Implemented	Welsh Government will invest £350,000 with University College London over the next 2 years to understand pull and push factors to win hearts and minds about having low carbon measures installed in homes. It will look to secure a further £600,000 to examine how residents with heat pumps can benefit from low carbon energy.	2021	Welsh Government					
Wales: Enable people to work at or near to home	Transport, Cross Cutting, Industry & Business, Public Sector	Information not available	Welsh Government has stated its long-term ambition to enable around 30% of Welsh workers to work remotely, at or near to home, on a regular basis beyond Covid.	Research, information. Fiscal	Implemented	This will be achieved by helping to give more people the choice to work in a way that helps their productivity as well as their work-life balance. As fewer car miles are driven in peak periods, it is likely that there will be additional benefits in terms of reduced noise, air pollution and congestion.	2021	Welsh Government					

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									2020	*2025*	*2030*	*2035*	*2040*
Wales: Increase trip mode share of Active Travel from a current estimated proportion of 27% to 33% by 2030 and at leaset 35% by 2040	Transport, Cross Cutting, Public Sector	Information not available	Welsh Government are continuing to invest more than ever in active travel routes and facilities to help local authorities create a comprehensive network of routes. It has an ambition to invest significantly in active travel between now and 2040.	Fiscal	Implemented	This funding will deliver very significant increases in the quantity and quality of cycling and walking routes and infrastructure by investment in area-wide networks of better, safer cycling tracks – physically separated from traffic, including hub-and-spoke networks linking villages to towns in rural areas. For example, this could include support for workplace travel schemes that incentivise cycling and walking, funding to secure all weather cycle parking at railway stations, investment in public bike hire and e-bike hire schemes and campaigns to encourage more people to walk and to cycle.	2021	Welsh Government					
Wales: Increase trip mode share of public transport from a current estimated proportion of 5%1 to 7% by 2030 and 13% by 2040	Transport, Cross Cutting	Information not available	Welsh Government are prepared to take significant action in both bus and rail as the core network of services, as well as embracing technology and emerging modes of shared transport to make public transport a more attractive, practical and affordable alternative to car travel.	Fiscal	Implemented	Enabling people to switch from private cars to lower carbon modes of travel will be important to meet near term carbon budgets. This will be enabled by developing an integrated, multi-modal public transport system, which results in a seamless and effortless experience for passengers.	2021	Welsh Government					
Wales: Plan for and invest in Electric Vehicle charging infrastructure	Transport, Cross Cutting	Information not available	The Welsh Governments Electric Vehicle charging strategy was published in March 2021. Its approach to EV charging will ensure that the charging infrastructure in Wales is on a par with the best in comparable areas of the UK.	fiscal	Implemented	Improvements in this area will not be driven by government alone and we will need to work closely with partners across the public, private and third sectors in developing the infrastructure needed to give people confidence in using electric vehicles.	2021	Welsh Government					
Wales: Zero emission bus fleet	Transport, Cross Cutting	Information not available	In addition to the actions to reform bus governance, we are committed to deliver on our targets to decarbonise the bus fleet. We will also reform the Bus Services Support Grant (BSSG) to encourage the decarbonisation of the bus fleet and continue to allocate funds, which enable our ambition. In addition, legislative provisions which support the decarbonisation of the bus fleet will be considered.	fiscal, research	Implemented	We estimate that delivery of the 2028 zero emission bus target will result in cumulative carbon savings of 1.32 $MtCO_2e$ between now and 2040. This assumes increased bus miles associated with improved service and additional bus mode share, which will be achieved through actions outlined in the above section on demand reduction and mode shift.	Unsure	Welsh Government					
Wales: All taxis and private hire vehicles to be zero emission by 2028	Transport, Cross Cutting	Information not available	Welsh Government have committed to deliver a zero tailpipe emission taxi and private hire fleet by 2028.	fiscal	Implemented	Reducing emissions from taxi and private hire vehicles will contribute to improving air quality in our towns and cities as well as contributing to our carbon budgets.	2021	Welsh Government					
Wales: Decarbonise the Rail network	Transport, Cross Cutting	Information not available	In line with rail industry recommendations, a rolling programme of OLE electrification in Wales is recommended to form the backbone of the rail network, supported using alternative technologies where not feasible.	fiscal	Implemented	A comprehensive programme to introduce new train fleets across the Wales and Borders routes is underway. This will include electric/ battery Stadler fleets for the core valley lines services and new diesel fleet which is expected to be in the region of 20% more efficient than the existing fleet.	2021	Welsh Government					
Wales: Regulations to reduce agricultural pollution	Land Use and waste	Information not available	Whilst the Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021 have been developed primarily to prevent the pollution of watercourses, the Regulations are also a key part of reducing atmospheric emissions from agriculture.	Regulatory	Implemented	The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021 came into force on 1 April 2021. The Regulations include transitional periods and will be fully implemented by 1 August 2024 and apply across the whole of Wales.	2021	Welsh Government					
Wales: Glastir	Agriculture	Information not available	Glastir is the current five year whole-farm sustainable land management scheme, offering payment for the delivery of specific environmental goods and services and contributes towards tackling emissions from agriculture.	Fiscal	Implemented	The main aims of the Glastir scheme are to reduce the impacts of climate change within agriculture and reverse biodiversity loss, whilst improving water, air and soil quality. Whilst the majority of Glastir Advanced contracts expire in December 2021, any remaining contracts will come to an end by 2023.	2012	Welsh Government					
Wales: Farm Business Grant (FBG)	Land use, waste, Electicity and Heat Generation and Transport	Information not available	A total of £40m was made available under the FBG through the EU Rural Development Programme to help farmers invest in new equipment and machinery.	Fiscal	Implemented	Grants of up to £12,000 were available to buy equipment to support farm efficiencies such as animal handling, energy efficiency, storage and management of nutrients – all of which contribute to lowering on farm emissions.	2014	Welsh Government					
Wales: Sustainable Production Grant (SPG)	Waste	Information not available	The scheme offered a maximum 40% grant contribution (from £12,000 to £50,000) towards capital investments in equipment and machinery which have been pre-identified to specifically support famers to address and safeguard nutrient management and improve water, soil and air quality by reducing the impacts of agriculture pollution.	Fiscal	Implemented	A total of £22m was made available through the last three rounds of the SPG, with the last funding window having closed in March 2021.	2014	Welsh Government					

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									2020	2025	2030	2035	2040
Wales: Wales Animal Health and Welfare Framework (WAHWF)	Land Use and waste	Information not available	The WAHWF sets out our plan for continuing and lasting improvements in standards of animal health and welfare for kept animals, whilst also helping to protect public health and contributing to tackling the climate emergency.Our goal is for all livestock farms in Wales to use Animal Health Planning as an integral part of their business management.	Fiscal, Information, Eduaction	Implemented	Improving the health status of farmed animals can significantly reduce their carbon footprint, particularly when managed alongside actions to optimise feeding and breeding of animals for longevity – health benefits accrue most if animals are correctly fed, bred and accommodated.	2015	Welsh Government					
Wales: Red Meat Development Programme	Land Use and waste	Information not available	The Red Meat Development programme has three strands crucial to the red meat sector's future competitiveness, success and sustainability. From farm to fork, the projects contribute to an efficient red meat industry, leading to less wastage and therefore a reduction in greenhouse gases emitted from the supply chain.	research & fiscal	Implemented	Hybu Cig Cymru are delivering the five year, £9.2m Red Meat Development Programme funded by the EU Rural Development Programme, which comes to an end in 2023. Identifying optimal genetics is crucial for the long term sustainable objective for improving the overall performance of any farming business, and offers both economic and environmental benefits enabling lambs to reach market specification sooner and with less inputs, thus improving a farm business's carbon footprint.	2018	Welsh Government					
Wales: Dairy Improvement Programme (DIP)	Land Use, waste and Cross Cutting	Information not available	The DIP, funded by the Welsh Government through the Rural Development Programme is a £6.5m, five year programme (2014-2020) delivered by the Agricultural and Horticultural Development Board (AHDB). It delivers two distinct projects, Herd Advance and Strategic Dairy Farms which aim to increase the performance, health and resilience of the Welsh dairy sector.	research & fiscal	Implemented	Healthy animals help protect the productivity and production levels of farmers, reduce capital losses, minimise negative trade impacts as well as reducing pollution and CO_2 emissions.With funding available until 2023, AHDB Dairy will embark on several additional work packages from 2021.	2014	Welsh Government					
Wales: Farming Connect	Land Use, waste and Cross Cutting	Information not available	Contracted from October 2015 until August 2022, Farming Connect is a £28m programme, providing subsidised independent, tailored business support and technical advice. The Advisory Service, an element of the wider Farming Connect Programme, provides advice on how to achieve optimum results from livestock, which in turn helps to reduce emissions.	Fiscal, information and education	Implemented	Outcomes from projects and trials are shared widely to raise awareness amongst famers of the importance of emission reduction activities, changing behaviours and improving farming practices. Also available through Farming Connect is the Greenhouse Gas Emissions Interactive Farm – a tool developed to demonstrate different examples of how a typical Welsh farm could reduce its greenhouse gas emissions (demonstrated as carbon dioxide equivalents, CO_2e) while also increasing profitability (either through saving money or increasing revenue).	2015	Welsh Government					
Wales: Agriculture Bill	Agriculture	Information not available	Welsh Government will introduce the Agriculture Bill to create a new system of farm support that will maximise the protective power of nature through farming.	Regulatory	Implemented	It is proposed that this new system will reward farmers who take action to meet the challenges of responding to the climate and nature emergencies, supporting them to produce food in a sustainable way. We will also seek to replace the time limited powers in the Agriculture Act 2020 which we took to provide continuity and some much needed stability for our farmers as we left the EU.	2022	Welsh Government					
Wales: Sustainable Farming Scheme (SFS)	Land Use, waste and Cross Cutting	Information not available	The proposed SFS will provide support to farmers – both financial and advisory – which will be targeted at outcomes not currently rewarded by the market. It is proposed the fundamental change to the current Basic Payment Scheme will be the level of payment being linked to the outcomes delivered by a farmer through undertaking a range of management actions on farm.	Fiscal, information and education	Planned	The proposal is to go beyond an income foregone/costs incurred model and reflect the value of environmental goods provided through future payments. It is also proposed outcomes from existing good practice requiring continued maintenance should be recognised and rewarded as well as creation of new outcomes. This will ensure active farmers who are working to benefit the environment are supported.	2025	Welsh Government					
Wales: transition schemes	Agriculture	Information not available	On 31 March, Welsh Government announced a package of support for farmers, foresters, land managers and food businesses worth over £227 million over the next three financial years to support the resilience of the rural economy and our natural environment.	Fiscal	Parts of this are planned, other parts implemented	Funding will be made available for a transitional scheme to provide financial support to farmers who are converting their operations to organic farming. The Horticulture Development Scheme (the indicative budget allocation for this application window, between 4 April and 27 May, is £1.5m) and Horticulture Start Up Schemes (an Expression of interest window for the new Horticulture Start Up scheme will open on 23 May 2022 and close on 25 June 2022) are part of the transition scheme package. Additional investment in the rural economy will be announced over the next three years, as we continue the transition to the Sustainable Farming Scheme, promoting the sustainable production of food, and support the rural economy on the path to a net zero, nature positive Wales.	2022	Welsh Government					
Wales: Create a National Forest for Wales	Land Use, Cross cutting	Information not available	Over the next five years we plan to create 30 new woodlands and 100 Tiny Forests to form part of the National Forest. This year we will consult on the long term strategy, organisational principles, delivery and funding models for the National Forest.	Fiscal, information, education, research	Implemented	The National Forest will be made up both of woodlands on Welsh Government land and those planted by others, and will require a range of interventions and actions to create. In part it will be funded through existing woodland support schemes, and the woodland creation scheme. However, it will also require standalone delivery and funding mechanisms to enhance and deliver areas of woodland that would otherwise not be supported.	2021	Welsh Government					

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									2020	*2025*	*2030*	*2035*	*2040*
Wales: Woodland Creation Scheme	Land Use, Cross cutting, Agriculture	Information not available	The scheme will provide payments to landowners to plant trees in Wales over the next two years. We opened a new window in September 2021 to allow more applications for this funding and ensure the full budget is spent.	Fiscal	Implemented	The Welsh Government currently funds woodland creation through the Glastir Woodland Creation scheme, which provides grants to farmers and land managers to support planting of woodlands. In 2020 the Welsh Government allocated £17m to woodland creation through the Glastir Woodland Creation scheme – the largest allocation since devolution.	2020	Welsh Government					
Wales: Implementing a Peatland Restoration Programme	Land Use, Cross cutting, Agriculture	Information not available	Wales' first national peatland action progamme (NPAP) outlines a plan of action to be taken over the next five years with six priority themes. The programme will target those peatland bodies most in need of restoration with the aim of delivering 600-800 hectares of restoration per year.	Fiscal, information, education, research	Implemented	Welsh Government has allocated £1.5m for year 1, with a further £1m per annum for the remaining 4 years. Works began in September 2020. In addition, from July 2021 Welsh Government funded NRW to establish a National Peatland Team in NRW to deliver the NPAP.	2020	Welsh Government					
Wales: New Sustainable Farming Scheme (woodland strand)	Land Use, Cross cutting, Agriculture	Information not available	Welsh Government intends for the new sustainable farming scheme to provide payments to farmers who choose to deliver positive benefits from planting and managing woodland on their farms.	Fiscal	Planned	This support will build upon the progress which will be made under the new woodland creation funding scheme over the next four years. Welsh Government also want to support farmers in planting 'hedges and edges'. It will develop and implement mechanisms to improve support for this ahead of the Sustainable Farming Scheme being introduced.	2024	Welsh Government					
Wales: Develop a new Timber Industrial Strategy for Wales	Land Use, Cross cutting, Industry & Business	Information not available	The Timber Industrial Strategy will seek to identify priority interventions across the timber supply chain to develop a wood economy and encourage greater use of timber in construction.	research & information	Planned	We will take action to increase the supply of timber available for long-life uses, including graded structural timber. We will publish the strategy by the end of 2022.	2022	Welsh Government					
Wales: Reduce waste sent to landfill	Waste, Public Sector, Cross Cutting	Information not available	For Carbon Budget 2, as part of our action to reduce landfill overall we will halve the amount of avoidable food waste and reduce the landfilling of biodegradable waste in Wales to zero by 2025.	Regulatory, information and education	Implemented	We have been on a trajectory of reducing landfill in Wales and this will continue. We are now targeting wastes which contribute the most emissions, such as food. By significantly reducing food waste and increasing the recycling of any biodegradable waste generated (for example through anaerobic digestion), we can reduce the damaging methane emissions caused by burying it in landfill. Anaerobic digestion also has the added benefit of generating renewable energy, thus contributing to renewable energy generation targets and decarbonising energy supply.	2021	Welsh Government					
Wales: Further increase recycling	Waste, Public Sector, Cross Cutting	Information not available	Welsh Governments Beyond Recycling Strategy highlights how it will strive to achieve the highest rates of recycling in the world. For Carbon Budget 2, this means it will achieve at least a 70% recycling rate for all major waste streams (household, industrial, commercial and construction).	Regulatory, information and education	Implemented	Actions will link with specific action in other emission sectors, such as the new recycling regulations for non-domestic premises, Extended Producer Responsibility (EPR) scheme for packaging and Deposit Return Scheme.	2021	Welsh Government					
Wales: Be Mighty Campaign	Waste, Public Sector, Cross Cutting	Information not available	In 2020, Welsh Government launched the Be Mighty Campaign which asked everyone to make small but important changes in how they recycle with the aim of becoming number one in the world rankings.	Information and education	Implemented	The campaign was co-developed and delivered in conjunction with local authorities as a coordinated national and local campaign, receiving significant traditional and social media coverage.	2020	Welsh Government					
Wales: Further increase CH_4 Capture and utilisation in Welsh landfill sites by 2030	Waste, Public Sector, Cross Cutting	Information not available	All operational landfills in Wales have been required to capture and utilise landfill gas since 1999. In Wales, this is implemented through the Environmental Permitting (England and Wales) Regulations 2016.	Regulatory, information, research and education	Planned	These regulations mean that landfill sites need to control the gas generated on their sites and must collect, treat it and use it in a way that minimises environmental damage. This includes the requirement to flare gas which cannot be used to produce energy. As current methane capture and reporting systems are variable in their effectiveness, we will work with NRW within this budget period to improve the controls and reporting around the release of landfill gas from operational landfills.	2021	Welsh Government					
Wales: Public Sector Routemap and Reporting Guides	Public Sector, Cross cutting	Information not available	All public sector organisations should use the Routemap and Reporting Guide to develop and publish plans by March 2023 to achieve a collective Net Zero public sector by 2030.	Regulatory, information and education	Implemented	All public sector organisations should use the Routemap and Reporting Guide to develop and publish plans by March 2023 to achieve a collective Net Zero public sector by 2030.	2021	Welsh Government					
Wales: Public Sector Net Zero Plan	Public Sector, Cross cutting	Information not available	The Welsh Government's plan to achieve net zero as an organisation by 2030 will be published before March 2023.	Regulatory, information and education	Implemented	The Welsh Government's plan to achieve net zero as an organisation by 2030 will be published before March 2023.	2021	Welsh Government					
Wales: Welsh Public Bodies commitment to Net Zero	Public Sector, Cross cutting	Information not available	The Welsh Government to include Net Zero Wales commitments in our remit letters and sponsor arrangements with public bodies in Wales	Regulatory, information and education	Implemented	The Welsh Government to include Net Zero Wales commitments in our remit letters and sponsor arrangements with public bodies in Wales	2022	Welsh Government					

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									2020	*2025*	*2030*	*2035*	*2040*
Wales: Mandatory Carbon Reduction Plans in Public Procurement contracts	Public Sector, Industry & Business and waste	Information not available	Make Carbon Reduction Plans a mandatory part of tenders for appropriate public procurement contracts and prioritise products which are fully recyclable, multi-use or able to be re-purposed as part of a more circular approach to waste.	Regulatory, information and education	Planned	Make Carbon Reduction Plans a mandatory part of tenders for appropriate public procurement contracts and prioritise products which are fully recyclable, multi-use or able to be re-purposed as part of a more circular approach to waste.	2023	Welsh Government					
Wales: Net zero/ultra-low emission public sector cars	Public Sector & Transport	Information not available	All new public sector cars and light goods vehicles should be zero/ultra-low emission by 2025 and heavy goods by 2030	Regulatory, information and education	Implemented	All new public sector cars and light goods vehicles should be zero/ultra-low emission by 2025 and heavy goods by 2030	2021	Welsh Government					
Wales: Public Sector sequestration of land	Public Sector & Land Use	Information not available	All public sector organisations should understand the sequestration potential of land in their ownership by March 2023 and commit to taking action to realise this potential by March 2030	Regulatory, information and education	Implemented	All public sector organisations should understand the sequestration potential of land in their ownership by March 2023 and commit to taking action to realise this potential by March 2030	2021	Welsh Government					
Wales: NHS Wales commitment to Net Zero	Public Sector, Land Use, Transport, Electricity & Heat generation	Information not available	NHS Wales is committed to the collective net zero ambition by 2030 delivering through the NHS Decarbonisation Strategic Delivery Plan	Regulatory, information and education	Implemented	NHS Wales is committed to the collective net zero ambition by 2030 delivering through the NHS Decarbonisation Strategic Delivery Plan	2021	Welsh Government					
Wales: Joint NHS Wales and LG Social Care Decarbonisation Plan	Public Sector, Land Use, Transport, Electricity & Heat generation & Waste	Information not available	A joint NHS Wales and LG Social Care Decarbonisation Plan should be created to support the achievement of a collective net zero by 2030	Regulatory, information and education	Implemented	A joint NHS Wales and LG Social Care Decarbonisation Plan should be created to support the achievement of a collective net zero by 2030	2021	Welsh Government					
Wales: Local Government commitment to net zero	Public Sector, Land Use, Transport, Electricity & Heat generation & Waste	Information not available	The Local Government Decarbonisation Strategy Panel and WLGA will support the commitments made by Local Government organisations to meet the collective net zero ambition by 2030	Regulatory, information and education	Implemented	The Local Government Decarbonisation Strategy Panel and WLGA will support the commitments made by Local Government organisations to meet the collective net zero ambition by 2030	2021	Welsh Government					

3.7 Cross-cutting measures

3.7.1 UK Emissions Trading Scheme

The UK Government in partnership with the Scottish Government, Welsh Government and the Northern Ireland Executive have established the UK ETS and now we are consulting on its development.

With a consultation published in March 2022[24], we are fulfilling our commitment to align the scheme with net zero and consulting on options to introduce the necessary changes to the cap predictably and smoothly over the coming decade.

This consultation will ensure that we can develop the UK ETS so that it drives emission reductions, helps us deliver our ambitious targets, and continues to demonstrate the UK's leadership on carbon pricing while supporting British industry. In line with commitments in the UK Government's Net Zero Strategy, this consultation sends a clear signal to businesses to give them the confidence to invest in the transition to cheap, clean homegrown energy. In long term, the UK ETS will help reduce our reliance on fossil fuels, and exposure to volatile oil and gas prices on global markets.

The consultation also looks at expansion of the scheme to more sectors of the economy, so it covers a greater share of emissions, with proposals to bring emissions from the domestic maritime sector within scope of the UK ETS. Expanding the UK ETS to additional sectors will ensure decarbonisation happens where it is most cost effective to do so, across sectors which are covered by the scheme.

Included in the consultation is also a Call for Evidence to explore waste incineration and energy from waste potentially being brought within scope of the UK ETS, and the benefits of including Greenhouse Gas Removal technologies within the UK Emissions Trading Scheme.

To mitigate the risk of carbon leakage, in which production and associated greenhouse gas emissions are offshored in ways that would not have happened if the pricing of emissions across jurisdictions was implemented in an equivalent way, we currently give at risk sectors a proportion of their allowances for free to reduce their exposure to the carbon price.

The consultation to develop the UK ETS continues the review of free allocation policy we started with a call for evidence in 2021. The free allocation review will be conducted in two phases. The first phase is looking at aligning the share of free allocation under the cap, the industry cap, with proposed changes to the overall UK ETS cap. These top-down changes will be implemented to take effect in 2024, alongside changes to the UK ETS cap. The second phase of the review will focus on the methodology for distributing free allocation to participants. These bottom-up changes will be implemented to take effect by 2026 to align with the second allocation period of the UK ETS.

Recognising the need for certainty in the near term, we are guaranteeing current levels of free allocation until 2026, subject to activity level changes. This will support industry in the transition to net zero in the context of high global energy prices while incentivising long term decarbonisation.

3.7.2 Northern Ireland Executive

The Green Growth Strategy is the Northern Ireland Executive's multi-decade strategy, balancing climate, environment and the economy. It sets out the long-term vision for tackling

[24] https://www.gov.uk/government/consultations/developing-the-uk-emissions-trading-scheme-uk-ets

the climate crisis in the right way and will be underpinned by the provisions of the Climate Change Act (Northern Ireland) 2022. This longer-term Strategy will be delivered through a series of Climate Action Plans aligned to carbon budget periods. Each one will be comprised of a number of sectoral plans setting out the actions required to meet sector-specific greenhouse gas emission and other targets.

The draft Green Growth Strategy was published for an eight-week public consultation which ended on 21 December 2021. Development of the draft Strategy included extensive external stakeholder engagement including with the Green Growth Forum which was established to support the Strategy's development. This Forum comprises key external representative bodies from local government, voluntary/community sector, private sector, academia, science/innovation, green industry, environmental organisations and public groups including young people.

At the core of the draft Green Growth Strategy are ten commitments from the Executive. They represent the Executive's aspirations and ambition for the future of Northern Ireland and the impetus they are placing on immediate action, in recognition of the urgency of mitigating the worst impacts of climate change.

The responses to the consultation have been analysed and, alongside the legislative requirements of the Climate Change Act (Northern Ireland) 2022, used to inform the redrafting of the Strategy.

More recently, the Northern Ireland Executive's Department for the Economy published the Energy Strategy – Path to Net Zero Energy on 16 December 2021. The strategy sets out Northern Ireland's pathway for energy to 2030. This Strategy was followed in January 2022 by publication of 'Path to Net Zero' Energy Action Plan for 2022.

3.8 Power

3.8.1 Progress to date

The transformation of the power sector over the last 30 years provides a strong basis on which to move forward, on our way to reaching net zero emissions by 2050 across the UK economy. Decarbonising the power sector has led the UK's efforts to reduce GHG emissions overall. This has largely been achieved through natural gas generation and renewables displacing coal, and more energy efficient appliances contributing to the reduction of electricity demand. Today, the country gets over half of its power from low carbon technologies.

In 2020, we published the *Ten Point Plan for a Green Industrial Revolution* and the *Energy White Paper,* which set out a clear vision for how we will transform the production and use of energy, in a decisive shift away from fossil fuels with a goal of a fully decarbonised, reliable, and low-cost power system by 2050. Since then, we have published the *Net Zero Strategy,* which committed to a power system where all our electricity will need to come from low carbon sources, subject to security of supply, bringing forward the government's commitment to a fully decarbonised power system by 15 years.

The dramatic rise in global energy prices following the Coronavirus (Covid-19) pandemic and Russia's invasion of Ukraine has highlighted the importance of reducing our reliance on fossil fuels. The *British Energy Security Strategy* accelerates the plans set out in these publication in a series of bold commitments which put Great Britain at the leading edge of the global energy revolution. It will deliver a more independent, more secure energy system and support consumers to manage their energy bills.

3.8.2 Key commitments

- Take action so that by 2035, all our electricity will come from low carbon sources, subject to security of supply, bringing forward the government's commitment to a fully decarbonised power system by 15 years. By 2030, 95% of British electricity could be low-carbon, and we will increase our renewable energy capacity by a further 15% by 2023.
- Accelerate deployment of renewable generation, such as wind and solar through the Contracts for Difference (CfD) scheme by undertaking a review of the frequency of the CfD auctions.[25] In February 2022 we announced auctions for funding through the CfD scheme would be annual rather than every two years, with the next round a year earlier in March 2023, helping to keep costs down through competition
- To deliver up to 50GW of offshore wind by 2030, including up to 5GW of innovative floating wind.
- Implement the Dispatchable Power Agreement (DPA) to support the deployment of first of a kind power CCUS plant(s).
- To secure a final investment decision on a large-scale nuclear plant by the end of this Parliament whilst taking measures to inform investment decisions during the next Parliament on two further nuclear projects with plans for up to 24GW by 2050.
- Adopt a new approach to onshore and offshore electricity networks to incorporate new low carbon generation and demand in the most efficient manner, taking account of the environment and local communities.
- Deliver the actions in our recent *Smart Systems and Flexibility Plan and Energy Digitalisation Strategy* to maximise system flexibility.[26]
- Provide £380m for our world-leading offshore wind sector, investing in supply chains, infrastructure and early-coordination of offshore transmission networks, securing jobs and benefitting communities across the UK.
- Reform system governance so that the whole system can achieve our net zero ambitions and meet consumers' needs.
- Drive market-wide rollout of smart meters with a new four-year policy framework that introduces fixed minimum annual installation targets for energy suppliers from 1 January 2022.
- Consider whether broader reforms to our market frameworks are needed to unlock the full potential of low carbon technologies to take us all the way to net zero.
- Ensure that consumers pay a fair, affordable price for their energy, and can engage with a retail energy market that offers the products and services required to make choices that support net zero.

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[25] https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference

[26] https://www.gov.uk/government/publications/transitioning-to-a-net-zero-energy-system-smart-systems-and-flexibility-plan-2021

3.8.3 Policies and proposals

3.8.3.1 Prioritising critical system enablers

Crucially, a whole system approach puts more emphasis on addressing critical system enablers. These measures will integrate different low carbon technologies into a coherent, single entity and optimise the system most efficiently and cost-effectively, in the interest of consumers.

Accelerating our domestic supply of clean and affordable electricity also requires accelerating the connecting network infrastructure to support it. Within this decade, our modern system will prioritise two key features: anticipating need, because planning ahead minimises cost and public disruption; and hyper-flexibility in matching supply and demand, so that minimal energy is wasted. This more efficient, locally-responsive system could bring down costs by up to £10 billion a year by 2050.

3.8.3.2 Networks

In 2021, the onshore electricity network had approximately 18,000 km of high voltage transmission cables, and approximately 800,000 km of lower voltage distribution lines, enough to stretch around the world 20 times. Networks are a complex system that have been slow in their transformation. We aim to halve the time it takes to get this infrastructure built so we can double the pace.

This means adopting a new approach to developing and delivering electricity networks, both onshore and offshore, to ensure that new low carbon generation can be connected to growing sources of demand.

The Offshore Transmission Network Review (OTNR) is transforming how the connections for offshore wind and other offshore transmission infrastructure is planned, designed, and delivered with coordination potentially saving consumers between £3-6 billion by 2050 and reducing the number of assets and onshore landing points by up to 50%. Ofgem has consulted upon regulatory changes to enable offshore coordination for in-flight projects, including potentially allowing anticipatory investment. BEIS is currently consulting on a new long-term policy regime for offshore networks.

Onshore, we welcome electricity networks' efforts to invest strategically ahead of need in new capacity, where it is efficient to do so, as well as Ofgem's work to create a price control framework which allows and encourages this. We will publish, jointly with Ofgem, an Electricity Network Strategic Framework, which will set out how we will facilitate an agile, flexible onshore network that allows the rapid, transformational change required while responding to consumer and energy system needs. This will include our plans to introduce competition in the building, ownership, and operation of onshore network assets, on which we published a consultation in August 2021.[27]

We will ensure lower total costs by offering clear signals on future need:

- establishing the Future System Operator as soon as practicable to oversee the UK energy system and to drive its contribution to the overall transition to net zero
- publishing a strategic framework this year with Ofgem for how networks will support net zero

[27] https://www.gov.uk/government/consultations/competition-in-onshore-electricity-networks

- appointing an Electricity Networks Commissioner to advise government on policies and regulatory changes to accelerate progress on network infrastructure
- setting out a blueprint for the whole system by the end of 2022 in the Holistic Network Design (HND) and Centralised Strategic Network Plan (CSNP).
- updating the National Policy Statements to recognise these blueprints in the planning system, increasing certainty for the planning inspectorate, developers and other stakeholders, and speeding up delivery
- ensuring Ofgem expedites its approvals process to build networks in anticipation of major new sources of generation and demand. Government will set out the importance of strategic network investment in its forthcoming Strategy and Policy Statement for Ofgem
- working with developers and the supply chain, we will increase pipeline visibility and certainty to help accelerate procurement timelines. And we will work with Ofgem to speed up connections to the local distribution networks
- dramatically reduce timelines for delivering strategic onshore transmission network infrastructure by around three years. Overall, we aspire to halve the end-to-end process by the mid-2020s
- ensuring that local communities can benefit from development of onshore infrastructure in their area, we will consult on community benefit options. We will launch an Offshore Coordination Support Scheme which will de-risk delivery of well-advanced offshore wind projects

3.8.3.3 Flexibility

The deployment of smart technologies and flexibility will underpin our energy security and the transition to net zero. Flexibility from technologies such as energy storage, smart and bidirectional charging of electric vehicles, flexible heating systems, and interconnection could save up to £10 billion per year by 2050 by reducing the amount of generation and network needed to decarbonise. A key enabler for demand side flexibility will be smart meters, which enable innovative products and services such as smart time-of-use tariffs. At the end of March 2022, there were 28.8 million smart and advanced meters in homes and small businesses across Great Britain, representing 51% smart coverage.

The *Smart Systems and Flexibility Plan* sets out a vision, analysis, and actions for delivering a smart and flexible energy system. We will facilitate flexibility from consumers and remove barriers to flexibility on the grid, both for small-scale and large-scale long-duration electricity storage, as well as driving policy to increase interconnector capacity. The Plan also sets out actions to improve market design and coordination so that flexibility providers can secure revenues across multiple markets. Data and digitalisation are a core aspect of the future system; we have set out a strategic approach to digitalisation and opening data across the energy sector through the *Energy Digitalisation Strategy*.

Significant progress towards net zero can happen, and is already happening, within our existing market framework. This combines markets for wholesale power, balancing, and system services with a CfD scheme for low carbon generation and a capacity market to ensure security of supply. In 2021, we published a Call for Evidence on actions to better align

the capacity market with net zero,[28] including potential actions to encourage the participation of more low carbon capacity. However, it will be necessary to consider whether broader reforms to our market frameworks are needed to unlock the full potential of low carbon technologies, including flexibility, to take us to net zero.

Throughout the transition, consumers should pay a fair, affordable price for their electricity, and be able to engage with a retail energy market that offers the products and services that allow them to make choices that support net zero. To support these aims, the Government is considering what reforms to the retail energy market are needed to support progress to net zero through the 2020s, including the role of suppliers and how they are regulated. To support these choices, consumers should receive accurate information about the carbon content of their energy products, and we will consider the case for reforming the framework which underpins green electricity tariffs and wider environmental carbon accounting schemes.

We will cut the cost for consumers who want to make improvements by 'rebalancing' the costs placed on energy bills away from electricity to incentivise electrification across the economy. This will also ensure heat pumps are comparatively cheap to run over time. We will publish our proposals in 2022, considering overall system impacts and limiting the impact on bills, particularly for low-income consumers.

The British Energy Security Strategy set out how we will ensure a more flexible, efficient system for both generators and users:

- encouraging all forms of flexibility with sufficient large-scale, long-duration electricity storage to balance the overall system by developing appropriate policy to enable investment
- ensuring all new homes are designed so that smart meters can be fitted from the outset, in advance of the Future Homes and Building Standards by 2024
- smartening up the system with more flexible pricing, through Time of Use tariffs and battery storage through electric vehicles
- ensuring consideration is given to the siting of hydrogen electrolysers to best use surplus low carbon electricity and reduce network constraints
- undertaking a comprehensive Review of Electricity Market Arrangements (REMA) in Great Britain, with high-level options for reform set out this summer
- ensuring we have a retail market fit for purpose. We will join REMA up with our ongoing retail review to ensure that consumers fully benefit from the next phase of our energy revolution, setting out plans before the next price cap period

3.8.3.4 System governance

This transformation of the energy system means our approach to system governance needs to evolve. The Government has committed to delivering a new public body to strengthen the resilience of Great Britain's energy system. The Future System Operator (FSO) will look at Great Britain's energy system as a whole, integrating existing networks with emerging technologies such as hydrogen. The FSO will be a new public body founded on the existing capabilities of the Electricity System Operator, and, where appropriate, National Grid Gas.

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[28] https://www.gov.uk/government/consultations/capacity-market-2021-call-for-evidence-on-early-action-to-align-with-net-zero

3.8.3.5 Other enablers

We will also need to address crosscutting enablers such as ensuring the planning system has the capacity to support the deployment of low carbon energy infrastructure (generation and networks), while also representing the interests of the environment and of the communities which host this infrastructure. We will do this by updating our energy National Policy Statements to provide greater clarity on the need and urgency for low carbon infrastructure, exploring ways of streamlining processes through our Nationally Significant Infrastructure Projects reform programme and addressing issues at a strategic level, for example through our Offshore Wind Enabling Actions Programme.

In addition, we will need to grow our supply of skilled workers and further strengthen the UK supply chain to service the demands of energy infrastructure, creating economic opportunity for citizens and communities across the UK.

3.8.3.6 Supporting sustained deployment of low carbon generation

In order to decarbonise we will need to build low carbon electricity generation infrastructure at an unprecedented scale and pace.

We have an ambition to deliver up to 50GW of offshore wind by 2030, including up to 5GW of innovative floating wind. This will also develop jobs and opportunities in the associated industrial supply chain putting us at the forefront of this new technology. Already, just off the coast of Aberdeenshire, we have built the world's first floating offshore wind farms. There will be huge benefits in the Irish and Celtic Sea. And by 2030 we will have more than enough wind capacity to power every home in Britain.

In the *British Energy Security Strategy*, we set out how with smarter planning we can maintain high environmental standards while increasing the pace of deployment of offshore wind by 25%. To do this, we have committed to establishing a fast track consenting route for priority cases where quality standards are met; introducing strategic compensation environmental measures including for projects already in the system; reviewing the way in which the Habitats Regulations Assessments are carried out for all projects making applications from late 2023; and implementing a new Offshore Wind Environmental Improvement Package including a Marine Recovery Fund and nature-based design standards.

We also need a sustained increase in the deployment of land-based renewables such as locally supported onshore wind and solar in the 2020s and beyond.

For ground-mounted solar, we will consult on amending planning rules to strengthen policy in favour of development on non-protected land, while ensuring communities continue to have a say and environmental protections remain in place. We will continue supporting the effective use of land by encouraging large scale projects to locate on previously developed, or lower value land, where possible, and ensure projects are designed to avoid, mitigate, and where necessary, compensate for the impacts of using greenfield sites.

We will seek to ensure a facilitative environment for the deployment of unsubsidised rooftop solar to complement our market-based approach of ensuring exporters receive a fair price through the Smart Export Guarantee. We will bring down bills and increase jobs by radically simplifying planning processes with a consultation on relevant permitted development rights and will consider the best way to make use of the public sector rooftops. We are looking at facilitating low-cost finance from retail lenders to drive rooftop deployment and energy efficiency measures. We will design performance standards to make installation of renewables, including solar PV, the presumption in new homes and buildings. We have already removed VAT on solar panels installed in residential accommodation in Great Britain.

For onshore wind, we will consult on developing local partnerships for a limited number of supportive communities who wish to host new onshore wind infrastructure in return for guaranteed lower energy bills. The consultation will consider how clear support can be demonstrated by local communities, local authorities and MPs. We included onshore wind in the latest CfD auction round and will include it in future rounds. In Wales, the UK Government will support the work underway by the Welsh Government, Ofgem, and networks to improve grid connections. We will also look at arrangements to support the repowering of existing onshore wind sites when they require updating or replacement. With advances in technology this process can enhance capacity and provide new opportunities for communities to benefit.

We have also included solar and onshore wind in the latest CfD auction round and will include it in future rounds.

We also have one of the best ocean energy resources in the world, so as an island nation, we will also aggressively explore renewable opportunities afforded by our geography and geology, including tidal and geothermal. And we are actively exploring the potential for international projects to provide clean, affordable and secure power, for example by expanding the CfD scheme.

This step change in renewable deployment will be achieved primarily by providing ongoing support through the CfD scheme. Allocation round 4 last December was the biggest-ever round of our flagship renewable energy scheme open to an expanded number of renewable energy technologies, with offshore wind, onshore wind, solar, tidal and floating offshore wind projects, amongst others, all eligible. The CfD will be key to delivering the levels of generation required by 2030. We will ensure the UK remains a world leader by offering clear investable signals through annual auctions, with the next round a year earlier in March 2023, helping to keep costs down through competition, and by consulting on changes to the 2024 CfD auction, Allocation Round 6, that incentivise renewables to locate and operate in a way that minimises overall system costs. Looking beyond this, ensuring we retain effective means to provide long-term stability will be crucial throughout the 2030s to achieve affordable, scalable deployment.

We also need to increase our nuclear capacity, which is why we have a commitment to take one project to final investment decision this Parliament and two projects to final investment decision in the next Parliament, including Small Modular Reactors, subject to project readiness, value for money and relevant approvals.

Depending on the pipeline of projects, this could see our nuclear sector progressing up to eight more reactors across the next series of projects, so we improve our track record to deliver an equivalent of one reactor a year, rather than one a decade.

We will increase our plans for deployment of civil nuclear to up to 24GW by 2050 – representing up to 25% of our projected electricity demand. Any projects would be subject to a value for money assessment, all relevant approvals and future spending reviews. This will include small modular reactor deployment.

In December 2020 we announced the start of formal negotiations on the construction of the Sizewell C project and those negotiations are ongoing. To facilitate a decision this Parliament, we plan to establish a Regulated Asset Base model to fund new nuclear projects at a low cost of capital, saving consumers money.

We will also collaborate with other countries to accelerate work on advanced nuclear technologies, including both small modular reactors and advanced modular reactors. We expect to initiate a competitive selection process next year for the next new nuclear projects

to be considered for deployment in the UK. As part of this, we will consider the role UK Government financing can play in supporting new projects.

We will radically change how we deliver new nuclear projects, setting up the Great British Nuclear Vehicle this year, tasked with helping projects through every stage of the development process and developing a resilient pipeline of new builds. We will work with industry to scope the functions of this entity starting straightaway – building on UK industrial strengths and expertise. Great British Nuclear will be backed to support projects to get investment ready and through the construction phase. In May this year, we launched the £120m Future Nuclear Enabling Fund competitive process.[29]

We expect to initiate the selection process in 2023 for further UK projects, with the intention that Government will enter negotiations with the most credible projects to enable a potential Government award of support in the first half of the next Parliament. Final contracts and construction will commence when any outstanding conditions are satisfied and projects are sufficiently mature. The UK has eight designated nuclear sites: Hinkley, Sizewell, Heysham, Hartlepool, Bradwell, Wylfa, Oldbury and Moorside. To facilitate our ambitious deployment plans we will also develop an overall siting strategy for the long term

Without impacting the robust safety, security and environmental protections offered by the UK regulatory regime, Government will work with the nuclear and environmental regulators to understand the potential for any streamlining or removing of duplication from the consenting and licensing of new nuclear power stations, including possibly new harmonisation on international regulation.

We are also providing funding for a small modular reactor design through our £385m Advanced Nuclear Fund and are progressing plans for an advanced modular reactor demonstrator in the early 2030s. Whether large- or small-scale projects, there remain several possible sites available for these options, including Wylfa in North Wales.

In addition to nuclear and renewables we are also supporting power carbon capture usage and storage (CCUS) and will implement the Dispatchable Power Agreement, with the aim of bringing forward at least one power CCUS plant in the mid 2020s. We will also aim to begin competitive allocation in the 2020s to support a future pipeline of projects and cost reduction via increased deployment and competitive tension. Finally, we will continue to review and evolve the policy framework to stimulate the delivery of future power CCUS projects and in April we published a CCUS Investor Roadmap.[30]

Bioenergy has already played a significant role in decarbonising the electricity system, accounting for 12.6% of total renewables generation in 2019.[31] Technological changes mean that biomass usage can now go beyond carbon-neutral and deliver negative emissions by combining it with carbon capture and storage (BECCS). We will publish a Biomass Strategy in 2022 that will set out how BECCS could be deployed. As is the case with all UK biomass use, any future BECCS projects will need to meet stringent sustainability and air quality requirements for the production and use of biomass, as will be set out in the Biomass Strategy.

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[29] https://www.gov.uk/government/publications/future-nuclear-enabling-fund-fnef

[30] https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-investor-roadmap#:~:text=The%20CCUS%20roadmap%20outlines%20joint,UK's%202050%20net%20zero%20target

[31] Net Zero Strategy, p.104, para 42

Our drive on low carbon generation makes electrolytic hydrogen especially valuable for flexibility and as a storage solution. Excess electricity used to produce hydrogen can be stored over time and used to power the grid when needed. Our ambition is for up to 10GW of low carbon hydrogen production capacity by 2030, with at least half of this from electrolytic hydrogen.

3.8.4 Scottish Government

The electricity grid intensity of Scotland has decreased from 320gCO_2e/kWh in 2010 to below 50gCO_2e/kWh for the years 2017-2019. This is largely due to the closure of two coal fired power stations in 2013 and 2016, as well as reduced reliance on gas for power generation.

There is a renewable, all energy consumption target of 50% by 2030, covering electricity, heat and transport. The Scottish Government is seeking to achieve this by expanding onshore and offshore wind, solar, bioenergy and hydro power. The recent ScotWind Offshore Wind Leasing Round saw offshore wind farms totalling 24.8GW selected, with the original aim having been 10GW. This is by far the world's largest commercial round for floating offshore wind and breaks new ground in putting large-scale floating wind technology on the map at GW scale, and will deliver around £700m in revenues to the public purse for these initial awards alone. The Scottish Government is also committed to reviewing its energy consenting processes and to continuing efforts to ensure a sustainable security of electricity supply.

3.8.5 Welsh Government

The Welsh Government's vision is for a decarbonised energy system which provides wider economic and social benefits for Wales than the system we see today. In Wales's current carbon budget the Welsh Government will focus on significantly reducing emissions from fossil fuels in Wales.

Much of the change will be driven by greater electrification of heat and transportation and the flexible use of generating technologies, energy demand, storage and low carbon fuels, enabling the transformation of Wales's industrial base. Technological changes will need to be married to behavioural and regulatory change. Market distortions which today mean low carbon, electrical heating is currently more expensive than fossil-fuelled alternatives need to be resolved, new technologies and the business models that support them need to be rapidly deployed and complexities in how power and gas networks work together need to be resolved.

Wales's Carbon Budget 2 will also be the period to plan and innovate for the future energy system for Wales. Delivering the smart energy system using a regionally planned approach, rather than a top down, market driven approach, is more likely to enable delivery at the speed demanded by the climate emergency, at optimal cost to the system, and in a way that delivers a more socially just system with no people or places left behind.

The Welsh Government has committed to expand renewable energy generation by public bodies and community enterprises in Wales by over 100 MW between 2021 and 2026. This will put Wales on the path to meet the longer-term target of 1 GW of renewable energy generation capacity to be locally owned by 2030. As part of its forthcoming consultation on renewable energy targets, the Welsh Government will also review its target for local ownership.

The policies and proposals for this sector have been set out under two broad mitigation areas of **Decarbonising electricity production from fossil fuels and increasing electricity from low carbon and variable renewables**. Below are the key policies areas for Wales. More detail can be found in the Net Zero Wales Plan and in Annex 2, CTF Table 3.

- **Reducing emissions from the combustion of fuels for electricity generation**
  Welsh Government aims to reduce carbon emissions from the power sector in Wales whilst maintaining security of supply in a high renewables system.
- **Planning frameworks to restrict fossil fuel extraction**
  Wherever possible we must prevent further extraction of fossil fuels. Welsh Government have placed all forms of fossil fuels at the bottom of the energy hierarchy within our strategic planning document, Planning Policy Wales.
- **Reducing emission growth from new energy from waste plants in Wales**
  An updated strategic assessment shows, apart from a modest potential need for smaller scale energy from waste capacity for non-recyclable waste and to properly dispose of dangerous wastes such as clinical waste, the success of recycling and the decrease in waste generated in Wales means no further large-scale energy from waste plants are required.
- **De-risking and integrating investment in Wales through energy planning**
  The only way to deliver an affordable net zero energy system is by pursuing a joined-up whole-systems approach – and by ensuring full public engagement across the whole spectrum of actions needed.
- **Planning the delivery of the electricity and gas grid we need for Wales**
  The focus of this policy will be to achieve a joint view across all participants of the likely future energy needs in Wales to 2050, building on existing modelling. Bringing together thinking across the gas and electricity networks and across the transmission and distribution networks in this way, the Welsh Government aims for Wales to be the first country to have a joined-up approach to developing gas and electricity networks, enabling opportunities for additional prosperity.
- **Increasing renewable energy developments on land through our planning regime**
  The Welsh Government's aim is to provide better certainty of outcomes for renewable energy developers in Wales, while also enabling decisions to be made within a statutory timeframe, and the potential to include other ancillary authorisations as part of a single consent.
- **Consenting storage projects to support a flexible and responsive energy system**
  Changes have been made to the consenting of energy storage in Wales to provide a quicker and more proportionate consenting regime. Welsh Government have delegated all planning applications for the consenting of storage (with the exception of pumped hydroelectric schemes) to Welsh Local Planning Authorities.
- **Marine evidence, planning and licensing: supporting offshore and marine renewable energy deployment**
  By November 2022, Welsh Government will report on the effectiveness of the Welsh National Marine Plan, including progress being made towards securing plan objectives and the effects of the policies in the plan with respect to our support for marine renewable energy.
- **Innovation in new renewable energy technology to drive faster and deeper decarbonisation and support the green economy**
  In Wales, the Whole system Business Research Innovation for Decarbonisation scheme challenges businesses to help communities and the public sector adapt to the challenge of net zero on a whole system basis.

- **Locally owned energy developments to secure an economic return for Wales**
  Welsh Government is on track to meetings its target for 1GW of renewable energy generation capacity to be locally owned by 2030. By 2019, 825MW of renewable energy generation capacity was locally owned. The Welsh Government also has a target to expand renewable energy generation by public bodies and community groups in Wales by over 100MW between 2021 and 2026. As part of our commitment to review targets for renewable generation we will review the 1GW target to ensure this still meets the scale of our ambition.
- **Maximising Welsh benefit from commercially operated infrastructure projects in Wales**
  Welsh Government's aim is to ensure maximum possible benefit is retained in Wales from new energy generators.
- **Scope out the challenges and opportunities around low-carbon heat**
  Welsh Government will:
  - consolidate these evidence bases with UK Government, identify any gaps, and commission work where necessary to fill these evidence gaps.
  - Publish a heat strategy for Wales in 2023.
- **Increase the use of waste heat and low carbon heat sources**
  Welsh Government will update the current national heat map for Wales to identify heat consumption and generation at sites across Wales. This will build on the work commissioned by the UK Government to update the National Comprehensive Assessment of heating and cooling published in September 2021. In 2022, Welsh Government will also incorporate evidence from its work on local area energy planning.

3.8.6 Northern Ireland Executive

The 'Path to Net Zero Energy' is Northern Ireland's Energy Strategy, published in December 2021. The Strategy sets a long-term vision of net zero carbon and affordable energy for Northern Ireland through energy efficiency measures and renewables. There are two interim targets to support delivery:

- Deliver 25% energy savings from buildings and industry by 2030;
- Provide 80% of electricity consumption from renewable sources by 2030;

In January 2022, the NI Executive launched the 'Path to Net Zero Energy' Action Plan. The 22-point action plan outlines some of the main areas of delivery to be taken forward during 2022 by central government and partners. It also includes a suite of new initiatives, such as a:

- £10 million green innovation fund
- Hydrogen centre of excellence
- One-stop shop for energy advice

Renewable electricity policies, published within the Energy Strategy[32] are:

[32] https://www.economy-ni.gov.uk/publications/energy-strategy-path-net-zero-energy

- A renewable electricity consumption target of 70% by 2030 (since raised to 80% by 2030, as per the Climate Change Act (Northern Ireland) 2022.
- A Support mechanism to incentivise investment in renewable generation, with a view to consult on potential options in 2022 for delivery in 2023. DfE are working with the UK Government to explore whether the Contracts for Difference scheme, currently operating in Great Britain, can be extended to Northern Ireland. If not, it will seek to put in place an alternative support mechanism for investors.
- A new Offshore Renewable Energy Strategic Action Plan (OREAP) to deliver 1GW of offshore wind from 2030. DfE are leading the development of the new OREAP working with other Northern Ireland Executive Departments, the Utility Regulator (NI), the transmission and distribution network operators, The Crown Estate and the renewables industry. The OREAP will address any barriers to the practicable and sustainable deployment of renewable generation projects in Northern Ireland waters with the aim of delivering an action plan by the end of 2023. It will also focus on maximising the potential of: integration of offshore wind and hydrogen electrolysis; offshore wind sectoral growth (infrastructure, skills and jobs, and supply chain); and the potential of innovation in offshore renewable energy technologies.

3.9 Fuel supply and hydrogen

3.9.1 Progress to date

Currently, emissions from fuel supply mainly derive from fossil fuels and can be attributed to stages of the supply journey. This chapter covers all aspects of fuel supply emissions:

- Extraction ('upstream') – exploration and production of oil and gas including drilling, surfacing resources and onshore processing at gas plants;
- Transportation ('midstream') – transportation and storage of oil and gas including pipelines, pumping stations, trucks, and transcontinental tankers;
- Refinement ('downstream') – refining oil into products including transport fuels, bitumen, lubricating oils, liquid petroleum gasses, heating oils, marine fuels, polymers, solvents, and alcohols. Refining emissions are counted as part of the industry sector but are discussed in this chapter to take a holistic view of supply.

Overall, between 1990 and 2019, net UK GHG emissions from fuel supply have decreased by 61%[33]. North Sea production has fallen; older, more polluting installations have been decommissioned whilst cleaner ones have been brought online; regulatory frameworks have supported efficiency gains; coal mines have closed; and iron pipes have been replaced with plastic to reduce methane leakage across the gas network.

We have also made progress in low carbon fuel production. In 2019, renewable fuels supplied under the Renewable Transport Fuel Obligation accounted for 5% of total road and non-road mobile machinery fuel. This mainly consisted of biodiesel and bioethanol but also included biomethane and renewable hydrogen[34].

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[33] https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019

[34] DfT (2020), 'Renewable Fuel Statistics 2019 Final Report', https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932933/renewable-fuel-statistics-2019-final-report.pdf

Building on the Ten Point Plan and the UK Hydrogen Strategy, the British Energy Security Strategy doubled the UK's hydrogen production ambition to up to 10GW of capacity by 2030, with at least half of this from electrolytic production. Alongside this, the Hydrogen Investor Roadmap[35] provided details on the hydrogen business model, the recently launched Net Zero Hydrogen Fund and the low carbon hydrogen standard. This package of measures aims to kickstart the production of low carbon hydrogen and showcase the exciting investment opportunities across the hydrogen value chain.

3.9.2 Key commitments

- An ambition for up to 10GW UK low carbon hydrogen production capacity by 2030, with at least half from electrolytic production.
- Aim to have up to 2GW electrolytic hydrogen and CCUS-enabled hydrogen production capacity operational or in construction by 2025.
- Designing, by 2025, new business models for hydrogen transport and storage infrastructure, which will be essential to grow the hydrogen economy.
- Levelling the playing field by setting up a hydrogen certification scheme by 2025, to demonstrate high-grade British hydrogen for export and ensure any imported hydrogen meets the same high standards that UK companies expect.
- Work with the sector to help develop a low carbon fuel strategy for transport for publication in 2022, as announced in the recent Transport Decarbonisation Plan, and deliver commitments on sustainable aviation fuels.
- Work with stakeholders to address barriers to electrification of oil and gas production by Q4 2022 and continue to drive down routine flaring and venting.
- Regulate the oil and gas sector in a way that minimises GHG emissions, notably through the revised Oil and Gas Authority (now renamed the North Sea Transition Authority-'NSTA') strategy, which empowers the NSTA/OGA to assess operators' plans to reduce their emissions levels against effectively a net zero test, and establish a climate compatibility checkpoint for future licensing on the UK Continental Shelf.

3.9.3 Policies and proposals

Oil and gas supply

We have always been clear that as we reduce our dependence on fossil fuels, the North Sea basin has a key role to play. Our approach will ensure that it does contribute to the transition, driving investment in transition technologies and providing the skills needed for net zero. However, we are clear that we do need to reduce our reliance on hydrocarbons as swiftly as possible. The best way to protect British businesses and consumers from volatile international fossil fuel markets is to get our economy off hydrocarbons.

Upstream, the North Sea Transition Deal (NSTD) has set us on a transformational path to deliver the long-term skills, innovation, infrastructure, and investment required to decarbonise oil and gas production and industry more widely. The deal will hold the industry to account on commitments it has made to halve its operational emissions by 2030, while supporting up to 40,000 high quality direct and indirect supply chain jobs in Scotland and our industrial heartlands in the North East, North West and East of England. It also emphasises our shared

[35] https://www.gov.uk/government/publications/hydrogen-investor-roadmap-leading-the-way-to-net-zero

commitment to achieving 10 $MtCO_2$/year of CCUS capacity, with industry leveraging existing infrastructure to provide key transport and storage capability; and positions the sector to help deliver our 10 GW hydrogen ambition.

One year after the publication of the NSTD in March 2021, Government and industry published the NSTD: One Year On report. This shows our continuing resolve to work together to deliver significant progress in implementing the commitments that were made. This report highlights the progress made to date across several areas in the Deal, including: supply decarbonisation, developing CCUS and hydrogen, transforming the supply chain, and aligning cross-sector energy training and standards to facilitate workforce mobility.

The NSTA published its revised strategy in February 2021, enshrining a range of new net zero obligations for the UK oil and gas industry. This is reflected through the suite of levers available to the NSTA, making net zero a key factor in its decisions, including to grant consent for projects. It empowers the NSTA to assess operators' plans to reduce their emissions levels against effectively a net zero test, in accordance with its revised strategy, the NSTA can now encourage operators to invest in transition technologies such as CCUS and hydrogen – seizing the economic opportunities available to the sector in a net zero future and living up to the commitments of the Transition Deal. The Strategy also introduces full societal carbon cost assessments into the approvals process.

Step-change abatement will be delivered by the electrification of existing and new offshore assets, through connections to onshore networks or offshore renewables. We will work with regulators to review supporting infrastructure in the Offshore Transmission Network Review and to address regulatory barriers. We have supported removing further barriers through £1 million of additional funding from 2021 to 2022.

Beyond power generation, flaring and venting account for most remaining upstream emissions and we will need to be ambitious to allow us to stay on track for our Sixth Carbon Budget target. We have endorsed industry's commitment in the NSTD to accelerate reductions beyond the World Bank's 'Zero Routine Flaring by 2030' initiative and new NSTA guidance sets out the expectation that all facilities should have zero routine flaring and venting by 2030 or sooner. Industry is taking steps through its Methane Action Plan for continuous emissions reductions with specific methane emissions reduction targets, whilst setting the expectation that assets will have individual action plans by 2022.

Additional work is being carried out by the Government and regulators to review what action can be taken to further reduce emissions. Improved measurement, reporting and verification will play a critical role in this. The Government, including the Offshore Petroleum Regulator for Environment and Decommissioning, is working closely with the NSTA to collect robust industry data which will enable effective implementation of their strategy. The NSTA's tracking of overall emissions reductions and benchmarking of flaring and venting data will also improve performance across industry. Government and regulators will continue to work with industry to drive emissions reductions, including through improved process efficiency, to stay on track for the Sixth Carbon Budget.

In terms of future licensing rounds for exploration activity on the UK Continental Shelf, we will introduce a climate compatibility checkpoint for any new licences, which will be used to assess whether any future licensing rounds remain in keeping with our climate goals.

We invited contributions on the design of this checkpoint with a public consultation which closed at the end of February. We are carefully considering the responses to the consultation and will announce the outcome in due course.

Midstream, the gas network must be effective at minimising gas leakage and associated emissions by replacing iron pipes with plastic, even with gas demand decreasing leading to 2050. Through network price controls, Ofgem has set gas distribution companies a target to replace 15,500km of iron mains and associated services in five years, from April 2021. This will reduce leakage by 17% and emissions by 0.5MtCO_2e. Additional financial incentives will encourage further action through pressure management and gas conditioning. We continue to work with Ofgem and Health and Safety Executive to review how best to continue to reduce methane leakage to zero in all future decarbonisation scenarios.

Blending hydrogen into the gas grid could also support initial steps to decarbonise heating. Government is working closely with key delivery partners to explore whether to blend hydrogen up to 20% by volume into gas networks, along with biomethane and natural gas. This will consider the air quality impacts of hydrogen combustion in domestic settings. Subject to both the economic and safety case for blending being demonstrated, we are aiming to make a final decision on blending by the end of 2023.

We recognise that industry will need early sight of decisions should blending proceed, and we propose five principles for delivery:

- Safety. Blending must remain within safe limits set by the Health and Safety Executive and changes to gas quality and infrastructure must meet all safety requirements;
- Operability. Changes to gas quality and infrastructure must maintain existing system, pipeline, and consumer appliance operability;
- Security of Supply. Blending must not prevent consumers' secure gas supply;
- Affordability. Costs to consumers should be affordable and value for money; and
- Temporary. Blending could support initial development of the hydrogen economy but is not a preferred long-term solution.

Whilst there may be significant value in having blending available to support the early development of the hydrogen economy, the Government currently views blending as a transitional option only. If enabled, it will likely have a limited role in heat decarbonisation as we move away from use of natural gas for heat. Hydrogen is expected to play a more valuable role in other parts of the economy, such as industry, heavy transport, or power generation.

Downstream, UK refineries already underpin major CCUS and hydrogen projects in key industrial clusters. These include Gigastack (Phillips 66), Humber Zero (Phillips 66) and HyNet (Essar Oil UK). The Industrial Energy Transformation Fund recently awarded £7 million and £800,000 to Essar Stanlow and Phillips 66 respectively, in support of hydrogen focussed net zero projects. We are also encouraged to see operators investing in the production of low carbon fuels and will continue to work with the sector to encourage innovation, maximise economic opportunities from net zero, and remove regulatory barriers which hinder the transition away from fossil fuels. In addition to this, the UK ETS can support business models to encourage uptake of an innovation in such projects, providing routes to market.

We have also published the draft Downstream Oil Resilience Bill[36] which will give the government the powers it needs to ensure secure fuel supplies are maintained during the transition to net zero.

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[36] https://publications.parliament.uk/pa/cm5802/cmselect/cmbeis/820/report.html

Low carbon fuel supply

The UK has a unique opportunity to be a leader in low carbon fuel production and we plan to publish key strategies in 2022.

We intend to publish a Biomass Strategy that will set out in detail the Government's view on how biomass can best contribute to a net zero economy, including to produce low carbon fuels. It will also assess our existing sustainability standards, already some of the world's most stringent, and set out where and how we can improve them further. When coupled with carbon capture and storage, it is possible that sustainable biomass can not only enable production of low carbon fuels but could also deliver vital negative emissions. Any future BECCS project will need to meet stringent sustainability requirements for the production and use of biomass.

This will be complemented by a long-term strategy for low carbon fuels as announced in our Transport Decarbonisation Plan, published in July 2021[37]. The strategy will consider how to maximise emissions savings from low carbon fuels used across different transport modes in the period to 2050.

The latter of the two strategies will build on the success of the Renewable Transport Fuel Obligation (RTFO), which has supported the market for low carbon fuel supply since 2008. Fuels supported under the RTFO need to comply with sustainability criteria such as minimum GHG thresholds, and by incentivising fuels produced from wastes, it saved 5.37MtCO_2e in 2019 alone. Further to sub-targets for so-called development fuels of strategic importance, we have recently widened support to more diverse fuels and implemented more ambitious targets for the RTFO to 2032 set at 21.1% of total liquid fuel supply.

To accelerate the development of UK plants to produce advanced fuels we have provided grant funding through schemes including the Future Fuels for Flight and Freight Competition and Advanced Biofuels Demonstration Competition. Delivering on the Ten Point Plan, in December 2021 we announced the winners of the £15 million Green Fuels, Green Skies Competition supporting eight companies pioneering new Sustainable Aviation Fuels (SAF) technologies. We have published a consultation on proposals for a new UK SAF blending mandate[38] aiming for introduction in 2025. It included design questions on which feedstocks and technologies should be eligible and welcomed views on what our SAF ambition and targets should be. We are currently reviewing the responses to the SAF mandate consultation, but our ambition is for a comprehensive policy framework, including the mandate, to enable the delivery of 10% SAF by 2030. Further detail can be found in the *Transport* chapter.

Hydrogen production

We have virtually no low-carbon hydrogen in our system today – but technology is making this a near-term reality with vast potential applications. By investing in the North Sea, renewables and nuclear, as set out in the British Energy Security Strategy, the UK is well-placed to exploit all forms of low carbon hydrogen production. Our drive on renewables makes electrolytic hydrogen especially valuable for flexibility and as a storage solution. Excess renewable electricity used to produce hydrogen can be stored over time and used to power the grid when needed.

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[37] https://www.gov.uk/government/publications/transport-decarbonisation-plan

[38] https://www.gov.uk/government/consultations/mandating-the-use-of-sustainable-aviation-fuels-in-the-uk

Our approach to scaling up the UK hydrogen economy in the 2020s was set out in the *UK Hydrogen Strategy* as well as under the Net Zero Strategy and British Energy Security Strategy. The UK has been clear that our skills, capabilities, assets, and infrastructure mean that we have the potential to excel in a range of low carbon hydrogen production technologies. This includes electrolytic production, CCUS-enabled methane reformation as well as less developed production technologies using new nuclear technologies and biomass. Supporting a variety of different production methods will enable us to develop low carbon hydrogen rapidly at scale during the 2020s to deliver our ambition for up to 10GW low carbon hydrogen production capacity by 2030, ensuring the UK is ready for the expected ramp up in demand needed to reach the Sixth Carbon Budget and net zero.

The UK is already at the forefront of innovation across the hydrogen value chain, reducing technological barriers to production and end use cases. We recently launched a new £60 million Low Carbon Hydrogen Supply 2 Competition to develop novel hydrogen supply solutions for a growing hydrogen economy – winners were announced in May 2022.[39]

Low carbon hydrogen is not yet competitive with traditional fuels because production projects face additional costs compared to existing energy sources. Investors cannot currently justify upfront capital investments without visibility or predictability of revenue and returns. The recent Hydrogen Investor Roadmap provided more detail on the Government's key policies to address these issues, informed by consultations undertaken alongside the UK Hydrogen Strategy:

- The **low carbon hydrogen business model** will provide revenue support to hydrogen producers to overcome the operating cost gap between low carbon hydrogen and high carbon counterfactual fuels and bring forward investment in new low carbon hydrogen projects. The Government response to the consultation on the business model[40] confirmed the design of the business model, alongside high level, indicative Heads of Terms for the Low Carbon Hydrogen Agreement (the business model contract). We aim to finalise the business model in 2022, and to allocate the first support contracts for projects reaching final investment decisions from 2023.
- The **Net Zero Hydrogen Fund (NZHF)** will provide up to £240 million of Government co investment to support the commercial deployment of new low carbon hydrogen production projects out to 2025. The Government response to the consultation on the design of the NZHF[41] included details of the proposed split of grant allocation across four strands, supporting both development expenditure and capital expenditure. The first wave of funding under the NZHF launched in April 2022.
- The **UK low carbon hydrogen standard** defines what is meant by low carbon hydrogen, allowing the Government to support production that can deliver emission reductions in line with the UK Climate Change Act. Hydrogen producers applying for NZHF and Low Carbon Hydrogen Business Model funding will need to ensure their hydrogen production pathway complies with the standard in order to be eligible for support. The Government response to the consultation on the standard and associated guidance on the standard[42] outlines the methodology underpinning the

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39 https://www.gov.uk/government/news/winners-of-60-million-government-competition-to-develop-hydrogen-as-the-superfuel-of-the-future-unveiled

40 https://www.gov.uk/government/consultations/design-of-a-business-model-for-low-carbon-hydrogen

41 https://www.gov.uk/government/consultations/designing-the-net-zero-hydrogen-fund

42 https://www.gov.uk/government/consultations/designing-a-uk-low-carbon-hydrogen-standard

standard and the greenhouse gas emissions threshold against which low carbon hydrogen production pathways will be measured.

The British Energy Security Strategy also committed to further policy development to enable the growth of the UK hydrogen economy:

- Designing, by 2025, new business models for hydrogen transport and storage infrastructure, which will be essential to grow the hydrogen economy.
- Developing the standard into a hydrogen certification scheme by 2025, to demonstrate high-grade British hydrogen for export and ensure any imported hydrogen meets the same high standards that UK companies expect.

In addition, we will publish a Hydrogen Sector Development Action plan.

The UK is already at the forefront of innovation across the hydrogen value chain, reducing technological barriers to production and end use cases. The £60 million Low Carbon Hydrogen Supply 2 Competition is supporting novel hydrogen supply solutions for a growing hydrogen economy.

The RTFO has supported the supply of renewable hydrogen into transport since 2018 and has been successful in launching small-scale renewable hydrogen supply. In July, the Department for Transport announced changes to the RTFO which could further encourage the uptake of renewable hydrogen in transport, including in rail and shipping. The original consultation, published in March, also proposed to make evidencing the provision of renewable electricity for hydrogen production easier through power purchase agreements and recognising the importance of regional grids. The final decision on these changes will be published shortly.

3.9.4 Scottish Government

The Scottish Government has taken steps to help enable the decarbonisation of offshore oil and gas production through the creation of the Innovation and Targeted Oil and Gas (INTOG)[43] planning and leasing round. INTOG will help to progress decarbonisation of the oil and gas sector, and open the door for smaller, innovative offshore renewables projects to demonstrate their technology, such as green hydrogen, in Scottish waters, and offer the potential for clean energy from offshore wind. In addition, Marine Scotland has a well-established and proactive planning and consenting process encouraging confidence in the use of offshore wind.

The Scottish Government published a draft Hydrogen Action Plan in November 2021, which articulates the actions that will be taken over the next five years to support the development of a hydrogen economy to further its efforts to reduce emissions from Scotland's energy system while ensuring a just transition. Later in 2022 an Energy Strategy and Just Transition Plan will be published, which will review future energy demand and lay out a plan for decarbonising the sector.

3.9.5 Welsh Government

The Welsh Government published its Hydrogen in Wales report[44] in January 2021 for consultation, setting out pathways for developing the Welsh hydrogen sector.

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[43] intog-public-summary (crownestatescotland.com)

[44] https://gov.wales/developing-hydrogen-energy-sector-wales

3.9.6 Northern Ireland Executive

In line with the rest of the UK thinking on low carbon hydrogen standards, the Northern Ireland Executive is focused on the production of green hydrogen – the NI Energy Strategy (published December 2021) sets out how constrained wind will be used to power electrolysis of fresh water to create hydrogen and oxygen. Wind is an important asset as it generates low carbon electricity and meets 48% of Northern Ireland base load with an additional 15% constrained/curtailed – a tremendous unused reserve that will be used for hydrogen generation.

The 10x Economy Vision Paper[45] (published mid 2021) focuses on the local economic, export and employment opportunities in the advanced engineering related supply chains of Northern Ireland and underpins our levelling up agenda.

The Northern Ireland Executive, in conjunction with the academic and private sectors, is supporting many hydrogen research and innovation projects across public transport, aviation, energy matrices, longer duration energy storage, remote design and testing, agri-food circular economy, waste water treatment, bio-methane and hydrogen gas network injection, maritime transportation and advanced manufacturing.

Following the launch of the Hydrogen Training Academy in early 2022, discussions have been ongoing with University of Ulster, Queen's University and Belfast Metropolitan College to deliver third level qualifications in hydrogen development, operation, design and maintenance, the first of their kind.

Our advanced engineering base will also allow the export of skills and expertise in the hydrogen services sector beyond Northern Ireland.

3.10 Industry

3.10.1 Progress to date

The UK's manufacturing and refining sector plays an essential role in society. It contributes £180 billion to the overall economy[46], directly accounting for 8% of GDP[47] and provides two and a half million direct jobs across the country[48] as well as over five million across the value chain[49].

Around half of industrial emissions are concentrated in specific clusters – geographical areas with large concentrations of industry. Industry emissions have reduced by more than half since 1990, due mainly to the changing structure of the UK's manufacturing sector, improved energy efficiency, and a shift to low carbon fuels. Despite this progress, the overall pace of reductions is slowing, and more action is needed to achieve our net zero commitments.

The Industrial Decarbonisation Strategy[50] (IDS), published in March 2021, was the first of its kind in a major economy. It sets out how industry can decarbonise in line with net zero while

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45 https://www.economy-ni.gov.uk/publications/10x-economy-economic-vision-decade-innovation

46 ONS (2021), 'Annual Business Survey', https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/uknonfinancialbusinesseconomyannualbusinesssurveysectionsas

47 ONS , 'Gross Domestic Product (GDP), https://www.ons.gov.uk/economy/grossdomesticproductgdp

48 ONS (2021), 'Annual Business Survey', https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/uknonfinancialbusinesseconomyannualbusinesssurveysectionsas

49 UK in a Changing Europe (2020), 'Manufacturing and Brexit', https://ukandeu.ac.uk/research-papers/manufacturing-and-brexit/

50 https://www.gov.uk/government/publications/industrial-decarbonisation-strategy

transforming industrial regions by attracting inward investment, future-proofing businesses, and securing the long-term viability of jobs.

This followed previous work including the landmark Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050[51], published in 2015, which set out a series of pathways for emissions reductions for energy intensive sectors.

We plan to have the world's first net zero industrial cluster by 2040, and have awarded grants from the £315 million Industrial Energy Transformation Fund (IETF), announced a £1 billion Carbon Capture and Storage Infrastructure Fund, and a £240 million Net Zero Hydrogen Fund. Additionally, as part of the Industrial Decarbonisation Challenge[52], we recently announced £171 million of funding, matched by over £200 million industry investment, for nine projects within five clusters.

Growing new industries in low carbon hydrogen alongside CCUS and renewable energy will put our industrial 'SuperPlaces' at the forefront of technological development. Together this will develop resilient supply chains, support jobs, and position UK companies at the forefront of an exciting growing global market, as well supporting industrial processes, industrial heat, power, shipping and trucking to make the shift to net zero.

Energy intensive industry in the UK has been covered by a cap-and-trade policy since 2005. The UK Government and Devolved Administrations – collectively making up the UK ETS Authority – successfully launched the UK Emissions Trading Scheme (UK ETS) on 1 January 2021. The UK ETS Authority published a consultation[53] in March 2022, including proposals to align the UK ETS Cap with a net zero consistent trajectory, as committed to when the scheme was set up.

We recognise the importance of addressing the risk of carbon leakage, so policy interventions do not lead to increased emissions elsewhere, and to ensure that UK industry has the confidence needed to fully decarbonise. The IDS and the Net Zero Review[54] set out the potential options available to address this, including regulatory standards and carbon border adjustment mechanisms (CBAMs), as well as the ongoing review of our current carbon leakage mitigation policy of free allowances under the UK ETS. Government will continue to explore options to mitigate carbon leakage, with emphasis on an international, multilateral effort to tackle carbon leakage at source through global action on industrial decarbonisation and climate regulation, with continued monitoring of related global policy developments

3.10.2 Key commitments

- Ambition to deliver 6MtCO_2 per year of industrial CCUS by 2030, and 9MtCO_2 per year by 2035.
- Set up the Industrial Decarbonisation and Hydrogen Revenue Support scheme to fund our new industrial carbon capture and hydrogen business models.
- Support the deployment of CCUS through the £1 billion CCS Infrastructure Fund.

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51 https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050

52 https://www.ukri.org/what-we-offer/our-main-funds/industrial-strategy-challenge-fund/clean-growth/industrial-decarbonisation-challenge/

53 https://www.gov.uk/government/consultations/developing-the-uk-emissions-trading-scheme-uk-ets

54 https://www.gov.uk/government/publications/net-zero-review-final-report

- Following Phase 1 of the Cluster Sequencing process, the HyNet and East Coast Clusters have been confirmed as Track 1 clusters.
- Support the installation of energy efficiency and on-site decarbonisation measures through the £315 million Industrial Energy Transformation Fund (IETF).
- Support the increased requirement for fuel switching to low carbon alternatives, with an ambition to replace around 50TWh of fossil fuels per year by 2035.
- In collaboration with the Steel Council we will consider the implications of the recommendation of the Climate Change Committee to set targets for ore-based steelmaking to reach near-zero emissions by 2035, and the business environment necessary to support the transition.
- Develop several Resource and Energy Efficiency (REEE) measures with ambition of achieving the anticipated requirement of 11MtCO_2e worth of savings by 2035, including up to 3MtCO_2e of potential abatement in the Iron and Steel sector.
- Developing the UK ETS to ensure emissions reductions from industry, power and aviation in line with our net zero target. Aligning the UK ETS with net zero sends a clear signal for investment and promotes market-based, cost-effective decarbonisation.
- Explore opportunities for faster decarbonisation of dispersed sites in the 2020s.

3.10.3 Policies and proposals

3.10.3.1 Fuel switching and carbon capture

Low carbon hydrogen

Fuel switching to hydrogen is likely to be technically feasible for most industrial processes and our modelling indicates it is the least-cost option to decarbonise harder to electrify sites, processes, and sectors.

The IDS sets out that a low regret level of deep decarbonisation infrastructure should be installed in industrial clusters this decade. This will give industry the confidence to invest in switching to low carbon fuels, such as hydrogen. Industrial users located in clusters are therefore expected to provide the most significant new demand for hydrogen by 2030, with the greatest potential from chemicals and iron and steel sectors. A significant proportion of this demand could arise from a small number of sites acting as 'pathfinders', proving the viability of hydrogen at a commercial scale and fostering the initial market for low carbon hydrogen.

The UK Hydrogen Strategy[55] indicated that in 2030 consumption of low carbon hydrogen as an industry fuel could range from around 10TWh per year if supply is limited to clusters, and up to around 20TWh per year if pipelines are connected to some dispersed sites. While supply is likely to come mostly from large scale cluster-based CCUS-enabled hydrogen production sites, there could also be industrial demand for low carbon hydrogen from electrolysis, which can be produced at a smaller scale on a more localised level. To stay on track for our Sixth Carbon Budget delivery pathway, hydrogen demand from industry may need to increase up to 50TWh by 2035. This increase would be driven by a growing number of sites having access to low carbon hydrogen, further technology development to enable an expanding range of processes to switch to hydrogen, and a shift in the associated costs,

[55] https://www.gov.uk/government/publications/uk-hydrogen-strategy

such as the price of carbon, to make hydrogen an increasingly competitive fuel option. In particular, the British Energy Security Strategy sets out an ambition to run annual allocation rounds for electrolytic hydrogen, moving to price competitive allocation by 2025 as soon as legislation and market conditions allow, so that up to 1GW of electrolytic hydrogen is in construction or operational by 2025.

The UK Hydrogen Strategy also set out the actions we are taking to support industry to realise the potential of this new technology. It is critical that we demonstrate fuel switching to low carbon hydrogen on industrial sites during the 2020s so we will provide further support for research and innovation through the Net Zero Innovation Portfolio and initiatives led by the Industrial Decarbonisation Research and Innovation Centre.

Demand-side measures and carbon trading markets will help to drive demand for hydrogen and will be supported by grant funding, such as the £55 million Industrial Fuel Switching Competition under our Net Zero Innovation Portfolio and the Phase 2 of the IETF, which supports on-site fuel switches. Regulatory measures can also support industry to switch to low carbon hydrogen, with the UK Hydrogen Strategy announcing calls for evidence on hydrogen-ready industrial equipment and decarbonising existing high carbon hydrogen production. Alongside this, hydrogen production measures in the fuel supply chapter of this strategy will bring forward low carbon hydrogen supply for use across the economy and help make hydrogen a price competitive decarbonisation option to encourage end users to switch.

Carbon capture, usage and storage (CCUS)

Carbon Capture, Usage and Storage (CCUS) will be an exciting new industry to capture the carbon we continue to emit and revitalise the birthplaces of the first Industrial Revolution. The Prime Minister's Ten Point Plan for a Green Industrial Revolution established a commitment to deploy CCUS in a minimum of two industrial clusters by the mid-2020s, and four by 2030 at the latest. Our aim is to use CCUS technology to capture and store 20-30MtCO_2 per year by 2030, forming the foundations for future investment and potential export opportunities. Developed alongside hydrogen, we can create these transformative 'SuperPlaces' in areas such as the Humber, North East, North West and southern England, as well as in Scotland and Wales.

Our £1 billion CCS Infrastructure Fund will provide industry with the certainty required to deploy CCUS at pace and at scale and will form part of a package of government support, which will also include the Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme and the £240 million Net Zero Hydrogen Fund supporting both CCS-enabled 'blue' and electrolytic 'green' hydrogen.

Following the completion of Phase 1 of the Cluster Sequencing process, the HyNet and East Coast Clusters have been sequenced as track 1 clusters for the mid-2020s and will be taken forward into Track-1 negotiations. If the clusters represent value for money for the consumer and the taxpayer then subject to final decisions of Ministers, they will receive support under the government's CCUS Programme.

We remain committed to helping all industrial clusters to decarbonise as we work to reach net zero emissions by 2050, and we are clear that CCUS will continue to play a key role in this process.

CCUS will be critical to achieving net zero, alongside low carbon alternatives such as low carbon hydrogen and electricity. These technologies offer a renewed era for our industrial heartlands. Connecting locally, for instance positioning hydrogen train trials near blue hydrogen clusters means we start to bring higher skilled, higher paid jobs and expertise to cluster in these areas. The engineers, fabricators and geologists currently working in

industrial clusters and the oil and gas sector will be able to make use of skills programmes such as Skills Bootcamps and Free Courses for Jobs to support new emerging industries in renewables, CCUS and low carbon hydrogen to help build SuperPlaces. As the demand pulls through these lower carbon technologies, the costs fall. And these industrial clusters, our potential SuperPlaces, foster and lead internationally on the development and roll out of these technologies.

Industrial CCUS is fundamental to decarbonising of industries such as chemicals, oil refining, and cement. This is because options for decarbonising industry are limited, and fuel switching is sometimes only a partial solution. CCUS is not currently investable for most industrial sectors as deployment costs are higher than the current carbon price can support, and businesses are unable to pass these through to consumers. Additionally, businesses may face challenges raising capital finance to invest in CCUS until it has been more widely deployed in the UK. The IETF aims to reduce this risk for first movers by providing grant funding towards the capital costs of CCUS projects, but the Fund alone will not help industry to overcome this barrier. Therefore, an investable business model is needed, alongside clear commitments to provide certainty to industry.

The IDS set out the ambition to capture 3MtCO_2 per year by 2030. Our delivery pathway for Carbon Budget 6 requires an increased ambition of 6MtCO_2 per year by 2030 and 9MtCO_2 per year by 2035. We envisage these emissions to be captured from industries in clusters as well as from more dispersed sites, where non-pipeline transport solutions such as the shipping of CO_2 may be required.

Revenue support for industrial carbon capture and hydrogen production

CCUS and hydrogen deployment will play a central role in our green industrial revolution and ensuring that the UK's businesses are competitive in a net zero future. We have been working with industry to develop business models for industrial carbon capture and hydrogen production to give investors the long-term revenue certainty they require. We are now setting up the IDHRS scheme to fund these business models and enable the first commercial scale deployment of low carbon hydrogen and industrial carbon capture. This will unlock by 2030 up to £6bn private sector capital, create thousands of jobs in key levelling up regions, grow the UK supply chain and achieve cost reductions, and deliver carbon savings to allow us to stay on track for our carbon budgets.

The IDHRS scheme will initially commit to providing up to £100 million to support initial electrolytic hydrogen projects. We will also be announcing a funding envelope in 2022 that will enable us to award the first contacts to industrial carbon capture facilities and CCUS-enabled hydrogen production projects from 2023 through the Cluster Sequencing process, to deliver up to 3MtCO_2/yr of industrial carbon capture and up to 1GW of CCUS-enabled hydrogen by the mid-2020s.

Subject to costs falling, we are also committing to further allocation rounds for all types of eligible low carbon hydrogen production and industrial carbon capture from 2025. We will announce further allocation rounds in due course which will enable us to meet our 2030 deployment ambitions of 6MtCO_2/year of industrial carbon capture, 10GW hydrogen production capacity, and four CCUS clusters, while continuing to grow the UK supply chain and achieve cost reductions. Once established, this framework could also be used in the future for other critical decarbonisation technologies. Moreover, the British Energy Security Strategy sets out an ambition to run annual allocation rounds for electrolytic hydrogen, moving to price competitive allocation by 2025 as soon as legislation and market conditions allow, so that up to 1GW of electrolytic hydrogen is in construction or operational by 2025.

From 2025 at the latest, all revenue support for hydrogen production will be levy funded, subject to consultation and legislation being in place. Further details on this can be found in the Government's response to the Hydrogen Business Model consultation[56]. This includes parallel work to ensure fairness and affordability, such as exemptions for energy intensive industries at risk of carbon leakage.

Electrification

Electrification has the potential to abate between 5 $MtCO_2e$ and 12$MtCO_2e$ of industry emissions per year by 2050. Electrification will play a more significant role (12$MtCO_2e$) if hydrogen is unavailable in dispersed sites. This equates to an increase demand of electricity by 15-44TWh. Additional electricity demand is consistent under our delivery pathway for the Sixth Carbon Budget, albeit the demand comes at a faster pace due to the possible adoption of electrification in the iron and steel sector.

Electrification technologies for low temperature processes are technologically mature and could be applied to less energy intensive sites today. However, industry faces barriers to adoption such as high electricity costs. We have seen the impact of overreliance on gas pushing up prices for hardworking people but our plan to expand our domestic renewables will push down electricity prices.

Applications for higher temperature processes are currently limited due to the low maturity of technologies. Some initial grant funding support will be available via Phase 2 of the IETF. Application rounds will run from Autumn 2021 to January 2023. We are also working with Ofgem, network operators, and stakeholders on the approach to delivering low carbon electricity networks with the capacity to meet increased demand from industry.

Biomass

Initial support for sustainable use of biomass fuel switching and BECCS is available via Phase 2 of IETF. As set out in the IDS, current evidence strongly suggests that given limited sustainable biomass supply, we may need to prioritise the use of biomass where it can be combined with carbon capture and storage (BECCS), resulting in negative emissions. The Biomass Strategy, due to be published in 2022 will review the amount of sustainable biomass available to the UK, how this could be best used across the economy, and establish a role for BECCS in reducing carbon emissions across the economy.

Industrial non-road mobile machinery (NRMM)

NRMM covers a wide variety of machinery across the economy (e.g. diggers, combine harvesters, generators, cranes), with total emissions of around 12 $MtCO_2e$ per year. Industrial NRMM accounts for around 6 $MtCO_2e$,[57] coming from construction, mining, and manufacturing, with the remaining emissions largely attributed to agriculture , and some to buildings and transport. New technologies have begun to penetrate markets for some NRMM uses, for example electrification technologies, particularly for small, light duty equipment. Government intervention is likely to be necessary to ensure low carbon technologies continue to be developed and ensure uptake at the level needed to reach carbon budgets and net zero.

The first stage in government support will involve innovation funding to prepare key low carbon technologies for commercialisation. The £40 million Red Diesel Replacement

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[56] https://www.gov.uk/government/consultations/design-of-a-business-model-for-low-carbon-hydrogen

[57] National Atmospheric Emissions Inventory (2021), 'Greenhouse Gas emissions reports', https://naei.beis.gov.uk/reports/reports?section_id=3

competition under our Net Zero Innovation Portfolio will provide grant funding to develop and demonstrate low carbon alternatives to red diesel for the construction and mining and quarrying sectors, to help these sectors to decarbonise. Phase 1 aims to develop component technologies relating to infrastructure, fuels and equipment over 11 months while Phase 2 aims to demonstrate the fully integrated system on construction, and mining and quarrying sites by March 2025.

Further cross government work is required to develop policies to support the deployment of technological solutions and required infrastructure in specific sectors, including agriculture, transport and buildings. Relevant government departments will work together to ensure a coherent approach.

3.10.3.2 Steel

UK steel plays a critical role in the economy as a foundation industry supporting local economic growth and our levelling-up agenda. Steel employs around 32,500 people and supports up to a further 40,000 jobs through its supply chains, providing high value employment in economically deprived areas.[58] The IDS contains commitments to work with the newly constituted Steel Council to consider the implications of the recommendation of the Climate Change Committee to 'set targets for ore-based steelmaking to reach near-zero emissions by 2035'. Hydrogen-based steelmaking, CCUS and electrification are some of the technological approaches being considered as part of this process.

The Steel Council offers the forum for government, industry, and trade unions to work in partnership on the shared objective of creating an achievable, long-term plan to support the sector's transition to a competitive, sustainable, and low carbon future.

Steel accounts for 14% of industry emissions,[59] with 95% of this coming from two blast furnace sites, Scunthorpe, and Port Talbot.[60] Options for decarbonising these sites and the wider steel sector include switching to Electric Arc Furnace applying industrial carbon capture technology to existing blast furnaces or in the future using hydrogen-based DRI.

The UK recognises the importance of coordinating international activity on steel sector decarbonisation, to reduce the costs and risks of unilateral action. This includes working with international partners to collaborate on measures to mitigate carbon leakage, increase the effectiveness of R&D spending, and create larger, international markets for low emission steel products. The UK is taking a leading role in driving forward this activity, championing a number of key initiatives in this area at COP26, and beyond. This includes the Clean Energy Ministerial Industrial Deep Decarbonisation Initiative, which the UK co-leads with India. This focuses on aligning approaches to data measurement, standards and procurement, to ensure there is a coordinated approach to market creation across borders. We are also supporting the Net Zero Industry Mission, under Mission Innovation, which aims to foster deeper collaboration on industry decarbonisation.

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[58] Employment figures sourced from ONS (2018), 'Industry (2, 3 and 5 – digit SIC) – Business Register and Employment Survey (BRES): Table 2', https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/industry235digitsicbusinessregisterandemploymentsurveybrestable2 Indirect jobs estimates based on ONS (2019), 'Type I UK employment multipliers and effects, reference year 2015', https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/adhocs/009746typeiukemploymentmultipliersandeffectsreferenceyear2015

[59] National Atmospheric Emissions Inventory (2021), 'Greenhouse Gas emissions reports', https://naei.beis.gov.uk/reports/reports?section_id=3

[60] BEIS analysis (2021), 'Net Zero Industry Pathway (N-ZIP) model', https://www.theccc.org.uk/wp-content/uploads/2020/12/N-ZIP-Model.xlsb

3.10.3.3 Resource efficiency and energy efficiency (REEE)

The Climate Change Committee estimate that REEE measures could contribute 11 $MtCO_2e$ of annual emissions reductions by 2035.[61] Various policies exist to incentivise and regulate action on REEE, but we need to ensure the right frameworks are in place to end clear investment signals and drive rapid action.

Resource efficiency

Resource efficiency and material substitution measures could save up to 9 $MtCO_2e$ per annum in industry within the UK by 2050.[62] Resource efficiency measures reduce emissions from industrial processes by keeping products and materials in circulation for longer by way of reuse, repair, remanufacture and recycling as well as reducing material usage. These activities enable the retention of value, and in some cases the creation of new value for both the producer and customer, at a much-reduced environmental impact.

The approach in driving the transition to a more resource efficient economy is set out for England in the Government's 2018 *Resources and Waste Strategy*, to be supplemented by a new Waste Prevention Programme, which outlines how we will maximise the value of our resources and minimise waste to increase the circularity of our economy. We will formalise joint working arrangements across government departments to promote collaboration on resource efficiency approaches, ensuring we are using all the policy tools available in working towards shared emissions and environmental targets.

Analysis underpinning the NZS estimates that 3 $MtCO_2e$ of potential savings per year could be driven by consumer-side measures by 2035. Government aims to support this shift in the 2020s through policy measures that inform consumers of the embodied carbon of industrial goods and empower them to make choices that support more efficient use of resources. Measures across different sectors will be explored, but opportunities have been identified in the construction, automotive and electronics sectors.

Government aims to support action in the construction sector by improving reporting on embodied carbon in buildings and infrastructure with a view to exploring a maximum level for new builds in the future. We recognise there is potential to reduce embodied carbon by way of material substitution where appropriate, such as in timber usage (see Natural Resources, Waste and F-gases chapter) and resource efficiency approaches, amongst others. We have also supported the Green Construction Board to produce a Routemap to Zero Avoidable Waste, published in July 2021.

Government is identifying opportunities to reduce the substantial embodied carbon footprint of the automotive sector, beyond the reduction and then elimination of emissions at the tailpipe.

We are building on the successful introduction this year of the first wave of right to repair measures for certain appliances and equipment. Alongside the review of Waste from Electrical and Electronic Equipment (WEEE), we will explore the use of labels that inform consumers of durability, repairability and recyclability. Other options under consideration include enhancing and extending producer responsibility schemes to incentivise sharing and renting.

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[61] The figures were derived by the CCC based on research from 2018 (Scott, et al., 2018). This research acknowledges that there are a range of possible scenarios that differ greatly in resource efficiency savings. The CCC's balanced pathway assume savings consistent with the high scenario. Empirical evidence on the likelihood of these scenarios is limited. The balanced pathway also includes estimated savings from industrial buildings, which are covered in the Heat and Buildings chapter.

[62] CCC (2020), 'Sixth Carbon Budget', https://www.theccc.org.uk/publication/sixth-carbon-budget/

To realise the wider emissions saving potential of resource efficiency measures will require establishing frameworks which minimise virgin resource use and maximise recycled, reused, or remanufactured content. We will continue to assess all, fiscal and nonfiscal, policy options to meet these objectives.

Knowledge can be a barrier preventing the value in waste resources from being realised, including the sharing of secondary resources across different industrial processes. We will support companies to identify these Industrial Symbiosis opportunities, boosting the take-up of circular economy initiatives. We will support inter-disciplinary approaches and strengthen the evidence base on resource efficiency initiatives by collaborating with the UKRI funded National Interdisciplinary Circular Economy Research (NICER) programme, and through the development of data systems to connect energy, waste, and water flows from industrial sites.

Energy efficiency

Energy efficiency measures in industry range from simple, bill-saving measures to complex retrofits of industrial equipment with long payback periods and replacement cycles. We intend to explore regulatory measures to drive greater, earlier uptake of energy efficiency measures in line with Carbon Budget targets, supported by a wider package of policies to enable a smooth industry transition. We intend to consult on the development of a package of measures. For smaller businesses, behaviours (awareness, prioritisation, maintenance) are often a further barrier to improving energy efficiency and we are considering new policies to respond to these barriers. New policies include establishing a dedicated energy advice offering for smaller businesses to provide trusted advice on improving industrial energy efficiency and decarbonisation, as outlined in The UK Government's British Energy Security Strategy (2022). Additionally, the Department for Business, Energy and Industrial Strategy has sponsored 100,000 free copies of the energy management standard BS ISO 50005 to support SMEs with a means to develop a practical, low-cost approach to energy management.

Building on behavioural insights approaches in other areas of government policy, we are keen to explore how local networks – such as growth hubs, Local Enterprise Partnerships (LEPs), the local net zero hubs, and chambers of commerce – can be used to drive energy-efficient behaviours amongst businesses. We will consider which levers could work best to support, interconnect and scale-up these networks.

Furthermore, the heterogeneity of the manufacturing industry means that processes are very varied, so codifying them for regulation across the whole sector may be challenging. We are currently exploring potential new regulatory options to address this challenge and we would seek to minimise burdens imposed by regulation, possibly by using digital tools.

Energy intensive industry (EII) firms are already covered by energy efficiency regulations, and many have adopted efficiency measures. We are examining how existing schemes can be enhanced (e.g. reforming Climate Change Agreements) and/or expanded (e.g. to non-EIIs and SMEs). For non-EIIs and SMEs, we are reviewing existing policies to ensure financial support is accessible and minimum standards are clear.

Funding for complex industrial retrofits with high payback periods remain available via the IETF Phase 2. These would be further supported by any future extension to the IETF, reflecting the government's manifesto commitment to increase funding to £500 million to 2028. Work will be undertaken to ensure sustainable financing measures are available long-term.

3.10.3.4 Demand-side measures

The IDS sets out our ambition to create demand for low carbon products, growing the associated market and supporting industry to share the costs of decarbonisation with consumers.

The IDS committed to exploring a range of policy options that can support this ambition including improved transparency of embodied emissions data, product labelling, regulatory standards, and agreeing public and private procurement approaches. The government has committed to developing detailed policy proposals in this area, beginning with a call for evidence on demand-side policy by Spring 2022. The call for evidence will investigate how we can define low carbon products and the emissions reporting that will be required to support those definitions. It will also explore the design of demand-side policy levers, with a view to the potential introduction of voluntary standards and labelling as early as 2025, and regulatory standards being introduced in the late 2020s.

Across these approaches, the IDS recognises the significant benefits which can be achieved through international cooperation, and the UK is leading the new Clean Energy Ministerial Industrial Deep Decarbonisation Initiative (IDDI), which aims to develop shared approaches to embodied emissions reporting and definitions for green steel and cement to drive public and private procurement.

3.10.3.5 Dispersed sites

Dispersed sites[63] account for approximately half of the UK's industrial emissions, and therefore form a major part of industry's pathway to net zero. These sites are highly diverse in [64]terms of location, sectors, and industrial processes, ranging from energy-intensive processes such as clinker production in cement to less energy-intensive processes like pasteurisation in food and drink manufacturing.

The IDS indicated that emissions reductions in the early 2020s would focus on energy efficiency. Deeper decarbonisation potential is expected to be reached in the 2030s onwards, when uptake of low carbon technologies in dispersed sites is expected to be rapid.

Whilst the broad trajectory on decarbonising dispersed sites remains valid, the more ambitious Carbon Budget 6 targets mean we will explore opportunities for faster decarbonisation in dispersed sites in the 2020s. Going further on dispersed sites in the 2020s could help industry avoid technological lock-in through offering decarbonisation opportunities to align with investment cycles; and spread the benefits of green technologies beyond the clusters, supporting the levelling up agenda.

To achieve this, we intend to advance work in the following main areas:

- Accelerated decarbonisation across dispersed sites: We will investigate the potential for securing earlier emissions savings from segments of emissions where the technological pathway is more straightforward, or where economies of scale can be developed. This could include areas such as heat pumps for low temperature processes, and electrification of off-gas grid sites.

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[63] Defined by the IDS as sites outside a 25km radius from the 6 main industrial clusters (Grangemouth, Teesside, Humberside, Merseyside, South Wales and Southampton)

[64] National Atmospheric Emissions Inventory, 'Emissions from NAEI large point sources', https://naei.beis.gov.uk/data/map-large-source

- Preparing sites for key infrastructure decisions in the mid-2020s: For most sites, more clarity on optimal decarbonisation options depends on key infrastructure decisions, such as the future of hydrogen in the gas grid by 2026. We will work with stakeholders to ensure that these sites understand their decarbonisation options once these decisions have been made. This would include funding for Mini-Cluster Industrial Decarbonisation Plans in the early 2020s, to develop shared infrastructure and integrated decarbonisation solutions in local areas. This would be supplemented by continued funding via Phase 2 of the IETF for site-level studies and deployment.[65]

3.10.4 Scottish Government

There has been a considerable decline in Scotland's industrial emissions since 1990, falling by almost 50% between 1990 and 2019. At present, around 30% of total Scottish greenhouse gas emissions are generated by a diverse range of industrial sub-sectors, predominantly manufacturing, as well as mining and construction. The Scottish Industrial Energy Transformation Fund[66] provides grant funding to energy intensive industries to reduce energy costs and emissions through increased energy efficiency.

Other key policies include a Scottish Industrial Energy Transformation Fund, a Low Carbon Manufacturing Challenge Fund, work on the Grangemouth Future Industry Board aimed at growing economic activity in the area while transitioning to NetZero, and a Green Jobs Fund.

3.10.5 Welsh Government

Our industrial sector faces decarbonisation challenges, which require long-term targeted and symbiotic action to ensure their international competitiveness, including fuel switching, carbon capture and storage or other new technology solutions and raw material substitution with waste streams from other industries requiring less energy to process.

The 2020s will be the period where substantial resource efficiency improvements are made and we develop and scale up new options for industrial decarbonisation such as carbon capture and storage, low-carbon hydrogen and engineered emissions removals. This period will also enable us to understand the costs, supply chain implications and where costs fall. Flexibility will be required as appropriate decarbonisation pathways for regions and industrial sectors are developed.

The scaling up of new options for industrial decarbonisation will then have a transformative impact on emissions from the end of the current decade and through the 2030s.

In the period of 2021-25, we will review a number of our key interventions with business such as Business Wales to ensure climate change aspirations are embedded at the heart of our operations. We will build on many of our strong academic initiatives and clusters to achieve a cohesive approach within regions and between our academic and business sectors to ensure that we maximise the opportunities for our communities.

The policies and proposals for this sector have been set out under the broad mitigation areas of **resource efficiency, fuel switching, carbon capture utilisation and storage (CCUS)** and **commercial buildings**. Below are the key policies for Wales, more detail can be found in the Net Zero Wales Plan and in Annex 2, CTF Table 3.

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[65] Locations outside of the 6 main clusters where co-location of industrial units could yield integrated solutions

[66] https://www.gov.scot/policies/energy-efficiency/scottish-industrial-energy-transformation-fund/

Drive decarbonisation through the manufacturing sector

In 2021, Welsh Government published a new Manufacturing Action Plan. Through the plan it will futureproof manufacturing in Wales, make use of new technologies and importantly, drive down emissions. Supporting manufacturers to export is an important part of the Manufacturing Action Plan, and the Export Action Plan sets out how it will be achieved. Export Clusters will help businesses transition from a reliance on sales to fossil fuel sectors overseas.

Increased resource efficiency in industry and business through regulation and funding

Welsh Government will secure greater recycling in businesses through the introduction of the new Business Recycling Regulations in 2023 and the introduction of extended producer responsibility for packaging in 2024 (which will also secure an increase in the recycling of business-to-business packaging).

Business Wales – using our financial and advice services to encourage business emission reduction

Business Wales supports new entrepreneurs, micro-businesses and SMEs to embed sustainable development practices in the fabric of their venture. A full review of the future Business Wales service has been undertaken and building on the current provision and dedicated support on sustainability the future provision from 2023 onwards will have a key focus on support businesses to reduce carbon emissions and promoting sustainable development policies.

Economy Futures Fund (EFF)

Welsh Government will seek to prioritise the decarbonisation all to action, where Welsh Government are looking for applications that enable more of the business base to become carbon light or free.

3.10.6 Northern Ireland Executive

The 10x Economic Vision highlights five priority clusters relating to areas where the emergence of significant capability and capacity with the potential to drive the economy forward has been seen. A number of local businesses within these specialisms, both Small and Medium Enterprises (SMEs) and large companies, have already demonstrated an appetite for collaborative working and have come together with academic partners and other key stakeholders to develop new products, services and ways of working. These technologies and clusters will evolve and change, and policy must keep pace with these changes. Whilst these clusters may change over time, commitment to ‘tightening an economic strategy from broad sectors to strong or emerging specialisations’ will remain. Those clusters particularly relevant to the path to net zero include:

3.10.6.1 Agri-Tech

The application of innovation and enabling technologies to build competitive advantage and transition to net zero across the primary and secondary processing sectors, including genomics, traceability of food, advanced packaging, plant and animal health specialisms, and the application of Artificial Intelligence to new agricultural methods.

3.10.6.2 Advanced Manufacturing and Engineering

Advanced manufacturing is the use of innovative or cutting edge technologies and methodologies for improved competitiveness in the manufacturing sectors. It embraces

companies in Aerospace and Defence, Automotive, Construction, Materials Handling, Electronics, Energy, Water and Consumer Products.

3.10.6.3 Windows of Opportunity

The transformation to new ways of living that reduce waste and carbon footprint cuts across these priority clusters. There are both significant economic opportunities and adjustments across the priority clusters and the economy more broadly to be gained through efforts to address climate change. Various industries such as energy, transport and construction will see changes in technology which will have substantial implications for the mix of skills required. The UK Government's '10 Point Plan for a Green Industrial Revolution' sets out a commitment for up to 250,000 new jobs to be created across the UK by 2030 as part of efforts to move towards net-zero. Northern Ireland aims to obtain a significant share of this growth in jobs and take advantage of other opportunities which arise from the transition to a greener, more sustainable economy.

3.11 Heat and buildings

3.11.1 Progress to date

The UK has around 30 million buildings[67] and includes some of the oldest building stock in Europe.[68] Currently, 1.7 million fossil fuel heating systems are installed per year (gas, oil, and coal).[69] The vast majority of emissions from buildings result from heating. Including indirect emissions (e.g. from electricity generation) emissions from heating buildings make up around 78% of all buildings emissions and about 21% of all UK emissions.

The package of measures presented here, and in our *Heat and Buildings Strategy* (HBS)[70] and associated consultations, delivers on commitments made in the *Ten Point Plan* for a *Green Industrial Revolution* and the *Energy White Paper*. In the *Ten Point Plan*, we committed to deliver greener buildings. Since then, we have announced £60 million to support decarbonisation of Social Housing and have allocated over £1 billion from the Public Sector Decarbonisation Scheme, in doing so, supporting up to 30,000 jobs.

Homes: The UK already has a strong track record improving energy performance, with 40% of our homes now above Energy Performance (EPC) Band C, up from just 9% in 2008. There are approximately 28 million households in the UK[71], and 86% of homes in England use natural gas boilers.[72] Across the UK, 9% of the energy consumed to heat homes is provided by other fossil fuels, such as oil and coal, generally in homes that do not have access to the

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67 ONS (2020), 'Households projections for England', Table 401, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/householdprojectionsforengland ; BEIS (2020) 'Non-domestic National Energy Efficiency Data-Framework' based on 2018 data, https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020

68 Buildings Research Establishment (2020), 'The Housing Stock of the United Kingdom', https://files.bregroup.com/bretrust/The-Housing-Stock-of-the-United-Kingdom_Report_BRE-Trust.pdf

69 Building Services Research and Information Association (BSRIA) (2020), Domestic boilers market analysis – United Kingdom, 2020, https://www.bsria.com/uk/

70 https://www.gov.uk/government/publications/heat-and-buildings-strategy

71 ONS (2020), 'Households projections for England', https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/householdprojectionsforengland, Table 401

72 MHCLG (2020), 'English Housing Survey 2019 to 2020', https://www.gov.uk/government/statistics/english-housing-survey-2019-to-2020-headline-report, Annex table 2.2.

gas grid[73]. In 2019, approximately 15 million (60%) of homes in England had a lower energy performance, with ratings of EPC band D and below[74]. The largest proportion of homes in England are owner-occupied (64% in 2019), with a much smaller proportion being socially rented (17% in 2019), or privately rented (19% in 2019)[75]. Owner-occupied homes are now the worst performing tenure, with the greatest proportion of homes below EPC band D[76]. Improving the energy performance of all homes and taking a 'fabric first' approach, by improving the energy efficiency will be key to ensuring the transition to low carbon heating is cost effective[77].

Non-domestic buildings: There are approximately 1.7 million non-domestic (commercial, industrial and public) properties in England and Wales[78]. Non-domestic buildings account for around a quarter of UK building emissions[79]. Commercial and industrial buildings over 1,000 m2 are responsible for over half of the energy used by commercial and industrial buildings (excluding process heat) but account for only 5% of the stock[80]. Public sector buildings account for about 9% of building emissions.[81]

3.11.2 Policies and proposals

Decarbonising heat

Much like the move to electric vehicles, the move to heat pumps will be a gradual transition from niche product to mainstream consumer option. Our core commitment is that we will aim to phase out the installation of new and replacement natural gas boilers in homes and buildings by 2035 at the latest, once costs have come down. This would be in line with the natural replacement cycle, and include hydrogen ready boilers in any areas not converting to hydrogen, to ensure all heating systems used in 2050 are compatible with net zero.

Accelerating heat pump deployment. We will grow the UK heat pump market to support 600,000 installations per year by 2028. As part of this, and working with industry to do so, we will aim for cost parity between heat pumps and gas boilers by 2030 with significant cost reductions of at least 25-50% by 2025. To achieve this, we will introduce a range of new policies to support heat pump deployment, including a new £450 million Boiler Upgrade Scheme over 2022/23 to 2024/25 with grants of £5,000 for an air source heat pump. In 2021, we consulted on phasing out the installation of new oil, coal, and LPG heating, and

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73 BEIS (2020), 'Energy Consumption in the UK 2020', https://www.gov.uk/government/statistics/energy-consumption-in-the-uk-2020

74 MHCLG (2020), 'English Housing Survey 2019 to 2020', https://www.gov.uk/government/statistics/english-housing-survey-2019-to-2020-headline-report, Annex table 2.8

75 MHCLG (2020), 'English Housing Survey 2019 to 2020', https://www.gov.uk/government/statistics/english-housing-survey-2019-to-2020-headline-report

76 MHCLG (2020), 'English Housing Survey 2019 to 2020', https://www.gov.uk/government/statistics/english-housing-survey-2019-to-2020-headline-report, Annex table 2.8

77 'Fabric first' means installing measures that upgrade the building fabric (e.g. walls/lofts) before making changes to the heating system.

78 BEIS (2020), 'Non-domestic National Energy Efficiency Data-Framework', https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020

79 BEIS analysis, this figure excludes industrial buildings. BEIS (2020), 'Final UK greenhouse gas emissions national statistics: 1990 to 2018', https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2018, Table 19

80 BEIS (2016), 'Building Energy Efficiency Survey', https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

81 BEIS (2020), 'Final 2018 UK greenhouse gas emissions national statistics: 1990 to 2018', https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2018

replace with low carbon alternatives such as heat pumps in off gas grid non-domestic buildings from 2024 and homes from 2026. We will launch a new market-based incentive for heating system manufacturers, similar to that for CO_2 in cars. Subject to strategic decisions on the pathways and market conditions, we would look to grow the heat pump market beyond 600,000 per year in 2028 and potentially up to 1.7 million a year by 2035, and we will consult on our proposed approach to doing this.

We are investing £60 million in a 'Heat Pump Ready' Programme which will support the development of innovative solutions to improve deployment, tools and technologies across the heat pump sector. These new opportunities will build on our previous Energy Innovation Programme activities, such as the Electrification of Heat Demonstration Project.

Heat networks. Under the £338 million Heat Network Transformation Programme, we will launch the £270 million Green Heat Network Fund to grow the market for low carbon heat networks. We will also pass new legislation to regulate the sector for consumers, give heat networks the statutory powers they need to build, and regulate the carbon emissions of projects from the early 2030s. We will also deliver new heat networks zones in England by 2025 where heat networks are the default solution for decarbonising heating. Finally, we will work with industry to increase the capacity and capability of the UK supply chain to support the sector to reach its growth potential and look to improve performance of legacy networks through the Heat Network Efficiency Scheme.

Hydrogen heating. We will work in partnership with industry and other key stakeholders to thoroughly assess the feasibility, safety, consumer experience and other costs and benefits, of hydrogen as an option for heating our homes and workplaces. We will support industry to develop and deliver large scale trials of hydrogen for heating, including a neighbourhood trial by 2023 and a village scale trial by 2025, and develop proposals for a possible 'hydrogen town' before the end of the decade. We will develop the evidence base and frameworks necessary to take strategic decisions on the role of hydrogen in decarbonising heat in 2026. In the shorter-term, we will work with the Health and Safety Executive and industry partners to explore whether to enable up to 20% hydrogen blending in suitable areas of the GB gas networks subject to the success of testing and trials, and value for money assessment.

Hydrogen-ready boilers and boiler standards. We are aiming to consult shortly on the case for enabling or requiring new gas boilers to be readily convertible to use hydrogen ('hydrogen-ready') by 2026. We will also use this consultation to test proposals on the future of broader boiler and heating system efficiency and explore the best ways to reduce carbon emissions from our gas heating systems over the next decade.

Biomethane in the gas grid. We will deliver a new Green Gas Support Scheme (GGSS) to support the injection of biomethane from anaerobic digestion (expected to deliver 2.8TWh of renewable heat per year in 2030/31), and we will explore the development of commercial-scale gasification and the replacement of the GGSS with a long-term biomethane support scheme.

Improving buildings

Our core commitment is to reduce bills, whilst improving comfort, health and home value, through ensuring as many homes as possible to achieve EPC Band C by 2035 at the latest, where cost-effective, practical, and affordable.

New Buildings. We plan to introduce the Future Homes Standard, which will ensure that from 2025 all new homes in England are ready for net zero by having a high standard of energy

efficiency and low carbon heating installed as standard[82]. Similarly, we will introduce the Future Buildings Standard which will ensure that from 2025, new non-domestic buildings use low carbon heat and have the best fabric standards possible. To reinforce this, we will consult on whether it is appropriate to end new gas grid connections, or whether to remove the duty to connect from the Gas Distribution Networks. As an interim measure to the Future Homes and Buildings Standards, in December 2021 we introduced an uplift in standards. Once the new standards come into effect, in June 2022, new homes will be expected to deliver around 30% less CO_2 emissions compared to the previous standards and new non-domestic buildings will be expected to produce 27% less CO_2 emissions.

Domestic private rented sector. We will build on our 2020 consultation on strengthening the Minimum Energy Efficiency Standards to EPC band C by 2028 to set long term minimum regulatory standards consistent with our net zero commitment for private rental sector. We are aiming to publish a response to this consultation by the end of the year. We have provided significant additional support to local authorities to ensure compliance and enforcement of these regulations, building on earlier compliance and enforcement pilots. To date, BEIS has made available a total of £6.4 million for compliance and enforcement of the PRS regulations. This includes providing £4.3m last financial year to 59 local authorities to support activity in these areas. We have also allocated a further £2m this financial year to be given to around 20 additional local authorities. We plan to scale up activity further in the coming years. We have also set out proposals to strengthen the compliance and enforcement framework under our recent EPC Band C consultation. This includes the introduction of a compliance and exemptions database to support local authority enforcement of these regulations.

Owner occupied homes. We are also exploring opportunities to improve the energy performance of owner-occupier homes. We have conducted a series of stakeholder workshops on the case for action, with over 50 representatives from the housing sector, landlord representatives, retrofit supply chain, NGOs, and consumer organisations. We plan to consult on options to upgrade homes in the owner occupier sector. We will work with owner-occupiers to help them improve the liveability of their homes. The provision of green finance will be an important step in making this easier and more accessible.

Social housing. We will provide £800 million additional funding to the Social Housing Decarbonisation Fund (SHDF) over 2022/23 to 2024/25, which will deliver energy performance improvements to social housing. We will also consider setting a long-term regulatory standard to improve social housing to EPC Band C and consider levers required to decarbonise the stock in line with net zero. We will consult the sector before setting any regulatory standard.

Low Income/Fuel Poor Consumers. We will ensure as many fuel-poor homes as reasonably practicable achieve a minimum energy efficiency rating of C by the end of 2030. To help achieve this, we will provide £950 million additional funding over 2022/23 to 2024/25 for off-gas-grid properties through the Home Upgrade Grant (HUG) to provide ongoing support for low-income households living off the mains gas grid with energy efficiency and low carbon heating upgrades. We have also expanded and extended the Energy Company Obligation Scheme and the Warm Home Discount Scheme until 2026.

Net zero backstop for homes. We will consider on an ultimate backstop date to ensure that all homes meet a net zero minimum energy performance standard before 2050, where cost effective, practical, and affordable.

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[82] The Net Zero Strategy, p.146, https://www.gov.uk/government/publications/net-zero-strategy.

Public Sector. We have committed to halve direct emissions from public sector buildings by 2032, against 2017 levels, and we aim to further reduce emissions from public sector buildings by 75% by 2037. To help achieve this, we will provide £1.425 billion additional funding for the Public Sector Decarbonisation Scheme (PSDS) over 2022/23 to 2024/25, and through our Greening Government Commitments (GGCs) which sets targets to reduce emissions from central government departments and arms-length bodies. We have also initiated the Public Sector Low Carbon Skills Fund which provides complementary funding alongside the PSDS to enable public sector organisations to acquire expert skills in order to unlock decarbonisation projects.

Non-domestic buildings. The *Energy White Paper* set a minimum energy efficiency standard of EPC Band B by 2030 for privately rented commercial buildings in England and Wales. Later this year we plan to consult on regulating the non-domestic owner-occupied building stock, and we are considering whether this should align with the private rented sector minimum energy efficiency standards. We will also respond to the 2021 consultation on introducing a performance-based policy framework in large commercial and industrial buildings and pilot the scheme in 2022.

We will look to consult stakeholders on the Small Business Energy Efficiency Scheme (SBEES) later this year. The scheme will aim to remove barriers for SMEs in accessing energy efficiency measures, drive forward better buildings performance and aid SMEs in meeting regulatory standards. Finally, we have consulted on strengthening the Energy Savings Opportunity Scheme (ESOS), which is a mandatory energy assessment scheme for large businesses' energy use and opportunities to improve energy efficiency.

Energy-related products. We have published a policy framework setting out illustrative proposals for raising minimum energy performance standards and improving consumer information for a range of high potential products, including but not limited to space heating, cooking, taps and showers and lighting. We plan to consult on more concrete proposals between 2022 and 2023 ahead of implementing measures from 2025.

Enabling actions

There are a range of barriers to home energy performance improvements, which we will also need to address to help people act:

Advice and information. Our existing Simple Energy Advice service has received over 1.5m users to date. We will enhance our digitally led service, and are considering options to support tailored retrofit advice in local areas. The aim is to create a Government-led home energy advice journey, supported by tailored local advice. This includes moving our Simple Energy Advice service to GOV.UK, which will improve user experience, and supporting local advice provision. This will help households to improve the energy performance of their homes, and move towards net zero.

Green finance. Catalysing the market for Green Finance is a priority. We are working with mortgage lenders to support homeowners to improve the energy performance of their properties and will publish our response to our lenders' consultation in due course. Government will also launch a new Green Home Finance Accelerator (GHFA) innovation programme, focussed on supporting lenders to develop green finance products targeted at consumer types who will be impacted by future regulation, and which the market is unlikely to develop on its own in the short term. The GHFA will build on the lessons learnt from the recent Green Home Finance Innovation Programme which had a specific focus on green mortgage innovation. We are also working with the UK Infrastructure Bank to explore whether they can play a role in supporting lenders to scale up green home finance offers for

homeowners. Additionally, we will explore opportunities to simplify and improve the GD Green Deal framework to support the funding of energy efficiency measures.

Rebalancing energy prices: the costs placed on energy bills away from electricity to incentivise electrification across the economy and accelerate consumers and industry's shift away from volatile global commodity markets over the decade. This will also ensure heat pumps are comparatively cheap to run over time. We will publish our proposals on how to do so in 2022, considering overall system impacts and limiting the impact on bills, particularly for low-income consumers.

Developing a workforce pipeline with the skills to meet the requirements of net zero transition:

The increase in deployment of low carbon heating systems over the coming decade will require a significant escalation in the number of trained, high-quality installers. With this in mind, we have launched the independent Green Jobs Taskforce with key industry bodies to advise on how we can have the skilled workforce to deliver net zero and support people in high carbon sectors with the transition.

We will encourage current gas engineers, electricians, and those with transferrable skills in complementary sectors, to retrain and specialise in smarter, greener, and cleaner technologies. There are over 140,000 plumbers and heating and ventilation engineers in the UK. Approximately 90% of builders stated they would be willing to retrain to meet the demand for new roles and skills' changes in the future.[83] Attracting new entrants to the sector also provides a great opportunity to diversify the workforce. We will work with industry to support training and new routes of entry to help boost heat pump installer numbers and other areas of skills shortage to support the decarbonisation of homes. We will also work with industry and the low carbon projects supported through the Green Heat Network Fund to increase opportunities to gain skills in the heat networks sector.

We will also continue to work with Ofgem, distribution network operators, and other local actors on the approach to planning the network in Great Britain and delivering smart, secure, cost-effective solutions. This will include considering the potential for storage and hybrid technologies in combination with flexible tariffs.

Supporting the British Energy Security Strategy

The Energy Security Strategy builds on the commitments set out in the Prime Minister's 10 Point Plan, the Energy White Paper, the Heat and Buildings Strategy and the Net Zero Strategy.

This included:

Zero-rating VAT for the next five years on the installation of insulation and low-carbon heating, saving between up to £1000-£2000 on the cost of an air source heat pump.

Expanding heat pump manufacturing: We will run a Heat Pump Investment Accelerator Competition worth up to £30m in 2022 to make British heat pumps, which reduce demand for gas..

Setting clear energy performance standards varying by building type to be phased in over the long-term.

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[83] CITB (2021), 'Building Skills for Net Zero' https://www.citb.co.uk/media/kkpkwc42/building_skills_net_zero_full_report.pdf

Catalysing a world-leading competitive low-cost green finance market to help property owners improve their properties stock by:

- Doubling innovation funding for the development and piloting of new green finance products for consumers from £10m to £20m
- Working with the UK Infrastructure Bank to develop proposals in response to the strategic steer restating the urgent need to improve the energy efficiency of our buildings.
- introducing a scheme under which lenders will work to improve the energy performance of the properties against which they lend

Improving consumer advice: By summer we will launch a comprehensive Energy Advice Service on GOV.UK which will help consumers navigate what can be unknown territory to improve the energy performance of their homes. We will launch additional support for homeowners through telephone support and specific local area advice for energy consumers.

Establishing a dedicated energy advice offering for smaller businesses to provide trusted advice on improving industrial energy efficiency.

Empowering consumers to choose energy-efficient products We are bringing in new minimum standards and labelling requirements for a range of energy-using products and will formally consult on draft regulations at the end of 2022, early 2023.

Reviewing planning barriers that households can face when installing energy efficiency measures such as improved glazing, including in conservation areas and listed buildings. This will be completed by the end of 2022 and ensure protection of local amenity and heritage, whilst making it easier to improve energy efficiency.

Ensuring all new homes are designed so that smart meters can be fitted from the outset, in advance of the Future Homes and Buildings Standards by 2024.

The Boiler Upgrade Scheme (BUS)

The Boiler Upgrade Scheme will support the continued deployment of low carbon heat following the closure of the Domestic Renewable Heat Incentive (RHI). The scheme will provide capital grants for the installation of low carbon heat technologies in domestic and small non-domestic properties. The grant model will help customers overcome the high upfront cost of low carbon technologies when replacing existing fossil fuel systems.

The BUS will provide grants of £5000 towards the installation and capital costs of air source heat pumps and biomass boilers, and grants of £6,000 for ground source heat pumps.

Private Rented Sector Regulations

As of April 2020, privately rented homes in England and Wales are required to meet the minimum standard of Energy Performance Certificate (EPC) Band E before they can be let, unless a valid exemption applies. Local authorities are the enforcement bodies for these regulations. Government committed in the Clean Growth Strategy to improve as many private rental homes as possible to EPC band C by 2030 where practical, affordable and cost effective, we consulted on this commitment in the winter of 2020/2021. We carefully analysed the responses received and we will publish a Government Response in due course.

Owner occupier regulations

In the Net Zero Strategy, we stated that we plan to consult on options to upgrade homes in the owner occupier sector. More widely, we committed to consult on phasing in higher

minimum performance standards to ensure all homes meet EPC Band C by 2035, where cost-effective, practical and affordable.

Home Upgrade Grant Scheme

The **Home Upgrade Grant** provides grants to low-income households to upgrade the energy performance of the worst quality, off gas grid homes in England by installing multiple energy efficiency measures and low carbon heating.

In the summer of 2021, the Government announced the launch of **the Sustainable Warmth** competition. This pot of money is worth over £500 million and comprises both the Local Authority Delivery scheme and the Home Upgrade Grant, applications for which closed on 4 August 2021. This funding will deliver energy efficiency upgrades to low-income households both on and off the gas grid. Homes with an EPC rating of D and below are eligible.

Local Authority Delivery Scheme

The Local Authority Delivery Scheme (LAD) is focussed on low-income households in homes that most need energy efficiency upgrades. The scheme is prioritising homes with low Energy Performance Certificate (EPC) ratings of D, E, F and G and targeted at households with a combined household annual low-income of no more than £30,000 who are most at risk of fuel poverty.

Phase 1 allocated £200m in grants to over 136 Local Authorities for delivery by March 2022, with a managed closure to September 2022. It is forecasted that up to 20,000 homes will be upgraded.

Phase 2, allocated £300m to the five Local Net Zero Hubs, who work with their regional Local Authorities to continue to deliver energy efficiency upgrades to up to 30,000 homes. LAD Phase 2 is currently in delivery and BEIS will continue to work with the Net Zero HUBs to ensure that as many homes benefit from the scheme as possible.

Phase 3, funding was allocated to successful LAs under the third phase of LAD (£287m) in December 2021 to January 2022, with delivery commencing from early 2022 until March 2023.

Green Homes Grant Voucher Scheme

Homeowners (both freehold and leasehold owner occupiers), and landlords could apply for vouchers of up to £5,000 towards the cost of installing energy efficient and low-carbon heating improvements in their homes. Some homeowners on income-based or disability benefits were eligible for vouchers covering the full cost of improvements, up to a value of £10,000. The scheme opened on 30 September 2020 and closed to new applications on 31 March 2021, with scheme closure date set at 30 November 2021. Through the scheme the government contributed over £233 million towards the installation of over 49,000 energy efficiency and low carbon heating home improvement measures

Public Sector Decarbonisation Scheme

The Public Sector Decarbonisation Scheme provides grants for public sector bodies to fund heat decarbonisation and energy efficiency measures. The scheme supports the aim of reducing emissions from public sector buildings by 75% (compared to 2017) by 2037, as set out in the Heat and Buildings Strategy in October 2021. We have already made available over £1 billion through Phases 1 and 2 of the Public Sector Decarbonisation Scheme over 2020/21 and 2021/22, and a further £1.425 billion will be invested in the scheme over the financial years 2022/23 to 2024/25.

Energy Company Obligation

The 2021 Sustainable Warmth strategy announced a continuation of ECO from 2022 – 2026 and an expansion in the value of the scheme from £640mn/annum to £1bn/annum. In Summer 2021, government consulted on the 4-year £4bn successor scheme (ECO_4) and published the consultation response in April 2022. The scheme focuses support by installing energy efficiency measures in low income and vulnerable and fuel poor households across Great Britain, living in energy inefficient homes. A minimum level of energy efficiency upgrade is required, for deeper improvements to homes.

Green Deal

The Green Deal, launched in 2013, enables consumers to take out loans to pay for energy efficiency improvements on their properties, with repayments made through their energy bill. Repayments are made on a Pay-As-You-Save basis: after the improvement has been made, the consumer begins to save energy, their energy bills are less than they would have been without the improvements, and these savings are used to repay the loan. In July 2015, Government announced there would be no further public investment in the scheme, but the scheme remains in place to support existing Green Deal Plans. Government will explore opportunities to simplify and improve the Green Deal framework to support the funding of energy efficiency measures.

Social Housing Decarbonisation Fund Demonstrator

The Social Housing Decarbonisation Fund will upgrade a significant amount of the social housing stock currently below EPC C up to that standard, delivering warm, energy-efficient homes, reducing carbon emissions and fuel bills, tackling fuel poverty, and supporting green jobs. The 2020 Summer Economic Update announced the SHDF Demonstrator project, launched in 2020, which has awarded £61m of funding to social landlords across England and Scotland to test innovative approaches to retrofitting at scale, seeing around 2000 social homes improved to at least EPC band C and supporting around 1,200 local jobs.

Social Housing Decarbonisation Fund Wave 1

The Social Housing Decarbonisation Fund will upgrade a significant amount of the social housing stock currently below EPC C up to that standard, delivering warm, energy-efficient homes, reducing carbon emissions and fuel bills, tackling fuel poverty, and supporting green jobs. The Government launched Wave 1 of the SHDF in August 2021. It will provide around £179m funding in financial year 21/22, delivering up to March 2023.

Renewable Heat Incentive

The Non-domestic RHI scheme was open to commercial, industrial, public sector, not for profit and community generators of renewable heat since November 2011 and closed to new applicants on 31 March 2021. The Domestic RHI opened in April 2014 and was available to homeowners, private and social landlords, people who build their own homes, and assignment of rights investors who successfully registered with Ofgem. Following a 12 month extension which was announced in March 2020, the Domestic RHI closed to new applicants on 31 March 2022. This extension provided further support for the deployment of renewable heating technologies in domestic properties, ahead of the launch of the Boiler Upgrade Scheme. The extension also provided ongoing support for the supply chain during the Coronavirus (Covid-19) pandemic. By mid-2021 the RHI had accredited 21,655 non-domestic installation and 95,256 domestic installations. The total renewable heat generated

and paid for by accredited installation stands at 75,156 GWh. The RHI is expected to save approximately 137 $MtCO_2e$ of greenhouse gas emissions over the course of its lifetime.[84]

EPC Disclosure and Targets for Lenders

We have consulted on the role that mortgage lenders can play in helping homeowners to improve the energy performance of their homes. The consultation proposed that lenders disclose information related to the energy performance of their portfolios and sign up to meet an improvement target. The target could be achieved by lenders offering low cost green finance products to customers (e.g. green mortgages, further advances), offering incentives (e.g. cashbacks), and providing information and advice to customers on the changes they can make.

Green Home Finance Innovation Fund (GHFIF)

Funded through the BEIS Energy Innovation Programme, the £1.8m GHFIF competition launched in September 2019 and completed in March 2022. GHFIF was designed to promote the establishment of green lending products for homeowners by supporting lenders to overcome the barrier to innovation posed by high initial development costs in an untapped green finance market. Three organisations were awarded grant funding to support the initial development and piloting of green mortgage products that incentivised energy efficiency retrofit in homes. The funded projects were led by two retail lenders and one fintech company. Two of the resulting 'green lending' products are now continuing in a commercial capacity.

Green Home Finance Accelerator (GHFA)

The purpose of the GHFA programme is to drive innovation in the green lending market and support the establishment of a diverse range of green finance products and services which incentivise domestic energy efficiency and low carbon heating retrofit for both owner occupiers and private landlords. The NZIP-GHFA programme will make up to £20m of grant funding available to support UK lenders to design, develop and pilot a range of innovative finance propositions (not simply green mortgages) enabling homeowners to decarbonise their homes and improve thermal comfort.

Energy-related Products Policy

Energy Labelling and Ecodesign aim to encourage uptake of the most energy efficient products and phase out the least energy efficient products from the market. Since 2019, we have introduced an energy label for commercial refrigeration and updated ecodesign requirements for welding equipment, electric motors and variable speed drives, washing machines, dishwashers, refrigeration, commercial refrigeration, lighting products and electronic displays. In 2021, the energy labels for lighting products, electronic displays, washing machines, refrigeration and dishwashers were also rescaled to aid consumer understanding and reflect technological progress. Circular economy requirements for a range of products were also introduced, contributing to a reduction in material waste. These regulations combined are estimated to save 4.5 $MtCO_2e$ by 2050 and provide consumers with savings on their energy bills.

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[84] Source: February 2018 Impact Assessment, Table 8, page 25 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/680624/ukia_20180029_en.pdf

3.11.3 Scottish Government

The Scottish Government published its Heat in Buildings Strategy in October 2021[85]. The Strategy sets out a vision for the future of heat in buildings, and the actions Scotland is taking in the buildings sector to deliver its climate change commitments, maximise economic opportunities, and ensure a just transition to net zero emissions, including helping address fuel poverty.

Policies in the Heat in Buildings Strategy build on those in the updated Climate Change Plan, setting out a highly ambitious vision for over 1 million homes in Scotland to convert to zero emissions heating by 2030 and the equivalent of 50,000 non-domestic buildings. Action to ensure this includes providing funding to make the uptake of zero emissions heating easier – for example through the Heat Networks fund and regulation, including the New Build Heat Standard: requiring new buildings from 2025 onwards to use zero direct emissions heating. A commitment has also been made to introduce regulations to increase uptake of zero emissions heating systems including minimum energy efficiency standards (equivalent to EPC C) in private-rented homes by 2028, and in owner occupied homes by 2033.

3.11.4 Welsh Government

To reduce emissions, housing needs to set challenging build and retrofit standards, and help people live in ways that are good for them now and for future generations. We have set enhanced standards for new build social homes to avoid locking in significant amounts of carbon, but we now need to ensure that all new homes are either low or zero carbon to run, or at a minimum future proofed for ease of later retrofit. Decarbonising our 1.4m existing homes is even more complex, we have some of the oldest housing stock in Europe and cannot repeat the mistakes of the past.

The Innovative Housing Programme (IHP) has invested £155m into building 2,000 innovative, affordable and market homes across Wales. The programme is now being mainstreamed into core housing capital programmes. We will learn from the IHP programme to inform new build policy and practice. In this carbon budget period we will set challenging requirements for all new homes.

Affordable homes built using Welsh Government grant funding will be expected to exceed standards set in Building Regulations, leading the way and driving market change.

We acknowledge that retrofitting existing homes is a complex and iterative process, and homes are likely to need to go through several stages of retrofit work to reduce their carbon incrementally, embracing innovation and experimentation over time.

Learning from our Optimised Retrofit Programme (ORP) will inform retrofit. ORP will act as proof of concept for approaches to both fabric and technology retrofit and establish a firm evidence base on which to develop our longer term retrofit strategy. Our principled approach is to target households with the worst thermal and energy efficiency ratings.

Investment of £1.8bn in the Welsh Housing Quality Standard (WHQS) has already significantly improved the quality of social homes across Wales, including raising their energy efficiency rating to a minimum of EPC D. 93% of our 225,000 existing social homes now meet the standard.

Our focus between 2021 and 2025 will be on optimising the thermal and energy efficiency of other existing Welsh homes. In deploying our optimised retrofit model, we will maximise air

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[85] https://www.gov.scot/publications/heat-buildings-strategy-achieving-net-zero-emissions-scotlands-buildings/

tightness, eliminate thermal bridging, optimise insulation, solar gain and natural ventilation so reducing heat loss and making homes 'fabric ready'. Individual homes are being assessed with building passports setting out their journey to zero carbon and retrofitted in a bespoke way to lower carbon emissions. We will incrementally extend our optimised retrofit approach beyond social homes, to the private rented sector and eventually owner-occupied homes.

We will take a staged approach using the social housing sector and investment in it to lead the way for both new build and retrofit programmes. We will not push households into fuel poverty but rather lift households out of fuel poverty focusing on changing fabric and behaviours to save people money as well as saving the planet. Our policy commitments will be supported by financial investment in social housing capital grants to build 20,000 new, low carbon social homes over this term of Government, to drive up standards in existing social housing stock and to test and learn approaches to retrofit. Our approach to funding retrofit will be based on partnership and shared responsibility. We will prioritise use of public funds on the most vulnerable and those least able to contribute, developing ways to support those less able to pay.

The policies and proposals for this sector have been set out under three broad mitigation areas of **energy efficiency**: **setting demanding standards for new build, and existing properties**; **low carbon heat**; and **behavioural shift and demand reduction**. Below are the key policies for Wales, more detail can be found in the Net Zero Wales Plan and in Annex 2, CTF Table 3.

- **The Optimised Retrofit Programme (ORP)**
  The ORP underpins Welsh Government's ongoing development of retrofit policy and practice across all sectors.
- **Welsh Housing Quality Standard (WHQS) – Improving energy efficiency for existing social homes**
  Welsh Government will continue to invest £108m per annum as a minimum, to support social landlords in meeting the new WHQS standard. Drawing on evidence from ORP the new WHQS 2022 standard will focus on Fabric First principles and seek to bring all social housing as close as feasible to EPC A or equivalent within a decade.
- **Part L Building Regulations**
  Part L of the Building Regulations provides guidance on the conservation of fuel and power. It is Welsh Governments primary tool for raising minimum standards for new build housing and conversions.
- **Social Homes will lead by example being built to standards in excess of Part L**
  Welsh Government have made a commitment in its Programme for Government (PfG) and it will build 20,000 low carbon, social homes during this government term.
- **Developing Innovative construction techniques and increasing the use of sustainable materials**
  While Part L sets the standard for what needs to be achieved in the construction of new build homes, Welsh Government have also invested £155m in the Innovative Housing Programme (IHP) over the last four years to work out how to best meet these standards.

- **Incentivising energy efficiency of homes through our Help to Buy – Wales**
  Homes purchased using a Help to Buy Wales (HtBW) loan are market homes; they are not specifically developed for the scheme. This means builders will need to ensure all market homes meet new standards.
- **Piloting Smart Flexible and Digitalised Systems to [maximise use of assets] and help reduce demand**
  The Welsh Government's Smart Living (SL) initiative provides early support to develop place-based and innovative solutions to supply flexible, digital development pathways across Wales.
- **Develop behaviour change interventions alongside our wider programmes**
  Welsh Government will continue to invest in specific behaviour change research relating to low carbon living.
- **Supporting the owner-occupied sector to improve energy efficiency and shift to low carbon heat**
  The Warm Homes Programme is the Welsh Governments key delivery mechanism in this area. Since 2011, Welsh Government has invested over £394m, benefitting more than 67,000 homes. It will continue to fund the current programme, before taking the new programme forward from 2023.

3.11.5 Northern Ireland Executive

3.11.5.1 Building Standards

The Department of Finance is planning a phased programme of uplifts to NI's building regulations to provide ultra-high energy efficient building fabric and services with low carbon heating standards for new buildings as soon as is practicable and no later than 2026/27. Consideration may be given to earlier uptake of requirements for low carbon heating solutions from 2022/23, if deemed feasible.

As an interim step to move towards net zero for 2050, a phase 1 uplift to new build standards took effect from 30 June 2022. A phase 2 discussion exercise will gather evidence, including whether an early introduction of requirements based on low carbon heating might be feasible in a phase 3 uplift in 2023. Full implementation of 'net zero ready' is anticipated by 2026/27.

These phases will take into account developments in other administrations to address standards for work to existing buildings and in related areas, such as ventilation, overheating and, potentially in collaboration with the Department for Infrastructure (DfI), electric vehicle charge-point provisions. There is a need to remain alert to emerging developments in areas such as embodied carbon, fuel price assumptions and grid impacts.

3.11.5.2 Energy Efficiency and Decarbonisation of Heating

The Department for Communities (DfC) and the NI Housing Executive (NIHE) are working collaboratively to achieve the aim of mitigating the effects of climate change, reduce fuel poverty and improve health through a variety of projects, initiatives and strategies. There is a need for improved energy efficiency, decarbonisation of heating and transformational behaviour change through education and empowerment so that householders understand how to take full advantage of new sustainable technologies and solutions.

There are a number of current initiatives ongoing as follows:

The **Energy Efficiency in Social Housing project** is a multi-million-pound investment programme to improve the energy performance of almost 1,900 homes. This has been made possible by funding of c. €23 million secured from the European Regional Development Fund

(ERDF) through its Investment for Growth and Jobs Programme for Northern Ireland 2014-2020. A further €22 million of funding is being invested by NIHE. This six-year €45 million programme is expected to be completed by September 2023. The schemes include: no fines properties, improving thermal efficiency in aluminium bungalows through the provision of new external wall cladding, new double glazing and improved insulation measures.

The **Rural-Led Energy Transition (RULET) Pilot** is a joint initiative between the NIHE and Ulster University, within SPIRE 2 – an EU funded project aimed at reducing or eliminating the risk of low-income households being left behind in the energy transition. **RULET** has evolved from the learning points of the **HANDIHEAT**[86] pilot project in County Fermanagh. RULET's focus is on how domestic electrical heating systems, combined with energy storage, can be delivered and operated at scale.

Another consideration is the potential to create significant system value by managing high levels of wind penetration into the electric network. Northern Ireland has world-leading levels of wind energy; however, when wind generation exceeds electricity demand, the output from wind turbines is dispatched down – 'tuned off'. In 2020, 15% of available wind energy with a retail value of over £80m, was dispatched down. This has potential to benefit low income householders.

The RULET project commenced on site in winter 2021 and monitoring will continue over the next two heating seasons.

3.11.5.3 Future Plans

Through a **300 Unit Low Carbon Programme**, NIHE will deliver a thermal improvement programme focused on:

- improved energy efficiency measures,
- low carbon heating,
- electricity tariff changes,
- improved householder education to effect behaviour change,

The aim is to commence this programme in winter 2022/23, complete installations by winter 2023/24 and monitor until late 2024. The objective is to compile a comprehensive suite of data and key learning points to help inform a revised Decarbonised Heating Policy for the Landlord and the private grants sector. It is expected that this change will begin to make a positive contribution toward a net zero future from the mid-2020s.

NIHE's **New Build Pilot** is exploring the viability of Modern Methods of Construction as a means of helping to increase the supply of social housing in Northern Ireland. In this research pilot, NIHE is undertaking the construction of a small development of new social housing units in Belfast. This scheme will provide 6 semi-detached dwellings (2 bed, 3 person) and will incorporate the following elements:

- Modern Methods of Construction (MMC)
- Ultra-low energy building techniques
- Mechanical ventilation and heat recovery system with integral heat pump.

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[86] The HANDIHEAT Project, which is now in its final year, continues to contribute to improvements in energy efficiency by demonstrating the effectiveness of renewable energy solutions in isolated rural communities across northern Europe, acting as Lead Partner.

The aim is to explore if a building can produce net zero greenhouse gas emissions in use, known as 'zero carbon in use'. Embodied energy can also be reduced by using low-carbon building materials and construction methods. The standards explored in this pilot far exceed current building regulations. The hope is that building to high energy standards now will futureproof new builds and avoid the need for expensive retrofit to achieve Net Zero.

3.11.5.4 Fuel Poverty and Housing Supply in NI

The Department for Communities' Affordable Warmth Scheme targets low income households in the owner occupied and private rented sectors most at risk of fuel poverty and provides a range of heating and insulation measures to improve the energy efficiency of a property. Changes to the eligibility criteria for the Scheme were implemented from 1 July 2021 to increase the income threshold from £20,000 to £23,000 and remove disability benefits from the calculation of income.

The Affordable Warmth Scheme is finding and helping households which need more intensive help and is spending on average almost £5,100 per household on energy efficiency improvements. The Scheme aims to assist about 3,200 low income households each year.

DfC's Fuel Poverty Strategy, 'Warmer Healthier Homes' will be updated to align with the Executive's Energy Strategy which was published in December 2021, the emerging Green Growth, Environmental and Housing Supply strategies and the very recent Climate Change legislation. This will ensure that there is a just transition to net zero, in line with climate change obligations, that current inequalities are addressed, and further inequalities are not created. Currently increasing global high energy prices present difficulties for aligning fuel poverty, energy and climate change strategies with an associated potential impact on efforts to reduce carbon and switch from fossil fuels to renewable heat sources.

A draft Housing Supply Strategy has been produced following an extensive public consultation process. It is anticipated that the Strategy will be brought forward for consideration by the NI Executive in due course. Work has commenced in parallel on the action planning process that will support the Strategy.

In Northern Ireland a Private Tenancies Bill, which currently received Royal Assent in May 2002, contains an enabling power for the Department for Communities to bring forward regulations which will set a minimum EPC rating which a privately rented property must achieve in order to be let.

3.12 Transport

3.12.1 Progress to date

Domestic transport has the largest share of UK greenhouse gas emissions of any sector across the economy, at 24% in 2020.

In July 2021 we published our world leading *Transport Decarbonisation Plan*. This covered all areas of transport and set out an ambitious but deliverable pathway to reaching net zero and delivering against carbon budgets along the way.

Removing exhaust emissions from road transport is a clear priority and we must continue the progress we have made to date. We have committed to set ambitious but achievable phase out dates for every type of road vehicle and are making progress designing and delivering our new net zero emission vehicle mandate for new cars and vans. This will set targets for a percentage of manufacturer's new car and van sales to be zero emission each year from 2024. Alongside the *Transport Decarbonisation Plan*, we published the *2035 Delivery Plan* outlining the key timelines, milestones, and progress towards our commitment to accelerate

the shift to zero emission vehicles. In March 2022, we published our Electric Vehicles Infrastructure Strategy[87] to set out our vision for the rollout of charging infrastructure.

Over 750,000 plug-in electric vehicles have been sold in the UK since 2010. From 1 January to 30 April 2022, 14.4% of all new cars sold in the UK were battery electric. Additionally, more than 300 walking and cycling schemes have been delivered since 2020. For public transport, our *National Bus Strategy for England*, published in March 2021, sets out a vision of a transformed bus industry and a green bus revolution. Rail is already the greenest form of motorised transport, with almost 38% of the network electrified and significantly more to come as set out in the *Great British Railways White Paper* in May 2021.

3.12.2 Key commitments

- End the sale of new petrol and diesel cars and vans from 2030; from 2035, all new cars and vans must be zero emission at the exhaust.
- Introduce a zero emission vehicle mandate setting targets for a percentage of manufacturers' new car and van sales to be zero emission each year from 2024.
- Take forward our pledge to end the sale of all new, non-zero emission road vehicles by 2040, from motorcycles to buses and HGVs, subject to consultation.
- Ensure the UK's charging infrastructure network is reliable, accessible, and meets the demands of all motorists. We have published an Electric Vehicle Infrastructure Strategy, setting out our vision for infrastructure rollout, and roles for the public and private sectors in achieving it.
- Building on £1.9 billion previous funding, we have committed an additional £620 million to support the transition to electric vehicles. The funding will support the rollout of charging infrastructure, with a particular focus on local on-street residential charging, and targeted plug-in vehicle grants.
- Build a globally competitive zero emission vehicle supply chain and ensure our automotive sector is at the forefront of the transition to net zero.
- Lead by example with 25% of the government car fleet ultra low emission by December 2022 and all the government car and van fleet zero emission by 2027.
- Take action to increase average road vehicle occupancy by 2030 and reduce the barriers to data sharing across the transport sector.
- Maximise carbon savings from the use of low carbon fuels, including by increasing the main Renewable Transport Fuel Obligation (RTFO) target.
- Increase the share of journeys taken by public transport, cycling and walking.
- Support decarbonisation by investing more than £12 billion in local transport systems over the current Parliament.
- Invest £2 billion in cycling and walking, building first hundreds, then thousands of miles of segregated cycle lane and more low-traffic neighbourhoods with the aim that half of all journeys in towns and cities will be cycled or walked by 2030. As announced in the *Transport Decarbonisation Plan*, we will create at least one zero emission transport city.

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[87] https://www.gov.uk/government/publications/uk-electric-vehicle-infrastructure-strategy

- Invest £3 billion in the National Bus Strategy, creating integrated networks, more frequent services, and bus lanes to speed journeys, and support delivery of 4,000 new zero emission buses and the infrastructure needed to support them.
- Electrify more railway lines as part of plans to deliver a net zero rail network by 2050, with the ambition to remove all diesel-only trains by 2040.
- Plot a course to net zero for the UK domestic maritime sector, phase out the sale of new non-zero emission domestic shipping vessels and accelerate the development of zero emission technology and infrastructure in the UK. We recently launched the UK Shipping Office for Reducing Emissions (UK-SHORE) to transform the UK into a global leader in the design and manufacturing of clean maritime technology.
- Become a leader in zero-emission flight, kick-starting commercialisation of UK sustainable aviation fuels (SAF), and developing a UK SAF mandate, to enable the delivery of 10% SAF by 2030, and we will be supporting UK industry with a £180m funding to support the development of SAF plants.

3.12.3 Policies and proposals

We will continue to work closely with Devolved Administrations, local authorities and other regional bodies, as we work towards our shared goal of achieving net zero.

Depending on progress in the sector, at some points additional targeted action maybe be required, such as steps to reduce use of the most polluting cars and tackle urban congestion, to enable these targets to be met.

Cycling and walking

Cycling and walking can help us tackle some of the most challenging issues we face as a society, not just climate change, but improving air quality, health and wellbeing, addressing inequalities, and tackling congestion and noise pollution on our roads. Increased levels of active travel can improve everyday life for us all.

We will invest £2 billion over five years with the vision that half of all journeys in towns and cities will be cycled or walked by 2030. We will also deliver thousands of miles of safe, continuous, direct routes for cycling in towns and cities, physically separated from pedestrians and volume motor traffic along with more low traffic neighbourhoods and school streets.

We will deliver a world class cycling and walking network in England by 2040. This will include comprehensive cycling and walking networks in all large towns and cities, with measures to enable cycling and walking, such as cycle training for all children and adults that want it. We will enable behaviour change through targeted personal incentives, such as GP prescribing of active travel, existing tax reliefs, and rewards programmes.

Buses and coaches

We will deliver the *National Bus Strategy*'s vision of a transformed bus industry and a green bus revolution. We will make buses more frequent, more reliable, more comprehensive, easier to understand and use, better co-ordinated and cheaper – to dramatically increase passenger numbers and reduce congestion and carbon emissions.

We have begun to support delivery of 4,000 new zero emission buses, either battery electric or hydrogen, and the infrastructure needed to support them. This will be the single largest investment ever made in zero emission buses, representing the replacement of nearly 12%

of England's local operator bus fleet. This included £71m in 2021 to support 335 new zero emission buses in 5 areas and £198.3m in 2022 to provide 943 buses.

We will deliver the first All-Electric Bus City. This will demonstrate what can be achieved when there is a real commitment to move all buses in a place to electric zero emission. Coventry has now been announced as the UK's first all-electric bus city, with £50 million to fund up to 300 electric buses and charging infrastructure.

We are consulting on a phase out date for the sale of new non-zero emission buses and coaches. We have already begun consulting on an appropriate date to end the sale of new non-zero emission buses and on the appropriate supporting policy and regulatory framework. We will also consult on a phase out date for the sale or purchase of new non-zero emission coaches.

Railways

We will deliver a net zero rail network by 2050, with sustained carbon reductions in rail along the way. Our ambition is to remove all diesel-only trains (passenger and freight) from the network by 2040. We will deploy new low-carbon technologies on the network such as hydrogen and battery trains, where they make operational and economic sense. We will incentivise the early take up of low carbon traction by the rail freight industry.

We will build extra capacity on our rail network to meet growing passenger and freight demand and support significant shifts from road and air to rail. This includes new high-speed lines, reopening lines and significant improvement to regional city public transport networks with the aim of making them as good as London's.

We are working with industry to modernise fares ticketing and retail and encourage a shift to rail and cleaner and greener transport journeys. The *Great British Railways White Paper* set out a transformation in how people will pay for their journeys, to encourage a shift to rail and cleaner, greener journeys. Greater provision of walking and cycling routes to and from stations, and supporting infrastructure, will be introduced to support healthier greener journeys. The *Great British Railways White Paper* will also encourage more rail freight by providing the right conditions for industry growth, with better coordination, modern contracts, and new safeguards.

Cars, vans, motorcycles, and scooters

We will end the sale of new petrol and diesel cars and vans by 2030. From 2035 all new cars and vans must be fully zero emission at the exhaust. Between 2030 and 2035, new cars and vans will only be able to be sold if they offer significant zero emission capability.

To provide certainty to consumers, energy providers, the chargepoint industry, vehicle manufacturers and supply chains during this transition, we will introduce a zero emission vehicle mandate setting targets requiring a percentage of manufacturers' new car and van sales to be zero emission each year from 2024. In April 2022 we published a consultation on proposed policy design features for the mandate including the level of ZEV uptake.

We will continue to regulate the exhaust CO_2 emissions of new non-zero emission cars and vans to limit their emissions until 100% of new sales are zero emission. This framework could subsequently be applied to all forms of new road vehicles sold in the UK.

How and when targets will be set and enforced

We are building a globally competitive UK zero emission vehicle supply chain to ensure our automotive sector is at the forefront of the transition to net zero. Since 2020, the government has been actively supporting the transformation of the automotive supply chain

to electrification through the Automotive Transformation Fund (ATF). We are allocating a further £350 million of this up to £1 billion ATF commitment to support the electrification of UK vehicles and their supply chains. We will also continue to invest in R&D through the Advanced Propulsion Centre (APC) competition to ensure the UK remains at the forefront of the development and industrialisation of zero emission vehicle technologies.

We will soon consult on a phase out date of 2035, or earlier if a faster transition appears feasible, for the sale of new non-zero emission powered two and three wheelers (and other L category vehicles).

We aim for 25% of the government car fleet to be ultra low emission by December 2022 and all the government car and van fleet zero emission by 2027.

We will ensure the UK's charging infrastructure network meets the demands of its users. We previously announced £1.3 billion of investment to accelerate the rollout of charging infrastructure on motorways, on streets, in homes and workplaces. The Government has recently committed an additional £620 million of funding to support the transition to electric vehicles. In 2022, we published an EV infrastructure strategy, setting out our vision for infrastructure rollout, and roles for the public and private sectors in achieving it.

Maritime

We will plot a course to net zero for the UK domestic maritime sector, with indicative targets from 2030 and net zero as early as is feasible. We will establish, after public consultation in 2022, an ambitious 'Course to Zero'. Following consultation, we will establish ambitious indicative targets and embed this course in our Clean Maritime Plan.

We will consult on a potential phase-out date for the sale of new non-zero emission domestic vessels. Following the conclusion of the current Clean Maritime Demonstration Competition and the Course to Zero consultation, we will consult in mid-2022 on the potential for accelerated decarbonisation through carefully designed, well signposted measures to phase out the sale of new, non-zero emission domestic vessels.

We are assessing how economic instruments could be used to accelerate the decarbonisation of the domestic maritime sector. Building on Maritime 2050, the Clean Maritime Plan and our published research, we will further investigate the use of economic instruments to drive decarbonisation. In March 2022, the Government published a consultation on developing the UK's Emissions Trading Scheme (UK ETS). This included a proposal to expand the UK ETS to include domestic maritime emissions.

We have extended the Renewable Transport Fuel Obligation to the maritime sector. Following consultation earlier this year, we will make renewable fuels of non-biological origin used in shipping eligible for incentives under the RTFO.

We have launched a consultation on the appropriate steps to support and, if needed, mandate the uptake of shore power in the UK.

We have launched the £20 million Clean Maritime Demonstration Competition (CMDC) to fund feasibility studies and technology trials. We have also launched a UK Shipping Office for Reducing Emissions (UK-SHORE) alongside £206m of new funding to accelerate research into and development of clean maritime technologies. UK-SHORE aims to transform the UK into a global leader in the design and manufacturing of clean maritime technology.

Aviation

In 2021, we consulted on our Jet Zero Strategy, which will set out the steps we will take to reach net zero aviation emissions by 2050. We plan to publish our Jet Zero Strategy

later in 2022. We have also consulted on a target for UK domestic aviation to reach net zero by 2040.

We are supporting the development of new and zero carbon UK aircraft technology through the Aerospace Technology Institute (ATI) programme and are funding zero emission flight infrastructure R&D at UK airports. As part of the Jet Zero ambition, the Aerospace Technology Institute (ATI) provides R&D funding, matched by industry, to support the design and development of new aerospace technologies, with particular focus on zero carbon technologies, that are most likely to grow the UK's share in the global market. We are also investing £3 million in 2021/22 through the Zero Emission Flight Infrastructure competition to accelerate R&D into infrastructure requirements at airports and airfields to handle new forms of zero emission aircraft.

We will accelerate the commercialisation of UK sustainable aviation fuels (SAF). Our ambition is to enable delivery of 10% SAF by 2030 and we will be supporting UK industry with a £180 million funding to support the development of SAF plants. This builds on our recently launched £15 million Green Fuels, Green Skies competition. We will also establish a SAF clearing house, the first of its kind announced in Europe, to enable the UK to certify new fuels.

We are currently reviewing the responses to the SAF mandate consultation. Ahead of a second consultation in 2022, we will continue to engage with industry to ensure our policy can support the delivery of any future mandate ambitions.

Freight and logistics

In 2021 we announced that – following consultation – we will end the sale of new non-zero emissions HGVs less than or equal to 26 tonnes by 2035, and that from 2040, all new HGVs must be fully zero emission at the tailpipe.

In May 2022 we also announced that £200m will be invested to launch the world's largest fleet of zero emission HGVs. An extensive zero emission road freight demonstrator programme will help decarbonise the UK's freight industry with initial competitions for battery electric and hydrogen fuel cell technology[88].

We will also support and encourage modal shift of freight from road to more sustainable alternatives, such as rail, cargo bike and inland waterways. This will be supported by a package of policies including:

- Investing in the capacity and capability of the rail network for freight, including infill electrification schemes;
- The Mode Shift Revenue Support and Waterborne Freight Grant Schemes;
- Introducing a rail freight growth target; and
- 'Last mile' measures to support more sustainable freight in urban areas.

Delivering decarbonisation through places

We will support transport decarbonisation by investing more than £12 billion in local transport systems over the current Parliament. We will deliver this through existing funding streams where decarbonisation sits alongside other core government objectives.

We are driving decarbonisation and transport improvements at a local level by making quantifiable carbon reductions a fundamental part of local transport planning and funding.

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[88] https://www.gov.uk/government/news/200-million-boost-to-rollout-of-hundreds-more-zero-emission-hgvs

Local Transport Plans (LTPs) – statutory requirements that set out holistic place-based strategies for improving transport networks and proposed projects for investment – will need to set out how local areas will deliver ambitious carbon reductions in line with carbon budgets and net zero.

We will embed transport decarbonisation principles in spatial planning and across transport policy making. In 2020, the government set out proposals for a new and improved planning system, central to our most important national challenges, including combating climate change and supporting sustainable growth. The National Model Design Code, published in July this year, guides local planning authorities on measures they can include within their own design codes to create environmentally responsive and sustainable places. The National Model Design Code provides tools and guidance for local planning authorities to help ensure developments respond to the impacts of climate change, are energy efficient, embed circular economy principles and reduce carbon emissions.

Maximising the benefits of sustainable low carbon fuels

We have increased the RTFO main obligation from 9.6% in 2021 to 14.6% in 2032. This is estimated to achieve additional carbon savings of up to 20.8 $MtCO_2e$ over this period. The 'development fuels' sub-target, which incentivises specific fuels of strategic importance, is already set to increase from 0.5% in 2021 to 2.8% by 2032, and by 2023 we will review whether there is scope to be more ambitious. We also committed to additional measures to promote the uptake of low carbon fuels in the freight, maritime and aviation sectors and we will work with stakeholders to develop a longer-term low carbon fuel strategy for the deployment of low carbon fuels across different transport modes to 2050.

Hydrogen in a decarbonised transport system

We expanded the RTFO to incentivise the use of renewable hydrogen in maritime and rail in 2018. As set out clearly in our Hydrogen Strategy and Transport Decarbonisation Plan, hydrogen is likely to play a significant role in transport applications, particularly where energy density requirements or refuelling times make it the most suitable low carbon energy source. Our dedicated hydrogen R&D funding and support is focussed on heavier applications, such as rail, maritime, aviation and heavy road freight, where hydrogen offers in-use advantages and the largest global market potential. The government remains technology neutral and acknowledges that there will be other transport applications where hydrogen may be well suited, including the potential for hydrogen to be utilised within combustion engines, where it can be shown to produce zero harmful emissions at the tailpipe.

We invested £3 million in 2021 to establish the UK's first multi-modal hydrogen transport hub in Tees Valley. The funding kick-started activity across the region, supporting collaborative R&D pilot trials that demonstrate hydrogen technology solutions across transport modes, forging new industry and academic partnerships.

Future transport – more choice, better efficiency

We will take action to increase average road vehicle occupancy by 2030. Increasing car occupancy from 1.55 to 1.7 could save nearly 3 Mt of carbon a year by 2030. We are building our evidence base to understand the barriers and potential policies to increase the uptake of shared mobility and will work with industry and local authorities to understand where further action can be taken.

We will reduce the barriers to data sharing across the transport sector. Better data can provide new policy and operational insights, drive new products and services and 'nudge' people towards lower emission journeys. We recently published a new annual statistical

release, drawing together various data sources on transport's environmental impact. Data consumers can use these data, without restrictions on use or disclosure, for journey planning applications, products and services enabling users to plan green endtoend journeys.

3.12.4 Scottish Government

The Scottish Government is committed to decarbonising all forms of transport, recognising that this is currently the highest emitting sector of the economy.

Scotland has committed to reducing car kilometres by 20% by 2030 and a draft route map[89], published in January 2022, provides the initial framework of measures identified as required to deliver this ambitious commitment. The Scottish Government will also phase out the need for new petrol and diesel cars and vans by 2030.

Modal shift to active travel and public transport is also being encouraged, including through the Young Person's Free Bus Travel Scheme, providing free bus travel for people under the age of 22 across Scotland.

On public transport, the Scottish Government has committed to decarbonising rail services by 2035 and will work with the Bus Decarbonisation Taskforce, comprised of leaders from the bus, energy and finance sectors, to ensure that the majority of new buses purchased from 2024 are zero emission.

For aviation, the Scottish Government has committed to work to decarbonise scheduled passenger flights within Scotland by 2040, and is supporting the trialling and introduction of zero and low emission aircraft operating across Highlands and Islands airports.

3.12.5 Welsh Government

Transport has a significant role to play in helping Wales reach net zero and generating wider benefits across health, air quality, accessibility and the economy. Through the policies and actions set out in the Net Zero Wales Plan and in 'Llwybr Newydd', our Wales Transport Strategy, we will put people and climate change at the front and centre of our transport system.

Llwybr Newydd sets our vision for an "accessible, sustainable and efficient transport system" built on three priorities. Firstly, we will plan ahead for better physical and digital connectivity, more local services, more home and remote working and more active travel, to reduce the need for people to use their cars on a daily basis. Secondly, we need an integrated transport system that works for everyone, where people and goods can move easily from door-to-door by accessible, sustainable and efficient transport services and infrastructure. This means significant investment in sustainable modes, such as bus, rail and active travel, to create services that people want to use, can use and do use. Thirdly, we will encourage people to make the change to more sustainable transport by making it more attractive and more affordable and by adopting innovations that make it easier to use for everyone. For the journeys which cannot be made by active travel, we will also need to see a rapid shift towards zero emission technologies in vehicles. This will happen first in cars, vans, trains and buses, later in HGVs, and finally in aeroplanes and ships. In the near future, these will be cheaper to own and run than existing petrol and diesel vehicles.

Fewer cars on the roads and in our towns and cities will reduce congestion, reduce the need for road building and allow us to repurpose land used to accommodate cars for potentially transformative urban realm improvements. Zero emission vehicles will result in reduced

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[89] https://www.transport.gov.scot/consultation/consultation-on-the-20-reduction-in-car-km-route-map/

concentrations of nitrogen dioxide, which harm our health, and reducing incidences of cardiovascular disease, respiratory disease, some cancers and Type II diabetes.

Overall, as a result of the uptake of zero emission vehicles the Welsh economy is expected to benefit from annual net cost savings against the baseline of between £730 million and £1 billion by 2050.

The policies and proposals for this sector have been set out under three broad mitigation areas of demand reduction and modal shift; technological options available and the uptake of transport with low or zero emissions; and improvements to fuel efficiency. Below are the Welsh Government's key policies; more detail can be found in the Net Zero Wales Plan and in Annex 2, CTF Table 3.

- **Enable people to work at or near to home**
  Welsh Government has stated its long-term ambition to enable around 30% of Welsh workers to work remotely, at or near to home, on a regular basis beyond the Coronavirus (Covid-19) pandemic.
- **Increase trip mode share of Active Travel from a current estimated proportion of 27% to 33% by 2030 and at least 35% by 2040**
  Welsh Government are continuing to invest more than ever in active travel routes and facilities to help local authorities create a comprehensive network of routes. It has an ambition to invest significantly in active travel between now and 2040.
- **Increase trip mode share of public transport from a current estimated proportion of 5% to 7% by 2030 and 13% by 2040**
  Welsh Government are prepared to take significant action in both bus and rail as the core network of services, as well as embracing technology and emerging modes of shared transport to make public transport a more attractive, practical and affordable alternative to car travel.
- **Plan for and invest in EV charging infrastructure**
  The Welsh Government's EV charging strategy was published in March 2021. Its approach to EV charging will ensure that the charging infrastructure in Wales is on a par with the best in comparable areas of the UK[90].
- **Zero emission bus fleet**
  In addition to the actions to reform bus governance, we are committed to deliver on our targets to decarbonise the bus fleet.
- **All taxis and private hire vehicles to be zero emission by 2028**
  Welsh Government have committed to deliver a zero tailpipe emission taxi and private hire fleet by 2028.
- **Decarbonise the Rail network**
  In line with rail industry recommendations, a rolling programme of OLE electrification in Wales is recommended to form the backbone of the rail network.

3.12.6 Northern Ireland Executive

The Department for Infrastructure (DfI) is working with local councils to ensure that Local Development Plans (LDPs) and planning decisions take account of existing regional strategic planning and transport policies and guidelines to support active travel choices such as

[90] Welsh Government (2021), 'Electric vehicle charging strategy for Wales', https://gov.wales/ electric-vehicle-charging-strategy-wales

walking, wheeling, cycling and public transport in preference to the private car. This includes building a safe and accessible cycling infrastructure by implementing the Belfast Cycling Network 2021, a bicycle network for other urban areas and a Strategic Plan for Greenways which will be delivered by councils. LDPs are vitally important documents that establish a 15 year framework for the development of council areas. A proactive approach is encouraged in their drafting and adoption including: promotion of Green and Blue Infrastructure; reduction of greenhouse gas emissions, carbon offsetting; and reduction of flood risk.

Promoting the increased use of public transport is also progressing through projects such as the proposed extension of the Belfast Rapid transit network, development of the Belfast and Foyle Transport Hub and the creation of over 20 Park and Ride facilities across Northern Ireland which will deliver an additional 4,495 spaces. DfI has also invested over £100M in Hydrogen zero emission and electric buses with Derry to become one of the first cities in the UK and Ireland to have a fully zero – emission fleet.

Work is being taken forward to support the introduction of Ultra Low Emission Vehicles to Northern Ireland through delivery of the transport elements of the Northern Ireland Executive's Energy Strategy, including development of a Local Transport Strategy and the establishment of an Electric Vehicle (EV) Task Force to review the provision of public EV charging infrastructure in Northern Ireland.

3.13 Natural resources, waste and F-gases

3.13.1 Progress to date

This chapter covers natural resources including agriculture, forestry, and other land use (AFOLU), (inclusive of peatlands and soils), as well as resources, waste, wastewater, and fluorinated gases (F-gases).

In the *Ten Point Plan*, we committed to protecting our natural environment. Since then we have launched the floods investment programme to better protect 336,000 properties from flooding. We also awarded 90 projects grants under round 2 of the £80 million Green Recovery Challenge Fund (GRCF). In total, the GRCF is set to plant almost over 1 million trees.

3.13.1.1 Agriculture, forestry, and other land use (AFOLU)

The *Agriculture Transition Plan* (2020) sets out how we will move away from the EU's Common Agricultural Policy to use public money to reward farmers and land managers for delivering environmentally sustainable outcomes in England.[91]

Forestry and woodlands currently act as carbon sinks and, in 2019, captured about 4% of our emissions.[92] Since 2010, 123,000 hectares of new woodland has been planted across the UK, an area equivalent to Bedfordshire. The *England Tree Action Plan* (2021) committed to increasing tree planting rates from 13,290 hectares across the UK in 2020/21, to 30,000 hectares each year by the end of this Parliament. The plan is supported by £500 million of the Nature for Climate Fund. In 2020-21 we funded new partnerships with Northumberland County Council, Trees 4 Cornwall, and England's network of ten Community Forests. Four new community forests were launched, Plymouth and South Devon in June 2021 and North-East, in July 2021 and Cumbria Coastal in November 2021.

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[91] 5 Defra (2020), 'Agricultural Transition Plan 2021 to 2024', https://www.gov.uk/government/ publications/agricultural-transition-plan-2021-to-2024

[92] BEIS (2021), 'Final UK greenhouse gas emissions national statistics 1990 to 2019', https:// www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics1990-to-2019

Although peatlands are the UK's largest terrestrial carbon store, in a degraded condition they represent a net source of emissions. In 2019, peatlands emitted 4% of UK net GHG emissions, having become degraded due to drainage for agricultural use, overgrazing and burning. We have rewetted around 100,000 hectares of peatland across the UK and set out further plans for peatland restoration and responsible management in the *England Peat Action Plan* (May 2021).

3.13.1.2 Natural Resources, waste, and F-gases

Waste management emissions consist of waste disposed to landfill sites, waste incineration without energy recovery, and the treatment of wastewater. The *Resources and Waste Strategy* (RWS), (2018) set out how we will transition to a more circular economy and included key reforms to enable us to manage our waste more efficiently, reduce the amount of waste we create as a society, and ensure we use resources more efficiently.[93]

Key commitments

- 75% of farmers in England will be engaged in low carbon practices by 2030, rising to 85% by 2035. Government is introducing farming schemes, including the new environmental land management schemes (*Sustainable Farming Incentive (SFI)*[94] and *Local Nature Recovery*[95] and *Landscape Recovery*[96]), which will provide a powerful vehicle for achieving net zero, and goals of the *25 Year Environment Plan*.[97]
- Increase investment in industry-led research and development into solutions to help deliver net zero in agriculture and horticulture, including through the Farming Innovation Programme.
- Treble woodland creation rates by the end of this Parliament, reflecting England's contribution to meeting the UK's overall target of increasing planting rates to 30,000 hectares per year by the end of this Parliament and maintain new planting at least at this level from 2025 onwards. We consulted on a long-term statutory tree target in England within the public consultation on Environment Act targets; we have proposed that tree canopy and woodland cover increases from 14.5% of land cover now, to 17.5% by 2050.
- We have boosted the existing £640 million Nature for Climate Fund with a further £124 million of new money, ensuring total spend of more than £750 million by 2025 on peat restoration, woodland creation and management. This will enable more opportunities for farmers and landowners to support net zero through land use change.
- Restore at least 35,000 hectares of peatlands in England by 2025, through the Nature for Climate Fund. Restore approximately 280,000 hectares of peat

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93 Defra (2018), 'Resources and waster strategy for England', https://www.gov.uk/government/ statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019

94 https://www.gov.uk/government/publications/sustainable-farming-incentive-how-the-scheme-will-work-in-2022/sustainable-farming-incentive-how-the-scheme-will-work-in-2022

95 https://www.gov.uk/government/publications/local-nature-recovery-more-information-on-how-the-scheme-will-work/local-nature-recovery-more-information-on-how-the-scheme-will-work

96 https://www.gov.uk/government/publications/landscape-recovery-more-information-on-how-the-scheme-will-work/landscape-recovery-more-information-on-how-the-scheme-will-work

97 Defra (2018), '25 Year Environment Plan', https://www.gov.uk/government/publications/25- year-environment-plan

in England by 2050, including via funding from the new environmental land management schemes.

- Private investment into tree planting has been mobilised through the Woodland Carbon Code, with the support of government's Woodland Carbon Guarantee, and into peat restoration through implementing a package of reforms to the Peatland Code (including expanding it to cover more peatland habitats).
- We will work with key stakeholders to develop a policy roadmap to increase the use of timber in construction in England, and will create a cross-government and industry working group tasked with identifying key actions to safely increase timber use and reduce embodied carbon.
- To support our commitment to explore options for the near elimination of biodegradable municipal waste to landfill from 2028, we are bringing forward £295 million of capital funding which will allow local authorities in England to prepare to implement free separate food waste collections for all households from 2025.
- Complete a review of the F-gas Regulation and assess whether we can go further than the current requirements and international commitments.
- Through the Environment Act 2021 we have legislated for Local Nature Recovery Strategies – a new system of spatial strategies that will map proposals for improving or creating habitat for nature and wider environmental benefits, helping to deliver net zero objectives.
- Biodiversity co-benefits and other environmental objectives are maximised alongside decarbonisation.

3.13.2 Policies and proposals

3.13.2.1 Agriculture, forestry, and other land use (AFOLU)

We have begun the Agricultural Transition Period from the Common Agricultural Policy (CAP) to Environmental Land Management schemes. We are reducing and then stopping untargeted Direct Payments in England and moving to a system where public money rewards farmers and land managers for environmentally sustainable actions, including reducing emissions and expanding the carbon sequestration potential of our land. We will introduce three environmental land management schemes: the Sustainable Farming Incentive (SFI), Local Nature Recovery (LNR) and Landscape Recovery (LR). The SFI will be open to all farmers and will support action at farm level to make farming more sustainable, incentivising low carbon practices, for example, soil and nutrient management. LNR will fund actions that support local nature recovery and deliver local environmental priorities. The LR scheme will support more radical and large-scale approaches to producing environmental and climate goods by funding long-term land use change projects such as large-scale tree planting, and peatland restoration projects. Net zero is a key priority of, and embedded across, the delivery of our environmental land management schemes.

Take up of these schemes will be voluntary and will require a shift in the practices of landowners and farmers. We are designing our schemes in partnership with farmers and landowners, ensuring we maximise our reach and bring the voice of farmers into our

work, including through appropriate payment rates, in line with the Payment Principles.[98] Participants will still be able to benefit from private sector funding, for delivering additional benefits. We have a comprehensive programme of engagement in place. Advice and guidance will also be provided to support participants to adopt new practices. Tests and trials for the schemes began in 2020 and pilots are currently underway. We have seen a 40% increase in Countryside Stewardship application (which we see as a bridge to LNR), and we have received the targeted number applications for the SFI pilot. The schemes are due to be rolled out in full by 2024.[99] Government has committed to maintain current levels of spending on the sector in England, based on 2019 levels, until 2024/5, amounting to an average of £2.4 billion a year.

We are also supporting the acceleration of private investment in nature through initiatives such as the Natural Environment Investment Readiness Fund. These will test new models and build pipelines of investable nature projects by providing technical assistance and capacity building support to create opportunities for private investment. Projects will capture the value of the carbon and other benefits provided by natural assets such as woodlands, peatlands wetlands and river catchments. They will create multi-functional landscapes that deliver diverse benefits, providing a return on investment and improving our understanding of how to attract private investment.

We have boosted the existing £640 million Nature for Climate Fund with a further £124 million of new money, ensuring total spend of more than £750 million by 2025 on peat restoration, woodland creation and management. This will enable more opportunities for farmers and landowners to support net zero through land use change.

Agriculture

Government will support a range of measures to decarbonise the agriculture sector specifically, including by providing further funding to support farmers to take up low carbon practices and technologies. We will introduce a targeted set of financial incentives to improve animal health and welfare and reduce emissions from animals, including action to identify and eliminate bovine viral diarrhoea, with pilots starting in late 2022 or early 2023. The Farming Investment Fund scheme which launched in 2021 will provide further grants to farmers, enabling them to invest in equipment, technology and infrastructure that will improve their profitability and benefit the environment. From 2022, Government will also provide grants for new slurry stores, equipment, and other interventions. The primary goal will be delivering reductions in nitrate and ammonia pollutants from slurry, a key cause of pollution on farms, but the grants will also reduce methane emissions and protect and restore habitats.

We will increase investment in industry-led research and development into productivity challenges, delivering net zero and testing new technologies and methods. The Farming Innovation Programme opened in October 2021 with further competitions planned for 2022 and beyond. These will bring together interested farmers, scientists, and researchers to tackle productivity and environmental challenges. We will invest in supporting knowledge exchange so more farmers and growers have access to the latest findings from cutting-edge research that they can apply on their farms.

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[98] Defra (2021), 'Environmental land management schemes: payment principles', https://www. gov.uk/government/publications/environmental-land-management-schemes-paymentprinciples/environmental-land-management-schemes-payment-principles

[99] Defra (2021), 'Sustainable Farming Incentive: Defra's plans for piloting and launching the scheme', https://www.gov.uk/government/publications/sustainable-farming-incentive-schemepilot-launch-overview/sustainable-farming-incentive-defras-plans-for-piloting-and-launchingthe-scheme

We will encourage and support increased agroforestry (trees and agriculture coexisting on the same land) through our environmental land management schemes, enabling agricultural land to sequester emissions while delivering other environmental benefits, such as air quality and biodiversity, and providing alternative income streams for farmers from trees.

Government is working, and will continue to work, in partnership with the sector to develop a new outcome-focused approach to regulation and enforcement which supports net zero. For example, ruminant livestock are the leading cause of farm emissions, but feed additives with methane inhibiting properties have the potential to reduce emissions, especially from housed cattle. Whilst this is an emerging technology, government is actively investigating the promising role these products may have in delivering emissions savings in the mid-term, including by assessing whether regulation could ensure maximised take up of such products.

We will also consider how best to reduce and better target the use of manufactured fertiliser, including exploring the potential of regulation in this area. In addition, we are considering whether we need new legislative powers to improve soil management and nutrient management. We will consider the recommendations of the Nutrient Management Expert Group, due to report in spring 2022, on the optimal policy approaches to minimise emissions from fertiliser use.

The Government's upcoming Food Strategy will support the delivery of net zero, nature recovery, and biodiversity commitments and will help to create a food system that incentivises farmers to produce high quality, high welfare food in the most sustainable way. Government is exploring options to reduce carbon emissions from food production, support innovation in the food sector, incentivise land use change to sequester more carbon, and preserve natural resources.

Government is also committed to exploring the monitoring, reporting, and verification of emissions in the agriculture sector and is currently carrying out research on carbon audit tools which are a potential means of gathering data to support this. The consultation to develop the UK ETS, published in March 2022, contains a call for evidence to improve the measuring of agricultural emissions to support and inform future decarbonisation policy more widely. The government is not, however, proposing to expand the Uk ETS to include agriculture. We will continue to review potential carbon pricing strategies for land use sectors, including the potential role for voluntary or compliance carbon markets to support cost effective decarbonisation for the sector.

Peat

The *England Peat Action Plan* (EPAP) sets out the government's long-term vision for managing, protecting, and restoring peatlands so that they provide a wide range of benefits to wildlife, people and the planet.

Tackling the drivers of peatland degradation is essential. The EPAP commits to ending the horticultural use of peat in the amateur sector by the end of this parliament and we launched a consultation on potential legislative measures (e.g. a sales ban) last year, which we will respond to this year. Legislation to end managed burning on protected blanket bog that is 40 cm deep or more, unless covered by a license, has already been laid, protecting 40% of England's blanket bog, and government is committed to reviewing the economic and environmental case for extending protections.

At least 35,000 ha of peatlands in England will be restored, by 2025, via the Nature for Climate Fund. From 2024, public funding for peatland restoration will be available in England through the new environmental land management schemes. To further support peatland restoration, government is implementing a range of policies that will mobilise private

investment. The Natural Environment Investment Readiness Fund has been launched and a package of reforms to the Peatland Code, including expanding it to cover more peatland types, will be implemented in 2022. We will aim to restore approximately 280,000 ha of peatland in England by 2050.

Degraded lowland peat is responsible for 86% of England's peatland emissions. Full restoration may not always be desirable, due to the lowlands' agricultural value and interactions with landscape scale water level management regimes. Where it is not possible to restore peatlands, we will support new responsible management measures for lowland peatlands. The Lowland Agriculture Peat Taskforce will provide recommendations in summer 2022 on how to improve the condition of lowland farmed peatlands, both to reduce emissions and support continued profitable agriculture. From 2024, our Local Nature Recovery scheme will provide a key funding stream for wetter modes of farming, including paludiculture. To prevent delay, our Farming Innovation Programme launched last year has been open to supporting applications for R&D in paludiculture, with more competitions to follow in 2022 and beyond.

Forestry and woodlands

We will treble woodland creation rates by the end of this Parliament, reflecting England's contribution to meeting the UK's overall target of increasing planting rates to 30,000 hectares per year by the end of this Parliament, and maintain new planting at least at this level from 2025 onwards. We have consulted on a long-term statutory tree target in England within the public consultation on Environment Act targets; the consultation proposed that tree canopy and woodland cover increases from 14.5% of land cover now, to 17.5% by 2050. We intend to spend over £500 million of the Nature for Climate Fund on funding woodland creation and management in England until 2025, beyond which the new environmental land management schemes will provide the main source of public funding. Whilst this rate of planting will lead to a relatively small emission savings in the short-medium term, it will play an increasingly important role as time goes on, while also providing other environmental benefits.

Private finance for tree planting and management is being generated via the Woodland Carbon Code with the support of government's Woodland Carbon Guarantee. Government has also launched a new England Woodland Creation Offer to fund woodland creation in England and will establish new Woodland Creation Partnerships in key areas, bringing together government, NGOs, and the private sector to develop bespoke offers to encourage woodland creation. In 2020-21 we funded new partnerships with Northumberland County Council, Trees 4 Cornwall, and England's network of ten Community Forests. Four new community forests were launched, Plymouth and South Devon in June 2021, North-East, in July 2021 and Cumbria Coastal in November 2021.

The government will review guidance on the tax treatment of trees and woodlands, to provide greater clarity to landowners on how new and existing trees on their land affect tax liabilities. Further, government will regulate to improve protections for existing woodlands and increase the number of woodlands under active management, improving resilience to natural hazards.

Felled trees store carbon within them and timber has the lowest embodied carbon of any mainstream building materials. Guided by market analysis, fire safety and structural considerations, key opportunities for the safe growth of timber use will be in low-rise buildings using traditional and certain modern methods of construction, and in a wide range of commercial and non-residential settings. We will promote the safe use of timber in construction through several measures, including by:

- Providing financial support to develop innovative timber products through the Forestry Innovation Fund;

- Working with key construction stakeholders, including the Green Construction Board, Construction Leadership Council, Home Builders Federation, and Federation of Master Builders to develop a policy roadmap on use of timber;
- Driving an increase in the use of certain modern methods of construction, some forms of which can encourage use of sustainable materials such as timber;
- Working with Homes England and delivery partners to explore ways to increase timber use in the delivery of housing programmes;
- Increasing public demand for sustainably sourced timber through procurement policies; and
- Encouraging research into barriers to uptake of timber, including looking at timber strength grades and the fire resistance of engineered timber structures.

Biomass

The Government will publish a *Biomass Strategy* in 2022 which we will set out the results of a review of the amount of sustainable biomass available to the UK (including domestically grown perennial energy crops and short-rotation forestry), and how this resource could be best utilised across the economy to help achieve net zero. The strategy will set out the role which Bioenergy with Carbon Capture and Storage (BECCS) can play in reducing carbon emissions and how the technology could be deployed. It will also consider where and how we can improve our existing biomass sustainability standards (already some of the world's most stringent) and examine the relationship between biomass, including how it is used, and our wider environmental targets, including air quality.

3.13.2.2 Resources, waste and F-gases

Resources and waste

The Government's Resources and Waste Strategy (RWS) set out the overall ambition and direction of travel for the waste sector. It made a commitment to increase municipal recycling rates to 65% and to ensure that no more than 10% of municipal waste is landfilled by 2035. Biodegradable waste sent to landfill today, however, slowly breaks down anaerobically, emitting methane for many years afterwards. Faster action will mean greater emissions savings. We will therefore explore policies to work towards the near elimination of biodegradable municipal waste to landfill by 2028. To support this commitment, we are bringing forward £295 million of capital funding which will allow local authorities in England to prepare to implement free separate food waste collections for all households from 2025.

To work towards these goals, we are delivering the reforms announced in the RWS. Consistent collections of household and business waste will be introduced via the Environment Act. The powers will allow us to require local authorities to separately collect a core set of materials for recycling, including paper and card, glass, metal, plastic, food waste and household garden waste. This will divert significant volumes of biodegradable waste from landfill and provide a high volume of emissions savings. A deposit return scheme for drinks containers and extended producer responsibility for packaging, placing the net costs of disposing of packaging on producers, will also be introduced. These two measures will increase the volume of materials being recycled and decrease our consumption of virgin materials, thereby reducing the amount of waste sent to landfill and reducing emissions from other sectors.

Complementing these measures, the introduction of the plastic packaging tax from April 2022 will encourage greater use of recycled plastic in plastic packaging, instead of new

(virgin) plastic. The tax will be charged at £200 per tonne and be paid by manufacturers and importers of plastic packaging that contains less than 30% recycled plastic. It is estimated that this will lead to an increase in the use of recycled plastic by 40% in 2022-23, equal to carbon savings of nearly 200,000 tonnes of CO_2 emissions. The government will also review aspects of the Landfill Tax in England and Northern Ireland in due course, as announced in Spring 2021. This will ensure the tax continues to support the government's ambitious environmental objectives.

Government is committed to moving to a more circular economy. This means keeping built assets, products, and materials in use for longer, including through repair and reuse, and making greater use of secondary materials, thus reducing waste arising. Recycling and material substitution, especially of carbon intensive materials such as steel, aluminium, and cement, are also an important part of our approach. The draft *Waste Prevention Programme for England (WPP)* (recently consulted on) sets out the overall approach to improving resource efficiency across key sectors and announced government's intention to consult on introducing extended producer responsibility in other areas, including textiles. The *Industrial Decarbonisation Strategy*, meanwhile, outlines our high-level ambition for resource efficiency measures across industry. At least one legislative target in the area of resource efficiency and waste reduction will be set under the Environment Act. For further information on our plans for resource efficient manufacturing see the *Industry* chapter.

Government is also committed to eliminating food waste to landfill and delivering the UN Sustainable Development Goal 12.3 to halve food waste by 2030. The Environment Act will require all local authorities in England to separately collect household food waste, preventing it from being sent to landfill. This will create carbon savings and support the shift to a circular economy, as food waste is instead turned into biogas and digestate (a soil improver) through anaerobic digestion. In addition, government will continue to work with Waste and Resources Action Programme (WRAP) and industry, and to support the Courtauld 2030 voluntary agreement with food and drink businesses, the Food Waste Reduction Roadmap, and the Target Measure Act approach, as well as campaigns in the public and private sector to reduce food waste, including the annual Food Waste Action Week.

Wastewater emissions will decrease due to improved treatment processes and expected data improvements. Water company research and investment into reducing process emissions from wastewater treatment plants will result in reductions in municipal process emissions via alternative treatment processes such as anaerobic treatment, membrane activated biofilm reactors, alternative ammonia removal processes and nature based solutions. Improvements in the way companies, and government, report on industrial emissions, and the way they are calculated, are also likely to result in reductions to the values on record.

F-gases

Government will continue to impose the requirements of the F-gas Regulation, which covers England, Wales and Scotland. The regulation requires a range of measures to reduce emissions, including controls and steady reductions on gas placed on the market, product bans, leak checks and mandatory certification for handlers of F-gases. These actions will help us to meet the UN Montreal Protocol's Kigali Amendment target of reducing HFC consumption by 85% by 2036, as well as the F-gas Regulation's target of a 79% reduction by 2030.

A review of the F-gas Regulation has commenced and is due to complete no later than 2022. This will be used to assess whether we can go further than the current domestic requirements and international commitments, including by looking at what additional reductions in F-gas use can be made to help the UK meet net zero by 2050.

3.13.3 Scottish Government

In agriculture, the Scottish Government's National Test Programme[100], announced in October 2021, will support Scotland's farmers and crofters in becoming world leaders in sustainable and regenerative agriculture. Advice and support for farmers and crofters on how to mitigate their emissions is provided through the Farm Advisory Service[101], Farming for a Better Climate[102] and Farming and Water Scotland[103].

Appreciating that Scotland's landscape and natural environment is one of its' greatest national assets, and has a vital role to play in meeting its' ambitious climate change targets, the Scottish Government has committed to significant increases in woodland creation and peatland restoration. The Scottish Government is now aiming for 15,000 hectares of tree planting per year in 2022/23, 16,500 in 2023/24 and 18,000 a year in 2024/25. Scottish Forestry and Forestry and Land Scotland are working with investors, carbon buyers, landowners and market intermediaries to increase private investment in new woodlands in order to increase the woodland carbon market by at least 50% by 2025. The Scottish Government is also committed to restoring 20,000 hectares of peatland a year, and will work closely with delivery partners, landowners, managers, farmers and crofters to continue to encourage this.

In waste, the Scottish Government is currently developing a route map with stakeholders to achieving Scotland's ambitious targets to end landfilling of biodegradable municipal waste by 2025, reduce the percentage of all waste sent to landfill to 5% by 2025 and recycle 70% of all waste by 2025. It is seeking to meet these through a Recycling Improvement Fund and a Route Map, a consultation that will be published in May 2022. The Scottish Government will also consult on proposals for a new Scottish Circular Economy Bill, to underpin measures that require primary legislation.

3.13.4 Welsh Government

Agriculture is at the heart of the economic, environmental, cultural and social fabric of Wales. Welsh farmers hold a unique position in society, recognised for their role in producing a supply of safe, high quality food from primarily marginal land using predominantly non-intensive systems with grass and rainwater to rear animals. Agriculture and food production rely on natural processes, and so will always cause some degree of greenhouse gas emissions; in particular, livestock will always emit some greenhouse gases. Welsh Government's ambition and challenge is to continue to reduce greenhouse gases by improving efficiencies on farm to achieve a cumulative effect whilst maintaining the production of high quality and sustainable food and it will be important for all farmers to continue to adopt low carbon technologies as they become available. Delivering the reductions that are needed will mean our landscape will continue to evolve as our use of land changes. Welsh Government will also need to work collaboratively to deliver new woodland, creating the opportunity for communities, farmers and other landowners to be at the heart of creating a wood economy. Delivering this vision will require land use change equivalent to around 10% of agricultural land in Wales, and farmers have an important role to play.

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[100] https://www.gov.scot/publications/next-step-delivering-vision-scotland-leader-sustainable-regenerative-farming/pages/2/

[101] https://www.fas.scot/

[102] https://www.farmingforabetterclimate.org/

[103] https://www.farmingandwaterscotland.org/

3.13.4.1 Sustainable Farming Scheme (SFS)

Wales's second carbon budget period (2021–2025) covers a time of transition for the sector as it develops and implements future domestic agricultural policies outside the EU. The Agriculture (Wales) White Paper, published in December 2020, outlined proposals for what may be the biggest change in agriculture policy for decades, setting out its proposal to introduce primary legislation which will establish Sustainable Land Management (SLM) as the framework for future agriculture support. This approach reflects the use of land for food production, whilst ensuring natural resources are preserved and enhanced for future generations.

- **Sustainable Farming Scheme (SFS)**
  The proposed SFS will provide support to farmers – both financial and advisory – which will be targeted at outcomes not currently rewarded by the market. It is proposed the fundamental change to the current Basic Payment Scheme will be the level of payment being linked to the outcomes delivered by a farmer through undertaking a range of management actions on farm.

- **Low carbon farming**
  Welsh Government's planned support for transformation in the sector is reflected in the range of policies and proposals set out below which, together with a range of pilots and interventions supporting the transition to the Sustainable Farming Scheme, will encourage the uptake of low carbon farming practices quickly and at scale. Widespread adoption of all appropriate low carbon practices will combine to reduce overall farm carbon footprint.

- **Regulations to reduce agricultural pollution**
  Whilst the Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021 have been developed primarily to prevent the pollution of watercourses, the Regulations are also a key part of reducing atmospheric emissions from agriculture.

- **Glastir**
  Glastir is the current five year whole-farm sustainable land management scheme, offering payment for the delivery of specific environmental goods and services and contributes towards tackling emissions from agriculture.

- **Farm Business Grant (FBG)**
  A total of £40m was made available under the FBG through the EU Rural Development Programme to help farmers invest in new equipment and machinery.

- **Sustainable Production Grant (SPG)**
  The scheme offered a maximum 40% grant contribution (from £12,000 to £50,000) towards capital investments in equipment and machinery which have been pre-identified to specifically support famers to address and safeguard nutrient management and improve water, soil and air quality by reducing the impacts of agriculture pollution.

- **Wales Animal Health and Welfare Framework (WAHWF)**
  The WAHWF sets out our plan for continuing and lasting improvements in standards of animal health and welfare for kept animals, whilst also helping to protect public health and contributing to tackling the climate emergency. Our goal is for all livestock farms in Wales to use Animal Health Planning as an integral part of their business management.

- **Red Meat Development Programme**
  The Red Meat Development programme has three strands crucial to the red meat sector's future competitiveness, success and sustainability. From farm to fork, the projects contribute to an efficient red meat industry, leading to less wastage and therefore a reduction in greenhouse gases emitted from the supply chain.

- **Dairy Improvement Programme (DIP)**
  The DIP, funded by the Welsh Government through the Rural Development Programme is a £6.5m, five year programme (2014-2020) delivered by the Agricultural and Horticultural Development Board (AHDB). It delivers two distinct projects, Herd Advance and Strategic Dairy Farms which aim to increase the performance, health and resilience of the Welsh dairy sector.

- **Farming Connect**
  Contracted from October 2015 until August 2022, Farming Connect is a £28m programme, providing subsidised independent, tailored business support and technical advice. The Advisory Service, an element of the wider Farming Connect Programme, provides advice on how to achieve optimum results from livestock, which in turn helps to reduce emissions.

- **Measures to release land (sharing agricultural land in Wales)**
  Changes in consumer and farmer behaviour can release land from agriculture whilst maintaining an improved food production sector. Improving efficiencies on farm as well as some small changes over time to diet can also release land within Wales.

- **Land sharing**
  We have set out our proposal to establish SLM as the framework for future agriculture support by way of the Agriculture Bill. It is proposed that SLM will reflect the use of land for production, whilst ensuring our natural resources are preserved and enhanced for future generations.

- **Transitional schemes**
  On 31 March, Welsh Government announced a package of support for farmers, foresters, land managers and food businesses worth over £227 million over the next three financial years to support the resilience of the rural economy and our natural environment.

3.13.4.2 Land Use, Land Use change and Forestry (LULUCF) in Wales

The LULUCF sector is the only one in the second carbon budget period with the capability to remove emissions from the atmosphere. Locking up atmospheric carbon through plant photosynthesis is the only available and functioning mechanism we have to tackle emissions from other sectors. To meet legislative targets, Wales must protect ancient woodlands, manage its soils better and affect a step change increase in woodland creation.

Welsh Government want to plant 43,000 hectares of new woodland by 2030 in this decade of action and 180,000 hectares by 2050, aligning with the Balanced Pathway set out by the CCC. Planting more trees will capture and store carbon, but can at the same time provide a wide range of other benefits to Wales, including creating 'green' jobs, helping to address the nature emergency, increasing well-being, and mitigating flooding and air quality issues. Many of the trees planted will contribute to the new National Forest for Wales.

As well as increasing woodland creation, Welsh Government are committed to increasing other natural carbon stores. Restoring and maintaining peatlands in good ecological condition will capture and store carbon, and also sustain their rich biodiversity. Over the next 5 years

it will aim to restore 600-800 hectares of degraded peatland each year through its National Peatland Action Programme.

The policy action in this area focuses on two broad areas of **increasing tree cover and safeguarding and increasing carbon stores and reducing greenhouse gas emissions**. Below are the key policies areas for Wales, more detail can be found in the Net Zero Wales Plan and in Annex 2, CTF Table 3.

- **Create a National Forest for Wales**
  Over the next five years we plan to create 30 new woodlands and 100 Tiny Forests to form part of the National Forest. This year we will consult on the long-term strategy, organisational principles, delivery and funding models for the National Forest.
- **Woodland Creation Scheme**
  The scheme will provide payments to landowners to plant trees in Wales over the next two years. We opened a new window in September 2021 to allow more applications for this funding and ensure the full budget is spent.
- **Implementing a peatland restoration Programme**
  Wales' first national peatland action programme (NPAP) outlines a plan of action to be taken over the next five years with six priority themes. The programme will target those peatland bodies most in need of restoration with the aim of delivering 600-800 hectares of restoration per year.
- **New Sustainable Farming Scheme (Woodland Strand)**
  Welsh Government intends for the new sustainable farming scheme to provide payments to farmers who choose to deliver positive benefits from planting and managing woodland on their farms.
- **Develop a New Timber Industrial Strategy for Wales**
  The Timber Industrial Strategy will seek to identify priority interventions across the timber supply chain to develop a wood economy and encourage greater use of timber in construction.

3.13.4.3 Waste

The vision for waste in Wales is clear: by 2050 everything will be reused or recycled. Beyond Recycling – a strategy to make the circular economy in Wales a reality was published by the Welsh Government in March 2021 and sets goals for zero waste to landfill by 2025 and zero waste (100% recycling) by 2050. This means that after 2025, there will be no need for new landfills for waste generated in Wales. This vision delivers all sorts of benefits to health, to the well-being economy, to society as well as to our emissions. In the short term and in this carbon budget, key actions from the strategy will drive further emissions reduction as part of the wider range of cross-government actions, which set us firmly on the path to a circular economy.

Wales already has global recognition as a leader in recycling – in 2020-21 Welsh Local Authorities achieved a municipal recycling rate of 65%. This includes universal separate weekly food waste collection from households, which through anaerobic digestion generates valuable renewable energy. By increasing recycling further, Wales will not only reduce emissions in the sector but will contribute to wider systemic change. Increasing recycling for example means making more recycled material available to be used in new products, thereby reducing emissions elsewhere and reducing the need for virgin raw materials. It can also improve our communities and our economy by helping to shorten supply chains, improve

efficiency, create employment and increase competitiveness. Recycling, re-use and repair also provide opportunities for communities to come together to share resources and revitalise the places we live in. Fundamentally, reducing our waste and making things last longer can also save citizens and businesses money.

The following policies and proposals set out how Welsh Government will continue its action to reduce landfill and maximise recycling to prevent waste from arising in the first place as part of its wider circular economy strategy.

- **Reduce waste sent to landfill**
  For Carbon Budget 2, as part of our action to reduce landfill overall we will halve the amount of avoidable food waste and reduce the landfilling of biodegradable waste in Wales to zero by 2025.
- **Further increase recycling**
  Welsh Government's Beyond Recycling Strategy highlights how it will strive to achieve the highest rates of recycling in the world. For Carbon Budget 2, this means it will achieve at least a 70% recycling rate for all major waste streams (household, industrial, commercial and construction).
- **Be Mighty Campaign**
  In 2020, Welsh Government launched the Be Mighty Campaign which asked everyone to make small but important changes in how they recycle with the aim of becoming number one in the world rankings.
- **Further increase CH_4 capture and utilisation in Welsh landfill sites by 2030**
  All operational landfills in Wales have been required to capture and utilise landfill gas since 1999. In Wales, this is implemented through the Environmental Permitting (England and Wales) Regulations 2016.

A circular economy

How we manage resources has never been more important. The pandemic has shown us that the materials we use cannot be taken for granted. To effectively tackle the climate emergency and nature crisis we must address the unsustainable consumption of resources as a root cause.

Our ambition is to implement systemic change in consumption emissions and to make the circular economy a reality. This is set out Beyond Recycling20, which states we will increase resource efficiency across all sectors, moving away from high carbon, non-recyclable materials and continuing to reduce waste.

By 2050, we aim to use only our fair share of the planet's resources and have 100% recycling (zero waste). The global biodiversity and climate systems will be the key beneficiaries, but the environment of Wales itself will also benefit, for example, from reductions in direct plastic pollution.

3.13.5 Northern Ireland

3.13.5.1 Northern Ireland Future Agricultural Policy

Farming for carbon

The agriculture sector accounted for 26% of the total CO_2e emissions in Northern Ireland in 2019. This is significantly higher than the proportion of the CO_2e emissions attributable to agriculture for the other parts of the UK. In England, Wales and Scotland the proportions stood at 8.4%, 13.8% and 16.3% respectively. This reflects the different composition

of the Northern Ireland economy and emitting sectors and the fact that agriculture in Northern Ireland is much more skewed towards livestock production and ruminant livestock in particular (which is the principal source of methane in Northern Ireland – a potent greenhouse gas (GHG)).

The Climate Change Committee (CCC), in its advice on reducing GHG emissions in Northern Ireland in February 2019, December 2020 and April 2021, recommended the following policy measures:

- Low carbon farming practices: crops and soil management; livestock breeding, health and diet improvement; manure management; and fuel efficiency;
- Higher levels of afforestation;
- Agroforestry – integrating trees within grassland or arable land; and
- Peatland restoration from a carbon source to sink through re-wetting and control of nitrogen deposition.

3.13.5.2 Future Agricultural Policy Measures

Department for Agriculture, Environment and Rural Affairs (DAERA) consulted on a range of Future Agricultural Policy Proposals for Northern Ireland in early 2022. The policy measures proposed to reduce carbon/GHG emissions following the consultation are outlined below. As science and knowledge expands, new possibilities will open up which will guide future new policy initiatives.

3.13.5.3 Low Carbon Farming Measures

Reducing numbers of older livestock – Earlier finished cattle use a higher percentage of their lifetime diet for growth rather than maintenance. This increases overall efficiency of production. In addition, cattle that are kept beyond their target slaughter weight or take longer to reach slaughter weight can lead to unnecessary GHG emissions. Achieving earlier age at slaughter and first calving will in practice involve increased emphasis on selective breeding for animal health and performance traits and improved health management planning and practice on farms.

Feed additives – there is ongoing worldwide research into feed additives to reduce enteric methane from ruminant livestock. A number of feed additive products are either commercially available or undergoing regulatory approval. Consideration is being given to the development of a challenge fund model to test these additives in Northern Ireland conditions and, if the market for these products matures sufficiently, taking the steps necessary to ensure methane reducing feed additives are routinely incorporated in ruminant concentrate diets.

Breeding – enteric methane emissions are subject to genetic variations. Ongoing research with dairy cattle by Wageningen University in the Netherlands and with beef cattle by Teagasc in the Republic of Ireland suggests that there is sufficient genetic variation in enteric methane emissions by cattle for methane emissions to be reduced by up to 25% through genetic selection by 2050. This is an area where industry can take a lead in directing genetic selection programmes to drive a reduction in the carbon footprint of ruminant livestock.

Urease inhibitor fertilisers – Research carried out locally by the Agri-Food and Biosciences Institute (AFBI) and Teagasc has shown that urea fertiliser treated with a urease inhibitor significantly reduces N_{20} emissions by over 70% compared to the most commonly used fertiliser in Northern Ireland, calcium ammonium nitrate (CAN). Urease inhibitor treated fertilisers are already commercially available in Northern Ireland.

Timing of fertiliser and slurry applications – Research carried out locally by AFBI has shown that an interval of 5 days between slurry and fertiliser applications significantly reduces N_2O emissions by over 80% compared to application of both fertiliser and slurry on the same day. Consideration is being given to how such practices could be encouraged.

Legumes and herbs (including peas and beans) – the natural fixation of nitrogen from the atmosphere through the action of symbiotic bacteria species associated with clovers and a range of herbs included in grass swards can lead to considerable reductions in the quantities of inorganic nitrogen fertiliser used on farms. In addition, ongoing research is indicating the possibility of increased carbon sequestration in soils managed to optimise the growth of mixed species swards. The soil nutrient status data made available to farmers through the Soil Testing and LiDAR measure over the next five years will assist farmers to manage soils to retain optimum clover levels in swards.

Bio-methane and hydrogen – there is growing interest in the potential to use anaerobic digestion to generate bio-methane for injection into the Northern Ireland gas grid and/or to produce hydrogen as a power source for the heavy goods transport sector using a combination of manures from livestock farms, waste streams from food processing and energy crops grown on land diverted from conventional agricultural uses. These developments have the potential to contribute to the decarbonisation of the agriculture, domestic heating and road transport sectors.

Combining this with technologies to capture and recycle nutrients from the digestate that would otherwise be land spread could also help address nutrient loading and water quality problems. Work is ongoing with industry stakeholders to explore the potential development of these circular economy initiatives.

A DAERA working group and work by Anderson (2021) at the Queen's University of Belfast have reviewed the quantities of surplus livestock manures in Northern Ireland. There are approximately 9.2 million m^3 slurry produced annually (from housed cattle, pigs and poultry). If anaerobically digested (AD), this manure would produce approximately 250 million m^3 of bio-methane or 2.5 TWh. This equates to approximately 14% of the natural gas consumed in Northern Ireland (Firmus, SGN, Phoenix and power stations) or an estimated 10% of NI's 23TWh yearly heat use.

In addition to generating renewable bio-methane and hydrogen, diverting this slurry from land spreading to centralised AD plants equipped with advanced technologies to further process the digestate fibre into peat replacing compost for the horticulture and bio-fertilisers for export, these proposals would make significant contributions to improving water quality in Northern Ireland, as well as helping to decarbonise the domestic heating sector and the heavy goods transport sector.

3.13.5.4 Delivery of Low Carbon Farming Measures

A number of the Low Carbon Farming measures will be delivered through other measures within the Future Agricultural Policy programme, as outlined below:

- Farm Sustainability Payment – conditions attached to the Farm Sustainability Payment include the requirement to participate in the Soil Testing and LiDAR measure which will assess soil carbon and above ground carbon in farm hedges and trees;
- Knowledge and Innovation Programmes – where possible, future agricultural policy interventions will include a strong education, training and knowledge exchange

component that should focus on improving productivity, environmental performance and sustainability, including a reduction in the carbon footprint;

- Generational Renewal – bringing younger farmers into a controlling position on farm businesses should help drive the adoption of new and innovative agricultural technologies that will improve productivity, reduce carbon intensity and create the conditions that will allow land to be released to other uses while sustaining agricultural production;
- The Ruminant Genetics Programme will produce information and genetic evaluations to drive improvement in livestock productivity, health and welfare and thus reduce GHG emissions. It will also open up the possibility of breeding directly for reduced enteric methane emissions;
- The Farming with Nature Package will focus initially on habitat and biodiversity and will help create the conditions for greater carbon sequestration through the expansion of tree cover, hedgerow management, unfarmed margins and buffer strips, etc.

Peatland rewetting – Around 18% of the Northern Ireland land area is peatlands, accounting for over 240,000 ha. Active peatland in a natural state can continuously accumulate carbon under waterlogged conditions. However, of more significance to the carbon agenda is the fact that degraded or damaged peatland will release significant amounts of carbon into the atmosphere. The majority of peatlands in Northern Ireland are in unfavourable condition, either degraded or modified, most of which are not designated for protection.

It is in this context that DAERA has drafted and consulted on a Peatland Strategy for Northern Ireland, reflecting the commitments in the UK Peatland Strategy and New Decade, New Approach document; the latter recognising the need for a coordinated and strategic approach to the challenge of Climate Change across government.

Currently, officials are redrafting the strategy document in light of the consultation responses and seeking agreement on the final content of the document. The Draft Strategy proposes 5 Strategic Objectives with 33 accompanying actions.

Once published, the Strategy will set the direction of travel over the next two decades and beyond and will provide a framework for both conserving intact peatlands and a peatland restoration programme. It is envisaged that an agreed Northern Ireland Peatland Strategy together with an Implementation Plan will be published in 2022.

To support the objectives of the strategy, a scheme to encourage and facilitate the rewetting and sustainable management of peatlands is likely to be co-developed with stakeholders supported by appropriate funding.

The objectives of the proposed Northern Ireland Peatland Strategy 2021-2040 include:

- By 2030, degraded peatland habitats prioritised for restoration to favourable conservation status;
- By 2040, all high priority degraded peatlands are under restoration management; and also;
- By 2040, that high priority degraded peatlands in Northern Ireland are under sustainable management.

- By 2040, all peatlands supporting semi-natural vegetation being managed for their peatland biodiversity and ecosystem function;

Forestry – It is also proposed that the Farming for Carbon Measures be supported by existing complementary DAERA policy measures, notably in relation to woodland creation. The Forests for Our Future Programme, launched in 2020, has the objective of planting 9,000 ha of new woodland by 2030. The Small Woodland Grant Scheme provides grant aid for woodland planting area between 0.2 and 5.0 ha; with an establishment grant and annual premia. The Woodland Carbon Code (WCC) is the quality assurance standard for woodland creation projects in the UK, generating independently verified carbon storage data.

Soil carbon – work to establish and refresh baseline data on carbon stored in agricultural soils and above ground biomass will be progressed through the Soil Testing and LiDAR measure. As the baseline levels of soil carbon and research supporting further soil carbon sequestration are validated to enable carbon accumulations to be credited in the GHG Inventory, DAERA will engage with stakeholders on the design of possible schemes to incentivise the farming of carbon as a business enterprise.

The Soil Nutrient Health Scheme is a new initiative aimed at verifiably baselining soil nutrient levels and estimating farm carbon stocks, right across Northern Ireland (NI). The scheme will run from 2022 to 2025. Farmers will have all their fields soil sampled and analysed by contractors.

Results will be provided along with training, enabling farmers to match nutrient applications to crop need, thereby increasing efficiency, reducing excess nutrient run-off to watercourses and improving farm economic and environmental sustainability.

3.13.5.5 Water

In March 2016, the Northern Ireland Department for Regional Development launched Sustainable Water – A Long Term Water Strategy for Northern Ireland (2015-2040). This cross-Departmental strategy contains a long-term vision to manage flood risk and drainage in a sustainable manner, which will help to address the future risks from climate change.

In March 2022, the Department for Infrastructure launched a consultation on Water, Flooding and Sustainable Drainage. Responses to the consultation will help to inform future policy on the introduction of more sustainable, environmentally friendly and green solutions to managing our water.

3.13.5.6 Waste

During the 2021/22-year Northern Ireland's recycling performance remained at over 50% thereby meeting the Waste Strategy target for recycling. This was in spite of the recycling pressures experienced by Councils due to the Coronavirus (Covid-19) pandemic. A programme of work commenced to normalise recycling behaviours once again, and ensure good progress is made towards meeting future EU Circular Economy package targets on recycling.

During this period DAERA operated a continuous cycle of behaviour change campaigns aimed at preventing waste and moving our resources further up the waste hierarchy. In addition, we funded the setup of the Northern Ireland Resources Network which aims to grow the reuse and repair sector in NI by providing targeted support.

The recently agreed Climate Change (Northern Ireland) Act requires that at least 70% of waste is recycled by 2030.

3.14 Greenhouse Gas Removals

3.14.1 Progress to date

The primary method of achieving net zero is to take ambitious decarbonisation measures across society. However, we must also acknowledge that sectors such as industry, agriculture and aviation will be difficult to decarbonise completely by 2050. Greenhouse gas removals (GGR) are therefore essential to compensate for the residual emissions arising from the most difficult activities to reduce or eliminate from within polluting sectors. This approach is supported by the Climate Change Committee[104], the Energy Systems Catapult[105], the National Infrastructure Commission and the National Grid ESO (the GB electricity system operator)[106].

GGR is the name given to a group of methods that actively remove greenhouse gases, predominantly CO_2, from the atmosphere, also commonly referred to as Carbon Dioxide Removal (CDR) methods and Negative Emission Technologies (NETs). The range of GGR approaches fall broadly into two categories:

Nature-based approaches: such as afforestation, and soil carbon sequestration.

Engineering-based approaches: such as Direct Air Carbon Capture and Storage (DACCS), Bioenergy with Carbon Capture and Storage (BECCS), wood in construction, biochar, and enhanced weathering (EW).

The 2017 *Clean Growth Strategy* was the first time the UK government formally addressed the need to deploy GGR methods. Since then, we have:

- Committed up to £100 million funding to research and develop nascent GGR;
- Published a call for evidence on GGR in December 2020; and
- Commissioned 4 studies to further our evidence base on the potential for GGR deployment in the UK and understanding of possible policy incentives.
- Set out our ambition for deployment of engineered GGRs in the Net Zero Strategy, including an ambition for 5MtCO_2 per year by 2030.
- Working in partnership with the devolved administrations, launched a call for evidence in the coming months exploring the role of the UK ETS as a potential long-term market for GGRs, as part of our consultation on the UK ETS.

3.14.2 Key commitments

- Set the ambition of deploying at least 5 MtCO_2/year of engineered removals by 2030, in line with CCC[107] and National Infrastructure Commission assessments[108].

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[104] CCC (2020), 'The Sixth Carbon Budget: Greenhouse gas removals', https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-GHG-removals.pdf

[105] Energy Systems Catapult (2020), 'Innovating to Net Zero: UK Net Zero Report', https://es.catapult.org.uk/reports/innovating-to-net-zero/

[106] National Grid (2020), 'Future Energy Scenarios', https://www.nationalgrideso.com/document/173821/download

[107] CCC (2021), 2021 Progress Report to Parliament', https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-reducing-emissions-2021-Report-to-Parliament.pdf

[108] National Infrastructure Commission (2021), 'Engineered greenhouse gas removals', https://nic.org.uk/app/uploads/NIC-July-2021-Engineered-Greenhouse-Gas-Removals-UPDATED.pdf

- Deliver £100 million innovation funding for Direct Air Carbon Capture and Storage (DACCS) and other GGRs. The £100m is made up of £70m allocated and delivered from the BEIS Energy Innovation Programme and a further £31.5m spent through the UKRI Strategic Priorities Fund.
- Develop markets and incentives for investment in greenhouse gas removal methods, by consulting on our preferred business models to incentivise early investment in GGRs, in 2022.
- Explore options for regulatory oversight to provide robust monitoring, reporting and verification (MRV) of GGRs, following the recommendations of the BEIS-led MRV Task and Finish Group involving experts from industry and academia.
- Seek an amendment to the Climate Change Act to enable engineered removals to contribute to UK carbon budgets.

3.14.3 Policies and proposals

Government has a clear role to play in responsibly deploying GGRs and is committed to deploy at least 5 $MtCO_2$/year of engineered removals by 2030. To achieve this, we are taking ambitious steps to enable commercial demonstration and deployment of engineered GGRs such as Direct Air Capture. We are addressing their financial and regulatory barriers, whilst also working to build the evidence base and address continued uncertainty around how GGRs can most effectively and sustainably be deployed and verified. Our role will change over time, as GGRs become more established, and the sector matures.

Addressing financial barriers and attracting investment

One of the fundamental barriers to GGR deployment is the lack of an established market or customer demand for engineered removals. GGR technologies are associated with high capital and operational costs, making private investment unattractive in the absence of a stable revenue stream for the provision of negative emissions.

The government's vision is to establish a liquid market for carbon removals, in which polluters have a strong policy or financial incentive to invest in GGRs to compensate for their remaining emissions. The UK Emissions Trading Scheme (ETS) is a possible marketbased solution for stimulating investment by GGRs – moving us towards a single, integrated compliance market for carbon, with negative emissions supporting liquidity as the ETS allowance cap falls over time.

GGR credits could function within an ETS market through, for instance, allowing polluting sectors to meet their obligations through the procurement of negative emissions alongside conventional abatement options. In March 2022, the UK ETS Authority published a call for evidence on the potential role of the UK ETS as a long-term market for GGRs. This explores a range of issues including the development of market eligibility criteria, market design options, impacts and timings for the inclusion of GGRs in the market. This will help inform future policy in this area, which will be developed in collaboration between the UK Government and the Devolved Administrations.

To advance our ambition to stimulate the GGRs sector, we will consult on business models for engineered GGRs in Spring 2022. This will set out details of our preferred mechanisms to incentivise early investment and enable commercial demonstration of a range of GGR technologies from the mid-to-late 2020s. The consultation will consider how GGR incentives interact with policies and business models currently under development for CCUS, hydrogen production, sustainable aviation fuels and other relevant sectors, along with wider carbon pricing policy. It will also consider how near-term policy incentives can most effectively

leverage private investment and enable a transition towards a market-led framework as the sector matures.

Our proposals will be informed by a study currently being conducted for BEIS by Element Energy, as well as a recent study on commercial frameworks for first-of-a-kind Power BECCS projects which is published alongside this document.

Whilst seeking to capitalise on the economic benefits of GGR development in the UK, we are also mindful of potential disruption to existing markets and the effects on consumers and businesses. The cost of support for GGRs is likely to be shared between the public and private sector. We will seek to develop an appropriate balance of risk allocation over the short, medium, and long term. Potential policy frameworks to enable developing GGR solutions will require careful consideration to guard against unintended effects. We will ensure that support for GGRs does not distort the development and commercialisation of decarbonisation technologies in other sectors.

Innovation

The majority of GGR techniques are at a pre-commercial stage and require innovation and demonstration support to be ready for commercial deployment. To address this GGR technologies were included as one of ten innovation priority areas announced in the *Ten Point Plan* for a green industrial revolution[109]. Together with UKRI, we are investing £100 million in the research, development, and demonstration of greenhouse gas removals across multiple programmes. This includes the DAC and other GGR innovation competition which will support the construction of pilot plants for a range of promising technologies to help them achieve commercial realisation[110]. The programme's pilot projects could remove between 100 and 1,000 tonnes of CO_2e per year in 2025 and have the potential to scale up to millions of tonnes by the 2030s.

Through the government's Strategic Priorities Fund, UK Research and Innovation (UKRI) will invest £31.5 million in five land based GGR demonstrator projects and a central hub. The hub will lead on coordination across the programme, as well as conducting cross-cutting research on the environmental, economic, social, ethical and governance implications of GGR approaches.

The Biomass Feedstocks Innovation Programme aims to increase the production of sustainable domestic biomass by funding innovative ideas that barriers production. The sustainable, increased supply of biomass for bioenergy conversion is a critical factor for the success of BECCS.

Monitoring, reporting and verification of GGRs

Once atmospheric carbon has been captured, the length of time it remains captured becomes crucial in verifying the effectiveness of a GGR process. This applies to both nature based and engineered solutions and is often referred to as the 'permanence' or 'durability' of GGRs. Establishing robust Monitoring, Reporting and Verification (MRV) protocols is highly complex, particularly for some nature-based solutions.

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[109] BEIS (2020), 'The Ten Point Plan for a Green Industrial Revolution', https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution

[110] BEIS (2021), 'Projects selected for Phase 1 of the Direct air capture and greenhouse gas removal programme', https://www.gov.uk/government/publications/direct-air-capture-and-other-greenhouse-gas-removal-technologies-competition/projects-selected-for-phase-1-of-the-direct-air-capture-and-greenhouse-gas-removal-programme

In 2021, we established a GGR MRV Task and Finish Group, comprised of experts across government, industry, academia, and regulatory services. The role of the group was to provide advice and guidance on the development of a MRV policy approach for GGRs. A recommendation made by the group is the need for an independent audit function to be responsible for a monitoring, reporting and verification regime. This would ensure that the amount and permanence of removals are quantified, robustly and transparently, which will be essential to developing and supporting a market for GGRs.

Accounting for emissions associated with international supply chains presents a challenge for GGR carbon accounting, and we will engage with our international counterparts to ensure best practice is achieved. Accounting for possible re-emissions, e.g., of CO_2 captured internationally but stored in the UK may be a particular challenge. We commit to collaborating with international partners to ensure alignment on any future MRV framework.

Legal and regulatory

Currently the Climate Change Act 2008 only recognises removals from Land Use, Land Use Change and Forestry (LULUCF) as counting towards our carbon budgets, a definition which does not allow engineered removals and some nature-based solutions to contribute. We propose to bring forward legislative amendments to address this.

3.14.4 Scottish Government

The updated Climate Change Plan (see section on policy making process) includes a number of policies aimed at assessing the feasibility of various Negative Emissions Technologies (NETs) for deployment in Scotland. The Scottish Government continues to develop the evidence base on these matters.

3.15 Innovation for net zero

3.15.1 Key commitments

- Increase government investment in R&D to £22 billion; increase total R&D investment to 2.4% of GDP by 2027.
- Publish the **UK's first Net Zero Research and Innovation Framework** to set out the key research and innovation challenges for the next 5-10 years; and a future update to demonstrate how the government is delivering against these.
- **Deliver a Government programme of innovation to enable decarbonisation –** funding of at least £1.5bn during next spending review period expanding a portfolio of cross government net zero innovation to fund BEIS-led programmes on power, buildings and industry; DfT-led programmes across transport; and DEFRA led programmes on natural resources, waste and F-gases, to target priorities aligned with the Net Zero Research and Innovation Framework. This spending includes new programmes set out in this Strategy such as £60m Heat Pump Ready programme.
- Take a leadership role in Mission Innovation 2.0, a global initiative working to accelerate clean energy innovation.[111]

[111] Mission Innovation is a global initiative of 24 countries, including the UK and the European Commission, working to accelerate clean energy innovation. It was established in 2015.

3.15.2 The challenge

Innovation is central to our approach to delivering net zero. It will require a step change in the rate of new technologies and processes being developed and deployed into the market and being adopted by businesses and consumers. Continued investment in cutting-edge research, development, and demonstration, will be integral to achieving this transformation and to the UK leading the world in areas of existing and potential competitive advantage. This investment will also support businesses to grow and solutions to be delivered at scale. Research, development, and innovation are needed to allow government, industry and business to make decisions about what new technologies and systems are promising. To respond, government must enable the efficient scaling of technologies, systems, and business models to pull them through to commercialisation for 2050 – and beyond.

3.15.3 Our goal

Our goal is for the UK to be a global leader in the technologies, processes, services, and business models needed to decarbonise our economies, protect our environment, and adapt to a changing climate. We will support our world class innovators, entrepreneurs, and financial institutions to develop and deploy the key technologies of the future. This will need to take place alongside other cross-cutting policies, regulatory changes, and commitments.

By supporting innovation, we could unlock the potential for 300,000 jobs in exports and domestic industry through new commercial opportunities across low carbon sectors.

In the Prime Minister's Ten Point Plan for a Green Industrial Revolution[112], we restated our commitment to raise total private and public R&D investment to 2.4% of GDP by 2027 – enabling the next phase of green innovation to help bring down the cost of the net zero transition, nurture the development of better products and business models, and understand consumer choices. We have started delivering on this with funding announced for programmes across the portfolio including renewables, energy storage and flexibility, and hydrogen[113]. This is contributing to levelling up across all regions of the UK whilst helping us to achieve our net zero target.

3.15.4 The role of innovation

Innovation can significantly reduce costs of the technologies, processes, and systems needed to reach net zero. This goes beyond just developing technologies. It also means exploring new business models, approaches to financing, the regulatory environment and how consumers respond. Taking a whole systems approach to innovation will be integral to maintaining and developing the UK's global leadership in areas where we have, or can develop, an international comparative advantage or unique capability. We must harness the UK's international reputation to attract inward investment and anchor existing and emerging supply chains in the UK. International collaboration will also be critical to ensure that clean technologies become cheaper and more readily available.

Innovation is a process which occurs within an ecosystem of interacting actors, technologies, and institutions. This requires technologies, systems or processes to progress through multiple phases of development – from basic research, through to commercialisation and diffusion. However, innovation does not flow neatly in one direction from one phase to the next; it is unpredictable and serendipitous, involving constant cycles of learning, testing,

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[112] BEIS (2020), 'The Ten Point Plan for a Green Industrial Revolution', https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution

[113] This includes legacy funding from government's previous £505 million Energy Innovation Programme.

refining, and discovery. At each phase of the innovation process there are different market failures and barriers, requiring distinct interventions. In the early stages, there are often minimal incentives for private actors to invest in innovation and direct funding policies can help 'push' technologies towards demonstration and early commercialisation. In the later stages, the importance of attracting private finance grows. Market incentive policies support the development of markets and leverage private finance to 'pull' technologies towards deployment and diffusion.

The Prime Minister's Ten Point Plan for a Green Industrial Revolution, our Plan for Growth, the Innovation Strategy and the Net Zero Strategy bring together ambitious policies and significant public investment to achieve net zero, whilst seeking to mobilise substantial private investment. These commitments will position the UK to take advantage of export opportunities in global markets presented by these low carbon technologies and services.

3.15.5 Supporting innovation for net zero

Achieving net zero will require profound changes to the UK economy. It will mean increasing our low carbon electricity supply, making the transition to low carbon buildings, decarbonising transport, building a hydrogen economy, decarbonising industry, rolling-out carbon capture and storage, transforming the way land and marine spaces are used, improving agricultural management, adopting better waste management, and deploying technologies to remove greenhouse gases from the atmosphere. This should include innovation to mitigate any environmental impacts from new technologies on our pathway to net zero.

In each of these sectors, known technologies, business models, services and approaches will need to be demonstrated and then deployed at scale, while novel technologies need R&D support now to determine whether they can be affordable and viable options in the longer-term. Underpinning this will be research to understand consumer acceptability and behaviour, and to create economic incentives will also be required for lasting change.

We've published the Net Zero Research and Innovation Framework which sets out the critical net zero research and innovation challenges across the UK that require development over the next 5-10 years, and presents timelines of short, medium, and longer-term priorities. The framework will help to align current and future government funding around agreed priorities and to crowd-in effort and investment from the private sector and research communities by providing a clear signal on our areas of focus.

Government R&D support

Government investment in research drives progress on our goals, from the physics underpinning battery technology to the mathematics underlying climate modelling. In November 2020, we committed to increasing investment in core UK Research and Innovation (UKRI) and National Academy funded research by more than £1 billion by the April 2024 (the 2023/24 Financial Year). UKRI investment in research, innovation, and skills creates the conditions for the UK to address the complex and interrelated challenges of achieving net zero by 2050.

Beyond early-stage research, investment in new technologies is essential for bringing them closer to commercialisation. We will expand our cross government portfolio of net zero innovation support, delivering at least £1.5 billion during the next spending review period. This will accelerate the commercialisation of low carbon technologies, systems, and business models across the economy.

The Transport Decarbonisation Plan committed to implementing a range of innovation programmes to support the decarbonisation of transport, with successful projects for zero

emission road freight trials and hydrogen transport pilots recently announced. Building on the success of our £20 million zero emission road freight trials, we will expand these to trial three zero emission HGVs technologies at scale on UK roads to determine their operational benefits, as well as their infrastructure needs. The accompanying Jet Zero: our strategy for net zero aviation proposes a suite of policies to reduce aviation emissions, including accelerating the development of sustainable aviation fuels and supporting the development of zero emission flight. The Agricultural Transition Plan set out the commitment to boost innovation and help farmers and growers increase productivity, sustainability, and resilience to a changing climate. Given the importance of R&D to deliver emissions savings across the natural resources, waste and F-gases sectors, we are also committing to spend £75 million on net zero related R&D in these sectors over the next three years.

We will prioritise innovations where there is a strong case for UK Government investment, while leveraging additional funding from industry. It will also support the UK in maintaining its leadership in the development of technologies such as nuclear reactors and fusion energy,[114] which are expected to complement renewable sources in the future. With high levels of innovation alongside ambitious policy support in technologies, the UK's low carbon sectors with the largest potential could unlock £60 billion of GVA in the UK[115].

The Industrial Strategy Challenge Fund (ISCF),6 delivered by UKRI and its partners, drives UK growth and productivity by directing innovation across sectors and disciplines behind government's strategic priorities. ISCF has to date allocated £824 million to eight challenges aligned to the 2017 Industrial Strategy Clean Growth Grand Challenge. Examples include the Transforming Food Production Challenge; the Faraday Battery Challenge; the Driving the Electric Revolution Challenge.

The government's Innovation Strategy sets out our plans for a refreshed Innovation Missions programme to build on UK leadership in mission-driven innovation and bring government together with industry, civil society, and academia to respond directly to major challenges confronting the UK. As referenced in the International chapter, Missions can play an important role in stimulating and leveraging innovation for tackling complex problems while simultaneously promoting growth and improved business outcomes and restoring the UK's place as a science superpower.

It is a strategic focus of our National Space Strategy to utilise space technology in the fight against climate change. Satellites provide an extraordinary insight into our climate and environment and enable us to understand and monitor how climate change is impacting the Earth. We will strive to remain at the forefront of Earth Observation (EO) technology and know-how. This supports our ambition to be a global science and technology superpower and to lead the world in tackling climate change and biodiversity loss.

It is essential that we track cross-government activity and ensure that innovation funding is strategically aligned to deliver the government's net zero ambition. This will be supported by the Net Zero Innovation Board (NZIB), chaired by the UK Government's Chief Scientific Advisor.

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[114] We published a Fusion Strategy and a Fusion Regulation Green Paper, recognising that fusion could be the ultimate clean power solution. BEIS (2021), 'Towards fusion energy: the UK government's fusion strategy', https://www.gov.uk/government/publications/towards-fusion-energy-the-uk-fusion-strategy; BEIS (2021), 'Towards fusion energy: proposals for a regulatory framework', https://www.gov.uk/government/consultations/towards-fusion-energy-proposals-for-a-regulatory-framework

[115] BEIS analysis based on the methodology used in the Energy Innovation Needs Assessments. BEIS (2019), 'Energy Innovation Needs Assessments', https://www.gov.uk/government/publications/energy-innovation-needs-assessments

Alongside our policies that specifically support our net zero objectives, there will be continued significant public investment in R&D to support all sectors. This includes the creation of a new institution – the Advanced Research and Invention Agency (ARIA) – to fund high-risk, high-reward research. ARIA's leadership will have full scope to determine the areas in which it will invest.

Policy and regulatory frameworks

As set out in the Net Zero Strategy and the British Energy Security Strategy, we will continue to develop a policy environment and regulatory framework which incentivises further deployment of new technologies, services, and business models. The UK's Electricity Market Reform is an example of how government can drive significant cost reductions in low carbon technology. Furthermore, while supporting the deployment of offshore wind through the Contracts for Difference scheme, costs have reduced by >50% in the last decade. This provides a clear example of policy 'pull' whereby open competition worked to drive cost reductions through deployment and innovation. As noted throughout the strategy, government will work with industry, businesses and consumers to consider the removal of regulatory barriers which may be hindering our transition to net zero.

Encouraging private sector investment

To deliver net zero, it is essential that public investment catalyses significant flows of private investment into innovative companies and activities. This means creating the right conditions for all businesses to innovate and giving them the confidence to do so. The right conditions will often involve de-risking capital in the forms of grants (allowing freedom to innovate) and concessionary capital (allowing businesses to commercialise and scale their operations). Providing the private sector with clarity on government R&D priorities can also help to build the confidence to invest in innovative companies and activities. As outlined, our Net Zero Research and Innovation Framework sets out a structure for this and a future update will demonstrate how the government is delivering against this Framework.

In Build Back Better: our plan for growth, and the Innovation Strategy, we set out our aim to unlock the potential of the £2.2 trillion held in UK pension schemes by addressing barriers to long-term investment. The government has established the Productive Finance Working Group, which published its roadmap for increasing productive finance investment in September 2021, and is progressing policy development through several Department for Work and Pensions consultations. These workstreams explore ways to make it easier for schemes to invest in alternative assets, including equity investment in innovative firms; creating the conditions for capital to flow into the UK's most promising firms will help ensure that finance is available for the innovation required to meet our net zero goals and improve outcomes for UK savers. Government will continue to engage closely with pension funds and the investment industry to understand the scope for industry-led initiatives that take advantage of innovation investment opportunities.

We will also provide the right conditions to attract private investment in R&D and innovation, including through tax and regulatory frameworks as well as policy signals from government. At Spring Budget 2021, the Government announced a review of R&D tax reliefs with the publication of a wide-ranging consultation. The review will ensure that the reliefs are up-to-date, competitive and well-targeted.

Wider support

Non-financial support in the form of engagement with businesses is also key to the development and deployment of new technologies, systems, policies and business models to achieve net zero. This includes, for example, support provided through UKRI, its Knowledge

Transfer Network, and other bodies like the Catapult network and Intellectual Property Office. It also includes UKRI's digital platform pilot programme, which will be used to bring net zero businesses together with investors for deal flow and to make information on companies more accessible to investors. The Innovation Strategy set out how we will build on this important support and provide advice, networking opportunities, skills development, and testing facilities. This includes a new online Innovation hub from Innovate UK, which will make it easier for businesses to navigate the government's funding offer, and expansion of the Innovate EDGE service which helps firms to enhance their investment readiness.

The Innovation Strategy also set out our ambition for government departments to procure more innovative solutions. Departments will produce clear policy problem statements that describe the priority outcomes that they want to solve or achieve. Alongside this, every major project should publish an outcome statement. Both measures will improve demand-signalling from departments, allowing them to procure innovation to accelerate the UK's transition to net zero. This will help us to leverage public procurement as a tool that drives greener and more resilient outcomes across public services.

International collaboration and leadership

Building on our approach domestically, we are committed to continued active membership of Mission Innovation as the primary forum to strengthen international cooperation on clean energy innovation which is essential for our long-term climate and energy goals. An ambitious second phase of Mission Innovation is a priority for government. We will provide global leadership and commit to co-leading missions to build a renewable-powered future and deliver low cost, low carbon hydrogen.

3.15.6 Scottish Government

The Scottish Government is committed to using public policies and investments to create an environment where new industries, markets and innovations can thrive, and where private investment is key to driving a just transition to net-zero by 2045. The Scottish National Investment Bank has been established with a primary mission to support a just transition to net zero by 2045. The Bank will play a key role in developing new net zero markets, and will work with public, private and third sector partners to channel and crowd in additional investment.

The Green Growth Accelerator, launched in June 2020, is an innovative funding model demonstrating the Scottish Government's ambitious and integrated approach with local authorities. The programme will unlock an additional investment for emissions-reducing infrastructure to support Scotland's transition, with outcomes focussed on carbon emissions reductions, unlocking net zero and just transition, while targeting growth in green jobs.

3.15.7 Welsh Government

The net zero challenge will be at the heart of a new Welsh Government Innovation Strategy, which is expected to launch in 2022. This will sit alongside and complement the UK Government's innovation strategy launched in July 2021, which focuses on prosperity through innovation.

3.15.8 Northern Ireland Executive

The10x Economic Vision highlights a real opportunity to make a difference over the next decade, but can be achieved by adopting a partnership approach to delivery. Co-design and collaboration across government, businesses and academia will be vital to achieving a culture of innovation that benefits everyone.

Taking full advantage of the decade of innovation will increase incomes, create jobs, improve productivity levels, provide opportunities for all, revitalise places, realise a net-zero economy and showcase NI.

Bringing together motivations of innovation, life chances and wellbeing the vision is structured in a way to drive growth, tackle the concentration of impacts on those groups least able to absorb the shocks, increase wider societal wellbeing and contribute towards our response to climate change in facing the environmental and economic challenges of the time.

Queens University Belfast – Sustainable Energy Research Centre

This Pioneering Research Project (PRP) has provided for the formation of interdisciplinary teams of academics, and supported collaborative projects through the provision of equipment, studentships and other resources. The centre has focused on the interlinking areas of marine and bio-energy generation, future vehicle technologies including biofuels, after treatment solutions and batteries, and low-carbon chemical manufacturing. The centre brings together research projects from Chemistry and Chemical Engineering, Mechanical and Aerospace Engineering, Maths and Physics, and the School of Natural and Built Environment.

The Centre for Advanced Sustainable Energy (CASE)

CASE is an industry-led, multi-partner sustainable energy research centre based at Queen's University Belfast. Through the Invest Northern Ireland Competence Centre programme, CASE funds collaborative Research and Development in sustainable energy, and bridges the gap between industry research needs and academic research offerings. The three strategic areas on which CASE concentrates are Bio-Energy; Marine Renewable energy; and Energy Systems (management and storage of clean energy).

The Centre has funded over 30 projects in areas from floating solar to tidal turbines, developing technologies capable of delivering environmentally sensitive clean power, and has just been selected to manage the Green Innovation Challenge Fund (GICF) on behalf of the Department for the Economy NI. This new £4.5 million award will be instrumental in finding the Path to Net Zero Energy as outlined in the NI Energy Strategy 2021.

Closely related to CASE, the **Bryden Centre for Advanced Marine and Bio-Energy Research** (The Bryden Centre), led by Queen's University, constitutes a 'virtual centre of competence' that supports research into biomass and marine-based renewable energy sources, taking an all-island (Northern Ireland and Republic of Ireland) approach. The Bryden Centre's research covers tidal and wave power, gas, liquid and biofuels, and includes a component dedicated to assuring that the energy systems are designed to support the environment. The team also works with over a dozen industrial partners.

Advanced Materials research

Queen's University's research programme includes projects developing advanced sustainable materials. The Polymer Processing Research Centre (PPRC) undertakes leading edge, industrially exploitable, fundamental and applied R&D to demonstrably improve industrial competitiveness, feeding into the theme of 'future focussed manufacturing' in the Belfast Region City Deal.

The **Advanced Composites Research Group**, within the School of Mechanical and Aerospace Engineering, brings together a multidisciplinary team of researchers, focussing on the science and engineering of composite materials and structures. The team works with partners, such as Bombardier and Bamford's among others, on Advanced Computational Modelling; Nano-enhanced Multifunctional Composites; Material Characterisation; and Structural Applications.

The Gibson Institute for Land Food and Environment, based at Queens University Belfast, is involved in major research projects funded by UK Research Councils (ESRC, NERC and MRC), EU Framework Programs, and works on areas including the Economics of Renewable Energy Production and Consumption. The Department for Levelling Up, Housing and Communities recently awarded Queen's researchers funding to look at the development of Zero-Carbon Co-operatives with business partners across NI, and to set up a Net-Zero Skills Academy.

Providing Vital Research Leadership

Ulster University's research community has developed significant strength in depth across key climate and sustainability projects most notably through the Centre for Sustainable Technologies (CST), the Centre for Engineering and Renewable Energies (CERE), and the Centre for Hydrogen Safety Research (HySAFER) as well as other key areas including Architects of Change, tourism, accounting, pharmacy and communication. All of Ulster University's research outputs are cross-referenced via PURE to highlight relevant UN Sustainable Development Goals (SDGs).

3.16 Green investment

3.16.1 Key commitments

- Use the UK Infrastructure Bank (UKIB) to crowd in private finance, support more than £40 billion of investment, and pull through low carbon technologies and sectors to maturity and scale.
- Continue to issue green gilts following the success of the UK's debut sovereign green bond in 2021, which raised £16 billion, and build on the issuance of the world's first National Savings and Investment Green Retail Savings Product.
- Support the British Business Bank's new objective to incorporate net zero and wider environmental, social and governance strategy across all activity, as well as the updated FCA and Bank of England remits to reflect the importance of environmental sustainability and the transition towards net zero.
- Introducing new Sustainability Disclosures Requirements as set out in *Greening Finance: A Roadmap to Sustainable Investing*, building on the steps the UK has taken to become the first G20 country to make disclosures aligned to the Taskforce for Climate-Related Financial Disclosures (TCFD) mandatory across the UK economy.
- Developing a UK Green Taxonomy and supporting the Green Technical Advisory Group to advise on greenwashing and how to implement the taxonomy in a UK context.
- Publishing a second iteration of the *Green Finance Strategy* for the UK, which will outline the pathway to net zero for finance in the UK.
- Work with external partners and data providers to better track private investment into the net zero economy going forward.

3.16.2 The challenge

Both public and private investment will be crucial for any path to net zero. While we expect most investment to come from the private sector, market failures mean the private sector alone will not deliver emissions reductions and innovation at the pace required.

Our 2019 *Green Finance Strategy* demonstrated how the strategic use of public funds, long-term policy frameworks, and signalling can leverage private investment into the technologies and infrastructure that will be needed to deliver net zero. Each technology and sector will present its own challenges, and long-term government support for a large pipeline of projects will be needed.

3.16.3 Our goal

We will work with the private sector to deliver a world-leading net zero financial system, ready to seize the opportunities of net zero. Climate-related financial risk will be embedded into our regulatory frameworks to help guide capital flows to green investments.

We estimate that additional capital investment must grow from present levels to an average of £50-60bn per year through the late 2020s and 2030s. Most of this investment will come from the private sector, providing new opportunities for businesses and investors.

This will mean supporting the full funding cycle, from emerging technologies through to infrastructure and project finance, to deliver the economic transition. Each green technology and infrastructure will require different types of financial support depending on its maturity. We must engage all types of capital, from early-stage grant and angel investment through to institutional finance like pension fund investors.

The UK is a world leading financial hub, with access to global capital pools, outstanding professional services, and a robust legal and regulatory framework. As such, the UK financial services industry is poised to enable private capital to flow into our net zero investment needs.

Public funds will be used strategically to support new technologies, as well as emerging sectors, as they move from the innovation stage through to commercialisation and deployment. Early-stage R&D is supported by various government grants. Later-stage organisations can reach commercialisation and benefit from investment through the Clean Growth Venture Capital (VC) Fund or support from the British Business Bank (BBB). These stages of support are essential for scaling the necessary technologies and supporting the growth of businesses aligned to meeting our net zero ambitions. In addition, Government has a key role to play in generating a stable demand environment for long term investment by establishing a carbon market, which it has supported through setting up the UK Emissions Trading Scheme which came into effect in January 2021.

Providing the suitable conditions for regulatory and early-stage innovation is a significant part of our Net Zero Strategy, but we must also mobilise the wider financial sector to meet the upfront investment challenge. This means stimulating new ways of providing information to markets on green investment and exposure to climate related financial risk, and providing the investment conditions to mobilise private capital into a portfolio of net zero financing.

We are driving more disclosure and transparency in the markets on climate risks and opportunities through the introduction of Sustainability Disclosure Requirements, as outlined in *Greening Finance: A Roadmap to Sustainable Investing*. These will bring together and streamline UK sustainability reporting requirements, including reporting aligned with the Taskforce for Climate-Related Financial Disclosures (TCFD) recommendations and UK Green Taxonomy disclosures.

Targeted public intervention via the British Business Bank (BBB), UK Export Finance and the UK Infrastructure Bank (UKIB) will pull through investment from the private sector. For instance, British Patient Capital, a commercial subsidiary of the BBB, is contributing to the

transition to net zero through its existing investment strategy: 9% of its underlying investment portfolio is in clean growth, sustainability, and mobility companies.

This builds on the growing voluntary commitments from financial institutions to a net zero transition that are already pivoting financial flows towards net zero in the runup to and following COP26[116]. For example, the Glasgow Financial Alliance for Net Zero (GFANZ), which was launched as part of the COP26 Presidency, brings together many of the world's biggest banks, asset owners, asset managers, insurers and service providers that are credibly committed to achieving net zero emissions. Using the UN's Race to Zero as the entry criteria, the gold standard for net zero commitments, GFANZ has raised, deepened, and broadened the global financial sector's net zero ambitions. GFANZ has launched as ambitious body of technical work to support net zero aligned investment and accelerate the transition to a net zero financial system and global economy.

We will publish an update to the *Green Finance Strategy* in 2022 which will include a net zero transition pathway for the UK financial sector. This will set out how this crucial sector will transition to net zero as a whole.

3.16.4 Financing green

The scale of the net zero challenge and persistent market failures mean that public sector intervention is needed to shape and accelerate the flow of private capital. The right policy signals can act as a catalyst for private sector investment, as shown by £90 billion of new investment in renewable energy between 2012 – 2021, in part facilitated by the Electricity Market Reforms (EMR)[117]. By bringing down the cost of capital through strong policy frameworks, we will reduce the financing costs of reaching net zero, delivering a better deal for the taxpayer.

The pathways set out in this strategy demonstrate that, whilst each sector requires its own policy framework, there are cross-cutting interventions required to support the transition to net zero. We will replicate the success of offshore wind and take actions to secure access to finance across the economy, ensuring that all sectors are able to access private investment going forward. For example, the Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme, will unlock private sector capital for industrial carbon capture and hydrogen production projects by providing long-term certainty to investors, de-risking revenue streams in these sectors.

Through the net zero innovation portfolio, funding is provided for low carbon technology innovation. As these technologies, and sectors, commercialise, they can benefit from further investment readiness support to help them access repayable private finance. For example, the Natural Environment Investment Readiness Fund (NEIRF)[118], launched by Defra and the Environment Agency in 2021, will build the portfolio of potential investments for net zero investors in nature.

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[116] Mark Carney and the COP26 Private Finance Hub – in partnership with the UNFCCC Climate Actions Champions and the Race to Zero campaign and the COP26 Presidency- have launched a coalition that combines existing and new net zero finance initiatives into a wider strategic forum: The Glasgow Financial Alliance for Net Zero (GFANZ). GFANZ aims to raise ambition in the financial sector by allowing firms to demonstrate collective commitment to net zero.

[117] BloombergNEF (2021), Database accessed 12/10/2021

[118] Defra, Environment Agency, Natural England (2021), 'Innovative nature projects awarded funding to drive private investment', https://www.gov.uk/government/news/innovative-nature-projects-awarded-funding-to-drive-private-investment

Some of these technologies may also avail of venture capital to allow them to scale rapidly. Government has shown its support for this necessary innovation underpinning its clean growth objectives with a £20 million cornerstone investment in the venture capital Clean Growth Fund[119]. This Fund aims to accelerate the deployment of innovative clean technologies that reduce greenhouse gas emissions, alongside catalysing the UK clean growth venture capital market and leveraging private sector funding into earlystage clean tech start-ups. For example, the fund led a £4.7 million investment round into Piclo (the independent energy trading marketplace) with coinvestment from Mott MacDonald Ventures.

The BBB is a government-owned economic development bank with a mission to drive sustainable growth and prosperity across the UK, and to enable the transition to a net zero economy, by improving access to finance for smaller businesses. UK Government has worked with the BBB on their new mission and objective to support the UK's transition to a net zero economy and incorporate environmental, social and governance issues across of its activities. The new net zero objective will support firms looking to move towards net zero, helping the UK reduce its energy consumption and mitigate the impacts of climate change.

Going beyond SME finance to larger scale infrastructure finance, there are significant pools of private finance ready to deploy into UK projects but there can be a mismatch between market appetite and the risk profile of projects. Infrastructure investment is vulnerable to market failure, as it is often complex, large, novel and longterm. Launched in June 2021, the new UK Infrastructure Bank can play a pivotal role in this space, crowding in private sector investment in important areas and helping to kick start new sectors. Across the Bank's full mandate (also covering regional growth), it has £12 billion of equity and debt capital and will be able to deploy £10 billion of government guarantees. We expect the Bank to use this to crowd in private investment as a cornerstone investor or guarantor to enable more than £40 billion of investment in the areas most prone to market failure, and to help deliver its dual policy focus of tackling climate change and supporting regional and local economic growth. Furthermore, the Bank will play a pivotal role in catalysing the role of local government in the transition, by financing strategic infrastructure projects led by local authorities, and providing advice and expertise in order to strengthen the pipeline of investable projects.

Industries will need to be supported in their transition away from high carbon emitting operations. For example, the IDHRS scheme will provide a revenue mechanism to enable deployment of industrial carbon capture and hydrogen production. UK Export Finance (UKEF)'s Transition Export Development Guarantees (TEDG), launched in 2020, will ensure that businesses, including those in the supply chain, are supported at all stages of their transition journey. This product can be used by a company for working capital, capital expenditure or R&D needs, provided they have a credible transition plan. The first TEDG was announced in August with UKEF providing an 80% guarantee on the £430 million commercial loan to Wood Plc. This support from UKEF will help Wood to continue to capitalise on opportunities linked to clean energy, hydrogen and decarbonisation. Furthermore, this instrument will support the export of low carbon technology from the UK as evidenced by this guarantee which will support Wood to take advantage of green trade opportunities.

The UK financial system is also taking a global leadership role transition financing and sustainable finance more widely. An example of transition finance leadership is the London Stock Exchange Group (LSEG) which was the first exchange globally to launch a dedicated Transition Bond Segment. This distinct transition label is the application of globally recognised

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[119] BEIS (2020), 'Government launches new £40m Clean Growth Fund to supercharge green start-ups', [Press release] https://www.gov.uk/government/news/government-launches-new-40-million-clean-growth-fund-to-supercharge-green-start-ups

standards, enhancing visibility and providing assurance to issuers and investors. We have seen the financial sector in the UK take the lead in net zero transition (for example, through the Glasgow Financial Alliance for Net Zero[120]) as well as leading financial innovation (such as Green Home Finance Innovation fund).

The Chancellor, in his Mansion House speech[121] in July 2021, set out how the government will ensure that the financial system in the UK plays a major role in the delivery of the UK's net zero target and ambition for a 'nature positive' future. This will build on the investment principles outlined in the 25 Year Environment Plan including 'do no significant harm' to the environment with investment, and implement a series of programmes aimed at building the portfolio of investable assets across the UK. This will involve providing grant programmes like the Natural Environment Investment Readiness Fund (NEIRF) to help nature-based projects become investment ready, but also providing capital through public-private impact funds such as the Big Nature Impact Fund to leverage in private finance. In addition to investing in climate and environmental solutions, government is also committed to ensuring sufficient private capital is available for investment into adaptation and resilience measures.

Furthermore, the government is supporting the development of a Taskforce on Nature-Related Financial Disclosures (TNFD). This will provide a framework for corporate and financial institutions to report and act on evolving nature-related risks to support a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes. This market-led, global initiative will build, consult on, and test, its framework over the next year and a half and will be designed to complement the TCFD by building on its 4-pillar approach and drawing on its lessons learnt.

These interventions are important to driving the desired 'nature-positive' future. As set out in the Prime Minister's *Ten Point Plan*, we hope that the UK will also become a leader in high-quality voluntary carbon markets (VCMs). For these private markets to scale successfully in support of net zero, their integrity and use as an addition (rather than alternative) to rapid decarbonisation will be critical. The government is closely following the important work of various sector-led initiatives including: the Taskforce for Scaling Voluntary Carbon Markets (TSVCM); the Voluntary Carbon Markets Integrity Initiative UK VCM Forum; and the Financing UK Nature Recovery coalition.

In 2021, the UK issued two Green Gilts with a total transaction size of £16bn. The first transaction of £10bn represented the largest debut transaction size for any country and achieved the biggest ever order book for a sovereign green transaction (in excess of £100bn). The second 32-year bond was also the longest maturity of such bond to date. In doing so the UK has become the third largest national issuer of green bonds just a month after beginning its issuance programme. This followed the successful publication of the UK Government Green Financing Framework on 30 June 2021, which outlines how proceeds raised from the green gilts will help tackle climate change, biodiversity loss and other environmental challenges.

We have also launched via NS&I the world's first sovereign retail green savings bond which allows savers to contribute towards the Government's green initiatives. These are the first standalone retail product to be tied to a sovereign's green bond framework and will allow

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[120] Chaired by Mark Carney, is bringing together over 160 firms from the leading net zero initiatives across the financial system to accelerate the transition to net zero emissions by 2050 at the latest.

[121] Chancellor sets out how UK financial services can create prosperity at home and project values abroad in first Mansion House speech: https://www.gov.uk/government/news/chancellor-sets-out-how-uk-financial-services-can-create-prosperity-at-home-and-project-values-abroad-in-first-mansion-house-speech

all UK savers to contribute to the fight against climate change and the government's other environmental objectives. It gives UK savers the opportunity to take part in this collective effort to tackle climate change by contributing to public spending on green, whilst increasing awareness in the government's green initiatives.

We are also committed to tracking finance flows, to complement how we measure carbon. Hence, we will be working with external partners and data providers to better track private investment into the net zero economy going forward. This will enable the UK to robustly, and regularly, assess the alignment of the UK's financial flows with net zero.

The UK launched the Green Finance Education Charter in our 2019 *Green Finance Strategy*[122], reflecting the need for UK and global financial services industries to develop the capabilities of their workforce in green finance principles and practice. Since then, twelve leading professional bodies representing over 1 million finance professionals have signed up to the Charter, hosted by the Green Finance Institute. To further build UK capacity, capability and climate leadership, we will look to expand Charter membership to universities and others, and work with the Institute for Apprenticeships and Technical Education (IfATE). We will also seek to internationalise the Charter by encouraging similar development overseas.

3.16.5 Greening finance

Financing the technologies required for our transition to net zero is only part of the solution. The transition represents both a risk and an opportunity for the real economy and the financial system that supports it. It is therefore vital that climate-related financial risks and impacts are factored into investment decisions and reflected in the cost of finance for different technologies and companies. To achieve this, we will harness the international reputation of the UK's leading financial sector to encourage private investment to support low carbon innovation and manage climate-related financial risk.

As the Chancellor outlined in his Mansion House speech[123], the Government intends to introduce economy-wide Sustainability Disclosure Requirements covering the whole economy. This will include requirements to report on businesses and investment products impact on the climate and environment, as well as the risks and opportunities these impacts pose to business. Our approach is detailed in *Greening Finance: A Roadmap to Sustainable Investing*.

The UK has already established itself as a world leader on green finance regulation, becoming the first G20 country to make disclosures aligned with the Task Force on Climate-related Financial Disclosures (TCFD) recommendations fully mandatory across the economy by 2025. As part of the roadmap to delivery, the Government implemented mandatory climate-related financial disclosures by publicly quoted companies, large private companies and the largest Limited Liability Partnerships (LLPs), which came into force from 6th April 2022. Following widespread support for the proposals, we will shortly be setting out regulations to bring this into force, including a requirement for scenario analysis – a powerful tool to support companies in their assessment of climate-related risks and opportunities.

Alongside measures to implement mandatory disclosures aligned with the TCFD recommendations for companies and LLPs:

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[122] BEIS (2019), 'Green Finance Strategy', https://www.gov.uk/government/publications/green-finance-strategy

[123] Chancellor sets out how UK financial services can create prosperity at home and project values abroad in first Mansion House speech: https://www.gov.uk/government/news/chancellor-sets-out-how-uk-financial-services-can-create-prosperity-at-home-and-project-values-abroad-in-first-mansion-house-speech

- The Financial Conduct Authority introduced a listing rule for premium listed companies which commenced on 1 January 2021. This requires companies to include a statement in their annual financial report which sets out whether their disclosures are consistent with the recommendations of the TCFD, and to explain why if they have not done so.
- Government introduced regulations, in force from 1 October 2021, to require pension schemes with £5 billion or more in assets to report line with the TCFD's recommendations. By October 2022, over 80% of members of occupational pension schemes – and more than 70% of assets under management – are schemes reporting in line with the TCFD recommendations.

Our stated objective is to increase the quantity and quality of climate-related financial disclosures in a proportionate manner. This is to ensure market participants have better information to adequately understand climate-related financial risks and opportunities to support the transition to net zero.

In November 2020, the Chancellor announced that the government is implementing a UK Green Taxonomy. This will clearly set out the criteria which specific economic activities must meet to be considered environmentally sustainable. The first two Technical Screening Criteria (TSC) on climate change mitigation and adaptation are expected to be made by the end of 2022. To support the development of the TSCs, we have announced the appointment of a Green Technical Advisory Group (GTAG) in June 2021. Made up a of range of financial and business stakeholders, taxonomy and data experts, and subject matter experts, and chaired by the Green Finance Institute, this provides independent, non-binding advice to the government on developing and implementing a Green Taxonomy in the UK context. For example, we have established an Energy Working Group as part of the GTAG to provide advice on key technologies such as hydrogen and carbon capture and storage. Taken together, these enhanced Sustainability Disclosure Requirements will support companies to communicate clear and credible low carbon transition plans needed by investors.

Key to delivering enhanced disclosure on climate change is the availability of data financial institutions can use. The UK Centre for Greening Finance and Investment (CGFI) is a national centre established to accelerate the adoption and use of climate and environmental data and analytics by financial institutions internationally. CGFI will equip financial institutions with the tools and capacity required to effectively allocate capital to meet net zero ambitions and ensure global UK leadership in green finance and green finance data and analytics.

Progress since the publication of the Net Zero Strategy

- The UK is continuing to build our reputation as a global thought leader on green finance to crowd in private capital to deliver the investment required to deliver our net zero objectives. Our 2019 Green Finance Strategy set out how we will harness the strength of the UK's world leading financial sector to catalyse green investment and accelerate delivery of net zero. We have committed to providing **an update to this strategy in 2022**.
- We have helped shape the **UK Infrastructure Bank (UKIB)** which will provide targeted support to UK infrastructure projects that deliver on the government's domestic agenda, including commitments to transition to net zero by 2050 and to level up economic opportunities across the country. UKIB has 12 billion of equity and debt capital and will be able to deploy £10 billion of government guarantees and is expected to be able to crowd in private investment as a cornerstone investor or guarantor to enable more than £40 billion of investment in UK infrastructure projects.

- In 2021, **the UK issued the second of its two Green Gilts taking the total transaction size of £16bn**. The first transaction of £10bn represented the largest debut transaction size for any country and achieved the biggest ever order book for a sovereign green transaction (in excess of £100bn). The second 32-year bond was also the longest maturity of such a bond to date. The UK became the third largest national issuer of green bonds just a month after beginning its issuance programme. In addition to the inaugural green gilts we launched a new **environmental retail savings product to be offered by NS&I**, which is the world's first green retail savings bond to be linked to a sovereign's green bond framework.
- The government has continued to support the Bank of England and Financial Conduct Authority in fulfilling their **updated remits** to reflect the importance of environmental sustainability and the transition towards net zero. Additionally, the government has continued to support the British Business Bank (BBB) in its adjusted mission with a stronger focus on net zero ("To drive sustainable growth and prosperity across the UK, and to enable the transition to a net zero economy, by improving access to finance for smaller businesses").
- The UK has already established itself as a world leader on green finance regulation, becoming the first **G20 country to make disclosures aligned with the Task Force on Climate-related Financial Disclosures (TCFD)** recommendations fully mandatory across the economy by 2025. The UK will also implement a UK Green Taxonomy, a common framework for determining which activities can be defined as environmentally sustainable – which will improve understanding of the impact of firms' activities and investments.
- In November 2021 the Prime Minister announced ten investor roadmaps to help mobilise the scale-up in private investment required to support the transition to a net zero economy. The roadmaps show exactly how we will deliver our green commitments and will be used to work with business, investors and regulators to encourage investment and industries in the UK. The first 3 of these, **EV, Hydrogen** and **CCUS** have now been published.

3.16.6 Scottish Government

The Scottish Government's 10-year Just Transition Fund is committed to accelerating the transition of the North East and Moray region of Scotland, in a way that is fair and leaves no-one behind. It has been announced in recognition of the particular need to pivot the strengths of the region toward supporting and capitalising on the opportunities presented by Scotland's ongoing transition to net zero.

3.16.7 Welsh Government

New Infrastructure Investment Strategy

Our new Wales Infrastructure Investment Strategy (WIIS) is the successor to the previous Wales Infrastructure Investment Plan, and was published alongside the draft Budget in December 2021. This sets out a 10-year vision for the outcomes that our infrastructure investments should enable, and sets out the framework for allocations of our capital budgets. The WIIS is built around the four well-being themes of economic, environmental, social and cultural well-being. In particular, the strategy has a clear focus on addressing the Climate and Nature Emergencies, and delivers on our Programme for Government commitment for a 10-year infrastructure strategy to support a zero-carbon economy.

3.16.8 Northern Ireland Executive

A £100m Northern Ireland Investment Fund (NIIF) Fund was established in 2017, providing loans and equity to private sector led developments on a repayable basis. The NIIF Fund Manager (contract currently held by CBRE) investment decisions are guided by an over-arching Investment Strategy which was agreed by the Executive. The Strategy has two overriding objectives, one of which is *"To address market failures and accelerate and increase investment in private sector led development, infrastructure and low carbon projects."* Beneath the over-arching objectives are a list of 'eligible activities' the Fund should target. This list includes, under the heading Low Carbon, *'Investment to drive the growth of a low carbon economy through capital investment in energy efficiency, energy storage and generation projects, including heat networks, non-domestic and domestic energy efficiency, photovoltaic, wind and hydro energy generation and waste to energy projects. Circular economy projects would also be considered such as projects which focus on resource efficiency/re-use'*. The Fund has yet to make its first investment in the Green space.

3.17 Green jobs, skills and industries

3.17.1 Key commitments

- Publish sector and supply chain development plans for key low carbon sectors and work with business to encourage investment in green skills and industries in the UK.
- Publish a UK Critical Minerals strategy, setting out our approach to securing technology-critical minerals and metals.
- Support the development of a skilled, competitive supply chain for key green industries in the UK.
- Reform the skills system so that training providers, employers and learners are incentivised and equipped to play their part in delivering the transition to net zero – including by legislating for skills required for jobs that support action on climate change and other environmental goals to be considered in the development of new local skills improvement plans.
- Deliver a Lifetime Skills Guarantee and grow key post-16 training programmes (such as apprenticeships, Skills Bootcamps and T levels) in line with the needs of employers in the green economy, helping individuals get the training they need for a job in the green economy, either at the start of their careers or when retraining or upskilling once already in the workforce.
- Introduce a sustainability and climate change strategy for education and children's services which will include a focus on equipping children and young people with the knowledge and skills they need to contribute to the green economy.

3.17.2 The Challenge

The national and global shift towards net zero provides a once in a generation opportunity to level up the country, create new green jobs, and put the UK at the forefront of growing global markets in green technologies. Delivering on this promise, whilst meeting our ambitious climate and environmental targets, will be in a large part dependent on having a sufficiently skilled workforce and robust, competitive supply chains in the UK.

Recent developments have thrown into sharp relief the inherent vulnerabilities associated with complex global supply chains and shocks to the global economic system. The transition to net zero will change the nature of the UK's critical supply chains. Our aim is to help ensure that supply chains critical for the transition to net zero are secure, ensuring that we

have access to the materials, minerals, and chemicals that our growing green economy will need. Our approach is that there is no "one size fits all" model for building resilience in individual supply chains: often a combination of levers may be the best solution to address a vulnerability.

We will need tens of thousands of engineers to build and maintain new offshore wind farms off the coasts of northern England and Scotland, construct nuclear power stations in the South of England, and manufacture electric vehicles in the Midlands; skilled builders and trades people to retrofit homes and buildings across the country; and conservation and biodiversity professionals to deliver nature-based solutions to climate change.

Alongside a broader shift to digitisation and automation, we can expect the transition to net zero to be one of the dominant labour market trends in the next 30 years: approximately 6.3 million jobs in the UK, about one in five, are likely to be affected by the transition to a green economy, with workers experiencing either an increase or decrease in the demand for their skills.[124]

3.17.3 Our goals

The government's ambition is to:

- Support up to 480,000 jobs across net zero industries in 2030, contributing towards a broader pivot to a greener economy which could support 2 million jobs in green sectors or by greening existing sectors by:
  - Working with business to grow green industries, supply chains and skills in the UK, and ensure our resilience to international changes in supply chains; and,
  - Using our net zero policy and funding to promote the growth of green skills and the green economy.
- Enable workers, industries, and places to transition to a net zero economy by 2050, and support industry to develop the skilled workforce to deliver a green industrial revolution by:
  - Reforming the skills system to make it more responsive to the needs of employers, so that training providers, employers, and workers are incentivised and equipped to support the transition to net zero;
  - Ramping up support for workers in the high carbon economy to transition to green jobs;
  - Working with business to ensure people from all backgrounds can access the opportunities in the green economy, including through career advice; and,
  - Providing children and young people with the high-quality education and training they need to work in a future green career, through improving teacher training and development in STEM and other key subjects, and expanding post-16 training programmes in line with the needs of the green economy.

[124] LSE Grantham Institute (2021), 'Green economy: how the transition to net-zero could affect UK jobs across the country', https://www.lse.ac.uk/granthaminstitute/news/green-economy-how-the-transition-to-net-zero-could-affect-uk-jobs-across-the-country/

3.17.4 Working with business to grow green UK industries and resilient supply chains

The investment needed for the transition to net zero will primarily be delivered by the private sector. As such, our first priority is to provide businesses, investors, workers, and skills providers with policy certainty to unlock investment, ensuring we support green industries to develop in the UK.

Our Net Zero and Energy Supply Strategies build on our Ten Point Plan and are our blueprint for a green industrial revolution – these commitments will unlock up to £100 billion of private investment by 2030 and support up to 480,000 well-paid jobs in green industries in 2030.

UK and international investment have backed the vision of a Green Industrial Revolution since the Prime Minister's Ten Point Plan was launched, with nearly 68,000 green jobs across the UK economy either already online or in the pipeline over the next decade – including in electric vehicle manufacturing in Sunderland, Hydrogen facilities in Teesside, and offshore wind in Northumberland, Yorkshire and Humber

In line with *Build Back Better: Our Plan for Growth*, we are taking action across a range of low carbon industries with the greatest economic potential and competitive strength. In doing so, we will support the growth of UK supply chains and create new opportunities for UK businesses and level up the country. We are acting to build green industries such as offshore wind in North East England and in Scotland, carbon capture and hydrogen production in our industrial heartlands, electric vehicles manufacture in the midlands and Northeast of England, and the restoration and protection of nature in rural areas.

We also recognise that the starting position when building resilience in critical supply chains should be to take a market-first approach. The UK prospers under an open economy and openness itself confers resilience. We will leverage the UK's competitive strengths across the supply chain, while deploying those levers available to the Government – including UK Export Finance and the new Office for Investment – to ensure that we exploit our strengths, while supporting those areas that could be vulnerable to global shocks. In addition, the UK ETS market supports supply-chain resilience by providing long term certainty, enabling businesses to invest with confidence and build the right supply chains.

We are working in partnership with our world-class sectors to enable them to take part in the transition, for example through the *North Sea Transition Deal*, which committed to focusing on supporting the transformation of the oil and gas supply chain to service the low carbon energy sector. Building on this, we have established the Energy Supply Chain Taskforce (UKESC) as a joint enterprise between industry and government to guide policy making and maximise the jobs and business opportunities from the transition in the UK. The UKESC cover all energy sectors and regions of the UK and, building on work already underway, it will map the energy project pipeline and identify higher value segments of the supply chain to prioritise in the UK.

The *Integrated Review Security, Defence, Development and Foreign Policy* committed to 'a resilient UK able to withstand and proactively tackle the challenges of today and the future', including a specific focus on supply chain resilience, committing to 'using all our economic tools and our independent trade policy to create economic growth that is distributed more equitably across the UK and to diversify our supply chains in critical goods'. Similarly, the *Plan for Growth* outlines the importance of international markets to ensuring diverse supply sources for the goods and services we need, improving the resilience of our supply chains and benefitting prosperity.

The development of resilient, efficient, and competitive supply chains will be a collaborative strategic endeavour. To support this, in May 2021 we published the *CCUS Supply Chain*

Roadmap, which sets out how government and industry can work together to harness a strong UK supply chain, and we have committed to publish a hydrogen sector development action plan in 2022, which will outline how the government will support companies to secure supply chain opportunities, skills and jobs in the sector. We will build on this by working with industry to publish further sector and supply chain development plans for those low carbon sectors where the UK has the potential to capture an economic advantage. This will include ensuring we are resilient to international changes in supply caused by external shocks, including climate-related disruption, spikes in global demand, rising commodity costs, or artificial constraints on supply. For example, we will need to ensure we have access to a diverse range of sources of chemicals, given they feed into 95% of our manufacturing base. As we move forward, where possible, government will provide more visibility around planned deployment cycles to increase the opportunity for suppliers to invest in long-term production, infrastructure, and training.

3.17.5 Supporting workers, industries and places to transition and develop the skills needed to deliver net zero

There are urgent and emerging skills challenges across the green economy which we will need to address over the short and long term if we are to meet our ambitions for a Green Industrial Revolution. Through the British Energy Security Strategy we are stepping up our ambitions in offshore wind, new nuclear, solar power and hydrogen, all of which will require thousands of skilled workers to deliver. In the construction and heating sectors, up to 230,000 skilled trades people could be required in 2030 to deliver the retrofitting of houses[125]and to meet our ambition of installing 600,000 heat pumps a year by 2028, we will need to rapidly increase the number of qualified installers from around 3,000 to 35,000 within the next 7 years.[126] As the automotive manufacturing sector transforms to producing electric vehicles, as many as 50,000 workers in the UK's automotive manufacturing sector could need reskilling by 2025.[127] In forestry and its supporting sectors, industry estimates point to projected labour demand of approximately 2,000 jobs over the next five years.[128]

As well as specialists in these sectors, employers will also need workers with wider cross-cutting skills to deliver net zero, including digital and data skills, project management, communications and change management.[129] There will also be increased need to work in a multidisciplinary way due to the way work will change in some sectors. For example, whole house retrofitting will need knowledge of multiple technologies.

The impact of the transition on the labour market will not be evenly spread across the UK, reflecting the geographical distribution of where existing industries will need to adapt and others new ones will flourish.[130] However, there are opportunities for workers in transitioning sectors, such as oil and gas, to utilise their specialist skills in key important green sectors,

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[125] ITB (2021), 'Building Skills for Net Zero', https://www.citb.co.uk/about-citb/construction-industry-research-reports/search-our-construction-industry-research-reports/building-skills-for-net-zero/

[126] Heat Pump Association (2020), 'Building the Installer Base for Net Zero Heating', https://www.heatpumps.org.uk/wp-content/uploads/2020/06/Building-the-Installer-Base-for-Net-Zero-Heating_02.06.pdf

[127] BEIS (2021), 'Green Jobs Taskforce Report', https://www.gov.uk/government/publications/green-jobs-taskforce-report

[128] Forestry Skills Forum (2021) 'Forestry Workforce Research', https://www.confor.org.uk/media/2678188/forestry-workforce-research-final-report-august-2021.pdf

[129] BEIS (2021), 'Green Jobs Taskforce report', https://www.gov.uk/government/publications/green-jobs-taskforce-report

[130] BEIS (2021), 'Green Jobs Taskforce report', https://www.gov.uk/government/publications/green-jobs-taskforce-report

sectors such as hydrogen and CCUS with these two sectors expected to grow from the middle part of this decade.

3.17.6 Working with industry and key partners to support good green jobs and skills

Industry and government will need to take action to ensure the UK has the skilled workforce to deliver net zero and that workers, industries and places are supported on the transition. This will be particularly important given the pace and scale of the change, and the specific challenges faced by smaller companies in some sectors and supply chains. To drive this forward, we have announced a Green Jobs Delivery Group to include representatives from industry, the skills sector and other key stakeholders to support the development and delivery of the Government's plans for green jobs and skills. The Green Jobs Delivery Group met for the first time on 11 May 2022, and will be the central forum through which government, industry and other key stakeholders work together to ensure that the UK has the workforce needed to deliver a green industrial revolution. The Group includes Ministerial representation from BEIS, Defra, DWP and DfE and will be co-chaired by an industry representative. The Group will be active for the duration of this Parliament and will aim to drive forward industry and government action on:

1. ensuring we have the skilled workforce to deliver net zero and wider environmental goals in line with the UK's levelling up agenda;
2. ensuring workers and communities in high carbon sectors are supported with the transition in the wider context of the UK's levelling up agenda;
3. better understanding and addressing barriers to recruitment, retention and progression in green jobs (including quality of work, pay, conditions, image, etc.);
4. ensuring green jobs are open to all;
5. building on the work of the Green Jobs Taskforce to develop a clearer understanding of the green economy and how to define and measure it.

To support this work, and monitor our progress, it is vital that we continue to develop the evidence on how net zero will impact jobs and skills. The Office for National Statistics will seek to refine our understanding and measurement of the green economy as the UK transitions to net zero, including looking at such issues as quality of work and diversity within the green economy.

Join up between local bodies, employers and local communities will be key to ensuring an effective transition. Building on the measures set out in the *Local Climate Action* chapter in the Net Zero Strategy, and our skills system reforms, we will assess how local areas are working to support workers and communities with the net zero transition across England.

We want to see continuous improvement in the quality of jobs in the UK, both in the creation of new high-quality jobs which support Government priorities such as net zero, and through in-work progression.

While skills policy is a devolved matter, the Government also welcomes close engagement with the devolved administrations, Mayoral Combined Authorities and the Greater London Authority, on this agenda, to ensure everyone across the UK has access to green skills and jobs.

3.17.6.1 Reforming the skills system

We are driving forward reforms to put employers at the heart of the skills system and ensure colleges are responsive to the needs of local economies. As demand for green skills

continues to grow across the UK, employers in the green economy must prioritise investment in the retraining and upskilling of their workforce, and actively take the opportunity to engage with education providers to shape local provision.

Central to our strategic reforms are the plans set out in the Skills for Jobs White Paper, which will enable local employers to set out their green skills needs to drive provision in local colleges. The programme is made up of two parts: local skills improvement plans and the Development Fund.

First, the Trailblazers for local skills improvement plans, led by employer representative bodies will identify and articulate unmet and future local skills needs and work with further education providers to adapt their technical training offer so that it becomes more responsive to employers' needs. Through the Skills and Post-16 Education Bill, we are legislating to put the employer leadership of these plans on a statutory footing and ensure they have regard to skills needed to help deliver on our net zero target, adaptation to climate change, and other environmental goals.

Second, our £65 million Development Fund pilots in 2021-2022 will support work to identify employers' skills needs, design provision to respond, and build the capacity of local further education providers to deliver. Where local areas identify a skills need, for example increasing the number of trained retrofitters, providers could use this funding to purchase equipment, train their staff, bring in industry expertise to provide training, or deliver new provision. The majority of the 18 pilots announced in July 2021 include a project focused on green skills, covering areas including decarbonisation, renewable energy, and electric vehicles.

Alongside this, we want people to get the advanced technical and higher technical skills they need to get good jobs. Colleges' place at the centre of their local communities and economies means that they are key to unlocking opportunities across the country and to building back better. We are, therefore, reforming the adult skills funding and accountability system for further education colleges and other training providers in a way that will help improve our skills provision. We are consulting on a range of proposals to make sure colleges are better supported to focus on helping their students into good jobs; reduce the complexity of funding so that colleges can focus on their core role of education and training; and define clearer roles and responsibilities for the key players in the system. This means that, for the first time, we will be able to reflect the value that relevant courses deliver to the taxpayer in the funding rate colleges receive for putting on courses. This will encourage providers to put on courses in subjects where there is strong demand from employers. We will hold colleges to account for delivering good outcomes, and are consulting on proposals to introduce new Accountability Agreements setting out national priorities against which we expect colleges to deliver, for example enabling students to access opportunities in the green economy.

Supporting the transition through the skills system will require teachers in the further education sector to have a strong understanding of sustainability. To deliver this, we have worked with employers to develop a refreshed apprenticeship standard for further education teaching (Level 5 Learning and Skills Teacher), which came into effect in September 2021. For the first time, all further education teachers training via an apprenticeship will be required to integrate sustainability into their teaching, including through modelling sustainable practices and promoting sustainable development principles in relation to their subject specialism. Early estimates from the Trailblazer Group suggest around 1,500 teachers each year could train using this apprenticeship standard. This standard will soon be incorporated into all future further education teaching qualifications, so that all teachers across all subject areas will be able to embed and promote sustainability in their teaching.

3.17.6.2 Ramping up support for workers in high carbon sectors to transition to green jobs

Over 80% of the workforce of 2030 is already in work today[131], as such meeting our ambitious targets for climate action in the next decade, and reaching net zero by 2050, will require government and industry to work together to ensure workers in high-carbon sectors can retrain and upskill as they move into jobs in the green economy. Much of this will take place in industry (see the case study below) and we will support this through our targeted programmes for industries and workers.

In key sectors, we will ramp up our support to develop UK supply chains and enable workers to access green jobs. This will include working with industry on a Heat Network Skills Programme to increase the capacity and capability of the UK supply chain to support the sector to reach its growth potential. Our Public Sector Low Carbon Skills Fund will enable public sector organisations to acquire expert skills in order to unlock decarbonisation projects. Alongside this, we will work with industry to support training and new routes of entry to help boost heat pump installer numbers and other areas of skills shortage to support the decarbonisation of buildings. We will also support the development of new green skills for hydrogen, CCUS and industrial decarbonisation to ensure the UK workforce is ready to deploy low carbon technologies. Our funding for the Aberdeen Energy Transition Zone will position the region as an exemplar for low carbon development, supporting the transition of existing oil and gas skills to renewable energy sectors. We also will continue to support the forestry sector to improve its training and career services.

Through the Lifetime Skills Guarantee, we are supporting workers to gain the skills they need to transition to the green economy, including through targeted support for retraining. As part of this, through the National Skills Fund (NSF) investment we are delivering Skills Bootcamps, which are short, flexible courses covering digital, technical and green skills. Green Skills Bootcamps are available in areas such as housing retrofit, solar, nuclear energy and vehicle electrification. Overall, we expect there will be approximately 16,000 Skills Bootcamp places available across the country in financial year 2021-22. We will undertake robust evaluation of this exciting training model to explore potential future plans. In addition, our Free Courses for Jobs offer has, since April 2021, been supporting adults that do not have a qualification at Level 3[132] or higher to access over 400 Level 3 courses for free. The offer currently includes qualifications linked to green sectors such as Agriculture, Building and Construction, Engineering, Environmental Conservation, Horticulture and Forestry and Science. An estimated 11 million adults over the age of 24 in England are eligible for the Free Courses for Jobs offer. We will continue working closely with employers to understand where the offer could be extended further to enable more adults to access qualifications to give them skills needed for the net zero transition.

This will be underpinned by the Lifelong Loan Entitlement (LLE) from 2025, which will provide individuals with a loan entitlement equivalent to up to four years of post-18 education to use over their lifetime. As part of the pathway towards the LLE, we will trial short course provision at Levels 4-6 to support in-work adults to upskill and retrain, enabling learners to flexibly build towards a full qualification in subjects crucial for net zero including STEM and digital innovation.

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[131] Industrial Strategy Council (2019), 'UK Skills Mismatch 2030 – research paper', https://industrialstrategycouncil.org/uk-skills-mismatch-2030-research-paper

[132] What Qualification Levels Mean, GOV.UK, https://www.gov.uk/what-different-qualification-levels-mean/list-of-qualification-levels

Through the NSF we are also delivering an Emerging Skills Project in electrification and battery technology, which commenced in June 2021. Alongside this, our NSF funded In-Work Skills Pilot, launched in September 2021, will seek to respond to immediate skills shortages required for net zero, stimulate demand for short course provision at levels 4-5 across STEM sectors, and boost worker's career and progression opportunities in key green sectors, such as electrification in the auto industry and low carbon engineering.

Given the pace and the scale of the transformation, we are considering how government can work more closely with sectors in the future to support them in the green transition, and identifying where we can adapt and enhance our support for people at risk of redundancy to support a transition to green jobs. This builds upon our existing work coach interventions and targeted provision including Sector-based Work Academy Programmes (SWAPs), traineeships, apprenticeships and other skills provision which are ensuring jobseekers can develop the right skills to move into green jobs.

3.17.6.3 Working with business to support people from all backgrounds to have a green career

We support the Green Jobs Taskforce's recommendation that industry should prioritise ensuring that people from all backgrounds can work in green jobs, building on existing good practice and capitalising on the unique opportunity of young people's interest in climate change and the environment. A more diverse workforce will aid the transition by expanding the talent pool, encouraging new ways of thinking, enhancing innovation, and boosting profitability and productivity across the economy.[133]

To drive this important work forward we will continue to encourage industry to ensure there is equal opportunity for all to work in the green economy, building on our support for industry initiatives such as the POWERful Women campaign and commitment under the 'Equal by 30 Campaign' to close the pay gap, improve female representation in senior roles and opportunity for women in the global clean energy sector by 2030. Through the cross-cutting delivery group we will explore what actions can be taken across industry to improve diversity in the green economy, including improving data collection and transparency.

Alongside this, we will continue to work with green employers to raise awareness of the opportunities in the green economy through an integrated careers information, advice and guidance offer through schools, colleges, universities, and employers to raise awareness of different career pathways in low carbon sectors.

To further break down perceived barriers to working in the energy sector, boost diversity and increase STEM skills, our Build Back Better campaigns will seek to inspire people from all walks of life to work in the green economy, and raise awareness of green education, training, and careers.

The UK's joint presidency of COP26 brought a unique opportunity to showcase green careers to a new generation of children and young people. We capitalised on this by working with industry to launch the Faces of The Energy Transition campaign to showcase the inspiring people, projects and organisations working to achieve the clean energy transition, and supporting green careers events at COP26 in Glasgow.

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[133] BEIS (2021), 'Green Jobs Taskforce report', https://www.gov.uk/government/publications/green-jobs-taskforce-report

3.17.6.4 Building a foundation for future green careers

Schools and colleges will play a vital role delivering high-quality education and training to equip young people with the knowledge and skills required for the green economy. This will help to grow the pipeline of skilled workers needed to help deliver the net zero transition.

The science, geography and citizenship programmes in the National Curriculum at both primary (KS1-2) and secondary (KS3-4) cover key content which supports knowledge and understanding of sustainability and climate change. An environmental science A level was introduced in 2017. Equipping students with secure knowledge and skills in STEM and other key subjects will be critical in supporting them to progress to skilled jobs in the green economy. We are, therefore, supporting teachers to deliver high-quality teaching in these subjects by creating a world-class teacher development system that builds from initial teacher training through to early career support, specialisation and onto school leadership. Our vision is that a golden thread of training, support and professional development – informed by high-quality evidence – will run through each phase of a teacher's career. We are also funding several initiatives to support subject-specific professional development in STEM subjects across all key stages. We are working with Oak National Academy to give teachers access to high-quality curriculum resources to support their teaching, including in subjects that cover sustainability and climate change. We are also working with industry, through programmes such as Tomorrow's Engineers Code, to showcase the diversity of roles and people that make up the STEM sector, encouraging more young people from different backgrounds to choose a career in the sector.

The Department for Education has recently published its Sustainability and Climate Change Strategy, with the Department engaging with the sectors and young people to capture and reflect their ideas and views. The Strategy sets out how our children's services, education and skills systems will support the UK to meet its net zero target, become more resilient to climate change and improve biodiversity. It includes a focus on ensuring excellence in education for a changing world, which will prepare children and young people with the knowledge and skills they need to contribute to the green economy.

At post-16 level, we will continue to build on our apprenticeship reforms, set out in the *Skills for Jobs White Paper*, to align the majority of post-16 technical education and training with employer-led standards by 2030. A strengthened system of employer-led standards, underpinning apprenticeships, T-levels and new higher technical qualifications will ensure employers, including in low carbon sectors, have a central role in designing and developing qualifications and training.

To ensure this system reflects the needs of the green economy, the Institute for Apprenticeships and Technical Education (IfATE) has convened a Green Apprenticeships Advisory Panel (GAAP) to work with employers to align apprenticeships to net zero objectives. Work is underway to map existing apprenticeship standards against green occupations and identify opportunities to create new standards in areas including retrofit, agri-tech and renewable energy and the GAAP has endorsed existing apprenticeships which support green career pathways. We have already seen positive engagement in the energy sector with over 1,000 apprenticeship starts in Wind Turbine Maintenance and Operations Engineering Technician standards in 2019/20. The GAAP will build on this list into 2022, in line with the *Ten Point Plan* and the findings of the Green Jobs Taskforce. The work of the GAAP will also support other key post-16 programmes that are underpinned by the same standards as apprenticeships (such as T levels and higher technical qualifications) to align with the needs of the green economy.

In 2021, we introduced the first occupational traineeships, in collaboration with sector bodies, to provide a clear, planned transition to an apprenticeship at Level 2-3 for young people aged 16-24. Going forward, we will consider the potential to develop and introduce other occupational traineeships, including in priority and green sectors to ensure that young people secure the jobs of the future.

We are continuing to roll out T Levels that support green careers, providing high quality technical qualifications as an alternative to A Levels which are underpinned by the same employer-led approach as apprenticeships. The building services engineering for construction T Level, launched in September 2021, will cover housing retrofit and heat pump installation. From September 2022, new T Levels will be available in Engineering, Manufacturing, Processing and Control, with Agriculture, Land Management and Production available by September 2023. IfATE is exploring the suitability of potential future T Levels and occupational specialisms, focusing on areas to support green skills.

IfATE has introduced an approval process for Higher Technical Qualifications (HTQs) at Levels 4 and 5. HTQs will be rolled out for teaching from September 2022, covering eleven occupational routes – including qualifications in digital, construction and engineering – coming on stream up to 2025. Future roll-out will continue supporting the development of skills for the transition to net zero as a key government priority. The goal is to grow the number of learners undertaking high-quality level 4 and 5 qualifications to meet skills needs at this level. Earlier this year, we launched an £18 million higher technical education provider growth fund to allow investment in new equipment that will support providers to expand technical studies, and boost local employer links. Our growth fund is supporting 15 universities and 87 FE colleges to teach HTQs from next year.

Finally, our network of Institutes of Technology (IoTs) across England are utilising their state-of-the-art facilities to offer training in green skills. This includes the East London IoT which offers training in green and zero carbon energy production, and the Greater Birmingham and Solihull IoT which focuses on sustainable engineering. The network is supporting increased participation from under-represented groups, including women, helping to grow the pipeline of individuals with STEM skills needed for green jobs. We are investing £120 million in the second wave of IoTs, to be up and running by 2022.

3.17.6.5 Next steps

The policies set out in this chapter represent a first step in addressing the challenges identified by the Green Jobs Taskforce. We will progress further work through the Green Jobs Delivery Group, maintaining the momentum generated by the Taskforce to drive action across the green skills agenda. Working alongside industry through the Green Jobs Delivery Group, we will continue to build the evidence on the skills gaps which could hamper the net zero transition if left unaddressed, assess how far existing interventions are on course to address those skills gaps, and where appropriate identify further opportunities to flex key skills programmes to support green sectors and occupations.

3.17.7 Scottish Government

The Scottish Government's Climate Emergency Skills Action Plan[134] sets out short and long term actions to support the skills needed for a green recovery and just transition to net zero. Actions include establishing a new Green Jobs Workforce Academy[135] to support

[134] https://www.skillsdevelopmentscotland.co.uk/media/47336/climate-emergency-skills-action-plan-2020-2025.pdf

[135] https://careers.myworldofwork.co.uk/green-jobs-workforce-academy

existing employees, and those who are facing redundancy, to assess their existing skills and undertake the necessary upskilling and reskilling they need to secure green job opportunities as they emerge.

The Scottish Government's Green Jobs Fund[136] supports businesses providing low carbon products and services with capital grants. The fund will secure and create jobs by supporting businesses and their supply chains to develop and grow.

3.17.8 Welsh Government

Skills Action Plan

We have an important part to play in ensuring that skills are a key enabler for net zero, promoting fair work alongside good and safe employment in social partnership with trade unions and employers. We will develop a Net Zero Wales Skills Action Plan, which we intend to publish later in 2022.

3.17.9 Northern Ireland Executive

Innovation is key to the disruptive transition required. '10X Economy' sets out the vision for the 2020s as a decade of innovation bringing opportunity and growth. The focus on innovation is reinforced in the Green Growth and Energy Strategies which both strongly advocate innovation, research and development. New skills will be critical to allow innovation to flourish into delivery. The Skills Strategy[137] consultation recognises that a transformational change in skills is required to take advantage of Northern Ireland's scale, yet addressing the challenges in the skills sector.

There are a number of skills gaps in the short, medium and long term. In the short term there will be a requirement to upskill engineers for the increased installation of heat pumps. In the medium term there will be increased need for Civil and Electrical engineers, which will be required for infrastructure along with digital and analytical experts to help understand how we consume energy. Finally in the long term there will be an ever increasing need for engineers and a requirement for project managers to help with the increased renewable and green production of the energy we consume.

To take one example, the decarbonisation of gas infrastructure will involve the development of new supply chains for production of bio-methane from anaerobic digestion plants and development of hydrogen production technologies, which will support green jobs and new skills in these sectors.

Colleges in Northern Ireland also offer direct innovation and R&D support to employers and provide assistance to bring new ideas in the renewable energy and sustainable technology sectors to the market. This includes support for new product and process development in areas such as biogas, biomass, low energy construction (including Nearly Zero Energy Buildings and Passive House techniques) and industrial energy conservation.

This support is channelled through College Innovation Centres and one example is the Centre for Renewable Energy and Sustainable Technologies (CREST) at South West College (SWC). CREST provides industry R&D, demonstration and testing facilities for new renewable energy products. The facilities are available to SMEs across Northern Ireland, who have ideas for new products or process developments but who do not have the physical and/or technical

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[136] https://www.gov.scot/publications/protecting-scotland-renewing-scotland-governments-programme-scotland-2020-2021/pages/5/

[137] Available at https://www.economy-ni.gov.uk/publications/skills-10x-economy-skills-strategy-northern-ireland

capacity to develop, test and commercialise them. These state-of-the-art facilities include laboratory space, testing equipment, demonstration technologies and the assistance of technical staff to help bring ideas and concepts to the next stage of development.

The CREST Centre itself was the catalyst for the new award winning Passive House premium rated Erne campus which was completed in 2021. This is the first educational and largest premium rated building in the world. Coupled with this, the campus also successfully attained a BREEAM Outstanding accreditation therefore making it a unique and world leading example of large scale sustainable design and construction. The development of the campus has earned international recognition and was instrumental in the College being assigned the designation of a United Nations High Performance Building Centre of Excellence at COP26 last year. This global standard has already begun to pay dividend from a curriculum delivery perspective with the development of links for student visits to USA and Canada planned for this summer.

In the **Hydrogen services** sector, Ulster University has developed post graduate courses for hydrogen specialisms (safety and technology) with additional operational, maintenance and design skills coming for 2025.

3.18 Public sector: Embedding Net Zero in government

3.18.1 Key commitments

- Require the government to reflect environmental issues in national policy making through consideration of five environmental principles.
- Ensure that decisions taken on government spending are informed by their impact on meeting net zero.
- New measures to reduce emissions from Government's £292 billion procurement spending – and ensure suppliers have plans for achieving net zero on major qualifying public contracts.
- Continue to fund the Public Sector Decarbonisation Scheme at £475 million per year to drive ambitious emissions reductions in schools, hospitals, and other public buildings, whilst taking further action on skills, reporting, and targets.
- Publish an annual progress update against a set of key indicators for achieving our climate goals.
- Expand climate change training to ensure the Civil Service has the skills and people it needs to deliver net zero.

3.18.2 The Challenge

Net zero is a complex and transformative undertaking for the UK. The way the government operates must rise to meet this challenge. This means reducing the public sector's own carbon footprint – but also changing how we are organised and how we take decisions. Building on our recent historic progress, we are now going further to ensure the whole government meets the challenge of net zero.

3.18.3 Our goals

Since setting the net zero target, a huge effort has been made across government to ensure we are set up in the right way to deliver on our climate ambitions. We have gone further than ever before to put the climate at the heart of our decision-making. This includes:

- Establishing two Cabinet Committees dedicated to climate change;

- Announcing as part of the Integrated Review of Security, Defence, Development and Foreign Policy that tackling climate change and biodiversity loss will be the Government's number one international priority;
- Using the Environment Bill to require the government to reflect environmental considerations in national policy making through consideration of five environmental principles;
- Taking new approaches to embed net zero in spending decisions;
- Establishing the No.10 Delivery Unit to ensure the government maintains a sharp focus on delivering the country's key priorities. One of the four priorities for this Unit is the delivery of net zero; and,
- Setting out in collaboration with key net zero delivery departments, a high level strategy for delivering on the UK's net zero commitments through the BEIS Outcome Delivery Plan 2021-2022. This plan identified key programmes critical to delivery and set out an evaluation plan to monitor and assess progress.

These efforts put climate change at the heart of our decision-making and have led to the ambitious announcements set out in recent years: the Prime Minister's Ten Point Plan for a Green Industrial Revolution, dedicated strategies for key sectors of the economy, and this Net Zero Strategy; and set us up to deliver on those commitments.

Our goal is to go even further to embed net zero across government activity. This will mean that government takes net zero into account when taking decisions, public sector buildings will emit less carbon, our procurement decisions will lead to greener supply chains, and civil servants across government will have the skills they need to deliver this mission.

To do this we must understand the interactions between climate change and other UK priorities. The measures set out in this chapter are crucial for ensuring that the UK takes a whole system approach to tackling climate change:

- Multiple forums – including Cabinet Committees – that bring together different perspectives on net zero and its interaction with other priorities;
- Delivering climate skills and training across the Civil Service – not just to civil servants working directly on climate issues;
- Close working relationships with local government and the Devolved Administrations; and,
- Embedding net zero in a wider range of decision-making levers.

3.18.4 Net zero in government decision-making

In the last two years the Government has made commitments to strengthen governance around net zero. Two Cabinet committees were established in 2020 to rationalise climate governance and put net zero at the heart of government decision-making. This is driven by the Prime Minister, who chairs the Climate Action Strategy Committee (CAS). This Committee considers matters relating to the delivery of the UK's domestic and international climate strategy. In addition, the Climate Action Implementation Committee (CAI) which is chaired by the COP President Designate. It considers the delivery of COP 26, net zero and building the UK's resilience to climate impacts. These committees' ability to scrutinise progress and take whole system decisions will be strengthened by the new measures described in this chapter.

These committees are supported by well-established and robust governance at official level. This includes a cross-government Director General group that was established in 2019 to ensure a whole-of-government approach to climate policy, with oversight at the most senior levels. Chaired by the BEIS Director General for Net Zero and International, this group brings together officials from across government, creating a whole system perspective, to support the delivery of significant climate announcements, including those contained in this Strategy.

3.18.4.1 Consistency of approach across the UK

To reach net zero we must take a UK-wide approach. The UK Government and the Devolved Administrations are committed to working together to deliver coordinated policy action to meet respective emissions reduction targets across the UK. Combined, Scotland, Wales and Northern Ireland produced 22% of UK emissions in 2019,34 and accounted for 16% of the UK's population, 13% of economic activity[138] and nearly half of the UK's land area (46%)[139]. Powers and policies to deliver ambitious emissions reductions in the Devolved Administrations Scotland, Wales and Northern Ireland are partly reserved to the UK Government and partly devolved.

The UK Government and the Devolved Administrations have established governance arrangements to ensure a joined-up and collaborative approach to climate change. At the bimonthly Net Zero, Energy and Climate Change Inter-Ministerial Group, UK Government ministers meet with Devolved Administration counterparts to discuss emerging policies that will contribute to delivery of net zero targets across the UK, such as delivering a UK-wide Emissions Trading Scheme, and the level of the sixth carbon budget which was set in law in June 2021. The Group is supported by the official-level Net Zero Nations Board on alternate months.

3.18.4.2 Embedding net zero in government decisions

Climate change is a major issue for all governments in the 21st century. Our mission to reduce emissions, seize economic opportunities, and adapt to extreme weather events will affect many more of the decisions that the Government takes than it would have done in previous decades. To that end, it is essential that we put in place new levers to ensure that all the Government's decisions adequately take climate change into account. This Strategy sets out key measures we will take to ensure a climate-focus on key future decisions made by the government.

We are using the Environment Bill to require the government to reflect environmental issues such as climate change in national policy-making through consideration of five environmental principles:

- The integration principle is the principle which states that policy-makers should look for opportunities to embed environmental protection in other fields of policy that have impacts on the environment.
- The prevention principle means that government policy should aim to prevent, reduce or mitigate harm.
- The rectification at source principle means that if damage to the environment cannot be prevented it should be tackled at its origin.

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[138] ONS (2021), 'Regional gross domestic product: all ITL regions', 1998 - 2019

[139] CCC (2020), 'Sixth Carbon Budget', https://www.theccc.org.uk/publication/sixth-carbon-budget/

- The polluter pays principle is the principle that those who cause pollution or damage to the environment should be responsible for mitigation or compensation.
- The precautionary principle states that where there are threats of serious or irreversible environmental damage, a lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

The duty to consider these principles should be applied in the early stages of policy development and considered throughout. In doing so, the extent to which a policy will contribute to climate change should be considered alongside other impacts of the policy on the environment. Net zero will therefore be facilitated by the principles where they are applied to relevant decisions.

The integration principle will create a prompt for policy makers to embed environmental protection in policy making, triggering consideration of the government's priorities for environmental protection (such as net zero) and whether these priorities can be supported through the new policy. The polluter pays and prevention principles could also help to contribute to net zero targets, through encouraging policies that reduce carbon emissions and prevent adverse impacts on climate where possible. These principles will ensure the environment is at the heart of policymaking across government.

Ensuring spending decisions contribute to net zero is a major priority for HM Treasury. The Green Book already mandates the consideration of climate and environmental impacts in spending. It has been updated so that policies must be developed and assessed against how well they deliver on the Government's long-term policy aims such as net zero.

Spending reviews are critical moments for the Government to look strategically at the country's priorities and make spending decisions based on these. At Spending Review 2020 (SR20), guidance required departments to state the greenhouse gas emissions of bids, and their impact on meeting Carbon Budgets and net zero. Allocations to departments were informed by this information, and £12 billion was committed to green measures. We have reviewed the learning from this exercise to further embed climate change in spending decisions in the next spending review and in the long term.

In September 2021, the Government published updated guidance on how impacts on greenhouse gas emissions should be measured in policy decisions. As a result, departments must place a significantly higher value on emissions in determining policy, as the values now fully reflect the UK's increased ambitions on climate. This complements wider considerations on natural capital impacts in policy decisions – and represents a significant step forward in incorporating environmental impacts into policy development.

As set out in the *Green Investment* chapter, we have also taken steps to ensure net zero is embedded in government funding and regulation of the financial system. Arm's-length bodies, such as the British Business Bank, have adopted net zero as a core objective. This will expand the flow of finance to those innovative firms that will help us reduce our energy consumption and mitigate the impacts of climate change.

This builds on important announcements in the 2021 Budget, particularly the new UK Infrastructure Bank that will use its £22 billion of financial capacity to crowd-in private investment to support economic growth, accelerate our progress to net zero, and help level up the UK. One of the Bank's objectives is to help the UK transition to net zero emissions by 2050.

We will make sure that the reformed planning system supports our efforts to combat climate change and help bring greenhouse gas emissions to net zero by 2050. For example, as part of our programme of planning reform we intend to review the National Planning Policy Framework to make sure it contributes to climate change mitigation and adaptation as fully as possible.

3.18.4.3 Supporting UK businesses

We are considering net zero through our support to business too across government activity. Innovate UK is the UK's Innovation Agency, it drives productivity and economic growth by supporting UK businesses to commercialise new ideas and address the big societal challenges facing the UK today.

As the UK moves to a net zero economy, Innovate UK is supporting businesses to exploit new ideas, develop supply chains, and thrive in growing global markets. Last year Innovate UK committed to spend £276 million with UK businesses to tackle net zero.

3.18.4.4 Net zero in the work of regulators

Many of the UK's regulators will play a role in facilitating delivery of the infrastructure, technologies and activities that will deliver the net zero transition. Several examples are set out in the sector focused chapters in this strategy. The government is also considering whether and how the functions of those regulators most important to the transition can be strengthened.

For example, to provide strategic guidance to Ofgem on the government's energy policy, the *Energy White Paper* committed the government to consulting on an energy sector strategy and policy statement (SPS) for Ofgem during 2021. The SPS will set out the strategic priorities and policy outcomes of the government's energy policy, with net zero as the driving theme. This will impose a legal obligation on Ofgem to have regard to the strategic priorities and policy outcomes when exercising its regulatory functions. To provide clear legal accountability, Ofgem will be required to report on how it intends to implement the SPS at the outset, and then report annually on its performance and its plans for the coming year.

The Competition and Markets Authority (CMA) is reviewing how the UK can better use the tools available under competition and consumer law to achieve net zero and our sustainability goals. This follows recent CMA work on misleading environmental claims, its market study into electric vehicles and its publication of information to businesses on sustainability agreements.

The National Infrastructure Strategy committed to taking a long-term approach to investment for the benefit of both investors and consumers, responding to the findings of the National Infrastructure Commission's report on the future of economic regulation in key infrastructure. The government also committed to publishing an overarching policy paper. The policy paper will set out next steps on key issues including: the consideration of duties in the round to ensure they reflect new challenges such as achieving net zero, promoting coherence, and supporting a transparent strategic framework; and the exploring of the merits of a cross-sector-strategic Policy Statement to provide clarity on government's overarching strategic vision for the regulated sectors.

In addition, the Government has recently consulted on proposals for reforming the UK's regulatory framework. When the consultation response is published, it will include the Government's decisions on how regulators can be encouraged to consider themes such as competition, innovation and net zero in their regulatory activities. For example, the consultation sought views on whether regulators might be granted more flexibility by

government to choose how they intervene in their sectors, to allow more agile, smarter regulation. The Government would like to see a consistent approach taken across the various regulated sectors and will set out more thinking on this in due course.

3.18.5 Demonstrating progress towards net zero

3.18.5.1 Increasing transparency of progress

Every year the government comprehensively reports the UK's historic emissions since 1990 and publishes projections of future emissions[140]. The UK's 'Energy and Emissions Projections' is a world-leading approach to projecting the UK's annual emissions, by sector, according to United Nations Framework Convention on Climate Change guidelines.

We are now going further to clearly demonstrate the tangible milestones that the UK will have to reach to achieve net zero, and to communicate and invite scrutiny on this progress to the public.

It is critical for public and industry confidence that the UK has a clear plan for achieving net zero – and that we are transparent about how this plan progresses and changes over time. The *Journey to Net Zero* chapter of this Strategy report set out a delivery pathway: an indicative trajectory of emissions reductions based on potential in each sector of the economy, which keeps us on track to meet the sixth carbon budget ending in 2037. Sector chapters set out policies and proposals in line with this indicative pathway to ensure we are on track for net zero. While it is impossible to predict every path to net zero, this pathway sets out the decisive action we know is needed and acts as the best plan we have to measure progress against.

We are therefore committing to provide a public update every year on progress in the previous year against the delivery pathway to net zero set out in this Strategy. This will include:

- An update on progress against the targets and ambitions set out in this Strategy, building on this list over time to incorporate additional Government targets and wider non-Government indicators of progress;
- Commentary on contextual changes that might affect the exact pathway to meeting decarbonisation commitments; and,
- A summary of key areas of progress made against this pathway the policies and proposals in this strategy.

We will publish an updated Net Zero Strategy when we set the next Carbon Budget.

Strengthening delivery oversight of net zero projects and programmes

3.18.6 Government leading by example

3.18.6.1 Decarbonising the public sector

Government and the wider public sector will lead by example during the transition to net zero. As well as ensuring that net zero is reflected in our structures and practices, we will continue to take ambitious action to reduce public sector emissions, showing leadership to the wider economy, and making a direct contribution to reaching net zero.

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[140] BEIS (2021), *Final UK greenhouse gas emissions national statistics. BEIS (2020), Updated energy and emissions projections: 2019*

Direct emissions from public sector buildings account for around 2% of total UK emissions, and the public sector has reduced its emissions by around 40% since 1990[141].

We intend to act in three areas to ensure we are on track to achieve net zero: investment, transparency, and capacity and capability, and in doing so will aim to reduce direct emissions from public sector buildings by 75% against a 2017 baseline, by the end of Carbon Budget 6.

Investment

Reducing direct emissions from public sector buildings requires investment in measures to reduce fossil fuel use, including the installation of low carbon heating and complementary energy efficiency improvements, and the installation of low carbon electricity systems such as rooftop solar PV. The Public Sector Decarbonisation Scheme is providing over £1 billion in grants over 2020/21 and 2021/22 for public sector bodies to fund heat decarbonisation and energy efficiency measures.

Building on the success of the Public Sector Decarbonisation Scheme, we will continue and extend the scheme to ensure that public sector bodies have access to finance to continue decarbonising their estates , investing a further £1425 million over 2022/23 to 2024/25.

High standards with transparency

Public sector organisations should be taking steps to achieve net zero now should report their progress so they can be held accountable and as publicly funded organisations. Government departments and their arm's length bodies already set and report against targets to reduce their greenhouse gas emissions in Greening Government Commitments. The updated Greening Government Commitments framework for 2021-25 will ensure the public estate continues to reduce its environmental footprint, align with commitments in our 25 Year Environment Plan and be consistent with a trajectory to achieving net zero greenhouse gas emissions by 2050.

All public sector bodies should now be monitoring their energy use and have targets to reduce emissions, particularly, to reduce the direct emissions for which they are responsible. To ensure we are on track to reach net zero, emissions from the public sector should be reported and monitored on a consistent and coherent basis. We will provide guidance to make clear the government's expectations in this regard.

We will also legislate to enable us to require the reporting of public sector emissions on a consistent and coherent basis if this is not done on a voluntary basis, and, if insufficient progress is made on reducing emissions in the public sector, to require that all public sector organisations are working toward and reporting against a legally-binding target to reduce their greenhouse gas emissions.

Capacity and capability

Reducing emissions requires specialist skills and expertise, as well as funding. Action at an unprecedented scale is required to reduce emissions from public sector estates in line with net zero, and organisations need the right skills and structures to deliver on this. We will continue to work with partners across government and the wider public sector to understand these needs, and provide the support needed to address them.

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[141] *Collection Final UK Greenhouse gas emissions national statistics, BEIS*, https://www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-national-statistics

3.18.6.2 Delivering net zero through public procurement

The Government is determined to leverage public procurement to help achieve net zero. We will use our buying power to drive decarbonisation and to create the policy tools and training to enable public procurers to grasp this opportunity.

Clearly establishing the strategic importance of net zero at project design stage, as described above, will mean that it is easier to draw through this 'golden thread' when reaching procurement stage. The government has recently announced three distinct new policies that can all help public procurers fully embed net zero into their work. These all kick in at different stages of the commercial cycle, complementing each other in terms of their scope and their reach.

The National Procurement Policy Statement (NPPS), published in June 2021, sets out clear principles that contracting authorities should be following organisationally. Tackling climate change and achieving net zero is one of the key considerations established – this should then be woven through individual procurements (for qualifying procurements).

The Procurement Policy Note on *Taking account of carbon reduction plans in the procurement of major government contracts* came into effect from Autumn 2021. This will impact over £50 billion of procurement spend. For qualifying contracts, it requires suppliers who are bidding on central government contracts (over £5 million p/a in value) to commit to achieving net zero by 2050 and to detail their organisation's UK greenhouse gas emissions via the publication of a Carbon Reduction Plan. Failure to do so may mean exclusion at supplier selection stage. Government will continue to take action to reduce emissions, and this policy is an important step in ensuring our supply chain is sharing this ambition and taking similar steps to reduce their emissions.

The Social Value Model requires government to expressly evaluate environmental, social and economic benefits, with these factors comprising a minimum of 10% of the evaluation score for qualifying procurements[142].

Throughout the development of these policy measures, government has been working with departments, suppliers and industry bodies to raise awareness of how environmental considerations can be brought into the commercial process, and to build capability in understanding and assessing suppliers' commitments. Several thousand buyers across government have completed Social Value training to develop the skills required to embed environmental policy outcomes and improve the sustainability of government contracts. We will continue to support the adoption and implementation of environmental policy measures to deliver the best commercial and environmental impact for the UK.

These measures provide a platform for even stronger action. We have embarked upon a programme of major domestic procurement reform. This will enable us to use flexibilities provided by our departure from the EU to give even greater consideration to environmental factors in our decision making. One specific example is the proposal to break the subject matter of contract link so that a company's wider environmental proposals for the project can be factored into procurement decisions.

Domestically we also want to make it easier for procurers to balance carbon against cost. We want to underpin our net zero target and COP26 ambitions by developing tools to help us decarbonise the government's supply chains and stimulate innovation and growth in the UK's

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[142] Government Commercial Function, 'Guide to using the Social Value Model'. 3 December 2020. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940827/Guide-to-using-the-Social-Value-Model-Edn-1.1-3-Dec-20.pdf

green economy. This work also takes into account the Climate Change Committee's (CCC) call for credible, quantifiable pathways for sectoral decarbonisation. We will also explore the possibility of establishing a new single unit for all sustainable procurement policy within government to strengthen performance, coordination, and oversight.

Our ambition is necessarily high – we are changing the expectations on ourselves when it comes to utilising £292 billion of annual procurement spend. In doing so we are also sending a clear signal to the market: data on carbon impact, and immediate ambition to reduce it, will be increasingly important in how we choose to do business with you.

3.18.6.3 Showing leadership on domestic and international standards

The BSI, in its role as the UK's national standards body, works across the sectors and topics that will be critical in achieving net zero, including greenhouse gas management, energy transition, biodiversity and sustainable finance. This work is helping the UK to take a global leadership role in net zero and influence change on a global scale. To this effect BSI and the International Organization Standardization have developed the London Declaration – a commitment to actively consider climate change in the development and revision of all international standards and to facilitate the involvement of civil society and those most vulnerable to climate change.

Through BSI's international reach, the UK will be able to help stakeholders reach consensus in international climate change standards and lead change globally in support of net zero.

3.18.7 Ensuring the right skills and talent in government

The government has established the Government Skills and Curriculum Unit (GSCU) to oversee the delivery of better training, knowledge and networks that the over 440,000 people working in the Civil Service will need today and in the future.

Net zero will continue to be a priority for the government until 2050 and beyond. To that end, BEIS and GCSU are reviewing the skills, training and networks that civil servants need to lead the UK's future efforts to decarbonise.

We are expanding the curriculum for civil servants to include specific training on climate change. We are also establishing climate specific training within the Civil Service Fast Stream curriculum.

We have also embedded climate considerations in the Policy Profession Standards, the competency framework that supports professional development for all civil servants developing policy. For the first time, this makes explicit that good policymaking requires an awareness of the potential for all policy areas to contribute or undermine our climate goals.

We are establishing a new climate focus within the Civil Service Fast Stream Generalist Scheme, which will focus on providing relevant skills and opportunities to some of the future leaders of the Civil Service.

3.18.8 Health/NHS

The NHS has a unique responsibility when to comes to climate change. According to its landmark Delivering a Net Zero NHS Report, as of 2020 the NHS in England was responsible for some 24.9Mt of emissions. This would equate to around 4% of national emissions. This includes major contributions to the UK's emissions footprint through the NHS's procurement of goods and services (calculated by NHS England at around 19 Mega tonnes of CO_2 equivalent), which are around 62% of the overall NHS footprint. In addition, NHS organisations manage over 25 million square meters of land in acute care alone, supporting key government ambitions on biodiversity, air quality, and waste reduction.

Given this background, the Government has recently taken steps to formalise the NHS's responsibilities on climate change in law. The Health and Care Act (2022) places a duty on NHS Trusts, Foundation Trusts, Integrated Care Boards and NHS England to have regard to the government's key ambitions on climate change and the natural environment in everything they do.

This will give vital legal grounding to the excellent work underway across the NHS, which has already achieved a 30% reduction on 2010 emissions. The NHS is now publicly committed to achieving Net Zero for its direct emissions by 2040, and by 2045 for its entire emissions footprint.

Across the system, Net Zero is pursued through Green Plans at both the individual NHS provider (Trust) and regional (Integrated Care System) level. The 2021/22 NHS Standard Contract set out the requirement for trusts to develop Green Plan to detail their approaches to reducing their emissions in line with the NHS's national trajectories. Green Plans provide a structured way for each trust and ICS to set out the carbon reduction initiatives over three-year periods. All 212 NHS Trusts in England now have a green plan, setting out actions they will take to reduce their impact on the environment.

The Green Plans focus in particular on the need to decarbonise the NHS estate, and this will be a major priority over the next decade. NHS direct emissions account for a third of all public sector direct emissions, and the majority of these are from NHS buildings.

The Government has already invested over £550m in NHS estate decarbonisation through the Public Sector Decarbonisation Scheme (PSDS). BEIS has recently confirmed a further £1.425 billion in public sector Net Zero funding for this Spending Review period. The first tranche of this funding is currently being allocated for 22/23. With regard to estates operations, the NHS is committed to ensuring NHS Trusts purchase 100% renewable energy.

The NHS also continues to take meaningful steps to decarbonise its significant supply chain emissions. In September 2021, NHS England set out clear expectations of suppliers between now and 2030, supported by a framework for suppliers to self-certify their decarbonisation achievements and benchmark against requirements, initially voluntarily. NHS England is due to launch the NHS sustainable supplier framework in 2022. It will also be used to simplify and provide consistency for the purchasing of low-carbon goods and services. They have also set out an intended timetable for when contractual requirements come into place.

With regard monitoring, since 2008, the NHS has tracked and reported its carbon footprint, regularly improving its methods and monitoring across the NHS. Annex 2 of Delivering a Net Zero National Health Service report describes the analytical approach to this in detail.

To support the NHS's net zero and wider environmental ambitions, new data collection methods are being developed to enable the more granular calculation of carbon footprints and environmental impacts at regional, ICS and trust levels. The Greener NHS Data Collection was launched on 30 April 2021 to understand actions that are taking place over 2021/22 and provide a baseline from which progress can be understood.

3.18.9 Scottish Government

Climate change is embedded across the Scottish Government through a robust ministerial and corporate governance framework as described in Chapter 1.

In addition, the Climate Change (Scotland) Act 2009 requires that the Scottish Government set out the greenhouse gas emissions impacts of its spending decisions. A "carbon

assessment" of the budget is produced annually alongside any document setting out draft proposals for the use of resources in any financial year[143].

3.18.9.1 Public sector

Since 2016, public bodies in Scotland (including councils and the NHS) have been required to submit annual reports on their organisational emissions, procurement and adaptation. Public consultation in 2019 demonstrated strong support for public sector bodies being required to set targets for when they will achieve zero direct emissions, and for reduced indirect emissions. Subsequently, reporting duties were strengthened to include requirements on targets, where applicable, alongside other measures including a requirement to report alignment of spending plans.

Examples of specific commitments and action by the Scottish public sector on climate change includes:

- A 10.7% annual decrease in reported emissions across local authorities between 2018/19 and 2019/20[144];
- NHS Scotland's capital programme of new hospitals and health facilities being governed by their recently strengthened commitment to net zero by 2040;
- Scotland's colleges' commitment to net zero by 2040, and universities' commitments to net zero;
- Scottish Water's target of net zero by 2040.

3.18.9.2 Monitoring and evaluation

In addition to the annual reporting of statutory emissions reduction target outcomes. the Scottish Government also reports annually to the Scottish Parliament on progress towards the delivery of Climate Change Plans for meeting emissions reduction targets[145]. The monitoring framework used for this reporting lies at the heart of Scotland's 'learning by doing' approach to delivering emissions reductions. This approach reflects the inherent uncertainties in areas such as further technological innovation, market development and wider take up and adoption as well as action by others.

The independent UK Climate Change Committee (CCC) also publishes independent annual assessments of Scotland's progress in reducing emissions[146].

3.18.10 Welsh Government

3.18.10.1 Public sector

The public sector has an important role, in not only removing carbon from its own estate but within their span of leadership influence and operations.

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[143] A carbon assessment of the Scottish Budget 2022-23 is available at: https://www.gov.scot/publications/scottish-budget-2022-23-carbon-assessment/documents/

[144] Public Bodies Climate Change Reporting 2019/20, Sustainable Scotland Network, available at: https://sustainablescotlandnetwork.org/uploads/store/mediaupload/1343/file/SSN_AnalysisReport_2021.03.15.pdf

[145] The first annual statutory monitoring report required under the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 was published in May 2021 and is available at: . https://www.gov.scot/publications/climate-change-plan-monitoring-reports-2021-compendium/

[146] Available on the UK Climate Change Committee website at: https://www.theccc.org.uk/

Our ambition is for the Welsh public sector to be collectively net zero by 2030, radically reducing emissions from over 780 organisations. These organisations deliver vital public services including health and social care, protecting people and the environment, education, culture and the arts – they support and shape communities and have a shared focus on improving the economic, social, environmental and cultural wellbeing of everyone in Wales.

Given the diverse nature of the organisations within the public sector the Net Zero Wales plan focuses on the highest emissions areas (sustainable procurement, mobility and transport, net zero buildings and land use) together with the actions of the largest emitting organisations (NHS Wales and local government).

Sustainable procurement is also a key area requiring change. Research undertaken within the Welsh public sector has identified that the supply chains supporting the Welsh public sector account for circa 60% of their carbon emissions. With £7bn spent annually by the public sector there is significant scope to leverage our spending power to consider alternatives to purchasing and where necessary to buy differently factoring in net zero Wales. The responsibility for this transformation lies with the public sector budget holders at the earliest stage of decision making and then transmitted through the procurement process and contract management. We want the public sector to procure from businesses that embrace net zero emissions and in doing so support low carbon suppliers as part of our wider transition to a net zero society.

The below provides an overview of the support tools available and best practice and reiterates the mandated actions the public sector need to be leveraging to drive real progress.

- All public sector organisations should use the Routemap and Reporting Guide to develop and publish plans by March 2023 to achieve a collective net zero public sector by 2030
- The Welsh Government's plan to achieve net zero as an organisation by 2030 will be published in spring 2022
- The Welsh Government to include Net Zero Wales commitments in remit letters and sponsor arrangements with public bodies in Wales
- Make Carbon Reduction Plans a mandatory part of tenders for Welsh Government procurement contracts over £5m from April 2022 and prioritise products which are fully recyclable, multi-use or able to be re-purposed as part of a more circular approach to waste
- All new public sector cars and light goods vehicles should be zero/ultra-low emission by 2025 and heavy goods by 2030
- All public sector organisations should understand the sequestration potential of land in their ownership by March 2023 and commit to taking action to realise this potential by March 2030
- NHS Wales is committed to the collective net zero ambition by 2030 delivering through the NHS Decarbonisation Strategic Delivery Plan
- A joint NHS Wales and LG Social Care Decarbonisation Plan will be created to support the achievement of a collective net zero by 2030

In addition to the above policies, key commitments for 2021-2025 and strategic planning for both the Health and Social Care sector and local authorities have been mapped out in the Net Zero Wales plan.

3.18.10.2 Monitoring and evaluation

Welsh legislation was designed to assess overall progress against the targets and budgets, by including reporting requirements after the end of each budgetary period. The Environment (Wales) Act 2016 requires Welsh Ministers to prepare and lay a statement after each budgetary period setting out whether Wales has met the budget and relevant interim targets. The statement must explain what the Welsh Ministers consider to be the reasons why the carbon budget and interim target has, or has not, been met. In particular, it must include the Welsh Ministers' assessment of the extent to which their proposals and policies for meeting the carbon budget for the period have been carried out and have contributed to the carbon budget for the period being met (or not being met). This report must be laid before the end of the second year after the budgetary period, allowing time for the emissions data to be compiled from the Greenhouse Gas Inventory, which requires 18 months from the close of year. The Carbon Budget 1 period was from 2016 – 2020, which means we will report on the Carbon Budget 1 period in 2022, and we will report on Carbon Budget 2 in 2027.

Under the Well-being of Future Generations framework we already have a monitoring approach that measures national progress in achieving the seven well-being goals. Our national well-being indicators tell the story of progress towards these goals and include measures of greenhouse gas emissions (both on a domestic and consumption basis). These are the national indicators most directly related to monitoring the impact of our Plans, but there are also many other indicators that the policies and proposals will influence.

The Net Zero Wales Plan monitoring and reporting framework allows for more detailed tracking of the policies, including implementation. It provides insight into how the policies set out in the Plan contribute to meeting the targets and budgets for the period. The Monitoring, Reporting and Verification (MRV) system consists of a suite of quantitative performance indicators within a tiered structure, which seek to track progress from the national level down to the policy level.

3.18.11 Northern Ireland Executive

3.18.11.1 Planning

The overall objective of the planning system is to further sustainable development. The Northern Ireland Regional Development Strategy 2035 (RDS) and the Strategic Planning Policy Statement for Northern Ireland (SPPS) provide the key guiding principles for planning in Northern Ireland and both recognise the need to mitigate and adapt to climate change. Engaging with a range of stakeholders; and applying best practice will ensure that the planning system is fit for purpose; evolves to reflect key developments in respect of sustainable development and climate change and that existing planning strategy, policy and legislation continue to address the climate change challenge.

3.18.11.2 Eco-Schools

Northern Ireland has 100% of schools registered on the Eco-Schools Programme. The Eco-Schools Green Flag, awarded to schools with high achievement in their programme, is a recognised and respected eco-label for environmental education and performance. In Northern Ireland, the Eco-Schools Programme is operated by Keep Northern Ireland Beautiful, an environmental charity, and is supported by the Department of Agriculture, Environment and Rural Affairs and other organisations. Northern Ireland is ranked fourth out of the sixty-four participating countries for number of Green Flag Status Schools and was also the first country in the world to award a Green Flag to one of its schools.

3.18.11.3 Electricity Contracts

The Department of Finance's (DoF) Construction and Procurement Delivery (CPD) has established a collaborative contract for the supply of metered electricity to public sector buildings throughout Northern Ireland. The contract is sourced from 100% renewable electricity. This is an established approach which is now considered business as usual.

CPD's current unmetered electricity contract is also sourced from 100% renewable electricity and this approach will continue as contracts come up for renewal.

3.18.11.4 Water Strategy

The Department of Infrastructure (DfI) is leading implementation of a Long Term Water Strategy for Northern Ireland (2015-2040), the objective of which is to deliver more sustainable, environmentally friendly and green solutions to managing our water.

3.18.11.5 Benefits of Hybrid Working Policy

The Coronavirus (Covid-19) pandemic response demonstrated Northern Ireland Civil Service' (NICS) ability to successfully adapt and innovate, and effective new ways of working and communicating emerged. A Hybrid Working policy is being rolled out across the NICS from June 2022. This will facilitate the majority of employees (c.75%) to adopt a mix of workplace-based and remote/home working. The Service is also continuing a roll out of 11 Connect2 hubs that will support hybrid working in the NICS by providing well-equipped remote working spaces in regional locations. One of the many advantages of these new ways of working is that it enables departments to achieve carbon reduction objectives with associated environmental benefits. The contributing factors are expected to be reduced daily commuting and less staff travel, the majority of which has necessarily been by car.

3.18.11.6 Scoring Social Value in Procurement

The Executive has implemented a policy to enhance the delivery of social value from public procurement. The Policy includes themes and outcomes to target zero carbon in supply chains. From 1 June 2022 all public sector tenders for works and services must include a minimum weight of 10% for social value in assessing and awarding contracts. This 10% minimum will apply to contracts for services and works above the threshold where the Procurement Regulations apply. Measures, impacts and outcomes will be reported annually. The first report will be published in June 2023.

3.18.11.7 Sustainability

The Northern Ireland Executive's Energy Management Strategy[147] aims to establish effective energy management processes that unlock value and lower net energy consumption by 30% by 2030 across Government (from a 2016/17 baseline year).

The **Department of Health**, for example, continues to work with its Arms Length Bodies to promote the Public Sector Energy Management Strategy to realise energy efficiency savings through targeted investment to save.

The **Department of Justice** (DoJ) is currently developing a Sustainability Strategy. It is anticipated that the Strategy, which will include actions on Travel and Transport, Energy and Carbon Emissions (non-travel), Water Management, Waste Management, Procurement, Biodiversity and Ecosystem and Corporate Social Responsibility will be submitted to the DoJ Board for approval in late spring 2022.

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[147] https://sibni.org/app/uploads/2019/03/Energy-Management-Strategy-March-2019.pdf

Ulster University has taken a strategic approach to managing its climate impact, involving multiple strands of activity: providing vital research input, accelerating and mainstreaming tertiary level education for sustainable development, and estates and professional services strategically prioritising activities towards achieving net zero campuses – see Sustainability at Ulster.

Ulster University's Sustainability Steering Group and associated Sustainable Leadership Working Groups provide a key forum for student, academic staff and professional services staff to collaborate and share best practice in a way that prioritises strategies towards Ulster University's climate action and sustainability agenda.

Ulster University has reduced its scope 1 and 2 carbon footprint by 60% since 2005/06. This reduction is attributed to a wider carbon management programme which has included significant investments in green buildings and infrastructure including building to BREEAM Excellent sustainability standards, a combined heat and power system, a ground source heating system, along with two large wind turbine generators and eight solar photovoltaic generation schemes which together generate 14.5% of the university's electricity demand.

For further information visit: www.ulster.ac.uk/sustainability

Queen's University has invested some £10 million across its campus to date in over 80 energy efficiency projects, and more than half of the electricity consumed by the University is now generated on-site using low carbon technology. These initiatives will be strengthened further by the roll out of their forthcoming Strategy 2030.

3.19 Local Climate Action

3.19.1 Key commitments

- Set clearer expectations on how central and local government interact in the delivery of net zero.
- Build on existing engagement with local actors through the Local Net Zero Forum, which brings together national and local government senior officials on a regular basis to discuss policy and delivery options on net zero.
- Continue the Local Net Zero Programme to support all local areas with their capability and capacity to meet net zero. This includes provisions to:
    - Continue the Local Net Zero Hubs) to support all areas of England to reach net zero, including those lacking capacity and capability, or those facing unique challenges.
    - Promote best practice and support local authorities to develop net zero projects that can attract commercial investment.
    - Increase knowledge sharing to demonstrate and share successful net zero system solutions.

3.19.2 The Challenge

Devolved and local government play an essential role in meeting national net zero ambitions. Across the UK many places have already made great strides towards our net zero future, having set their own targets and strategies for meeting local net zero goals. Taking a place-based approach to net zero is also vital to ensuring that the opportunities from the transition support the government's levelling up agenda.

The combination of devolved, local, and regional authorities' legal powers, assets, access to targeted funding, local knowledge, and relationships with stakeholders enables them to drive local progress towards net zero. Not only does local government drive action directly, but it also plays a key role in communicating with, and inspiring action by, local businesses, communities, and civil society. Of all UK emissions, 82% are within the scope of influence of local authorities.[148]

Local leaders are well placed to engage with all parts of their communities and to understand local policy, political, social, and economic and environmental nuances relevant to climate action. The government currently works with the Core Cities Group, for instance, which undertakes a range of activities to promote climate change adaptation, raise awareness and foster leadership in cities. There is also the work of the Local Adaptation Advisory Panel, a forum between central and local government to promote adaptation locally. Local government decides how best to serve communities and is best placed to integrate activity on the ground so that action on climate change also delivers wider benefits – for fuel poor households, for the local economy, for the environment and biodiversity, as well as the provision of green jobs and skills.

Despite the excellent work already underway, we understand that there remain significant barriers to maximising place-based delivery on net zero. We know that some places are moving faster than others and that places and communities will face different challenges when meeting net zero commitments and adapting to climate change.

There are significant regional variations in the level of emissions (see Figure 29 below) and some of the hardest hit local economies that face multiple development and growth challenges are proportionally home to a greater number of lower skilled workers. Many of these areas are also where high-carbon industries are located.

We also recognise that certain types of communities, such as rural and coastal communities, face significant and unique challenges. For example, the increased age of rural housing makes it both more difficult and expensive to introduce energy efficiency measures and rural communities also have greater reliance on cars. Similarly coastal communities face significant challenges as they may be vulnerable to more frequent flooding, rises in sea level, and accelerated coastal erosion which will have the potential to affect public services and infrastructure. However different types of localities may also have opportunities available to them that do not exist everywhere. For instance, coastal communities may be able to utilise tidal energy or industrial scale water source heat pumps, and rural areas may have access to sustainable biomass.

There are currently no net zero statutory targets on local authorities or communities in the UK, and we do not believe that a new general statutory requirement is needed. This is because of the existing level of local commitment with the sector, and because it is difficult to create a uniform requirement that reflects the diversity of barriers and opportunities local places experience – we also do not want to place additional demands on the sector. However, we do understand that there is a real need to ensure local leaders across the board are supported by enhancing the capacity and capability of local areas to deliver net zero, coordinating engagement with local authorities, and clarifying expectations at a national level to accelerate local progress towards net zero.

Central and local government will need to work closely together to deliver net zero and our interim carbon budgets. Government analysis suggests that over 30% of the emissions

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[148] European Commission Free allocation of allowances in the EU ETS, https://ec.europa.eu/clima/policies/ets/allowances_en

reductions needed across all sectors to deliver on our Carbon Budget 6 target, as set out in this strategy, rely on local authority involvement to some degree.[149]

3.19.3 Our goal

The government will continue to set UK-wide priorities for meeting carbon budgets and for assessing how each sector will help meet those budgets. Local government has a key role in integrating delivery at a local and regional level to deliver more cost-effective routes to net zero and derive local co-benefits that embed climate action in the heart of local places and services. By taking this approach, we can achieve even more for net zero and for the economy locally and nationally; we recognise that a one-size-fits-all approach will not work. We want to build strong partnership working between central, devolved, and local government, increase the co-ordination and better support all levels of government to utilise the influences available to them.

We want to continue to empower our local leaders to take the actions which will lead to the biggest gains in emissions reduction, including the potential opportunities in building back greener and meeting our ambitions to level up the country. While the Coronavirus (Covid-19) pandemic has severely impacted our communities, it has also reshaped how we think about place, community, and our natural and built environment.

Community empowerment, engagement, and action can play a role in supporting the UK's transition to net zero and enable communities to access the benefits that it brings, from greener jobs to improved health. Communities are especially well placed to help raise awareness and engage people in adopting net zero behaviours. For example, community ownership of renewables and other assets, often in partnership with other organisations, can be an important driver of reducing local emissions. It can also enable people to learn more about climate change and build sustainable behaviours.

We will continue to provide support for public and private investment opportunities in local places that will enable the local delivery of emissions savings across the sectors. In the sector chapters we have shown the range of programmes from building retrofit, heating, electric vehicle charging and many others where funding will go to local government to deliver action in their communities.

3.19.4 Enabling local areas to deliver net zero

To support all local government in developing and delivering their net zero delivery plans, we have committed to act in three key areas:

- **Setting clearer expectations for local places** clarifying how the partnership with local government should work, and considering how action at national, regional, local, and community levels fits together to tackle the emission and climate risk challenges we face, and the wider benefits the transition brings.
- **Providing resources for local places to deliver** stronger contributions to national net zero targets, across dedicated funding streams for net zero and non-ringfenced funding, noting the number of broader priorities on which local government needs to deliver.

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[149] BEIS, Free allocation of allowances in the UK ETS, https://www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets#free-allocation

- **Building capacity and capability** at the local level to support ambition and share best practice, while also providing support in areas that may not have made as much progress to date.

To act effectively across these areas, and for local government to translate national goals into local action, we will build on our existing engagement to improve the way local and national government collaborate on net zero. The Department for Business, Energy and Industrial Strategy (BEIS) has overall responsibility for improving coordination with local government and other local actors on the effective design and delivery of local net zero policies, as part of the Department's overall responsibility and wider leadership on delivering net zero. Other departments lead on their specific policy areas such as Department for Transport on the decarbonisation of transport. We are building on many of the existing ways of working together to provide more consistency and clarity over roles and responsibilities between national and local government.

We have established a Local Net Zero Forum to ensure that there is direct input from local leaders. Chaired by BEIS, the Forum will be cross departmental and bring together national and local government senior officials on a regular basis to discuss policy and delivery options on net zero.

The Forum will build on our existing engagement mechanisms through the representative bodies such as the Local Government Association (LGA), Association for Public Service Excellence (APSE), Core Cities Group and the Association of Directors of Environment, Economy, Planning and Transport (ADEPT). The creation of the Forum also draws on the recommendations for a policy framework put forward by member network UK100. The Forum will support the establishment of clearer delivery roles for local government and provide a single engagement route into HM Government in a coordinated and coherent way.

On adaptation, local actors will be supported through increased Environment Bill powers to take effective action, reduced financial burdens from waste management and stronger abilities to improve health and social outcomes for local citizens.

Achieving our aims requires national decision makers to have the right knowledge and awareness to understand the local impacts of decisions. BEIS will work with other departments and stakeholders to demonstrate successful net zero system solutions by creating a network of experience that amalgamates learning through case studies and non-spatial planning tools.

We have already developed a Carbon Literacy toolkit for the delivery of Carbon Literacy training for local authorities. This training has been made available to all local authority staff and aims to increase awareness and ability to reduce emissions across all the policies and programmes local government work on. BEIS has created a sector course and places like Manchester and Sheffield are among the early adopters who have trained staff and councillors.

3.19.4.1 Funding

Funding for local climate action comes from a combination of the Local Government Finance Settlement, other government grants and support schemes, borrowing, and private finance. Collectively, this means there is a range of funding available for local authorities to act on climate change, including innovative financing structures and partnership working.

An important part of the funding landscape is the diverse range of grant funding schemes provided by HM Government to support local delivery. We recognise that longer term and more co-ordinated funding streams can enhance innovation and investment, reduce

bureaucracy, and encourage more efficient and integrated decision making. We are exploring how we could simplify and consolidate funds which target net zero initiatives at the local level where this provides the best approach to tackling climate change. Building on the vision in the Prime Minister's Ten Point Plan, we also will work across departments to explore how we can give certainty to investment in longer-term programmes supported by regeneration initiatives.

In addition to the above, the UK Infrastructure Bank (UKIB) will lend to local authorities for strategic and high value projects and invest in projects alongside the private sector, crowding in private sector capital. It has twin objectives of helping to tackle climate change, particularly meeting the UK's net zero emissions targets and helping to support regional and local economic growth across the UK. The UKIB will offer loans to local authorities for high value and strategic projects of at least £5 million. To complement this investment activity, over time, the UKIB will develop an expert advisory service to help local authorities develop and finance projects. The UKIB will build partnerships across the UK including with government departments, government sponsored bodies, local authorities and relevant representative organisations to foster collaboration and drive value for money. As it engages with the market, the UKIB will continue to learn and adapt, which will ensure that its loans to local authorities are as effective as possible.

The UKIB is currently operating in an interim form, as it expands its capability and capacity. It will continue to refine the Local Authority Lending Function over the coming months.

BEIS will continue to work with partners and the finance sector to develop new finance and business models to support local delivery. These business models will look to develop aggregated projects and portfolios of projects building up scale and spreading delivery risk more effectively for investors.

3.19.4.2 Sectoral priorities at a local level

We understand that for local areas to deliver net zero they will need specific support to plan and identify priorities across different sectors.

Local energy

Decarbonisation of our buildings, transport systems and energy system will require significant action at a regional and local level. Generation and storage are becoming increasingly decentralised, with solar and batteries being deployed in buildings, vehicles, and local communities. Heat and transport decarbonisation in particular needs to be delivered in a way that meets local needs and with the involvement of local decision makers. Decarbonisation will require strong co-ordination across electricity, heat, hydrogen, transport, and buildings. That means local actors can be strong drivers of change, enabling coordinated non-spatial planning and engagement with markets, and supporting cleaner, cheaper and more efficient energy whilst providing a significant contribution towards local economic strategy.

Better engagement and information sharing across organisations can enable better forward-planning and a more coordinated approach. BEIS has work underway with Ofgem to develop a better understanding of the opportunities and challenges presented by local area energy mapping and planning (LAEMP) and are considering the most appropriate policy options to take forward. This work could help to bring together key local stakeholders to explore the impact of decarbonisation choices across sectors and how different technology options may impact on local energy networks.

The Government has committed up to £104 million of funding through the Industrial Strategy Challenge Fund to Prospering from the Energy Revolution (PFER). This is an innovation

programme which develops smart local energy systems to provide investable, scalable local business models and finance mechanisms using integrated approaches to deliver cleaner, cheaper energy services. The Programme is running until 2023 and to date has co-funded and developed several initiatives including:

- Three large-scale smart energy systems demonstrator projects to show how integrated intelligent local systems can deliver power, heat, and mobility to users in new and better ways.
- 10 detailed design projects undertaking analysis of the energy assets and consumers in specific local areas and assessing the technology options for integrated approaches to accelerate the journey to net-zero. Concurrently, they are also developing the business models, market approaches and investment options for implementing the final energy system designs in these cities and regions.
- 17 projects to research and develop key technology components that could make smart local energy systems more efficient and effective.
- The programme also funds two important initiatives to increase knowledge and share best practice, for the benefit of everyone working to make the energy revolution a reality. These are EnergyRev, a large multi-university research consortium, and the Energy Revolution Integration Service (ERIS) run by the Energy Systems Catapult. ERIS has developed Net Zero Go, an online platform to offer practical support to help more councils deliver clean energy projects that help meet net zero targets, and support a homegrown, secure UK energy system.

The PFER programme is designed to work across a range of different areas including big urban conglomerations, cities, towns, industrial regions, regeneration projects and rural communities. Each of these face different challenges and opportunities in reaching net zero and the programme seeks to identify the economic as well as the social and environmental benefits of delivering integrated smart local energy systems, not just for the place but also nationally..

The government also provides funding to deliver programmes that support decarbonisation through the Local Net Zero Programme which is supporting Local Enterprise Partnerships, local authorities, and communities in England to play a leading role in decarbonisation and clean growth. Almost £24.5 million has been invested in the Local Net Zero programme to date, including funding for the creation and continuing support of 5 Local Net Zero Hubs. The Hubs promote best practice and support local authorities to develop net zero projects that can attract commercial investment. To date, the Hubs have leveraged £71.9 million private investment and are currently supporting local authorities to develop a project pipeline with a capital value of £3.6 billion, including a £2 billion Industrial Decarbonisation project in the North-West.

Heat and buildings

- Local Authorities have been, and will continue to be, key delivery partners when it comes to improving the housing and building stock across the country, especially through integrating activity on energy efficiency, heating and retrofit. This has been recognised in recent years through their delivery of Green Home Grants, Home Upgrade Grant, and heat networks. As demonstrated in previous chapters (Heat and Buildings), local delivery of these schemes has been integral in reducing carbon emissions and supporting local economies. For example, over 200 local authorities have taken part in phase 1 of the Green Home Grants Local Authority Delivery Scheme (LAD) which is focused on low-income households in homes that most

need energy efficiency upgrades. Phases 1 and 2 of the Local Authority Delivery schemes aim to support around 50,000 households who will benefit from energy efficiency upgrades, making it easier and cheaper to heat their homes. Through the first two phases of the scheme, over £500 million was awarded to local authorities.

- The Social Housing Decarbonisation Fund will upgrade a significant amount of the social housing stock currently below EPC C up to that standard, delivering warm, energy-efficient homes, reducing carbon emissions and fuel bills, tackling fuel poverty, and supporting green jobs. The 2020 Summer Economic Update announced the SHDF Demonstrator project, launched in 2020, which has awarded around £60m of funding to social landlords across England and Scotland to test innovative approaches to retrofitting at scale, seeing up to 2000 social homes improved to at least EPC band C and supporting around 1,200 local jobs. Wave 1 of the SHDF will look to provide around a further £179m of funding for the SHDF for financial year 2021/22, with delivery to 2023. SHDF Wave 1 will see energy performance improvements to around 20,000 social housing properties, reducing bills and carbon emissions. As part of the 2021 Spending Review process, £800 million of additional funding was secured for the Social Housing Decarbonisation Fund (SHDF) for the period of FY2022/23 to FY2024/25.
- Government has also delivered the Public Sector Decarbonisation scheme which provides grants for public sector bodies to fund heat decarbonisation and energy efficiency measures. We have already made over £1 billion available through the Public Sector Decarbonisation Scheme over 2020/21 and 2021/22 to support heat decarbonisation and energy efficiency in the public sector, and a further £1.425 billion will be invested over 2022/23 to 2024/25.
- As referenced in our Net Zero Strategy and Heat and Buildings strategy, decarbonising public sector buildings will demonstrate leadership, encouraging action in other sectors as well as making a direct contribution to Net Zero.

National planning policies already recognise the importance of sustainable development and make clear that reducing carbon emissions should be considered in planning and decision making. The National Model Design Code provides tools and guidance for local planning authorities to help ensure developments respond to the impacts of climate change, are energy efficient, embed circular economy principles, and reduce carbon emissions. The government is considering how the planning system can further support our commitment to reaching net zero. We will make sure that the reformed planning system supports our efforts to combat climate change and help bring greenhouse gas emissions to net zero by 2050. For example, as part of our programme of planning reform we intend to review the National Planning Policy Framework to make sure it contributes to climate change mitigation and adaptation as fully as possible.

Local transport

July 2021, the government published its Transport Decarbonisation Plan, which sets out the commitments and the actions needed to decarbonise the entire UK transport system. One of the six strategic priorities of the plan is developing solutions that consider the needs of different locations, highlighting the importance of tackling emissions at a local level to ensure that every place in the UK has its own net zero transport network by 2050, serving the unique needs of its communities.

To support this, we will publish new guidance on local transport plans that will support local transport authorities to bring their local transport plans in line with current government priorities including decarbonisation. Alongside the updated local transport plan guidance we

will publish standalone guidance for local transport authorities on quantifiable reductions in local transport in line with the commitment made in the Transport Decarbonisation Plan, to make quantifying carbon reductions a fundamental part of planning and funding. Both pieces of guidance will be published in Autumn 2022.

We have also published a Local Authority Transport Decarbonisation Toolkit to help local authorities reduce emissions from transport. It provides guidance to local authorities in planning and delivering measures to reduce carbon emissions from transport by highlighting the benefits of different interventions, setting out the key actions local authorities can take, sharing best practice and lessons learnt and signposting to other published guidance and methodologies

Local green infrastructure and the environment

As outlined in Chapter 5, we understand that many issues concerning green infrastructure and the environment are geographic and context specific. In responding to localised climate change risks, we commit to work closely with local authorities to ensure communities are consulted in planning, designing, and implementing activity in this space.

The Environment Act 2021 established a new system of spatial strategies called Local Nature Recovery Strategies (LNRS) to target action for nature and to drive the use of nature-based solutions to tackle wider environmental challenges like climate change. It is expected that there will be around 50 Local Nature Recovery Strategies covering the whole of England with no gaps and no overlaps. Preparation of each LNRS will be locally led (likely by County Councils or Combined Authorities), evidence-based and collaboratively produced, involving public bodies, land owners/managers and stakeholders. This will provide local government with a new tool through which they can work with local partners to identify where effort to create or restore habitat would have greatest benefit for climate mitigation, whilst also having positive benefits for nature and the wider environment.

On green infrastructure, the Government committed in the 25 Year Environment Plan to introduce stronger new standards for Green Infrastructure (GI). Natural England will launch the new GI Framework in 2022, and has already published GI Principles and Mapping to help planning by local authorities and developers.

As part of the £200 million Flood and Coastal Resilience Innovation Programme, we have allocated £36m over 6 years, to develop a 'Coastal Transition Accelerator Programme' to trial opportunities, in a small number of coastal areas at significant risk of coastal erosion, to transition and adapt to a changing climate. The EA is currently working with coastal authorities on a £1 million refresh of Shoreline Management Plans (SMPs) to ensure that they are up to date, using the best evidence in their recommendations and focus attention on priority areas for investment and adaptation.

3.19.5 A universal offer to harness opportunities across the UK

We are committed to supporting all local areas and communities, ensuring that none are left behind and creating net zero solutions which work for all of them. As we are reducing emissions across the economy, we must also ensure that the transition to net zero is a fair one.

As outlined above, BEIS runs the Local Net Zero Programme to support all local areas capability and capacity to meet net zero and government. The programme has developed over time and now takes a place-based approach to tackling net zero in the round, covering all net zero issues. The programme directly helps places make faster progress towards net

zero, improves cost-effectiveness, and significantly increases the economic benefits of the green industrial revolution by attracting commercial investment and supporting green jobs.

The programme focuses on all areas of England, including those lacking capacity and capability, or those facing unique challenges, such as rural and coastal communities. The programme ensures that all local areas can engage on issues relating to net zero.

Case study: Investing in industrial heartlands

The government has invested £95 million for two new offshore wind ports to be constructed in the Humber region and Teesside, boosting the UK's world-leading industry, and creating thousands of new jobs in the North.

Able Marine Energy Park, on the South Bank of the River Humber, will receive up to £75 million government investment, and Teesworks Offshore Manufacturing Centre, on the River Tees, will benefit from up to £20 million. Construction will begin later this year to upgrade the two ports with new infrastructure – helping to revitalise these historic industrial heartlands. Together these new ports will have the capacity to house up to 7 manufacturers to support the development of the next-generation offshore wind projects, boosting the UK's offshore wind manufacturing base while directly creating up to 3,600 new green jobs.

The Government has embedded a net zero principle in initiatives which target different types of places, such as the Levelling Up Fund, the Towns Fund, and the Shared Prosperity Fund. This is to ensure that all funded schemes have considered how to align with our net zero ambitions. We will continue to monitor the impacts of these schemes and strengthen these criteria if necessary. We will take the same approach with other new schemes and priority places such as Freeports.

The Levelling Up White Paper set out the future role for Local Enterprise Partnerships (LEPs), ensuring local businesses continue to have clear representation and support in their area to drive the green recovery from the Coronavirus (Covid-19) pandemic. LEPs have played a significant role in providing advice and incentives for businesses to reach net zero. As LEPs are integrated into Mayoral Combined Authorities and other local government institutions, we remain committed to ensuring a strong local business voice is retained, particularly to support businesses to transition to net zero.

In England, the government works closely with local government, and Defra hosts the Local Adaptation Advisory Panel (LAAP), a forum for dialogue on climate change adaptation between local authorities, central government, and delivery bodies. This group produced a good practice guide on adaptation for local government, with the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), who published it in 2019

Case study: the Green Recovery Challenge Fund

The government's £80 million Green Recovery Challenge Fund is kickstarting over 150 nature projects across England. For example, the Wildfowl and Wetlands Trust was awarded £1.58 million to create and restore 130 hectares of nature-rich wetland habitat along the Somerset coast. This habitat will help increase flood resilience, improve soil, water quality, and help absorb carbon, increasing the robustness of the county's coastline overall. The GRCF is also support green jobs and is currently on track to support up to 2,000 jobs by the end of 2021, rising to up to 2,500 by the time all projects are completed in March 2023.

3.19.5.1 Working with local communities

To ensure that all parts of the UK benefit from the transition to net zero we also want local communities to take bold action that supports the transition. Local communities benefit from strong relationships and ties to their areas and their local authorities; these can be key to reducing emissions across the economy and making sure people stay engaged in the process. Where local authorities and communities work together effectively, we have already seen significant improvements in both delivery and in wider public engagement.

Some very ambitious campaigns on food, recycling, water, and other areas critical to climate action, have been launched and run by pioneering local communities and activists. Community projects can also act as a catalyst for raising public awareness and promoting green choices.

Community groups can bring together people, finance, and ideas to have a real impact on the behaviours, infrastructure, and attitudes locally. Community cohesion and grassroots initiatives are also central to locally based resilience to climate change risks, such as flooding and heatwaves.

Government understands the important role that communities have in the transition to net zero. Through the introduction of UK-wide growth funding schemes, such as the UK Shared Prosperity Fund, the Levelling Up Fund, and the Towns Fund, Government is enabling local areas to tackle net zero goals in ways that best suit their needs. For example, The Towns Fund has awarded over 23.6m to Glastonbury Town which includes the Glastonbury Clean Energy project that aims to generate renewable energy for use by other projects within the Plan, as well as local businesses and residents.

Government also works with community groups, both geographic and communities of interest, such as sports clubs, faith groups, and youth groups, on net zero issues. For example, BIES is supporting the Greener and Cleaner Bromley Project in South London, which is a community space, run by local people wanting to support their community with greener and more sustainable living, from drop-in conversations and questions answered to workshops, talks, lending schemes and more.

Case study: Clay Cross

Clay Cross, in Northeast Derbyshire, was one of the 101 Towns invited to develop a Town Investment Plan. The plan, submitted to Government in October 2020, set out their ambition to establish the town as an exemplar at the forefront of the low carbon revolution. This involved working with established local businesses, including the key local employer Worcester Bosch, to deliver innovation in clean energy and showing the potential to deliver a net zero economy. By 2030 they hope to be able to show significant reductions in the overall levels of emissions by ensuring clean growth principles underpin investment. These ambitions will be realised through a cohort of projects which include the development of a low carbon energy strategy for the town, a low carbon energy demonstrator project linked to the rebuilding of the local leisure centre, low carbon workspace and housing proposals, and a skills and enterprise training centre, which will have an emphasis on providing energy industry related skills.

3.19.5.2 Community energy

Community Energy is an example of how communities can come together to reach local and national net zero targets[150]

Government has provided support to community energy projects through the Rural Community Energy Fund (RCEF), a £10 million fund to supporting community-run projects in England that benefit the energy transition to net zero. The fund is currently in delivery stage and has provided development grants to 208 projects which focus a variety of technologies including solar, wind, low carbon heating and electric vehicle charging. Communities have predominantly financed their schemes commercially through share offers and borrowing.

The Government is also supporting Community Energy Groups to work closely with Local Authorities by funding a Pathways programme with Community Energy South. The Pathways programme provides local authorities with support to develop community led energy groups and projects across England, this helps to both reduce emissions and ensure that communities can benefit from locally owned renewable energy. In addition, BEIS has worked closely with Community Energy England to develop and maintain their knowledge sharing role which includes peer mentoring. This resource can help communities develop their own schemes across heat and power generation, transport, energy efficiency, and also wider approaches to net zero.

Ofgem also supports community energy projects and following a consultation process has announced that it plans to welcome applications from community interest groups, co-operative societies, and community benefit societies to the Industry Voluntary Redress Scheme. This will allow groups to apply for funds to deliver energy related projects that support energy consumers in vulnerable situations, support decarbonisation, and will benefit people in England, Scotland, and Wales.

To build on our existing actions, we intend to continue to work closely with Community Energy England and have established a Community Energy Contact Group. to strengthen our engagement with the community sector.

3.19.6 Scottish Government

As well as seeking to embed climate objectives into all Scottish Government community funding programmes, there are a number of grant funds that directly support local climate action. This includes funding for active travel infrastructure and for community and local energy projects through mechanisms such as the Community and Renewable Energy Scheme.

In addition to grant funding, the Scottish Government is building a network of regional community climate action hubs across Scotland to provide a strategic regional approach to climate change action. These will support communities to identify the actions that are most appropriate for their needs, promote collaboration between groups, foster peer-to-peer learning, develop new community climate action and help groups take advantage of funding opportunities. Two pathfinder hubs were launched in September 2021. In addition, the Climate Action Towns initiative announced in March 2021 involves seven small towns, in the first instance, providing them with support to develop local plans focused on climate action.

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[150] HMT (2021), 'Net Zero Review'

3.20 Empowering the public and business to make green choices

3.20.1 Key commitments

- Explore how to improve and enhance public facing climate content and advice on gov.uk. We will also enhance our digitally-led Simple Energy Advice (SEA) service to provide homeowners with personal, tailored advice on improving and decarbonising their homes, including tailored retrofit advice in local areas, and links to local, accredited, trusted installers.
- Continue supporting UK businesses to meet their net zero commitments, including exploring a government-led advice service that consolidates and simplifies advice and other support on net zero.
- Increase awareness of net zero and empower businesses and the public to make green choices, by building on government communications and engagement, and exploring providing environmental impact labelling of products, goods, and services.
- Make green choices affordable and easy by working with businesses and industry to set strong regulatory signals and collaborating to reduce costs and provide better quality, longer lasting and lower environmental impact products, and services.

3.20.2 The challenge

Together we are moving towards a net zero society, led by technological innovation. We will see transformations to our economy, society, and the way we live and work: new low carbon technologies, infrastructure and job opportunities; cleaner air, greener spaces and reduced flooding; and changes to everyday life such as in the way we travel, heat our homes and save our money. To reach net zero, everyone will need to play their part. We know that public concern about climate change is high – with 80% in the UK either concerned or very concerned[151]. We also know that people and businesses recognise that change must happen – 80% of respondents in a recent survey believe the way we live our lives will need to change to address climate change[152]. Equally, however we know that the public is unsure of what net zero will mean in practice, what steps they can take, or they face barriers that stop them from acting.[153] This chapter sets out how government will support individuals and businesses to make green choices – an act of choosing the more, or most, sustainable option from a range of possibilities, such as using an electric vehicle instead of a petrol or diesel vehicle when it is time to change your family car, replacing an old gas boiler with a heat pump, or switching to innovative green financial products.

3.20.3 Our goal

Our goal is to make the act of choosing green significantly easier, clearer and cheaper. We recognise that the best way to do this is to go with the grain of existing behaviour and trends and by working closely with partners like Local Authorities, voluntary sector organisations, social enterprise regulators, and businesses, who all play an important role in how we use and choose different services.

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[151] BEIS Public Attitudes Tracker: Wave 37 – Key findings, https://www.gov.uk/government/statistics/beis-public-attitudes-tracker-wave-37

[152] BEIS Research Report Number: 2021/034, 'Climate change and net zero: public awareness and perceptions, Annex 1: data tables. https://www.gov.uk/government/publications/climate-change-and-net-zero-public-awareness-and-perceptions

[153] BEIS (2021), 'Net zero public dialogue' https://www.gov.uk/government/publications/net-zero-public-dialogue

3.20.4 The role of green choices in meeting net zero

There are numerous individual actions – some one-off and some we take regularly – that people can take to contribute to our pathway to net zero. These individual actions combine to create wider systemic change required to meet net zero. New analysis on green choices[154], has helped us to identify choices and behaviours that impact on net zero, broadly falling into three categories:

- Adopting new low carbon technologies, such as switching to zero emission vehicles.
- Using energy, technologies, or services more efficiently, such as using smart meter-enabled 'time of use' tariffs which reward consumers financially for using energy at off-peak times, or when there is excess clean energy available.
- Everyday business and consumer choices, such as choosing green financial products like the recently launched NS&I Green Savings Bond, or seeking more responsibly invested pension schemes.

We want to better understand the behavioural factors that need to be considered in the policies required to meet net zero. The Government Chief Scientific Adviser and Government Office for Science will be producing a scenario-based foresight report to understand the system wide implications of these factors, to be published this year.

3.20.5 Our approach for supporting green choices

We know that people want to play their part in achieving net zero. Our approach for how government will empower everyone to make green choices is underpinned by six principles. [155]Although they were developed with the public in mind, many of them equally apply to green choices taken by businesses, particularly medium or small enterprises. The principles reflect wider public engagement from across the country and Parliament.

Public engagement, including through communications campaigns such as Together for Our Planet, plays a significant role in driving green choices. We will deliver public engagement on net zero to:

- Communicate a vision of a net zero 2050, build a sense of collective action, improve understanding of the role different actors play in reaching net zero, and how and when choices can be made;
- Ensure there is trusted advice and support for people and businesses to make green choices;
- Mobilise a range of actors and stakeholders to increase and amplify their communication and action on net zero and green choices; and
- Give people opportunities to participate in and shape our plans for reaching net zero, thereby improving policy design, buy-in and uptake of policies.

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[154] Net Zero Societal Change Analysis Project, Energy Systems Catapult Research, June 2021.

[155] This draws on work commissioned by BEIS from the Behavioural Insights Team 'Net zero: principles for successful behaviour change initiatives', The Behavioural Insights Team. BIT conducted a rapid evidence review of relevant literature, compiled a total of 87 policy case studies from OECD countries and consulted with 10 experts from a range of behavioural and social sciences.

3.20.6 Principles underpinning green public and business choices

3.20.6.1 Principle 1: Minimise the 'ask' by sending clear regulatory signals

By targeting measures at an industry level, rather than at the individual consumer, we can make green choices much simpler for the consumer. This will also help grow a stronger market for low carbon goods and give businesses clear, early signals. The UK ETS does this through enshrining in law the cap and its decreasing trajectory and therefore sending a clear signal to businesses to decarbonise. Other examples include, the 2030 phase out date for petrol and diesel cars and vans sends a signal to industry and will improve the availability and quality of zero emission vehicles on the market. Similarly, as set out in the *Heat and Buildings Strategy*, we will introduce a range of policies that will bolster the low carbon heating market, creating new opportunities for business, and better choice for the consumer.

We are taking action to ensure that products are more sustainable, both in relation to their energy efficiency during use and use of materials over their lifetime (resource efficiency) through developing proposals for new regulatory product standards and better consumer information. We are exploring updating and expanding 'Ecodesign' product regulation which sets minimum requirements to phase out the least energy and resource efficient products from the market.

3.20.6.2 Principle 2: Make the green choice the easiest

By addressing all the major, practical barriers to individual behaviours we can make it easier for people to make green choices. We will ensure that we take a consumercentred approach to net zero policy design, removing frictions and minimising disruptions to people's lives.

In our *Transport Decarbonisation Plan*, we have committed to better integrating transport modes, with more bus routes serving railway stations and improved integration of cycling and walking networks, so that opting to make a green travel choice is easier. This is in addition to delivering interventions to enable more people to walk and cycle for short journeys such as a national e-cycle support programme. Our vision is that half of all journeys in towns and cities will be cycled or walked by 2030. We are also committed to increasing road vehicle occupancy. This will help decarbonise and decongest our roads. In April 2022, we published guidance for local authorities on support for shared car ownership and shared occupancy schemes and services[156] and are continuing to build our evidence base to understand the barriers and potential policies to increase the uptake of shared mobility.

We are committed to removing inconvenience and increasing availability of green choices. Following the commitments made in our Resources and Waste Strategy, the Environment Bill will introduce powers that will allow us to require separate food waste collections in all local authorities in England, which will help people to reduce emissions from food waste with ease.

3.20.6.3 Principle 3: Make the green choice affordable

We are already seeing the upfront cost of green choices, such as electric vehicles, drop. We are looking across all sectors to see how we can continue this trend and make green choices more affordable.

Through the Smart Export Guarantee (SEG) energy suppliers are moving to increasingly innovative tariffs which support electric vehicle deployment while continuing to enable households to access a market-led route for exporting and receiving payment for their unused electricity. As committed to in our *Heat and Buildings Strategy*, the Boiler Upgrade

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[156] https://www.gov.uk/government/publications/car-clubs-local-authority-toolkit/car-clubs-local-authority-toolkit

Scheme will provide grants to help households transition to low carbon heating. We are also supporting motorists through plug-in vehicle grants, which provide support towards the upfront purchase of eligible cars, vans, motorcycles, and trucks.

We are supporting the public to both save and contribute towards public spending that helps the UK reduce its emissions through the NS&I Green Savings Bond. The Green Finance Institute and Abundance Investment, supported by UK100, Local Partnerships and Innovate UK, have also launched a national campaign to help local authorities issue a type of municipal finance investment – Local Climate Bonds. For citizens, the Local Climate Bond provides a low-risk and fixed return investment, and a way to mobilise their savings to help tackle the climate change in their area.

3.20.6.4 Principle 4: Empower people and businesses to make their own choice.

Consumer preference can shape producers' decisions, but sometimes consumers and businesses lack clear information to make informed choices. As announced by the chancellor in his Mansion House speech in July 2021, we will work with the Financial Conduct Authority to introduce a sustainable investment label – a quality stamp – so that consumers and retail investors can clearly compare the impacts and sustainability of their investments for the first time.

We plan to help empower people to make informed choices about the goods and products they buy and services they use by exploring how we better label these with their emission intensity and environmental impact. We are also exploring the use of product labelling to show the durability, repairability and recyclability of products, as well as their environmental footprint with a view to stimulating demand for better quality items. We continue to explore the evidence base for environmental labelling within food production and disposal, including the most accurate methodologies to monitor and verify the carbon emissions, and environmental impact, of food items.

We are providing tailored advice and support to homeowners on what they can do to improve their homes. Our Simple Energy Advice service has already had over 1.7 million users, providing homeowners with personal, tailored advice for improving and decarbonising their homes and links to local, accredited, trusted installers. Homeowners can also find out about government schemes for which they may be eligible. We will enhance the digitally led service and are considering options to support tailored retrofit advice in local areas, supported by tailored local advice. This includes moving our Simple Energy Advice service to gov.uk, which will improve user experience, and supporting local advice provision.

We are also reviewing other existing digital information and advice services related to net zero and exploring how to improve wider existing public-facing net zero content and advice on gov.uk

We know that technologies can also improve public understanding of energy use and energy efficiency. In-Home Displays for smart meters give accurate information about energy consumption to help households easily understand how to use less energy and save money on their bills. Building on this, the Smart Energy Savings initiative is trialling how innovative products and services can use smart meter data to provide consumers with advice on how to manage their energy use. At the end of March 2022, there were 28.8 million smart and advanced meters in homes and small businesses across Great Britain.[157]

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[157] Smart metering statistics, Quarterly update March 2022, https://www.gov.uk/government/collections/smart-meters-statistics

3.20.6.5 Principle 5: Motivate and build public acceptability for major changes

Achieving our net zero target must be a shared endeavour. It is therefore vital that we listen to the publics views on how to reach net zero. We already regularly invite the public to shape policies on net zero through consultations and deliberative dialogues. Since 2019, we have run, funded, or are still running deliberative dialogues on a range of net zero issues, such as green choices, homes, heating, transport decarbonisation, green savings, hydrogen, food, Carbon Capture Use and Storage (CCUS) and Advanced Nuclear Technologies (ANT).

To ensure that the transition to net zero is fair and affordable, and does not negatively impact disadvantaged groups, we are committed to assessing the impact of our net zero policies. We consult on policy changes, and we will continue to make it easier for people and businesses, including those who are most marginalised, to feed into key policy decisions on net zero.

The Devolved Administrations have a range of initiatives aimed at engaging and motivating the public around net zero and climate action:

The Scottish Government launched a draft *Public Engagement Strategy for Climate Change* in December 2020, and the final report of Scotland's Climate Assembly was laid in Scottish Parliament in June 2021.

The *Welsh Government Engagement Approach for Low Carbon Delivery Plan 2* was published in June 2021, encouraging collective action on climate change through four Calls to Action.

In March 2021, the Northern Ireland Executive unveiled a new digital climate action campaign, delivered by MyNI in the run up to the COP26 conference. It aims to raise climate awareness, encourage change, enable action, and exemplify climate leadership.

3.20.6.6 Principle 6: Present a clear vision of how we will get to net zero and what the role of people and business will be

Businesses have significant power to drive change towards achieving our domestic net zero goal. Our approach to supporting businesses to deliver this change will need to be differentiated by business size and sector, as these factors will influence the ease with which a net zero target and other relevant actions can be adopted. We have seen significant numbers of companies signing up to science based targets alongside sector-specific ambition being put forward already. For example, Water UK has launched the world's first sector-wide plan to deliver net zero carbon emissions by 2030.

We know that businesses account for 18% of UK territorial emissions and so encouraging them to take action to reduce their emissions is important[158]. But just as vital is the role businesses are playing in designing the ground-breaking new technologies, world leading products and innovative approaches that we need to develop the low carbon economy and enable others to reach net zero. Collaboration across sectors and value chains will enable us to innovate faster, create stronger incentives for investment and drive down costs for low carbon alternatives through the global mechanisms laid out in the Paris Agreement.

To underline the importance of this area, the Prime Minister appointed a net zero Business Champion, Andrew Griffith MP, to spearhead business engagement nationwide in the year to COP26. Already over half of the FTSE100 companies have committed to Science-

[158] ONS, Provisional UK greenhouse gas emissions national statistics 2020: https://www.gov.uk/government/statistics/provisional-uk-greenhouse-gas-emissions-national-statistics-2020

Based Targets by joining the global Race to Zero campaign. Alongside engaging large corporates, the Net Zero Business Champion has led a campaign targeting small and micro businesses across the UK. Over 1,900 have joined the Race to Zero to date by visiting the Business Climate Hub, developed in partnership with a global business coalition led by the International Chambers of commerce. Companies, particularly large businesses, once they have joined the Race to Zero, should work with others to drive breakthroughs in their sectors, regions, and support SMEs in their value chains to take action. We're encouraging Business Representative Organisations (BROs) to become Race to Zero Accelerators by recruiting members into the Race to Zero. To be recognised officially as an Accelerator, businesses must recruit at least 20% of members not already in Race to Zero by COP26.

Many businesses across the UK have said they want to tackle climate change, but that they don't know where to start[159]. Through the small business campaign, government has taken an important step towards making net zero relevant to SMEs by helping them access the support they need. Beyond COP26 we will continue to support UK businesses to meet their net zero commitments, including exploring a government-led digital advice service that consolidates and simplifies advice, funding, and other support on net zero.

For larger businesses, we want to ensure businesses are aware of their energy and carbon use so they can take action towards reaching net zero. Climate risks must be assessed and disclosed through the Task Force on Climate-related Finance Disclosures (TCFD). This is complemented by Streamlined Energy and Carbon Reporting, which requires energy and emissions reporting in all UK large businesses to improve awareness of energy costs. We also require large businesses and their corporate groups to carry out a broader assessment of their energy use from buildings, transport and industrial processes every 4 years under the Energy Savings Opportunity Scheme (ESOS), which is designed to identify practicable and cost-effective energy saving opportunities. In the future building users and decision makers will be able to compare the performance of their buildings to other similar buildings using a performance-based energy rating to support targeted investments.

Government will work in partnership not just with businesses themselves, BROs, sector-based trade associations, business groups in the Devolved Administrations and local and regional organisations to translate the pathways within this strategy into business specific plans to reach net zero.

3.20.7 Scottish Government

The Scottish Government's work to encourage and enable a shift in climate change behaviours is closely aligned with the Public Engagement Strategy which is described in Chapter 8.

3.20.8 Northern Ireland Executive

One of the key principles of NI's Energy Strategy is to place consumers at the heart of our energy future by making energy as simple as possible for everyone and developing policies that enable and protect consumers through the energy transition. In order to achieve this vision, the Strategy includes an objective to ensure the public and businesses are informed, empowered, supported and protected to enable them to transition to decarbonised solutions for all their energy needs.

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[159] BEIS W11 Kantar Attitudes Tracker, Jan 2021 (Question: % agree that as a business we have a responsibility to reduce our carbon emissions to tackle climate change)

The Energy Strategy includes a number of key policies to empower the public and business during the energy transition:

- Establish a ‘one stop shop’ to deliver trusted information, advice and support to consumers;
- Run information and awareness campaigns on energy decarbonisation; and
- Develop policies that facilitate active consumers and energy communities in decentralised and smart energy systems.

Empowering the public and business also cuts across many areas of the Energy Strategy and will require a joined-up approach to delivering the Strategy and a sharp focus on consumer interests during the development of policies. Examples of these cross cutting areas are smart meters, support for energy efficiency measures, micro-generation and low carbon heat technologies as well as creating a roadmap to cleaner, greener transport systems and developing frameworks for Citizen Energy Communities and Active Consumers.

Chapter 4 Projections

4.1 Introduction

This chapter presents information from the most recent full update to the UK's GHG Energy and Emissions Projections (EEP) 2019, published in October 2020.[1] It includes estimates of future energy demand and GHGs in the UK up to 2040. The analysis for EEP 2019 was completed before the coronavirus (Covid-19) pandemic, so these projections take no account of the impacts of this on future energy demand or emissions.

4.2 Key developments

This section reports on updated emission projections for 2030 and 2040. The key points are:

- The UK's Energy and Emissions Projections (EEP) are estimates of the future level of energy consumption and greenhouse gas emissions and only include existing and planned policies deemed to be sufficiently quantified by August 2019, which was the cut-off point for inclusion in EEP 2019. They therefore represent a counterfactual, showing what the UK would expect to happen in the absence of further more recent policies such as those included in the UK's Net Zero Strategy, published in October 2021, which set out policies and proposals to keep the UK on track for meeting carbon budgets and the 2030 Nationally Determined Contribution. Chapter 3 contains information on more recent policies and measures not included in these projections;
- On this basis, the projections show that by 2030, UK emissions of the basket of the 7 GHGs covered by the Kyoto Protocol would be expected to be approximately 365 $MtCO_2e$, or 55% lower than the 1990 level; and by 2040, the projections show equivalent figures of 361 $MtCO_2e$ and 55% lower respectively.The UK projects emissions of CO_2, CH4 and N2O of 52%, 68% and 60% respectively below 1990 levels by 2040. As new policies and measures are developed and implemented, the resulting emissions savings will be factored into future projections.
- The UK projects that (joint) emissions of the fluorinated GHGs: HFCs, PFCs, SF6, and NF3 will be 83% below their 1990 levels by 2040.

[1] See https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019

4.3 Overall projections of GHG emissions

The projections presented in this National Communication focus on the With Existing Measures (WEM) policy scenario. EEP 2019 also includes a With Additional Measures (WAM) scenario: this includes additional policies that were classed as planned at the cut-off date of August 2019. The projection models incorporate information from the UK's 1990-2018 GHG Inventory publication (published in 2020). The historic statistics presented here and in Chapter 2 are from the UK's 1990-2020 GHG Inventory (published in 2022). The UK's 1990-2020 GHG Inventory includes additional emissions from application of methodologies in the IPCC 2013 wetlands supplement which were not included in the 1990-2018 GHG Inventory. This gives rise to a discontinuity between historic and projected data presented in this chapter. However, the UK does not expect broad patterns of the emissions profile to change significantly when this new information[2] is incorporated into the next edition of the projections.

The WEM scenario includes policies that had been implemented or adopted by August 2019 but excludes planned measures. In addition, the UK provides selected data from the WAM scenario, which includes planned measures as at the same policy cut-off date. Both projection scenarios exclude any use of flexible mechanisms such as the UK Emissions Trading Scheme (ETS) or Joint Implementation and Clean Development Mechanism (CDM) credits.

The figures within this National Communication include British Crown Dependencies and Overseas Territories. These territories are excluded from UK Carbon Budget's legislation and do not appear in the EEP report. According to the UK's 1990-2020 GHG Inventory, these regions were responsible for 0.9% of total emissions on average between 2017 and 2020 (inclusive). Throughout this chapter, the geographical scope of the presented figures includes the UK and its Crown Dependencies and Overseas Territories as denoted by the label '(UNFCCC coverage)' unless otherwise specified.

Under the WEM scenario, the UK projects GHG emissions including LULUCF of 365 $MtCO_2e$, about 55% below the 1990 level by 2030, and roughly 361 $MtCO_2e$ by 2040. The percentages are very similar if LULUCF is excluded[3].

Tables 4.1 and 4.2 show overall projections for each gas under WEM and WAM scenarios respectively. This shows that additional planned policies as of August 2019 are expected to mainly affect CO_2 emissions, reducing them by 11 Mt more in the year 2040 than in the equivalent projection under the WEM scenario.

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[2] This statistical release explains how the Inventory has changed: (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1051408/2020-final-greenhouse-gas-emissions-statistical-release.pdf)

[3] We report LULUCF emissions in full to be consistent with Inventory Convention reporting. This scope is wider than that under Articles 3.3 and 3.4 of the Kyoto Protocol and includes estimates for all anthropogenic sources minus sinks.

Table 4.1: GHG emissions by gas for WEM scenario, $MtCO_2e$ (UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	609	571	571	570	510	420	324	303	296	291	295
Methane	135	129	111	90	67	56	52	46	44	43	43
Nitrous oxide	50	40	30	26	23	22	21	21	20	20	20
Hydrofluorocarbons	14	19	8	9	12	14	12	7	4	2	2
Perfluorocarbons	2	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphur hexafluoride	1	1	2	1	1	<0.5	<0.5	<0.5	1	1	1
Nitrogen trifluoride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**810**	**760**	**723**	**697**	**613**	**512**	**410**	**378**	**365**	**358**	**361**
Change from 1990 (%)		-6	-11	-14	-24	-37	-49	-53	-55	-56	-55
Memo Items											
Aviation bunkers	16	20	30	35	32	33	14	37	37	37	37
Marine bunkers	9	9	8	9	12	11	9	11	11	11	11

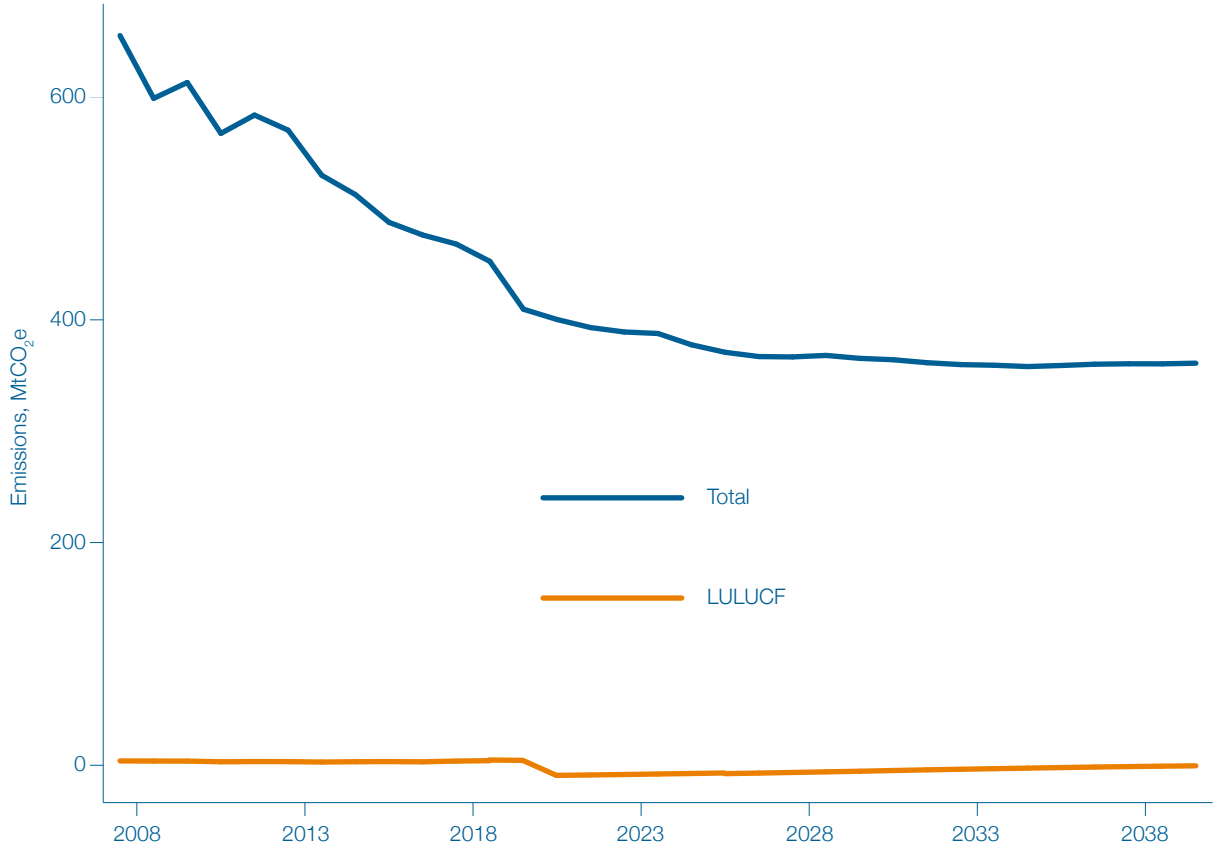
Table 4.2: GHG emissions by gas for WAM scenario, $MtCO_2e$ (UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	609	571	571	570	510	420	324	302	292	284	284
Methane	135	129	111	90	67	56	52	46	43	42	41
Nitrous oxide	50	40	30	26	23	22	21	21	20	20	20
Hydrofluorocarbons	14	19	8	9	12	14	12	7	4	2	2
Perfluorocarbons	2	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphur hexafluoride	1	1	2	1	1	<0.5	<0.5	<0.5	1	1	1
Nitrogen trifluoride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**810**	**760**	**723**	**697**	**613**	**512**	**410**	**377**	**360**	**349**	**348**
Change from 1990 (%)		-6	-11	-14	-24	-37	-49	-54	-56	-57	-57
Memo Items											
Aviation bunkers	16	20	30	35	32	33	14	37	37	37	37
Marine bunkers	9	9	8	9	12	11	9	11	11	11	11

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.3.1 Projected progress across territorial emissions

Figure 4.1: Projected UK emissions in $MtCO_2e$ (WEM scenario, UNFCCC coverage)



Note: The historic data in this chart is from the UK's GHG Inventory 2022: projections modelling is based on the GHG Inventory 2020.
Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

The UK projects in the WEM scenario that the energy supply and business sectors make up around 23% of UK emissions in 2030. With the existing policies and measures in place, emissions from these sectors are projected to increase by 3% between 2030 and 2040 and emissions from the remaining sectors (excluding LULUCF) are projected to fall by 4% between 2030 and 2040. In the WAM scenario, projected energy supply and business emissions decrease by 5% over the same period. The UK no longer reports emissions against Traded and Non-Traded sectors according to European Union Emissions Trading System (EU ETS) definitions since leaving the EU in 2020.

Tables 4.3 and 4.4 show the main impact of additional planned policies. By 2040, the UK projects that the additional impact of these measures could leave emissions 13 $MtCO_2e$ (4%) lower.

4.3.1.1 Projected progress of total territorial UK emissions

Table 4.3: WEM scenario projections, $MtCO_2e$, Projected progress across territorial emissions (UNFCCC coverage)

	Actuals			Projections			
	2010	2015	2020	2025	2030	2035	2040
Emissions total exc. LULUCF	609	509	406	386	371	361	362
LULUCF	4	3	4	-8	-5	-3	0
Total	**613**	**512**	**410**	**378**	**365**	**358**	**361**

Table 4.4: WAM scenario projections, $MtCO_2e$

	Actuals			Projections			
	2010	2015	2020	2025	2030	2035	2040
Emissions total exc. LULUCF	609	509	406	385	366	352	349
LULUCF	4	3	4	-8	-5	-3	0
Total	613	512	410	377	360	349	348

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4 Projections by sector

Table 4.5 shows the UK's projections of the distribution of GHG emissions across sectors of the UK economy.

Table 4.5: GHG emissions by sector in $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Transport	130	131	135	138	126	125	100	113	103	92	85
Energy supply	281	239	224	233	209	147	85	62	62	62	64
Business	113	111	114	106	90	83	74	61	55	53	54
Residential	80	82	89	86	88	68	67	68	71	74	78
Agriculture	54	53	51	49	46	47	45	48	48	48	48
Waste management	65	68	61	48	29	19	18	16	15	15	15
Industrial processes	60	51	27	21	13	13	10	9	9	9	8
Public	13	13	12	11	10	8	7	8	9	9	9
LULUCF	13	11	8	5	4	3	4	-8	-5	-3	<0.5
Total	**810**	**760**	**723**	**697**	**613**	**512**	**410**	**378**	**365**	**358**	**361**
Change from 1990 (%)		-6	-11	-14	-24	-37	-49	-53	-55	-56	-55

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.1 Transport

Table 4.6 gives projections for transport emissions of around 21% lower than 1990 levels by 2030 and 34% lower by 2040. The UK expects that measures to improve vehicle efficiency, such as CO_2 emissions regulation and the design of the Zero Emission Vehicles (ZEV) mandate for new cars and vans, will directly reduce emissions by mandating greater use of biofuels and providing incentives to encourage the adoption of electric vehicles.

Table 4.6: Transport emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Carbon dioxide	127	128	132	136	125	124	99	112	101	90	84
Methane	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	2	2	2	1	1	1	1	1	1	1	1
Total	**130**	**131**	**135**	**138**	**126**	**125**	**100**	**113**	**103**	**92**	**85**
Change from 1990 (%)		1	4	6	-3	-4	-23	-13	-21	-29	-34

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.2 Energy supply

The UK projects energy supply emissions of 78% lower than 1990 levels by 2030 and 77% lower by 2040 (see Table 4.7). Following recent sharp falls in coal-fired generation, the projections show a further gradual decline in fossil fuel-based generation up to the late 2020s as it is displaced by an increase in renewable electricity generation. From the late 2020s natural gas generation is projected to gradually increase in the WEM scenario, alongside the continued more rapid growth in renewables to meet increasing electricity demand. The projections show that emissions from electricity production will fall steadily to the late 2020s before rising slightly to 2040.

Table 4.7: Energy Supply emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Carbon dioxide	245	211	206	220	199	139	80	56	56	57	59
Methane	34	27	17	11	9	7	5	6	5	5	5
Nitrous oxide	1	1	1	1	1	1	1	1	1	1	1
Total	**281**	**239**	**224**	**233**	**209**	**147**	**85**	**62**	**62**	**62**	**64**
Change from 1990 (%)		-15	-20	-17	-26	-48	-70	-78	-78	-78	-77

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.3 Business

Table 4.8 shows business emissions are projected to be 51% lower than 1990 levels by 2030, and 53% lower by 2040. The UK attributes improvements over time to the impact of policies that encourage energy efficiency, such as building regulations and minimum energy efficiency standards for new products, together with economic measures such as the Streamlined Energy and Carbon Reporting (SECR) and the Renewable Heat Incentive.

Table 4.8: Business emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Carbon dioxide	112	109	109	97	78	70	62	53	50	50	51
Methane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	1	1	1	1	1	1	1	1	1	1	1
Hydrofluorocarbons	<0.5	<0.5	2	6	10	12	11	6	3	1	1
Perfluorocarbons	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphur hexafluoride	1	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	1	1
Nitrogen trifluoride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**113**	**111**	**114**	**106**	**90**	**83**	**74**	**61**	**55**	**53**	**54**
Change from 1990 (%)		-2	<0.5	-7	-21	-26	-35	-47	-51	-54	-53

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.4 Residential

The long-term driver of emissions from UK households is the increase in household numbers over the whole period, due to population growth in the UK and a continuing trend for households to be smaller (Table 4.9). These drivers of increasing emissions are initially offset by the impact of existing energy and emission reduction policies through, for example, improved insulation of homes. The overall impact of these factors is projected to lead to a rise in domestic emissions of 7 $MtCO_2e$ (10%) between 2030 and 2040.

Table 4.9: Residential emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Carbon dioxide	79	80	86	83	85	65	65	66	68	71	76
Methane	2	1	1	1	1	1	1	1	1	1	1
Nitrous oxide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**80**	**82**	**89**	**86**	**88**	**68**	**67**	**68**	**71**	**74**	**78**
Change from 1990 (%)		2	11	7	9	-16	-17	-15	-12	-8	-3

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.5 Agriculture

These projections show emissions from the agriculture sector remaining constant between 2030 and 2040. Table 4.10 illustrates this.

Table 4.10: Agriculture emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Carbon dioxide	6	7	5	6	5	5	6	10	10	10	10
Methane	29	29	28	27	25	26	25	25	25	24	24
Nitrous oxide	18	18	17	16	15	15	15	14	14	14	14
Total	**54**	**53**	**51**	**49**	**46**	**47**	**45**	**48**	**48**	**48**	**48**
Change from 1990 (%)		-1	-5	-9	-15	-14	-17	-10	-11	-11	-11

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.6 Waste management

The UK's WEM projections show annual GHG emissions from waste management falling to 77% below 1990 levels by 2040 (Table 4.11). Waste emissions from landfill continue to fall because more waste is being preferentially disposed of in alternative ways, such as through recycling, Biological Waste Treatment (BWT) and incineration, and because small improvements in landfill efficiency continue to be made.

The Landfill Directive drove the historical reductions in emissions from waste. Emissions reductions should continue for a time as emissions lag behind disposal. The UK projects that increases in BWT emissions and domestic wastewater emissions should partially counteract the decrease in landfill emissions.

Table 4.11: Waste management emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Carbon dioxide	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methane	63	66	60	46	27	18	16	14	13	13	13
Nitrous oxide	1	1	1	1	1	2	2	2	2	1	1
Total	**65**	**68**	**61**	**48**	**29**	**19**	**18**	**16**	**15**	**15**	**15**
Change from 1990 (%)		4	-6	-27	-56	-70	-73	-76	-77	-77	-77

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.7 Industrial processes

Table 4.12 indicates that emissions from industrial processes are projected to fall 85% below 1990 levels by 2030 and 86% below by 2040.

Table 4.12: Industrial Processes emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Carbon dioxide	20	18	17	17	11	12	9	9	8	8	8
Methane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	24	14	5	3	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hydrofluorocarbons	14	18	3	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorocarbons	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphur hexafluoride	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**60**	**51**	**27**	**21**	**13**	**13**	**10**	**9**	**9**	**9**	**8**
Change from 1990 (%)		-15	-54	-65	-79	-79	-84	-84	-85	-86	-86

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.8 Public

The UK's projections show emissions from public services rising slightly in the mid 2020s and 2030s (Table 4.13).

Table 4.13: Public emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Carbon dioxide	13	13	12	11	9	8	7	8	9	9	9
Methane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**13**	**13**	**12**	**11**	**10**	**8**	**7**	**8**	**9**	**9**	**9**
Change from 1990 (%)		-1	-9	-16	-29	-40	-44	-38	-35	-33	-30

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.4.9 Land Use, Land Use Change and Forestry (LULUCF)

The amount of carbon stored in UK trees has increased since 1990. However, the UK expects that this balance will change in the future as forests mature and are felled and replanted over the sustainable forest management cycle. UK experts suggest the accumulation rate will fall substantially by 2030, Table 4.14 reflects this. The UK's 1990-2020 GHG Inventory includes modelling updates to wetland areas that have increased historical emissions in the LULUCF sector. As EEP 2019 modelling is based on an earlier version of the inventory, this is not yet reflected in projections of emissions.

Table 4.14: LULUCF emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

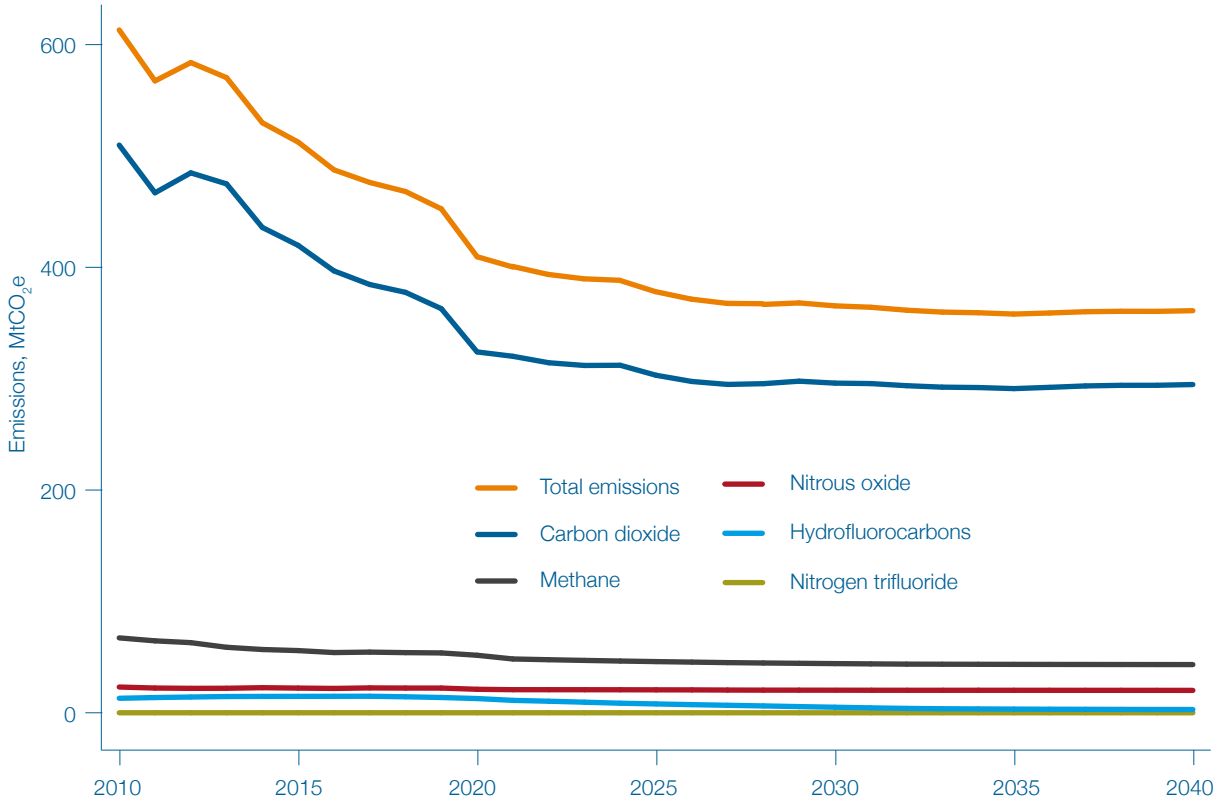
	Actuals							Projections			
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	6	4	1	-1	-3	-3	-3	-10	-7	-4	-2
Methane	5	5	5	5	5	5	5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	2	2	2	2	2	2	2	2	2	2	2
Total	**13**	**11**	**8**	**5**	**4**	**3**	**4**	**-8**	**-5**	**-3**	**<0.5**
Change from 1990 (%)		-18	-37	-59	-72	-76	-71	-161	-141	-119	-104

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.5 Projections by gas

This section focuses on overall trends in the emissions of each GHG. Figure 4.2 shows projections for overall emissions of GHG gases to 2040.

Figure 4.2: Overall emissions of greenhouse gases by gas, $MtCO_2e$ (WEM scenario, UNFCCC coverage)



Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.5.1 Carbon Dioxide

Table 4.15 shows that the largest sectoral emitters of CO_2 in 2020 were, in decreasing order, transport, energy supply, residential, business. By 2030, the UK projects CO_2 emissions that are 51% lower than 1990 values, and by 2040 the UK projects CO_2 emissions that are 52% lower than 1990 emissions.

Table 4.15: Carbon dioxide emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals							Projections			
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Transport	127	128	132	136	125	124	99	112	101	90	84
Energy supply	245	211	206	220	199	139	80	56	56	57	59
Business	112	109	109	97	78	70	62	53	50	50	51
Residential	79	80	86	83	85	65	65	66	68	71	76
Agriculture	6	7	5	6	5	5	6	10	10	10	10
Waste management	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Industrial processes	20	18	17	17	11	12	9	9	8	8	8
Public	13	13	12	11	9	8	7	8	9	9	9
LULUCF	6	4	1	-1	-3	-3	-3	-10	-7	-4	-2
Total	**609**	**571**	**571**	**570**	**510**	**420**	**324**	**303**	**296**	**291**	**295**
Change from 1990 (%)		-6	-6	-6	-16	-31	-47	-50	-51	-52	-52

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.5.2 Methane

The two biggest emitters of CH_4 in 2020 were agriculture and waste management. The UK projects a decline in CH_4 emissions between 2020 and 2030 of 7 $MtCO_2e$. This means that by 2030, emissions of CH_4 are projected to be 67% lower than 1990. By 2040, the WEM scenario projects that methane emissions will be 68% lower than 1990 values (Table 4.16).

Table 4.16: Methane emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals							Projections			
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Transport	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Energy supply	34	27	17	11	9	7	5	6	5	5	5
Business	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Residential	2	1	1	1	1	1	1	1	1	1	1
Agriculture	29	29	28	27	25	26	25	25	25	24	24
Waste management	63	66	60	46	27	18	16	14	13	13	13
Industrial processes	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Public	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LULUCF	5	5	5	5	5	5	5	<0.5	<0.5	<0.5	<0.5
Total	**135**	**129**	**111**	**90**	**67**	**56**	**52**	**46**	**44**	**43**	**43**
Change from 1990 (%)		-4	-17	-33	-50	-59	-62	-66	-67	-68	-68

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.5.3 4.5.3 Nitrous oxide

Most nitrous oxide emissions come from agriculture. The UK projects a modest decline in N_2O emissions out to 2040, projecting emissions in 2030 that are 59% lower than in 1990, and 60% lower than 1990 in 2040.

Table 4.17: N2O emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Transport	2	2	2	1	1	1	1	1	1	1	1
Energy supply	1	1	1	1	1	1	1	1	1	1	1
Business	1	1	1	1	1	1	1	1	1	1	1
Residential	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Agriculture	18	18	17	16	15	15	15	14	14	14	14
Waste management	1	1	1	1	1	2	2	2	2	1	1
Industrial processes	24	14	5	3	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Public	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LULUCF	2	2	2	2	2	2	2	2	2	2	2
Total	**50**	**40**	**30**	**26**	**23**	**22**	**21**	**21**	**20**	**20**	**20**
Change from 1990 (%)		-20	-39	-47	-54	-55	-58	-59	-59	-59	-60

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.5.4 Hydrofluorocarbons

Almost all HFCs are emitted by the business sector. In 2030, the UK projects HFC emissions of 8 $MtCO_2e$ less than in 2020, equivalent to a 72% decline since 1990. The UK projects a reduction in HFC emissions in 2040 of 86% compared to 1990 levels.

Table 4.18: HFC emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Business	<0.5	<0.5	2	6	10	12	11	6	3	1	1
Industrial processes	14	18	3	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**14**	**19**	**8**	**9**	**12**	**14**	**12**	**7**	**4**	**2**	**2**
Change from 1990 (%)		29	-46	-36	-16	-2	-15	-51	-72	-84	-86

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.5.5 Polyfluorocarbons

PFC emissions remain at low levels over the projection period.

Table 4.19: PFC emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Business	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Industrial processes	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**2**	**1**	**1**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**
Change from 1990 (%)		-64	-65	-76	-83	-84	-90	-77	-77	-77	-77

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

4.5.6 Sulphur hexafluoride

SF_6 emissions remain at low levels over the projection period.

Table 4.20: SF6 emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040
Business	1	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	1	1
Industrial processes	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**1**	**1**	**2**	**1**	**1**	**<0.5**	**<0.5**	**<0.5**	**1**	**1**	**1**
Change from 1990 (%)		4	50	-15	-45	-66	-66	-60	-57	-53	-53

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

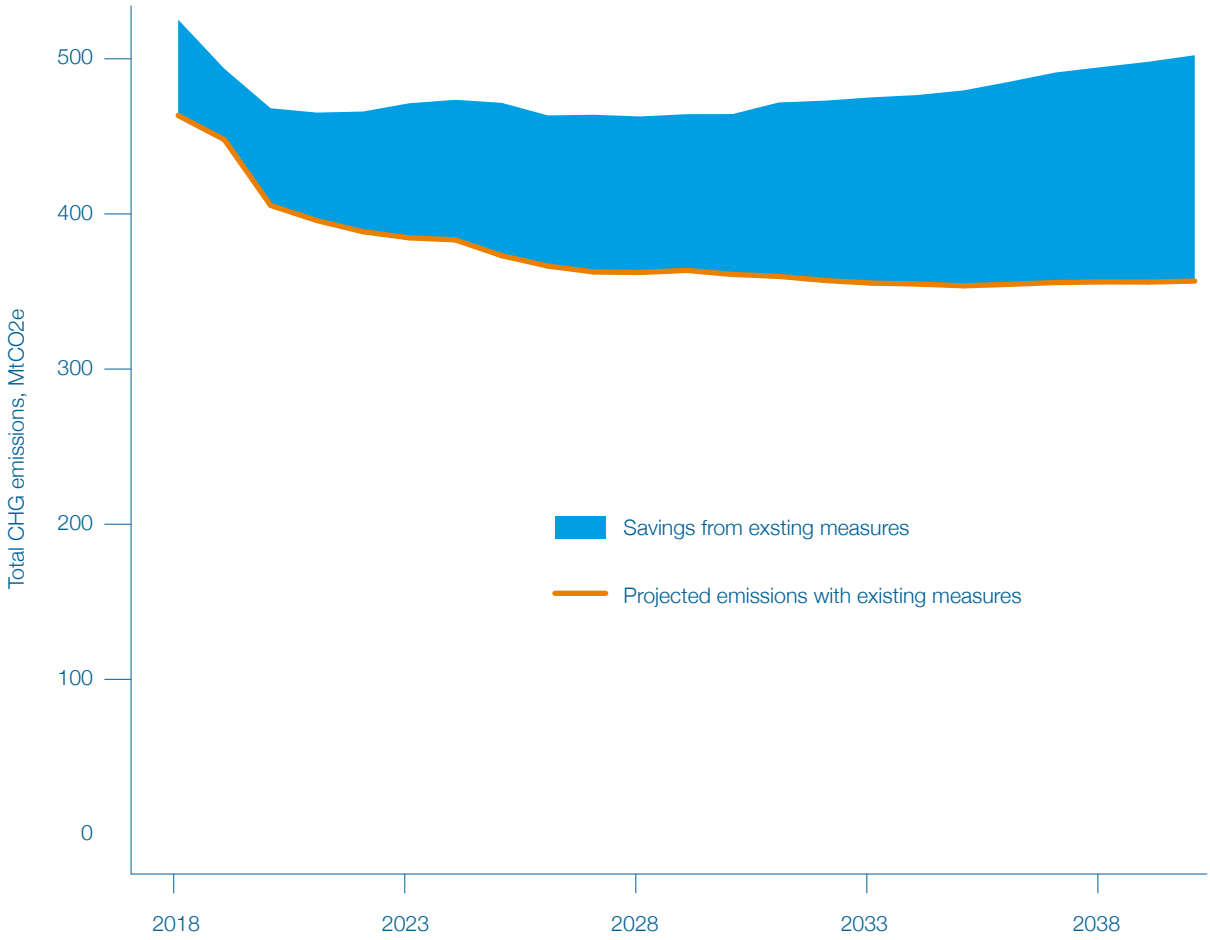
4.6 Total effect of policies and measures

The WEM scenario projections in this chapter include the impact of the UK's implemented and adopted policies and measures as reported in EEP 2019, for which the policy cut-off point was August 2019. They therefore represent a counterfactual, showing what the UK would expect to happen in the absence of further policies such as those included in the UK's Net Zero Strategy, published in October 2021.

The name, sector, GHG(s) and activity affected, and descriptions of these policies and measures can be found in Annex 2, Table 3. The WEM scenario within this chapter does not include planned policies, but those are included within domestic reporting and are therefore shown in Annex 2, Table 3.

Since Biennial Report 4, the UK has continued to update its analysis of policies and measures expected to help meet both Nationally Determined Contributions and the targets for Carbon Budgets set under the UK Climate Change Act (2008). Some further policies introduced after EEP 2019 have been included in Annex 2, Table 3, but these are not yet quantified. Over time, the UK's projections will include newer or more recently announced policies as they progress to the impact assessment stage.

Figure 4.3: Projected impact of policies, $MtCO_2e$ (WEM scenario, UK Coverage)



Source: EEP 2019

The UK treats the policies adopted before 2009 as part of a 'baseline', because carbon budget targets were set for the first time in 2009. Figure 4.3 and Table 4.21 show the estimated emissions savings attributable to policies adopted between April 2009 and August 2019, as published in the 2019 UK EEP. For example, in 2030 the UK projects that UK policies (excluding planned policies) will deliver emissions reductions of around 103 $MtCO_2e$.

Differences in projected emissions between scenarios do not exactly match the sum of emissions reductions provided by individual policies. This is due to price interactions and adjustments to policy impacts to improve accuracy.

The Net Zero Strategy[4] (published 2021) delivers a comprehensive set of measures to support and capitalise on the UK's transition to net zero by 2050. It sets out how the UK will end its domestic contribution to climate change with an approach where 'green' and 'growth' go hand-in-hand. It is a cross-economy strategy which keeps the UK on the path to net zero, including action the UK will take keep on track to meet Carbon Budgets and the UK's 2030 Nationally Determined Contribution.

4 https://www.gov.uk/government/publications/net-zero-strategy

Table 4.21: Projections of total net GHG emissions, $MtCO_2e$ (WEM scenario, UK Coverage)

	Projections			
Scenario	2025	2030	2035	2040
Emissions excluding the impact of measures adopted between 2009-19 (baseline)	474	463	476	495
Emissions including all implemented or adopted measures (excluding planned policies)	373	361	354	357
Savings from measures adopted 2009-19 (excluding planned policies)	99	103	126	146

Source: EEP 2019

4.7 Projection methods by sector

The UK projections of emissions of CO_2 and combustion-related emissions of other GHGs (CH_4 and N_2O) are based on the UK's EEP modelling suite used for its annual publication and internal analysis. This models the UK energy market, including final sector energy use and the electricity supply sector. It includes a top-down econometric model of energy demand and combustion-related GHG emissions for the UK economy with a bottom-up supply side Dynamic Dispatch Model (DDM). The top-down econometric energy demand projections are adjusted for the impact of policies which are modelled separately using more detailed sectoral models. The sector classification and the principal source of past energy statistics is the Digest of UK Energy Statistics (DUKES).

Energy use projections are converted to emissions projections using fuel emissions factors from the UK GHG Inventory. Additional calibration is used to account for energy use not captured in DUKES. Industrial process emissions are calibrated by comparing historic emissions in the UK's GHG Inventory to industrial production.

The UK's model suite projects emissions using projections for fossil fuel prices, carbon prices, economic growth, and demographics. Key assumptions for projections are given in Annex 2, Table 5.

The UK's domestically published projections include variant scenarios for high and low fossil fuel price assumptions, high and low GDP growth rates, and a pre-2009 policy baseline.

Projections of energy demand by fuel and sector start from a baseline econometric 'business as usual' projection, from which savings due to policies and measures are subtracted.

The overall modelling approach is similar to that used in previous Biennial Reports submitted by the UK, although there have been incremental improvements to the projections which are described in the UK's domestic EEP publications[5].

4.7.1 Transport

The CO_2 road transport model is an econometric response surface model integrated into the economy-wide Energy Demand Model (EDM) and calibrated against the Department for Transport's (DfT's) National Transport Model (NTM). The econometric model is multi-modal as it includes cars, light good vehicles (LGVs), heavy goods vehicles (HGVs), and public service vehicles (PSVs). It includes a population driver for cars and a manufacturing Gross Value added (GVA) driver for HGVs as well as price, motor spirit/diesel engine share, and fuel efficiency and biofuel substitution effects.

Most energy efficiency improvements are policy-driven, such as by new car emissions intensity targets and complementary measures such as lower rolling resistance tyres for

[5] See https://www.gov.uk/government/collections/energy-and-emissions-projections

HGVs. Unlike for other demand sectors, impacts of policies and measures on road transport fuel demand are modelled within the EEP modelling suite. Road vehicle efficiencies, motor spirit/diesel engine shares, and biofuel use under different policy scenarios are used to calculate mitigation impacts from differences in demand between scenarios.

Electricity demand from electric cars and LGVs is passed to the Dynamic Dispatch Model (DDM) which models a demand-side response.

Non-CO_2 road transport emissions projections follow a bottom up calculation methodology in line with the historical time-series of emissions. The activity data (vehicle distances travelled) is projected using 2018 DfT traffic forecasts.

DfT's projected traffic growth, the planned electrification of existing track, and the construction of new lines such as Crossrail and High Speed 2 underpin the rail transport model.

Projections for UK commercial aviation involve estimates of future UK GDP, consumer expenditure, population, and oil prices. The Fleet Mix Model captures efficiency improvements, for example the model assumes increasing use of biofuels. DfT provides more detailed information about methodology and assumptions with its aviation forecast. The modelling has extrapolated trends in the GHG Inventory to extend aviation emissions projections to UNFCCC coverage.

The UK projects that national navigation will remain largely static.

4.7.2 Energy supply

The UK uses the DDM to project investment and generation in the electricity supply sector. The DDM is a market-based model that simulates the operation of the electricity market and the investment decision of the market participants in detail. It is a profit-maximisation model incorporating the effect of Government policies such as Contracts for Difference which incentivise low-carbon generation through market mechanisms.

The DDM also models investment in the supply of heat and electricity from Combined Heat and Power plants, mostly in industry.

4.7.3 Business

For emissions projections, the UK breaks manufacturing down into sectors using the Standard Industrial Classification (SIC). The manufacturing sectors in the EDM are:

- Chemicals;
- Construction;
- Engineering and vehicles;
- Food, drink and tobacco;
- Iron and steel;
- Non-ferrous metals;
- Non-metallic mineral products;
- Pulp, paper and printing;
- Textile products; and
- Manufacturing not elsewhere classified.

The UK projects Gross Value added (GVA) for each of these sectors using GDP, interest rates, and, in some cases, terms of trade (the relative prices of imports and exports). The UK projects total energy demand for each sector from GVA and energy prices. Except for iron and steel, the model splits total energy demand into different fuels using historical fuel demands and projections of relative fuel prices. In iron and steel, the UK estimates energy demand using sector GVA and the tonnages of steel produced using electricity or by the Basic Oxygen Steel (BOS) process.

Energy demand is projected by commercial services from sector GVA, using the average growth rate since 1991 and temperature. The overall demand is then split into fuels.

To project business electricity demand from business, it is included in non-domestic demand and passed to the DDM. Emissions from fuels combusted on-site are included in the business sector.

4.7.4 Residential

The UK projects the residential emissions from gas, oil and solid fuels use separately. The estimates depend on assumptions about the percentage of households using each fuel as their main heating source. The primary drivers of residential energy demand are household numbers, fuel prices, temperature and income.

Residential demand for electricity is projected using the same drivers and passed to the DDM.

4.7.5 Agriculture

UK agriculture uses a relatively small amount of energy. Therefore, projections of its combustion emissions come from simple trend models.

The UK uses Food and Agricultural Policy Research Institute (FAPRI) methodology[6] to provide projections of activity, such as livestock numbers, crop production, fertiliser nitrogen use, and non-CO_2 emissions to 2030. Projections for later years are held constant. The FAPRI projections come from an economic model that assumes a specific set of international prices for agricultural commodities and a path for the sterling exchange rate. Together, these factors are important determinants of the returns to farmers and hence of total agricultural production. The UK converts these FAPRI activity projections to emissions using the latest agriculture model in the UK's GHG Inventory.

4.7.6 Waste management

Projections of CH_4 from landfill depend on UK projections of tonnages of municipal waste going to landfill and on figures for commercial and industrial waste. Waste composition is projected from knowledge of changes to BWT processes and from projections of waste arising.

These projections of waste going to landfill are then run through MELMod, the landfill emissions calculation model. The MELMod model is based on the IPCC's first-order decay methodology, which the 2014 GHG Inventory report summarises. UK population projections underpin predictions of emissions of CH_4 and N_2O from domestic wastewater and sewage/sludge decomposition. Industrial wastewater emissions are predicted to stay constant. BWT emissions from multiple sources are combined. Some are projected to be constant, and

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[6] https://www.afbini.gov.uk/publications/fapri-uk-greenhouse-gas-emission-modelling-system-england-wales-scotland-and-northern

some are extrapolated from the latest year of historical data using sector experts' estimates of future BWT capacity.

4.7.7 Industrial processes

Manufacturing sub-sector GVA projections or energy demand projections are used to project CO_2 emissions from industrial processes where there is evidence of correlation. Other CO_2 emissions are projected to remain constant at the last actual value from the UK's GHG Inventory (published 2020).

Many methods are used for projections of non-CO_2 emissions from industrial processes. Some sources use manufacturing sector GVAs while others use more detailed assumptions about future activity. Annex N of the UK's domestic EEP publication[7] provides more information on non-CO_2 emissions projection methods.

4.7.8 Public

Sector employment levels are used as the main driver in modelling non-electricity energy demand from public services. The projections assume that the historical trend of improving energy efficiency per employee will continue. Temperature also affects public sector demand. The models break non-electricity energy demand into fuels using the same proportions as in latest historical data.

Electricity demand is trended to use only public sector employment as a driver and is included in the non-domestic demand we pass to the supply-side modelling.

Public services emissions modelling does not consider energy prices as a driver.

4.7.9 Land Use, Land Use Change and Forestry (LULUCF)

The Centre for Ecology and Hydrology and Forest Research model LULUCF emissions using approaches that are consistent with the current inventory methodology. They produce four scenarios – Baseline, Central, High and Low – for future emissions. Each makes assumptions about afforestation, wildfires, peat extraction, land use change and deforestation. They developed these scenarios with a policy maker stakeholder group and updated them in 2016 following discussions with UK Devolved Administrations. Broadly, their central scenario is a continuation of current policies and activity rates. This is the scenario used in generating emissions projections for this report.

4.7.10 Estimation of emissions in Crown Dependencies and Overseas Territories

The UK's Crown Dependencies and Overseas Territories are not included in the projections which the UK produces annually to monitor progress against its own carbon budgets. The projections in this report supplement the UK annual figures with forecasts for areas that are consistent with the UK's 1990-2018 GHG Inventory. The latter are simple linear trends of the emissions in each National Communication sector based on observations from the previous 9 years. Emissions in these territories are only a small proportion of UK emissions, making up 0.9% of the UK's UNFCCC coverage emissions in recent years.

4.7.11 4Strengths of the projection methodology

The UK's modelling methodology has the following strengths:

- The initial starting point for the UK's Energy and Emissions Projections is the latest historical data from the GHG Inventory and DUKES. In the case of EEP 2019, this

[7] See https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019

was based on the UK's GHG Inventory 2020 (latest actuals 2018) and 2019 energy statistics (latest actuals 2018). These are well established sources of information;

- The main Energy Demand Model (EDM) uses econometric methods that capture long-run relationships between economic activity, energy consumption and emissions;
- The detailed model of electricity generation captures both short-run fuel switching and long-term investment strategies;
- The UK updates its projections regularly as part of the monitoring of UK national carbon budgets;
- Models use authoritative national and international sources for socio-economic projections;
- There is a rolling programme of review and update for the projection methodologies and econometric models, and modelling performance is tested by back-casting to see how well the model predicts what happened in the recent past;
- The projections distinguish between business as usual emissions and the emission reductions due to mitigating policies and measures; and
- The modelling estimates the mitigation impacts of policies using a common cross-Government methodology.

4.7.12 Weaknesses of the projection methodology

The UK's modelling has the following weaknesses:

- The modelling generally assumes that historical relationships will continue in the future, which can fail to capture structural changes and new technologies where these fall outside the scope of included policies and measures;
- Analysis for EEP 2019 was completed before the coronavirus (Covid-19) pandemic and prior to publication of the Net Zero Strategy, so these projections take no account of the impacts of these on future energy demand or emissions. Similarly, analysis assumed that the drivers of uncertainty were similar to previous years;
- There is considerable recognised uncertainty in economic and social projections from external sources;
- Econometric modelling is subject to estimation errors and the possibility of incorrect identification energy use drivers.

4.7.13 Key assumptions

A set of key assumptions about UK economic growth, demographic changes and future fuel price trajectories underpin the UK's projections. The main sources of projected assumptions are the forecasts made by the UK's Office for Budget Responsibility (OBR) and Office for National Statistics (ONS), and supplemented by International Monetary Fund projections of world growth. Fuel prices are produced by the Department for Business, Energy and Industrial Strategy (BEIS). Table 5 in Annex 2 documents key parameters and assumptions.

The UK released EEP 2019 in October 2020. UK GDP forecasts to 2021 were from the March 2019 Economic and Fiscal Outlooks and beyond 2021 GDP came from the January 2017 Fiscal Sustainability Report. The UK's ONS produced the population projections in 2016 alongside a supporting methodology description. It produces population and household

projections. The ONS released information about changes in methodology since the previous population projection alongside the 2018 population projections. The household projections combine population projections with household formation propensities. Table 4.22 shows updated socio-economic growth assumptions.

Table 4.22: UK growth projections, percentage per annum

	Projections			
Change in:	2025	2030	2035	2040
GDP	1.9	2.3	2.2	2.3
Households	0.7	0.6	0.5	0.6
Population	0.5	0.4	0.3	0.3

Source: EEP 2019

BEIS updates the fossil fuel price and carbon prices projections annually, which are subject to peer review and are used widely across UK government. Table 4.23 shows sets out the key fossil fuel and carbon price values for EEP modelling, and Table 4.24 details exchange rate assumptions.

Table 4.23: Fossil fuel and carbon price assumptions, 2019 prices (various scenarios, UK coverage)

	Projections			
Price for:	2025	2030	2035	2040
Crude oil (Brent 1 month), $/bbl	68.45	79.53	90.60	90.60
Gas (NBP), p/therm	53.00	59.00	64.00	64.00
Coal (CIF ARA), $/tonne	68.38	72.72	77.06	77.06
EU ETS carbon price (at time of modelling), £/tCO_2	28.79	43.49	43.49	43.49

Source: EEP 2019

Table 4.24: Exchange rates against GBP sterling

	Projections			
Exchange rate	2025	2030	2035	2040
Euros (€ per £)	1.10	1.15	1.2	1.2
US Dollars ($ per £)	1.39	1.45	1.5	1.5

Source: EEP 2019

4.7.14 Quality assurance and quality controls

Quality assurance of modelling is a high priority within UK Government, and analysis for the EEP follows the BEIS quality assurance guidelines.

A small group of BEIS analysts produces the energy and emission projections, and owns, maintains and updates the EDM which underpins the projections. The EEP team liaises with other modelling teams, both inside and outside BEIS, to quality assure and compile the data which go into the overall projections.

Figures relating to electricity come from iteratively solving two specialised models with the EDM. These are the DDM and the Prices and Bills Model of retail electricity prices. This cycling ensures that electricity demand is in equilibrium with prices. The co-ordinators of

these models also assure projections results. Projections for non-energy non-CO_2 emissions are produced by the BEIS Science division.

The Centre for Ecology and Hydrology produces the UK's LULUCF projections under contract; this is overseen by the BEIS Science and Innovation for Climate and Energy Directorate.

BEIS bases transport sector modelling on, and calibrates it against, the detailed models for road, rail and air used by the Department for Transport (DfT). These latter are in turn subject to DfT's quality assurance.

Analytical teams in the relevant areas prepare estimates of the emissions or energy savings due to UK Government policies. These are normally based on assessment documents for each measure. Analysts prepare these according to central guidance, which ensures that energy use and GHG emissions are valued consistently across UK Government.

Analysts send the policy savings in a standard template and the EEP team checks them to look for any unaccounted overlaps and to ensure internal consistency between energy and emissions savings. The team confirms the model savings with the submitting analysts and departments. The UK updates its GHG projections to inform progress against national carbon budgets and publishes each set of projections. The EEP team improves and adapts the core Energy Demand Model incrementally, quality assuring each change to confirm validity and robustness. (The team responsible for the DDM quality assures any change relating to electricity generation.) The EEP team presents interim and final results to a Steering Group which oversees the process, and stakeholders review draft EEP reports before publication. The independent Committee on Climate Change (CCC) reviews the projections after their release.

4.8 Uncertainty

In October 2020 the UK published annexes of data to accompany its domestic projections. These included low and high fossil fuel prices and low and high UK GDP rates as variant scenarios and sensitivities.

4.8.1 Fossil fuel prices

Table 4.25 shows the price assumptions used for the fossil fuel price scenarios.

Table 4.25: Prices in fossil fuel variant scenarios, 2019 prices (various scenarios, UK coverage)

	Projections			
	2025	2030	2035	2040
Low Fossil Fuel Prices				
Crude oil (Brent 1 month), $/bbl	44.00	50.00	55.00	55.00
Gas (NBP), p/therm	36.00	40.00	43.00	43.00
Coal (CIF ARA), $/tonne	48.10	53.30	58.50	58.50
High Fossil Fuel Prices				
Crude oil (Brent 1 month), $/bbl	106.00	118.00	130.00	130.00
Gas (NBP), p/therm	78.00	83.00	88.00	88.00
Coal (CIF ARA), $/tonne	93.06	101.77	110.48	110.48

Source: EEP 2019

The EEP team produced these scenarios following a fundamental analysis of the drivers of the main fossil fuel wholesale prices available to the UK within the European energy market. They are not sensitivities to the overall level of fossil fuel prices and do not maintain fuel cross-price ratios.

4.8.2 Growth sensitivities

To investigate the impact of different economic growth rates, the EEP includes scenarios where the economy performs at 25 basis points per annum above or below the reference scenario value. Table 4.26 shows this.

Table 4.26: Variant UK GDP growth sensitivities, percentage per annum (various scenarios, UK coverage)

	Projections			
Scenario	2025	2030	2035	2040
High UK GDP Growth	2.1	2.5	2.5	2.5
Low UK GDP Growth	1.6	2.0	2.0	2.0

Source: EEP 2019

Taking the combinations of the different fossil fuel and GDP variants gives four different emissions scenarios (Table 4.27).

Table 4.27: Total emissions in variant scenarios, $MtCO_2e$ (WAM policy accounting, UK coverage)

	Projections			
	2025	2030	2035	2040
WAM Reference scenario	372	356	345	344
Variant scenarios				
Low Fossil Fuel Prices	380	369	359	362
High Fossil Fuel Prices	365	341	331	330
Low UK GDP Growth	370	353	341	339
High UK GDP Growth	374	359	349	350

Note: includes LULUCF

Source: EEP 2019

4.8.3 Overall uncertainty

Future values of key variables such as fossil fuel prices, the impacts of policy and demographic/economic growth cannot be known with certainty. However, these variables underpin the UK projections. Understanding the impact of this uncertainty is important in the context of the UK's aim to reduce emissions through policy intervention, and so it is regularly investigated in EEP publications. Uncertainty analysis presented here is based on the most influential drivers of energy use and emissions, previously identified through sensitivity analysis. The EEP team carries out a Monte Carlo simulation to vary the values of these drivers, firstly obtaining historical distributions of input values then running the projections model on samples from these distributions.

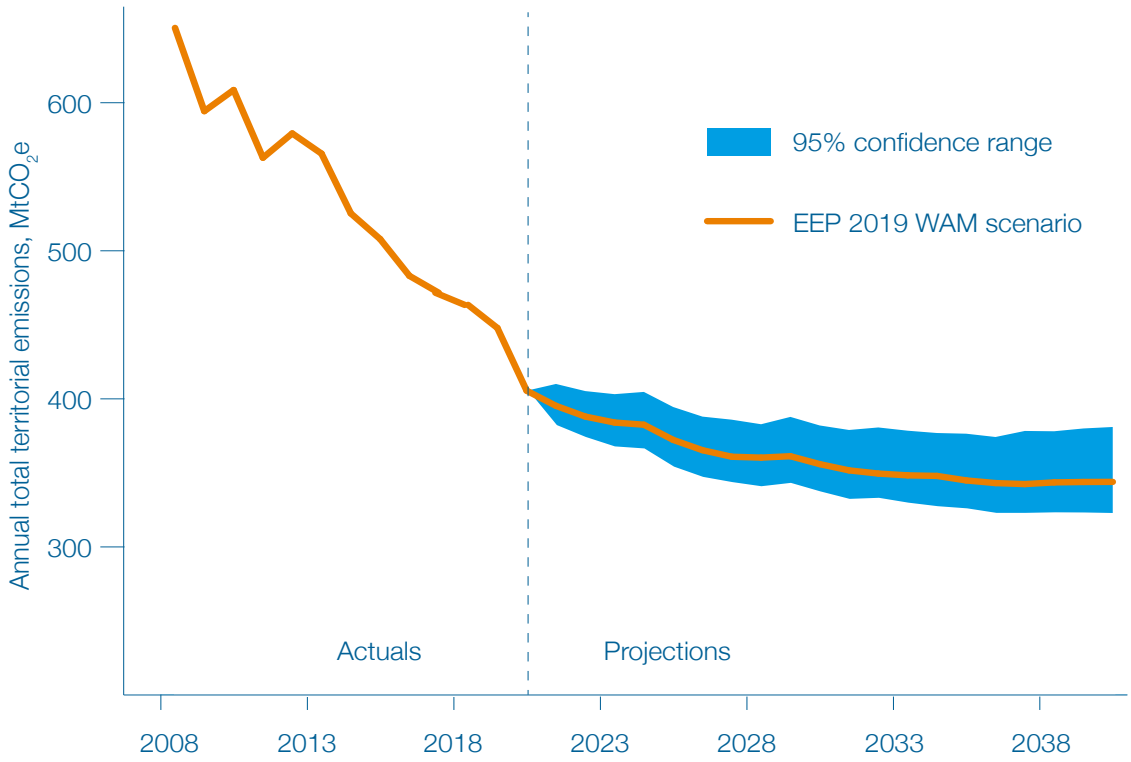
For the EEP 2019 publication, we derived the uncertainty analysis from the estimates published in EEP 2018 (used for BR4), due to time constraints at the time of analysis. Because further data on Covid-19 was not yet available, we assumed that the drivers of uncertainty were similar to previous years. The confidence interval originally presented in the EEP 2018 report has been extended to 2040 through a simple extrapolation of the overall

linear trends exhibited by the upper and lower bounds of the confidence interval for the final nine years of the projected series.

This method underpins the 95% confidence interval estimates presented in Figure 4.4 and Table 4.28. The upper and lower boundaries represent the projected emissions corresponding to the lower 2.5% and upper 97.5% percentiles of the Monte Carlo simulations respectively.

This analysis excludes the electricity supply industry and possible "structural breaks" in society or the economy which might significantly affect emissions. For example, societal and behavioural step changes or breakthrough technologies like improved storage could have profound impacts on the UK's energy mix and emissions but are hard to anticipate.

Figure 4.4: Uncertainty in UK projected emissions, $MtCO_2e$ (WAM scenario, UK coverage)



Note: includes LULUCF

Source: EEP 2019 based on uncertainty ranges from EEP 2018 (with extrapolated final years)

Table 4.28: Confidence interval for total emissions from Monte Carlo simulations, $MtCO_2e$ (WAM scenario, UK coverage)

	Projections			
Upper 95% confidence interval	**394**	**382**	**376**	**381**
Reference: EEP 2019 WAM scenario	372	356	345	344
Lower 95% confidence interval	353	336	325	322
Comparisons, %				
Upper 95% confidence interval, difference from reference	6	7	9	11
Lower 95% confidence interval, difference from reference	-5	-5	-6	-6
Upper 95% confidence interval, change on 1990 values	-51	-53	-53	-53
Reference, change on 1990 values	-54	-56	-57	-57
Lower 95% confidence interval, change on 1990 values	56	-58	-60	-60

Source: EEP 2019 based on uncertainty ranges from EEP 2018 (with extrapolated final years)

The methodology only looks at future uncertainty and does not examine uncertainty in historical inputs or emission estimates, such as those before 2020. By 2030, the UK WAM scenario projects GHG emissions will be between 53% and 58% below 1990 levels, with the Reference case estimate 56% below. By 2040, the range is slightly wider with emissions projected between 53% and 60% below 1990 levels. The higher uncertainty for later years reflects the reduced confidence in modelled projections further into the future.

4.9 Differences from the last National Communication

The table below summarises the differences between the projections in this publication and the last National Communication, which is based on projections produced in 2017 (based on EEP 2017).

The main differences between the two projections include additional implemented and adopted polices, some re-estimations of the impact of policies, improved modelling, revised fossil fuel prices, and economic growth assumptions.

The projections have also been updated to take into account improvements to the measurement of historical emissions in the UK's 1990-2018 GHG Inventory, projection methods, emission factors and activity data. The effect of changes to the UK's 1990-2020 GHG Inventory are summarised in Chapter 2.

The net effect of these changes is to reduce projected emissions in 2030 from 52% below 1990 levels in the Seventh National Communication to 55% below 1990 levels in the Eighth National Communication. The projected GHG reduction of 17 $MtCO_2e$ between the two projections primarily results from the Eighth National Communication projecting fewer CO_2 emissions, there are minimal changes in the projections of the other gases.

Table 4.30: Comparison with last National Communication, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Seventh National Communication			Eighth National Communication		
GHG including LULUCF	1990	2030	Projected change (%)	1990	2030	Projected change (%)
Carbon dioxide	599	314	-48	609	296	-51
Methane	135	41	-70	135	44	-67
Nitrous oxide	51	22	-57	50	20	-59
Hydrofluorocarbons	14	4	-70	14	4	-72
Perfluorocarbons	2	<0.5	-84	2	<0.5	-77
Sulphur hexafluoride	1	<0.5	-67	1	1	-57
Nitrogen trifluoride	<0.5	<0.5	N/A	<0.5	<0.5	N/A
Total GHG	803	382	-52	810	365	-55

Primary source: EEP, uplifted to UNFCCC coverage

We report LULUCF emissions in full to be consistent with Inventory Convention reporting. This scope is wider than that under Articles 3.3 and 3.4 of the Kyoto Protocol and includes estimates for all anthropogenic sources minus sinks.

Chapter 5 Vulnerability assessment, climate change impact and adaptation measures

5.1 Introduction

This chapter describes the ways the UK continues to develop its adaptation strategies and plans to deal with unavoidable impacts of climate change and their economic, environmental, and social costs.

The UK has a long history of government support for work on climate change adaptation. In 2008, the Climate Change Act ('the Act') created the legal framework for climate change adaptation in the UK. The Act establishes a five-yearly cycle of requirements including UK-wide Climate Change Risk Assessments and National Adaptation Programmes, which set out both the key risks the UK faces from the challenges of climate change, and the key actions that the government, and others, will take to adapt to these in the UK for the following 5 years across sectors.

The Act also provides for an Adaptation Reporting Power for the UK government, to require public authorities, and public and private companies that provide infrastructure and related services to report on how they have assessed climate change risks to their work, and their actions to address those risks.

The UK government (Defra) also sponsors the independent Adaptation Sub-Committee, publicly known as the Adaptation Committee (AC), of the Climate Change Committee (CCC). The AC was established under the Act to advise Government on adaptation and review progress on implementation of the NAP.

The UK government recognises there are many barriers to overcome to adapt effectively to a changing climate. These include limitations in information and awareness of climate risk, clarity on ownership of risks and responses, and the complexity of adapting for an uncertain future.

The UK government also recognises that government leadership is often required to ensure solutions are applied across the whole system. The scale of the challenge is made clear in the latest UK-wide Climate Change Risk Assessment, CCRA3. The UK Government must go further and faster to prepare for the impacts of a warmer world. We will set out how we will meet these challenges in the third National Adaptation Programme (NAP3).

CCRA3 also highlighted the international nature of many climate risks which can cause cascading effects across borders and sectors with significant impacts on the UK. The UK government is building on the discussions and key messages from COP26, where adaptation

was a focal point championed by the UK Presidency. We will continue learning from others about how to adapt, while also building capacity and sharing best practice.

5.2 Key developments

Since the 7th National Communication in 2017 the UK has delivered against the full cycle of adaptation requirements in the Act, including:

- **two comprehensive, nationwide Climate Change Risk Assessments** in January 2017 and January 2022. The third CCRA (CCRA3), published in January 2022, sets out 61 UK-wide climate risks and opportunities cutting across multiple sectors of the economy. The UK government's independent statutory and advisory body, the Climate Change Committee (CCC), produced the underpinning 2021 Independent Assessment of UK Climate Risk which identified eight priority risk areas for further action between 2021 and 2023;
- **our second National Adaptation Programme (NAP2) and the Third Strategy for Climate Adaptation Reporting** in July 2018. The NAP covers plans and policies in England and non-devolved climate adaptation matters. It also sets out the key actions that the government and others will take to adapt to the challenges of climate change in the UK for the following 5 years for different UK sectors, and forms part of the five-yearly cycle of requirements laid down in the Act. NAP2 describes over 150 actions to be taken between 2018 and 2023; and
- **two statutory CCC progress reports on the delivery of NAP2** in July 2019 and June 2021. These review progress in adaptation policy and action. The 2021 progress report concluded that only five of 34 sectors assessed had shown notable progress in the past two years, and no sector is yet scoring highly in lowering its level of risk. There were 50 recommendations in this report, including restoring upland peat by 2045, bringing forward plans to address overheating risk in homes, making the next round of Adaptation Reporting mandatory for all infrastructure sectors, building a strong UK emergency resilience capability against climate shocks; and implementing a public engagement programme on adaptation.

In addition, the UK has delivered:

- **the UK's 2018 Climate Projections (UKCP18)**. These provide an updated assessment of how the UK climate may change in the future. UKCP18 updated the probabilistic projections over land and provided a set of future climate projections for the globe at 60km scale and for the UK at 12km scale. In 2019 projections were downscaled to a level (2.2km) previously only used for short-term meteorological modelling allowing realistic simulation of high impact events, e.g. localised heavy rainfall in summer. Marine projections have been updated for sea-level rise and storm surge. UKCP18 was used to inform the underpinning research and advice for CCRA3; and
- **the first UK Adaptation Communication to the UNFCCC** in December 2020, updated in September 2021. This is an important step in upholding the transparent reporting system of the UNFCCC. It provides a comprehensive overview of domestic and international frameworks and support. The document sets out national circumstances, institutional arrangements and legal frameworks relevant to adaptation, as well as national adaptation priorities, policies and actions.

The UK Government is now preparing NAP3, to be published in 2023, which will aim to shape a society which makes timely far-sighted and well-informed decisions to address the

risks and opportunities posed by a changing climate. The UK Government intends for NAP3 to be the most ambitious NAP yet, with a clear set of objectives, and a robust and systematic set of actions, policies, programmes and investments to meet those objectives. There will be clear timelines, and measurable metrics and progress indicators to measure progress, all linked to the 61 risks in our latest risk assessment.

5.3 Adaptation in the UK

Responsibility for climate change adaptation is shared between the four nations of the United Kingdom. National governments in Northern Ireland, Wales and Scotland are responsible for their own respective adaptation programmes. In the case of Scotland, there is a devolved statutory framework on adaptation set out through the Climate Change (Scotland) Act 2009. The UK government is responsible for climate change adaptation in England, and for policy areas for which it has UK-wide competence such as security and foreign affairs.

The four governments of the UK are committed to working closely together to share best practice and develop UK wide initiatives where appropriate. They accept we must mainstream adaptation throughout government policy in a more holistic way. This will include accounting for the synergies between adaptation and mitigation. To achieve net zero, we must integrate adaptation action into mitigation efforts. Successful mitigation will in turn ensure adaptation remains achievable. This includes the need to ensure our increasingly electrified power system, nature-based solutions and other low carbon infrastructure are resilient to future climate impacts.

5.3.1 UK Government programme

Building on the UK's strong approach to climate change adaptation reported in the seventh National Communication, we continue to develop our capability and capacity to adapt to current and predicted climate changes. More specifically, the UK government is also developing its policy response to CCRA3 in the form of NAP3.

The NAP's overarching aim is to shape a society which makes timely, far-sighted, and well-informed decisions to address the risks and opportunities posed by a changing climate. It sets out actions and commitments on adapting to climate change from the UK government industry, local authorities, and civil society to build up UK resilience to climate change, covering business, infrastructure, natural environment, health, communities and built environment and local government sectors.

The UK's approach is to integrate consideration of climate risks and adaptation across all policies, programmes, and activities within government, and beyond. This means that the NAP needs to be dynamic, adding further actions and activities as understanding of climate risks develops, and policy opportunities arise.

5.3.2 Scottish Government programme

5.3.2.1 Scottish Government Climate Change Adaptation Programme

The Climate Change (Scotland) Act 2009 sets the statutory framework for Scotland to adapt to climate change. The legislation requires a programme for climate change adaptation to be set out every 5 years. This must address risks identified in the statutory UK Climate Change Risk Assessments (CCRA), which are also updated every five years, based on independent expert advice.

The second statutory Scottish Climate Change Adaptation Programme (SCCAP2)[1] was launched in September 2019 and outlines how Scotland is preparing for the impacts of climate change over the period to 2024. It sets out policies and proposals to increase the capacity of Scotland's people, communities, businesses and public sector to adapt to climate change and to respond to the risks to Scotland published in CCRA2.

The Programme takes an outcomes-based approach, derived from both the UN Sustainable Development Goals and Scotland's National Performance Framework[2]. The seven high level outcomes cover community resilience and climate justice, the economy, infrastructure, the natural and marine environments and international partnerships.

In line with the statutory framework, and in response to CCRA3[3], the Scottish Government is now beginning to prepare for its third statutory Adaptation Programme, as well as continuing to implement the actions set out in the current Programme.

Annual reports are required on progress towards achieving the goals of the Adaptation Programme[4]. Regular independent assessments of how well Scotland is preparing for climate change are also published by the CCC[5].

5.3.2.2 Impacts and vulnerability assessment

Climate projections from the UK Met Office provide key information about recent climate trends in Scotland, and projections on how these changes are likely to continue and intensify in coming decades. These find that Scotland will experience warmer, wetter winters with more intense rainfall events, hotter drier summers with greater extremes, and that sea levels will continue to rise[6].

The evidence underpinning the most recent (2022) CCRA then draws from these projections to identify the priority climate risks specific to Scotland[7]. The Advice Report, published in June 2021[8], identifies 61 individual risk areas, covering the natural environment and assets; health, communities and the built environment; business and industries and international dimensions. Statutory Scottish Climate Change Adaptation Programmes (see preceding section) are required to respond to the full range of identified risks.

5.3.2.3 Adaptation measures

SCCAP2 sets out around 170 policies and proposals to build resilience over the period to 2019 and 2024. A full list of these measures can be found in the Programme itself, but some examples are also set out below:

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1 https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/

2 https://nationalperformance.gov.scot/

3 https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2022

4 Annual progress reports are available at: https://www.gov.scot/policies/climate-change/climate-change-adaptation/ and for 2021: https://www.gov.scot/publications/scottish-climate-change-adaptation-programme-progress-report-2021/

5 Is Scotland climate ready? – 2022 Report to Scottish Parliament: https://www.theccc.org.uk/publication/is-scotland-climate-ready-2022-report-to-scottish-parliament/

6 https://www.adaptationscotland.org.uk/why-adapt/climate-trends-and-projections

7 https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA-Evidence-Report-Scotland-Summary-Final-1.pdf

8 Independent Assessment of UK Climate Risk - Climate Change Committee (theccc.org.uk)

Flood Risk Management Plans

There are 14 Local Plan Districts in Scotland, each with their own Flood Risk Management Plan[9] setting out actions to reduce the risk of flooding. The Plans are approved by the Scottish Government and published by SEPA as Scotland's strategic flood risk management authority. Since 2008, the Scottish Government has made available £42 million per year to enable local authorities to invest in flood risk management actions.

Infrastructure Investment Planning

The Infrastructure Investment Plan for Scotland 2021-22 to 2025-26[10] outlines a coherent, and strategic approach to delivering Scotland's National Infrastructure Mission. The Plan focuses on three core strategic themes for guiding investment decisions in Scotland: Enabling the transition to net zero emissions and environmental sustainability; Driving inclusive economic growth; and building resilient and sustainable places. The Scottish Government is committed to ensuring that Scotland's transport network is resilient to the impacts of climate change. As part of the Infrastructure Investment Plan, it is investing £60 million to support climate adaptation and resilience of our trunk road network.

Land Use and Forestry Strategies

The Scottish Government's third Land Use Strategy[11], published in March 2021, has a place-based focus and sets out Scotland's long-term vision for sustainable land use, their objective and key-policies for delivery. Climate change adaptation is integrated throughout the Strategy as is the positive role that both nature-based solutions and wider green and blue infrastructure can have in helping Scotland to achieve its various national targets and priorities.

Scotland's Forestry Strategy[12] presents the Scottish Government's 50-year vision for Scotland's forests and woodlands and sets out a 10-year framework for action, including in relation to improving the resilience of forests and woodlands. It has the principles of sustainable forest management at its core and recognises the need for better integration of forestry with other land uses and businesses, reinforcing the principle of 'the right tree, in the right place, for the right purpose'.

Support for capacity building domestically

The Scottish Government funds the Adaptation Scotland programme[13] to support capacity building and action on adaptation by the public sector, businesses and communities in Scotland. This includes developing Scotland's pioneering place-based approach to climate change adaptation. The programme also supports public bodies to develop adaptation capabilities that enable them to take adaptation action at the right time and in an effective way through the award-winning Adaptation Capability Framework.

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9 https://www2.sepa.org.uk/frmstrategies/

10 https://www.gov.scot/publications/national-mission-local-impact-infrastructure-investment-plan-scotland-2021-22-2025-26/pages/2/

11 https://www.gov.scot/publications/scotlands-third-land-use-strategy-2021-2026-getting-best-land/#:~:text=Scotland%27s%20Third%20Land%20Use%20Strategy%20sets%20out%20our,and%20the%-20benefits%20we%20get%20from%20our%20land.

12 https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/pages/1/

13 https://www.adaptationscotland.org.uk/

Support for adaptation internationally

The Scottish Government champions climate justice, recognising that those who experience the greatest impacts may need more support to adapt. At COP26 in Glasgow in 2021, it announced trebling of the Climate Justice Fund[14] to £36 million over four years to support resilience internationally.

In October 2019, the Scottish Government signed an Adhesion Declaration to join the global Regions Adapt initiative as a framework for regional governments' action, collaboration and reporting on climate change adaptation.

5.3.3 Welsh Government Programme

The Act requires Welsh Ministers to lay reports before the Senedd Cymru/Welsh Parliament on the objectives, actions and future priorities of Welsh Ministers around the impacts of climate change. This requirement is further strengthened by the Wellbeing of Future Generations (Wales) Act 2015, which sets out a number of overarching Well-being Goals that apply to a number of public sector organisations in Wales.

Climate change is integral to all the Well-being Goals and there is specific reference to a 'resilient Wales', which includes resilience to the effects of climate change. Climate change is also a key element of the Future Generations Commissioner for Wales' role and the Future Trends Report, and Public Service Board well-being assessments are required to take into account the latest CCRA. Each 5-yearly CCRA and the Climate Change Committee's independent advice that informs it, are statutory requirements under the Act. The Environment (Wales) Act 2016 also sets out further provisions in relation to climate change, including requirements for the sustainable management of natural resources as well as setting out governance arrangements for coastal and flood management.

The Welsh Government published its second climate change adaptation plan for Wales, Prosperity for All: A Climate Conscious Wales, in December 2019. The plan sets out the actions Welsh Government is taking across all relevant policy sectors to build resilience to the impacts arising from climate change. A number of significant, strategic and interlinked policy developments have taken place in Wales that will help to establish a robust framework for climate change adaptation.

The current Natural Resources Policy highlights the need to align all our policies to the delivery of the national priorities identified within it and sets out how this will be achieved. This cross-sector process is ongoing but has already been applied to the Planning Policy Wales consultation, Future Wales, the National Development Framework and the development of our Sustainable Farming Scheme. Natural Resources Wales published its Area Statements[15] in April 2020, which support the national priorities within the Natural Resources Policy.

In addition, we have recently seen publication of the updated National Development Framework, the Flood and Coastal Erosion Risk Management Strategy, Water Resource Management Plans, the National Peatland Action Programme, the launch of the National Forest for Wales, and consultation on the proposed new Sustainable Farming Scheme for Wales.

The Welsh Government is currently reviewing and updating its policy approach in response to the Advice Report, published in June 2021. The next national climate change adaptation plan for Wales is due to be published in 2024.

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[14] https://www.gov.scot/policies/international-development/climate-justice-fund/

[15] https://naturalresources.wales/evidence-and-data/maps/wales-environmental-information/?lang=en

5.3.4 Northern Ireland Government Programme

5.3.4.1 Northern Ireland Climate Change Adaptation Programme (NICCAP):

In Northern Ireland, the Department of Agriculture, Environment and Rural Affairs (DAERA) takes the lead on ensuring that the Northern Ireland Executive fulfils its legislative duties in relation to Climate Change Adaptation arising from the Act. In this function, DAERA chairs and facilitates a Cross-Departmental Climate Change Adaptation Working Group which includes representation from all Northern Ireland Executive Departments.

DAERA also works closely with Defra and the other Devolved Administrations of Scotland and Wales on matters relating to climate adaptation. The current NI Climate Change Adaptation Programme (NICCAP2)[16], which was published in September 2019 in response to CCRA2, focuses on five key priority areas and seven outcome objectives in response to the risk areas identified in the preceding CCRA.

NICCAP2 which covers the period 2019-2024 takes account of cross cutting issues identified in CCRA2 and supersedes the previous NICCAP1 which covered the period 2014-2019. The NICCAP2 cuts across a number of priority areas as highlighted in Figure 5.1.

Figure 5.1: Northern Ireland Climate Change Adaptation Programme 2019-2024 Key Priority Areas and Outcome objectives

NICCAP2 Key Priority Areas	NICCAP2 Outcome Objectives and Visions
NC Natural Capital, including Terrestrial Coastal/Marine/Freshwater ecosystems,soils and biodiversity.	- **NC1:** We will have species, habitats and water bodies that are resilient to the impacts of climate change.
	- **NC2:** We have coastal communities, habitats, landforms and infrastructure that are resilient to impacts of climate change.
	- **NC3:** We have soils and woodland that are resilient to the impacts of climate change.
IF Infrastructure Services.	- **IF1:** We have Transport & Network Services that are resilient to the impacts of Flooding & extreme weather.
P People & Built Environment.	- **P1:** We have people, homes, buildings and communities that are resilient to the impacts of Flooding & extreme of weather.
B Disruption to Businesses & Supply Chains.	- **B1:** We have businesses that can adapt to impacts of Climate Change & extreme weather.
I Food Security/Global Food Production.	- **I1:** We have a food system that is resilient to impacts of climate change.

NICCAP2, for the first time, included a Chapter which focused on Civil Society and Local Government contribution to adaptation action. To assist with wider stakeholder engagement with Local Government and Civil Society, DAERA funded the establishment of the Climate NI Project which is governed by a Project Steering Group with representation from a wide range of sectors.

[16] https://www.daera-ni.gov.uk/sites/default/files/publications/daera/Northern Ireland Climate Change Adaptation Programme 2019-2024 Final-Laid.PDF

Additionally, through the Climate NI Project, a Local Government Climate Action Network (LGCAN) has been established, which includes representation from Northern Ireland Local Councils which assists with information and knowledge exchange with environmental NGOs, business sectors, academia and local Government. A core aim of the Climate NI project is to share best practice, increase the understanding of the impacts of climate change in Northern Ireland, to share knowledge, promote action and provide independent advice. Climate NI provides a vital link between environmental NGOs, business sectors, academia and Government. Through the Climate NI Project a Planning Toolkit called NIAdapts[17] was developed to support Councils in the development of Climate Change Adaptation Plans.

The Advice Report included a Northern Ireland specific summary report. The CCCs advice formed the basis of CCRA3, and they will inform the development of the next Northern Ireland Climate Change Adaptation Programme (NICCAP3) which is due to be published in September 2024.

In advance of the development of the next Adaptation Programme, DAERA are currently undertaking a mid-term review of the current Adaptation Programme. This will provide an opportunity to both review current adaptation progress and forward look towards the development of the next Adaptation Programme in response to the latest independent assessment by the CCC and CCRA3.

The Climate Change Act (Northern Ireland) 2022 received Royal Assent on 6 June 2022. This new Act complements the existing adaptation provisions under the Act, in particular through the introduction of a legal requirement for the CCC to undertake an independent assessment and make recommendations in relation to the Northern Ireland Climate Change Adaptation Programme three years after laying future Adaptation Programmes.

5.4 Expected impacts of climate change

For the UK, parties can also draw upon impacts studies using the latest climate projections UKCP18 and CCRA3 as mentioned above.

Climate modelling in the UK is led through the Met Office Hadley Centre Climate Programme, funded by the Department for Business, Energy and Industrial Strategy (BEIS), with input from the Department for Environment, Food and Rural Affairs (Defra) and Foreign, Commonwealth and Development Office (FCDO). This relationship ensures that the world-leading modelling capability of the UK, feeds directly into UK government and informs policy. Significant recent developments, such as the upgrade to supercomputing at the Met Office, have led to more detailed and higher resolution climate models, which provide more accurate information on climate variability and change to decision-makers and society.

The latest collection of Met Office climate models (HadGEM3) shows many significant improvements relative to previous versions. This improved model underpins UKCP18 as well as the UK Earth System model (UKESM), which represented the UK contribution to the latest coupled model intercomparison project (CMIP6) and the current IPCC Assessment Report (AR6).

General climate change trends projected over UK land for the 21st century in UKCP18 are broadly consistent with earlier projections (UKCP09), showing an increased chance of warmer, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extremes. This is seen in the probabilistic (25km), global (60km), regional (12km) and local (2.2km) projections.

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[17] https://www.climatenorthernireland.org.uk/NIAdapts/

Due to new treatment of land ice contribution, sea level rise projections for UKCP18 are higher than UKCP09. For example, the upper end of the range of sea level rise in UKCP18, for the high emission scenario for London, is around 25 cm higher than in UKCP09 at 2100. This is not unexpected and has been factored into adaptation planning. Due to vertical land movement, sea level rise in the North of the UK is generally lower than in the South.

Current endeavours in UK climate services seek to maximise the utilisation of UKCP18 and engage the user community on what scientific advances could trigger the need for future projections. The UK Climate Resilience Programme uses UKCP18 to build the evidence on climate risks, adaptation, and services in the UK. It has delivered several high impact outputs to date, including climate risk indicators to support climate risk assessments and FUTURE-DRAINAGE, a project providing estimates of changes in rainfall for use in drainage design.

5.5 Vulnerability assessment

CCRA3 has presented strong evidence that even under low warming scenarios the UK will be subject to a range of significant and costly impacts unless significant further action is taken now. Full details of the risk assessment are contained in a series of reports published by the CCC which are fully endorsed by the UK government and the other three governments.

The Technical Report for CCRA3 identifies 61 climate risks and some opportunities cutting across multiple sectors of our society. It identifies a wide range of potential costly impacts of climate change including on health and productivity, affecting many of our households, businesses, and public services. Impacts range from a deterioration in soil health and agricultural productivity to impacts on water availability and thereby our alternative energy supply. For example, unless we take further action, under a 2°C by 2100 warming scenario annual damages from flooding for non-residential properties across the UK is expected to increase by 27% by 2050 and 40% by 2080. At 4°C this increases to 44% and 75% respectively.

CCRA3 prioritises the following eight risk areas for action in the next two years in the UK:

- risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards;
- risks to soil health from increased flooding and drought;
- risks to natural carbon stores and sequestration from multiple hazards;
- risks to crops, livestock and commercial trees from multiple climate hazards;
- risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks;
- risks to people and the economy from climate-related failure of the power system;
- risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings; and
- multiple risks to the UK from climate change impacts overseas.

The accompanying monetary Valuation Report[1] provides an analysis of the economic costs of approximately 60 key risks and opportunities that the UK will face from climate change, looking at the potential costs for 2 and 4°C pathways at mid- and late century. The report identifies 8 risks with potentially ‘Very High’ impacts by 2050 (£billions per year):

- risks to natural carbon stores and sequestration;

- risks to infrastructure networks from cascading failures;
- risks to health and wellbeing from higher temperatures;
- river and surface flooding;
- risks to business from flooding;
- risks to finance, investment and insurance;
- risks to the finance sector; and
- risks to UK food availability.

For most risk areas, valuation evidence is presented without existing or planned adaptation. Estimates represent impacts to the whole UK economy, but impacts are likely to vary significantly across localities or particular areas and groups. It was not possible to provide economic estimates of all 61 risks and opportunities due to a lack of evidence; 14 risks do not have an indicative score as a result. Finally, these estimates present large ranges due to a highly uncertain future in climate change, and large variations between 2° C and 4° C scenarios.

The Valuation Report estimates that, for these eight risks identified by the CCC, economic damages by 2050 under 2°C could exceed £1 billion per annum. For 36 of the risks, damages could be at least £10 million p.a. Other sources of evidence suggest that, by 2045, the cost of climate change to the UK could be at least 1% of GDP. The CCRA3 Technical Report also shows that in most risk areas we need to take more action, and there are many actions we can take to improve resilience that would be good value for money, including many low cost 'low regret actions'. The evidence shows that we must do more to build climate change into any decisions that have long-term effects, such as in new housing or infrastructure, to avoid often costly remedial actions in the future. And we must consider low probability but high impact events arising from, for example, high warming scenarios and interdependent or cascading risks.

5.6 Adaptation measures

5.6.1 Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards

This section sets out specific examples of adaptation action in the UK, mainly related to the eight priority risks identified in CCRA3.

The Environment Act's new requirements for biodiversity net gain will begin in 2023, meaning most types of new development will deliver improvements of 10% or more for biodiversity. We are working in accordance with the principles in the Environment Act 2021 to ensure that development results in environmental improvement rather than merely preventing harm.

The Advice Report provides compelling evidence of the benefits to society of the natural environment. It explains the threat climate change poses to UK biodiversity, at a time when it is already degrading rapidly – the abundance of UK terrestrial and freshwater species has declined by 13% since 1970, and species distribution showed an average 5% decline over the same period. Increased temperatures and extreme events, such as drought and wildfire, pose the biggest threats while upland areas face particularly acute risks (75% of present-day upland species face a potential decline in climate suitability by 2100 under a medium level of warming).

The Advice Report recommends reducing pollution and creating suitable conditions for existing species. Active management of habitats can also improve their resilience. Such actions should be underpinned by enhanced monitoring and surveillance. From the two years from 2021, there is time-limited opportunity to build adaptation explicitly into policies to protect terrestrial and freshwater habitats and species through the review of environmental policy following EU Exit. We outline our current actions below and accept that to meet the increasing challenges to our natural environment we must raise ambition as we look toward NAP3.

The Nature Compact agreement at the G7 and the Environment Act 2021 include a new, historic, legally binding target to halt the decline in species abundance by 2030. Defra will set out our approach to delivering these commitments in the refreshed Environmental Improvement Plan due in 2023.

The 25 Year Environment Plan committed the UK Government to establishing a Nature Recovery Network (NRN) – an expanded, improved and increasingly connected web of wildlife rich places across England. Establishing the NRN will support our goal of halting biodiversity loss by improving and connecting habitats and species. In doing this, wider benefits will accrue, such as landscapes more resilient to climate change through improved ecosystem function. Larger and less fragmented wildlife sites will improve the resilience of populations to fluctuating weather conditions and extreme events. Better connected habitat will also allow some species (or their genes) to spread across the landscape and colonise new areas that may be more suitable for them in a changing climate. Our overall goal by 2042 is to expand the existing resource of wildlife-rich habitat by 500,000 hectares and progress our goal of restoring 75% of the area of protected sites to favourable condition.

The UK Government acknowledge the importance of monitoring and surveillance to ensure quantifiable results and impacts. Evaluation will be informed by data gathered at a national and local level including funding, impacts and spatial data.

We recognise the importance of reducing water pollution and restoring the water environment. Statutory river basin management plans provide an overarching management framework for the water environment that addresses risks both to public health and water ecology. These integrated plans draw on action across a range of areas including Catchment Sensitive Farming, chemicals, physical modification, and EA oversight of the water sector.

A further £124m of new money for the Nature for Climate Fund has been announced to enable more opportunities for farmers and landowners to support net zero through land use change. This will ensure a total spend of more than £750m by 2025 on peat restoration, woodland creation and management, increasing the size and therefore resilience of the woodland resource and providing opportunities to implement adaptive actions in existing woodland.

We are working to limit the threat of invasive non-native species to UK biodiversity. The GB Invasive Non-Native Species Strategy sets out:

- a hierarchy of priorities to protect our terrestrial, freshwater and marine environments – including prevention, early detection (surveillance, monitoring and rapid response) and finally long-term management and control;
- the actions we are currently taking to raise awareness through the Be Plant Wise, Check Clean Dry and Invasive Species Week initiatives; and
- the importance of strategic research.

Risk analysis and horizon scanning are also central to the strategy. These are used to identify non-native species that pose a potential threat to the UK – both of which consider the impact of climate change on the ability of a non-native to establish and cause adverse impacts.

We are committed to protecting the UK's terrestrial and freshwater habitats and species and so we will scale up our actions on ecosystem restoration, the establishment of nature-based solutions and building resilience of species and habitats to climate change. Increasing the size, condition and number of protected sites while reducing fragmentation by habitat restoration, creation and management are important factors in helping ensure resilience and are at the heart of our approach. Defra's Nature Recovery green paper includes, among other things, a broader exploration of our approach to site designation.

5.6.2 Risks to soil health from increased flooding and drought

The Advice Report sets out the importance of well-functioning, fertile soils and how climate threats to UK soils can exacerbate existing human pressures on the environment. Healthy soil is an important natural capital resource, underpinning a range of environmental, economic, and societal benefits, including increased biodiversity, flood mitigation, improved water quality, recycling nutrients and providing multiple ecosystem services and outcomes notably for agricultural and forestry production. Soil degradation in England and Wales costs between £0.9bn and £1.4bn a year due to remedial action, loss of productivity and the negative impact on rivers, water management and water quality.

The report acknowledges that soil health features in all the current national adaptation plans across the UK. However, it calls for a comprehensive soil monitoring strategy to understand and measure progress on climate change adaptation; and targeted interventions and land management strategies to improve soil health. Further actions the Advice Report recommends include:

- soil-friendly farming practices, including no-till and precision farming;
- good water management on agricultural and forested land to keep soil moisture in balance; and
- investment in soil monitoring to understand the current condition of soils and the future success of adaptation actions.

The Government accepts the importance of addressing risks to soil health. There are a number of existing regulations, such as the Crop Residues (Burning) Regulations 1993 (Environmental Protection Act 1990), the Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018 (Farming Rules for Water), and the Agricultural Land (Removal of Surface Soil) Act 1953. These all protect agricultural soil from specific degradation issues, i.e. burning and therefore loss of soil organic matter, erosion and trampling through poor land management near water courses, and removal of surface soil. We understand that more action is needed and outline our current priorities and actions below.

We are committed, as part of the 25 Year Environment Plan, to achieving sustainably managed soils by 2030. A Written Ministerial Statement in October 2021 set out Defra's commitment to a new Soil Health Action Plan for England. The Action Plan will provide a single strategic approach to soil health, taking a natural capital approach through considering the numerous biological, chemical and physical attributes of soil.

The Sustainable Farming Incentive is a key focus of the Action Plan and will reward farmers for actions to improve soil health. Two new soil standards will be rolled out from 2022. The Improved Grassland Soils and the Arable and Horticultural Soils standards will promote

actions that improve soil structure. This will result in increasing soil capacity to absorb, hold and drain water and so improve soil resilience to the impacts of flood and drought.

We agree with the recommendations on soil monitoring and under the Soil Health Action Plan for England, is developing a Soil Health Monitoring Scheme to produce a new, robust data baseline. A healthy soils indicator is also being developed, as set out in the 25 Year Environment Plan, which will consider the key attributes of healthy soil including its physical, biological and chemical properties. The indicator will feed into the Soil Health Monitoring Scheme and could inform future policy and land management practices as well as any future targets for soil health under the Environment Act 2021.

Separately, a new Soil Structure Measuring and Monitoring Scheme is being developed to enable visual assessments to be carried out by farmers and land managers (community/citizen science) across all land use/soil types. Engaging farmers and land managers in the process will increase knowledge of the benefits of healthy soil structure. This will provide a user-friendly way of measuring long-term trends, support future incentive schemes and create a baseline that will feed into any future soil health target. Defra has established the Lowland Agricultural Peat Task Force to recommend ways of improving the condition of England's lowland farmed peatlands. The Task Force is currently exploring new solutions including innovative ways to manage peatland water table levels and long-term opportunities for paludiculture (the practice of farming on wet land, such as rewetted bogs and fens). The Task Force will present its findings to the UK Government in summer 2022.

We accept that there have been gaps in preventing soil degradation and are committed to improving soil health. This will include conducting further research on agricultural and land management techniques and systems that improve soil health, understanding the complexity of the soil biome and how soils can be managed to optimise biodiversity and the applicability of agro-ecological forms of agriculture that promote soil health.

5.6.3 Risks to natural carbon stores and sequestration from multiple hazards

The Advice Report describes the pressure human activity is exerting on the UK's natural carbon stores and how this is being exacerbated by climate change. It identifies UK peatlands as one of the most important terrestrial natural stores for carbon – with equivalent CO_2 storage which is 25 times larger than the UK's total current annual emissions and an order of magnitude higher than the carbon stored in trees. The effects of climate change alone could reduce the area of land suitable for peat forming vegetation in the uplands by between 50% and 65% by the 2050s. Carbon stored in coastal and marine habitats, referred to as "blue carbon" is also thought to be a critical store, and the report calls for a baseline assessment of the total stock to be completed urgently.

Achieving net zero by 2050 is in part dependent on the removal of CO_2 from the atmosphere and reducing emissions by utilising nature-based solutions. CCRA3 warns that losses from existing natural carbon stores would threaten this target. To avoid permanent losses the report recommends:

- spatial targeting of land use policies to match changing conditions, including consideration of climate change impacts in decisions over species choice in tree planting programmes;
- the restoration of degraded peatlands and other wetlands; and
- soil carbon monitoring.

We recognise that we must safeguard our natural carbon stores from climate related threats in order to meet net zero.

We plan to reduce the increased threat of fire and drought to peatland landscapes by restoring peatland, supporting Lantra[18] accredited Vegetation Fire training modules and using wildfire management plans to mitigate and adapt to risk at both site and landscape scales. We will reduce the threat from flooding by enabling peatland to hold more water and to manage its flow better. The England Peat Action Plan 2021 (EPAP) outlines the strategic framework for peatland protection, management and restoration, and has climate adaptation as part of its core objectives. An implementation plan for the EPAP is due to be published in 2023 and will include a trajectory of restoration and responsible management over the next 20 years. We will provide an interim update on progress on implementation of the plan in Summer 2022.

Our new environmental land management schemes will provide the main delivery mechanism for peatland restoration after 2024-25. To further support peatland restoration, government is implementing a range of policies that will mobilise private investment. The Natural Environment Investment Readiness Fund has been launched and a package of reforms to the Peatland Code, including expanding it to cover more peatland types, will be implemented in 2022.

We recognise that blue carbon habitats also play an important role in preventing biodiversity loss and supporting adaptation and resilience to climate change, alongside carbon sequestration benefits. At present, 38% of UK waters are in Marine Protected Areas, including the majority of saltmarsh and seagrass habitats. Our focus is now on ensuring these are effectively managed. Defra has also committed to designating a number of pilot Highly Protected Marine Areas (HPMAs) in England, including areas containing important habitats for long term carbon storage. Ecological recovery within HPMAs will increase the resilience of the marine environment to climate change and enable it to adapt to climate change impacts.

We are continuing to build the evidence base for blue carbon including baseline information, such as the report on blue carbon stocks and fluxes published by the Centre for Environment Fisheries and Aquaculture, which collated over 500 records of blue carbon measurements from coastal wetlands and the seabed. The report provides a new collation of UK based measurements and highlights where further scientific action should be focused.

At COP26 the UK announced its intention to establish a new cross-administration UK Blue Carbon Evidence Partnership to progress the evidence base on blue carbon habitats in the UK, advancing our shared commitment to protecting and restoring blue carbon habitats. The first meeting of the Partnership was held in May 2022, with representatives from across the UK Administrations.

We accept the Advice Report's conclusions on the importance of spatial targeting of land use policies. The Forestry Commission recently published a decision-making framework for peat protection and woodland establishment which provides guidance to protect peatland carbon stocks from inappropriate woodland planting. The England Trees Action Plan (2021) (ETAP) includes an action to develop new guidance that will help determine when afforested peat should be restored to bog, and to minimise impacts on peaty soils from tree planting. Additional commitments in the plan include developing metrics that allow decision-makers to assess the realistic costs of forest to bog restoration and improving land use decision-making through the new peatland map data (due to be completed in 2024).

The UK Forestry Standard (UKFS) is the national standard for sustainable forest management that requires consideration of climate change in woodland creation proposals, woodland

[18] An award body for land-based industries in the UK and Republic of Ireland. They provide training courses and nationally recognised qualifications delivered through training partners.

management plans and contingency planning. This includes increasing resilience to the risk of wildfire by using a wildfire management plan approach which is based on the Forestry Commission's Practice Guidance and upskilling operators and managers using its Lantra accredited Vegetation Fire training modules. This will provide robust guidance on forest design and management to minimise wildfire risk at the site and landscape scale, working in partnership across the Defra group and landowners.

A new UKFS Practice Guide on adapting forest and woodland management for the changing climate will be published in 2022. Additionally, the Nature for Climate Fund includes a suite of delivery mechanisms that will enhance the resilience of the overall woodland resource and provide opportunities for new native productive woodlands that are adapted to the future climate. The English Woodland Creation Offer is a recently launched woodland creation grant which includes scoring for climate change resilience.

ETAP recognises that while trees will be an important part of our efforts to reduce emissions, trees themselves are vulnerable to the impacts of climate change. It therefore commits government to the following actions:

- support the Forestry and Climate Change Partnership in implementing its adaptation plan, to launch a climate change competition to highlight best practice and the need to adapt new and existing woodlands to the effects of climate change;
- maintain our membership of the European Forest Genetic Resources Programme to promote the conservation and sustainable use of forest genetic resources in Europe.

We will also produce a Woodland Resilience Implementation Plan (WRIP) to improve the ecological condition of our woodlands and increase their resilience to threats and pressures, including climate change. Forestry England will develop a Forest Resilience Strategy, including specific and measurable actions and targets and a forest resilience indicator to monitor the resilience status and condition of the nation's forests. The forestry and woodland measures set out above equally apply to Priority Risk Areas 1 and 4.

UK soil contains around 10 billion tonnes of organic carbon. However, our latest data suggest that arable farmland soils have been losing carbon relative to levels measured in 1978. We recently published a Written Ministerial Statement setting out the government's commitment to produce a new Soil Health Action plan for England. A key action within the plan includes the development of a healthy soil indicator where soil carbon is being considered as one of many key soil variables. Further actions on soils can be found under Priority Risk Area 2.

We are taking further action to meet this risk, to protect and restore precious nature-based solutions and unlock the many ecosystem services they provide. To ensure our ambition of restoring 25% of this peatland further research is required to explore new ways of managing water across lowland landscapes. The impact of new methods on domestic food production, water availability and flood risk will also need to be modelled and piloted.

5.6.4 Risks to crops, livestock and commercial trees from multiple climate hazards

The Advice Report sets out how climate change will pose a direct threat to crops, livestock and commercial trees. The report details how the UK's agricultural and forestry productivity are essential for both future domestic food security and achieving net zero emissions by 2050. The productivity in these sectors is dependent on the health and diversity of terrestrial and freshwater ecosystems.

The Advice Report also outlines how effective adaptation measures will depend on the development and establishment of new varieties of crops, technologies and management practices and warns that such developments can have significant lead times. The report

recommends beneficial actions for the next five years which include better long-term seasonal forecasts for land managers, assessment of land use options given changing water availability and land use strategies that bring climate change mitigation and adaptation together.

It concludes that risk assessment and planning is more evident in the forestry sector than agriculture. It also highlights that there is an opportunity to improve climate resilience in forthcoming national and devolved policies for land management, net zero and nature protection. Defra support the conclusions made in the Advice Report including that climate hazards pose an increasing threat to crops, livestock and commercial trees. We are working to address this risk and more detail is provided in the recently published Net Zero Strategy. This includes a total spend of over £750 million on peat restoration, woodland creation and management in England through the Nature for Climate Fund. for the three new environmental land management schemes will support farmers to deliver public goods, including adapting to climate change. Defra is also developing measures through ETAP and WRIP to protect commercial trees. To help address risks to agriculture and forestry from pests and pathogens Defra intend to publish a new GB Plant Biosecurity Strategy in July 2022, although this may not happen until September 2022.

We understand the importance of enhancing the productivity, sustainability and resilience of the main UK crops. We are supporting a major, long-term research platform, known as Genetic Improvement Networks (GINs), for the genetic improvement of arable crops and fresh produce. This includes work to increase the resilience of major UK crops to climate change and associated pest and disease risks.

Each GIN includes internationally renowned scientists in crop genetic improvement, undertaking work to identify and characterise pre-breeding resources with improved productivity and resilience to major biotic and abiotic stresses. We currently fund four GINs, focusing on oilseed rape, vegetables, wheat and pulses which share a common governance structure in the form of the 'Defra Crop Genetic Improvement Platform' to bring the research together more effectively in this space. Defra awarded £6.5 million over the five-year period (2018 to 2023) towards the GINs.

We are also expanding the scope of our breeding work to increase the sustainability and resilience of a wider range of agricultural products. This includes an ongoing project to scope the potential for a forage crop network, and a recently launched competition for a similar scoping study on soft fruit. Following recent consultation, we will be taking a step-by-step approach to amending regulations to enable the development and innovation of new genetic technologies including gene editing. Gene editing could unlock crops and animals that are more resilient to the impacts of climate change, such as extreme weather and certain pests, by speeding up changes that could have occurred more slowly via traditional breeding methods.

We continue to support the UK Research and Innovation (UKRI) Transforming Food Production (TFP) Initiative, which has already made a public investment of £90 million over four years to support the rapid development and deployment of advanced precision agricultural solutions. This initiative is enhanced by an additional £14.5m of Defra funding to support collaborative agricultural research and development under the recently tendered "Farming Innovation Pathways" Competition.

We also announced the first £17.5m share of funding in our Farming Innovation Programme, which will encourage collaborative farmer-led research and development to enhance productivity and improve environmental outcomes in England's agriculture and horticulture sectors throughout the agricultural transition, as well as setting the sectors on the path to net zero. Defra is also working closely with the Met Office Hadley Centre for Climate Science and

Services to better align our crop breeding work with pressures identified in their analyses of the effects of climate change on farming.

We agree that innovation in technologies to manage water and nutrient input is important. The Water Management sub-theme of the forthcoming Farming Transformation Fund is intended to support farmers by providing grant scheme funding for investments such as the construction of water storage reservoirs or abstraction or irrigation pumps. This will help support farmers during dry periods and bring benefits through more secure water supply, while helping to reduce peak requirements for water when agricultural and public demand for water is often at their highest. We aim to support projects which will reduce the environmental burden while increasing the resilience of public supply during dry weather.

We are committed to supporting research and development to increase the sustainability and resilience of a wider range of agricultural products. We are currently refreshing our Agriculture and Food Climate Service in partnership with the Met Office to align the work more closely with challenges identified by CCRA3 and to develop novel solutions to enhance resilience in agri-food systems.

There is a great deal of emerging policy targeted at achieving net zero, much of which – such as peatland restoration and tree planting – will contribute to adaptation. Simultaneously, efforts are underway across Defra to support adaptation and resilience in the agricultural sector with resulting reductions in agricultural emissions. We will continue to develop evidence led policy to deliver climate mitigation and adaptation benefits, principally through our environmental land management schemes. This will be supported by our new Agri-innovation Minister portfolio.

5.6.5 Risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks

The Advice Report sets out how most products, including food, finished goods, components and materials, have complex – often international – supply chains. Extreme weather is already causing supply chain disruption and exposure to climate hazards is set to increase. Climate hazards can affect the supply of food, goods and vital services, as well as the infrastructure and routes by which these are transported. Adaptation actions involve the provision of better information, diversification of supply chain risks and building better capacity to manage, share and transfer risk. It highlights that there is an important role for new technology and infrastructure.

Although some action has already been taken by businesses, it is unclear whether action will keep pace with the increasing risk or how effective it will be specifically in managing climate or weather-related disruption. It concludes that enhancing supply chain resilience should be a priority for recovering planning from the Coronavirus (Covid-19) pandemic, and should also be a factor in the development of new trade agreements as trade patterns change following EU-Exit. Businesses can be supported through ensuring information and advice is available, especially for smaller businesses, and by implementing stronger reporting requirements for businesses and infrastructure providers, such as ports and airports.

We accept that climate change is posing increasing risks to supply chains. We outline our current priorities below but understand more will be required in the next eighteen months to address this complex risk area.

We are examining risks to critical non-food supply chains including identifying risks from climate change and advising lead government departments on actions to improve resilience of those supply chains into the future. Such actions include:

- exploring options to diversify the UK's supply chains to minimise disruption;
- working alongside international partners to support supply chain climate resilience and building domestic UK capability in key sectors;
- promoting the UK as a centre of resilience and risk expertise, with a focus on speciality insurance underwriting, green investment financing, and environmental advisory services including consultancy and standards assurance;
- working with the insurance specialty market and other related resilience services to help build capacity in developed and emerging markets and develop and build commercial opportunities for UK firms in the finance, insurance and infrastructure sectors; and
- contributing to the government's response to risks to finance, led by HM Treasury.

We also agree that insurance can play a critical role in transferring or mitigating the risks that climate change poses to supply chains. The Business of Resilience campaign, an initiative by the Department of International Trade (DIT) in partnership with City of London Corporation, has been created to promote the UK as a global hub for Insurance Resilience Solutions to international buyers. This will have the eventual result of increasing exports of UK speciality insurance and resilience services as well as promoting the attractiveness of the UK as an investment destination for speciality insurers and resilience service providers.

We support the development of global sustainability disclosure standards, including the work of the International Financial Reporting Standards Foundation to create an International Sustainability Standards Board to develop a global baseline corporate reporting standard for sustainability. Further, in recognition of rising private sector interest and action on the financial materiality of nature-related considerations, we are committed to working with international partners to catalyse a market-led coalition on nature-related financial risks and reporting in its 2019 Green Finance Strategy. Supported by the government from its inception, the Taskforce on Nature-related Financial Disclosures will provide a framework for corporates and financial institutions to report and act on evolving nature-related risks to support a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes.

Domestically, in November 2020 the Chancellor announced the UK's world-leading intention to make disclosure requirements aligned with the Task Force on Climate-related Financial Disclosures (TCFD) recommendations fully mandatory across the UK economy by 2025. Since that announcement, the UK government and regulators have made significant progress towards implementing the TCFD. In July 2021, the Chancellor announced that the UK would go further, with new disclosure requirements to elicit decision-useful sustainability-related information. In October 2021, the government published Greening Finance: A Roadmap to Sustainable Investing setting out details of new, economy-wide Sustainability Disclosure Requirements that will require companies, asset managers, asset owners and investment products to disclose their sustainability-related risks, opportunities and impacts.

We accept that climate hazards will cause increasing threats to our supply chains through our infrastructure and transport routes. Consideration will need to be given to the potential vulnerabilities for the transport system including rail, roads, ports and airports. The Department for Transport (DfT) is currently drafting an internal Climate Change Adaptation DfT strategy. The strategy will explore potential action against all risks identified by the CCC, expectations, interdependencies, standards, and scenario planning across policy areas and with industry and operators.

We support the report's conclusions which are consistent with the recently passed Agriculture Act (2020) which includes a requirement to regularly report to Parliament about food security. The UK Food Security Report will inform future policy on UK food security, and was first published in 2021, with subsequent reports to be produced at least every three years. The report considers both global and domestic food security, including global food availability, UK food sources, UK food chains, household security, and consumer safety and confidence. Data is drawn from both national and international data sources, including UK National Statistics as well as data from the Food and Agricultural Organisation of the United Nations. Further policies impacting the food system will be set out in the forthcoming government Food Strategy, which will support the development of a food system that is sustainable, resilient and affordable, that will support people to live healthy lives, and that will protect animal health and welfare.

We understand that the risks to UK food availability, safety and quality will increase throughout this century. We also acknowledge how it is often difficult to quantify that risk. Defra is exploring what additional research and analysis is required to understand and address this risk.

5.6.6 Risks to people and the economy from climate-related failure of the power system

The Advice Report describes how, as the UK becomes more dependent on electricity as our dominant energy source, people and the economy will be increasingly exposed and vulnerable to electricity system failures.

We recognise that risks from climate-related hazards will become more common as our dependence on electricity grows and the variability of our weather increases. As noted in the Net Zero Strategy, low carbon power, mostly from intermittent renewable generation, is expected to become the predominant form of energy in 2050. It will account for approximately 50% or higher share of final energy consumption, up from 10% in 2019, as light transport vehicles and domestic heating electrify.

The Advice Report recommends that the government works with the regulator (Ofgem) and the industry to review the approach to electricity system design and risk assessment in the context of the more central role of electricity in the UK's future energy system. Climate resilience must also be reflected in the wider energy system governance and in planning conditions for new infrastructure. The report concludes that the risks can be managed, but that ensuring the UK has a power system that is resilient to future climate impacts is now an urgent issue.

Guaranteeing that homes and businesses have the certainty of secure energy supplies they can rely on now and in the future is an absolute priority. The government supports these recommendations and is committed to improving and maintaining the resilience of UK energy infrastructure, networks and assets in the face of future system changes and climate risks. We are working with the energy industry, regulators and other stakeholders to reduce vulnerabilities and ensure an effective response to actual or potentially disruptive incidents to ensure security of supply.

We accept that climate resilience must be reflected in the wider energy system governance. The Heat and Building Strategy sets out the principle of taking a 'whole-building' and whole-system approach to building decarbonisation, considering the interventions most appropriate for the whole building, as well as local and regional suitability and how best to manage system-level impacts.

We acknowledge the climate risks of an increasingly renewable-based electricity system, particularly from offshore wind. Alongside working with Ofgem and National Grid ESO to

manage these risks, we are currently considering how to ensure flexible demand and supply is taken into account. We are working to decarbonise flexible firm capacity to ensure when renewable output is lower, we have secure capacity which meets our net zero ambition. Current work includes:

- working to deliver a smart and flexible electricity system with Ofgem, that will underpin our electricity security and the transition to net zero in the transitioning to a net zero energy system: smart systems and flexibility plan 2021;
- reviewing how the Capacity Market will need to align with net zero by bringing forward more low carbon capacity and better address emerging security of supply challenges; and
- investigating how large-scale, long-duration electricity storage could facilitate a net zero system and its role in the efficient and cost-effective delivery of security of supply.

We accept that the decarbonisation of transport and the associated reliance on electricity needs to be considered. An internal Climate Change Adaptation DfT strategy is currently being drafted and more information can be found under the risk area explained under section 5.6.5 above.

5.6.7 Risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings

The Advice Report outlines the significant risks of overheating in buildings as UK temperatures increase and heatwaves become more common. High temperatures will increase risks to life, wellbeing and productivity and are already impacting people in the UK. UK Climate Projections show a hot summer is likely to occur every other year by 2050, by which time the number of heat-related deaths could more than triple from today's level without additional adaptation action; from around 2,000 per year to around 7,000. Higher temperatures can impact productivity if indoor environments are not adapted to them due to discomfort, staff absences, dissatisfaction and impacts on work performance, and analysis has indicated that preventing productivity losses and cooling associated with increasing temperatures will provide substantial benefits to communities in avoided costs. Higher temperatures will impact both homes and non-domestic buildings, affecting wider services. For example, the future delivery of health and social care will be impacted by higher temperatures due to both health and productivity impacts, and higher temperatures may have further implications if, as trends indicate, there is an increased proportion of home-based care rather than in hospitals and in care homes.

Building designs and technology are available that can greatly reduce occupant exposure to heat while ensuring high levels of thermal efficiency. Beneficial adaptation actions include the updating of building regulations and other policy measures to address overheating through passive cooling measures like better shading, reflective surfaces and green cover. The report warns that with 300,000 homes due to be built each year across the UK there is a major risk of lock-in if they are not planned and built to address overheating alongside energy efficiency and low-carbon heating.

Overheating in buildings has been highlighted as a key risk for the health and productivity of people in the UK. We have outlined our current priorities below and will develop these further as we produce NAP3 and have introduced a new requirement on overheating into the Building Regulations. This prioritises addressing overheating through passive measures including reducing solar gains and sufficient removal of heat. Statutory guidance has been produced to accompany the new requirement.

The Department for Health and Social Care (DHSC) is working with its arms' length bodies and other stakeholders in the health and care sector to ensure the health system is better adapted to an increase in the frequency and severity of extreme weather events. The UK Health Security Agency (UKHSA) is currently developing the Single Adverse Weather and Health Plan which aims to mainstream adaptation activity. This work includes:

- exploring steps that can be taken to improve the resilience of health and care settings to hot weather;
- raising awareness of actions that can be taken by the public and the health and care workforce to protect themselves and vulnerable people in a heatwave; and
- reducing the evidence gap around the costs of extreme weather events and adaptation in the health and social care sectors.

The NHS's owned Third Health and Social Care Adaptation Report was published in December 2021 and assesses health sector vulnerability to existing and future climate risks and opportunities, including overheating. The fourth iteration of the Health Effects of Climate Change Report in the UK is due in 2023 and will include an update of the evolving risks for health under UKCP18. This report will feed into the development and delivery of a programme of research on how climate change will affect health.

The government has undertaken research to examine the overheating risk and impacts in existing buildings to inform our approach to managing this risk. In September 2021 BEIS published Cooling in the UK report, a research project led by infrastructure consultancy AECOM consulting that assesses potential future cooling needs in buildings, and the Energy Follow Up Survey (EFUS) Reports, led by the Building Research Establishment (BRE). This report primarily focused on winter heating patterns, energy consumption and thermal comfort, but also included work by Loughborough University on summer overheating.

Last summer the government also launched the new £5 million 'Climate Services for a Net Zero Resilient World' research programme led by a consortium of some of the leading authorities in environmental science. This includes University College London, the Tyndall Centre for Climate Change Research, Ricardo Energy & Environment, and the UK Centre for Ecology and Hydrology. This work will help the UK adapt and become more resilient to the impacts of climate change, including overheating, and will also engage with local authorities on local climate action plans, by equipping them with information on how to help households cope with extreme temperatures and helping them to identify low-cost, low-carbon measures.

In October we published the Heat and Buildings Strategy which sets out our plan to decarbonise the UK's 30 million homes and workplaces. Within the Strategy we commit to considering current and possible future scenarios, including overheating risk and indoor air quality risk when developing future policies to future-proof buildings. BEIS plans to undertake further research in this area, while developing the detailed policy framework underpinning the strategy.

ETAP, as mentioned above, published in May 2021, includes actions to enhance urban tree cover to protect urban populations from overheating by providing shade and reducing the urban heat island. Actions include extending the Urban Tree Challenge Fund to support the planting and establishment of trees in urban and peri-urban areas and working to publish guidance for local authorities to develop their own local tree and woodland strategies.

Further actions related to urban planning include changes to the National Planning Policy Framework, which stipulates that planning policies and decisions should ensure that

new streets are tree-lined, that opportunities are taken to incorporate trees elsewhere in developments, that appropriate measures are in place to secure the long term maintenance of newly-planted trees, and that existing trees are retained wherever possible to make clear the expectation that trees, such as community orchards, should be incorporated in new developments and that streets should be tree lined. The National Model Design Code, published in July 2021, highlights the importance of planting trees and other landscape features to provide habitats, shading, cooling, air quality improvements and carbon sequestration, as well as being a vital component of attractive places.

5.6.8 Multiple risks to the UK from climate change impacts overseas

The Advice Report sets out how extreme weather events in the UK and globally can create cascading risks that spread across sectors. The Advice Report recommends updating the current model of conventional risk governance in the UK to include cascading climate risks.

We understand that the potential for cascading risks is growing through a more inter-connected world, where risks can spread across sectors and in doing so lead to system-wide consequences. The Integrated Review has committed the government to publish a Resilience Strategy which will detail how the UK can improve its resilience to the effects of a wide range of risks, including climate change impacts. By 2030, we aim to have improved its ability to assess and understand the risks we face. We will use our systems, infrastructure and capabilities to better prepare for, respond to and recover from risks in all parts of the UK at a local, regional and national level.

We have committed to ensuring all new UK bilateral aid spending does no harm to nature.

Within the Foreign, Commonwealth and Development Office (FCDO) this includes using appropriate carbon price in bilateral programming, routine assessment of climate and environment risk and alignment with partner countries' long-term climate and environment strategies (as set out in the UK Government's 2019 Green Finance Strategy). We are securing commitment from multinational partners and fellow bilateral donors to align assistance they provide with the goals of the Paris Agreement and do more for nature. This has already resulted in a timebound commitment from the World Bank to align all new operations with the Paris Agreement by July 2023 and increase the percentage of support that has climate co-benefits for people and planet, with a balance between mitigation and adaptation.

We understand that climate hazards abroad can produce cascading effects in the UK and has committed to doubling the UK International Climate Finance (ICF) to £11.6 billion between 2021-25. The UK Biennial Finance Communication to the UN Framework Convention on Climate Change, under Article 9.5 of the Paris Agreement, set out our approach to delivering ICF programmes, including aiming for a balance between mitigation and adaptation spend. The forthcoming ICF Strategy will expand further on this approach.

We are currently reviewing the approach to climate risk assessment used for ICF programmes in the light of the UK commitment to align all ODA spend with the Paris Agreement. ICF delivery partners already have measures in place to consider the risks posed to mitigation investments by climate impacts. ICF seeks to maximise adaptation co-benefits where feasible. For example, the Climate Leadership in Cities Programme provided technical assistance to megacities in Asia and South America to develop Paris-aligned climate action plans addressing both mitigation and adaptation in an integrated way.

Beyond ICF, we will continue to champion action to advance adaptation alongside mitigation internationally, helping to build global resilience, drive action to protect those who are most vulnerable to climate change, and learn from others around the world as we tackle these shared challenges together. There is a clear opportunity to integrate our approach to climate

mitigation, adaptation, and other environmental policies, to maximise co-benefits and minimise trade-offs. The 2030 Strategic Framework for International Climate and Nature Action, currently under development for publication later in 2022, will be the UK's first international strategy to do this, seeking to advance global adaptation and resilience as an international priority, including through co-beneficial mitigation and nature actions.

Increasing international action and finance for adaptation has been a key focus of the UK's COP26 Presidency, recognising that globally, adaptation attracts considerably less finance than mitigation. Since 2011 the UK's ICF has directly supported 88 million people to cope with the effects of climate change and mobilised £5.2 billion of public and £3.3 billion of private finance for climate change purposes in developing countries.

The transnational nature of many climate-linked risks means that no single government can address them alone; we will continue our work with international partners, recognising that a resilient UK is crucial to global resilience and vice versa.

Additionally, the scale of the adaptation gap internationally means that UK-funded action on climate adaptation and resilience measures internationally depends in part on international collaboration with close partners in G7 and G20 including in meeting international spend targets such as the $100 billion/year in climate finance and stepping up to meet the commitment made at COP26 to double 2019 levels of adaptation finance by 2025. While good progress has been made, the effectiveness of actions on tackling climate change and biodiversity loss, and enhancing countries' abilities to adapt to their effects, will remain dependent on the policy and spending choices of others. By establishing initiatives such as the Adaptation Action Coalition and Adaptation Research Alliance, the UK is bringing countries together to co-develop solutions and innovations for some of the most challenging impacts of climate change and in doing so, helping embed best practice on adaptation into policy decisions.

We have a proven track record in delivering research into climate change risk and adaptation, through the Global Challenges Research Fund and Newton Fund-funded programmes such as those delivered by the Met Office, UKRI, the UK Space Agency and the National Academies. However, we accept that we need further research to fully understand the direct and indirect links between action taken overseas to improve adaptation and how that impacts the UK's own climate resilience.

We understand the need to reduce underlying vulnerabilities overseas alongside its work to respond to disasters and has increased support for disaster risk preparedness, including capacity building. The UK announced £120 million in new funding at the G7 last year to protect those most at risk and help reduce losses and damage to communities, infrastructure and livelihoods caused by climate change.

Furthermore, the UK recognises the myriad of ways that climate and environmental change can impact on public health systems and global health more widely. We need to learn from the challenges in the climate-environment-health nexus and from the Coronavirus (Covid-19) pandemic. Health systems are on the frontline of protecting populations from the health threats of a changing and more variable climate such as: food and water insecurity; extreme weather; flooding; heat stress; reduced air quality (including increasing ground level ozone); increased land pressure from a landscape changing; vector-borne diseases and zoonoses, amongst others. With UK leadership, over 50 countries committed to build more resilient and low-carbon sustainable health systems at COP26. Working with international partners, we will support mechanisms to help implement these commitments, aiming to increase access to finance, technical assistance and capacity building and knowledge, for the development of climate-sensitive health systems that can effectively respond to increased and new health

risks and emergencies. We will pursue a One Health approach, working with partners across government, to ensure lessons from the current and previous pandemics translate into greater pandemic preparedness. We will seek to strengthen our evidence base to explore further efforts to address the challenges in this nexus, and link health more firmly to climate objectives.

We recognise the need to increase focus on embedding climate resilience into UK supply chains if sustainable and resilient growth is to be achieved and is considering future policy that will help address this. DIT has established the Global Supply Chains Directorate to improve the resilience of the UK's critical supply chains against shocks, including climate change. We understand that there are limits to what the UK government can do alone to control vulnerability factors globally.

5.6.9 Flooding and coastal erosion

CCRA2 set the risks of flooding and coastal change to communities, businesses and infrastructure as a priority risk area. Although the Advice Report does not include the effects of flooding and coastal change as a priority risk area, we fully recognise that flood risk to people from rivers, surface water and coastal flooding remains high both now and in the future.

Our policy statement published in July 2020, alongside the National Strategy on flood and coastal erosion, sets out our ambition to create a nation more resilient to future flood and coastal erosion risk. The Policy Statements sets out over 40 actions which will accelerate progress to better protect and better prepare the country against flooding and coastal erosion.

As part of this, we are investing a record £5.2 billion to build up to 2,000 new flood defences. This investment will better protect 336,000 properties from flooding and coastal erosion. In addition, we are providing £200 million to inform future approaches to improving resilience to flooding and coastal erosion in communities across the country. Within the programme 25 local areas will take forward wider innovative actions that improve their resilience to flooding and coastal erosion including natural flood management, property flood resilience and community engagement. The programme will also support four areas across the country to help plan future investment in flood and coastal resilience by adopting a long-term adaptive pathways approach.

Surface water is the most widespread form of flooding in England, with around 3.2 million properties at risk. Managing surface water flooding requires strong collaboration between a wide range of stakeholders, recognised in the government's Surface Water Management Action Plan which includes 22 actions to improve understanding and strengthen delivery. In July 2021 we published an update report on progress to date with its Surface Water Management Action Plan and its response to the independent review into surface water and drainage responsibilities.

To help places better plan and adapt to future risks from flooding from rivers, the sea and surface water, the Environment Agency (EA) is working to produce a new national assessment of flood risk (NaFRA2) by 2024. As part of our reforms to the planning system, we will consider what mechanisms and policy may be needed to ensure wider flood risk issues are considered during decision making. This includes future flood risk from rivers and the sea, surface water and ground water flood risk.

Using the power of nature is part of our solution to tackling flood and coastal erosion risks. We are taking a holistic approach to flood risk management including encouraging more natural flood management where appropriate, alongside engineered defences. We have

committed to doubling the number of government-funded projects which include nature-based solutions to reduce flood and coastal erosion risk. We have committed to joining up our plans for trees, peat, soil and nature to secure multiple benefits including for flood risk, carbon sequestration and net gain. For example, the England Woodland Creation Offer provides 'Additional Contributions' in locations identified by EA as benefitting from natural flood management. We will continue to develop our evidence base and understanding of the effectiveness of these interventions.

Rising sea levels can cause both coastal flooding and coastal erosion. We are committed to defending the coastline where this is sustainable and affordable to do so, and to let it function naturally in areas where it is not. The EA is currently working with coastal authorities on a £1 million refresh of Shoreline Management Plans (SMPs) to ensure that they are up to date, using the best evidence in their recommendations and focus attention on priority areas for investment and adaptation. Informed by this refresh of technical evidence supporting SMPs, we will review national policy for them to ensure local plans are transparent, continuously review outcomes and enable local authorities to make robust decisions for their areas. As part of this we will engage with stakeholders, including the EA and Coastal Protection Areas to consider the Committee's views that SMP should be made statutory.

We will also review the effectiveness of existing planning policy on Coastal Change Management Areas (CCMAs). Many local authorities have adopted CCMAs policies that allow those at risk of losing their home through erosion within 20 years to get planning permission to replace the property and relocate at an appropriate distance inland and close to the coastal community from which the development was displaced.

As part of the £200 million Flood and Coastal Resilience Innovation Programme, we have allocated £36m over 6 years, to develop a 'Coastal Transition Accelerator Programme' to trial opportunities, in a small number of coastal areas at significant risk of coastal erosion, to transition and adapt to a changing climate.

Our policy statement sets out our commitment to ensure homes, communities and businesses are better prepared to manage flood risk. To achieve this, we want to accelerate uptake of Property Flood Resilience. We will publish a roadmap by the end of 2022 to accelerate take-up of property flood resilience measures. This will ensure all relevant bodies are playing their part and that consumers can have assurance about the quality of products and their installation. We are also making a number of changes to the Flood Re scheme which further accelerate the uptake of Property Flood Resilience. This includes permitting Flood Re to offer additional funds above the cost of a claim to make flooded properties more resilience to future flooding (also known as Build Back Better).

To drive forward progress and ensure that actions taken to manage flood and coastal erosion risk work for the benefit of our communities to build resilience everywhere we have committed to develop a national set of indicators. This will enable us to monitor trends over time to better understand the impact of our flood and coastal erosion risk management policies.

5.6.10 Public health and other social services

The Advice Report highlights the breadth of climate risks relevant to public health and social services including education and prison services. Cold weather spells, heatwaves and incidents of flooding can all have a harmful impact and often on the most vulnerable groups. We will continue to consider the risks raised in the report as we prepare for NAP3 and have summarised our actions to date on health and social care, prison and education services below.

5.6.11 Health and social care delivery

We are committed to working alongside UKHSA, NHS England & NHS Improvement (NHSE&I) and partners across the health and social care system to develop the actions and commitments required for NAP3.

There are well developed warning systems in place to alert the public and emergency responders to imminent threats of flooding, heavy rainfall, strong winds, heatwaves and cold weather. The Met Office issued a new Extreme Heat Warning service in June 2021, designed to work alongside UKHSA's Heat-Health Alert system. UKHSA is committed under NAP2 to develop a Single Adverse Weather and Health Plan for England by 2023. Building on the existing Heatwave and Cold Weather Plans for England, this will include updated guidance on hot and cold weather, drought, flooding and thunderstorm asthma to inform action across the health system and local communities and reduce the health impacts of adverse weather events and plan for longer term climate change impacts on health.

Under the Adaptation Reporting Powers of the Climate Change Act, the NHS and UKHSA published the Third Health and Care Adaptation Report on behalf of the sector. This builds on the 2015 report and helps to ensure the NHS can continue to deliver a climate-smart, resilient health service. The Adaptation Report, published in 2021, outlines current and future policies that address risks to health and social care delivery. The report recognises the risks and opportunities in the Advice Report. It also assesses health sector vulnerability to existing and future climate risks and opportunities this, including overheating. The report highlights actions to address any adaptation gaps between current policies and commitments.

The Health and Care Act 2022 places clear duties on NHS Trusts, Integrated Care Boards and NHS England to have regard to the Government's climate and environmental ambitions, including on climate change adaptation, in the exercise of their functions.

The Care Quality Commission, which regulates health and care services in England, will be referencing environmental sustainability in its new regulatory model, looking at how organisations providing health and care services are adapting to climate change or mitigating its impacts. The new model will be implemented towards the end of 2022.

5.6.12 Vector-borne diseases and climate change overseas

We acknowledge the threat of vector-borne diseases (VBDs) to UK public health and there are currently effective policies in place to address this risk. However, in the light of the increasing threat of VBDs driven by climate change, we are considering additional actions to mitigate against this growing risk. UKHSA leads on conducting surveillance for a range of VBDs, working in collaboration with other government arms' length bodies, local authorities, and environmental NGOs.

Beyond surveillance, there is a cross government contingency plan for managing the detection of invasive mosquitos in the UK. In addition, UKHSA contributes to the production of specialist and national public health guidance on VBDs. Specialist guidance is in place for wetland practitioners on vector mosquitos and for clinicians on identifying and managing potential cases of exotic human infections. UKHSA also issues public advice, including tailored advice for travellers, on how to reduce the risk of acquiring infection.

We are currently developing future policies and commitments to effectively mitigate the public health risk from climate change, including VBDs. This includes UKHSA's work with partners to contribute to the Health Effects of Climate Change report, due in 2023. This report will include a specific chapter on vector borne diseases, setting out in detail the current and future risk from VBDs and commitments to address them.

We understand that there is a need to continue to strengthen our future resilience to VBDs. This includes ensuring that we have the capacity to detect, monitor and respond to emerging and zoonotic infections in the UK and abroad. This could be optimally enhanced by:

- building and maintaining improved national serum/plasma archives for ongoing sero-surveillance purposes, working with external partners;
- strengthening links with the NHS tropical disease units to refer more samples of undiagnosed fevers to UKHSA Rare and Imported Pathogens Lab (RIPL) for testing, therefore increasing its sentinel functions;
- targeting surveillance by referring undiagnosed cases of fevers of infectious origin in patients in areas with a high vector prevalence for testing by UKHSA RIPL;
- enhancing laboratory diagnosis by expanding the repertoire of tests available and establishing international links to obtain clinical material to evaluate new tests; and
- we have taken significant action to mitigate the risk of VBDs in the future and will continue to work closely with partners to address gaps going forward.

5.6.13 Monitoring and evaluation

The UK government and Scotland, Wales and Northern Ireland governments each developed and employ a specific indicator framework for tracking progress to accompany their adaptation policy cycle. The indicators usually cover topics identified in the risk assessment and listed in the adaptation plans.

In England, two sets of indicators are used for reporting on adaptation on a two-year cycle and are published in the CCC's biennial progress reports on reducing emissions and adapting to climate change. These are the broader cross-sector indicator framework for assessing climate change preparedness and the NAP monitoring tracker, which monitors the 253 actions in NAP2.

Cross-sector indicator framework

The cross-sector indicator framework aims to assess whether risks identified in CCRA3 have been reduced. Using these indicators, the AC assigns a score to the progress made as regards each adaptation priority, based on progress in managing risk. The AC aims to focus on indicators that measure progress towards adaptation outcomes and not just number of adaptation actions. In using these indicators, the CCC aims to assess: (i) the degree of vulnerability to risks from current and future climate, (ii) the sufficient uptake of low-regret adaptation actions and (iii) whether long-term decisions systematically account for climate risks.

The 2021 set includes a total of 133 indicators. They were selected on the basis of their suitability to demonstrate change over time (even if no data is available). Indicators have been identified through applying a 'theory of change' to assess the indicators' suitability and evaluate the effectiveness of adaptation actions which requires the attribution of adaptation actions to specific outcomes. As of 2021, the CCC is applying the theory of change by means of adaptation pathways. The complete set results from an iterative research process in which the CCC regularly updated and added indicators (2017, 2019, 2021), as it is its task to review the previous indicator framework in the light of CCRA3.

The 2021 set comprises three types of indicators, namely, indicators that provide a robust assessment of trends in risk factors, indicators to track adaptation actions, and indicators to assess climate impacts. The indicators are classified according to four chapters (Natural Environment, People and the Built Environment, Infrastructure and Business), which are

then clustered by adaptation priority, step in the 'theory of change' process (input, output, outcome, impact) and by climate risk category (vulnerability, hazard, exposure).

Types of Indicators

The CCC relies on three types of indicators:

- to track adaptation actions;
- to assess trends in risk factors, namely, hazard, exposure and vulnerability; and
- to assess climate impact.

Adaptation actions can reduce either exposure or vulnerability, but do not have an effect on hazards (which are influenced by mitigation efforts). A change in any of the three types of risk can have positive or negative social, economic, or environmental impacts which, in turn, give an indication of how risk is changing, and the effectiveness of adaptation actions.

5.6.14 Broader international cooperation on adaptation

We are committed to a balance in International Climate Finance (ICF) spend between Mitigation and Adaptation, recognising the importance of delivering an ambitious adaptation agenda. In a policy paper published before COP26, 'the Glasgow Imperative', the UK outlined plans to drive adaptation and resilience action through five pillars: i) Building resilience across all of society; ii) Effective Risk Management; iii) Transforming Finance; iv) Catalysing Locally Led Action; and v) Harnessing the power of nature.

We are also committed to international co-operation across all five of these pillars. An example of this work is the UK's current co-chair role in the Adaptation Action Coalition (AAC). This is a member coalition of nation states that aims to accelerate global action on adaptation to achieve a climate resilient world.

The UK's ICF has to date helped 88 million people internationally, cope with the effects of climate change by assisting countries to better:

- adapt to long term impacts well in advance, for example by changing or diversifying livelihoods and ensuring infrastructure is fit for purpose;
- anticipate and reduce the impact of climate variability and extremes for example through effective forecasting and preparedness measures; and
- absorb the effects of climate extremes and disasters for example through effective and rapid response that enables people to cope with disaster and recover quickly.

5.6.15 Prison services

The Ministry of Justice (MoJ) published its Preparing for Climate Change: A Climate Change Adaptation Strategy in 2020 which outlines what is required to enable it to prepare for climate change. We are now implementing this strategy, and are committed to ensuring the effects of climate change are considered in key policies, programmes and projects including by:

- a Climate Change Risk Assessment of its estate and operations has been commissioned including detailing risks of over- and under-heating, drought and flooding;
- incorporating climate resilience into the design of MoJ's New Prisons construction programme; and

- development of a detailed Climate Adaptation Action Plan which accounts for climate hazards.

5.6.16 Education

The Department for Education (DfE) launched a strategy for sustainability and climate change for the education and children's services systems in April 2022. The strategy's vision is for the UK to be the world-leading education sector in sustainability and climate change by 2030. This will be achieved through four strategic aims:

- excellence in education and skills for a changing world: preparing all young people for a world impacted by climate change through learning and practical experience;
- net zero: reducing direct and indirect emissions from education and care buildings, driving innovation to meet legislative targets and providing opportunities for children and young people to engage practically in the transition to net zero;
- resilience to climate change: adapting our education and care buildings and system to prepare for the effects of climate change; and
- a better environment for future generations: enhancing biodiversity, improving air quality and increasing access to, and connection with, nature in and around education and care settings.

The strategy brings together a range of initiatives, including work which commenced in 2020/21, when we commissioned the Resilient School Building study by leading Architectural and MEP design professionals. The aim was to assess the range of design parameters affecting the adaptation of school buildings to overheating, tested to 2°C and 4°C global warming scenarios, across English geographical locations. The findings informed changes to the S21 DfE Output Specification which include:

- requiring all designs for new and refurbished buildings funded by DfE to use Design Summer Years that match the IPCC 2°C global warning scenarios and future proofed to 4°C global warming scenarios; and
- minimum floor to ceiling heights, plus the mandating of cross-flow or stack ventilation and adapting to higher temperatures by passive means to reduce reliance on active cooling.

Research continues on risks set out in CCRA3 while planning for a zero-carbon school estate as set out in the strategy. The DfE is actively working in partnership with the Environment Agency (EA), Defra, water companies and local authorities to improve schools' learning and awareness of risk and resilience around flooding, air quality, increased rainfall and water shortages. We have trialled flood prevention and overheating amelioration measures and wider sustainability measures across several schools and have plans for schools at highest risk, to share a flood risk plan template to set out emergency plans.

A strategic approach to piloting new building technology will be launched in order to support the future retrofit of the education estate and act as catalyst to the construction sector for implementing new technology. Building technology pilots will support action to adapt the existing estate to protect against the current and future effects of climate change and from 2025 onwards, we will accelerate change once we understand the best value for money approach. This approach can be summarised as innovate, test, and invest, and is shown schematically within the strategy.

Further, we are helping schools at highest flood risk adapt through raising awareness and flood planning including material for pupils; delivering flood risk reduction measures through

partnerships with EA, water companies and Lead Local Flood Authorities (LLFAs); and, carrying out a detailed assessment of climate change impacts on flood risk across the school estate to build into our investment planning. DfE are also piloting approaches with four water companies to make schools more efficient, as well as developing a range of interventions to support efficiency with the potential to save millions of litres of water a day. This specifically includes:

- contributing £16.6 million in a collaborative partnership with the EA to deliver 55 Flood Alleviation scheme projects across England, which will reduce flood risk to over 142 schools, other properties and businesses, improve habitat and provide wider economic benefit;
- working directly with all schools in the scheme areas – EA colleagues visit schools to raise awareness about flooding, the scheme, water safety and climate change;
- widening our approach by working with local government and their LLFAs by providing grant investment towards sustainable drainage systems (SuDs) flood mitigation, in order to help protect schools from increasing risk of surface water flooding;
- piloting water efficiency measures with water companies, in recognition of the future increasing water scarcity;
- delivering 205 school heat decarbonisation plans, to help inform the schools increase technical understanding on the requirements necessary to assist in the drive to low carbon solutions; and
- developing a Water Strategy to reduce flood risk in future years, recognising that that flooding causes significant damage to schools, disrupts education, and impacts on the health and the wellbeing of pupils and workforce DfE has been developing a Water Strategy, to help inform what we are able to do to reduce risk in future years.

Over the lifetime of the flood schemes, they will massively reduce the chance of educational days being lost due to flooding.

5.6.17 Local adaptation

Adaptation is geographic and context specific and action is required at national, regional and local levels. In responding to localised climate change risks, we commit to work closely with local authorities to ensure communities are consulted in planning, designing and implementing adaptation activity

At the local level, when developed, adaptation policies usually build on risk assessments, critical to inform the priority setting process and form a baseline for measuring progress towards adaptation. There are some examples:

- London: The Mayor of London, required by the Greater London Authority Act 1999 to consider the impact of climate change and adaptation options, developed a dedicated adaptation chapter on adapting to climate change for the 8.7 million Londoners in its 2018 London Environment Strategy (Greater London Authority, 2018).
- Bristol: Bristol (a member of Mayors Adapt, an initiative of the European Commission's Directorate General Climate Action) endorsed its 2020 strategy, building on a climate resilience assessment, and is now developing an action plan.

- Northern Ireland: In Northern Ireland, Derry and Strabane District Council were the first to develop a local authority climate adaptation plan, building on a local risk assessment. Climate NI developed a five-step adaptation planning tool to support local councils and organisations in assessing current and future vulnerability to climate impacts, leading to the development of a risk register and adaptation plan. Several other local authorities are developing adaptation plans and strategies. However, although around 300 councils have declared a climate emergency, less than 12% of them mention adaptation to climate change.

Chapter 6 Financial Assistance and Support for Technologies

6.1 Introduction

This chapter sets out the financial assistance the UK has provided to developing countries to support emissions reductions and increase the resilience of the most vulnerable countries to the impacts of climate change.

The chapter is structured as follows:

- An overview of UK support for developing countries through ICF.
- The allocation of UK ICF since the UK's Seventh National Communication and Fourth Biennial Review, covering mitigation and adaptation with examples of programming in UK priority areas.
- How the UK is supporting technological development and transfer to developing countries.
- Actions the UK is taking to build capacity in developing countries for mitigation, adaptation, technology transfer and negotiations.
- How the UK is helping to accelerate the alignment of financial flows with the Paris Agreement and raising ambition globally.
- How the ICF is using its monitoring and evaluation framework to apply lessons learned and improve.

6.2 Key Developments

- The UK is committed to the collective target of providing and mobilising US$100 billion climate finance a year through public and private sources, for developing countries. The UK succeeded in meeting its 2015 pledge to provide £5.8 billion in International Climate Finance (ICF) between 2016/17 and 2020/21. In 2019 the PM made a commitment to delivering £11.6 billion for the period 2021/22 to 2025/26. This commitment is additional to the £5.8 billion spent up to March 2021. British International Investment (BII) (formerly CDC) has also committed to a 30% climate target which is expected to deliver a further £2 billion climate finance over five years.
- In March 2021 the UK Government published the Integrated Review of Security, Defence, Development and Foreign Policy which made tackling climate change and biodiversity loss its number one international priority. The UK is beginning a

programme of new investment, taking forward its 10-point plan for a green industrial revolution by funding British research and development in green technologies, and supporting climate investment internationally through UK ICF.

- Recognising that adaptation is a priority for many developing countries, UK ICF aims for a balance between adaptation and mitigation. The majority of UK climate finance is grant-based, with 91% of support provided over the reporting period being through grants.
- As first outlined in the 2019 Green Finance Strategy and further reinforced in the Integrated Review, the UK Government has also pledged to ensure that all UK ODA is aligned to the Paris Agreement, reflecting the UK Government's commitment to tackling the causes of climate change and its impacts as a driver of future instability and poverty. In the 2021, the UK Government response to the Dasgupta Review on the Economics of Biodiversity, the UK committed to integrate nature into its ODA, ensuring that all new UK bilateral aid spending does no harm to nature.
- The UK is one of the largest contributors to the major multilateral climate funds, with £724 million provided over 2019 and 2020. At the G7 in 2019 the UK announced it will double its contribution to the GCF to £1.44 billion of new funding between 2020 and 2023, making the UK the largest contributor. £450 million of this commitment was provided in 2020. Other climate specific funding over the period 2018, 2019 and 2020 includes £106 million to the Global Environment Facility. The UK also pledged £15 million new funding to the Adaptation Fund at COP26. At least £3 billion of the £11.6 billion ICF commitment will be used to protect and restore nature and biodiversity over the five years to 2025/26 and £1 billion new funding for the Ayrton Fund will support clean energy Research, Development and Demonstration.
- At COP26 the UK launched the Clean Green Initiative (CGI) to help developing countries bridge the infrastructure gap, while supporting climate change and sustainable development goals, helping to scale up investment by the private sector. Bold commitments have been made at COP26 around key themes:
- **protecting nature:** £1.5 billion new UK funding over five years for the Global Forest Finance Pledge (part of the £3 billion nature commitment);
- **phasing out coal:** the UK is the largest contributor to the Climate Investment Funds (CIFs) and committed an additional £350 million: £200 million to the new Accelerating Coal Transitions programme and £150 million to the Renewable Energy Integration programme (announced at UNGA);
- **mobilising finance:** The CIFs with strong UK leadership announced a new Capital Markets Mechanism expected to issue billions of green bonds in the City of London to support climate action; **net zero cities:** £27.5 million new funding to support the launch of the Urban Climate Action Programme (UCAP);
- **access to finance:** including a £100 million to respond to recommendations from the UK co-chaired Taskforce on Access to Climate Finance to make it faster and easier for developing countries to access finance for their climate plans. COP26 also saw the launch of the International Just Transition Declaration[1] committing

[1] UN Climate Change Conference UK 2021: https://ukcop26.org/supporting-the-conditions-for-a-just-transition-internationally/

to working together to ensure no one is left behind in the transition towards net zero economies.

- Since 2011, UK ICF[2] investments have helped 88 million people to cope with the effects of climate change. This includes supporting vulnerable individuals and communities to become more resilient to increased climate variability such as helping farmers grow crops that can adapt to changing weather conditions. Since 2011, UK ICF has also mobilised £8.0 billion in public and private finance in addition to our ICF spend commitments. Overall ICF provided from April 2011 to March 2021 is expected to avoid or reduce 960 million tonnes of carbon dioxide equivalent.

6.3 Overview of UK support, approach and channels

The economic recovery after the Coronavirus (Covid-19) pandemic will be critical to secure more ambitious and urgent action to promote a clean, green, inclusive, and resilient future. The UK is committed to supporting the global shift to net zero by providing developing countries access to more, better, and faster finance. Public finance will be used to mobilise the trillions that are urgently needed from the private sector to meet our climate and nature goals. As the new G7 Partnership for Infrastructure and Investment develops; we will collaborate with our G7 counterparts to drive progress towards a global Green Industrial Revolution.

The UK is building on the successful delivery of £5.8 billion ICF between 2016/17 – 2020/21 by providing a doubling of finance to £11.6 billion between 2021/22 – 2025/26. This is dedicated ring-fenced funding that is distinguishable from non-climate ODA. The £11.6 billion (2021/22) is a new commitment which is on top of the £5.8 billion commitment (2016/17 – March 2021). Tackling climate change is fundamental to achieving the Sustainable Development Goals (SDGs), therefore UK ICF is integrated into wider development spending.

The UK Government has committed to align its ODA spend with the Paris Agreement in 2019 and we have continued to implement this commitment. In 2021 the Foreign, Commonwealth and Development Office (FCDO) included a new rule in its programme operating framework to ensure that ODA spend aligns with the Paris Agreement and does no harm to nature, with an intention to embed best practice approaches through all ODA spending departments.

The UK's ICF is playing a vital role in helping developing countries to respond and adapt to the challenges of climate change and prevent its worst effects. UK ICF is focusing on driving the rapid transformation and systemic shifts required to achieve the Paris Agreement goals and deliver on the Glasgow Climate Pact.

British International Investment (BII), the UK's development finance institution, is playing a transformative role in tackling climate change by supporting clean, inclusive, and resilient growth in the countries where it invests. With a climate finance target of at least 30% of new investment, it is supporting investments that facilitate transformation towards net-zero economies by 2050 by either investing in activities that are already low carbon or which indirectly enable emissions reductions in other activities.

The UK is ensuring a balanced split between mitigation and adaptation finance, recognising that support for nature can deliver on both as well as addressing biodiversity loss. The UK is investing in mitigation where emissions are growing rapidly and in countries with forests that can play a role as major carbon sinks, whilst supporting those most vulnerable to

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[2] 2021 UK ICF Results: https://www.gov.uk/government/publications/uk-climate-finance-results-2021/2021-uk-climate-finance-results

impacts to adapt and become more resilient. COP26 saw the launch of the International Just Transition Declaration[3] committing to working together to ensure no one is left behind in the transition towards net zero economies. The UK will enhance the gender-responsiveness of its programming, including by increasing the proportion of climate finance that has gender equality as a principal or significant objective as defined by the OECD Development Assistance Committee Gender Equality policy marker[4].

The UK provides support through both bilateral and multilateral channels, as well as rules-based international system (RuBIS) to help drive global climate action. Through the establishment of the FCDO the UK will continue to use its network of officials in developing countries to ensure close relationships with other governments and organisations – facilitating bilateral programmes based on developing country needs. The UK will continue to support UN climate change processes, multilateral funds and development banks to deliver impact at scale and use their leverage to maximise value for money.

6.3.1 UK International Climate Finance (ICF) overview

UK ICF is an important international instrument for delivering on Paris Agreement commitments to collectively mobilise $100 billion per year and is part of the UK's broader Official Development Assistance (ODA). In recognition of the urgency with which the causes of climate change and its impacts must be tackled, the UK successfully delivered on its commitment to provide £5.8 billion ICF over the period 2016/17 – 2020/21.

The UK ICF portfolio is managed by three departments: the Foreign, Commonwealth and Development Office (FCDO), the Department for Business, Energy and Industrial Strategy (BEIS), and the Department for Environment, Food and Rural Affairs (Defra). Collectively they aim to provide the necessary capital investment, technical assistance, and capacity building to drive transformational change towards low-carbon, climate resilient and nature positive development paths, drawing in investment from the private sector and other actors.

UK ICF focuses on four key themes: 1) clean energy, 2) nature for climate and people, 3) adaptation and resilience, 4) sustainable cities, infrastructure and transport. This includes supporting developing countries to pursue clean economic growth, halt deforestation and build resilience, whilst achieving co-benefits for other sustainable development goals such as improved livelihoods, food and water security, gender equality and health for all. The UK will strike a balance between mitigation and adaptation spending and will invest at least £3 billion in solutions that protect and restore nature.

The UK recognises the challenges faced by some countries in accessing climate finance and will continue to work with delivery partners and the multilateral funds to improve access. The UK will continue to push for greater transparency, efficiency, effectiveness, and impact of finance that is distributed through multilateral sources. While there will not be a single access point for developing countries to directly apply for ICF support, much of our ICF is spent through our teams based in developing countries. **UK Climate Finance programming is developed in partnership with developing countries, so that it addresses their needs**. We are also working in coordination with others to improve access to finance, for example through the NDC Partnership and the Taskforce on Access to Climate Finance launched at COP26.

Cumulative ICF results show that over the period 2011/12 – 2021/22 (2020 bracketed), UK ICF programmes have so far achieved:

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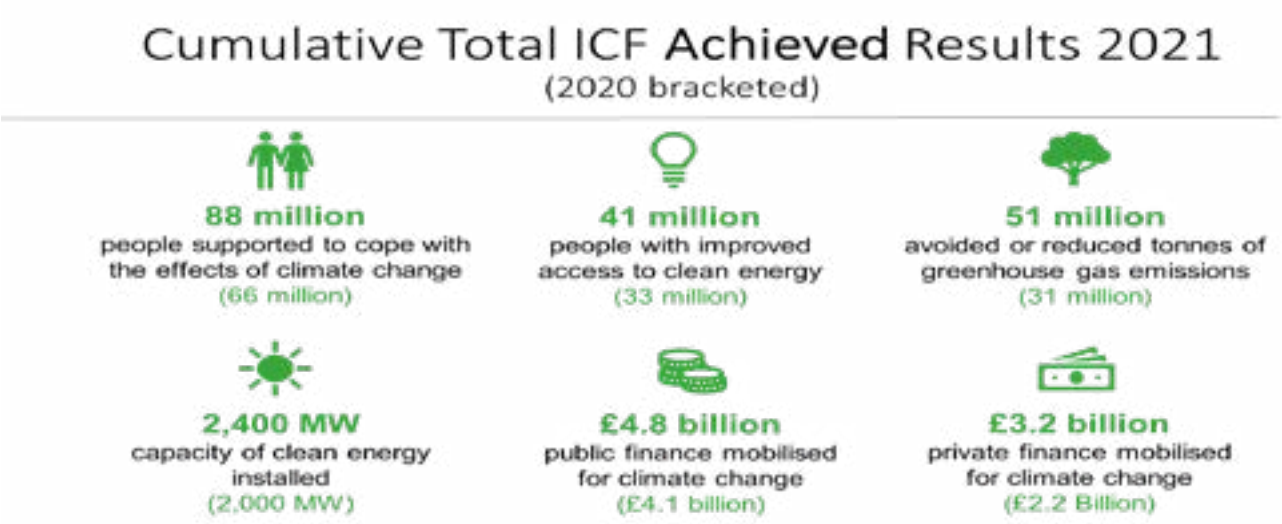
[3] https://ukcop26.org/supporting-the-conditions-for-a-just-transition-internationally/

[4] https://www.oecd.org/dac/gender-development/dac-gender-equality-marker.htm



6.3.2 Contribution to Multilateral Development Banks overview

- The UK has worked very closely with the Multilateral Development Banks to scale up climate finance over the period and at COP26, with the UK's ICF noted for its positive impact on this multilateral architecture. Climate also plays a critical role across a number of UN SDGs and environmental agreements. The UK will pursue the following outcomes, using both bilateral and domestic relationships, and UK positions in multilateral fora and institutions, and diplomatic outreach:
- The UK will use its position in IFIs (including the multilateral development banks, development finance institutions, and the International Monetary Fund) to seek stronger mainstreaming of climate, nature and wider environmental considerations. This includes by better incorporating climate and environment risk, and encouraging additional, urgent action and scaling up of new instruments and approaches.
- Working through the IFIs, our in-country presence, and in new fora like the Coalition of Finance Ministers for Climate Action to support developing countries to embed climate change economy-wide.
- Maximising synergies between climate finance and Financing for Development (e.g., through the Addis Ababa Action Agenda) and multilateral environmental agreements.

6.3.3 UK and UNFCCC Mandatory and Voluntary Contributions overview

As a signatory to the UNFCCC, the UK pays contributions to the UNFCCC core budget to ensure the effective functioning of the Paris Agreement and the UNFCCC process. The UK also makes voluntary contributions each year to UNFCCC trust funds, including the Trust Fund for Supplementary Activities to support a range of priority activities, and the Trust Fund for Participation in the UNFCCC process to fund developing country participation.

Between 2019 and 2022, the UK contributed to the UNFCCC £4.5 million in voluntary contributions and EUR 4,466,318 in core contributions (Convention, Kyoto Protocol and International Transaction Log). These contributions were 61% ODA-funded in line with the OECD-DAC Annex 2 on ODA eligible international organisations. In addition, the UK provides small scale funding to help contribute to the costs of the OECD Climate Change Experts Group programme and to provide targeted support to the most progressive and vulnerable

countries in the negotiations, including through the Cartagena Dialogue and the Climate Ambition Support Alliance (CASA) (see section 6.6.4). As a member of the IPCC the UK makes voluntary contributions each year to the IPCC's Trust Fund. The UK has contributed £115,000 per year between 2019 and 2021.

6.3.4 Research and development spending overview

The UK supports research and development through multiple channels (see Section 6.4.8) including a commitment to spend £1 billion on ODA funded research, development, and demonstration (RD&D) through the Ayrton Fund on clean energy over five years from April 2021. Other initiatives include the Newton Fund which supports bilateral and regional research and innovation partnerships between the UK and partner countries. From 2014–2021 a UK investment of up to £735 million was made with 'match' funding from partner countries.

6.4 UK International Climate Finance

This section explains how the UK directs its climate finance. Firstly, a high-level quantitative overview of UK ICF spend is shown, and the UK's overarching strategic approach set out. UK support for operating entities of the UNFCCC Financial Mechanism and other multilateral funds is explained, in addition to UK support for mitigation and adaptation activities. The UK succeeded in meeting its 2015 pledge to provide £5.8 billion in International Climate Finance (ICF) between 2016/17 and 2020/21 and is committed to delivering an additional £11.6 billion for the period 2021/22 and 2025/26. The £11.6bn is a new commitment which is on top of the £5.8bn spent up to March 2021.

6.4.1 Strategic approach

Table 6.1: Overview of UK ICF spend 2016 – 2020

	2016	2017	2018	2019	2020
Total climate spend	£1,051m	£902.5m	£1,169m	£1,183m	£1,329m
Multilateral spend	£268m	£154.3m	£217m	£199.2m	£524.8m
Bilateral spend	£783m	£748.2m	£951m	£984.4m	£803.8m
Mitigation spend	£517m	£452.6m	£591m	£702.2m	£701.5m
Adaptation spend	£533m	£447.9m	£564m	473.4m	£623.3m

Source: Relevant CTF tables submitted for UNFCCC reporting including those with NC8

UK ICF works through a mix of instruments, partners and delivery channels including bilateral programmes, multilateral contributions, private sector and civil society programmes. Within this, there is a growing role for bilateral partnerships and programming, reinforced by well-staffed country missions with delegated budgets. Much of UK ICF is spent through our teams based in developing countries. Through bilateral ICF programmes and broader ODA effort, the UK is developing and strengthening relationships with partner governments at technical and Ministerial level and across multiple ministries, enabling demand led support. Our in-country teams partner with government officials to support the development of strategies across various themes including climate adaption, NDCs and reversing biodiversity loss and ensure that our portfolios are supporting delivery of those strategies.

Furthermore, detailed country development diagnostics inform decision making and as a result, programming choices reflect the local context and need. Programmes are designed and delivered in consultation with local communities and in partnership with key institutions, local and national governments. As such, the UK is ensuring that programmes

are designed to be responsive to country needs; adaptable to changing circumstances; to drive transformational change and offer value for money. Through our overseas networks, we also provide support to develop countries' climate change policies and strategies, as well as providing tailored and expert technical assistance. For example, one of the specific actions we are taking is to consider countries' revised NDCs as they are submitted over the course of this year. We then cross-check our map of technical assistance and capacity building support with countries' capital investment needs. We will also draw on the UNFCCC Standing Committee on Finance's Report on the Determination of the Needs of Developing Country Parties to inform future pipeline development (first published in 2021 and every four years thereafter). More broadly we continue supporting and engaging with organisations like the NDC Partnership, whose mission is to ensure effective support for the implementation of developing countries' NDCs and enable us to coordinate our support with that of other countries and organisations. The UK will also work closely with partner countries to plan and evaluate our programmes and identify ways to achieve greater impacts.

Over the period 2021 – 2025, UK ICF will focus on driving transformation and systemic shifts required to achieve the Paris Agreement goals and deliver on the Glasgow Climate Pact across four themes:

Clean Energy: A major focus of our ICF programming will be on accelerating the clean energy transition in developing countries so that they can provide access to affordable, reliable and clean energy for all and reduce or avoid high emissions pathways, making use of innovation, technology and carbon pricing and addressing social and gender barriers to clean energy access.

Nature for Climate and People: Through our ICF and in line with the recommendations from the Dasgupta Review, we will protect, restore and sustainably manage nature including through protection and restoration of critical ecosystems on land and in the ocean, reversing forest loss, and supporting sustainable food and water systems. We will also seek to ensure our global financial and economic systems support nature through sustainable production and consumption and management of risks, while supporting communities and livelihoods.

Adaptation and Resilience: UK ICF will ensure that countries and communities are supported to adapt to, prepare for and cope with the damaging effects of climate change and climate-linked disasters. Without action, hard won gains in areas such as health, nutrition and livelihoods risk being reversed. Those living in poverty, women and girls, Indigenous Peoples and Local Communities, people with disabilities and marginalised and crisis-affected groups are already being hit hardest by the impacts of a changing climate and they stand to suffer most unless action is taken.

Sustainable Cities, Infrastructure and Transport: In the context of rapid changes in urban development, UK ICF will focus on supporting the low-carbon, green and resilient urbanisation needed to promote sustainable cities, along with wider infrastructure across the transport, building, water and waste sectors. With 68% of the world population projected to live in urban areas by 2050 and cities accounting for 75% of global CO_2 emissions, investment in sustainable cities is key for meeting both our development and climate goals.

6.4.2 Support for cross cutting multilateral climate funds

The UK is one of the largest contributors to the major multilateral climate funds, with £724m provided over 2019 and 2020. The UK's contribution to the GCF will double to £1.44bn between 2020 and 2023, making the UK the largest contributor. £450m of this commitment was provided in 2020. The other main multilateral funds that that benefitted from UK support are the Climate Investment Funds (£200 million UK finance), and the Global Environment Facility with £50m climate specific support provided over 2019 and 2020.

Table 6.2: UK support to multilateral climate funds over past three years (2020, 2019 and 2018). GEF figure is over past four years).

Fund	£m	$m	Funding source	Financial Instrument	Sector	New and Additional
Global Environment Facility	150.5 general 106.46 climate specific	194.6 general 137.17 climate specific	ICF ODA	Grant	Cross-cutting	Support is new and additional to previous reported contributions.
Green Climate Fund	595.46 climate specific	837.53 climate specific				
Global Green Growth Institute	5.79 climate specific	7.30 climate specific				
Climate Investment Funds – Clean Technology Fund	200 climate specific	255.59 climate specific				
UN Convention to Combat Desertification General Fund – Assessed Contribution	0.31 climate specific	0.40 climate specific				
UNDP Climate Promise	3 climate specific	3.75 climate specific				

Source: Relevant CTF tables submitted for UNFCCC reporting including those with NC8

6.4.2.1 Global Environment Facility

The Global Environment Facility (GEF) is the principal multilateral agency supporting developing countries in tackling major environmental problems and supporting implementation of the international agreements covering biodiversity (including wildlife loss), land degradation, deforestation, chemical pollution, marine and freshwater degradation – including marine plastic – and climate change.

The GEF budget is replenished on 4-yearly cycles and a total of 28 countries contribute. It is currently in the seventh replenishment period (GEF7) from July 2018 until June 2022 which has a total budget of $4.1 billion (the GEF 8 replenishment negotiations will be finalised in June 2022). Of the GEF7 total, the UK is contributing up to £250 million in total (10.07% burden share of the total). The UK contribution makes the UK the third largest donor to GEF7 after Japan and Germany. Of this, 60% of programmes under GEF7 have clear climate benefits and so £150 million of our contribution is scored as ICF.

Since its inception in 1991 GEF has invested in improving the management of 3,300 protected areas covering an area of about 860m hectares, an area larger than Brazil. GEF has been instrumental in supporting national policy reform and planning frameworks that promote biodiversity considerations across sectors and geographies with globally significant biodiversity. This has resulted in legal, environmental, regulatory, governance and socio-economic additionalities beyond incremental cost benefits. GEF Sustainable Forestry Management interventions were estimated to have avoided 4,875km2 of deforestation, sequestering 1.33 tonnes of carbon per hectare per year and increasing household assets by USD$163-353. It has also supported management of 790 climate change mitigation projects contributing to 2.7 billion tonnes of greenhouse gas emission reductions and sustainable management of 34 of the world's major river basins and provided $131m to the Global Wildlife Programme to tackle the illegal wildlife trade.

6.4.2.2 Green Climate Fund

Since becoming operational in 2015, the Green Climate Fund (GCF) has become the key multilateral climate fund, with a mandate to make 'an ambitious contribution to the global efforts towards attaining the goals set by the international community to combat climate change'. The UK is a strong supporter of the GCF having committed £720 million

for the initial resource mobilisation period (2015-2019), and doubling this commitment to £1.44 billion for the first replenishment period (2020-2023). The UK is committed to ensuring that the GCF delivers maximum impacts in the developing countries it supports.

The GCF funds transformational projects with a strong focus on leveraging private finance, with a commitment to provide 50% of its resources for mitigation and 50% for adaptation. At least 50% of its adaptation support will be provided to particularly vulnerable countries including Least Developed Countries (LDCs), Small Island Developing States (SIDS) and African States. The GCF has continued to improve its programming and efficiency track record, tightening its policy framework, and building the Secretariat's capacity. In the eight years since it became operational, the GCF has committed $10 billion to climate projects (with an additional $27.2 billion leveraged in co-financing). $4 billion of this GCF commitment (that will mobilise $15 billion in co-financing) has been approved by the Board since June 2020. Around 70% of the GCF's adaptation funding is going to the most vulnerable countries (SIDS, LDCs and African States). 34% of GCF funds are now being delivered through its Private Sector Facility.

6.4.2.3 Climate Investment Funds

The UK is the largest investor in the $10.3 billion CIFs, having committed an additional £560 million over 2019/20 and 2020/21, to pilot low-emission and climate resilient development through projects implemented by the multilateral development banks in the areas of green recovery (£10 million), energy storage (£200 million), coal transition (£200 million) and renewable energy integration (£150 million); the latter two being key COP26 announcements and deliverables. From this commitment, the UK has spent £210m by the end of 2020 on green recovery and energy storage.

The CIFs now operate across 72 countries and have a total portfolio of 325 projects. The projects are unlocking finance flows in the green markets of developing countries and are expected to generate at least $61 billion of co-financing. With strong support from the UK the CIFs have also embarked on a new era of programming which targets key challenge areas that include coal transitions, renewable energy integration, nature-based solutions, cities and industry, and on implementing a Capital Markets Mechanism to raise billions in additional investment from the private sector.

6.4.2.4 Adaptation Fund

The UK pledged £15 million to the Adaptation Fund (AF) at COP26. Since 2010 the AF has committed $850m in support to nearly 100 countries. It has a growing pipeline with over $300 million of requests for support. This is three times the average annual disbursements from the Fund, demonstrating continued high demand from recipients. Funding for any single country was previously capped at $10 million, but this has now been increased to $20 million to allow countries additional support. The AF offers developing countries direct access to funding and often faster than other funds. This is in part because the AF funds projects alone, rather than co-financing with others, and so must cover the full cost of approved projects. This makes it a useful complement to mechanisms such as the GCF, as does its speed and lower project size, which allow for the trialling of innovative new approaches that can subsequently be taken to scale through support from other, larger funds

6.4.2.5 Least Developed Countries Fund

The Least Developed Countries Fund (LDCF) is administered by the Global Environment Facility (GEF) but operates and is funded separately. To date nine of GEF's eighteen implementing agencies have been involved in implementing LDCF projects and programmes: United Nations Development Programme (UNDP), United Nations Environment Programme

(UNEP) , African Development Bank (AfDB), Food and Agriculture Organisation (FAO), World Bank, International Fund for Agricultural Development (IFAD), Asian Development Bank (ADB), International Union for the Conversation of Nature (IUCN), and United Nations Industrial Development Organisation (UNIDO). The UK, through DFID contributed £30 million from December 2016 to March 2019. The UK no longer funds LDCF.

6.4.2.6 The Special Climate Change Fund

The Special Climate Change Fund (SCCF) is administered by the Global Environment Facility (GEF) but operates and is funded separately. The SCCF supports adaptation and technology transfer in all developing country parties to the United Nations Framework Convention on Climate Change (UNFCCC), supporting both long-term and short-term adaptation activities in water resources management, land management, agriculture, health, infrastructure development, fragile ecosystems, including mountainous ecosystems, and integrated coastal zone management. The UK does not fund SCCF.

6.4.2.7 Climate Promise

The UK has provided £3m as a voluntary contribution to the Climate Promise, to support UNDP in helping countries to scale up their efforts to protect and restore nature, and simultaneously address climate change, biodiversity loss and poverty. The funding will be used to support up to 8 countries to increase ambition and accelerate implementation against their targets on forests, land and nature under the Paris Agreement. The Climate Promise overall is building capacity in over 120 developing countries to enable them to strengthen and deliver national climate pledges under the Paris Agreement.

6.4.3 Contributions through bilateral, regional and other channels.

UK ICF includes significant bilateral programming drawing on the UK's experience of supporting and delivering high quality development interventions and sharing the UK's own expertise. This involves working with national and local governments, city authorities and other key public institutions, integrating climate and nature objectives into the design of wider development programmes and launching regional initiatives in Africa, Asia, Latin America that will seek to deliver impact at scale. We will seek to build capacity and provide technical assistance to key institutions to support:

- Partner governments to design, develop and deliver strategies, policies and programmes that will accelerate action on climate and environment; generate jobs and low carbon growth; and build resilience.
- Priority countries and regional groups to effectively contribute to climate negotiations, including technical, legal and strategic UNFCCC support as well as support for developing GHG inventories and reporting.
- The development and implementation of ambitious climate and nature action plans including high-quality, ambitious Nationally Determined Contributions, National Adaptation Plans and long-term, and nature positive development strategies.
- Dialogue between governments and private sector, increasing access to climate finance and building the capacity of markets to enable the clean growth transition.

6.4.4 Mitigation

UK ICF provides funding for over 100 programmes which support mitigation, including the aforementioned multilateral funds. Additionally, British International Investment (BII), formerly CDC group, has invested over £750 million (over $1 billion) in climate finance since 2017 and has set a climate finance target of 30% of new investment commitments over its next

5-year strategy – at least £3 billion. This is a step up from BII's four year average climate commitments (2017-2020) of 17%. BII's £3 billion of climate finance will be invested over the next five years across several different sectors, such as renewable power, infrastructure and agriculture, including forestry. BII continues to increase its commitments to renewable power, with BII's overall direct commitments to renewable energy at $894 million at the end of 2020. BII's portfolio of over 1,000 investments will be net zero by 2050 at the latest.

For example, in 2017 BII invested in:

- Ayana, an independent solar and wind generation company developing utility-scale renewable energy infrastructure in India;
- Zephyr Power, a renewable energy company in Pakistan that has developed a 50 megawatt wind-power plant; and,
- Benban Solar Park in Egypt, the largest solar park in Africa.

Below are some examples of UK programmes (this is not an exhaustive list).

6.4.4.1 Accelerating decarbonisation

Energy Transition: The UK has provided support for the International Energy Agency's (IEA) Clean Energy Transition Programme (CETP) which leverages the IEA's unique energy expertise across all fuels and technologies to accelerate global clean-energy transitions by providing independent, cutting-edge support to governments whose energy policies will significantly influence the prospects for – and the speed of – the global transition towards more sustainable energy production and use. Priority countries include Brazil, China, India, Indonesia, Mexico and South Africa, as well as other IEA Association countries and key regions such as Southeast Asia, Latin America and Africa.

The Renewable Energy Performance Platform (REPP) seeks to mobilise private sector development activity and investment in innovative small and medium scale renewable energy projects (up to 25MW / 50MW for wind) in sub-Saharan Africa. REPP aims to increase the number of sound 'bankable' smaller renewable energy projects by developing innovative and first of a kind transactions to set precedence. REPP does this by assisting project proponents throughout the project development stage, by financing Technical Assistance, drawing on existing risk mitigation instruments such as political risk insurance and providing results-based finance where necessary. The UK has committed £148 million for 2015 to 2023 of which £88m has been provided by end of 2021/22.

The Clean Energy Fund Technical Assistance Programme (CEF TA) – The UK has contributed £19.5 million to the Asian Development Bank's existing Clean Energy Fund (CEF) from 15/16 to 2019/20. The fund supports the development of renewable energy and energy efficiency projects in developing countries in the Asia-Pacific region. The fund focuses specifically on technical assistance activities including building the knowledge and skills base of the industries and governments in the supported countries, as well as undertaking feasibility studies of potential low carbon energy projects. Through a variety of projects, the programme aims to increase country-level (public and private sector) action to implement successful low carbon projects that improve access to clean energy and reduce greenhouse gas (GHG) emissions.

Innovation: since the last National Communication the UK has launched several programmes to accelerate decarbonisation internationally, through technology or financial innovation. The UK also supports decarbonisation in developing countries through its support for innovative research, development and deployment of low-carbon technologies, which are detailed within the '6.5 Technology development and transfer' section of this chapter "

Zero Emission Vehicles: To accelerate the decarbonisation of the road transport sector, the UK is working with a range of bilateral and multilateral partners. Bilaterally, the UK is working with partner countries through the UK Partnering for Accelerated Climate Transitions (UK PACT) Programme, which includes a variety of electromobility-related projects. For example, supporting electric vehicle readiness in Johannesburg, accelerating electric bus adoption in Colombian cities, and developing an action plan for electrification of two-wheelers in Jakarta. The UK also provided £177.5 million to the Sustainable Infrastructure Programme – see section 6.6.1.

At the multilateral level, in addition to supporting electromobility-focused projects through the CIF's Clean Technology Fund and Nationally Appropriate Mitigation Action (NAMA) Facility, the UK contributed an initial £4 million in 2021/22 to the World Bank's new Global Facility to Decarbonise Transport (GFDT). The GFDT, which launched at COP26, aims to mobilise US$200 million within the next decade to support Emerging Markets and Developing Economies (EMDEs) decarbonise their transport sectors. The UK is also working with countries in the ZEV Transition Council to identify further opportunities for a more strengthened and coordinated international support offer for EMDEs in the road transport decarbonisation space.

Buildings/industry: The Market Accelerator for Green Construction (MAGC) is a £103 million bilateral programme funded by UK ICF from 2018/19 to 2020/21 and delivered by the International Finance Corporation (IFC) to drive the financing and construction of more energy efficient buildings in emerging economies. The programme is supporting up to 24 countries across Latin America, Africa, Asia and the Middle East, aiming to build demonstration portfolios of green construction at scale, reducing emissions, mobilising new finance and inspiring markets to shift towards the new energy efficient buildings of the future. Primarily, MAGC provides concessional finance for sustainable building projects, where the perceived financial risk is high, and deploys technical assistance to incentivise local intermediaries to leverage larger volumes of private capital into low-carbon projects. It also builds capacity at the country-level increasing knowledge and ambition for green building projects, funds the improvement and enhancement of IFC's EDGE building standard and tool, as well as building evidence through a significant research project that quantifies the financial and emissions case for green construction in developing markets and further drive wider uptake.

UK Climate Investments: UK Climate Investments LLP was mandated to invest in up to £200 million of UK ICF in low carbon projects in emerging markets in its pilot phase (2015-2022). As of November 2021 UKCI's investment budget is now fully committed. The Investment Mandate requires UKCI to make equity investments into renewable energy and energy efficiency projects in India and Sub-Saharan Africa. Through investing a minority equity stake, UKCI aims to leverage additional private equity and debt investment into the projects. The central objectives of the pilot were to:

- Use a private sector actor to have a demonstration effect, build a successful track record and prove commerciality of low carbon investments to the broader market by making a strong return on investment; and
- Ensure additionality and transformational capacity of UKCI's resources by engaging with market barriers and avoiding displacement of private capital. UKCI's investments in India and Sub-Saharan Africa have each provided innovation in their markets. For example, UKCI has supported the creation of the first Renewable Energy YieldCos in India and South Africa, to increase capital recirculation, developed an innovative financing tool for Black Economic Empowerment investment – a potential market barrier – and supported an environmentally sustainable housing fund in Kenya – creating an entirely new asset class.

6.4.4.2 Carbon markets and carbon pricing

The UK Government considers that carbon pricing is crucial to support and raise the ambition needed to tackle the climate change challenge. Carbon pricing can provide a cost effective and technology-neutral way of reducing emissions, and it can help mobilise the private sector towards the achievement of the Paris Agreement goals. It is for this reason that the UK continues to promote the use of pricing instruments both domestically and internationally.

The UK Emissions Trading Scheme (UK ETS) came into force on 1 January 2021, replacing the UK's participation in the EU Emission Trading System (EU ETS). The system has been established to increase the climate ambition of the UK's carbon pricing policy, while mitigating the risk of carbon leakage through free allowances. The UK ETS will promote cost-effective decarbonisation, allowing businesses to cut carbon emissions where it is cheapest to do so. It will be the world's first net zero carbon cap and trade market, and a crucial step towards achieving the UK's target for net zero carbon emissions by 2050.

Internationally, the UK continues to support carbon pricing and carbon markets through a portfolio of programmes aimed at building capacity and piloting new approaches:

- The UK has invested £7 million since 2011 in the Partnership for Market Readiness (PMR) fund, supporting 19 countries to design and build readiness for domestic carbon pricing initiatives such as carbon taxes or ETSs.
- From 2021 the UK has committed a further £20 million to PMR's successor programme, the Partnership for Market Implementation (PMI), which will help developing countries to implement carbon pricing schemes, as well as to support related regional work, through the 2020s. At least 15 countries have applied for support.
- The UK is improving access to carbon finance in least developed countries through our involvement in the World Bank's Carbon Initiative for Development (Ci-Dev). Ci-Dev focusses mainly on the poorest countries in Africa to help them participate in the international carbon markets while providing clean energy for households and communities. The programme enables local developers to put their ideas into practice, for example by aggregating many small projects at household or community level and calculating the carbon that has been saved in order to unlock results-based finance. The UK committed £50 million to Ci-Dev since 13/14.
- In 2016, the UK contributed £60m to the Transformative Carbon Asset Facility. TCAF's purpose is to support scaled up crediting approaches in countries with sizeable mitigation potential, and to help enhance overall ambition. Almost 90% of the funding will be spent on results-based purchases of emission reductions from supported programmes.
- Lowering Emissions by Accelerating Forest Finance (LEAF), the largest initiative to date for scaling carbon markets (see Section 6.4.6).

In 2015 the Paris Agreement reiterated the importance of carbon markets in meeting international commitments by establishing a new framework for cooperation to enable countries to go further on their mitigation and adaptation actions, and to promote sustainable development and environmental integrity. COP26 finally saw consensus in this area ('Article 6'), completing the Paris Agreement rulebook. Building on this agreement, the above provisions will help make the UK vision for the future of the global carbon market a reality by providing the foundations to facilitate bottom-up cooperation while creating the necessary top-down structures.

The UK Government also supports international initiatives to ensure that voluntary carbon markets – in which carbon credits are voluntarily purchased by businesses and other non-state actors – develop with high levels of integrity. In particular, the UK Government welcomes and is closely engaging with the work of the Voluntary Carbon Markets Integrity Initiative[5] and the Integrity Council for Voluntary Carbon Markets[6]. These independent bodies are working to ensure that voluntary carbon markets drive credible, transparent action aligned with the Paris Agreement, across both the supply and demand of carbon credits.

6.4.5 Adaptation

Even if we stopped emissions rising today, the world would still need to deal with significant climate disruption. No-one is immune from the impacts of climate change and the poorest and most vulnerable are hardest hit. This includes young people, women and girls, people with disabilities and indigenous peoples. The need for action on adaptation and loss and damage resulting from climate impacts has never been greater. The UK is committed to a balance in ICF spend between Mitigation and Adaptation, recognising the importance of delivering an ambitious adaptation agenda. In a policy paper published before COP26, 'the Glasgow Imperative', the UK outlined plans to drive adaptation and resilience action through five pillars: i) Building resilience across all of society; ii) Effective Risk Management; iii) Transforming Finance; iv) Catalysing Locally Led Action; and v) Harnessing the power of nature.

The UK's ICF has to date helped 88 million people cope with the effects of climate change by assisting countries to better:

- Adapt to long term impacts well in advance, for example by changing or diversifying livelihoods and ensuring infrastructure is fit for purpose.
- Anticipate and reduce the impact of climate variability and extremes for example through effective forecasting and preparedness measures.
- Absorb the effects of climate extremes and disasters for example through effective and rapid response that enables people to cope with disaster and recover quickly.

Programmes supported by the UK may work across all three areas of action as set out above.

Some examples of UK activities in each of these areas are detailed below (not exhaustive):

Anticipate: The Risk Informed Early Action Partnership (REAP) brings together an unprecedented range of stakeholders across the climate, humanitarian and development communities with the aim of making 1 billion people safer from disaster by 2025. REAP does not create a new funding mechanism or directly implement ground-level projects, however, seeking instead to enable coherence, alignment and complementarity of existing initiatives, while learning together what new initiatives are needed to make 1 billion people safer.

Absorb: The Coalition for Climate Resilient Investment develops and pilots practical tools, solutions and financial instruments to support a more efficient integration of physical climate risks in investment decision-making.

Adapt: The Least Developed Countries Initiative for Effective Adaptation and Resilience (LIFE AR) has been supported by the UK since April 2020 and works closely currently with

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[5] https://vcmintegrity.org/

[6] https://icvcm.org/

6 'frontrunner countries' from the LDC Group at UNFCCC to transform the way that climate finance is accessed, managed and targeted with an objective that at least 70% of climate finance will support local level actions by 2030. This supports the LDC Vision that by 2030 all their (currently 46) countries will be climate resilient by 2030 and will reach net zero by 2050.

6.4.6 Crosscutting: nature, land use, and oceans

The UK supports a combination of climate mitigation and adaptation through cross-cutting activities that deliver protection and restoration of nature, both terrestrial and marine, and changes in land use.

Lowering Emissions by Accelerating Forest finance (LEAF) is an ambitious financing mechanism that is mobilising public and private finance for tropical forest protection using high integrity voluntary carbon markets. Companies providing finance must commit to deep emission cuts in their own value chains, while emissions reductions generated by reduced deforestation are independently verified using the stringent ART/TREES standard. So far, LEAF has mobilised $1bn (£700m) in results-based finance and is poised to grow to become one of the largest ever public-private efforts to protect tropical forests. The UK has committed £200m for results-based finance and technical assistance.

Mobilising Finance for Forests (MFF) is a new £150 million (2021-2036) UK blended finance programme aimed at increasing private sector investment in activities which protect and restore forests, whilst reducing deforestation associated with unsustainable land use practices over 15 years. It was launched in March 2021 and has already disbursed £100 million to the delivery partner (the Dutch Finance Institution FMO), who are responsible for selecting funds and projects aimed at creating value from standing forests and/ or incorporating forest protection and restoration into sustainable forms of agricultural production. The majority of the capital will be invested in existing sustainable land use funds, while some is reserved for direct investment in projects in tropical forest regions. MFF made its first investment in November 2021 into the Green Fund to issue debt to projects in Brazil, Colombia, Ecuador, Peru, Indonesia, Liberia, and Gabon.

The **Biodiverse Landscapes Fund** programme is providing £100m over seven years from 2021/22, mostly through international climate finance, to strengthen protection of six critical ecosystems across the KAZA region (Angola, Botswana, Namibia, Zambia and Zimbabwe), the Western Congo Basin, Madagascar, the lower Mekong, Mesoamerica and Ecuador and Peru. As well as reducing carbon emissions, it will help half and reverse loss of biodiversity and support sustainable livelihoods from resources in protected areas.

The **Biodiverse Landscapes Fund** (£100m over seven years from 2021/22) which aims to deliver biodiversity protection and conservation, poverty reduction, and climate change mitigation and adaptation outcomes across six highly biodiverse landscapes worldwide. The six landscapes covered are Kavango Zambezi Transfrontier Conservation Area, Mesoamerica, Congo Basin, Andes Amazon, Lower Mekong, and Madagascar.

The UK's **Blue Planet Fund** will deliver £500m (over five years) from 2021/22, mostly from international climate finance to protect marine environments (addressing climate change and biodiversity loss) and reduce poverty. It will, for instance, provide technical assistance through the UK Ocean Country Partnership Programme, support conservation of coral reefs (Global Fund for Coral Reefs), strengthen investment in critical marine ecosystems such as mangroves through the Ocean Risk and Resilience Action Alliance.

The UK is continuing to deliver a set of ongoing programmes funded from previous and current international climate finance:

The **UK Blue Carbon Fund**, managed by the Inter-American Development Bank, aims to encourage the sustainable management of mangrove forests in target countries across Latin America and the Caribbean by developing and embedding operational blue carbon markets. It seeks to mobilise public and private sector investment to support mangrove protection and fund projects in areas such as sustainable aquaculture, coastal zone management and eco-tourism to tackle the main drivers of mangrove degradation. The Fund is projected to sequester or avoid 2.9 million tonnes of greenhouse gas emissions; protect or restore 5,570 hectares of mangrove forest; and protect or restore £48 million of ecosystem services.

The £10.3 million **Blue Forests Initiative** (2016-2024), delivered by UK NGO Blue Ventures, works with local coastal communities in Madagascar and Indonesia to protect and restore mangrove habitat, create new sustainable livelihoods, support community health and women's empowerment, and increase climate resilience. The programme is projected to protect over 180,000 hectares of mangrove forests; deliver over 7.7 million tonnes of carbon savings; benefit 86,000 people through sustainable livelihoods, and create successful models to increase the resilience of coastal communities that are replicable and scalable.

The Low Carbon Agriculture for Avoided Deforestation and Poverty Reduction Programme in Brazil, through the Inter-American Development Bank, is restoring deforested and degraded land on small- and medium-sized farms in the Amazon, Atlantic Forests, Cerrado and Caatinga biomes, targeting the barriers experienced by farmers in accessing rural credit to support sustainable production.

=The UK has contributed to the BioCarbon Fund, a multilateral project administered by the World Bank aiming to reduce greenhouse gas emissions from the land use sector through sustainable landscape management, whilst improving the livelihoods of forest communities. The Fund combines upfront technical assistance with results-based finance which rewards countries which implement landscape-level approaches that reduce emissions from the forest and land-use sector. It works with 5 countries: Colombia, Indonesia, Ethiopia, Mexico and Zambia.

The UK has contributed to the Eco.business fund for Latin America, a public-private partnership investment fund which aims to shift incentives in financial institutions (i.e. banks) towards investing in nature, by embedding social and environmental risk into investment decisions, catalysing transformational change in the financial sector. The UK has also invested in the Land Degradation Neutrality Fund which brings together public and private investors to support investments in financially viable private projects on land rehabilitation and sustainable land management worldwide, including sustainable agriculture, sustainable livestock management, agro-forestry and sustainable forestry.

The UK contributed £20m in 2020 to the World Bank's Global Programme on Sustainability. The programme supports the integration of natural capital into economic and financial decision making in selected countries. It began in early 2019, building on the World Bank's previous Wealth Accounting and Valuation or Ecosystem Services (WAVES) programme. The GPS budget is $34m with programme close due in 2025 and the UK is currently the largest donor. The programme is commencing activities in 6 Core Implementing Countries in 2022 with smaller grants being provided to 15 countries on sustainability linked themes.

The UK has contributed £4.4 million to the **Cities4Forests Initiative** (2021-2023), delivered by the World Resources Institute, to support initiatives that enable authorities and decision makers in several developing countries' cities to protect and restore forests in or around urban areas.

6.4.7 Mobilising private finance

Channelling the finance to enable climate action is a challenge faced by every country and organisation – the scale and speed of this transition will require all forms of finance: public and private; domestic and international. In the Convention and the Paris Agreement, developed country Parties have committed to provide financial resources to assist developing country Parties with respect to mitigation and adaptation. Public finance plays a crucial role in bearing risk and in catalysing action, but it cannot fund the transition alone. In Article 2.1c of the Paris Agreement, all Parties also committed to making finance flows consistent with a pathway towards low greenhouse gas and climate resilient development; this should catalyse the trillions of investment needed, but requires a fundamental shift in the global financial system. Taking climate and nature risk into account when making financial decisions should be seen as essential to economic, social and environmental sustainability. Whilst private finance is not a substitute for increased public finance flows, it will be vital in increasing the scale and reach of climate mitigation and adaptation actions, and ultimately in enabling this transition.

This transition requires all forms of finance, with ODA and domestic resources being used in a targeted, catalytic way to unlock the trillions which will drive this transition. We will use ICF to leverage and mobilise private finance by reducing the barriers preventing the deployment of commercial finance needed to drive low-carbon growth and economic transitions in developing countries. UK ICF will continue to place a strong emphasis on transformational change, through targeted investment in innovative projects and technologies with the potential to be scaled up and replicated by the private sector.

This work will include using and influencing instruments such as British International Investment (BII) International, the UK's development finance institution and the Private Infrastructure Development Group (PIDG) to offer direct and intermediated investment into climate-responsive companies, supporting both mitigation and adaptation-related private sector activity. This in turn can demonstrate to commercial investors that such opportunities can offer attractive risk-adjusted returns. Some examples include:

The **UK Sustainable Infrastructure Programme** (SIP) as detailed in Section 6.6.1, and **UK Climate Investments** (UKCI) LLP as detailed in Section 6.4.4.1.

Global Climate Partnership Fund (GCPF): The UK has invested £54.5 million from 13/14 to 18/19 in junior equity into the GCPF, providing a risk cushion to other investors. GCPF is a public-private partnership which seeks to mobilise investment flows in energy efficiency and renewable energy projects in developing and emerging markets, with the aim to reduce greenhouse gas emissions. GCPF primarily does this by providing debt finance via local Financial Institutions, extending credit lines so they can offer loans for small-scale low carbon projects. GCPF has so far invested in 23 countries and in about 30 financial institutions.

Get FiT Uganda: The UK has contributed £53.3 million in grants, since 2013/14. This finance is supporting small-scale, on grid projects in Uganda and building the capacity of Uganda institutions to attract private investment in the renewable energy sector.

The **Climate Public Private Partnership** (CP3) is an up to £130 million programme that aims to support clean energy and demonstrate the commercial viability of investments in climate related businesses in emerging markets. By acting as an anchor investor into two private equity climate funds, CP3 sought to catalyse new sources of climate finance from institutional investors such as pension funds and private wealth funds. CP3 currently supports a portfolio of 116 different investments, covering a diverse range of sectors across the globe. These investments are expected to increase clean energy generating capacity, reduce greenhouse gas emissions, increase resource efficiency and support job creation. CP3 invests across

developing countries in Asia, Africa and South and Central America. CP3 is expected to avoid 2.6 million tonnes of CO_2 equivalent over its lifetime (to 2026).

The **Global Innovation Lab** supports actionable, innovative, catalytic and financially sustainable ideas for the low-carbon economies of developing countries. The UK has already provided £1.57m since August 2011. The programme brings together public and private sector experts who scrutinise innovative climate finance projects and help develop them towards commercialisation. The Lab has contributed to mobilise $3.2 billion for Lab-endorsed proposals, 30% of which is private funding.

Mobilising Institutional Capital Through Listed Product Structures (MOBILIST) develops investment solutions to support global development and the climate transition. MOBILIST competitively sources and selects emerging and frontier market-dedicated investment products with the aim of listing on global and local public exchanges to respond to the prudential and investment regulations and mandates that institutional investors are subject to. MOBILIST invests capital, delivers technical assistance, conducts research and builds partnerships to catalyse investment in new listed products. The first set of products resulted in the first listing of an investment trust vehicle exclusively focused on emerging market renewable energy projects. UK ICF provided £24.5 million as an anchor investor and a further £63 million in private capital was raised from private investors bringing the total to £87.5 million (initial public offering in December 2021).

The UK is working with the African Development Bank (AfDB) and African Trade Insurance Agency (ATI) on the **Room to Run Sovereign guarantee** (R2R), which will unlock up to $2 billion of additional climate finance for Africa. This additional climate finance will be deployed across eligible AfDB member countries to support both government and private sector projects. The $400 million of R2R cover provided by ATI will be partly re-insured though firms in the City of London.

The **Private Infrastructure Development Group** (PIDG) operates across the infrastructure project life-cycle and capital structure by deploying expertise and small amounts of capital through equity, debt, guarantees, project development funds and grants. It addresses the early stage risks associated with infrastructure projects, making projects bankable and acting as a key enabler for other DFIs and private investors to co-invest. The UK committed £74.4 million to PIDG between 2018/19 and 2021/22. PIDG delivers high development impact in low-income countries and fragile and conflict-affected states that helps economies grow and combat poverty.

The Climate Investment Funds (CIF) Capital Market Mechanism (CCMM) initiative will leverage existing assets from the CIF's Clean Technology Fund (CTF) to issue investment-grade bonds of up to $6.2bn and raise significant new finance for scaling eligible private and public projects in clean energy and sustainable infrastructure in emerging economies. The bonds are planned to be issued in 2022 in the City of London and could mobilize up to $700 million annually. At its full potential, this initiative could leverage a further $70 billion from both the private and public sector at the project level, contributing significantly to the $100 billion goal.

6.4.8 Research and development spending

The Global Challenge Research Fund (GCRF) provides dedicated funding to research focused on addressing global challenges which most significantly impact upon developing countries. It achieves this by supporting challenge-led disciplinary and interdisciplinary research, strengthening capability for research and innovation within Low and Middle Income Countries, and providing an agile response to emergencies, where there is an urgent research and on-the-ground need. From 2016–2021, this represents a UK investment of up to £1.5 billion.

The **Ayrton Fund** commitment was a new commitment announced by the UK Government as part of the doubling of UK International Climate Finance (ICF) announced by the Prime Minster at the UN Climate Action Summit in New York in 2019. It is a commitment to spend £1 billion on ODA funded research, development and demonstration (RD&D) for innovative clean energy technologies and business models for developing countries over five years from April 2021. Its vision is to help drive forward the clean energy transition in developing countries, by creating and demonstrating new technologies and business models to deploy them. The Ayrton Fund commitment will combine and co-ordinate a range of funding platforms and programmes targeting different aspects of the technology research, development and demonstration needs. This will include £100 million to fund research into clean energy storage, distribution and usage though existing funds such as GCRF and the Newton Fund, as well as support through a portfolio of new and existing programmes including, amongst others, Transforming Energy Access (TEA), the Clean Energy Innovation Facility (CEIF), Climate Compatible Growth (CCG), Modern Energy Cooking Services (MECS) and the Low Energy Inclusive Appliances (LEIA). At COP 26 in Glasgow, the UK announced the scale-up by £126.4 million, to March 2026, of TEA, one of the key delivery platforms for the commitment.

The Newton Fund supports bilateral and regional research and innovation partnerships between the UK and selected middle income countries agreed at a national level. The aim of this is to address specific global development challenges and build research and innovation capacity. It operates through matched funding, with partner countries contributing similar resources to support the partnership. From 2014–2021 a UK investment of up to £735 million was made with 'match' from partner countries.

The Gilbert Initiative provides an organising framework for a coherent UK Government portfolio in climate resilient food systems by providing an oversight structure that will enable coordination and communication on investment plans and existing programmes; a UK Government light-touch reporting on results from food systems investments and framework for collaboration on specific investments.

The Climate and Resilience Research Programme (CLARE) announced at COP26 (£100 million) is a partnership between UK ICF and the International Development Research Council. The programme will support research to improve our understanding of weather and climate systems across African and the likely impacts of future change. It will also support research and innovation focused on low-carbon and climate resilient technology as well as help strengthen local capacity to undertake and benefit from cutting edge climate research and evidence for development. The programme has three main objectives: firstly, to produce world-leading science to advance knowledge of African climate variability and change and enhance prediction of future African climate; secondly, to drive improved knowledge, methods and tools on how climate information and services can be better designed for, delivered and integrated into major decisions today and thirdly, to support international collaboration and the development of scientific capacity in Africa.

The **Global Centre on Biodiversity for Climate (GCBC)** announced at COP26 with £40 million over 2022/23 – 2024/25, is a UK-ICF funded research and development programme. The Global Centre will address critical research gaps in how the conservation and sustainable use of biodiversity can deliver climate solutions and improve livelihoods in developing countries, to be delivered through a partnership of research institutions and experts from the global north and south.

6.5 echnology development and transfer

Some illustrative examples include:

Global Energy Storage Programme (GESP): The UK was one of the main donors to the GESP (£200 million). Collective GESP funding is expected to mobilise an additional $2 billion public and private investments for vital technologies in energy storage.

Energy Sector Management Assistance Programme (ESMAP): the UK supports the ESMAP-IFC Offshore Wind (OSW) Development Programme which was launched in March 2019 with the aim of accelerating the adoption of offshore wind in emerging markets. As part of the programme, in 2019 delegates from 12 developing countries participated in a week-long offshore wind study tour to the UK to visit British research centres, ports, manufacturers, and industry experts. This study tour has helped a number of participating countries such as Vietnam [7] and the Philippines [8] to develop and publish offshore wind roadmaps.

The GSMA Innovation Fund for Climate Resilience and Adaptation: The UK committed £5 million to support this fund which will help accelerate the testing, adoption and scalability of digital innovations that enable the world's most vulnerable populations to adapt, anticipate and absorb the negative impacts of climate change. In addition, the UK provided £5.5m seed funding to the Global Innovation Fund to support the establishment the 'Innovating for Climate Resilience fund', which will invest, through grant, equity, and debt instruments, in innovations with the potential to scale and support the world's poorest to build resilience and adaptation.

Clean Energy Innovation Facility (CEIF): In 2019 the UK launched the £50 million Clean Energy Innovation Facility with this money being provided by end of 2021/22, which aims to accelerate the commercialisation of promising innovative clean technologies in key hard-to-abate sectors through four delivery partners: sustainable cooling (IFC), industrial decarbonisation (World Bank ESMAP), energy storage (Innovate UK) and smart energy (Asian Development Bank). CEIF contributed to the UK's pledge to double its public sector spending on clean energy innovation to £400 million in 2020/2021 through Mission Innovation. To date, CEIF has supported countries including India, Bangladesh, Vietnam, Kazakhstan, Ethiopia, Kenya, Liberia, Malawi, Mozambique, Namibia, Nigeria, South Africa, Somalia, Tanzania, Mexico and Colombia.

Carbon Capture Usage Storage: The Carbon Capture Usage and Storage Programme aims to support developing countries to develop both the technical and institutional knowledge necessary to enable the development of CCUS technologies. The UK has contributed £70m to this programme between 12/13 and 17/18. The programme delivers against that objective by providing technical assistance to support pilot project activities to enable legal, policy or regulatory change and technology demonstration in-country. It is supporting countries including South Africa, Mexico, India, Indonesia, China and Nigeria.

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[7] https://esmap.org/offshore-wind-devprogram_wind-roadmap-for-vietnam

[8] https://esmap.org/ESMAP-Offshore-Wind-Roadmap-for-the-Philippines

The Energy Catalyst programme accelerates the innovation needed to end energy poverty. Through financial and advisory support, and by building strategic partnerships and uncovering new insights, Energy Catalyst supports the development of technologies and business models that can improve lives in Africa and Asia. Energy Catalyst is an Innovate UK programme with co-funding from the Foreign, Commonwealth and Development Office, Global Challenges Research Fund, the Department of Business, Energy and Industrial Strategy and the Engineering and Physical Sciences Research Council. Over the two years 2019, when GCRF began funding Energy Catalyst, and 2020, £8.4 million GCRF funding was dispersed through the Energy Catalyst Programme.

UK ICF sought to support non-Annex I Parties with pollution abatement and remediation activities through the provision of air quality monitoring equipment through the World Bank **Pollution Management and Environmental Health** (PMEH) programme. However, as the programme moved into implementation, it was found that the target countries already had suitable equipment, and the programme was insufficiently flexible to allow for alternative activities (within the agree scope of the UK funding) to be supported. The UK's evidence collection at business case stage has since become more robust, with the UK collecting evidence of demand from a range of sources. Unused funds from the PMEH Programme were re-directed to other ICF Programmes.

6.5.1 Securing policy commitments to accelerate low carbon technology deployment

The UK is an active member of the **International Energy Agency** and has worked to ensure that the Agency has a strong focus on helping its members and the wider energy sector accelerate the clean energy transition drawing on its world-leading analysis and convening power. In 2021 the UK commissioned the production of the IEA's 2050 Net-Zero Road Map for the energy sector. The report is the world's first comprehensive study of how to transition to a net zero energy system by 2050 while ensuring stable and affordable energy supplies, providing universal energy access, and enabling robust economic growth.

6.6 Capacity building

Some illustrative examples include:

6.6.1 Capacity building for mitigation

Nationally Determined Contribution Partnership (NDCP): The UK is a key member, current Co-Chair and one of the largest donors to the **NDCP**, with £11.3m provided from 16/17 to 21/22, a programme which supports developing countries to turn climate commitments made through the Paris Agreement into action. These commitments are called Nationally Determined Contributions (NDCs). NDCP co-ordinates action to enhance and implement NDCs in developing countries, supporting countries to build their capacity in order to take effective climate action. This process provides a crucial forum for donor co-ordination at the country level, as NDCP has a broad membership of country, associate and institutional members that take part in the process, ensuring that there is no duplication of effort. NDCP provides demand-led support for action on both mitigation and adaptation, helping countries to implement the entirety of their NDC. The UK has led on the launch of the NDCP Partnership Action Fund at COP26. The multi-million dollar, multi-donor fund will improve NDCP's capacity to respond to country support requests, acting as backstop funding by providing support when partners are not able to respond with their own resources. It will enable the Partnership to build on their established country engagement process and support demand-led requests to improve and accelerate the implementation of NDCs and Long-Term Strategies.

As of the end of financial year 2020/2021, the UK has contributed £135 million to the **World Bank Energy Sector Management Assistance Programme (ESMAP)**. Specifically on Energy Transitions, the UK has contributed £37 million to ESMAP to provide technical assistance to support developing countries to shift away from unabated coal-fired power generation, and to be transformational in sustainably creating the conditions for alternatives to coal and hence reducing emissions. This includes focusing on the welfare of people and communities, and closing and repurposing mining lands and coal power plants. The high-performing programme has mobilised capital investments from the World Bank and increased private sector support to renewable energy projects, with success in offshore wind, and decommissioning and repurposing four coal-fired power plants in South Africa. The UK also supports the global "Network of Energy Storage Testbeds" (NESTs) Initiative – in Morocco and South Africa – which is part of the Energy Storage Partnership under ESMAP; the testbeds enable countries to assess energy storage performance under realistic local grid conditions at low cost and at manageable scale.

The Sustainable Infrastructure Programme: In 2017 the UK established the Sustainable Infrastructure Programme (SIP) in Latin America in partnership with the Inter-American Development Bank. The purpose of the programme is to enable and accelerate the implementation of the Nationally Determined Contributions in Latin America, initially Brazil, Colombia, Mexico and Peru, focusing on supporting and catalysing private sector investments in low carbon infrastructure. The UK is providing up to £177.5 million from its ICF budget, with £111.5m being spent to date, to provide technical and financial support. This includes technical assistance to governments to help them shape their regulatory frameworks in a way that is attractive to private investors, support the development of local capital markets, while also investing in demonstration projects to show commercial viability.

UK Partnering for Accelerated Climate Transitions (UK PACT) is a flagship programme funded by the UK Government through its International Climate Finance (ICF) portfolio. The programme works in partnership with ODA-eligible countries with high emissions reduction potential to support low-carbon development and clean growth transitions and to respond to the critical global need for capacity building to address the gap between NDC targets and their implementation. UK PACT works bilaterally with partner countries to deliver demand-led, flexible support in line with country priorities and in areas of UK expertise that currently focuses on areas like green finance, clean energy, sustainable transport, sustainable livelihoods, forests and land-use (including nature-based solutions), and climate policy and regulation with projects in delivery across 16 ODA- eligible countries in Sub-Saharan Africa, Asia, and Latin America. In September 2021, the UK Prime Minister announced £200 million of new funding for UK PACT to continue its delivery and grow as a programme over the next four years to March 2026. This new funding is additional to the £60 million already committed to UK PACT up to March 2022.

As of March 2021, UK PACT projects have mobilised or invested a total of US$869.6 million for reducing greenhouse gas emissions. UK PACT has strengthened climate networks, such as in Mexico, where the creation of strong legislative networks alongside technical recommendations resulted in the approval of Mexico City's congress of a legally binding commitment to net zero by 2050 and other climate related policies. UK PACT has also trained over 30,000 individuals, for example through training delivered to the Government of Colombia on the Paris Agreement's transparency framework, and workshops delivered in China for public and private sector counterparts on ESG investment and TCFD disclosure.

The 2050 Calculator is a £3.5 million bilateral capacity building programme that supports countries to build their own versions of this energy and emissions planning tool. The 2050 Calculator is a uniquely open, transparent and interactive model, originally developed in 2010

to help the UK Government plan the country's low-carbon transition in an evidence-based way. Since 2012, UK International Climate Finance has supported the creation of 19 national and 6 regional energy models, which have been used to develop NDCs and action plans, raise awareness and inform long-term energy strategies. Calculators now cover 61 countries, territories, and cities. The current phase of the calculator programme is assisting India, Kenya, Malaysia, Nigeria, Thailand, Philippines, Vietnam, and Colombia.

The Climate Compatible Growth programme (£38 million) was announced at the African Investment Summit. It will provide tools and evidence (through a systems thinking approach) that supports investment decision takers in countries in Africa and Asia take an integrated and climate compatible approach about deployment of critical infrastructure capital. With a focus on energy and transport the research addresses how the design of physical infrastructure, regulatory and market systems can promote decarbonisation and how different infrastructure systems interact and can evolve to secure low carbon futures.

The Taskforce for Nature-Related Financial Disclosures (TNFD) programme (£2.8m, 2021-2023) provides funding to support the establishment of the TNFD, contributing to the crucial transition to a nature positive economy. The TNFD aims to give financial institutions and companies a complete picture of their nature-related risks and opportunities to incorporate into their decision-making processes, and to incentivise a shift away from activities that harm nature towards nature-positive projects. Defra have also funded TNFD African Voice to strengthen African country engagement with the TNFD.

6.6.2 Capacity building for adaptation

Adaptation Research Alliance (ARA) has been co-developed with international partners from the Global North and South and was formally launched at COP26 by the UK. The Goal of ARA is to increase investment and research into developing and informing effective solutions to the impacts of climate change through action orientated research. UK ICF has provided leadership in its development and will provide money for the secretariat, and CLARE will deliver its principles. The ARA membership currently includes 129 organisations: 32 from Africa of which 31 Sub-Saharan Africa, 26 from Asia – largely led by India and Bangladesh (18 org), 43 from Europe, 5 from North America, including one from St. Lucia, 5 from South America, 6 International Organisations.

The Adaptation Action Coalition (AAC) supported by the UK, Bangladesh, Egypt, Malawi, the Netherlands and St Lucia has the intent is to get all 122 countries that have signed the UNCAS 'Call for Action' to join the coalition, and thereby commit to increasing action on adaptation and resilience. This is a major COP26 deliverable, demonstrating a shift in the focus being given to adaptation and resilience which a priority developing country ask. The UK specifically supports several key workstreams under the AAC including the Locally Led Adaptation initiative delivered by WRI and IIED and the Water Tracker managed by the Alliance for Global Water Adaptation (AGWA) to integrate water into national adaptation planning.

Infrastructure for Climate Resilient Growth (ICRG) in India: ICRG is a UK ICF funded, £25 million technical assistance programme, delivered in partnership with Government of India (GOI). ICRG interventions, at national and sub-national level, seek to facilitate more effective investment in natural resource management (NRM) infrastructure built under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) to support resilient livelihoods. By integrating climate information services and risk management into MGNREGS, ICRG helps improve abilities of poor and vulnerable people to cope with climate change impacts. MGNREGA is one of the world's largest social protection programme with

an annual budget of £7-8 billion, supporting around 70 million households to cope with poverty and marginalisation every year.

The Centre for Disaster Protection programme: This programme is the UK's flagship Disaster Risk Finance (DRF) technical assistance programme. Total UK financing from the start in 2017 to March 2022 has been approximately £27 million. It supports developing countries and the humanitarian and development community to strengthen their pre-disaster planning and financial arrangements so they can better manage crisis and disaster risks, thereby reducing the impact on people and helping to safeguard economic development. It is a partnership between the UK Government, the World Bank, research institutions and the private sector. It draws upon UK and global expertise in risk, finance and insurance to provide:

a. Advice and Analytics: impartial advice and analytics for developing countries, development and humanitarian agencies, civil society and other key actors, supporting them to design and implement risk financing arrangements and to embed them within effective systems for disaster preparedness, response and recovery.

b. Research and Evidence: investment in global public goods that develop best practice, methodologies and tools, and produce evaluations and evidence on what works.

c. Capacity Building: knowledge and training for developing country Ministries of Finance, national disaster management agencies and other line ministries, as well as humanitarian agencies, civil society and other relevant stakeholders.

d. Innovation: work to generate and incubate new and innovative solutions to development and humanitarian problems, including by bringing together experts from the public and private sectors and other fields.

e. Policy and Outreach: influencing the multilateral system and external partners to align policy and programming with emerging best DRF practice to optimise impact.

f. Domestic insurance market development: strengthening insurance regulation and supervision, work to ensuring appropriate products are available for people and businesses.

6.6.3 Capacity for technology transfer

Newton Fund (see above Section 6.4.8) independent evaluation has found at least 3,228 collaborations and partnerships have been formed under Newton Fund, which have led to over 5,700 publications. Award Holders strongly agreed that working in partnership has improved the quality of their work, developed their research and translational skills, and facilitated access to resources, while the usefulness and applicability of sampled research outputs were found to contribute to solving development challenges. An online survey revealed that:

- 84% of non-UK Award Holders from industry and technology sectors reported that their capacity to translate research into products, solutions or policies had improved;
- 83% had been able to establish new institutional and commercial links;
- 89% reported their profile was raised in the field of applied research and product development; and

- 76% indicated their capacity to commercialise innovative products or solutions had improved.

6.6.4 Capacity building for negotiations

Climate Ambition Support Alliance (CASA): The CASA programme aims to increase the capacity and capability of climate-vulnerable country negotiators to engage in international climate negotiations, helping to preserve and enhance the rules-based international system and increase appetite for higher ambition. Phase 1 of CASA was launched in 2018 and runs until January 2024, building on the UK's previous Negotiations Support Programme. UK ICF has committed £15.6 million, of which £8.45m has been spent to date, to the programme to provide legal, technical, strategic, diplomatic and media support before, during and after the negotiations. To date CASA has been providing in situ support to the Least Developed Countries (LDC) Group, the Alliance of Small Island States (AOSIS), the Republic of the Marshall Islands, the High Ambition Coalition (HAC) and individual developing country negotiators. At COP26, groups and negotiators supported by CASA were engaged; they secured a profile and made meaningful contributions towards the Summit's outcomes and the Glasgow Climate Pact. The support provided by the programme is highly valued by recipients, with the chair of the Alliance of Small Island States stating at COP26 that CASA had been critical in creating an enabling environment for AOSIS members to fulfil their technical work and foster collaboration.

6.7 Accelerating the alignment of finance flows and raising ambition

6.7.1 ODA alignment

In 2019 the UK made a commitment to align all UK ODA with the Paris Agreement. This commitment was outlined in the 2019 Green Finance Strategy, which also identified four key criteria for what it would mean for ODA to be Paris Aligned:

1. Using an appropriate carbon price in relevant bilateral programme appraisal;
2. Ensuring any investment support for fossil fuels affecting emissions is in line with the Paris Agreement temperature goals and transition plans;
3. Implementing a proportionate approach to climate risk assurance; and
4. Ensuring that relevant programmes do not undermine the ambition in countries' Nationally Determined Contributions (NDC) and adaptation plans.

A variety of approaches have been adopted to implement these requirements including the announcement of the cross-Government fossil fuel policy and within the FCDO an introduction of a new rule within the Programming Operating Framework to ensure that all new spend is aligning with the ambitions of the Paris Agreement. We have been working with our multilateral partners to increase their ambition and align with the Paris Agreement. By COP26 eight multilateral development banks (MDBs) had made timebound commitments to Paris alignment, with the majority planning to align by 2023. Discussions of approaches continue to be held between officials to maintain progress on the implementation of this world-leading commitment.

In addition to our commitment to align UK aid with the Paris Agreement, the UK Government has taken steps to integrate nature into its Official Development Assistance (ODA), ensuring that all new UK bilateral aid spending does no harm to nature. This is a step towards delivering on our commitment in the Integrated Review to investing in nature and a nature-positive economy. This commitment to 'do no harm' sits alongside our commitment to spend at least £3 billion of our International Climate Finance on Nature by 2026.

The UK also supports the alignment of financial flows and raising of ambition through the NDC Partnership (NDCP) – see Section 6.6.1.

6.7.2 Accelerating ambition and implementation internationally

The Climate Accelerator (CFA) is a £10.8 million UK International Climate Finance programme that works to support climate action at scale by supporting governments, project proponents seeking finance and the financial sector. It works with middle income countries to help them achieve their national climate plans and NDCs by helping to identify challenges and blockages that prevent finance from flowing at the volume and speed required to have a meaningful impact on their climate ambitions.

By bringing together project proponents, finance providers (including experts from the City of London) and policymakers, the CFA seeks to enable a collaborative approach to unlocking a steady flow of blended funding for climate projects at scale and create a pipeline of 'investment ready' low-carbon projects, thereby strengthening countries' ambitions to limit global warming to 1.5°C. It does this in a number of ways including identifying and supporting projects, which will contribute to a country's NDC, to attract primary finance, which in many instances will involve blended finance products capable of funding projects at scale.

6.8 Monitoring and evaluation, lessons learnt and transparency

Designing effective programmes that respond to the needs of developing countries is a priority of UK ICF. The UK draws on evidence from commissioned studies and from its ICF monitoring and evaluation framework to enable continuous improvements in project selection, design and implementation.

6.8.1 Monitoring and evaluation

The UK's cross-departmental ICF monitoring and evaluation framework assesses the performance of ICF against intended outcomes, and supports the generation and use of evidence across the ICF portfolio to allow for continuous improvement. The framework includes programme and portfolio results-reporting, annual reviews of all programmes, and independent evaluations at both programme and portfolio level.

The monitoring aspect of the framework consists of 11 key performance indicators (KPI), covering achievements in adaptation, mitigation, nature, transformational change and mobilised finance. Programmes wholly or partly funded by ICF report results against relevant ICF KPIs. These are collected .and aggregated across the ICF portfolio for reporting publicly. The ICF key performance indicators, their detailed methodologies, and annual aggregate results are published on the UK Government website9. This suite of indicators is under review to ensure they capture the range of relevant benefits from ICF activities, including biodiversity benefits.

Programmes receiving UK International Climate Finance are reviewed annually. Results are compared with expected milestones and targets, and the opportunity is taken to reflect on evidence generated over the year – such as from independent evaluations. Lessons are documented and applied, and shared more widely across the portfolio as appropriate.

The UK's ICF monitoring and evaluation framework increases the impact of climate finance by filling key evidence gaps. It achieves this through the following objectives:

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[9] https://www.gov.uk/government/publications/uk-climate-finance-results

- Evaluate and monitor programmes to understand why, how and in what contexts our programmes are successful (or otherwise) in achieving their aims;
- Develop and use the evidence base to improve decision-making within the UK Government and influence the wider climate finance landscape; and
- Provide accountability for our ICF through understanding whether programme results are being achieved.

The evaluation aspect of the framework ensures independent scrutiny and learning from a range of commissioned evaluations. At portfolio level, independent evaluations provide evidence and learning to increase the effectiveness and to measure the impact of the UK's international climate finance. At programme level, independent evaluations are commissioned to understand contextual factors around the effectiveness and value-for-money of interventions and to inform programming decisions such as whether to scale-up. For example, in 2020 the UK published an independent evaluation of our Carbon Market Finance Programme, implemented through the World Bank's Carbon Initiative for Development (Ci-Dev) programme, and in 2020 and 2021 the UK published independent Monitoring, Evaluation and Learning Reports for UK PACT.

The UK's ICF welcomes regular scrutiny from both the UK's Independent Commission on Aid Impact and the International Development parliamentary oversight committee. In particular, the UK's monitoring and evaluation framework has been well regarded by the UK's Independent Commission on Aid Impact, which stated in the 2019 review that: "The UK has made an important contribution to promoting better results measurement across the international climate finance architecture", and that "the UK has been a consistent champion of results measurement […] encouraging its multilateral partners to develop results frameworks and strengthen their monitoring and evaluation processes." The Commission also noted that "other actors in the climate finance area look to the UK as a thought leader on the monitoring and evaluation of climate finance."

6.8.2 Lessons learnt and evidence-based programming

Evidence is critical to designing climate finance programmes effectively and to ensure they deliver the greatest impact and respond effectively to the needs of developing countries. Evidence generated through the UK's ICF monitoring and evaluation is fed back into programme and portfolio level design decisions through the annual review process which all programmes undertake, management responses to evaluations recommendations, and analytical appraisal for future programming.

Two of the key lessons learnt from this process of evaluation were that technical assistance is crucial for longer term sustainable development and success requires local buy-in and commitment. The UK's Sustainable Infrastructure Programme was designed to reflect these lessons through its combination of technical assistance to address technical or regulatory barriers and investment capital. Experience demonstrates that when working together, these tools create the greatest opportunities to leverage public and private investment. To ensure that interventions are demand-led and sustainable, this programme works in close collaboration with partner governments and supports national plans.

The ICF portfolio has also yielded important lessons learnt around ensuring effective and efficient project implementation. The UK has been deploying these lessons in the following ways:

- Through the NAMA Facility, the UK identified that countries require greater support for the detailed project preparation phase, to increase the chances of projects progressing successfully through implementation; and
- Through the multilateral funds, such as the Climate Investment Funds, the UK has learned the value of flexible programming to respond to in-country circumstances such as shifts in the costs of technologies.
- The 2020 UK PACT programme evaluation suggested extending project timescales would increase impact and drive transformational change, through sustained action on emissions reductions. Since then, the first multi-year project was approved in April 2021, and following the SR outcome in October 2021 approving multi-year funding, new UK PACT programming from October 2021 will be offered as multi-year opportunities.

In addition to the evidence base drawn from the existing ICF portfolio, the UK's Knowledge, Evidence and Engagement Programme supports the development of effective climate finance by funding commissioned research to inform the focus and design UK ICF programmes and to build on lessons learned. The programme has helped to develop an evidence base on how to devise interventions that can be transformational and effectively respond to the needs and priorities of developing countries, and how to maximise the impact of UK support to ensure it delivers climate, poverty reduction and economic outcomes. Eleven research projects have been funded including:

- An ICF literature review which is providing an evidence base to be used at the ICF portfolio and programme level to inform business cases and strategy, as well as identifying evidence gaps and improved approaches to evaluations.
- The ongoing Economics of Energy Innovation and Systems Transitions research and engagement project aims to help large emerging economy governments accelerate energy innovation and system transitions by transforming the economic analysis that informs their decisions.

The UK has spent £7 million between April 2018 and March 2022 through this programme and further funding is currently being scoped.

The UK originally funded the CIF Evaluation and Learning Initiative, and then supported this initiative to be incorporated into the core activities of the CIFs. This initiative has drawn out learning from the last 12 years of CIF programmes, identifying the transformational impacts these have helped bring about and providing useful lessons for funds across the climate finance landscape.

6.8.3 Reporting and transparency

The UK has an ambitious aid transparency policy ensuring all aid spend data including climate finance, is published and externally assessed to international standards. All business cases and annual reports are published on Development Tracker[10].

In particular, the UK is committed to a conservative and accurate approach to climate finance accounting, giving confidence to developing countries and civil society that the levels of climate-specific support reported accurately reflect the levels of climate-specific support provided. A specific example is our approach to calculating the level of climate finance associated with integrated development projects. Rather than using a standardised

[10] https://devtracker.fcdo.gov.uk/

co-efficient for calculating this, as most providers of support do, the UK calculates the specific climate related cost of each programme on a case-by-case basis, reflecting the real contribution of each activity to meeting climate goals.

The UK also works closely with the OECD in reporting climate finance and up to 2019 reported annually to meet the requirements under Article 16 of the EU GHG Monitoring Mechanism Regulation.

In addition, the UK is committed to the avoidance of double counting, having played a key role in developing the Technical Working Group methodology used to enable OECD-CPI analysis of aggregate mobilisation of private finance. The UK is also committed to developing the evidence base on how public finance and policy measures can attract and measure private finance, including through participating in the OECD Research Collaborative for Tracking Private Finance.

Chapter 7 Research and Systematic Observation

7.1 Introduction

This chapter presents information on the UK's activities in climate research and observations, including domestic and international activities, and information about the roles of government departments and agencies engaged with the climate research agenda. The UK continues to be a world leader in research into climate science and observations, with an array of expertise across the country and collaborative research efforts with partners across the world.

7.2 Key developments

The UK is committed to research on both climate science and observations, as well as mitigation and adaptation actions. Selected highlights include:

- Publication of the third UK Climate Change Risk Assessment (CCRA3), setting out the priority risks and opportunities for the UK posed by climate change. The National Adaptation Plan (NAP) is due to be published in 2023, which will set out the actions that the UK Government and others will take over a 5-year period to adapt to the challenges of climate change in the UK.
- Continued work under the world-leading Met Office Hadley Centre Climate Programme, which plays a vital role in providing relevant scientific evidence for UK Government.
- Continued UK support for the Intergovernmental Panel on Climate Change (IPCC), through UK Government funding and through the contributions of the UK's world-leading research community.
- Major collaborative projects with international partners, such as the Climate Science for Service Partnership programmes (CSSP) (with China, Brazil, South Africa amongst others), and Future Climate for Africa (FCFA).
- Significant investment in UK funding for science and innovation: approximately £3 billion was invested in research, development and demonstration of low-carbon energy, transport, agriculture and waste between 2015 and 2021.
- UK-funded programmes providing climate information services for domestic policy areas, such as the Climate Services for a Net Zero resilient World (CS-N0W) programme.
- Significant investment in UNFCCC priority areas including a pioneering programme of work on Greenhouse Gas Removal Technologies and their implications.

- Continued participation in the Global Climate Observing System (GCOS), led by the UK's Met Office and involving a wide range of UK-based organisations.
- UK Space Agency cooperation with international programmes such as MicroCarb and the European Space Agency-led TRUTHS mission.
- The continued development of the UK DECC (Deriving Emissions linked to Climate Change) Network of tall towers. This provides top-down verification of the UK's emission inventory.

7.3 Research

7.3.1 Introduction to research

The delivery of climate science in the UK follows a clear strategic vision. The fundamental principle is that UK and international climate action must be underpinned by a robust evidence-base on the science of climate change. While this evidence-base is both strong and wide ranging, there is a continued need to develop it to understand and manage the risks of climate change, including through developing mitigation and adaptation strategies. Through direct UK Government funding for science, funding provided by the UK Research Councils, and collaboration with our international partners, we work to support research into these areas.

Section 7.3.2 will describe the UK's approach to the delivery of climate research, including priorities and research funding, section 7.3.3 will describe how the UK cooperates internationally on climate research, section 7.3.4 will provide examples of climate services and how climate research is being used for policy application in the UK Government, and section 7.3.5 will go into detail on specific areas of climate science research in the UK, addressing the priority areas identified in UNFCCC guidance.

7.3.2 UK approach to the delivery of climate research

7.3.2.1 UK mitigation policy context

The UK Government's vision for action on climate change is summarised in the Net Zero Strategy[1]. Green technology, including research and development into new options to tackle climate change, is a cornerstone of the net zero journey.

The Net Zero Strategy details the funding the UK provides in support of the mitigation efforts required to address climate change. The policies and spending brought forward in the Net Zero Strategy mean that since the UK Government's Ten Point Plan[2] was published in 2020, the UK Government has mobilised £26 billion of UK Government capital investment for the green industrial revolution. As part of the Net Zero Strategy, the UK Government has committed to deliver at least £1.5 billion of funding during the spending review period (three years, starting in the 2022 financial year) expanding a portfolio of cross UK Government net zero innovation. This includes BEIS-led programmes on power, buildings and industry; Department for Transport-led programmes across transport; and Department for Environment and Rural Affairs (Defra)-led programmes on natural resources, waste and fluorinated gases, to target priorities aligned with the Net Zero Research and Innovation Framework. This spending includes programmes such as the £60m Heat Pump Ready programme.

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[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf

See Chapter 3 for more detail on Policies and Measures.

7.3.2.2 UK adaptation policy context

The UK Government publishes a UK-wide Climate Change Risk Assessment (CCRA) every five years to assess the risks for the UK from the current and predicted impacts of climate change. The third iteration (CCRA3) was published in January 2022 by Defra, which is the department co-ordinating the UK Government's programme of work on adaptation. Defra funded the Adaptation Committee of the Committee on Climate Change and a large consortium of experts led by the University of Exeter in partnership with the Met Office Hadley Centre to prepare an Independent Assessment of UK Climate Risk to inform CCRA3, which was published in June 2021[3]. The CCRA3 will feed into the development of the next UK National Adaption Programme (NAP), expected in 2023. The NAP **sets out the policies and programmes to treat climate risks across the economy. The third iteration will cover 2023-28 and be known as NAP3**. The Independent Assessment of UK Climate Risk highlights research priorities where further evidence is needed to gain an understanding of the threats and opportunities of climate change to the UK and inform the options to approach climate change risks effectively in the future.

See Chapter 5 for more detail on adaptation measures.

7.3.2.3 UK capability and excellence in climate research

The UK is extremely well placed to address the research priorities associated with climate change, because of the strength of our climate science research community. There are numerous centres of climate science excellence, including the Met Office Hadley Centre, the UK Research and Innovation – National Environmental Research Council (UKRI-NERC) centres including the National Centre for Atmospheric Sciences, the National Centre for Earth Observation, the British Antarctic Survey, in addition to many world-leading UK university research departments and applied and policy-relevant research within the private sector.

7.3.2.4 UK Government departments and their agencies

The following section provides background information on those departments and agencies who are engaged with the climate research agenda.

The **Department for Business, Energy and Industrial Strategy** (BEIS) is the lead UK Government department covering mitigation policy and, as highlighted above, plays a central role in funding research into low-carbon technologies. BEIS also leads the UK Government input into the IPCC and provides funding and governance for the Met Office Hadley Centre Climate Programme (MOHCCP). The MOHCCP provides the climate science evidence base that underpins much of the UK climate science capability, including the UK Climate Projections that inform the legally required 5-yearly UK Climate Change Risk Assessments, and a significant contribution to IPCC Assessment Reports.

The **Department for Environment, Food and Rural Affairs** (Defra) is responsible for several policy areas that are associated with GHG emissions including: agriculture, forestry, land management, waste, and fluorinated gases. Defra works with BEIS to ensure specific UK Government policies on low-carbon energy and decarbonisation measures are sustainable and aligned with Defra's objectives on the environment, food production and rural economy including ensuring opportunities for maximising co-benefits such as cleaner air. Defra is also the UK Principal to the intergovernmental Group on Earth Observations (GEO),

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[3] xxxxx

and responsible for delivery of the UK Climate Projections, Climate Change Risk Assessments and National Adaptation Programmes (adaptation agenda is described above).

Foreign, Commonwealth and Development Office (FCDO) has an active interest in the funding of climate science, reflecting its commitment to tackling climate change and its effects as a driver of future instability and poverty. Further details on FCDO funding of research, which spans both mitigation and adaptation, can be found in the international cooperation section below.

The **Department for Transport** (DfT) (and the Office for Zero Emission Vehicles) is also heavily involved in low-carbon policy in the UK, given the significant contribution that transport emissions make to total UK emissions and the challenges in decarbonising this sector. The UK's ambition is for a modern, low-carbon, low-pollution transport system with net zero emissions in 2050 – as set out in the Transport Decarbonisation Plan, published in July 2021. In support of this, a range of programmes are being undertaken, including the £1 billion Automotive Transformation Fund supporting development of an electrified automotive supply chain, and funding for innovative technologies including £180 million for sustainable aviation fuels, £125 million of UK Government funding for the Future Flight Challenge, and £23 million for the Clean Maritime Demonstration Competition. Building on the success of our £20 million zero emission road freight trials, these are being expanded to trial three zero emission HGV technologies at scale on UK roads. Since 2020, the UK has committed over £2.5 billion to the electric vehicle transition, of which over £1.6 billion is to support charging infrastructure.

Several agencies and public bodies exist to advise and implement the UK environmental strategy, including climate change. These include:

- The **Met Office** is an executive agency, sponsored by the Department for Business, Energy and Industrial Strategy. See section 7.3.2.8 for more information on Met Office-led climate research programmes.
- **UK Research and Innovation** (UKRI) is the national funding agency investing in science and research in the UK, sponsored by the Department for Business, Energy and Industrial Strategy, supported by 7 agencies and public bodies. See section 7.3.2.9 for more information on the Research Councils and UKRI.
- The **Environment Agency** (EA) protects and improves the environment and promotes sustainable development in England. It plays a lead role in managing flood risk and minimising the impact of flooding.
- **Natural England** (NE) is the UK Government's advisor on the natural environment. NE aims to increase the capacity of the natural environment to cope with climate change, and support opportunities to mitigate against the causes of climate change. NE has developed the evidence base on carbon sequestration and storage by semi-natural habitats, including peatlands.
- The **Forestry Commission** is responsible for protecting and expanding England and Scotland's woods and forests. Through its research agency, Forest Research, it supports research on the role of woodlands in climate change mitigation and adaptation, both in rural and urban areas.
- The **Centre for Environment, Fisheries and Aquaculture** (Cefas) commissions and carries out a range of research activities connected to the aquatic environment, including the impacts of climate change and the UK's ability to adapt to it.

- The **Joint Nature Conservation Committee** (JNCC) plays an important role in nature conservation at a UK scale, by co-ordinating nature conservation action at a UK level; working in partnerships to provide common approaches, shared solutions and best practice; and providing a cost-effective and robust environmental evidence base across the UK.
- The **UK Space Agency** (UKSA) alongside the BEIS Space Directorate consolidates funding for space programmes from across the UK Government, the Research Councils and other public bodies. The UK Space Agency is responsible for civil space policy; working with the scientific community, policy makers and business; and strengthening the UK's relationship with the European Space Agency (ESA), and other international agencies including UNOSSA and CEOS. Climate change science and adaption is a core priority in terms of fundamental science, space missions, data management, processing and analytics and the generation of climate services.
- **The UK Health Security Agency** (UKHSA, previously Public Health England) is an agency of the Department of Health and Social Care. UKHSA is committed under the 3rd National Adaptation Plan to develop a single adverse weather and health plan for England by 2023. Building on the existing Heatwave and Cold Weather Plans for England, this will include updated guidance on hot and cold weather, drought, flooding and thunderstorm asthma to inform action across the health system and local communities and reduce the health impacts of adverse weather. Under the Adaptation Reporting Powers of the Climate Change Act 2008, the NHS and UKHSA published the Third Health and Care Adaptation Report 2021 on behalf of the sector.
- The **Climate Change Committee** (CCC) is an independent, statutory body established under the Climate Change Act 2008. Its purpose is to advise the UK and Devolved Administrations on emissions targets and to report to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change.

7.3.2.5 Research funding

Climate science is a priority area for UK Government funding of science. More broadly, investment in the UK's science, research and innovation base is viewed as fundamental by the UK Government. UK science is the most productive in the G7 – from 3.2% of global research and development (R&D) spend, the UK accounts for 16% of the most highly-cited research articles. Recent examples of the UK Government's commitment to science funding include:

- The Department for Business, Energy, and Industrial Strategy (BEIS) has confirmed an allocation of £7,908 million to UKRI for the financial year 2021-22. This provides an increase in excess of inflation to the core research and innovation budgets of UKRI councils.
- Total UK public investment in R&D has also increased over this period, rising from £13.2 billion in 2020-21 to £14.9 billion in 2021-22.

7.3.2.6 Devolved Administrations

The Scottish Government is a significant funder of research relating to climate and achieving a just transition to net zero across all sectors of the economy and wider environment. In 2011, the Scottish Government established a centre of expertise on climate change to provide

an interface between policy and researchers in academia, enhance the levels of knowledge exchange, and provide advice on both mitigation and adaption in Scotland.

The Welsh Government is engaged as an active partner in a number of the climate science programmes identified in this chapter. These programmes feed into the Welsh Government's climate change policy and provide a robust evidence base to support action in this area. In addition to the UK research programmes, the Welsh Government supports a range of additional climate change research and funds Natural Resources Wales to act as its principal adviser on the environment.

The Northern Ireland Government has an established programme of research and innovation projects related to reducing greenhouse gases from agriculture and climate change mitigation. Going forward, the draft Green Growth Strategy, the Northern Ireland Executive's multi-decade strategy aimed at balancing climate, environment and the economy in Northern Ireland will develop NI's first Climate Action Plan.

7.3.2.7 Coordination mechanisms

In addition to the underpinning climate science vision discussed above, there are specific coordination mechanisms and functions that help to guide UK climate science.

BEIS hosts the UK Government Office for Science (GO-Science) which ensures that all levels of UK Government receive the best scientific advice possible and create policies that are supported by strong evidence. The GO-Science is led by the Government Chief Scientific Adviser, Patrick Vallance, who was made Chief Scientific Adviser for COP26. This appointment helped bring a scientific focus to the event and ultimately helped increase ambition during negotiations.

The Research and Innovation for our Dynamic Environment (RIDE) Forum has evolved from the Living With Environmental Change (LWEC) partnership, which provides coordination and alignment of research activities in environmental change. It is a forum of 23 public sector member organisations who hold a stake in environmental change research, innovation, training and capabilities, whether that be as funders, providers and/or users. The RIDE Forum's unique contribution lies in its breadth. It brings together the complementary resources of the many different disciplines and publicly-funded sector stakeholders needed to increase our understanding of the natural, social, economic and technological systems interacting with environmental change and the translation of that knowledge into innovating policy and practice. It focuses on the UK perspective and challenges, whilst necessarily placing that in the international context.

Marine science provides vital knowledge and information to enable key decisions on the management of the seas and oceans. The Marine Science Co-ordination Committee (MSCC) provides the forum to deliver the UK Marine Science Strategy (2010 to 2025) and to improve UK marine science co-ordination. The committee involves the major marine science funding Departments, the Devolved Administrations, the key marine science providers and independent members. One of the priority areas is responding to climate change and its interaction with the marine environment. One particular initiative relevant to UNFCCC is the Marine Climate Change Impacts Partnership[4] which provides independent advice on marine and coastal climate change impacts evidence, mitigation and adaptation. Their "report cards" have been developed for countries around the world from the Arabian Gulf to the Caribbean.

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[4] https://www.mccip.org.uk/

UKSA chair the Space4Climate group bringing together a range of UK stakeholders who together create a seamless supply chain of data and information from satellites to the end users of climate services. UKSA has also funded a strategic landscape review with the UN Office for Outer Space to look at the international partnerships and organisations that bring together space and climate with to sharing expertise and aligning goals.

For UK Government-funded research into low carbon technology, the Net Zero Innovation Board has been established. The board provides strategic oversight for UK Government funding of Net Zero Innovation Programmes. The Board is Chaired by the UK Government's Chief Scientific Advisor, Sir Patrick Vallance, and attended by senior civil servants responsible for major decarbonisation RD&D programmes across BEIS, UKRI, DHLUC, Defra, FCDO, DfT and Ofgem.

7.3.2.8 The Met Office and the Met Office Hadley Centre

The Met Office is the UK's national weather service. It provides weather and climate-related services to the Armed Forces, UK Government departments, the public, civil aviation, shipping, industry, agriculture and commerce. The Met Office is an executive agency, sponsored by the Department for Business, Energy and Industrial Strategy.

Met Office Hadley Centre for Climate Science and Services

The Met Office Hadley Centre is one of the UK's foremost climate change research centres. Its flagship climate research programme is the BEIS-funded Met Office Hadley Centre Climate Programme (MOHCCP). This delivers world-leading scientific evidence on climate variability and change and provides the core science evidence on which UK Government can make decisions to help the UK become resilient to climate change, benefit from opportunities for growth and engage in international climate negotiations.

The MOHCCP makes a vital contribution to the UK national climate capability through its central role in climate data provision from modelling and observations, and through translating, delivering and applying climate science. It focuses on both direct policy-relevant research and improving the underlying fundamental science.

The current iteration of the MOHCCP, 2021-2024 addresses four key questions that the UK Government has agreed the climate science community needs to answer over the next five years and beyond. These questions reflect the changing agenda for climate science, moving from defining the problem to enabling solutions.

1. What are the current weather and climate hazards, risks and impacts that should be expected in the UK and globally?
2. What are the future hazards, risks and impacts from weather and climate that we may wish to avoid or need to adapt to?
3. What are the carbon budget and mitigation scenarios that will avoid the most dangerous impacts of global climate change?
4. What are the impacts and opportunities from mitigation and adaptation actions to proceed towards a resilient and net zero future?

In addition to these research themes, enhancements to infrastructure have included development of next generation modelling systems, observational datasets, and the exploitation of a new generation of high-performance computing.

Newton Fund Weather and Climate Science for Service Partnership Programme

The Newton Fund Weather and Climate Science for Service Partnership (WCSSP) programme has developed a global network of projects and partnerships that harness the scientific expertise needed to strengthen the resilience of vulnerable communities to weather and climate variability. Administered by the Met Office on behalf of the UK Government, WCSSP projects aim to develop strong international partnerships, connecting the best scientific expertise. Through the programme, which started in 2014, the Met Office and other UK institutions collaborate with organisations in Brazil, China, India, South Africa and South-East Asia to advance our knowledge of weather and climate science and create new and improved weather and climate services, that support the United Nations Sustainable Development Goals.

Strategic Priorities Fund

The Met Office and UK Research and Innovation (UKRI) councils are delivering climate research through the Strategic Priorities Fund (SPF) UK Climate Resilience (UKCR) programme. It is led by the Met Office and the Natural Environment Research Council (NERC), working in partnership with the Engineering and Physical Sciences Research Council (EPSRC), the Economic and Social Research Council (ESRC), the Department for Environment, Food and Rural Affairs (Defra), and the Committee on Climate Change (CCC) Adaptation Sub-Committee.

The programme draws together a fragmented climate research community from across the UK to deliver robust, multi-disciplinary climate risk and solutions research, ensuring the UK is resilient to climate variability and change. Running for five years from 2018 to 2023, the objectives of the programme are to:

1. Characterise and quantify climate-related risks,
2. Manage climate-related risks through adaptation,
3. Co-produce climate services.

The programme recognises that multi- and inter-disciplinary approaches are required to achieve these objectives, and it draws upon researchers from the natural sciences, social sciences, engineering, and the arts and humanities. An important aspiration of the programme is to grow the community of interacting researchers, practitioners and policymakers in climate resilience from across the UK. UKCR is producing useful and useable outputs that make it easier to bring climate risks into decision making for public, private and third sector decision makers.

7.3.2.9 Research Councils and UK Research and Innovation (UKRI)

Launched in April 2018, UKRI is a non-departmental public body sponsored by the Department for Business, Energy and Industrial Strategy (BEIS). UKRI is the UK's largest public funder of research and innovation. UKRI invests more than £8 billion annually to advance our understanding of society and the world around us and deliver benefits for society, the economy and the environment.

The organisation brings together the seven disciplinary research councils, Research England, which is responsible for supporting research and knowledge exchange at higher education institutions in England, and the UK's innovation agency, Innovate UK. The nine councils work together in innovative ways to deliver an ambitious agenda, drawing on our great depth and breadth of expertise and the enormous diversity of our portfolio.

The primary role of the seven disciplinary Research Councils is to fund research, training and knowledge exchange. Each year a total of around £3 billion is invested in research conducted at UK universities, Research Council institutes, and in securing access to international facilities for UK researchers. Together, the Research Councils cover the full spectrum of academic disciplines from the medical and biological sciences to astronomy, physics, chemistry and engineering, social sciences, economics, and the arts and humanities. The Research Councils work in partnership with each other and with policy and business partners to tackle global challenges, such as environmental change, energy and food security. The research councils are:

- Arts and Humanities Research Council (AHRC)
- Biotechnology and Biological Sciences Research Council (BBSRC)
- Engineering and Physical Sciences Research Council (EPSRC)
- Economic and Social Research Council (ESRC)
- Medical Research Council (MRC)
- Natural Environment Research Council (NERC)
- Science and Technology Facilities Council (STFC)

Each research council has a particular strategic perspective on funding of climate science. NERC is the UK's leading public funder of environmental science. NERC invests around £290 million each year in cutting-edge research, postgraduate training and innovation in universities and research centres, alongside £34 million capital in world-class laboratories, plus additional capital in large research infrastructure. Data generated through NERC funded research is made available through its network of Data Centres under the Environmental Data Service (EDS). NERC-supported research aims to the address the great challenges facing society: how we benefit from natural resources, our resilience to environmental hazards and how to manage environmental change – with climate change being a fundamental aspect of these areas. In addition, NERC-funded discovery science drives fundamental advances in knowledge across the breadth of the NERC science remit. Long-term science funding sustains the UK national capability that delivers scientific understanding of environmental processes over large time and spatial scales, supports world-leading environmental science and innovation, and meets national needs. NERC plays a leading role in the development of risk-based predictions of the future state of the climate on regional and local scales, spanning days to decades. NERC also develops improved predictive capability working with national and international partners, notably the Met Office Hadley Centre.

NERC research centres all have programmes delivering climate change science, some of which are highlighted in this chapter. The centres are the: Centre for Ecology and Hydrology, British Geological Survey, British Antarctic Survey, National Oceanographic Centre, National Centre for Atmospheric Science and the National Centre for Earth Observation.

EPSRC funds a broad range of research and training aimed at tackling climate change and achieving UK's net zero 2050 target. EPSRC leads the UKRI Energy Programme, whose key drivers are to ensure secure and affordable energy supplies, whilst reducing carbon dioxide emissions. EPSRC's specific focus is on engineering and scientific research into new low- and zero-carbon energy technologies, both for energy generation and for managing and reducing demand for energy in buildings, industries and transport. A key element is the provision of training to ensure sufficient researcher capacity to underpin future energy options. Research areas specific to the engineering and physical sciences include aspects of sustainable power

generation and supply, conventional generation including carbon abatement technologies, nuclear fission and nuclear fusion.

EPSRC also supports research in engineering and physical science that advances the utility of models (i.e. developing better mathematical sciences for modelling and reducing uncertainties) and improvements to the input into models (i.e. better sensors and data acquisition). Research on mitigation and adaptation strategies for energy and infrastructure is also funded, for example, research to increase the contribution of bioenergy to the UK and how to build resilience into national infrastructure and transform cities to minimise the impacts of climate change.

ESRC has a strategic priority area of climate change and sustainability. ESRC fund social science research to understand and inform a successful social and economic transition to sustainable and biodiverse environment, and a net zero society. For example, economics, behavioural practices, and social research. In addition, ESRC contribute to interdisciplinary research programmes on climate change mitigation and adaptation.

MRC has over-arching strategic priorities related to climate science, including exploring the relationship between our environment and human health and wellbeing, and the impacts on human disease. The MRC encourages partnership working in the international community to accelerate progress in global health research, including addressing the challenges which arise from climate change. Research at the MRC Centre for Environment and Health includes the human health impact of climate change scenarios and environmental risks at the individual and population level, as well as the public health impacts of climate policies.

BBSRC supports research relevant to environmental change, including the responses of biological systems to climate and other environmental factors and their possible adaptations to them. Bioscience is identifying options for reducing energy consumption and GHG emissions, and developing renewable biological sources of energy, materials and chemicals that will reduce dependency on petrochemicals and help the UK become a low-carbon economy.

STFC works with partners, such as NERC, the Met Office, Defra, BEIS and industry, to enable climate change research. STFC's main research areas are astronomy, particle physics and nuclear physics, but it hosts and provides access to world-leading facilities, technologies and expertise serving the whole of the UK research base. Examples of this include operating the Centre for Environmental Data Analysis[5], providing data services for the Copernicus Climate Change Service and the European Space Agency, leading the development of data standards and data service standards in the context of the World Climate Research Programme (WCRP) Coupled Model Intercomparison Project (CMIP), and hosting the JASMIN data storage and analysis platform on behalf of NERC.

7.3.3 International cooperation

The UK is an enthusiastic participant in a wide range of international programmes related to climate science and recognises the value of collaborations that enable scientists from differing countries and regions to work in partnership and to leverage UK expertise in support of significant global challenges. This section describes the extensive work that the UK undertakes in climate-related research and initiatives with partners across the globe, and presents examples of UK support for adaptation and mitigation projects. Finally, there is a discussion of potential barriers to exchange of relevant data.

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[5] http://ceda.ac.uk

7.3.3.1 International cooperation for global climate science initiatives

The UK recognises the fundamental importance of policymakers around the world being able to access the best available science on climate change. The UK has had significant involvement in the preparation of the IPCC 6th Assessment reports (AR6) through the participation of UK scientists and their research, and support of Prof. Jim Skea, of Imperial College London, as co-chair for the Working Group III (WGIII) report on Mitigation of Climate Change. The UK Government played a key role in supporting the IPCC process including by providing financial and technical assistance, and also hosted the approval plenary for the WGIII report in March-April 2022.

The UK also supports other global climate science initiatives, for example, sitting on the board of the World Adaptation Science Programme, and, as COP President, currently sits on the Steering Board of the UN Emissions Gap Report.

7.3.3.2 International cooperation on Climate Understanding and Adaptation

The UK recognises that the damaging impacts of climate change are already being felt in countries around the world and that weather and climate play a significant role in the daily lives of many people. This is particularly the case in the developing world where exposure and vulnerability are high. As such, the UK places great importance on cooperation with international partners to deliver research that will help those most impacted by the world's changing climate.

Whilst it is possible to identify interventions that will increase the resilience of poor peoples' livelihoods to an uncertain climate future, the range and cost of adaptation options and improved resilience measures could be significantly improved by enabling the production of more accurate and tailored climate and weather forecasts and enhanced operating procedures for responding to forecasts and early warning systems.

The UK Government, FCDO in particular, is supporting research programmes that increase capacity in this area and advance our knowledge of the practical application of climate science in the developing country context. The UK has been key in enabling the launch of The Adaptation Research Alliance (ARA), an alliance of over 140 organisations across 30 economies that will see governments, research institutions and communities collaborate to increase the resilience of vulnerable communities on the frontline of climate change. Signatory organisations are operating at a range of scales including local community-based organisations, universities, government departments, regional organisations and international organisations such as the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). More than half of these organisations are based in the global South – organisations participating include those based in Kenya, South Africa, India and Colombia. The Alliance has already produced a set of Adaptation Research for Impact Principles, undertaken two evidence reviews, four consultations on research priorities, and awarded 28 microgrants to enable recipients to identify burning issues for adaptation research across Africa, Asia and South America.

To better understand and improve confidence in predictions of climate variability and change across sub-Saharan Africa on timescales to support adaptation, FCDO and NERC have invested in a £20 million Future Climate for Africa research programme (FCFA). The programme has improved the understanding of what drives Africa's climate and how it will change, as well as the impacts and adaptation options. The use of this climate information to address real world problems and inform development plans was achieved by FCFA through innovative engagement processes that included, amongst others, government decision-makers, communities and researchers. The programme has involved over 200 researchers, of which there are 185 from Africa, spanning 14 countries and 185 institutions; and has:

- influenced 17 policies, plans and investments;
- produced over 185 peer reviewed articles, working papers and policy briefs on issues of climate science and its application in Africa; and
- produced 72 climate-related tools and supported 34 learning events and engagements.

On shorter timescales, the Weather and Climate Information Services for Africa programme (WISER) has delivered transformational change in the quality, accessibility and use of weather and climate information at all levels of decision making for sustainable development in Africa. The Met Office has led the East African component of this programme, enhancing national and regional weather observing and forecasting capabilities in the region. Pan-African work is led by the UNECA African Climate Policy Centre (ACPC). To date, the programme has achieved substantive results, including for example improving the understanding of weather and climate issues and access to services for 11 government departments in Kenya and Tanzania, and providing new and improved forecast services in Kenya and Tanzania for almost 1 million households.

FCDO recognises that adaptation support needs to be underpinned with rigorous research and evidence to inform decision-making. The Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) programme has focused on societal barriers to resilience and adaptation in climate change hotspots in Africa and Asia. It achieved significant policy influence, in addition to research excellence. CARIAA led to more than 20 examples of policy impact, including several which effectively integrated gender equality and social inclusion considerations into climate change policy. For example, IPCC AR6 includes more than 20 references to outputs from this programme.

The Science for Humanitarian Emergencies and Resilience (SHEAR) research programme, co-funded with NERC, has led FCDO's efforts to improve understanding of how climate/weather observations and forecasting can result in more effective decision-making to reduce exposure of the most vulnerable to the increased risks posed by natural hazard – including those presented by a changing climate – through measures such as provision of risk information, early warning systems and forecast-based financing. As part of the programme, research undertaken by University of Reading and Partners has contributed to the use of forecasts from the Global Flood Awareness System (GloFAS) to drive action before disasters within the Red Cross Red Crescent (RCRC) network, UN Agencies and the Start Network. The success of robust Early Action Protocols (EAPs) led to a dedicated RCRC funding mechanism for forecast-based Action and inspired similar funds that together cover 60 countries. For example, in 2020, over $5m was released based on a GloFAS trigger to protect hundreds of thousands of people in Bangladesh.

The Asia Regional Resilience to a Changing Climate programme (ARRCC), delivered by the UK's Met Office and the World Bank, is increasing the resilience of vulnerable groups and of economic growth to current and future climate and environmental impacts in Asian countries namely Afghanistan, Bangladesh, Nepal and Pakistan. To date it has delivered a range of high-quality trainings, national and regional partnerships, cutting-edge tools and system enhancements, and world-class knowledge products that are on track to be fully adopted and used.

FCDO has also recently launched a landmark programme of innovative climate research that will turn new discoveries into actionable solutions to reduce the risks from climate change. The Climate Adaptation and Resilience research programme (CLARE) will deliver the commitment made at COP26 to support action-focused research to inform development in a changing climate, ensuring that science is the foundation of decision-making as developing

countries adapt to the changing climate. Jointly funded by the UK and Canada, CLARE will generate new knowledge, practical tools and approaches to support those most vulnerable to the impacts of climate change and related natural hazards, such as floods, droughts and heatwaves. The UK has committed a total UK aid funding to £100 million towards this programme, which is set to benefit at least 5 million people around the world.

Through the Newton-Bhabha Fund, NERC is working with India on a number of programmes relevant to climate change. For example, the Sustaining Water Resources for Food, Energy and Ecosystem Services programme (£3m UK contribution, with matched Indian research effort) is aiming to develop a whole systems approach to basin modelling to enable informed decision making about the management of India's water resources. These models will have a forecasting capability that can be used to study future trends including the impact of climate change.

The Met Office collaborates extensively with organisations across Europe through its participation in European Union funded research programmes, which in the past five years have been the Horizon 2020 and Horizon Europe programmes. Collaborative work through these programmes has provided substantial benefits to the development of climate science capability and understanding in the UK and globally, through leveraging the capabilities and talent pool between world-leading research organisations. Major projects in which the Met Office played a leading role include:

- The EU Climate Projections (EUCP) which have provided advances in modelling and projections across the continent;
- The Climateurope project which created a network and forum for Europe climate service providers, practitioners and users;
- The PRIMAVERA project developing European high-resolution climate modelling capability and providing new datasets and understanding for IPCC AR6; and
- The High-End Climate Impacts and Extremes (HELIX) project led by the University of Exeter in partnership with the Met Office which looks at climate impacts at different global warming levels.

Other major projects in which the Met Office has played a key role include the EMBRACE and CRESCENDO projects that emphasized the development and application of full Earth System Models, including a coordinated European contribution to CMIP5 and CMIP6.

7.3.3.3 International cooperation on mitigation technologies

FCDO has facilitated and demonstrated the application of low-carbon technologies to support clean energy access in developing countries. Examples include:

- The Modern Energy Cooking Services (MECS) programme that, has been working closely with the Kenyan Ministry of Energy over the last two years on a revised national energy policy that includes for the first time a specific component on electric clean cooking. With around 70% of the Kenyan population connected to an underutilised grid, but 83% still cooking on firewood and charcoal. The transition to electric cooking is a huge opportunity for improving health, reducing deforestation and expanding the use of modern energy. The new energy policy, expected to be released in 2022, will include a significant shift away from biomass cooking to improved options that particularly benefit women and girls.
- The Low Energy Inclusive Appliances (LEIA) programme responded to the need of the need for cooling technologies in Pakistan as it suffered some of the hottest

temperatures ever recorded during the Coronavirus (Covid-19) pandemic. The programme conducted a series of research and standards development activities that directly informed World Bank provision of 200,000 Solar Home systems and the use of energy efficient fans to LEIA standards, including for the poorest people unserved by the grid.

- The Transforming Energy Access (TEA) programme is investing in early-stage testing and scale-up of innovative technologies and business models that accelerate access to affordable and clean energy-based services for poor households, enterprises and social institutions, particularly in Sub-Saharan Africa and South Asia. Since 2016 the programme has:
  - improved access to clean energy for 9.5 million people (including 4.8 million women) in developing countries, through the incubation and scaling of new clean energy businesses in sectors like distributed solar, green mini-grids, and energy-efficient appliances;
  - stimulated UK-led clean energy innovation funding research and development (R&D) of 147 new technologies and 202 innovative business models in areas such as circular economy energy storage, sustainable cooling, electric pressure cookers, remote network management, energy access crowdfunding and many more;
  - created over 74,000 sustainable jobs in clean energy and supported over 700 African graduates and trainees with placements in energy access businesses;
  - leveraged £599 million of additional investment from both private and public sources; and
  - avoided around 979,000 tonnes of carbon dioxide emissions.
- The Climate Compatible Growth (CCG) programme is providing research and global public goods to help countries develop economic strategies, plans, and policies to attract investment into low-carbon growth opportunities across multiple sectors, currently focused on grid-scale energy and transport. It builds on partnerships in key countries that bring together key stakeholders and decision-makers in target countries, supporting them with a consortium of world-class UK and international researchers to rapidly build the evidence, tools and decision support frameworks needed to leverage a shift to clean investments.

See *section 7.3.5.5* for more detail on research for mitigation technologies.

7.3.3.4 Barriers to dissemination of climate research

Despite the extensive body of collaborative research undertaken by UK scientists, it is recognised that barriers continue to exist to the dissemination of data and research.

The UK Government believes that Open Access to research is a public benefit which enhances transparency, scientific integrity and rigour, stimulates innovation, promotes public engagement, and improves efficiency in research. The UK is widely recognised as being a leading nation in the Open Access and Open Data movements.

Since the Finch Report was published in 2012, the UK has made substantial progress towards the objective of ensuring that publicly funded research is made available through an Open Access route. UK Research and Innovation (UKRI) announced its new open access policy in August 2021. The UKRI open access policy applies to peer-reviewed research articles submitted for publication from 1 April 2022 requiring full and immediate open access;

and for the first time, monographs, book chapters and edited collections published from 1 January 2024.

UKRI is supporting a range of activities to help researchers publish open access alongside the policy:

- Increasing funding to support open access from £24M to £46.7M per year. This includes allocations to the research articles block grant, a dedicated fund for monographs and the policy supporting actions.
- Ensuring open access options for authors, by supporting Jisc to enable more research organisations, publishers and learned societies to participate in transitional open access arrangements.
- Engaging with stakeholders to support implementation, including establishing a stakeholder forum.
- Research England Development (RED) Fund support for the UK Reproducibility Network to promote uptake of open research practices.

Nevertheless, further effort is required. To this end, in 2015 the Minister for Universities and Science, Jo Johnson, requested an independent report from Professor Adam Tickell, Chair of the UK Open Access Co-ordination Group, on open access to research policy. As part of this advice, a recommendation was made that a roadmap for national open research data infrastructure be produced, with a set of recommendations. A Taskforce was established to deliver this.

The first Taskforce report[6] observed that there remain significant barriers to sharing data, including the lack of infrastructure for data access and preservation, concerns about personal or commercially confidential information, or lack of incentives for researchers.

In addition to open access of published scientific results, the final report of the Open Research Data Task Force[7] also highlighted the importance of open research data and set out recommendations to reduce barriers, including but not limited to infrastructure provision, user friendly services and incentives for researchers. The UK Government has recognised the importance of Data and in 2020 launched a National Data Strategy[8]. This was followed with the publication of a policy framework in November 2021 to address Mission 1 of the National Data Strategy to unlock the value of data across the economy[9].

UKRI itself has a vision for coherent state-of-the-art national digital research infrastructure, that will seamlessly connect researchers, policy makers and innovators to the computers, data, tools, techniques and skills that underpin the most ambitious and creative research. Data infrastructure and associated services is a key theme within this vision. It will be delivered through the evolution of existing infrastructures to support new communities of practice and subject to funding, by investing in new capabilities to enable researchers to turn data into knowledge. For example, NERC, whose commitment to data sharing was

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6 http://www.universitiesuk.ac.uk/policy-and-analysis/research-policy/open-science/Pages/open-research-data-task-force.aspx

7 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/775006/Realising-the-potential-ORDTF-July-2018.pdf

8 https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy

9 https://www.gov.uk/government/publications/national-data-strategy-mission-1-policy-framework-unlocking-the-value-of-data-across-the-economy/national-data-strategy-mission-1-policy-framework-unlocking-the-value-of-data-across-the-economy#intervention

reported previously in the NC7 submission, continues to operate a number of data centres under its Environmental Data Service[10]. The EDS is responsible for making data available under the NERC data policy, which specifies that NERC-funded scientists must make their data openly available within two years of collection and deposit it in a NERC data centre for long term preservation. NERC makes its environmental data available free of charge apart from special cases that involve third party data. NERC is currently reviewing its Environmental Data Service with a view to further developing the roles of its data centres into a more integrated user-focused set of services, with an aim to maximise the economic and social impact of environmental research. In addition, the UK Data Service[11] provides ESRC funded access and training to use UK's largest collection of economic, social and population data for research and teaching.

7.3.4 Climate information services

In order to manage the risks associated with climate change it is necessary to deliver climate information in accessible, usable and relevant forms, and to combine climate hazard information with context dependent knowledge on vulnerability and exposure to the hazards. Climate services translate climate research and data into these usable formats and help to apply the information for users so they can make more informed decisions. The transition to a low carbon resilient economy and increasing awareness of climate impacts at a local level is driving a growing need for climate services in the UK and internationally. Examples of UK-funded programmes providing climate services are below.

7.3.4.1 Climate services to inform decision-making in the UK

Met Office-led Climate Services and UKCP18

The Met Office provides a range of climate information services to inform UK Government decisions and policy. These include international climate negotiations, domestic mitigation and domestic risk assessment and adaptation (as described in the UK Climate Change Act). They are typically based on the tailoring the scientific research from the Met Office Hadley Centre Climate Programme (MOHCCP).

Climate services focusing on observational data are delivered through a climate dashboard and the National Climate Information Centre (NCIC). Further climate services deliver seasonal climate forecasts, decadal forecasts and long-term projections (UKCP18, see below), including guidance on how to use them to a range of departments and other users, and regular updates on global carbon budgets. A dedicated Knowledge Integration team works closely with UK Government stakeholders in order to co-develop these climate services and tailor them to particular policy maker needs. Additionally, Defra commissions climate services from the Met Office related to encouraging the wider use of UKCP18 and to inform issues related to food, farming and the natural environment.

The latest UK climate projections (UKCP18), produced by the Met Office Hadley Centre, were released beginning in November 2018 and provide an up-to-date assessment of how the UK climate may change in the future. These projections updated the probabilistic projections over land and provided a set of future climate projections for the globe at 60km scale and for the UK at 12km scale. In 2019, these were downscaled for the UK to a level (2.2km) previously only used for short-term meteorological modelling, allowing more realistic simulation of high impact extreme events, e.g. localised heavy rainfall in summer.

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[10] https://eds.ukri.org/

[11] https://ukdataservice.ac.uk/

General climate change trends projected over UK land for the 21st century in UKCP18 are broadly consistent with earlier projections (UKCP09), showing an increased chance of warmer, wetter winters and hotter, drier summers along with an increase in the frequency and intensity of extremes. This is seen in the Probabilistic (25km), Global (60km), Regional (12km) and Local (2.2km) projections, which add detail to the top-level view including providing more localised information.

The UKCP18 projections have been used extensively to support the development of the third Climate Change Risk Assessment (CCRA3), as required under the Climate Change Act 2008, to inform the 5-yearly National Adaptation Programmes (NAPs) of England, Scotland, Wales and Northern Ireland. In addition, UKCP18 is being used by organisations as part of their adaption and resilience planning, in support of the NAPs and other drivers affecting businesses and individuals in the UK.

Current endeavours in UK climate services seek to maximise the utilisation of UKCP18. The UK Climate Resilience (UKCR) Programme uses UKCP18 to build the evidence on climate risks, adaptation and services in the UK. It has delivered several high impact outputs to date, including climate risk indicators to support climate risk assessments, FUTURE-DRAINAGE which provides estimates of changes in rainfall for use in drainage design, EFLAG which is providing a new dataset of river flows for water resource planning, and urban climate services for use within cities to raise awareness of climate change issues and provide information to help climate resilient planning.

UK Climate Services provided by other research bodies

The UK academic sector has a strong track record providing environmental services in the UK and overseas. The CEDA Archive forms part of NERC's Environmental Data Service (EDS) and is responsible for looking and supplying data from atmospheric and earth observation research. It currently hosts over 18 Petabytes of data from climate models, satellites, aircraft, meteorological observations, and other sources. Many universities now provide bespoke climate services to individual departments across the UK Government covering physical science, economics, social science research and engineering.

In 2021, BEIS commissioned the Climate Services for a Net Zero resilient World (CS-N_0W) programme. The £5M, 4-year programme, delivered by a consortium led by consultancy Ricardo and including University College London, the Tyndall Centre and the UKRI-NERC centres of excellence, comprises 15 sub projects, including:

- Global decarbonisation analysis
- A review of global maritime emissions, to inform the UK's position in discussions with the International Maritime Organisation
- Analysis of the interactions between mitigation measures and the atmosphere (e.g. H2, Biological VOCs, aviation emissions)
- A compilation of peer-reviewed evidence on climate impacts at a global, regional and country scale, via a simple-to-use database and comprehensive literature review
- An assessment of future water availability for water-intensive, low-carbon energy infrastructure
- Improving the resilience of UK energy networks, through understanding future impacts, based on the UKCP18 climate projections
- Projections of temperature change and impacts on UK housing

- Improving understanding the co-benefits of climate action – international regional/ country assessments of climate change mitigation co-benefits
- Improving understanding of UK adaptation-mitigation co-benefits and trade-offs
- Summarising the potential for greenhouse gas emissions verification through application of novel technologies and comparison with current accounting approach for GHG emissions

The overarching aims of the programme are to deliver climate information to policy teams and other decision-makers, in a range of audience-appropriate formats, to improve their understanding of the role of climate change in their policy areas and to ensure decisions take this evidence into account and reduce overall harm and costs of climate change across the BEIS portfolio. CS-N_0W will build on underpinning science and service development in other parts of the UK community.

7.3.4.2 Climate services to inform overseas development and international decision making

This section details some of the international climate services work carried out by the Met Office. For details of other international projects led by FCDO and UKRI-NERC, see section 7.3.3.2.

The Met Office's International Applied Science to Services team deliver projects to make climate information useful and accessible for the international community, so that informed decisions can be made in the face of climate variability and change. Understanding future climate risks depends on analysing both current and future climate conditions and the socio-economic vulnerabilities exposed by those conditions. Drawing this knowledge together requires us to build strong national, international, and importantly transdisciplinary partnerships.

The Met Office produces Climate Risk Reports for the FCDO using a 'climate in context' approach to provide an evidence-base for climate sensitive regional policy and planning. Working with development consultants from the Overseas Development Institute, who have expertise in the regions being assessed, has enabled us to draw from across our disciplines to explore the current and evolving climate-related risks on development themes central to FCDO regional office planning and policy activities, such as food security, livelihoods, water resources, infrastructure, and human health. Climate risk information provided in the context of these socio-economic systems aims to inform climate-smart development planning and decision making and support climate adaptation and resilience building.

Using a similar multi-disciplinary approach, the Met Office has worked with the Development, Concepts and Doctrine Centre (DCDC) to produce a series of reports for Africa, Middle East, the Americas and Russia that summarise observed climate, climate projections and their potential implications from a defence and security perspective, providing strategic context and insight for the MOD and the wider UK Government.

The Met Office's transdisciplinary approach to co-developing user-relevant climate information and services has been developed over a number of years and across several projects. The FCDO funded Future Climate For Africa project Future Resilience for African Cities and Lands (FRACTAL) pioneered methodologies and principles to bring together and effectively integrate the needs, knowledge and actors required to generate information and develop plans and actions to build resilience in developing country city regions, with a focus on South Africa. These methodologies and principles have subsequently been applied in other FCDO funded

projects and programmes including the Weather and Climate Services for Africa programme (WISER) and the Asia Regional Resilience to a Changing Climate Programme ARRCC.

While the WISER programme has worked to make a step change in the quality, accessibility and use of weather and climate information services for sustainable development in Africa, the ARRCC programme (2018-2022) has focused on delivering new technologies and innovative approaches to help vulnerable communities (primarily in Bangladesh, Pakistan, Nepal and Afghanistan) receive and use climate information, weather warnings and forecasts to better prepare for climate-related shocks.

The Met Office was a major partner in the UK Space Agency International Partnership Programme (UKSA IPP) CommonSensing project is to improve the uptake and use of satellite-based climate information in three South Pacific countries – Fiji, Vanuatu, and Solomon Islands. Project activities supported national and regional governments to build resilience to the impacts of climate change and improve access to climate finance.

The Met Office also provided support to another UKSA project – the Dengue forecasting MOdel Satellite-based System (D-MOSS) – which developed a dengue fever early warning system for Vietnam.

Under the Weather and Climate Science for Services Partnerships programme (WCSSP), the Met Office has carried out underpinning science which is being pulled through into climate service development. In CSSP China, a service which delivers forecasts off summer rainfall for the Yangtze River Basin months ahead is being used to inform water management organisations in the region, such as the Three Gorges Dam. CSSP Brazil has produced a new service that supports wildfire management and planning across South America by combining seasonal forecasts of temperature and rainfall with fire trend data to predict fire probability.

7.3.4.3 Climate Services research and future development

As climate services are less mature than weather services, and because there is both rapidly improving capability from climate science (e.g. better spatial information of treatment of climate extremes) and more sophisticated needs for climate information (e.g. from evolving regulation and stress testing) there is ongoing investment in climate service research. The SPF UKCR programme is a join initiative between the Met Office and UKRI to produce the approaches needed to make a step change in building resilience to climate change in the UK. Components include better risk assessment, building resilience, for instance through adaptation, and development of climate services to deliver climate information. The outputs of the programme will include improved practice, new national datasets, and a vibrant community of climate resilience researchers.

The Weather and Climate Science for Service Partnerships (WCSSP, established for China, Brazil, India, Southeast Asia and South Africa) provide additional climate service research, typically focused on a particular region but with transferable elements for use more widely. The University sector in particular plays a major role in UK climate service research, including enabling more inter and transdisciplinary services needed to inform low-carbon resilient development.

The UK plays an active, and at times leading, role in the development and delivery of climate services internationally. Key international activities include thought leadership with the WMO for the Global Framework for Climate Services (facilitated by the WMO and UN Agencies), leadership of international WMO climate service Expert Teams, and strong engagement in climate service development in Europe, for instance through the Climateurope and Climateurope2 EU projects. Additionally, discussions are ongoing to facilitate a National Framework for Climate Services, with development driven through the SPF UKCR

programme. A number of ISO standards are used in the UK to further adaptation-based services including ISO14090/91.

7.3.5 Priority areas in UK Climate Research Programmes

The following section describes examples of UK funded research programmes, addressing the priority areas identified in UNFCCC guidance.

7.3.5.1 Climate process and climate system studies, including paleoclimate studies

Predictions of regional climate are reliant on global climate models, and observations. Global climate models have developed rapidly over the last few decades but require further improvements particularly in the representation of key earth system processes. The UK is funding several major research initiatives to improve the understanding of key processes and refine their representation in climate models.

Cryosphere

Changes in Antarctic ice sheets can induce large changes in sea level and in the freshwater flux to the oceans, which in turn can affect the ocean circulation and climate. However there remain large uncertainties deriving from the cryosphere in predictions of future sea level rise. NERC and the United States National Science Foundation are undertaking a $50m collaboration to substantially improve both decadal and longer-term projections of ice loss and sea level rise originating from Thwaites Glacier in West Antarctica. The 2015 SCAR (Scientific Committee on Antarctic Research) horizon scan singled out this location as a 'region of particular concern' and it is considered to be one of the most unstable glaciers in Antarctica.

One of the most pressing problems in understanding and predicting global climate change is the inability of modern climate models to reproduce Arctic climate change. The Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC) was designed in response to this need. By partnering with BEIS, NERC were able to provide funding for ship berths on the MOSAiC expedition to enable UK researchers to participate in this observational study and undertake research that will provide a step change in understanding the Arctic climate system.

Polar oceans

The Southern Ocean is one of the most important components of the global carbon cycle, having captured half of all human-related carbon that has entered the ocean to date. This vast anthropogenic perturbation to the Southern Ocean carbon system is activating a range of complex climate feedbacks, many of which are poorly understood and quantified.

=NERC is investing in two complementary research programmes to address the uncertainties in the future behaviour of the Southern Ocean carbon sink and therefore substantially reduce uncertainty in 21st century global climate change projections. The Ocean Regulation of Climate by Heat and Carbon Sequestration and Transports is an £8.4 million programme that will focus on a subset of the physics of heat and carbon uptake. The Role of the Southern Ocean in the Earth System is a £7 million programme that aims to make 21st century global climate change projections more accurate through improved assessment of the Southern Ocean carbon sink, and provide the scientific basis to inform international climate policy on the role of the Southern Ocean in global climate change.

Atmospheric dynamics

Improved prediction of the European climate is critical for the UK, with the impacts of unusual weather episodes such as the 2003 heat wave, 2010 cold winter and 2012 wet summer

felt across society and the economy. Recent developments in observation, modelling and data reanalyses provide an exceptional scientific opportunity to increase understanding of the causes and predictability of these unusual seasons. Weather and climate models are critical to society's ability to reduce the impacts of hazardous weather, informing decisions on mitigating and adapting to climate change. NERC has invested £5 million on research in partnership with Met Office to deliver a better understanding of convective processes and their interactions with atmospheric flows, and to translate this into new convection parameterisation schemes. Representing convection is still the key error in weather and climate models. This limits our confidence in predictions and in turn their value when it comes to making decisions on timescales, which can range from days to decades.

North Atlantic climate system

Major changes are occurring across the North Atlantic climate system in ocean and atmosphere temperature and circulation, in sea ice thickness and extent and in key atmospheric constituents such as ozone, methane and aerosols. Changes in the North Atlantic directly affect the UK's climate, weather and air quality, with major economic impacts on agriculture, fisheries, water, energy, transport and health. The North Atlantic also has global importance since changes here drive changes in climate, hazardous weather and air quality further afield, such as in North America, Africa and Asia. NERC is investing £9 million in a five-year research programme to enhance the UK's capability to detect, attribute, and predict changes in the North Atlantic climate system.

The Atlantic Meridional Overturning Circulation (AMOC) is a key component of the global climate system and dominates northward ocean heat transport over most of the Atlantic. The Subpolar North Atlantic is the region where the AMOC is actively shaped through a combination of surface fluxes of heat, freshwater and momentum. There is increasing evidence that Subpolar North Atlantic knowledge is important for decadal climate prediction. NERC, in collaboration with the National Science Foundation, have invested in a programme to extend the observations of the Overturning in the Subpolar North Atlantic Program (OSNAP) to a decade and to support research which will use the observations effectively in science and policy predictions.

Understanding dangerous climate threshold

UK scientists are investigating the possibility of crossing future dangerous thresholds in the climate system, such as irreversible decline of the Greenland Ice Sheet, dieback of the Amazon rainforest and collapse of The Atlantic Meridional Overturning Circulation (AMOC). For example, new work shows there is now greater confidence that partial irreversible loss of the West Antarctic Ice Sheet has already begun, and that East Antarctica and northeast Greenland are potentially more sensitive to climate change than first thought, which has implications for future sea level rise and associated impacts.

Water cycle

Changes to the Hydrological cycle are being induced by climate change and other catchment changes. These changes are affecting the infiltration and movement of pollutants within river systems and the ecosystems that they support. NERC is investing in an £8m programme over 4 years, to better understand the processes and sources by which pollutants are entering, mixing and being transported through river systems as well as how mixtures of chemical (and biological contaminants) and their exposure regimes are impacting on the quality, ecology and biodiversity of UK rivers. The overarching aim of the Understanding Changes in Quality of UK Freshwaters programme is to enable and inform the development of better plans for adaptation, mitigation and detection of risks associated with declining river quality now and in the future.

Climate Resilience

NERC leads an £18.7 million UKRI investment (with the Arts and Humanities Research Council (AHRC), and the Engineering and Physical Sciences Research Council (EPSRC), in partnership with Met Office) bringing together fragmented climate research and expertise to deliver robust, multi and interdisciplinary climate risk and adaptation solutions research focussing on the two major knowledge gaps in UK Climate Resilience research; 1) characterising and qualifying climate-related risks in decision-relevant terms; 2) developing effective adaptation strategies and policies that deliver resilience, improve lives, and promote economic growth. This will ensure the UK is resilient to climate variability and change, and powerfully positioned to exploit the opportunities of adaptation and green growth.

7.3.5.2 Modelling and prediction, including general circulation models

Climate modelling

Climate modelling in the UK is led through the Met Office Hadley Centre Climate Programme, funded by BEIS and Defra. This relationship ensures that the world leading modelling capability of the UK feeds directly into UK Government and informs policy. Exploitation of the latest supercomputer at the Met Office has allowed the UK to lead the global effort to develop larger ensembles of higher resolution climate and Earth system model simulations, through a number of international collaborations including a UK-led EU-funded project PRIMAVERA (PRocess-based climate sIMulation: AdVances in high-resolution modelling and European climate Risk Assessments). These provide more accurate information on climate variability and change to decision-makers and society.

The UK climate and Earth System models, HadEGM3-GC3.1 (Hadley Centre Global Environment Model 3 – Global Coupled 3.1)and UKESM1.0 (UK Earth System Model 1.0), made a significant contribution to the 6th Coupled Model Intercomparison Project (CMIP6), with data submitted to fourteen individual Model Intercomparison Projects (MIPs). The UK has played an international leading role in Earth System Model development, for example through the EU project CRESCENDO (Coordinated Research in Earth Systems and Climate: Experiments, kNowledge, Dissemination and Outreach). This data is now being actively analysed by scientists around the world and was extensively used in the recent IPCC 6th Assessment Report (AR6). A special issue of the Journal of Advances in Modelling the Earth System (JAMES) details the UK contribution to the CMIP6 DECK[12] (Diagnostic, Evaluation and Characterization of Klima).

The next generation of UK models are under active development and will be the last based on the Unified Model (UM) system. HadGEM3-GC5 will be the core UK physical climate model for the coming ~5 years and will also form the basis of the 2nd UK Earth system model (UKESM2). UKESM2 will continue to be developed through a collaboration between the Met Office Hadley Centre and NERC centres. UKESM2 is intended for use in the next CMIP project (CMIP7) and will be released for use by the full UK research community.

In addition to UKESM, NERC has invested £5 million (with resources matched by the Met Office) in its 'understanding and representing atmospheric convection across scales' programme. This builds on developments in understanding of convection in recent years to significantly improve the parameterisation of convection within models, which remains a limitation. This will lead to substantial improvements in both the weather and climate models that are critical to society's ability to reduce the impacts of hazardous weather and inform

[12] https://agupubs.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)1942-2466.UKESM1

decisions regarding mitigation of and adaptation to climate change. Some early tests of how the new convection scheme impacts climate simulation are planned in 2022.

The Met Office is investing in its Path to High Resolution Research and Innovation Theme through 4 flagship projects around km-scale modelling at global and large-regional domains as well as 10km (atmosphere and ocean) global coupled climate simulations and urban-scale regional modelling. These projects assess the role of scale-interactions delivered by these ultra-resolutions, notably on the ability to simulate high-impact weather across timescales from 1-day forecasts to century length projections. Knowledge gained will inform choices for future operational capability.

The Met Office Hadley Centre – NERC collaboration on Earth system modelling will continue to emphasize model realism with respect to a range of key Earth system processes, couplings and feedbacks. In the near term such developments are targeted for UKESM2 (with a target release date of mid-late 2025), which, in addition to already employing a global carbon cycle including terrestrial nitrogen limitation and interactive whole-atmosphere chemistry and aerosols, will include the following new process descriptions; (i) interactive Greenland and Antarctic ice sheets, coupled to both the ocean and atmosphere, (ii) interactive wildfires, coupled to the terrestrial carbon cycle, dynamic vegetation and atmospheric composition, (iii) permafrost physics and biogeochemistry, (iv) nitrate aerosols and (v) an improved treatment of stratospheric ozone . UKESM2 will be designed to run using emissions of carbon dioxide (CO_2) and methane (CH_4), with full cycles of both gases simulated. This will support research into the efficacy of various CO_2 and CH_4 mitigation actions for reducing climate warming, while considering the broader Earth system and environmental responses. Work on including various forms of human land-use will also allow investigation of a range of land-based climate mitigation options.

Climate prediction

The UK views the prediction of climate variability and change for the coming seasons to a decade ahead as a key area of climate science. In recent years the Met Office seasonal and decadal prediction systems have been substantially upgraded to higher resolution in both the atmosphere (~50km) and the ocean (0.25 deg), resulting in significantly improved climate predictions when assessed against the recent historical period. The EUCP project, which is led by the UK, has been investigating how to seamlessly link decadal predictions with longer term climate projections.

The Met Office is also investing in its 'Producing and Exploiting Ensembles' Research and Innovation Theme by increasing the ensemble size for seasonal and decadal predictions by a factor of 4 and by producing large ensembles of historical and future climate simulations and projections. The increase in ensemble size increases the skill of seasonal and decadal predictions and increases the accuracy and understanding of past climate change and future projected changes.

Key improvements include a new capability to predict the large-scale circulation in the North Atlantic region (the North Atlantic Oscillation), and hence winter conditions for the UK and the rest of Europe out to seasons and years ahead. However, current climate models appear to underestimate the size of the predictable signal and work is ongoing to understand the reason why.

Decadal prediction has recently become an international operational activity governed by the World Meteorological Organisation (WMO) and the Hadley Centre has recently been chosen as the international Lead Centre for Annual to Decadal Prediction. The Met Office therefore collects decadal forecasts each year from around 10 international centres and collates them into a summary: the WMO Global Annual to Decadal Climate Update. This provides forecasts

of near surface temperature, precipitation, and atmospheric circulation, as well as selected climate indices including the probability of global temperature temporarily exceeding 1.5oC above preindustrial levels – an event which will happen as global warming approaches the first Paris agreement level. These forecasts offer the potential to provide early warnings of other extreme events and are being used, for example, to develop other new climate services including multiyear Atlantic hurricane forecasts for the insurance industry.

7.3.5.3 Research on the impacts of climate change

Observed impacts of climate change

The Met Office has worked with partners in the UK and abroad on new datasets documenting the observed impacts of climate change, particularly on fire weather and on mountain glaciers. The latter includes satellite observations of a worldwide expansion of glacial lakes, a global dataset of changes in the frequency of glacial lake outburst floods, and an inventory of glaciers with a high rock content which melt less rapidly.

Future climate change impacts on Global Warming Levels (GWLs) of 1.5°C, 2°C and 4°C

A UK-led EU project HELIX (High-End cLimate Impacts and eXtremes) assessed climate change impacts at Global Warming Levels of 1.5°C, 2°C and 4°C, and this has continued with the Met Office Hadley Centre Climate Programme (MOHCCP). HELIX and subsequent work assessed changes in extreme rainfall, river and coastal flooding, drought, water and food security, heatwaves, human heat stress, fire weather land ecosystems and biodiversity, and economic impacts, at global scales and also with a regional focus in Europe, Africa and South Asia. Recent Met Office work has also applied the GWL framing to impacts of climate change in the UK, including a range of extreme temperature and rainfall metrics plus drought and wildfire risk. Publications and figures from these projects featured extensively in the IPCC Special Report on 1.5C Global Warming and the IPCC 6th Assessment Report (AR6), and HELIX was also influential in establishing the AR6 framing of future climate change in terms of Global Warming Levels.

Integrated modelling of climate change impacts

The Met Office has made substantial contributions to all three rounds of the Inter-Sectoral Impacts Model Intercomparison Project (ISIMIP). As part of this, the Met Office has been undertaking a long-term programme of developing a more integrated approach to modelling climate change impacts in the model JULES (Joint UK Land Environment Simulator). The focus has initially been on the response of biomes to changing climate and resulting impacts on the water and food sectors. The configuration includes the estimation of changing fire frequency, nitrogen limitation on plant growth, and the influence of changing biomes on elements of the water cycle such as surface runoff, soil moisture and river flow.

Climate change impacts in South America

Under the Climate Science for Service Partnership (CSSP) Brazil project, the Met Office has been working with Brazilian partners to improve modelling of crops and forest response to drought, with a view to improving carbon cycle and crop productivity estimates. The Met Office and Brazilian partners have also assessed climate change-driven increases in the risk of landslides due to heavy rainfall.

Climate change impacts in Asia

As part of the current FCDO funded Asia Regional Resilience to a Changing Climate (ARRCC) programme, the Met Office is involved in strengthening understanding of monsoon dynamics on seasonal timescales. Skilful seasonal forecasts have the potential to support long-term

planning decisions for agriculture, food security and water availability, and provide advanced warning of anomalous climatic conditions, such as droughts and floods, which can lead to widespread impacts on vulnerable livelihoods and the economy.

On climate timescales, driven by the needs of hydropower stakeholder in Nepal, the ARRCC programme has supported applied research to evaluate present-day climate and projected changes to extreme rainfall. The findings are informing resilient development policy and planning decisions, enabled through ongoing engagement with key stakeholders (e.g. Electricity Regulatory Committee). In addition, ARRCC has facilitated new sea-level science and 21st century projections for tide gauge locations across South Asia, adapting the methods used for the UKCP18 marine projections. The new projections are feeding into local-level research by project partners the Institute of Water Modelling in Bangladesh, and capacity building and knowledge sharing has been conducted in parallel through sea-level science training workshops and science-policy webinars in Pakistan and Bangladesh.

The NERC-funded project EMERGENCE studied the new CMIP6 climate projections. Research involving the Met Office as a project partner assessed the impacts of human heat stress on farm labour productivity in the rice-growing regions of South Asia.

Climate change impacts in Africa

Met Office has led major research in the Global Challenges Research Fund (GCRF) AFRICAP (Agricultural and Food systems Resilience: Increasing Capacity and Advising Policy) project on climate smart agricultural development. Research into present-day climate extremes is informing policies and practices for disaster risk management in East and Southern Africa. Weather extremes have significant implications for human lives and livelihoods, through their adverse impacts on food, energy and water security, health and vital infrastructure. For example, Met Office research found that the maize-growing region of South Africa is at risk of experiencing record-breaking hot and dry events under current climatic conditions.

The Met Office is a project partner in the NERC-funded project CongoPeat, an extensive study of the newly discovered world's largest tropical peatland in the Cuvette Centrale in the Congo basin. The Met Office contribution is to support the development of a new model of tropical peatlands in JULES for testing against palaeoclimate data and application to future projections of climate change and deforestation, to assess the risk of large-scale carbon release if the peatlands were to be degraded by human activity.

7.3.5.4 Socio-economic analysis, including analysis of both the impacts of climate change and response options

The Economic and Social Research Council (ESRC) are investing in research and data collections to understand how individuals, communities, political and corporate actions can contribute to, or mitigate and adapt to the effects of climate change. ESRC investments generate the evidence to support sustainable and equitable societies, structures, and systems for the future.

ESRC funds a team of social scientists and interdisciplinary experts to provide leadership for climate and environmental social science research – Advancing Capacity for Climate and Environment Social Science (ACCESS). They will increase the co-ordination and visibility of social science research through outreach and close relationships with stakeholders.

ESRC are investing in major research programmes designed to understand the impact of climate change on society and the economy, with the goal of developing practical solutions that will move us in the right direction to a more sustainable world. The Centre for Climate Change and Social Transformations (CAST), led by Cardiff and Bath universities, is a global

hub for understanding the profound changes required to address climate change. CAST's work focuses on how we can all make a difference in our everyday lives in the areas of food, travel, shopping, and heating or cooling in buildings, and how best to bring about these changes. And ESRC investment in the Place-based Climate Action Network (P-CAN) is translating top-level climate policy into direct, practical actions within local communities, creating healthier, more prosperous and resilient towns and cities with reduced greenhouse gas emissions. The Productivity Institute also includes important research, and the productivity portfolio has recently been expanded to include a large grant on a Productive and Inclusive Net Zero.

Interdisciplinary research delivered in partnership across UKRI is critical to achieving ESRC's research ambitions. Social science research within cross-council programmes helps to accelerate the rapid transformation required for a sustainable future and develop innovative solutions to tackle climate and environmental challenges effectively and fairly. Through cross-council programmes ESRC has supported research on climate change, air quality, land use decisions, coastal and urban environments, and the circular economy. ESRC existing portfolio also includes UKRI collaborations such as the UK Energy Research Centre and the Centre for Research on Energy Demand Solutions focusing on innovative energy solutions and moving to a low carbon economy.

7.3.5.5 Research and development on mitigation technologies

Note that examples of this theme of research are also found above in the discussion of research and international cooperation. See *Chapter 5* for adaptation innovation and technology.

Government funded innovation

Innovation is central to the UK's approach to delivering net zero. The UK has a commitment to raise total private and public R&D investment to 2.4% of GDP by 2027 – enabling the next phase of green innovation. The UK Government has recently expanded its cross-government portfolio of net zero innovation support, delivering at least £1.5 billion over the period to 2025. This will accelerate the commercialisation of low carbon technologies, systems, and business models across the economy. Sectors covered include power, buildings, industry, transport, and natural resources, waste and F-gases.

To guide priorities and investment, the UK published a Net Zero Research and Innovation Framework which sets out the critical research and innovation challenges across the UK over the next 5-10 years. UK Government funded innovation is supported by substantial programmes to develop a supportive policy environment and regulatory framework, including green finance and investment.

The UK is committed to continued active membership of Mission Innovation as the primary forum to strengthen international cooperation on clean energy innovation. The UK will provide global leadership and co-lead missions to build a renewable-powered future and deliver low cost, low carbon hydrogen.

Lower carbon energy system and economy

The shift towards low carbon sources of energy means more intermittent or inflexible generation particularly from wind and solar, and increased electricity demand as we electrify transport and heat. Significant amounts of low carbon flexibility will be needed to facilitate shifts in energy in time or location to balance supply and demand. Flexibility is essential for integrating low carbon power, heat and transport. UK Government is investing up to £100m for challenges in the areas of 'Energy Storage and Flexibility' as part of the Net Zero

Innovation Portfolio. This includes the Flexibility Innovation Programme which will make up to £65 million available for innovation which enables large-scale widespread electricity system flexibility through smart, flexible, secure, and accessible technologies and markets; and the Long Duration Energy Storage Programme which aims to accelerate commercialisation of innovative longer duration energy storage projects at different technology readiness levels, through first-of-a-kind full-system prototypes or actual demonstrations.

Greenhouse gas removal

The large-scale removal of greenhouse gases from the atmosphere is assumed in nearly all global scenarios that succeed in holding the increase in the global average temperature to well below 2°C above pre-industrial levels. The feasibility, mechanisms, and implications of some greenhouse gas removal (GGR) methods are, however, insufficiently understood for commercial-scale deployment. BEIS is investing £70 million in a pre-commercial Direct Air Capture and Greenhouse Gas Removal Innovation Programme with the aim of developing First of a Kind demonstration plants to showcase GGR technologies in the UK. This programme will better define the 'real world' feasibility of GGR techniques that might significantly assist in achieving climate policy goals from a range of technical, economic, societal and environmental perspectives.

Alongside the innovation programme, research teams across the UK will investigate the viability of five innovative methods of large-scale greenhouse gas removal from the atmosphere to help the UK reach its net zero climate target. For example, UK Research and Innovation (UKRI) will invest £30 million in five interdisciplinary projects and a central Hub located at the University of Oxford, to conduct the research over 4.5 years. The Met Office Hadley Centre is an unfunded project partner in at least one of these projects, ensuring effective use of UK climate projections. An additional £1.5 million will be invested in further studies in year 3 of the research.

Air pollution and urban environmental control

Currently, approximately half of the energy use, carbon dioxide emissions and exposure to air pollution in cities is due to either buildings or transportation and this level is increasing. UKRI has invested £42.5million through the UKRI's Strategic Priority Fund in the Clean Air programme which supports multidisciplinary research and innovation, which will help develop practical solutions for today's air quality issues and equip the UK to proactively tackle future air quality challenges to protect health and support clean growth. The programme will stimulate practical and usable solutions for clean air through predictive understanding of future air quality challenges, a systems approach to analysis, new technologies, and innovative policy and practice interventions to benefit vulnerable groups, improve public health and support clean growth.

Reduction in industrial energy use

Reducing industrial energy demand could make a substantial contribution towards decarbonisation. Industry accounts for 21% of UK GHG emissions. These emissions come from intense energy use, the manufacturing process, petroleum refining, fuel manufacturing and fugitive emissions, and grid electricity consumption. Industrial decarbonisation to the scale required requires a suite of technologies within industry including commercially mature energy efficiency, fuel switching (e.g. hydrogen), material efficiency, and carbon sequestration technologies such as carbon capture, use and storage (CCUS) and negative emission technologies such as direct air carbon capture (DACC) and bio-CCS (BECCS). UKRI's major coordinated investment in this space is the ISCF Industrial Decarbonisation Challenge (£170m), which is supporting the development of low-carbon technologies that will increase the competitiveness of industry and reduce the carbon footprint of heavy and energy

intensive industries in the UK, such as iron and steel, cement, refining and chemicals through investment in deployment projects, cluster plans and the Industrial Decarbonisation Research and Innovation Centre (IDRIC).

A major UKRI investment that is also tackling these questions is the Centre for Research into Energy Demand Solutions (CREDS)[13], which is a research centre established in 2018 with a vision to make the UK a leader in understanding the changes in energy demand needed for the transition to a secure and affordable, net-zero society. CREDS is focussing on the challenges of demand side change going 'further, faster and flexibly'.

Carbon capture, usage, and storage (CCUS)

Between 2004-2019 the UK has provided over £330 million public funding for CCUS Research and Innovation. This has been crucial in understanding the fundamental science, developing improved capture processes and equipment, as well as training the next generation of subject matter experts in CCUS. As part of BEIS £1bn Net Zero Innovation Portfolio innovation projects focussing on CCUS will be funded predominantly through three programmes: BEIS' Energy Entrepreneur Fund (EEF), UK participation in the 3rd international call of "Accelerating CCS Technology (ACT-3)" and the £20m CCUS Innovation 2.0 programme.

The aim of CCUS Innovation 2.0 is to develop novel CCUS technologies and processes that have the potential to reduce the cost of deployment in industrial sectors that have emissions that are hard to abate by other means. It does this through two grant-funded calls which will fund a number of innovation programmes to increase the technology and commercial readiness of a portfolio of projects, selected through a transparent competition process, in preparation for subsequent routes to deployment. Through this process, the consortia delivering the projects are expected to demonstrate both the technical and commercial viability of their proposed solutions, which would be aimed at deployment at moderate scale in the 2030 timeframe through first-of-a-kind demonstrators, or similar. The CCUS Innovation 2.0 programme is also funding a next-generation study which is aimed at providing techno-economic cases studies aimed at helping UK industry to understand the opportunities for deploying next-generation carbon capture technologies on site archetypes covering industry, waste and power generation for deployment in the 2030 timeframe.

Bioenergy

BBSRC and EPSRC jointly fund the £5.3 million Supergen Bioenergy Hub which brings together industry, academia, and other stakeholders to focus on the research and knowledge challenges associated with increasing the contribution of UK bioenergy to meet strategic environmental targets in a coherent, sustainable and cost-effective manner. It does this by taking a "whole systems" approach to bioenergy, so that the research focuses on the benefits that new technologies can bring within the context of the whole production and utilisation chain. In order to ensure focused research with rapid dissemination and deployment this is done in close collaboration with industrial partners and other stakeholders, including UK Government agencies. The hub takes an expressly interdisciplinary approach to bioenergy, ensuring important issues are addressed, such as the impacts of land-use change not just as scientific quantification exercises, but taking due account of the social and economic impacts. The science requirements of the bioenergy hub will be underpinned by the BBSRC Networks in Industrial Biotechnology and Bioenergy.

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[13] https://www.creds.ac.uk/

Marine renewable energy mix towards 2050

The International Energy Agency's (IEA) International Vision for Ocean Energy sets a goal of installing 337 gigawatts of wave and tidal capacity, creating 1.2 million jobs, and reducing CO_2 emissions by 1 billion tonnes by 2050. With the Supergen Marine ORE programme and the UK Centre for Marine Energy Research (UKCMER) hub, EPSRC is investing in the world-leading research, innovation, development, demonstration and deployment of wave and tidal energy. For example, the three-year EcoWatt2050 project is using computer models to simulate ways in which the deployment of multiple large-scale wave and tidal energy arrays can be planned and arranged to minimise environmental impacts and offset effects of climate change. The UKRI Energy Programme recently commissioned the Offshore Renewable Energy (ORE) Supergen to develop a wave energy roadmap to articulate how targeted research and innovation could play an important role in the wave energy journey to commercialisation which has very recently been published and to enable the capability to be matured in time to contribute to the UK's net zero 2050 target. In response, UKRI-EPSRC has also recently invested in a portfolio of research projects focussed on tackling the challenges outlined in the roadmap including novel designs for niche applications; survivability and reliability of devices in the marine environment; power take off and control systems; modelling, forecasting and evaluation of wave energy resource; and new materials for wave energy converters.

Research for developing countries

The £1bn Ayrton Fund for clean energy innovation is the main UK vehicle for ODA R&D funding of mitigation technologies (with the scope for Ayrton also including demonstration projects). Ayrton Platforms and programmes are listed under 7.2.3.3 above, however some specific examples of innovations supported by these programmes include the below:

- FCDO provided £1m of funding to the St Andrews University-led Nexgenna research group, on top of the £10m from the Faraday Institution, and this has allowed the team to focus on the energy storage opportunities and needs of developing country markets. NEXGENNA has identified a new Sodium Ion battery made only with low-cost materials for which a patent is being sought. They are working with commercial companies on some of the key technical challenges including extended cycle life and power density, while maintaining the important advantages sodium ion has over lithium ion including safety, materials sustainability and cost.
- Energise Africa is a crowdfunding platform raising investment from the UK public in enterprises delivering household solar systems in Sub-Saharan Africa. It launched in 2017 to understand the market opportunity, design and develop the crowdfunding platform itself, and iterate the offer for both borrowers and lenders. Since then, the programme has built an investor community of over 4,200 people, raised over £25million and enabled more than 600,000 people in Sub-Saharan Africa to access life-changing clean, affordable electricity.

7.4 Systematic observations

Systematic observations in the UK and its overseas territories are made by a number of national agencies and organisations. The UK's Met Office is the lead agency for making and collecting meteorological and atmospheric observations and participates in the Global Climate Observing System (GCOS). Terrestrial observations are also made or coordinated by the Natural Environment Research Council (NERC), the Environment Agency (EA), the Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW), the Northern Ireland Environment Agency (NIEA), the Forestry Commission and others. Collection of oceanographic (and marine) observations is widely distributed throughout the

UK with many UK Government departments and laboratories, universities and commercial companies involved. The UK also contributes to space-based observations through the European agencies; the European Space Agency (ESA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT).

7.4.1 Data quality

The Met Office makes a considerable effort to undertake comprehensive quality control of its GCOS stations by running checks on the data held in its climate database. These include range, internal consistency and spatial checks on the observations. Faults identified are flagged for further investigation to resolve the problem promptly. Any changes to observing networks go through a robust set of checks before implementation to ensure that GCOS monitoring principles are upheld.

The Met Office climate network includes seven stations which have been recognised as centennial observing stations as part of the WMO long-term observing stations initiative. Other subsets of the UK climate network, such as the Central England Temperature sites, also recognise the importance of sites with long and unbroken records. The Met Office works closely with the observing sites to ensure the continuation of the record wherever possible and have automated a number of climate stations in the past.

The Met Office employs dedicated teams to inspect land and marine observing sites to ensure consistency of exposure according to WMO No. 8 guidelines. Details of local conditions, instruments and exposure (Metadata) are recorded using in-house developed software and archived. This includes assessing exposure using the WMO CIMO siting classification for land observing sites.

In addition to the day-to-day treatment of data, larger projects related to data quality are periodically undertaken. For example, intercomparisons are made when equipment is changed. The Met Office is in the process of replacing its land surface observing network and has carried out extensive user testing and side by side comparisons of the equipment, inputs and outputs, with a programme of longer-term checks being carried out to ensuring continuity of climate records. This will ensure relative performance is understood and provide documentation for future reference.

The Met Office is committed to the principles of free and unrestricted exchange of essential data, as defined by the World Meteorological Organisation Resolution 40, which sees meteorological observations from the Met Office observations networks made available to the meteorological community via the WMO Information System (WIS). A key development to ensure the continued availability of meteorological and environmental data internationally is the WMO Integrated Global Observing System (WIGOS). WIGOS is currently in the implementation phase and the Met Office is actively supporting WIGOS and leading its implementation within the UK.

7.4.2 Atmospheric observations

The UK‘s contribution to the Global Climate Observing System (GCOS) Surface Network (GSN) comes from the national network (for the UK itself) of 20 stations within the UK‘s Regional Basic Climate Network (RBCN) and the 34 stations within the UK’s Reference Climate Network. The UK land surface observing network currently comprises 280 ordinary, principle and reference climate stations and 149 synoptic stations. There are an additional 2482 rainfall-only stations. These stations are all compliant with GCOS standards but are more subject to site changes or closures than the above networks.

The British Antarctic Survey (BAS) runs four overseas GCOS Surface Network stations: Halley, Rothera and Fossil Bluff and Grytviken, South Georgia. All four of the UK BAS GSN stations operate to GCOS standards and historic data have been supplied to the International Data Centre (IDC), for their operational periods where the data have been digitised.

The Met Office contributes to the European Meteorological Network (EUMETNET) Surface Marine programme (E-SURFMAR) (managed by Meteo-France & KNMI), which deploys around 120 drifting buoys per year in the North Atlantic, Nordic Seas and Mediterranean. The Met Office also procures and deploys around thirty drifting buoys each year in the South Atlantic/Southern Ocean in support of the global drifter array.

The Met Office currently manages the UK National fleet of Voluntary Observing Ships (VOS), an internationally coordinated programme of the WMO's Global Ocean Observing System (GOOS). The UK fleet consists of around 175 VOS making manual observations and a further 50 ships hosting the Met Office in-house built Autonomous Marine Observing System (AMOS). AMOS are additionally installed at six land stations in the Falklands and one Met Office-Plymouth Marine Laboratory collaborative buoy in the English Channel.

The Met Office is currently running a project to replace all original AMOS systems with a second-generation version, known as AMOS2X. This is planned to be rolled out across all Met Office automated marine platforms, including ships, moored buoys and Light Vessels by April 2023.

All marine data are exchanged on the Global Telecommunication System (GTS) and available to the International Comprehensive Ocean-Atmosphere Data Set (ICOADS). This includes contributions from BAS, NERC and other research programmes. The Met Office presently operates ten moored buoys, mainly to the west of the UK and in Biscay, and four instrumented light vessels in the English Channel, which contribute to the wider World Weather Watch/Global Observing System (WWW/GOS) surface network.

The UK contributes to the Baseline Surface Radiation Network (BSRN) with two stations, at Lerwick and Camborne, which are in the process of being refreshed.

The Met Office Radiosonde Network is part of the full WWW/GOS Upper Air Network and GCOS Upper Air Network (GUAN) and provides measurements of air temperature, water vapour and wind speed and direction. There are two sites in the UK, at Lerwick and Camborne. The Met Office Radiosonde Network is part of the Full WWW/GOS Upper Air Network and GCOS Upper-air Network (GUAN) and provides measurements of air temperature, water vapour and wind speed and direction. The data is widely used for climate measurement and model verification. The two sites in the UK are Lerwick (03005) and Camborne (03808). The Met Office also assists with the support of a small number of overseas stations.

The Atmospheric Measurement and Observation Facility (AMOF) is a NERC funded UK research facility that enables advanced measurements of the atmosphere. It manages a comprehensive suite of mobile instrumentation, observatories and laboratories. AMOF includes the Chilbolton Atmospheric Observatory (CAO) which is hosted by the Science and Technology Facilities Council (STFC). Through a combination of long-term observations and tailored operations it provides national capability for the study of clouds, rainfall, boundary-layer processes and aerosols. The portfolio includes a powerful combination of dual-polarisation Doppler radars, lidars, radiometers, and supporting instruments; the continuous round-the-clock operation of lidar and cloud radar instruments at Chilbolton is unique within the UK. The activity collects water vapour density measurements. Co-located surface meteorological measurements including solar irradiance (relevant to the surface radiation budget) are taken. Continuous monitoring of cloud profiles has allowed evaluation of model

biases or errors to be identified. Monitoring began in 1998 and is important for understanding the mechanisms by which aerosol in the atmosphere leads to the formation of different cloud types, which is important for predicting climate change. This approach, which was first established at Chilbolton, has been rolled out to other observatories across Europe as part of the Aerosol Clouds and Trace Gases Research Infrastructure (ACTRIS), and elsewhere, notably at US ARM sites.

BEIS has a monitoring and verification research programme that derives independent emission estimates for the UK using in-situ high-precision high-frequency atmospheric observations of the principal greenhouse gases reported in the UK's greenhouse gas inventory (see Chapter 2), and a range of other trace gases, at the Mace Head Atmospheric Research Station on the west coast of the Republic of Ireland and at tall tower sites in the UK DECC (Deriving Emissions linked to Climate Change) Network. The measured atmospheric concentrations are used to infer UK greenhouse gas emissions estimates using an inversion modelling technique.

7.4.3 Oceanic observations

The Met Office routinely produces many ocean products which contribute to larger international observational programmes. Observations from Voluntary Observing Ships (VOS) provide measurements of sea surface temperature, sea ice and sea state (the latter two measurements being from manually observing VOS). Sub-surface observations are not made from any UK VOS.

BAS ships observe sea-ice extent in an opportunistic manner through the VOS programme; it is observed as part of the 6-hourly meteorological synoptic observations disseminated via the WMO GTS/WWW system as part of BAS Antarctic operations.

The Met Office acts as one of two Global Data Assembly Centres (GDAC) for VOS data, with responsibility for basic quality control of ship data, and collection of those data in delayed-mode format (e.g. ship's logbooks). As part of its role as a real-time monitoring centre for marine data the Met Office routinely monitors VOS data.

The UK Argo Programme contributes to the international Argo array that makes global measurements of temperature and salinity in the water column. The UK presently has around 148 active floats contributing to the Argo float array, including floats that make additional measurements of bio-geochemical variables. The UK Argo programme is managed by the Met Office and operated in partnership with National Oceanography Centre (NOC) Southampton, British Oceanographic Data Centre (BODC) and Plymouth Marine Laboratory (PML).

The National Oceanography Centre (NOC) will invest in Biogeochemical (BGC) Argo floats over the next three years to contribute to the expansion of standard Argo to biogeochemical essential ocean variables.

NOC will continue to contribute to the full ocean depth continent-to-continent ship based hydrographic sections under the GO-SHIP programme of the Global Ocean Observing System. The UK occupied Section A5 (24.5N) in the North Atlantic in 2020. In particular, BAS and NOC cooperate in regular occupations of a transect across the Drake Passage between South America and Antarctica (SR01).

Other sustained ocean observations undertaken under the NOC-Led Climate Linked Atlantic Sector Science programme are the Atlantic Meridional Transect (AMT) Ship of Opportunity programme sampling biogeochemical variables in the upper ocean on passage from the UK to the Southern Ocean (led by PML) and Continuous Plankton Recorder (CPR)

measurements of surface plankton in the North Atlantic basin (led by the Sir Alister Hardy Foundation for Ocean Science); the Western Channel Observatory – a long time series in shallow waters in the SW English Channel (led by PML).

7.4.4 Terrestrial observations

The UK reports river discharge measurements from seven UK gauging stations to the Global Terrestrial Network for River Discharge (GTN-R), which forms part of the Global Terrestrial Network – Hydrology (GTN-H).

All seven sites operate in accordance with GCMPs. The majority of sites have a complete historical record with the Global Runoff Data Centre (GRDC). Data will continue to be provided to the GTN-R for all seven sites as part of the larger UK contribution of over 200 sites to the GRDC.

The National River Flow Archive (NRFA) is maintained by the UK Centre for Ecology and Hydrology and is the UK's main focal point for hydrometric data, providing stewardship of, and access to, daily, monthly and flood peak river flow data from over 1,500 gauging stations across the UK. The NRFA collates, quality controls, and archives river flow data from gauging station networks across the UK including the extensive networks operated by the main UK Measuring Authorities. NRFA data also include catchment daily rainfall, station descriptions, photographs, and various spatial data sets (e.g. digital elevation data, land cover, geology and hydrogeology). The NRFA regularly provides data updates, summary information and reports the GRDC, Eurostat, OECD and the ONS.

The National Groundwater Level Archive (NGLA) is maintained by the British Geological Survey (BGS), part of the Natural Environment Research Council (NERC) and operated in close collaboration with the NRFA. The NGLA brings together water level data from across the UK for a set of boreholes chosen to provide a representative national network, with boreholes in all major aquifers, which can be used to assess seasonal resource variations and long-term trends. A sub-set of the data from the NGLA are used in reports by the ONS to account for the UKs progress against groundwater-related SDGs.

Water quality monitoring is carried out in the UK by various organisations in response to water management needs – including regulatory requirements and to report on the quality of rivers, lakes, estuaries and coastal waters. This broadly consists of surveillance monitoring to measure widespread long term environmental change, and locally targeted risk-based monitoring to check for deterioration, drive water quality improvement measures, and evaluate progress towards meeting water quality objectives.

Of the stations in the Met Office land surface network, 73 synoptic sites have automatic snow depth sensors. Some ordinary climate stations also periodically report snow depth.

The British Antarctic Survey (BAS) monitors and maintains networks of GPS stations measuring the movement of key ice streams and glaciers.

7.4.5 International cooperation on observations

The following are examples of UK involvement with international observation programmes:

The intergovernmental Group on Earth Observations (GEO)

The UK is a member of the intergovernmental Group on Earth Observations, GEO, with Defra as UK Principal. GEO is a unique global network connecting government institutions, academic and research institutions, data providers, businesses, engineers, scientists and experts to create innovative solutions to global challenges through global collaboration of

experts to help identify gaps and reduce duplication in the areas of sustainable development and sound environmental management.

The UK is an active member of the GEO Climate Change Working Group (amongst others) with representatives of UK government, academia and private sector coming together to contribute to the development of a climate change programme for GEO that uses its unique convening power to connect Members and key partners such as the UN Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change (IPCC), the World Meteorological Organization (WMO), the United Nations Environment Programme (UN Environment), and the Committee on Earth Observation Satellites (CEOS) to lead national, regional and global climate action efforts.

The UK provides funding to the Group on Earth Observations Global Agricultural Monitoring Initiative (GEOGLAM) towards its work to increase market transparency and improve food security by producing and disseminating relevant, timely, and actionable information on agricultural conditions and outlooks of production at national, regional, and global scales. The UK contribution is being used to support the development of National Adaptation Plan guidance for the agricultural sector.

Copernicus

Copernicus is a joint initiative of the European Commission (EC) and ESA to which the UK contributes. The fleet of Sentinel satellites is the world's leading Earth observation constellation. Recent UK involvement includes:

- manufacture of the Sentinel-5 Precursor satellite, launched in October 2017, bridging the data gap between Envisat and Sentinel-5 providing measurements of greenhouse gas concentration in the atmosphere;
- Instrument contributions including: CCD detectors; radar electronics; cryo-coolers; instrument calibration expertise and facilities;
- Platform equipment including: batteries; propulsion systems and communications equipment;
- UK scientists are leading the specification of the anticipated Sentinel-8 high spatial resolution land surface temperature instrument;
- The UK has a scientist on the CO_2 monitoring task force.

In addition to the Sentinel satellite activity, Copernicus also involves in-situ measurements and the provision of services. The European Centre for Medium Range Weather Forecasting (ECMWF) manages the Copernicus Climate Change and Atmosphere Services from the UK. The Climate Change Service (C3S) combines observations of the climate system with the latest science to develop authoritative, quality-assured information about the past, current and future states of the climate in Europe and worldwide. Various UK institutions contribute to observational C3S services such as those recovering and providing access to historical surface meteorological observations and those providing updates forwards in time to sea-surface temperature information. The Copernicus Marine Environmental Monitoring Service led by MERCATOR in France, also features contributions from the Met Office providing ocean reanalyses.

TRUTHS and MicroCarb

The UK Space Agency collaborates with a range of international organisations, working for instance with CNES (French space agency) on MicroCarb, a satellite monitoring system for CO_2 sources and sinks across the whole earth. The UK Space Agency also co-leads on the

TRUTHS mission, along with the National Physical Laboratory. TRUTHS is a European Space Agency (ESA) climate mission, to provide a standard reference of radiation from the sun. In addition, it will enable in-flight calibration of Earth observation (EO) satellites. TRUTHS will help deliver improved confidence in Earth Observation data gathered from space and the climate forecasts driven by this data.

EUMETNET Composite Observing System (EUCOS)

The Met Office contributes to the EUCOS network, which aims to establish, operate, and evolve a European observing network under the auspices of the European Meteorological Network (EUMETNET) to deliver increased efficiency, leading to improved weather and climate services to save lives and livelihoods across Europe and further afield. EUCOS includes a terrestrial segment (surface and upper-air observing) and a surface marine programme, both of which contribute to GCOS.

ARGO

The international Argo project is an international array of profiling floats that provides a continual record of the three-dimensional temperature and salinity structure of the global ocean to 2,000m depth, with a small number of newer float designs measuring down to 6,000m depth and an increasing number of floats also measuring bio-geochemical (BGC) variables (dissolved oxygen, pH, chlorophyll fluorescence, nitrate, suspended particles and irradiance). The UK's contribution to Argo is undertaken by a partnership between the Met Office, the National Oceanography Centre (NOC) Southampton, which includes the British Oceanographic Data Centre (BODC) and Plymouth Marine Laboratory (PML). See section 7.4.3 for more detail.

Capacity building

The UK supports some overseas observation sites directly through the UK/Met Office contribution to the World Meteorological Organisation (WMO) Voluntary Cooperation Programme (VCP). For over 40 years, the UK has supported significant GUAN (Global Climate Observing System – GCOS – Upper Air Network) stations at St Helena, Seychelles and in the South Pacific (the latter in partnership with the Secretariat of the Pacific Regional Environment Programme (SPREP) and New Zealand's MetService) at Funafuti in Tuvalu, and Tarawa in Kiribati. These observations provide important data both for weather prediction and climate monitoring. Additional support is also provided to other GUAN stations where funds allow.

Chapter 8 Education, training and public awareness

8.1 Introduction

Education, training, public awareness and communications on climate change are an essential element of action on climate change. All actors, from the government to formal educators, have an important role to play in conveying clear, accurate and useful information to the public. Education, training and information raising is a devolved area of competence. This chapter covers actions supported by the UK government, Devolved Administrations and local government.

It is important to raise public awareness of climate science so that the public understand the risks and uncertainties of climate change. We need to engage the public in a conversation about the actions needed to combat climate change. This should involve climate scientists communicating the science effectively to the public.

8.2 Key developments

- In April 2022, the UK's Department for Education published its Sustainability and Climate Change Strategy for England, for education and children's services. It is centred on four strategic aims: 1) Excellence in education and skills for a changing world 2) Net Zero by 2050 3) Resilience to Climate Change and 4) A better environment for future generations. The strategy sets out a vision for the UK education sector to be world leading in sustainability and climate change by 2030. In achieving this vision, the Department for Education seeks to both inspire and respond to international action and make a difference to children and young people all over the world by championing and helping to create formal and extracurricular learning and training opportunities for all.
- In 2021, the UK Government published the Net Zero Strategy, which sets out our plan for achieving net zero carbon emissions by 2050, including clear principles on how we will engage the public and support them to make green choices.
- Ahead of COP26, the UK Government launched the 'Together for our Planet' campaign which used storytelling, high impact visuals and partnerships to demonstrate to the public the positive impact of tackling climate change.
- In December 2020, the UK government launched the MacKay Carbon Calculator, a simple, user-friendly model of the UK's energy system. Its purpose is to engage the public by helping them explore the full range of options for reducing greenhouse gas (GHG) emissions to the year 2050.

8.3 Education and training

8.3.1 England

In England there are over 72,000 early years and childcare providers. Across the UK there are more than 16m children, young people and adults in education. In April 2022 the UK Department for Education launched the Sustainability and Climate Change Strategy for the education and child services sector in England[1]. The strategy aims to prepare all children and young people to meet the challenges of climate change impacts and to benefit from the opportunities in our transition to net zero by 2050. The strategy explains our short, medium and longer-term actions towards achieving our vision for the UK education sector to become a world leader in sustainability and climate change by 2030.

Since November 2021, the Department has engaged domestic and international stakeholders across sectors and has targeted young people, through a youth panel to gain their views on the strategy.

1. The final version of the strategy was published on 21 April. The vision for the strategy is that the United Kingdom is the world-leading education sector in sustainability and climate change by 2030. We will achieve this through the following strategic aims: Excellence in education and skills for a changing world: preparing all young people for a world impacted by climate change through learning and practical experience;
2. Net Zero: reducing direct and indirect emissions from education and care buildings, driving innovation to meet legislative targets and providing opportunities for children and young people to engage practically in the transition to net zero;
3. Resilience to climate change: adapting our education and care buildings and systems to prepare for the effects of climate change.
4. A better environment for future generations: enhancing biodiversity, improving air quality and increasing access to, and connection with, nature in and around education and care settings.

8.3.1.1 Climate Education

Building on a foundation of fundamental numeracy, literacy and broad academic knowledge, all children will learn about nature, the causes and impacts of climate change and the importance of sustainability.

From birth to five years old, the early years foundation stage (EYFS) framework ensures that all children develop an understanding of the world and the natural environment. As they progress through primary and secondary school, children and young people will continue to build on this through science, geography and citizenship teaching within the national curriculum. Furthermore, existing (General Certificate of Secondary Education) GCSEs such as design and technology, food preparation and nutrition, and economics contain environmental and sustainability issues.

Support and resources will be provided to teachers to ensure they have both the confidence and capability to teach climate change

By 2025, DfE aims to introduce a Natural History GCSE giving young people a further opportunity to engage with and develop a deeper knowledge and understanding of

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[1] https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy

the natural world. An Environmental Science A level is already available for those who have an interest.

For those who continue their studies into Universities and Colleges (further and higher education), there are many excellent opportunities to gain in-depth knowledge into sustainability and climate change. Additionally, many further and higher education providers are already taking steps to embed sustainability and climate change across the full range of their courses.

Practical educational activities and clubs outside of the national curriculum allow children and young people to bring their learning to life. In some schools, children and young people can take part in eco-clubs or vegetable growing, or be exposed to sustainable food choices, recycling, adaptation projects or weather and energy monitoring.

The National Education Nature Park and Climate Leaders' Award will ensure all children and young people have opportunities to gain practical experience and turn their learning into positive action. These initiatives will be inclusive for all and will ensure that those from disadvantaged backgrounds can access these opportunities.

Retrofitted and new-build education buildings will provide various learning opportunities through their design ensuring that they are net-zero compliant with minimal environmental impact.

DfE will support the provision of carbon literacy training for all sustainability leads in every nursery, school and college by 2025.

The DfE will develop and publish a framework by 2023 to evaluate the impacts of the actions and initiatives set out within the strategy.

We will continue to identify appropriate opportunities to align climate education with the UN's Education for Sustainable Development (ESD for 2030) framework.

8.3.1.2 Green Skills and Careers

The Government's Net Zero Strategy sets out in detail how our skills reforms will support more people into green jobs and help grow future talent pipelines. DfE's Sustainability and Climate Strategy continues to build on this. This includes aligning apprenticeships to net zero objectives through the Institute for Apprenticeships and Technical Education's (IfATE) Green Apprenticeships Advisory Panel; continuing the roll-out of T-Levels (2-year courses taken after GCSEs) to support young people into green careers; driving STEM (Science, Technology, Engineering and Maths) provision through our growing network of Institutes of Technologies (IoTs); and expanding Skills Bootcamps so that adults are able to upskill and retrain in key green sectors. Through the Skills and Post-16 Education Bill, we are legislating to ensure employer leadership of Local Skills Improvement Plans have regard to skills needed to help deliver on our net zero target, adaptation to climate change, and other environmental goals.

Building on the work of the Green Jobs Taskforce, through a Green Jobs Delivery Group, launched earlier this year[2], government has brought together representatives from industry, the skills sector and other key stakeholders to develop data-driven action to support the delivery of plans for green jobs and skills, ensuring that we are offering young people and workers the opportunity to develop the skills needed to deliver the low-carbon transition.

Since the publication of the Net Zero Strategy, we have:

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[2] https://www.gov.uk/government/news/expert-report-every-uk-job-has-the-potential-to-be-green

- Set out investment of £3.8bn in further education and skills, to ensure people can access high-quality training and education that leads to good jobs, addresses skills gaps, boosts productivity and supports levelling up. This includes funding for programmes to support green skills crucial to the net zero transition.
- Committed to expand Skills Bootcamps to provide more opportunities for adults to gain new skills. We will prioritise green skills in areas such as heat pumps, zero emission vehicles, and carbon capture.
- Widened the eligibility criteria of our Free Courses for Jobs offer. From April 2022, any adult in England earning under the National Living Wage annually, or unemployed, will be able to access these qualifications for free. This includes qualifications linked to green sectors such as agriculture, building and construction, engineering, environmental conservation, horticulture and forestry and science.
- Launched a pilot of our new General Further Education College Accountability Agreements that will ensure colleges strategically plan provision to meet skills needs at both local and national levels, including those in the green sector.
- Established eight Local Skills Improvement Plan (LSIP) trailblazers, where employer representative bodies have been working closely with providers and key local stakeholders to develop tailored plans to help shape technical skills provision to better meet local labour market needs. Multiple trailblazers have been considering the skills needed to support green growth in their local economy.
- Commenced delivery of our £65 million Strategic Development Fund pilots to identify employers' skills needs, design provision, and build the capacity of local FE providers to deliver them. Where local areas identify skills needs, providers can use this funding to, amongst other things, purchase equipment, train their staff, bring in industry expertise to provide training, or deliver new provision.

8.3.2 Wales

8.3.2.1 Young People

Children and young people will also continue to be at the heart of Welsh Government's approach to public engagement on climate change and environmental matters, recognising the crucial role that the voices of our youth play in Wales' efforts to tackle the climate emergency. The voices of young people were extremely important in the development of the Net Zero Wales Plan, and the Working Together to Reach Net Zero Plan. They illustrated the power of collective action and are continuing to inspire others to do more.

The Welsh Government is committed to listening to young people and supports many activities, including funding Eco Schools and Size of Wales . These leading environmental organisations reach up to 93% of schools across Wales. Their educational and pupil-led, real-world programmes get schools, young people, families and the wider community involved in hands on environmental projects, greening their playgrounds, homes and outside space.

We are continuing our commitment to enhance opportunities for children and young people to have their voices heard but to also provide real opportunities to participate and influence what happens next. Our Youth Climate Ambassadors attended and participated at COP26, ran sessions during Wales climate week and continue to produce resources and videos, showing the actions they are taking, to inspire others.

8.3.2.2 Public sector education

There are about 311,000 people working in public services in Wales. Education and training in the form of carbon literacy programmes within the public sector will play an important role in increasing understanding across society on the climate emergency. The Welsh Government will shortly launch a new e-Learning module providing introductory training on the climate emergency available to all staff and is piloting bespoke training packages for relevant teams on topics such as biodiversity with a view to rolling-out further topic-specific modules, and a broader carbon literacy programme in the future.

The Welsh Government has provided funding to the Welsh Local Government Association (WLGA) to develop a support programme for all 22 local authorities in Wales to address climate change including taking steps to adapt to the effects of climate change that are already 'locked in' as a result of previous emissions.

Focussing around the four key themes of the Welsh Government's public sector route map[3] to net zero across the Welsh public sector by 2030 (buildings, land use, transport and procurement), the programme is delivering a range of support including toolkits, commissioned research on suitable interventions, training to build knowledge and expertise, and events to facilitate sharing of best practice.

The primary focus is on local authorities' decarbonising their own organisations but also acknowledging and supporting the important leadership role they have within their communities. This also includes a series of decarbonisation masterclasses to highlight best practice and innovative projects that Welsh councils are delivering on their journey to net zero, developing a communications and engagement strategy, and establishing the All Wales Climate Change Officers Group to promote alignment and consistency across authorities and identify potential opportunities for collaboration.

A Local Government Climate Change Strategy Panel of chief executives and experts has been set up to support local government work on both adaptation and decarbonisation and to oversee the WLGA programme. Through that forum and with the input of the local authority Leaders and Ministers, a set of local government commitments were agreed and included in the Net Zero Wales plan.

8.3.3 Scotland

Scotland's Curriculum for Excellence (CfE)[4], incorporates an emphasis on the cross-cutting theme of Learning for Sustainability – a term that brings together sustainable development education, global citizenship and outdoor learning. CfE enables young people in Scotland to learn about sustainability, including climate change, in a holistic way across the whole curriculum. Learning related to several important crosscutting themes, including sustainable development and global citizenship, is built into the experiences and outcomes across all eight curriculum areas in CfE. The Learning for Sustainability Action Plan[5] will help to ensure that all children and young people in Scotland can experience this vital area of education.

Further information on education and training, including the Scottish Government's Climate Emergency Skills Action Plan, is available in Chapter 3.

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[3] https://gov.wales/net-zero-carbon-status-2030-public-sector-route-map

[4] https://scotlandscurriculum.scot/

[5] https://www.gov.scot/publications/learning-for-sustainability-vision-2030-action-plan/

8.3.4 Northern Ireland

Queen's University Belfast has signed the Sustainable Development Goal (SDG) Accord, affirming its commitment to embedding SDGs into education, research, leadership, operations, and engagement activities. This includes a commitment to annually reporting on progress.

Sustainability is a key principle of the University's Social Charter, and Queen's is home to a wide range of teaching, research and practical actions in the field, including in areas directly connected with climate change.

In December 2021, the University became a member of the UN Sustainable Development Solutions Network (SDSN) and is developing links with other SDSN partners across the UK and Ireland.

The Centre for Sustainability, Equality and Climate Action (SECA) encourages collaborative links across Schools, Faculties and Directorates in Queen's University Belfast to investigate the interconnections between socio-economic (in)equality and the interlinked climate and ecological crisis as determined by natural and social sciences.

The Education Strand of the Corporate Strategy 2030 includes a goal to re-define degree structure at Queen's University, including curriculum, assessment and feedback. This includes a focus on embedding the UN Sustainability Goals within all programmes supported by meaningful engagement between students and research leaders and innovators. An implementation plan is under development to scope out the delivery of this goal. A host of postgraduate teaching courses incorporate aspects of SDGs as well as many undergraduate courses; for example every course offered by the Faculty of Engineering and Physical Sciences includes consideration of aspects in relation to sustainability, energy, food, land use, and climate change.

Queen's University is also taking part in a new Carbon Literacy initiative, which will provide certified training to 400 students across its three Faculties on carbon literacy and climate action. The project, run in partnership with DAERA and Keep Northern Ireland Beautiful, has been offered to students from January 2022.

8.3.4.1 Accelerating and Mainstreaming Education for Sustainable Development

Ulster University's Strategy for Learning and Teaching Enhancement (SLaTE) has developed a focus on education for sustainable development to be rolled out across all faculties and campuses. Some recent achievements include Students Organising for Sustainability (SOS) UK SDG Teach In; an Education for Sustainable Development Project (ESD) to embed ESD across all curricula; Postgraduate Certificate in Higher Education Practice which includes a 'Shaping the Curriculum' module.

8.4 Public Awareness

8.4.4.1 England

Insight

The BEIS Public Attitudes Tracker runs four times a year and consists of one longer, annual survey and three shorter, quarterly surveys which focus on a subset of questions where government perceives attitudes might shift quickly or be affected by seasonal changes. The survey was set up in 2012 to understand and monitor public attitudes to the Department's main business priorities, including climate change. Following disruptions to data collection due to Covid-19, the time series has been restarted from Autumn 2021 with a new methodology using address-based online surveying. The most recent data was collected

from 15 September to 17 October 2021 with a representative sample of 5,560 adults aged 16 or over in the UK.

COP26

In November 2020, the UK government launched the brand 'Together for our Planet', marking the one year to COP26 milestone. The campaign used storytelling, high impact visual moments and partnerships to demonstrate to people the positive impact of tackling climate change. The campaign was successful in building positive sentiment and understanding around the summit by showcasing how people across the UK are going One Step Greener to tackle climate change. As part of the campaign, 26 One Step Greener champions showed how taking one step can have a positive impact on the environment, encouraging the public to also do their bit, however large or small.

Net Zero Strategy

In the lead up to COP26, the Government published the Net Zero Strategy, which sets out its proposal for decarbonising all sectors of the UK economy to achieve net zero carbon emissions by 2050. This strategy aims to inform and engage the public on our approach to Net Zero.

The Strategy sets out how the government will support the public to make green choices, by making these easier, clearer and cheaper, and outlines the government's commitment to deliver public engagement on net zero by:

a. Communicating a vision of a net zero 2050, build a sense of collective action, improve understanding of the role different actors play in reaching net zero, and how and when choices can be made.

b. Ensuring there is trusted advice and support for people and businesses to make green choices.

c. Mobilising a range of actors and stakeholders to increase and amplify their communication and action on net zero and green choices.

d. Giving people opportunities to participate in and shape our plans for reaching net zero, thereby improving policy design, buy-in and uptake of policies.

Social media has been used as a tool to generate wider awareness of the UK government's work on Net Zero. In the run up to the publication of the Net Zero Strategy, the BEIS twitter account @beisgovuk was used to raise awareness of the release and content of the strategy.

Digital Advice

The UK government has funded several digital tools that can help people reduce their carbon footprint, including the 'Simple Energy Advice' service on how to reduce energy use in the home. The Simple Energy Advice service has received over 1.7m users to date, providing homeowners with personal, tailored advice for improving and decarbonising their homes and links to local, accredited, trusted installers. The government are also reviewing other existing digital information and advice services related to net zero and exploring how to improve wider existing public-facing net zero content and advice on gov.uk.

Public Involvement in Climate Decision Making

The UK government regularly fund public workshops and deliberative dialogues to inform a wide range of policy areas, including on climate change. In recent years, the UK has also run and funded public workshops and deliberative dialogues on a range of net zero issues such

as homes, heating, transport decarbonization, hydrogen, food, Carbon Capture Use and Storage (CCUS), Advanced Nuclear Technologies (ANT) energy, and the environment.

Through the UKRI's sciencewise programme, we have funded over 60 deliberative dialogues on science and technology over the last 15 years. Since July 2020, the Department for Digital, Culture, Media and Sport is also supporting a consultation tool for people under 25, managed by the British Youth Council. 'Involved' is an Instagram page that invites young people from across the country to share their views on key issues with the government by asking questions through the app's polling and stories functions. Responses feed directly into live public consultations and wider policy making across government departments.

Met Office

The Met Office works closely with governments, individuals and organisations to share its expert scientific knowledge and advice. Climate science can be challenging to communicate, so the Met Office has established a range of channels and approaches to conveying everything from the basics of climate science to its very latest world-class research. These channels include the main Met Office website which has pages dedicated to helping the public find out more about the climate system and climate change, a range of social channels (including YouTube and Twitter) which deliver targeted and engaging information and an award-winning outreach programme aimed at encouraging young people to study science, technology, engineering and maths (STEM) and to find out more about the work of the Met Office, including climate science.

MacKay Carbon Calculator

In December 2020, the UK government launched the MacKay Carbon Calculator[6], a simple, user-friendly model of the UK's energy system (named in honour of the late Sir David MacKay who was the driving force behind the first UK 2050 calculator). Its purpose is to engage a wide variety of people by helping them explore the full range of options for reducing GHG emissions to the year 2050. People can use this open-source tool to see the impact of building nuclear power stations or wind farms, of reducing energy demand by insulating homes or driving less, and can build their own vision of the future

There are two online versions of the calculator, a universal version called My2050 and a detailed version. Both versions contain levers of decarbonisation; 15 in My2050 and 45 in the detailed version. People can use these levers to create pathways to find out how we might reduce the UK's greenhouse gas emissions to net zero by 2050 and beyond. Users can choose their 'levels of ambition' for decarbonising different parts of the energy system, and the calculator then shows how their choices affect UK emissions expressed as 'carbon dioxide equivalent' (CO_2e). A toolkit for teachers is also available to support its use in schools, offering lesson plans linked to the national curriculum. The former Department for Energy and Climate Change (now the Department for Business, Energy and Industrial Strategy) received funding from the International Climate Fund to support 10 developing countries to build their own Calculators, as well as to develop a Global Calculator. There are now over 30 Calculators around the world covering different countries, regions and cities. The Global Calculator can be used to explore global options for reducing greenhouse gas emissions and meeting the international 2°C target, and to see how those options affect one another. Access to the Calculator is available free online.[7]

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6 https://mackaycarboncalculator.beis.gov.uk/

7 http://www.globalcalculator.org/

Local Net Zero Hubs

The government also engages with the public through the Local Net Zero Hubs which aim to promote best practice and support local authorities and communities to develop net zero projects. For example, the Greater Southeast Local Net Zero Hub is supporting a project in Bromley, Greener and Cleaner, which aims to help people work towards creating a more sustainable local community. During COP26, the Local Net Zero Hubs also delivered a locally led COP26 Domestic campaign in partnership with local authorities and other partners in the UK. It focused on promoting local contributions to the UK Net Zero ambition. During the campaign, hundreds of case studies/carbon stories were collected which focused on locally delivered net zero projects to showcase what individuals and organisations can do now to support government's net zero ambitions. The case studies have been presented openly for local authorities, businesses, and communities to access[8]. These stories are a legacy of the COP26 Domestic Campaign; a resource that will continue to inspire and accelerate collective action locally.

8.4.1 Wales

8.4.1.1 Public engagement

Since 2013, the Welsh Government has been delivering important external communications on the climate emergency. The focus of this activity has been around Wales Climate Week, an annual event held to coincide with the global Conference of the Parties (COP). In November 2021, to mark the hosting of COP26 in Glasgow, Wales Climate Week formed part of a broader programme of 'COP Cymru' events. This extensive programme engaged with nearly 4000 virtual attendees at a series of COP26 Regional Roadshows and Wales Climate Week events. A total of 38 sessions were held and involved 200 speakers, stimulating an important debate on the urgent action needed to decarbonise and adapt to the impacts of climate change.

COP Cymru also marked the launch of 'Net Zero Wales – Carbon Budget 2'[9] setting out the next stage in our pathway (2021 to 2025) to net zero by 2050. This plan signals the important shift that will need to be made by the public as we look ahead to Carbon Budget 3 (and references that nearly 60% of the abatement in the CCC's Balanced pathway for the UK that occurs by 2035 will rely on societal or behaviour change).

The launch of the Plan was supported by the publishing of Working Together to Reach Net Zero[10], demonstrating the commitments already being made by individuals, communities and organisations across Wales. An important focus of these collective efforts is Wales' Pledge Campaign, which has now generated hundreds of pledges for action. Welsh Government continues to promote the Pledge Campaign, as well as showcasing inspiring case studies around some of the actions already taken.

The Plan emphasises the importance of every citizen, community, group and business in Wales embedding the climate emergency in the way we think, work, play and travel. To support public understanding and behaviour in response to the climate emergency, work is already underway to launch a nationwide behaviour change campaign to begin later in 2022. The campaign will aim to reach everyone in Wales and encourage society to do what we can to help Wales along the path to becoming a net zero nation by 2050. To shape this, the Plan

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8 www.carboncopy.eco

9 https://gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf

10 https://gov.wales/working-together-reach-net-zero-all-wales-plan

commits to consulting on a Behaviour Change Strategy by summer 2022, setting out the principles around how we will involve society in the approach.

8.4.1.2 Just Transition

Above all, the vision and ambition is to plan a better, fairer, and greener future – and a focus on fairness will be essential in embedding the required changes across society. A Just Transition will be at the heart of Wales' approach to public engagement, ensuring no-one or no community is left behind. The approach will be framed within the context of our Programme for Government (and wellbeing objectives), and two key statutory duties: the Wellbeing of Future Generations Act and the Environment (Wales) Act (2016). These important pieces of legislation will be used to shape effective public involvement to better understand the needs of Wales' communities and people.

8.4.1.3 Stakeholder Engagement

Beyond important public engagement, the Welsh Government will publish a new Stakeholder Engagement Plan in 2022, describing our approach up to 2026. It will cover both mitigation and adaptation and set out how we will collaborate and involve our partners to develop and deliver the actions needed to tackle the climate emergency. It will also set out our aspirations for continuing to build Team Wales and broadening support and consensus right across Welsh society.

8.4.1.4 Public Sector (Employee Engagement)

The Welsh Government is also conducting important engagement work across the public sector in Wales. In recognition of the leadership role that the public sector needs to be demonstrating to broader society, an important step-change will be required amongst the estimated 311,000 people who work in public services. This includes employee engagement programmes as an opportunity to employ learnings towards broader societal engagement, an example of which includes a project being delivered by the Welsh Government Energy Service who are working with Welsh local authorities, health, Pembrokeshire Coast National Park Authority and Mid and West Wales Fire and Rescue Service to identify barriers to and opportunities for carbon reduction through workforce behaviour change.

8.4.1.5 Wales and Africa

The vision of the Welsh Government Wales and Africa programme is to support Wales to be a globally responsible nation through building and growing sustainable partnerships in sub-Saharan Africa that support the delivery of the UN's Sustainable Development Goals (SDGs). The programme supports dozens of small civil society groups who work with African partners on education, climate change initiatives, livelihoods, health and sport and culture projects promoting well-being both in Wales and in African communities.

Working with Size of Wales, the Mbale tree planting programme is a flagship collaboration initiative of the Welsh Government, The Mount Elgon Tree Growing Enterprise and partners in the Mbale Region of Eastern Uganda. For over 10 years and since the programme started 15 million trees have been distributed. The project seeks to support communities by distributing 3.1 million trees every year – one for every person in Wales, with the ambition of reaching 25 million trees by 2025. It also seeks to engage people of all ages on climate change and the importance of trees and forests as part of the solution.

The programme also supports the Plant! scheme which is now in its 10th year. Plant! celebrates the birth of every child born or adopted in Wales by planting two trees, one in new Welsh woodland ensuring trees for our future generations, while also nurturing a close personal relationship with nature from an early age. The other is a fruit tree planted in Mbale (Uganda).

8.4.2 Scotland

In September 2021, the Scottish Government published the Public Engagement Strategy for Climate Change[11]. The strategy marks a new chapter in Scotland's people-centred approach to climate change policy, moving from encouraging incremental changes in attitudes and behaviours, to supporting a society-wide transformation. It sets out Scotland's vision: for all of Scotland to understand the challenges they face and embrace their role in our transition to a net zero and climate ready Scotland. The Scottish Government's approach is centred around three pillars: ensuring people *understand* the action that Scotland is taking to tackle climate change and how it relates to their lives; enabling people to *participate* in sharing just and fair policies; and encouraging people to *take action*. The approach set out in the strategy will guide how the Scottish Government shapes engagement and participation with the Scottish public on climate change over the next five years.

8.4.3 Northern Ireland

As part of the 'Path to Net Zero' Energy action plan for 2022, Northern Ireland's Department for the Economy (DfE) has committed to developing and implementing a 'one stop shop' to provide Consumers with Energy advice.

DfE also manage a phone line offering Energy advice including advice and information on grants. This is updated regularly with emerging information flowing from the 'Path to Net Zero' Energy strategy.

8.4.3.1 Carbon literacy

In December 2020, the Department of Agriculture Environment and Rural Affairs (DAERA) initiated a project with Keep Northern Ireland Beautiful (KNIB) to develop and deliver carbon literacy training specific to Northern Ireland. The Project builds upon the pre-existing Carbon Literacy Project ran in other parts of the UK. Accredited carbon literacy courses are being delivered to teachers across Northern Ireland utilising the existing eco-schools' network. The training is also being made available to youth and community leaders via a train the trainer approach. The Carbon Literacy Project aims to raise awareness of climate change and the impacts of everyday actions on an individual, community and organisational basis to encourage action to tackle climate change.

To help support the delivery in schools, a new formal Open College Network (OCN) Award, which is equivalent to a GCSE, in reducing carbon footprints through environmental action has been developed. This will be available for schools to deliver from September 2022.

UK Government civil service materials for the carbon literacy programme have also been adapted for delivery to the Northern Ireland Civil Service (NICS) and will be delivered through the NICS training programme.

Further information on the Carbon Literacy project can be found on the Keep Northern Ireland Beautiful website[12].

Business in the Community and Climate NI, both voluntary and community organisations, are delivering climate action campaigns targeted at Businesses and Local Government respectively. These campaigns include carbon literacy training, business support services and climate pledges.

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[11] https://www.gov.scot/publications/net-zero-nation-public-engagement-strategy-climate-change/

[12] https://keepnorthernirelandbeautiful.etinu.net/cgi-bin/generic?instanceID=73

Annex 1: UKs Fifth Biennial Report to the UNFCCC

1. Introduction

The UK is pleased to submit its fifth biennial report.

This report provides information on greenhouse gas emissions and trends, including information on the UK's national GHG inventory.

2. Information on GHG emissions and trends

2.1 Summary information

This chapter presents information on the UK GHG inventory, covering emissions estimates for the period 1990-2020, and the national system established to produce and quality assure the UK GHG inventory.

Total UK emissions decreased by around 49.5% between 1990 and 2020. The reduction in GHG emissions since 1990 has been mainly driven by factors such as the move away from coal-fired generation towards the use of natural gas and renewable sources, tighter regulation of landfills, increased utilisation of landfill methane (CH_4) in gas flares and engines, and abatement technology in adipic acid and nitric acid manufacture. In 2020, COVID-19 had a significant impact on greenhouse gas emissions in the UK, in particular from transport and from businesses.

2.2 GHG inventory

The UK is obliged to produce an annual GHG inventory, containing an estimate of all anthropogenic GHG emissions across the UK, in order to meet its commitments under the UNFCCC and the Kyoto Protocol. The inventory is also used to track progress against the UK's domestic emissions reduction targets under the Climate Change Act. For more information on the UK's domestic and international targets, see Chapter 3.

The GHG inventory covers the seven direct GHGs under the Kyoto Protocol. These are collectively known as the 'basket' of GHGs and are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). For more information on the UK inventory, see Chapter 2 of the UK's 8th National Communication.

2.2.1 National Inventory arrangements

This section provides a summary of the national system the UK uses for preparing its GHG inventory. For more information on UK national inventory arrangements, see Chapter 2 of the UK's 8th National Communication.

The Department for Business, Energy and Industrial Strategy (BEIS) has been appointed as the Single National Entity with responsibility for the overall management and strategic development of priority improvements in the UK's GHG inventory. The latest National Inventory Report (NIR) provides the contact details for the Single National Entity. The UK's GHG inventory is compiled and maintained by a consortium led by Ricardo Energy & Environment[1] – the Inventory Agency – under contract to BEIS.

The GHG inventory is compiled annually according to international best practice with regard to the Intergovernmental Panel on Climate Change (IPCC) 2006 Guidelines[2] and the IPCC 2013 Wetlands Supplement[3]. The GHGs reported are estimated using methodologies which mostly correspond to the detailed sectoral Tier 2/3 methods in the IPCC Guidelines.

The development of the inventory is driven through the National Inventory Steering Committee (NISC), and the inventory improvement programme. Methodological improvements take account of new data sources, updated guidance from IPCC, and specific research programmes sponsored by UK Government Departments including the Department for Business, Energy and Industrial Strategy (BEIS), the Department for Environment, Food and Rural Affairs (DEFRA), and the Department for Transport (DfT) together with the Devolved Administrations. All methodological improvements are applied back to 1990 to ensure a consistent time series.

The UK operates an established national system for GHG emissions estimation, reporting and archiving. The methodologies and data sources used to create the GHG inventory are summarised in Section 1.4 of the NIR.

2.2.2 Changes since the last Biennial Report and National Communication

Since the UK submitted its Fourth Biennial Report in 2019, one major change to the UK's national inventory system is that the NISC has been restructured from a single body to two groups, the Advisory Body and the Executive Body. For more information see Chapter 2 of the UK's Eighth National Communication.

Since the publication of the Seventh National Communication in 2017, various updates and revisions to methodologies have been implemented in the UK's GHG inventory that have impacted on the time series of emissions. Summary information on the major revisions to the UK GHG inventory since the publication of the UK's seventh National Communication can be found in Chapter 2 of the UK's eighth National Communication.

2.2.3 Kyoto Protocol

The Kyoto Protocol (KP) was adopted in 1997 in response to the threat of dangerous climate change. For the KP, the UK's base year for assessing emissions of CO_2, CH_4, and N_2O is 1990. The UK has chosen to use 1995 as the base year for fluorinated gases emissions

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[1] Ricardo Energy & Environment, The Gemini Building, Fermi Avenue, Harwell, Didcot, OX11 0QR, Tel: +44(0)1235753000, email: enquiry-ee@ricardo.com.

[2] IPCC 2006 Guidelines: http://www.ipcc-nggip.iges.or.jp/public/index.html

[3] IPCC 2013 Wetlands Supplement: https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/

(HFCs, PFCs, SF_6 and NF_3). This is in line with most EU Member States, and in accordance with Article 3.8 of the Kyoto Protocol. This differs from the base year used by the UK when reporting more generally to the UNFCCC where the base year for all GHGs is 1990. The UK also uses the inventory to track progress against legally binding domestic targets, which are further discussed in Chapter 3.

The UK National Registry required for the KP[4] is operated and maintained by the Environment Agency[5] on behalf of BEIS. The UK Registry entered live service in January 2021.

BEIS is accountable for the UK Emissions Trading Scheme (UK ETS) and KP on behalf of the UK Government. BEIS delivers Registry services via third-party delivery partners and provides governance in the form of legislation, policy and Authority-level operations (including public reports). The Environment Agency (EA) is responsible for the day-to-day administration of the Registry.

Information on the UK Emissions Registry is available on the UK Registry website in the Kyoto Protocol Public Reports area[6]. Chapter 14 of the NIR contains further information on the changes to the Registry.

2.2.4 Geographical coverage used in this report

Unless otherwise indicated, this report presents emissions estimates based on UNFCCC geographical coverage[7]. Figures in this chapter present emissions estimates consistent with this coverage. This is consistent with the coverage for emissions trends presented in Chapter 2 of the UK's 8th National Communication and the projections presented in Chapter 4 of the UK's 8th National Communication. For more information on geographical coverage used for domestic and international reporting of the UK GHG inventory, see Chapter 2 of the UK's 8th National Communication.

2.3 Greenhouse gas emissions trends

In 2020 total GHG emissions for the UK by UNFCCC coverage were 409.5 $MtCO_2e$. This compares with emissions of 810.2 $MtCO_2e$ in 1990, representing a decrease in emissions of around 49.5%. Annual GHG emissions estimates for 2020 were an estimated 49.6% below the fixed base year[8] emissions. Annex 2, CTF Table 1 shows a summary of greenhouse gas emissions for the UK from 1990 to 2020 by gas and by sector. The data are presented under UNFCCC coverage with and without net emissions or removals from LULUCF.

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4 UK national registry https://view-emissions-trading-registry.service.gov.uk/

5 Environment Agency, PO Box 544, Rotherham, S60 1BY, United Kingdom, Tel: 03708 506 506 (UK), +44 (0) 114 282 5312 (outside UK). Email: enquiries@environment-agency.gov.uk.

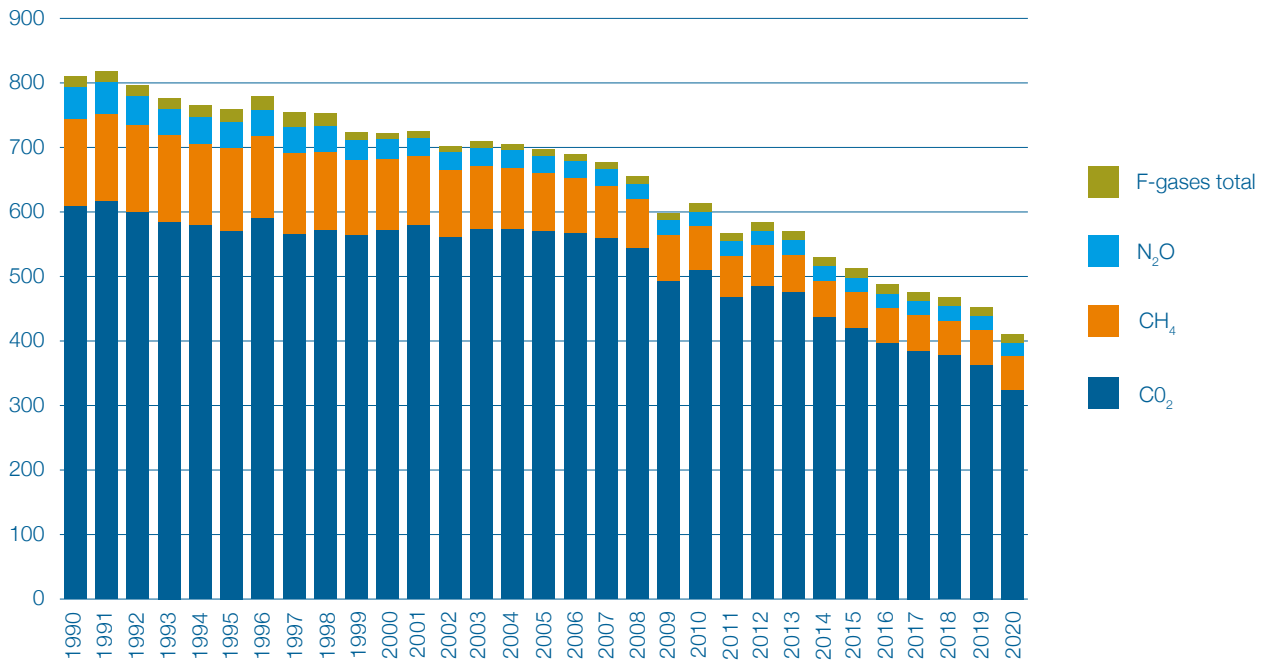
6 https://view-emissions-trading-registry.service.gov.uk/kp-reports/

7 The UK's ratification of the UNFCCC has been extended to the Overseas Territories of Bermuda, the Cayman Islands, the Falkland Islands and Gibraltar; and the Crown Dependencies of Guernsey, the Isle of Man and Jersey and the UK reports an inventory on this basis.

8 The UK's base year for assessing emissions of CO_2, CH4, and N2O is 1990. The UK has chosen to use 1995 as the base year for emissions of the fluorinated gases: HFCs, PFCs, SF6 and NF3. This is in line with most other EU Member States, and in accordance with Article 3.8 of the Kyoto Protocol.

Figure 2.1 shows the trend in emissions between 1990 and 2020 for the basket of seven GHGs covered by the Kyoto Protocol.

Figure 2.1: Total emissions of GHGs, 1990–2020, $MtCO_2e$.



Source: UK GHG Inventory, 1990-2020

Carbon dioxide (CO_2) accounted for the largest share of UK greenhouse gas emissions in 2020, making up 79.1% of the inventory. Methane (CH_4) was the second largest with 12.6%, followed by nitrous oxide with 5.1%. Fluorinated greenhouse gases (F-gases) made up 3.1% of emissions. Comparing sectors, the largest contribution to greenhouse gas emissions is from the energy sector; in 2020 this contributed 76.3% to the total net emissions.

Chapter 2 of the UK's 8th National Communication contains more information on greenhouse gas emissions and trends, including a detailed breakdown of GHG emissions and trends by gas and by source sector, as well as information on uncertainties and changes to the emissions estimates since the UK's 7th National Communication, and on the UK's quality assurance and quality control processes.

3. Quantified economy-wide emissions reduction targets

3.1 Introduction

The UK has committed to both international and domestic emissions reduction targets.

Under the EU's Convention pledge to the UNFCCC, the EU and its Member States, the UK and Iceland are jointly committed to achieving a 20% reduction of GHG emissions from 1990 levels by 2020[9]. The UK is also jointly committed to this target under the Doha Amendment to the Kyoto Protocol[10], which entered into force on 31 December 2020. To reach this target, an effort sharing agreement distributed the effort required amongst EU Member States, which at that time included the UK[11]. The UK left the European Union on 31 January 2020; under

[9] EU 2020 Convention pledge (2011) https://unfccc.int/resource/docs/2011/sb/eng/inf01r01.pdf

[10] Doha Amendment: https://unfccc.int/files/kyoto_protocol/application/pdf/kp_doha_amendment_english.pdf.

[11] Decision No 406/2009/EC https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009D0406

the terms of the Withdrawal Agreement, the UK remains committed to its shared targets and reporting with the EU under the Convention and the Kyoto Protocol.

The Paris Agreement entered into force on 4 November 2016 and was ratified by the UK on 18 November 2016. Parties to the Paris Agreement are required to prepare, communicate and maintain successive Nationally Determined Contributions (NDCs). On 12 December 2020, the UK communicated its new NDC under the Paris Agreement. The NDC commits the UK to reducing economy-wide greenhouse gas emissions by at least 68% by 2030, compared to 1990 levels. At COP26 in November 2021, the UK announced that it intended to extend ratification of the Paris Agreement to include the UK's Crown Dependencies.

3.2 International targets

This section details the UK's international 2020 targets. For information on the UK's 2030 target under the Paris Agreement, see the UK NDC[12].

Under both the EU's Convention pledge to the UNFCCC and the Doha Amendment to the Kyoto Protocol, the EU and its Member States, the UK, and Iceland are jointly committed to achieving a 20% reduction of GHG emissions from 1990 levels by 2020. More detail on the EU's Convention pledge target is given in Annex 2, CTF Table 2.

The Kyoto Protocol was adopted in 1997 as an international agreement in response to the threat of climate change. Countries that have signed and ratified the Kyoto Protocol are legally bound to reduce their greenhouse gas emissions by an agreed amount. The first commitment period of the Kyoto Protocol was from 2008 to 2012. A single European Union Kyoto Protocol reduction target for greenhouse gas emissions of -8% compared to base-year levels was negotiated for the first commitment period, and a Burden Sharing Agreement allocated the target between Member States of the European Union. Under this agreement, the UK reduction target was -12.5% on base-year levels.

The second commitment period of the Kyoto Protocol applies from 2013 to 2020 inclusive. For this second commitment period the EU, the Member States and Iceland communicated an independent quantified economy-wide emission reduction target of a 20 percent emission reduction by 2020 compared with 1990 levels (base year) ('the EU2020 target'). The EU2020 target is based on the understanding that it will be fulfilled jointly by the European Union, the Member States, the UK (including its relevant Crown Dependencies and Overseas Territories) and Iceland. Under the terms of the Withdrawal Agreement, the UK remains committed to its shared target and reporting with the EU under the Convention and the Kyoto Protocol, including any further requirements for the conclusion of the true-up period.

3.2.1 EU 2020 Climate and Energy Package and the Kyoto Protocol

Under the second commitment period of the Kyoto Protocol 2013 to 2020, the EU (and participating non-EU Member States) has a collective target to reduce its emissions by 20% relative to 1990 levels by 2020. In 2009 the EU established sub-targets through the 2020 climate and energy package[13], which underpins the implementation of the 2020 target under the Convention. A 20% reduction of total GHG emissions from 1990 levels is equivalent to a 14% reduction compared to 2005 levels. This 14% reduction objective is divided between the Emissions Trading System (ETS) and Effort Sharing Decision (ESD) sectors. These two sub-targets are:

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[12] The UK's Nationally Determined Contribution communication to the UNFCCC: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/943618/uk-2030-ndc.pdf

[13] EU 2020 Climate and Energy Package https://ec.europa.eu/clima/policies/strategies/2020_en

- A 21% reduction in emissions from sectors covered by the EU ETS compared to 2005 levels, which includes emissions from the power and industrial sectors, and since 2012 has included international aviation within the European Economic Area; and
- A 10% reduction in emissions from ESD sectors compared to 2005 levels, including buildings, agriculture, waste and transport not covered by the EU ETS.

The ESD target is distributed between Member States, and participating non-EU Member States, to reflect national circumstances, requirements for economic growth and scope for further emissions reductions. Each Member State has a national emission target for non-ETS sectors for 2020, which have been translated into binding quantified Annual Emission Allocations (AEAs) for the period 2013–2020.

Member State (and participating non-EU Member State) emissions from the traded sector are managed centrally by the Union and are not counted towards individual targets, as set out in the EU's joint fulfilment agreement for the Doha Amendment. Therefore, only the ESD sectors and a subset of LULUCF emissions are counted towards EU Member State targets under the second commitment period of the Kyoto Protocol.

The UK's share of the target under the Kyoto Protocol is discussed below. Table 3.1 illustrates the distinction between EU and UK international targets for 2020. All 2020 targets have been set using Global Warming Potential values from the IPCC's fourth Assessment Report (AR4).

3.2.2 UK targets under the Effort Sharing Directive and Kyoto Protocol

Under the ESD, the UK has a target of reducing its total emissions to around 16% below the 2005 level by 2020 for non-ETS sectors. The UK's Annual Emission Allocations (AEAs) were initially calculated[14], and subsequently adjusted in 2013[15] to ensure consistency with the enlarged EU Emission Trading System (EU ETS) scope for 2013-2020. In August 2017, the AEAs for 2017-2020 were updated[16] to ensure consistency with the latest international guidelines and methodologies for reporting emissions.

The UK's AEAs follow a declining path from 358.7 $MtCO_2e$ in 2013, to 350.9 $MtCO_2e$ in 2020, giving an allocated emission level for the entire commitment period of 2,830.5 $MtCO_2e$[17].

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[14] European Commission Decision 2013/162/EU https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013D0162

[15] Initial AEA calculations were revised in Commission Decision 2013/634/EU due to changes in the scope of the EU ETS: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013D0634

[16] Commission Decision (EU) 2017/1471 of 10 August 2017 amending Decision 2013/162/EU to revise Member States' annual emission allocations for the period from 2017 to 2020 (notified under document C(2017) 5556): http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2017.209.01.0053.01.ENG&toc=OJ:L:2017:209:TOC

[17] https://ec.europa.eu/clima/ets/esdAllocations.do?languageCode=en&esdRegistry=GB&esdYear=&search=Search&currentSortSettings=

The initial allocated emissions total for the non-ETS sectors in the UK (2,743.4 $MtCO_2e$) was used to calculate the UK's Assigned Amount for the second commitment period (CP2) of the Kyoto Protocol. The calculation of the UK's Assigned Amount is set out in UK's Initial Report for the second commitment period, and results in an Assigned Amount of 2,744,937,332 assigned amount units (AAUs) where one AAU is equivalent to one tCO_2e[18]. 2,744,937,332 AAUs for CP2 were issued to the UK Registry in 2021.

For the Kyoto Protocol, the UK's base year for assessing CO_2, CH_4, and N_2O emissions is 1990, and the UK has chosen to use 1995 as the base year for emissions of the F gases: HFCs, PFCs, SF_6 and NF_3. This is in line with most EU Member States, and in accordance with Article 3.8 of the Kyoto Protocol.

Table 3.1 a,b Comparison of EU and UK international emissions targets for 2020. See text below on the main differences in geographical, aviation and LULUCF coverage.

a) EU targets			
Target	EU target under the Convention	EU target under the Kyoto Protocol (CP2)	EU 2020 Climate and Energy Package
Target year or period	2020	2020 (Second commitment period 2013-2020)	2013-2020
Emissions reduction target	20% reduction on base year levels	20% reduction on base year levels	Overall: 20% cut in greenhouse gas emissions (from 1990 levels) ESD (non-traded) sectors: 10% reduction on 2005 levels EU ETS (traded) sector: 21% reduction on 2005 levels
Base year	1990	1990, but subject to flexibility rules. 1995 or 2000 may be used as base year for F-gases.	1990 for overall emission reduction target; 2005 for targets broken down into ETS and non-ETS emissions.
Aviation and shipping	Aviation in the scope of the EU ETS included. Domestic shipping included. International shipping excluded.	Domestic aviation included. International aviation excluded. Domestic shipping included. International shipping excluded.	ESD sectors: aviation and international shipping excluded, domestic shipping included. EU ETS sector: domestic aviation and aviation within the EEA included, shipping excluded.
Gases covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3	ESD sectors: CO_2, CH_4, N_2O, HFCs, PFCs, SF_6. EU ETS sector: CO_2, N_2O, CF4 and C2F6
Sectors included	Energy (including Transport), Industrial Processes and Product Use, agriculture, waste, aviation in the scope of the EU ETS.	Annex A of Kyoto Protocol (Energy including Transport, Industrial Processes and Product Use, Agriculture, Waste), LULUCF according to Kyoto Protocol accounting rules for CP2.	ESD: Transport (except aviation), buildings, non-ETS industry, agriculture (except forestry) and waste. EU ETS: Power and heat generation, energy-intensive industry sectors, aviation (Annex 1 of ETS directive).
GWPs used	IPCC AR4	IPCC AR4	IPCC AR4

[18] UK Kyoto Protocol Initial Report for the second commitment period (2017) https://unfccc.int/files/national_reports/initial_reports_under_the_kyoto_protocol/second_commitment_period_2013-2020/application/zip/gbk-cp2-ir-29aug2017.zip

b) UK Targets		
Target	UK target under the EU Effort Sharing Decision (ESD)	UK target under the Kyoto Protocol (second commitment period, CP2)
Target year or period	2013-2020	2020 (Second commitment period 2013-2020)
Emission target	16% reduction on 2005 emission levels for non-ETS sectors (excluding LULUCF)	2,744,937,332 AAUs over commitment period; 20% reduction on base year levels by 2020, jointly fulfilled with EU.
Base year	2005	1990 for CO_2, CH_4 and N_2O, 1995 for F-gases. UK's base year estimate of the reported Kyoto basket of greenhouse gases for the second commitment period is 803.2 $MtCO_2e$.
Geographical coverage	UK and Gibraltar	For the second commitment period, this includes the UK plus: a. Crown Dependencies (Guernsey, Isle of Man and Jersey) b. Overseas Territories (Cayman Islands, Falkland Islands and Gibraltar only. Other Overseas Territories are not included as they are not signed up to the Kyoto Protocol).
Aviation and shipping	Aviation and international shipping excluded. Domestic shipping included.	Domestic aviation included. International aviation excluded. Domestic shipping included. International shipping excluded.
Gases covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6.	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3.
Sectors included	Transport (except aviation), buildings, non-ETS industry, agriculture (except forestry) and waste. Excludes LULUCF.	Reported: Annex A of Kyoto Protocol (Energy including Transport, Industrial Processes and Product Use, agriculture, waste), LULUCF according to Kyoto Protocol accounting rules for CP2. Included in UK target: ESD sectors and KP-LULUCF.
Global Warming Potentials used	IPCC AR4	IPCC AR4

3.2.3 UK targets under the EU Emissions Trading Scheme and Kyoto Protocol

The EU Emissions Trading Scheme (ETS) was established in 2003 by Directive 2003/87/EC and is the largest ETS in the world. It is currently in Phase III (2013-2020). The EU ETS incentivises participants from the EU Member States and participating non-EU Member States (Norway, Iceland, Liechtenstein, and the United Kingdom as of 31 January 2020) to reduce emissions by placing a cap on total EU GHG emissions from the power and industrial sectors and enabling trading of allowances to ensure emissions reductions are delivered cost efficiently. The Phase III cap reduces the number of available allowances by 1.74% each year to deliver an overall reduction of 21% below 2005 verified emissions by 2020. Since the beginning of phase 3 of the EU ETS (2013-2020), the cap on emissions is set for the EU (and participating non-EU Member States) as a whole. A UK Emissions Trading Scheme (UK ETS) replaced the UK's participation in the EU ETS on 1 January 2021.

3.2.4 Differences in scope between targets and IPCC reporting requirements

The scope of UK GHG emissions reporting varies according to the differing requirements under the EU targets and the Kyoto Protocol (Table 3.1b), and the IPCC scope for reporting under the Convention. For aviation, the scope of the EU ETS is largely additional to the IPCC inventory and the Kyoto Protocol coverage, as the EU ETS includes CO_2 emissions from flights between EU Member States, emissions which are otherwise included in the inventory as 'Memo Item: International Aviation Bunkers' and not counted towards national emissions totals. Domestic aviation and shipping within the UK are included within all targets and coverages.

The UK's contribution to the EU target only applies to the UK and, of its Overseas Territories, Gibraltar. As the UK's Crown Dependencies and its other Overseas Territories that have

signed up to the UNFCCC and the Kyoto Protocol are not in the EU, the EU targets do not apply to these regions. Geographical coverage under the Kyoto Protocol includes all UK Overseas Territories and Crown Dependencies that have signed up to the Convention, excluding Bermuda for the Second Commitment Period (CP2).

LULUCF is excluded from the EU ESD and EU Convention targets but is included in the IPCC inventory and in accordance with Articles 3.3, 3.4 and 3.7 under the Kyoto Protocol.

3.3 Domestic targets

The UK has domestic targets for reducing greenhouse gas emissions under the Climate Change Act 2008 (CCA)[19]. The CCA established a long-term legally binding framework to reduce emissions, initially committing the UK to reducing emissions by at least 80% below base year emissions by 2050. In June 2019, following the IPCC's Special Report on Global Warming of 1.5°C and advice from the independent Climate Change Committee (CCC), the CCA was amended to commit the UK to achieving a 100% reduction in emissions (to net zero) by 2050.

The CCA also introduced carbon budgets, which set legally binding limits on the total amount of GHGs the UK can emit for a given five-year period and must be set 12 years in advance of the start of each period.

3.3.1 Carbon budgets

The first six carbon budgets cover the period 2008-37, with the seventh carbon budget (covering 2038-42) due to be set by mid-2026.

The UK's performance against its 2050 target and carbon budgets is assessed through the UK's net carbon account, measured in tonnes of carbon dioxide equivalent (tCO_2e). The UK GHG inventory is the basis for calculating the UK's net carbon account. Performance against a carbon budget is assessed against the earliest UK GHG inventory that covers the whole of the carbon budget period, which is published two years after the carbon budget period in question ends. For example, the sixth carbon budget will be assessed in 2039 based on the 1990-2037 UK GHG inventory.

The net carbon account also includes the UK's net purchases/sales of international carbon units, if any. Carbon units can include allowances issued under cap-and-trade systems, and international carbon credits issued under international schemes. While the UK intends to meet its targets through reducing emissions domestically, it reserves the right to use such voluntary cooperation under Article 6 of the Paris Agreement. This could occur through linking the UK ETS to another emissions trading system, or by using international emissions reductions or removals units.

The net carbon account for each carbon budget is calculated according to rules set out in Carbon Accounting Regulations[20].

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[19] https://www.legislation.gov.uk/ukpga/2008/27/contents

[20] https://www.legislation.gov.uk/uksi/2021/189/made?view=plain

Table 3.2: Carbon budget accounting summary

Target	Carbon budget 1	Carbon budget 2	Carbon budget 3	Carbon budget 4	Carbon budget 5	Carbon budget 6
Target year or period	2008-12	2013-17	2018-22	2023-27	2028-32	2033-37
Emission target	3,018 $MtCO_2e$	2,782 $MtCO_2e$	2,544 $MtCO_2e$	1,950 $MtCO_2e$	1,725 $MtCO_2e$	965 $MtCO_2e$
Base year	1990 (CO_2, CH_4, N_2O) 1995 (F-gases)	1990 (CO_2, CH_4, N_2O) 1995 (F-gases)	1990 (CO_2, CH_4, N_2O) 1995 (F-gases)	1990 (CO_2, CH_4, N_2O) 1995 (F-gases)	1990 (CO_2, CH_4, N_2O) 1995 (F-gases)	1990 (CO_2, CH_4, N_2O) 1995 (F-gases)
Geographical coverage	UK (excluding crown dependencies and overseas territories)	UK (excluding crown dependencies and overseas territories)	UK (excluding crown dependencies and overseas territories)	UK (excluding crown dependencies and overseas territories)	UK (excluding crown dependencies and overseas territories)	UK (excluding crown dependencies and overseas territories)
International aviation and shipping	Excluded	Excluded	Excluded	Excluded	Excluded	Included
Gases covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6.	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6.	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3[21].	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3.	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3.	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3.
Sectors included	Energy (including transport), industrial processes and product use, agriculture, waste, LULUCF	Energy (including transport), industrial processes and product use, agriculture, waste, LULUCF	Energy (including transport), industrial processes and product use, agriculture, waste, LULUCF	Energy (including transport), industrial processes and product use, agriculture, waste, LULUCF	Energy (including transport), industrial processes and product use, agriculture, waste, LULUCF	Energy (including transport), industrial processes and product use, agriculture, waste, LULUCF
Global Warming Potentials used	IPCC SAR	IPCC AR4	IPCC AR5	IPCC AR5	IPCC AR5	IPCC AR5

4. Progress in achievement of quantified, economy-wide emission reduction target

4.1 Mitigating actions and effects

Chapter 3 of the UKs Eighth National Communication provides a comprehensive overview of the UK's policies, plans and proposals to meet our emissions reduction targets. These are organised by sector and cover all greenhouse gas emissions. In addition to the explanatory text, policies are summarised in Annex 2, CTF Table 3. Where the information is available, Annex 2 CTF Table 3 quantifies the emissions reductions expected from the policies set out in Chapter 3 of the UKs Eighth National Communication. Chapter 3 also covers enabling policies and proposals which seek to mitigate and manage the economic and social consequences of the transition as well as maximise the opportunities, including green jobs, green investment and local climate action.

The UK has made considerable efforts to embed decision-making on climate change across the UK Government. The 'Embedding net zero' section 3.18 of Chapter 3 of the UKs Eighth National Communication sets out the institutional arrangements and how we monitor, report and track our progress to our net zero target.

4.2 Emissions reduction targets: international targets

Under both the EU's Convention pledge to the UNFCCC and the Doha Amendment to the Kyoto Protocol, the EU and its Member States (and participating non-EU Member States) are jointly committed to achieving a 20% reduction of GHG emissions from 1990 levels by 2020. More detail on the EU's Convention pledge target is given in Chapter 3 of the UK's Fifth

[21] The UK Government is planning to bring forward legislation to include nitrogen trifluoride (NF3) in scope of carbon budgets, and will seek to do this in time to be included in Carbon Budget 3.

Biennial Report and CTF Table 2 in Annex II. Note that for progress against targets detailed in this chapter, geographical coverage used to calculate GHG emissions and trends is aligned with the geographical scope of the target (see Table 3.1).

4.2.1 UK contribution to EU 2020 targets: EU ESD

In October 2021 the European Commission confirmed for each participating country their performance against the EU Effort Sharing Decision (ESD) for 2019[22]. UK greenhouse gas emissions for 2019 under the ESD were confirmed to be 329.1 $MtCO_2e$[23], 24.9 $MtCO_2e$ below the UK's annual limit for 2019 of 354.1 $MtCO_2e$, meaning that the UK met its seventh annual target in the period. Provisional estimates indicate that UK greenhouse gas emissions for 2020 under the Effort Sharing Decision will also be below the annual emissions limit, by around 54.1 $MtCO_2e$. The UK is therefore on track to meet all its annual targets under the EU ESD for 2013-2020, as shown in Table 4.1 below.

Table 4.1: Progress towards the EU Effort Sharing Decision, UK and Gibraltar, 2013-2020 ($MtCO_2e$)

	2013	2014	2015	2016	2017	2018	2019	2020
Total greenhouse gas emissions excl. LULUCF and NF_3 (A)	566.5	524.0	503.5	482.8	470.5	460.3	449.2	402.1
Total verified emissions from stationary installations under the EU ETS (B)	225.3	197.9	175.9	147.4	136.8	128.9	118.6	104.6
CO_2 emissions from civil aviation (C)	1.7	1.6	1.6	1.5	1.6	1.5	1.5	0.6
Total ESD emissions (D = A – B – C)	339.5	324.4	326.0	333.9	332.1	329.9	329.1	296.9
Annual emissions allocation (E)	358.7	354.2	349.7	345.2	360.4	357.2	354.1	350.9
Difference (E – D)	**19.3**	**29.8**	**23.7**	**11.3**	**28.4**	**27.4**	**24.9**	**54.1**

Source: Final UK GHG emissions national statistics 1990-2020 Excel data tables (table 2.2(c))[24].

Notes:

i. The geographical coverage for the ESD is the UK and Gibraltar. Under the terms of the Withdrawal Agreement, the UK remains committed to its targets under the EU ESD due to its shared target with the EU under the Kyoto Protocol.
ii. ESD emissions are calculated as total greenhouse gas emissions for the UK and Gibraltar minus NF3 and LULUCF emissions, minus verified emissions from stationary installations under the EU ETS, minus CO2 emissions from civil aviation.
iii. ESD emissions for 2020 are provisional and subject to change, pending completion of the EU review and compliance process in 2022.

4.2.2 UK contribution to EU 2020 targets: EU ETS

Member State (and participating non-EU Member State) emissions from the traded sector are managed centrally by the European Union and are not counted towards individual Member State targets, as set out in the EU's joint fulfilment agreement for the Doha Amendment.

4.2.3 UK progress towards Kyoto Protocol targets: first commitment period (2008-2012)

The UK met its emissions reductions target for the first commitment period of the Kyoto Protocol. Under the first commitment period of the Kyoto Protocol (2008-12), the EU and its Member States, Iceland and Norway collectively made a commitment to reduce greenhouse gas emissions across the EU by 8% on 1990 levels by 2012. As part of this, the UK

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22 Commission Implementing Decision (EU) 2021/1876 of 20 October 2021 on greenhouse gas emissions covered by Decision No 406/2009/EC of the European Parliament and of the Council for the year 2018 for each Member State: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021D1876&qid=1642152861255

23 ESD dataset 2021, EEA website: https://www.eea.europa.eu/data-and-maps/data/esd-3

24 https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2020

undertook to reduce total greenhouse gas emissions by 12.5% below base year levels over the five-year period 2008-12[25].

4.2.4 UK progress towards Kyoto Protocol targets: Second commitment period (2013-2020)

Parties submitted 'initial reports' to facilitate the calculation of their allocated emission units permitted under their Kyoto targets.[26] The UK's initial report translates the UK's targets for the non-traded sectors into Assigned Amount Units (AAUs).[27] Particular rules for the accounting of the LULUCF sectors are used (KP-LULUCF), and some minor LULUCF sources are also excluded from accounting.[28]

As of 28 October 2020, 147 Parties have deposited their instrument of acceptance (including the UK), therefore the threshold for entry into force of the Doha Amendment has been met[29]. The amendment entered into force on 31 December 2020. Table 4.2 contains indicative figures for the UK's progress against its targets under the Doha Amendment, which show the UK is on track to meet its target. The second commitment period of the Kyoto Protocol concluded in December 2020, but progress against the Kyoto target will not be finalised until the 'true-up' process, after final reporting of all emissions over the commitment period has taken place.

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[25] Council Decision (2002/358/EC) of 25 April 2002: http://www.eea.europa.eu/policy-documents/council-decision-2002-358-ec

[26] 'Initial Reports' for the second commitment period of the Kyoto Protocol: https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-kyoto-protocol/second-commitment-period/initial-reports

[27] UK Initial Report for the second commitment period of the Kyoto Protocol: https://unfccc.int/files/national_reports/initial_reports_under_the_kyoto_protocol/second_commitment_period_2013-2020/application/zip/gbk-cp2-ir-29aug2017.zip

[28] Kyoto Protocol https://unfccc.int/sites/default/files/resource/docs/cop3/l07a01.pdf ; Decision 2/CMP.7 https://unfccc.int/resource/docs/2011/cmp7/eng/10a01.pdf; IPCC 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol https://www.ipcc-nggip.iges.or.jp/public/kpsg/index.html

[29] UNFCCC Doha Amendment: https://unfccc.int/process/the-kyoto-protocol/the-doha-amendment. Information on the acceptance and entry into force of the Doha Amendment: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-c&chapter=27&clang=_en

Table 4.2: Indicative progress towards Kyoto Protocol target: 2nd Commitment Period (KP2), 2013-2020 ($MtCO_2e$)

	2013	2014	2015	2016	2017	2018	2019	2020
Effort Sharing Decision (ESD) sectors – UK and Gibraltar (excludes ETS and LULUCF)	339.5	324.4	326.0	333.9	332.1	329.9	329.1	296.9
Emissions from other Overseas Territories and Crown Dependencies included in UK ratification of Doha Amendment (excludes LULUCF)	3.2	3.1	3.1	3.0	3.1	3.1	3.2	2.7
Accounted KP-LULUCF emissions	-2.8	-3.0	-2.4	-2.4	-2.5	-1.6	-1.1	-1.5
Total yearly emissions	**339.8**	**324.6**	**326.7**	**334.5**	**332.7**	**331.4**	**331.3**	**298.1**
Cumulative emissions (2013-2020)								**2,619.1**
Allowance for KP2 period (2013-2020)								**2,744.9**

Source: Final UK GHG emissions national statistics 1990-2020 Excel data tables (table 2.2(b))[30].

Notes:

i. The Kyoto Protocol second commitment period runs from 2013-2020. The UK is Jointly Fulfilling its target with the EU and its Member States. The EU accounts for emissions produced under the EU ETS, and participating countries account for emissions in the non-traded sectors. Therefore, ESD emissions are used here to indicate UK progress in the non-traded sectors (except for LULUCF sectors).
ii. The Crown Dependencies of Guernsey, Jersey and the Isle of Man and the Overseas Territories of Gibraltar, the Cayman iii. Islands and the Falkland Islands have agreed to have the UK's ratification of the Doha Amendment extended to them. As for the UK, Gibraltar's traded sector emissions are accounted for under the EU ETS and non-traded sector emissions accounted for under the EU ESD (excluding LULUCF). Emissions from the other Overseas Territories and Crown Dependencies and from aviation and shipping between the UK and these areas were calculated from data in the 1990-2020 inventory.
iii. Under the Kyoto Protocol target, alternative rules for the accounting of the land use, land-use change and forestry sector (LULUCF) are used (KP-LULUCF). Some minor sources are also excluded from accounting. (e.g. lag effects of conversion of land to settlement pre-1990). Final accounting will not occur until the Kyoto Protocol 'true-up' process, so these figures are indicative.
iv. The base year estimate for the second commitment period of the Kyoto Protocol is not shown in this table. The calculation for the base year estimate (803.2 MtCO2e) is set out in the UK's initial report for the second commitment period[31].

4.3 Emissions reduction targets: domestic targets

The first carbon budget ran from 2008-12. In 2014, it was confirmed the UK had met the budget with emissions 36 $MtCO_2e$ below the cap of 3,018 $MtCO_2e$. Territorial emissions estimates (both with and without LULUCF) for base year and target years and handling of emissions trading in the EU ETS are included in the final statement[32].

The second carbon budget ran from 2013-17. In 2019, it was confirmed the UK had met the budget with emissions 384 $MtCO_2e$ below the cap of 2,782 $MtCO_2e$. Territorial emissions estimates (both with and without LULUCF) for base year and target years and handling of emissions trading in the EU ETS are included in the final statement[33].

A final statement for the third carbon budget, covering the period 2018-22, will be published in May 2024. Reporting based on latest greenhouse gas emissions estimates shows the UK net carbon account is below the average level required to meet the third carbon budget in each of the first three years of the period. Territorial emissions estimates (both with and without LULUCF) for base year and target years and handling of emissions trading in the EU ETS are included in the reporting[34].

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30 https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2020

31 https://unfccc.int/files/national_reports/initial_reports_under_the_kyoto_protocol/second_commitment_period_2013-2020/application/zip/gbk-cp2-ir-29aug2017.zip

32 https://www.gov.uk/government/statistics/final-statement-for-the-first-carbon-budget-period

33 https://www.gov.uk/government/statistics/final-statement-for-the-second-carbon-budget-period

34 https://www.gov.uk/government/collections/annual-statements-of-emissions

Information on legislated UK domestic greenhouse gas emissions reduction targets (carbon budgets) can be found in Chapter 3 of the UK's Eighth National Communication and Chapter 3 of this Biennial Report.

The UK's most recent full update to the greenhouse gas emissions projections can be found in Chapter 4 of the UK's Eighth National Communication. These projections are based on the 2019 edition of the UK's Energy and Emissions Projections (EEP 2019), for which the policy cut-off point was August 2019. They therefore represent a counterfactual, showing what the UK would have expected to happen in the absence of further policies such as those included in the Net Zero Strategy. Over time, future projections will include further measures from the Net Zero Strategy as they progress to the impact assessment stage.

Some further policies introduced after EEP 2019 have been included in Annex 2 CTF Table 3, but the mitigation impact of these additional policies has not yet been quantified in the projections.

5. Projections

5.1 Introduction

This chapter presents information from the most recent full update to the UK's GHG Energy and Emissions Projections (EEP) 2019, published in October 2020.[35] It includes estimates of future energy demand and GHGs in the UK up to 2040. The analysis for EEP 2019 was completed before the coronavirus (Covid-19) pandemic, so these projections take no account of the impacts of this on future energy demand or emissions.

5.2 Key developments

This section reports on updated emission projections for 2030 and 2040. The key points are:

- The UK's Energy and Emissions Projections[36] (EEP) are estimates of the future level of energy consumption and greenhouse gas emissions and only include existing and planned policies deemed to be sufficiently quantified by August 2019, which was the cut off point for inclusion in EEP 2019. These projections therefore represent a counterfactual, showing what the UK would expect to happen in the absence of further, more recent policies such as those included in the UK's Net Zero Strategy, published in October 2021, which sets out policies to keep the UK on track for meeting carbon budgets and the 2030 Nationally Determined Contribution. See Chapter 3 of the UK's 8th National Communication for information on more recent policies and measures not included in these projections.
- On this basis, the projections show that by 2030, UK emissions of the basket of the 7 greenhouse gases (GHGs) covered by the Kyoto Protocol[37] would be expected to be approximately 365 $MtCO_2e$, or 55% lower than the 1990 level; and by 2040, the projections show equivalent figures of 361 $MtCO_2e$ and 55% lower respectively. As new policies and measures are developed and implemented, the resulting emissions savings will be factored into future projections.

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[35] See https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019

[36] See https://www.gov.uk/government/collections/energy-and-emissions-projections

[37] We report LULUCF emissions in full to be consistent with Inventory Convention reporting. This scope is wider than that under Articles 3.3 and 3.4 of the Kyoto Protocol and includes estimates for all anthropogenic sources minus sinks.

- The UK projects emissions of CO_2, CH4 and N2O of 52%, 68% and 60% respectively below 1990 levels by 2040.
- The UK projects that (joint) emissions of the fluorinated GHGs: HFCs, PFCs, SF6, and NF3 will be 83% below their 1990 levels by 2040.

5.3 Overall projections of GHG emissions

The projections presented in this National Communication focus on the With Existing Measures (WEM) policy scenario. EEP 2019 also includes a With Additional Measures (WAM) scenario: this includes additional policies that were classed as planned at the cut-off date of August 2019. The projection models incorporate information from the UK's 1990-2018 GHG Inventory publication (published in 2020). The historic statistics presented here and in Chapter 2 are from the UK's 1990-2020 GHG Inventory (published in 2022). The UK's 1990-2020 GHG Inventory includes additional emissions from application of methodologies in the IPCC 2013 wetlands supplement which were not included in the 1990-2018 GHG Inventory. This gives rise to a discontinuity between historic and projected data presented in this chapter. However, the UK does not expect broad patterns of the emissions profile to change significantly when this new information[38] is incorporated into the next edition of the projections.

The WEM scenario includes policies that had been implemented or adopted by August 2019 but excludes planned measures. In addition, the UK provides selected data from the WAM scenario, which includes planned measures as at the same policy cut-off date. Both projection scenarios exclude any use of flexible mechanisms such as the UK Emissions Trading Scheme (ETS) or Joint Implementation and Clean Development Mechanism (CDM) credits.

The figures within this National Communication include British Crown Dependencies and Overseas Territories. These territories are excluded from UK Carbon Budget's legislation and do not appear in the EEP report. According to the UK's 1990-2020 GHG Inventory, these regions were responsible for 0.9% of total emissions on average between 2017 and 2020 (inclusive). Throughout this chapter, the geographical scope of the presented figures includes the UK and its Crown Dependencies and Overseas Territories as denoted by the label '(UNFCCC coverage)' unless otherwise specified.

Under the WEM scenario, the UK projects GHG emissions including LULUCF of 365 $MtCO_2e$, about 55% below the 1990 level by 2030, and roughly 361 $MtCO_2e$ by 2040. The percentages are very similar if LULUCF is excluded[39].

Tables 5.1 and 5.2 show overall projections for each gas under WEM and WAM scenarios respectively. This shows that additional planned policies as of August 2019 are expected to mainly affect CO_2 emissions, reducing them by 11 Mt more in the year 2040 than in the equivalent projection under the WEM scenario.

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[38] This statistical release explains how the Inventory has changed: (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1051408/2020-final-greenhouse-gas-emissions-statistical-release.pdf)

[39] We report LULUCF emissions in full to be consistent with Inventory Convention reporting. This scope is wider than that under Articles 3.3 and 3.4 of the Kyoto Protocol and includes estimates for all anthropogenic sources minus sinks.

Table 5.1: GHG emissions by gas for WEM scenario, $MtCO_2e$ (UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	609	571	571	570	510	420	324	303	296	291	295
Methane	135	129	111	90	67	56	52	46	44	43	43
Nitrous oxide	50	40	30	26	23	22	21	21	20	20	20
Hydrofluorocarbons	14	19	8	9	12	14	12	7	4	2	2
Perfluorocarbons	2	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphur hexafluoride	1	1	2	1	1	<0.5	<0.5	<0.5	1	1	1
Nitrogen trifluoride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**810**	**760**	**723**	**697**	**613**	**512**	**410**	**378**	**365**	**358**	**361**
Change from 1990 (%)		*-6*	*-11*	*-14*	*-24*	*-37*	*-49*	*-53*	*-55*	*-56*	*-55*
Memo Items											
Aviation bunkers	16	20	30	35	32	33	14	37	37	37	37
Marine bunkers	9	9	8	9	12	11	9	11	11	11	11

Table 5.2: GHG emissions by gas for WAM scenario, $MtCO_2e$ (UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	609	571	571	570	510	420	324	302	292	284	284
Methane	135	129	111	90	67	56	52	46	43	42	41
Nitrous oxide	50	40	30	26	23	22	21	21	20	20	20
Hydrofluorocarbons	14	19	8	9	12	14	12	7	4	2	2
Perfluorocarbons	2	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphur hexafluoride	1	1	2	1	1	<0.5	<0.5	<0.5	1	1	1
Nitrogen trifluoride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**810**	**760**	**723**	**697**	**613**	**512**	**410**	**377**	**360**	**349**	**348**
Change from 1990 (%)		*-6*	*-11*	*-14*	*-24*	*-37*	*-49*	*-54*	*-56*	*-57*	*-57*
Memo Items											
Aviation bunkers	16	20	30	35	32	33	14	37	37	37	37
Marine bunkers	9	9	8	9	12	11	9	11	11	11	11

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.3.1 Projected progress across territorial emissions

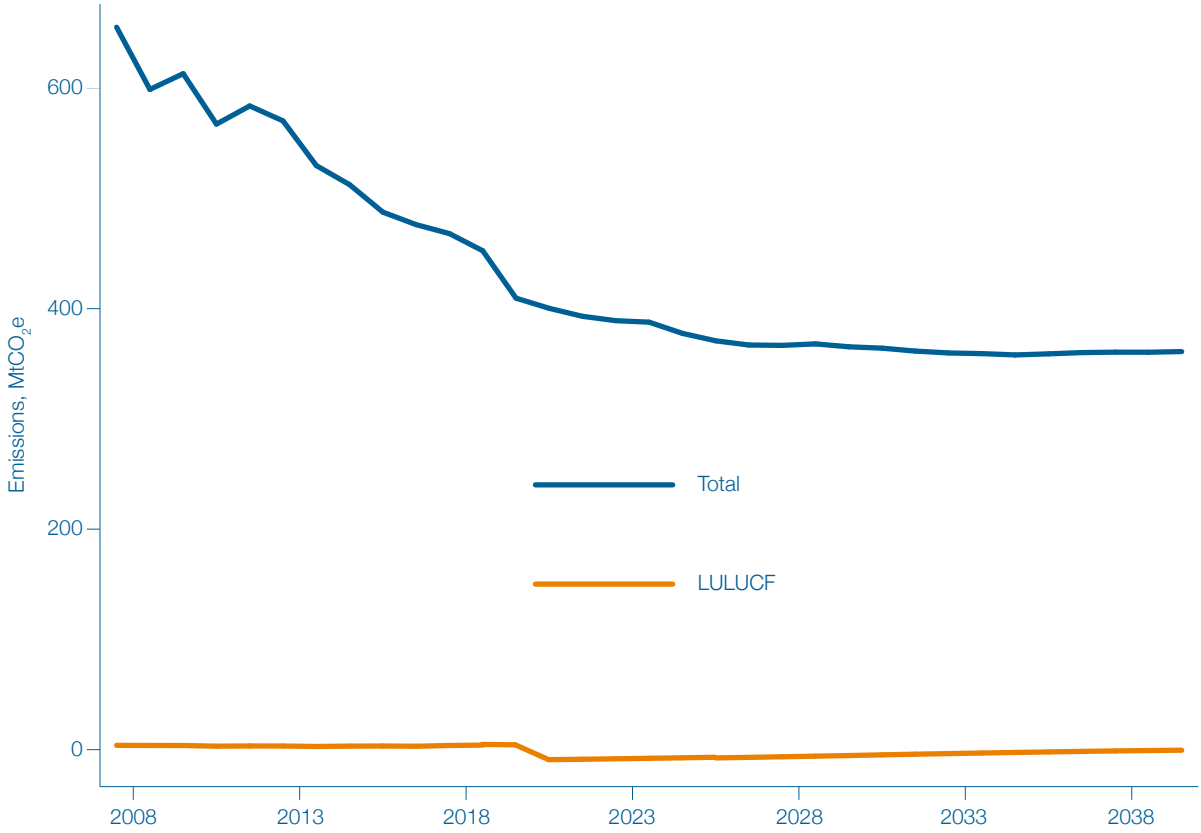


Figure 1: Projected UK emissions in $MtCO_2e$ (WEM scenario, UNFCCC coverage)

Note: The historic data in this chart is from the UK's GHG Inventory 2022: projections modelling is based on the GHG Inventory 2020.

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

The UK projects in the WEM scenario that the energy supply and business sectors make up around 23% of UK emissions in 2030. With the existing policies and measures in place, emissions from these sectors are projected to increase by 3% between 2030 and 2040 and emissions from the remaining sectors (excluding LULUCF) are projected to fall by 4% between 2030 and 2040. In the WAM scenario, projected energy supply and business emissions decrease by 5% over the same period. The UK no longer reports emissions against Traded and Non-Traded sectors according to European Union Emissions Trading System (EU ETS) definitions since leaving the EU in 2020.

Tables 5.3 and 5.4 show the main impact of additional planned policies. By 2040, the UK projects that the additional impact of these measures could leave emissions 13 $MtCO_2e$ (4%) lower.

5.3.2 Projected progress of total territorial UK emissions

Table 5.3: WEM scenario projections, $MtCO_2e$, Projected progress across territorial emissions (UNFCCC coverage)

	Actuals			Projections			
	2010	2015	2020	2025	2030	2035	2040
Emissions total exc. LULUCF	609	509	406	386	371	361	362
LULUCF	4	3	4	-8	-5	-3	0
Total	613	512	410	378	365	358	361

Table 5.4: WAM scenario projections, $MtCO_2e$Projected progress across territorial emissions (UNFCCC coverage)

	Actuals			Projections			
	2010	2015	2020	2025	2030	2035	2040
Emissions total exc. LULUCF	609	509	406	385	366	352	349
LULUCF	4	3	4	-8	-5	-3	0
Total	613	512	410	377	360	349	348

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4 Projections by sector

Table 5.5 shows the UK's projections of the distribution of GHG emissions across sectors of the UK economy.

Table 5.5: GHG emissions by sector in $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Transport	130	131	135	138	126	125	100	113	103	92	85
Energy supply	281	239	224	233	209	147	85	62	62	62	64
Business	113	111	114	106	90	83	74	61	55	53	54
Residential	80	82	89	86	88	68	67	68	71	74	78
Agriculture	54	53	51	49	46	47	45	48	48	48	48
Waste management	65	68	61	48	29	19	18	16	15	15	15
Industrial processes	60	51	27	21	13	13	10	9	9	9	8
Public	13	13	12	11	10	8	7	8	9	9	9
LULUCF	13	11	8	5	4	3	4	-8	-5	-3	<0.5
Total	**810**	**760**	**723**	**697**	**613**	**512**	**410**	**378**	**365**	**358**	**361**
Change from 1990 (%)		*-6*	*-11*	*-14*	*-24*	*-37*	*-49*	*-53*	*-55*	*-56*	*-55*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.1 Transport

Table 5.6 gives projections for transport emissions of around 21% lower than 1990 levels by 2030 and 34% lower by 2040. The UK expects that measures to improve vehicle efficiency, such as CO_2 emissions regulation and the design of the Zero Emission Vehicles (ZEV) mandate for new cars and vans, will directly reduce emissions by mandating greater use of biofuels and providing incentives to encourage the adoption of electric vehicles.

Table 5.6: Transport emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	127	128	132	136	125	124	99	112	101	90	84
Methane	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	2	2	2	1	1	1	1	1	1	1	1
Total	**130**	**131**	**135**	**138**	**126**	**125**	**100**	**113**	**103**	**92**	**85**
Change from 1990 (%)		*1*	*4*	*6*	*-3*	*-4*	*-23*	*-13*	*-21*	*-29*	*-34*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.2 Energy supply

The UK projects energy supply emissions of 78% lower than 1990 levels by 2030 and 77% lower by 2040 (see Table 5.7). Following recent sharp falls in coal-fired generation, the projections show a further gradual decline in fossil fuel-based generation up to the late 2020s as it is displaced by an increase in renewable electricity generation. From the late 2020s natural gas generation is projected to gradually increase in the WEM scenario, alongside the continued more rapid growth in renewables to meet increasing electricity demand. The projections show that emissions from electricity production will fall steadily to the late 2020s before rising slightly to 2040.

Table 5.7: Energy Supply emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	245	211	206	220	199	139	80	56	56	57	59
Methane	34	27	17	11	9	7	5	6	5	5	5
Nitrous oxide	1	1	1	1	1	1	1	1	1	1	1
Total	**281**	**239**	**224**	**233**	**209**	**147**	**85**	**62**	**62**	**62**	**64**
Change from 1990 (%)		*-15*	*-20*	*-17*	*-26*	*-48*	*-70*	*-78*	*-78*	*-78*	*-77*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.3 Business

Table 5.8 shows business emissions are projected to be 51% lower than 1990 levels by 2030, and 53% lower by 2040. The UK attributes improvements over time to the impact of policies that encourage energy efficiency, such as building regulations and minimum energy efficiency standards for new products, together with economic measures such as the Streamlined Energy and Carbon Reporting (SECR) and the Renewable Heat Incentive.

Table 5.8: Business emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	112	109	109	97	78	70	62	53	50	50	51
Methane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	1	1	1	1	1	1	1	1	1	1	1
Hydrofluorocarbons	<0.5	<0.5	2	6	10	12	11	6	3	1	1
Perfluorocarbons	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphur hexafluoride	1	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	1	1
Nitrogen trifluoride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**113**	**111**	**114**	**106**	**90**	**83**	**74**	**61**	**55**	**53**	**54**
Change from 1990 (%)		*-2*	*<0.5*	*-7*	*-21*	*-26*	*-35*	*-47*	*-51*	*-54*	*-53*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.4 Residential

The long-term driver of emissions from UK households is the increase in household numbers over the whole period, due to population growth in the UK and a continuing trend for households to be smaller (Table 5.9). These drivers of increasing emissions are initially offset by the impact of existing energy and emission reduction policies through, for example, improved insulation of homes. The overall impact of these factors is projected to lead to a rise in domestic emissions of 7 $MtCO_2e$ (10%) between 2030 and 2040.

Table 5.9: Residential emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	79	80	86	83	85	65	65	66	68	71	76
Methane	2	1	1	1	1	1	1	1	1	1	1
Nitrous oxide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**80**	**82**	**89**	**86**	**88**	**68**	**67**	**68**	**71**	**74**	**78**
Change from 1990 (%)		*2*	*11*	*7*	*9*	*-16*	*-17*	*-15*	*-12*	*-8*	*-3*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.5 Agriculture

These projections show emissions from the agriculture sector remaining constant between 2030 and 2040. Table 5.10 illustrates this.

Table 5.10: Agriculture emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	6	7	5	6	5	5	6	10	10	10	10
Methane	29	29	28	27	25	26	25	25	25	24	24
Nitrous oxide	18	18	17	16	15	15	15	14	14	14	14
Total	**54**	**53**	**51**	**49**	**46**	**47**	**45**	**48**	**48**	**48**	**48**
Change from 1990 (%)		*-1*	*-5*	*-9*	*-15*	*-14*	*-17*	*-10*	*-11*	*-11*	*-11*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.6 Waste management

The UK's WEM projections show annual GHG emissions from waste management falling to 77% below 1990 levels by 2040 (Table 5.11). Waste emissions from landfill continue to fall because more waste is being preferentially disposed of in alternative ways, such as through recycling, Biological Waste Treatment (BWT) and incineration, and because small improvements in landfill efficiency continue to be made.

The Landfill Directive drove the historical reductions in emissions from waste. Emissions reductions should continue for a time as emissions lag behind disposal. The UK projects that increases in BWT emissions and domestic wastewater emissions should partially counteract the decrease in landfill emissions.

Table 5.11: Waste management emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methane	63	66	60	46	27	18	16	14	13	13	13
Nitrous oxide	1	1	1	1	1	2	2	2	2	1	1
Total	65	68	61	48	29	19	18	16	15	15	15
Change from 1990 (%)		4	-6	-27	-56	-70	-73	-76	-77	-77	-77

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.7 Industrial processes

Table 5.12 indicates that emissions from industrial processes are projected to fall 85% below 1990 levels by 2030 and 86% below by 2040.

Table 5.12: Industrial Processes emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	20	18	17	17	11	12	9	9	8	8	8
Methane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	24	14	5	3	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hydrofluorocarbons	14	18	3	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorocarbons	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphur hexafluoride	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**60**	**51**	**27**	**21**	**13**	**13**	**10**	**9**	**9**	**9**	**8**
Change from 1990 (%)		*-15*	*-54*	*-65*	*-79*	*-79*	*-84*	*-84*	*-85*	*-86*	*-86*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.8 Public

The UK's projections show emissions from public services rising slightly in the mid 2020s and 2030s (Table 5.13).

Table 5.13: Public emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	13	13	12	11	9	8	7	8	9	9	9
Methane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**13**	**13**	**12**	**11**	**10**	**8**	**7**	**8**	**9**	**9**	**9**
Change from 1990 (%)		*-1*	*-9*	*-16*	*-29*	*-40*	*-44*	*-38*	*-35*	*-33*	*-30*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.4.9 Land Use, Land Use Change and Forestry (LULUCF)

The amount of carbon stored in UK trees has increased since 1990. However, the UK expects that this balance will change in the future as forests mature and are felled and replanted over the sustainable forest management cycle. UK experts suggest the accumulation rate will fall substantially by 2030, Table 5.14 reflects this. The UK's 1990-2020 GHG Inventory includes modelling updates to wetland areas that have increased historical emissions in the LULUCF sector. As EEP 2019 modelling is based on an earlier version of the inventory, this is not yet reflected in projections of emissions.

Table 5.14: LULUCF emissions by GHG, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

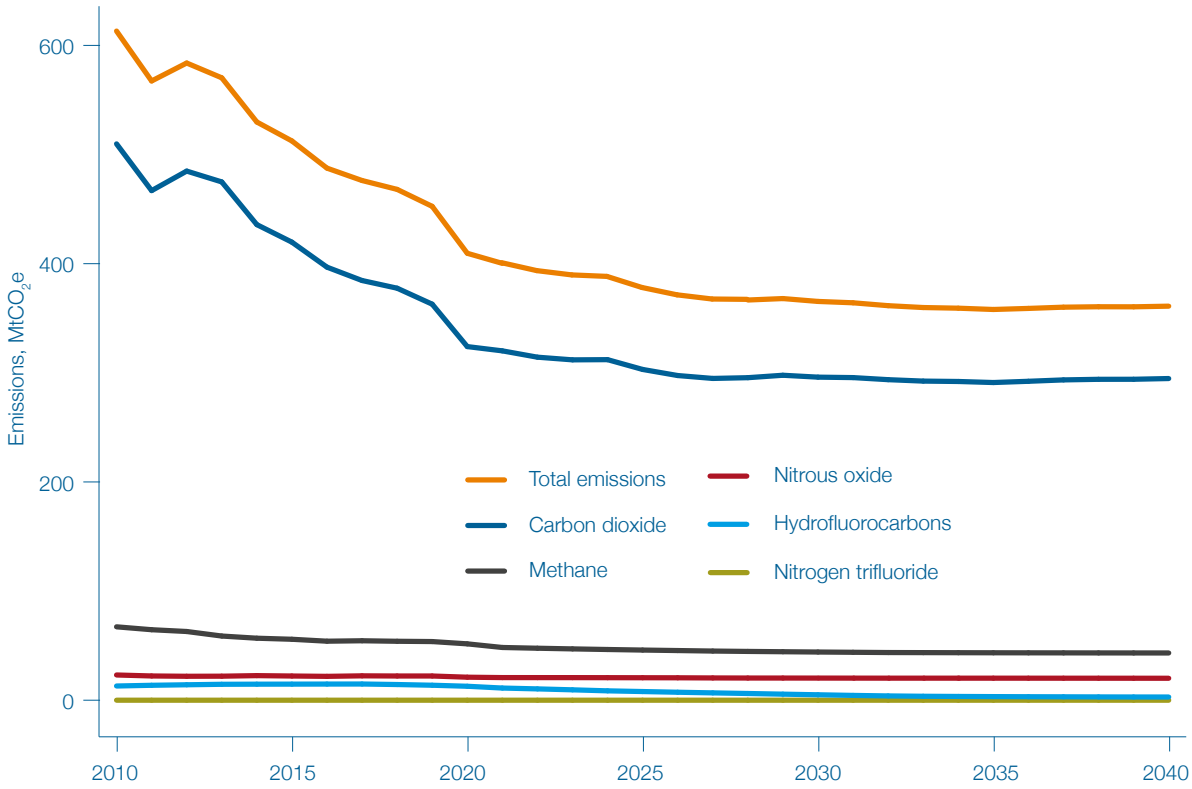
	Actuals						Projections				
Gas	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Carbon dioxide	6	4	1	-1	-3	-3	-3	-10	-7	-4	-2
Methane	5	5	5	5	5	5	5	<0.5	<0.5	<0.5	<0.5
Nitrous oxide	2	2	2	2	2	2	2	2	2	2	2
Total	**13**	**11**	**8**	**5**	**4**	**3**	**4**	**-8**	**-5**	**-3**	**<0.5**
Change from 1990 (%)		*-18*	*-37*	*-59*	*-72*	*-76*	*-71*	*-161*	*-141*	*-119*	*-104*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.5 Projections by gas

This section focuses on overall trends in the emissions of each GHG. Figure 5.2 shows projections for overall emissions of GHG gases to 2040.

Figure 5.2: Overall emissions of greenhouse gases by gas, $MtCO_2e$ (WEM scenario, UNFCCC coverage)



Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.5.1 Carbon Dioxide

Table 5.15 shows that the largest sectoral emitters of CO_2 in 2020 were, in decreasing order, transport, energy supply, residential, business. By 2030, the UK projects CO_2 emissions that are 51% lower than 1990 values, and by 2040 the UK projects CO_2 emissions that are 52% lower than 1990 emissions.

Table 5.15: Carbon dioxide emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Transport	127	128	132	136	125	124	99	112	101	90	84
Energy supply	245	211	206	220	199	139	80	56	56	57	59
Business	112	109	109	97	78	70	62	53	50	50	51
Residential	79	80	86	83	85	65	65	66	68	71	76
Agriculture	6	7	5	6	5	5	6	10	10	10	10
Waste management	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Industrial processes	20	18	17	17	11	12	9	9	8	8	8
Public	13	13	12	11	9	8	7	8	9	9	9
LULUCF	6	4	1	-1	-3	-3	-3	-10	-7	-4	-2
Total	**609**	**571**	**571**	**570**	**510**	**420**	**324**	**303**	**296**	**291**	**295**
Change from 1990 (%)		*-6*	*-6*	*-6*	*-16*	*-31*	*-47*	*-50*	*-51*	*-52*	*-52*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.5.2 Methane

The two biggest emitters of CH_4 in 2020 were agriculture and waste management. The UK projects a decline in CH_4 emissions between 2020 and 2030 of 7 $MtCO_2e$. This means that by 2030, emissions of CH_4 are projected to be 67% lower than 1990. By 2040, the WEM scenario projects that methane emissions will be 68% lower than 1990 values (Table 5.16).

Table 5.16: Methane emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Transport	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Energy supply	34	27	17	11	9	7	5	6	5	5	5
Business	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Residential	2	1	1	1	1	1	1	1	1	1	1
Agriculture	29	29	28	27	25	26	25	25	25	24	24
Waste management	63	66	60	46	27	18	16	14	13	13	13
Industrial processes	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Public	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LULUCF	5	5	5	5	5	5	5	<0.5	<0.5	<0.5	<0.5
Total	**135**	**129**	**111**	**90**	**67**	**56**	**52**	**46**	**44**	**43**	**43**
Change from 1990 (%)		*-4*	*-17*	*-33*	*-50*	*-59*	*-62*	*-66*	*-67*	*-68*	*-68*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.5.3 Nitrous oxide

Most nitrous oxide emissions come from agriculture. The UK projects a modest decline in N_2O emissions out to 2040, projecting emissions in 2030 that are 59% lower than in 1990, and 60% lower than 1990 in 2040.

Table 5.17: N_2O emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Transport	2	2	2	1	1	1	1	1	1	1	1
Energy supply	1	1	1	1	1	1	1	1	1	1	1
Business	1	1	1	1	1	1	1	1	1	1	1
Residential	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Agriculture	18	18	17	16	15	15	15	14	14	14	14
Waste management	1	1	1	1	1	2	2	2	2	1	1
Industrial processes	24	14	5	3	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Public	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
LULUCF	2	2	2	2	2	2	2	2	2	2	2
Total	**50**	**40**	**30**	**26**	**23**	**22**	**21**	**21**	**20**	**20**	**20**
Change from 1990 (%)		*-20*	*-39*	*-47*	*-54*	*-55*	*-58*	*-59*	*-59*	*-59*	*-60*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.5.4 Hydrofluorocarbons

Almost all HFCs are emitted by the business sector. In 2030, the UK projects HFC emissions of 8 $MtCO_2e$ less than in 2020, equivalent to a 72% decline since 1990. The UK projects a reduction in HFC emissions in 2040 of 86% compared to 1990 levels.

Table 5.18: HFC emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Business	<0.5	<0.5	2	6	10	12	11	6	3	1	1
Industrial processes	14	18	3	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**14**	**19**	**8**	**9**	**12**	**14**	**12**	**7**	**4**	**2**	**2**
Change from 1990 (%)		*29*	*-46*	*-36*	*-16*	*-2*	*-15*	*-51*	*-72*	*-84*	*-86*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.5.5 Polyfluorocarbons

PFC emissions remain at low levels over the projection period.

Table 5.19: PFC emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Business	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Industrial processes	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**2**	**1**	**1**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**
Change from 1990 (%)		*-64*	*-65*	*-76*	*-83*	*-84*	*-90*	*-77*	*-77*	*-77*	*-77*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.5.6 Sulphur hexafluoride

SF_6 emissions remain at low levels over the projection period.

Table 5.20: SF6 emissions by sector, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Actuals						Projections				
Sector	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Business	1	1	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	1	1
Industrial processes	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total	**1**	**1**	**2**	**1**	**1**	**<0.5**	**<0.5**	**<0.5**	**1**	**1**	**1**
Change from 1990 (%)		*4*	*50*	*-15*	*-45*	*-66*	*-66*	*-60*	*-57*	*-53*	*-53*

Primary sources: UK GHG Inventory 2022. EEP 2019, uplifted to UNFCCC coverage

5.6 Total effect of policies and measures

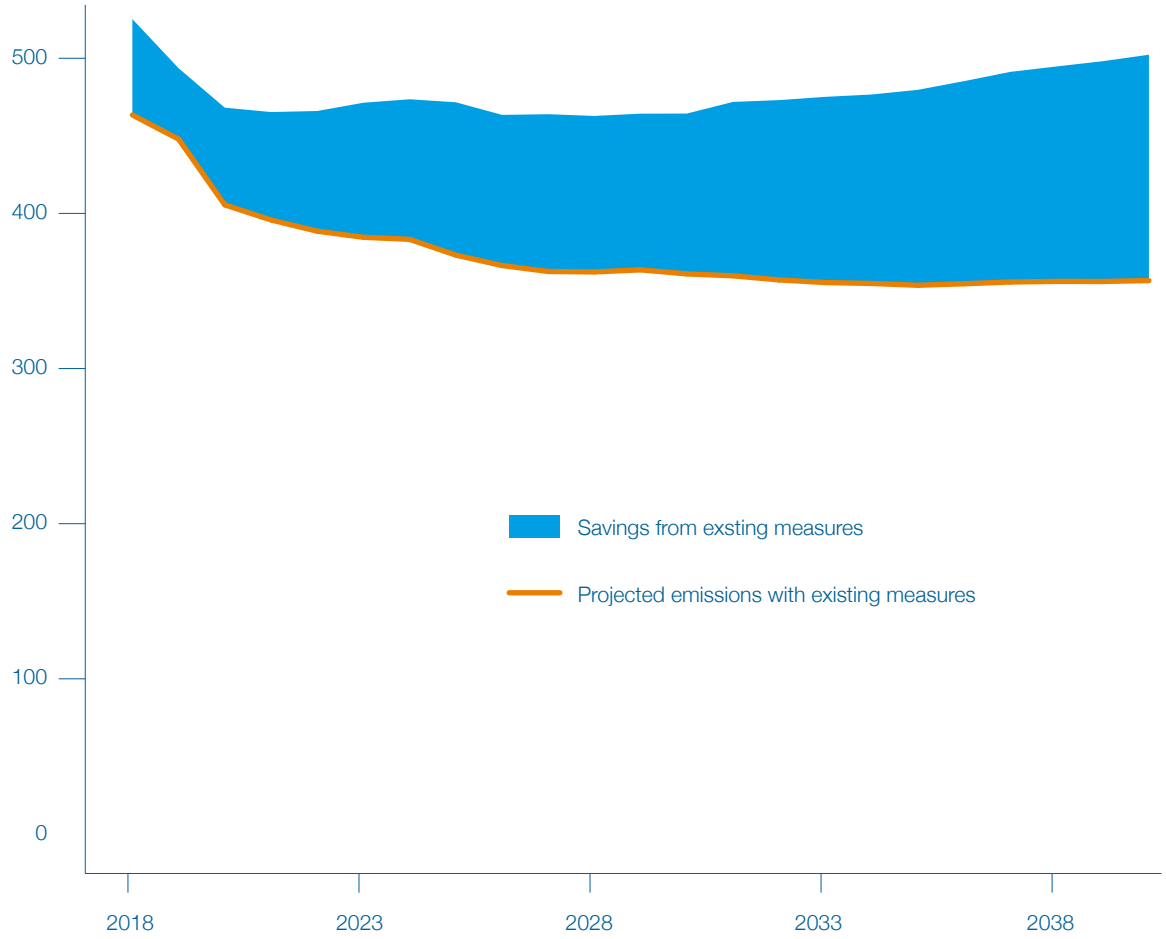
The WEM scenario projections in this chapter include the impact of the UK's implemented and adopted policies and measures as reported in EEP 2019, for which the policy cut-off point was August 2019. They therefore represent a counterfactual, showing what the UK would expect to happen in the absence of further policies such as those included in the UK's Net Zero Strategy, published in October 2021.

The name, sector, GHG(s) and activity affected, and descriptions of these policies and measures can be found in Annex 2, Table 3. The WEM scenario within this chapter does not include planned policies, but those are included within domestic reporting and are therefore shown in Annex 2, Table 3.

Since Biennial Report 4, the UK has continued to update its analysis of policies and measures expected to help meet both Nationally Determined Contributions and the targets for Carbon Budgets set under the UK Climate Change Act (2008). Some further policies introduced after EEP 2019 have been included in Annex 2, Table 3, but these are not yet quantified. Over

time, the UK's projections will include newer or more recently announced policies as they progress to the impact assessment stage.

Figure 5.3: Projected impact of policies, $MtCO_2e$ (WEM scenario, UK Coverage)



Source: EEP 2019

The UK treats the policies adopted before 2009 as part of a 'baseline', because carbon budget targets were set for the first time in 2009. Figure 5.3 and Table 5.21 show the estimated emissions savings attributable to policies adopted between April 2009 and August 2019, as published in the 2019 UK EEP. For example, in 2030 the UK projects that UK policies (excluding planned policies) will deliver emissions reductions of around 103 $MtCO_2e$.

Differences in projected emissions between scenarios do not exactly match the sum of emissions reductions provided by individual policies. This is due to price interactions and adjustments to policy impacts to improve accuracy.

The Net Zero Strategy[40] (published 2021) delivers a comprehensive set of measures to support and capitalise on the UK's transition to net zero by 2050. It sets out how the UK will end its domestic contribution to climate change with an approach where 'green' and 'growth' go hand-in-hand. It is a cross-economy strategy which keeps the UK on the path to net zero, including action the UK will take keep on track to meet Carbon Budgets and the UK's 2030 Nationally Determined Contribution.

[40] https://www.gov.uk/government/publications/net-zero-strategy

Table 5.21: Projections of total net GHG emissions, $MtCO_2e$ (WEM scenario, UK Coverage)

	Projections			
Scenario	**2025**	**2030**	**2035**	**2040**
Emissions excluding the impact of measures adopted between 2009-19 (baseline)	474	463	476	495
Emissions including all implemented or adopted measures (excluding planned policies)	373	361	354	357
Savings from measures adopted 2009-19 (excluding planned policies)	99	103	126	146

Source: EEP 2019

5.7 Projection methods by sector

The UK projections of emissions of CO_2 and combustion-related emissions of other GHGs (CH_4 and N_2O) are based on the UK's EEP modelling suite used for its annual publication and internal analysis. This models the UK energy market, including final sector energy use and the electricity supply sector. It includes a top-down econometric model of energy demand and combustion-related GHG emissions for the UK economy with a bottom-up supply side Dynamic Dispatch Model (DDM). The top-down econometric energy demand projections are adjusted for the impact of policies which are modelled separately using more detailed sectoral models. The sector classification and the principal source of past energy statistics is the Digest of UK Energy Statistics (DUKES).

Energy use projections are converted to emissions projections using fuel emissions factors from the UK GHG Inventory. Additional calibration is used to account for energy use not captured in DUKES. Industrial process emissions are calibrated by comparing historic emissions in the UK's GHG Inventory to industrial production.

The UK's model suite projects emissions using projections for fossil fuel prices, carbon prices, economic growth, and demographics. Key assumptions for projections are given in Annex 2, Table 5.

The UK's domestically published projections include variant scenarios for high and low fossil fuel price assumptions, high and low GDP growth rates, and a pre-2009 policy baseline.

Projections of energy demand by fuel and sector start from a baseline econometric 'business as usual' projection, from which savings due to policies and measures are subtracted.

The overall modelling approach is similar to that used in previous Biennial Reports submitted by the UK, although there have been incremental improvements to the projections which are described in the UK's domestic EEP publications[41].

5.7.1 Transport

The CO_2 road transport model is an econometric response surface model integrated into the economy-wide Energy Demand Model (EDM) and calibrated against the Department for Transport's (DfT's) National Transport Model (NTM). The econometric model is multi-modal as it includes cars, light good vehicles (LGVs), heavy goods vehicles (HGVs), and public service vehicles (PSVs). It includes a population driver for cars and a manufacturing Gross Value added (GVA) driver for HGVs as well as price, motor spirit/diesel engine share, and fuel efficiency and biofuel substitution effects.

Most energy efficiency improvements are policy-driven, such as by new car emissions intensity targets and complementary measures such as lower rolling resistance tyres for HGVs. Unlike for other demand sectors, impacts of policies and measures on road transport

[41] See https://www.gov.uk/government/collections/energy-and-emissions-projections

fuel demand are modelled within the EEP modelling suite. Road vehicle efficiencies, motor spirit/diesel engine shares, and biofuel use under different policy scenarios are used to calculate mitigation impacts from differences in demand between scenarios.

Electricity demand from electric cars and LGVs is passed to the Dynamic Dispatch Model (DDM) which models a demand-side response.

Non-CO_2 road transport emissions projections follow a bottom up calculation methodology in line with the historical time-series of emissions. The activity data (vehicle distances travelled) is projected using 2018 DfT traffic forecasts.

DfT's projected traffic growth, the planned electrification of existing track, and the construction of new lines such as Crossrail and High Speed 2 underpin the rail transport model.

Projections for UK commercial aviation involve estimates of future UK GDP, consumer expenditure, population, and oil prices. The Fleet Mix Model captures efficiency improvements, for example the model assumes increasing use of biofuels. DfT provides more detailed information about methodology and assumptions with its aviation forecast. The modelling has extrapolated trends in the GHG Inventory to extend aviation emissions projections to UNFCCC coverage.

The UK projects that national navigation will remain largely static.

5.7.2 Energy supply

The UK uses the DDM to project investment and generation in the electricity supply sector. The DDM is a market-based model that simulates the operation of the electricity market and the investment decision of the market participants in detail. It is a profit-maximisation model incorporating the effect of Government policies such as Contracts for Difference which incentivise low-carbon generation through market mechanisms.

The DDM also models investment in the supply of heat and electricity from Combined Heat and Power plants, mostly in industry.

5.7.3 Business

For emissions projections, the UK breaks manufacturing down into sectors using the Standard Industrial Classification (SIC). The manufacturing sectors in the EDM are:

- Chemicals;
- Construction;
- Engineering and vehicles;
- Food, drink and tobacco;
- Iron and steel;
- Non-ferrous metals;
- Non-metallic mineral products;
- Pulp, paper and printing;
- Textile products; and
- Manufacturing not elsewhere classified.

The UK projects Gross Value added (GVA) for each of these sectors using GDP, interest rates, and, in some cases, terms of trade (the relative prices of imports and exports). The UK projects total energy demand for each sector from GVA and energy prices. Except for iron and steel, the model splits total energy demand into different fuels using historical fuel demands and projections of relative fuel prices. In iron and steel, the UK estimates energy demand using sector GVA and the tonnages of steel produced using electricity or by the Basic Oxygen Steel (BOS) process.

Energy demand is projected by commercial services from sector GVA, using the average growth rate since 1991 and temperature. The overall demand is then split into fuels.

To project business electricity demand from business, it is included in non-domestic demand and passed to the DDM. Emissions from fuels combusted on-site are included in the business sector.

5.7.4 Residential

The UK projects the residential emissions from gas, oil and solid fuels use separately. The estimates depend on assumptions about the percentage of households using each fuel as their main heating source. The primary drivers of residential energy demand are household numbers, fuel prices, temperature and income.

Residential demand for electricity is projected using the same drivers and passed to the DDM.

5.7.5 Agriculture

UK agriculture uses a relatively small amount of energy. Therefore, projections of its combustion emissions come from simple trend models.

The UK uses Food and Agricultural Policy Research Institute (FAPRI) methodology[42] to provide projections of activity, such as livestock numbers, crop production, fertiliser nitrogen use, and non-CO_2 emissions to 2030. Projections for later years are held constant. The FAPRI projections come from an economic model that assumes a specific set of international prices for agricultural commodities and a path for the sterling exchange rate. Together, these factors are important determinants of the returns to farmers and hence of total agricultural production. The UK converts these FAPRI activity projections to emissions using the latest agriculture model in the UK's GHG Inventory.

5.7.6 Waste management

Projections of CH_4 from landfill depend on UK projections of tonnages of municipal waste going to landfill and on figures for commercial and industrial waste. Waste composition is projected from knowledge of changes to BWT processes and from projections of waste arising.

These projections of waste going to landfill are then run through MELMod, the landfill emissions calculation model. The MELMod model is based on the IPCC's first-order decay methodology, which the 2014 GHG Inventory report summarises. UK population projections underpin predictions of emissions of CH_4 and N_2O from domestic wastewater and sewage/sludge decomposition. Industrial wastewater emissions are predicted to stay constant. BWT emissions from multiple sources are combined. Some are projected to be constant, and

[42] https://www.afbini.gov.uk/publications/fapri-uk-greenhouse-gas-emission-modelling-system-england-wales-scotland-and-northern

some are extrapolated from the latest year of historical data using sector experts' estimates of future BWT capacity.

5.7.7 Industrial processes

Manufacturing sub-sector GVA projections or energy demand projections are used to project CO_2 emissions from industrial processes where there is evidence of correlation. Other CO_2 emissions are projected to remain constant at the last actual value from the UK's GHG Inventory (published 2020).

Many methods are used for projections of non-CO_2 emissions from industrial processes. Some sources use manufacturing sector GVAs while others use more detailed assumptions about future activity. Annex N of the UK's domestic EEP publication[43] provides more information on non-CO_2 emissions projection methods.

5.7.8 Public

Sector employment levels are used as the main driver in modelling non-electricity energy demand from public services. The projections assume that the historical trend of improving energy efficiency per employee will continue. Temperature also affects public sector demand. The models break non-electricity energy demand into fuels using the same proportions as in latest historical data.

Electricity demand is trended to use only public sector employment as a driver and is included in the non-domestic demand we pass to the supply-side modelling.

Public services emissions modelling does not consider energy prices as a driver.

5.7.9 Land Use, Land Use Change and Forestry (LULUCF)

The Centre for Ecology and Hydrology and Forest Research model LULUCF emissions using approaches that are consistent with the current inventory methodology. They produce four scenarios – Baseline, Central, High and Low – for future emissions. Each makes assumptions about afforestation, wildfires, peat extraction, land use change and deforestation. They developed these scenarios with a policy maker stakeholder group and updated them in 2016 following discussions with UK Devolved Administrations. Broadly, their central scenario is a continuation of current policies and activity rates. This is the scenario used in generating emissions projections for this report.

5.7.10 Estimation of emissions in Crown Dependencies and Overseas Territories

The UK's Crown Dependencies and Overseas Territories are not included in the projections which the UK produces annually to monitor progress against its own carbon budgets. The projections in this report supplement the UK annual figures with forecasts for areas that are consistent with the UK's 1990-2018 GHG Inventory. The latter are simple linear trends of the emissions in each National Communication sector based on observations from the previous 9 years. Emissions in these territories are only a small proportion of UK emissions, making up 0.9% of the UK's UNFCCC coverage emissions in recent years.

5.7.11 Strengths of the projection methodology

The UK's modelling methodology has the following strengths:

- The initial starting point for the UK's Energy and Emissions Projections is the latest historical data from the GHG Inventory and DUKES. In the case of EEP 2019, this

[43] See https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019

was based on the UK's GHG Inventory 2020 (latest actuals 2018) and 2019 energy statistics (latest actuals 2018). These are well established sources of information;

- The main Energy Demand Model (EDM) uses econometric methods that capture long-run relationships between economic activity, energy consumption and emissions;
- The detailed model of electricity generation captures both short-run fuel switching and long-term investment strategies;
- The UK updates its projections regularly as part of the monitoring of UK national carbon budgets;
- Models use authoritative national and international sources for socio-economic projections;
- There is a rolling programme of review and update for the projection methodologies and econometric models, and modelling performance is tested by back-casting to see how well the model predicts what happened in the recent past;
- The projections distinguish between business as usual emissions and the emission reductions due to mitigating policies and measures; and
- The modelling estimates the mitigation impacts of policies using a common cross-Government methodology.

5.7.12 Weaknesses of the projection methodology

The UK's modelling has the following weaknesses:

- The modelling generally assumes that historical relationships will continue in the future, which can fail to capture structural changes and new technologies where these fall outside the scope of included policies and measures;
- Analysis for EEP 2019 was completed before the coronavirus (Covid-19) pandemic and prior to publication of the Net Zero Strategy, so these projections take no account of the impacts of these on future energy demand or emissions. Similarly, analysis assumed that the drivers of uncertainty were similar to previous years;
- There is considerable recognised uncertainty in economic and social projections from external sources;
- Econometric modelling is subject to estimation errors and the possibility of incorrect identification energy use drivers.

5.7.13 Key assumptions

A set of key assumptions about UK economic growth, demographic changes and future fuel price trajectories underpin the UK's projections. The main sources of projected assumptions are the forecasts made by the UK's Office for Budget Responsibility (OBR) and Office for National Statistics (ONS), and supplemented by International Monetary Fund projections of world growth. Fuel prices are produced by the Department for Business, Energy and Industrial Strategy (BEIS). Table 5 in Annex 2 documents key parameters and assumptions.

The UK released EEP 2019 in October 2020. UK GDP forecasts to 2021 were from the March 2019 Economic and Fiscal Outlooks and beyond 2021 GDP came from the January 2017 Fiscal Sustainability Report. The UK's ONS produced the population projections in 2016 alongside a supporting methodology description. It produces population and household

projections. The ONS released information about changes in methodology since the previous population projection alongside the 2018 population projections. The household projections combine population projections with household formation propensities. Table 5.22 shows updated socio-economic growth assumptions.

Table 5.22: UK growth projections, percentage per annum

	Projections			
Change in:	**2025**	**2030**	**2035**	**2040**
GDP	1.9	2.3	2.2	2.3
Households	0.7	0.6	0.5	0.6
Population	0.5	0.4	0.3	0.3

Source: EEP 2019

BEIS updates the fossil fuel price and carbon prices projections annually, which are subject to peer review and are used widely across UK government. Table 5.23 shows sets out the key fossil fuel and carbon price values for EEP modelling, and Table 5.24 details exchange rate assumptions.

Table 5.23: Fossil fuel and carbon price assumptions, 2019 prices (various scenarios, UK coverage)

	Projections			
Price for:	**2025**	**2030**	**2035**	**2040**
Crude oil (Brent 1 month), $/bbl	68.45	79.53	90.60	90.60
Gas (NBP), p/therm	53.00	59.00	64.00	64.00
Coal (CIF ARA), $/tonne	68.38	72.72	77.06	77.06
EU ETS carbon price (at time of modelling), £/tCO_2	28.79	43.49	43.49	43.49

Source: EEP 2019

Table 5.24: Exchange rates against GBP sterling

	Projections			
Exchange rate	**2025**	**2030**	**2035**	**2040**
Euros (€ per £)	1.10	1.15	1.2	1.2
US Dollars ($ per £)	1.39	1.45	1.5	1.5

Source: EEP 2019

5.7.14 Quality assurance and quality controls

Quality assurance of modelling is a high priority within UK Government, and analysis for the EEP follows the BEIS quality assurance guidelines.

A small group of BEIS analysts produces the energy and emission projections, and owns, maintains and updates the EDM which underpins the projections. The EEP team liaises with other modelling teams, both inside and outside BEIS, to quality assure and compile the data which go into the overall projections.

Figures relating to electricity come from iteratively solving two specialised models with the EDM. These are the DDM and the Prices and Bills Model of retail electricity prices. This cycling ensures that electricity demand is in equilibrium with prices. The co-ordinators of these models also assure projections results. Projections for non-energy non-CO_2 emissions are produced by the BEIS Science division.

The Centre for Ecology and Hydrology produces the UK's LULUCF projections under contract; this is overseen by the BEIS Science and Innovation for Climate and Energy Directorate.

BEIS bases transport sector modelling on, and calibrates it against, the detailed models for road, rail and air used by the Department for Transport (DfT). These latter are in turn subject to DfT's quality assurance.

Analytical teams in the relevant areas prepare estimates of the emissions or energy savings due to UK Government policies. These are normally based on assessment documents for each measure. Analysts prepare these according to central guidance, which ensures that energy use and GHG emissions are valued consistently across UK Government.

Analysts send the policy savings in a standard template and the EEP team checks them to look for any unaccounted overlaps and to ensure internal consistency between energy and emissions savings. The team confirms the model savings with the submitting analysts and departments. The UK updates its GHG projections to inform progress against national carbon budgets and publishes each set of projections. The EEP team improves and adapts the core Energy Demand Model incrementally, quality assuring each change to confirm validity and robustness. (The team responsible for the DDM quality assures any change relating to electricity generation.) The EEP team presents interim and final results to a Steering Group which oversees the process, and stakeholders review draft EEP reports before publication. The independent Committee on Climate Change (CCC) reviews the projections after their release.

5.8 Uncertainty

In October 2020 the UK published annexes of data to accompany its domestic projections. These included low and high fossil fuel prices and low and high UK GDP rates as variant scenarios and sensitivities.

5.8.1 Fossil fuel prices

Table 5.25 shows the price assumptions used for the fossil fuel price scenarios.

Table 5.25: Prices in fossil fuel variant scenarios, 2019 prices (various scenarios, UK coverage)

	Projections			
	2025	2030	2035	2040
Low Fossil Fuel Prices				
Crude oil (Brent 1 month), $/bbl	44.00	50.00	55.00	55.00
Gas (NBP), p/therm	36.00	40.00	43.00	43.00
Coal (CIF ARA), $/tonne	48.10	53.30	58.50	58.50
High Fossil Fuel Prices				
Crude oil (Brent 1 month), $/bbl	106.00	118.00	130.00	130.00
Gas (NBP), p/therm	78.00	83.00	88.00	88.00
Coal (CIF ARA), $/tonne	93.06	101.77	110.48	110.48

Source: EEP 2019

The EEP team produced these scenarios following a fundamental analysis of the drivers of the main fossil fuel wholesale prices available to the UK within the European energy market. They are not sensitivities to the overall level of fossil fuel prices and do not maintain fuel cross-price ratios.

5.8.2 Growth sensitivities

To investigate the impact of different economic growth rates, the EEP includes scenarios where the economy performs at 25 basis points per annum above or below the reference scenario value. Table 5.26 shows this.

Table 5.26: Variant UK GDP growth sensitivities, percentage per annum (various scenarios, UK coverage)

	Projections			
Scenario	**2025**	**2030**	**2035**	**2040**
High UK GDP Growth	2.1	2.5	2.5	2.5
Low UK GDP Growth	1.6	2.0	2.0	2.0

Source: EEP 2019

Taking the combinations of the different fossil fuel and GDP variants gives four different emissions scenarios (Table 5.27).

Table 5.27: Total emissions in variant scenarios, $MtCO_2e$ (WAM policy accounting, UK coverage)

	Projections			
	2025	**2030**	**2035**	**2040**
WAM Reference scenario	372	356	345	344
Variant scenarios				
Low Fossil Fuel Prices	380	369	359	362
High Fossil Fuel Prices	365	341	331	330
Low UK GDP Growth	370	353	341	339
High UK GDP Growth	374	359	349	350

Note: includes LULUCF

Source: EEP 2019

5.8.3 Overall uncertainty

Future values of key variables such as fossil fuel prices, the impacts of policy and demographic/economic growth cannot be known with certainty. However, these variables underpin the UK projections. Understanding the impact of this uncertainty is important in the context of the UK's aim to reduce emissions through policy intervention, and so it is regularly investigated in EEP publications. Uncertainty analysis presented here is based on the most influential drivers of energy use and emissions, previously identified through sensitivity analysis. The EEP team carries out a Monte Carlo simulation to vary the values of these drivers, firstly obtaining historical distributions of input values then running the projections model on samples from these distributions.

For the EEP 2019 publication, we derived the uncertainty analysis from the estimates published in EEP 2018 (used for BR4), due to time constraints at the time of analysis. Because further data on Covid-19 was not yet available, we assumed that the drivers of uncertainty were similar to previous years. The confidence interval originally presented in the EEP 2018 report has been extended to 2040 through a simple extrapolation of the overall linear trends exhibited by the upper and lower bounds of the confidence interval for the final nine years of the projected series.

This method underpins the 95% confidence interval estimates presented in Figure 5.4 and Table 5.28. The upper and lower boundaries represent the projected emissions corresponding to the lower 2.5% and upper 97.5% percentiles of the Monte Carlo simulations respectively.

This analysis excludes the electricity supply industry and possible "structural breaks" in society or the economy which might significantly affect emissions. For example, societal and behavioural step changes or breakthrough technologies like improved storage could have profound impacts on the UK's energy mix and emissions but are hard to anticipate.

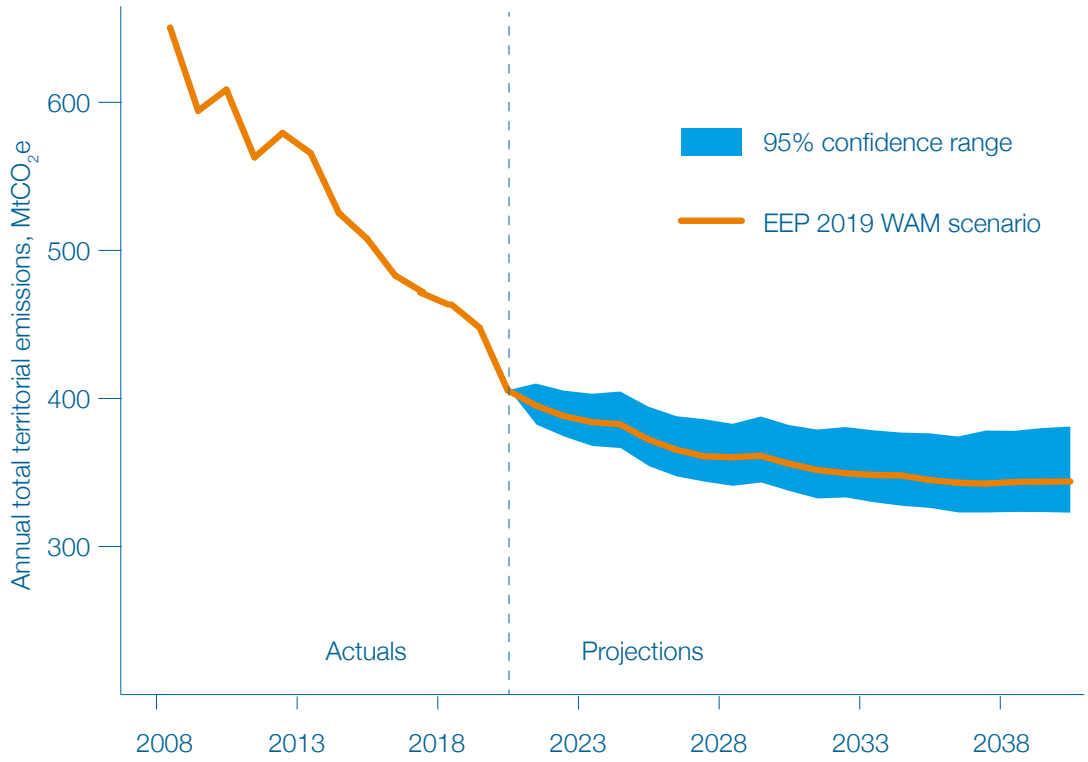


Figure 5.4: Uncertainty in UK projected emissions, $MtCO_2e$ (WAM scenario, UK coverage)

Note: includes LULUCF

Source: EEP 2019 based on uncertainty ranges from EEP 2018 (with extrapolated final years)

Table 5.28: Confidence interval for total emissions from Monte Carlo simulations, $MtCO_2e$ (WAM scenario, UK coverage)

	Projections			
Uncertainty, $MtCO_2e$	**2025**	**2030**	**2035**	**2040**
Upper 95% confidence interval	394	382	376	381
Reference: EEP 2019 WAM scenario	372	356	345	344
Lower 95% confidence interval	353	336	325	322
Comparisons, %				
Upper 95% confidence interval, difference from reference	6	7	9	11
Lower 95% confidence interval, difference from reference	-5	-5	-6	-6
Upper 95% confidence interval, change on 1990 values	-51	-53	-53	-53
Reference, change on 1990 values	-54	-56	-57	-57
Lower 95% confidence interval, change on 1990 values	56	-58	-60	-60

Source: EEP 2019 based on uncertainty ranges from EEP 2018 (with extrapolated final years)

The methodology only looks at future uncertainty and does not examine uncertainty in historical inputs or emission estimates, such as those before 2020. By 2030, the UK WAM scenario projects GHG emissions will be between 53% and 58% below 1990 levels, with the Reference case estimate 56% below. By 2040, the range is slightly wider with emissions projected between 53% and 60% below 1990 levels. The higher uncertainty for later years reflects the reduced confidence in modelled projections further into the future.

5.9 Differences from the last Biennial Report

Table 5.29 summarises the differences between the projections compared to the last Biennial Report, which was based on projections produced in 2019 (EEP 2018, using the latest inventory available up to 2017). The main differences between the two projections include additional implemented and adopted polices, some re-estimations of the impact of policies, improved modelling, revised fossil fuel price and economic growth assumptions.

The UK has also updated the projections to take account of improvements to the historical inventory and other improvements to methods, emission factors and activity data. The net effect of these changes is to decrease projected emissions in 2030 from 54% below 1990 levels in the Fourth Biennial Report to 55% below 1990 levels in the Fifth Biennial Report. The projected GHG decrease of 2 $MtCO_2e$ between the two projections is mostly from CO_2 and methane emissions: there are minimal changes in the projections of the other gases.

Table 5.29: Comparison with last Biennial Report, $MtCO_2e$ (WEM scenario, UNFCCC coverage)

	Fourth Biennial Report			Fifth Biennial Report		
GHG including LULUCF	**1990**	**2030**	**Projected change (%)**	**1990**	**2030**	**Projected change (%)**
Carbon dioxide	599	300	-50	609	296	-51
Methane	133	42	-68	135	44	-67
Nitrous oxide	48	20	-58	50	20	-59
Hydrofluorocarbons	14	4	-70	14	4	-72
Perfluorocarbons	2	<0.5	-79	2	<0.5	-77
Sulphur hexafluoride	1	1	-61	1	1	-57
Nitrogen trifluoride	<0.5	<0.5	N/A	<0.5	<0.5	N/A
Total GHG	798	368	-54	810	365	-55

Primary source: EEP, uplifted to UNFCCC coverage

6. Financial Assistance and Support for Technologies

6.1 Introduction

This chapter sets out the financial assistance the UK has provided to developing countries to support emissions reductions and increase the resilience of the most vulnerable countries to the impacts of climate change.

The chapter is structured as follows:

- An overview of UK support for developing countries through ICF.
- The allocation of UK ICF since the UK's Seventh National Communication and Fourth Biennial Review, covering mitigation and adaptation with examples of programming in UK priority areas.
- How the UK is supporting technological development and transfer to developing countries.
- Actions the UK is taking to build capacity in developing countries for mitigation, adaptation, technology transfer and negotiations.
- How the UK is helping to accelerate the alignment of financial flows with the Paris Agreement and raising ambition globally.
- How the ICF is using its monitoring and evaluation framework to apply lessons learned and improve.

6.2 Key Developments

- The UK is committed to the collective target of providing and mobilising US$100 billion climate finance a year through public and private sources, for developing countries. The UK succeeded in meeting its 2015 pledge to provide £5.8 billion in International Climate Finance (ICF) between 2016/17 and 2020/21. In 2019 the PM made a commitment to delivering £11.6 billion for the period 2021/22 to 2025/26. This commitment is additional to the £5.8 billion spent up to March 2021. British International Investment (BII) (formerly CDC) has also committed to a 30% climate target which is expected to deliver a further £2 billion climate finance over five years.
- In March 2021 the UK Government published the Integrated Review of Security, Defence, Development and Foreign Policy which made tackling climate change and biodiversity loss its number one international priority. The UK is beginning a programme of new investment, taking forward its 10-point plan for a green industrial revolution by funding British research and development in green technologies, and supporting climate investment internationally through UK ICF.
- Recognising that adaptation is a priority for many developing countries, UK ICF aims for a balance between adaptation and mitigation. The majority of UK climate finance is grant-based, with 91% of support provided over the reporting period being through grants.
- As first outlined in the 2019 Green Finance Strategy and further reinforced in the Integrated Review, the UK Government has also pledged to ensure that all UK ODA is aligned to the Paris Agreement, reflecting the UK Government's commitment to tackling the causes of climate change and its impacts as a driver of future instability and poverty. In the 2021, the UK Government response to the Dasgupta Review on

the Economics of Biodiversity, the UK committed to integrate nature into its ODA, ensuring that all new UK bilateral aid spending does no harm to nature.

- The UK is one of the largest contributors to the major multilateral climate funds, with £724 million provided over 2019 and 2020. At the G7 in 2019 the UK announced it will double its contribution to the GCF to £1.44 billion of new funding between 2020 and 2023, making the UK the largest contributor. £450 million of this commitment was provided in 2020. Other climate specific funding over the period 2018, 2019 and 2020 includes £106 million to the Global Environment Facility. The UK also pledged £15 million new funding to the Adaptation Fund at COP26. At least £3 billion of the £11.6 billion ICF commitment will be used to protect and restore nature and biodiversity over the five years to 2025/26 and £1 billion new funding for the Ayrton Fund will support clean energy Research, Development and Demonstration.
- At COP26 the UK launched the Clean Green Initiative (CGI) to help developing countries bridge the infrastructure gap, while supporting climate change and sustainable development goals, helping to scale up investment by the private sector. Bold commitments have been made at COP26 around key themes:
    - protecting nature: £1.5 billion new UK funding over five years for the Global Forest Finance Pledge (part of the £3 billion nature commitment);
    - phasing out coal: the UK is the largest contributor to the Climate Investment Funds (CIFs) and committed an additional £350 million: £200 million to the new Accelerating Coal Transitions programme and £150 million to the Renewable Energy Integration programme (announced at UNGA);
    - mobilising finance: The CIFs with strong UK leadership announced a new Capital Markets Mechanism expected to issue billions of green bonds in the City of London to support climate action; net zero cities: £27.5 million new funding to support the launch of the Urban Climate Action Programme (UCAP);
    - access to finance: including a £100 million to respond to recommendations from the UK co-chaired Taskforce on Access to Climate Finance to make it faster and easier for developing countries to access finance for their climate plans. COP26 also saw the launch of the International Just Transition Declaration44 committing to working together to ensure no one is left behind in the transition towards net zero economies.
- Since 2011, UK ICF45 investments have helped 88 million people to cope with the effects of climate change. This includes supporting vulnerable individuals and communities to become more resilient to increased climate variability such as helping farmers grow crops that can adapt to changing weather conditions. Since 2011, UK ICF has also mobilised £8.0 billion in public and private finance in addition to our ICF spend commitments. Overall ICF provided from April 2011 to March 2021 is expected to avoid or reduce 960 million tonnes of carbon dioxide equivalent.

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[44] UN Climate Change Conference UK 2021: https://ukcop26.org/supporting-the-conditions-for-a-just-transition-internationally/

[45] 2021 UK ICF Results: https://www.gov.uk/government/publications/uk-climate-finance-results-2021/2021-uk-climate-finance-results

6.3 Overview of UK support, approach and channels

The economic recovery after the Coronavirus (Covid-19) pandemic will be critical to secure more ambitious and urgent action to promote a clean, green, inclusive, and resilient future. The UK is committed to supporting the global shift to net zero by providing developing countries access to more, better, and faster finance. Public finance will be used to mobilise the trillions that are urgently needed from the private sector to meet our climate and nature goals. As the new G7 Partnership for Infrastructure and Investment develops; we will collaborate with our G7 counterparts to drive progress towards a global Green Industrial Revolution.

The UK is building on the successful delivery of £5.8 billion ICF between 2016/17 – 2020/21 by providing a doubling of finance to £11.6 billion between 2021/22 – 2025/26. This is dedicated ring-fenced funding that is distinguishable from non-climate ODA. The £11.6 billion (2021/22) is a new commitment which is on top of the £5.8 billion commitment (2016/17 – March 2021). Tackling climate change is fundamental to achieving the Sustainable Development Goals (SDGs), therefore UK ICF is integrated into wider development spending.

The UK Government has committed to align its ODA spend with the Paris Agreement in 2019 and we have continued to implement this commitment. In 2021 the Foreign, Commonwealth and Development Office (FCDO) included a new rule in its programme operating framework to ensure that ODA spend aligns with the Paris Agreement and does no harm to nature, with an intention to embed best practice approaches through all ODA spending departments.

The UK's ICF is playing a vital role in helping developing countries to respond and adapt to the challenges of climate change and prevent its worst effects. UK ICF is focusing on driving the rapid transformation and systemic shifts required to achieve the Paris Agreement goals and deliver on the Glasgow Climate Pact.

British International Investment (BII), the UK's development finance institution, is playing a transformative role in tackling climate change by supporting clean, inclusive, and resilient growth in the countries where it invests. With a climate finance target of at least 30% of new investment, it is supporting investments that facilitate transformation towards net-zero economies by 2050 by either investing in activities that are already low carbon or which indirectly enable emissions reductions in other activities.

The UK is ensuring a balanced split between mitigation and adaptation finance, recognising that support for nature can deliver on both as well as addressing biodiversity loss. The UK is investing in mitigation where emissions are growing rapidly and in countries with forests that can play a role as major carbon sinks, whilst supporting those most vulnerable to impacts to adapt and become more resilient. COP26 saw the launch of the International Just Transition Declaration46 committing to working together to ensure no one is left behind in the transition towards net zero economies. The UK will enhance the gender-responsiveness of its programming, including by increasing the proportion of climate finance that has gender equality as a principal or significant objective as defined by the OECD Development Assistance Committee Gender Equality policy marker47.

The UK provides support through both bilateral and multilateral channels, as well as rules-based international system (RuBIS) to help drive global climate action. Through the establishment of the FCDO the UK will continue to use its network of officials in developing countries to ensure close relationships with other governments and organisations – facilitating

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[46] https://ukcop26.org/supporting-the-conditions-for-a-just-transition-internationally/

[47] https://www.oecd.org/dac/gender-development/dac-gender-equality-marker.htm

bilateral programmes based on developing country needs. The UK will continue to support UN climate change processes, multilateral funds and development banks to deliver impact at scale and use their leverage to maximise value for money.

6.3.1 UK International Climate Finance (ICF) overview

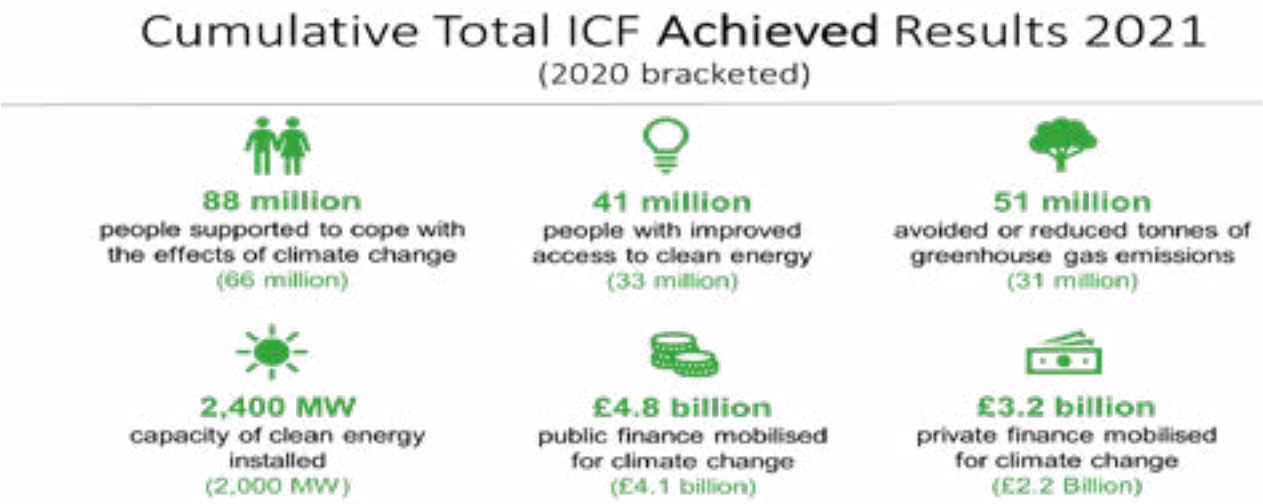
UK ICF is an important international instrument for delivering on Paris Agreement commitments to collectively mobilise $100 billion per year and is part of the UK's broader Official Development Assistance (ODA). In recognition of the urgency with which the causes of climate change and its impacts must be tackled, the UK successfully delivered on its commitment to provide £5.8 billion ICF over the period 2016/17 – 2020/21.

The UK ICF portfolio is managed by three departments: the Foreign, Commonwealth and Development Office (FCDO), the Department for Business, Energy and Industrial Strategy (BEIS), and the Department for Environment, Food and Rural Affairs (Defra). Collectively they aim to provide the necessary capital investment, technical assistance, and capacity building to drive transformational change towards low-carbon, climate resilient and nature positive development paths, drawing in investment from the private sector and other actors.

UK ICF focuses on four key themes: 1) clean energy, 2) nature for climate and people, 3) adaptation and resilience, 4) sustainable cities, infrastructure and transport. This includes supporting developing countries to pursue clean economic growth, halt deforestation and build resilience, whilst achieving co-benefits for other sustainable development goals such as improved livelihoods, food and water security, gender equality and health for all. The UK will strike a balance between mitigation and adaptation spending and will invest at least £3 billion in solutions that protect and restore nature.

The UK recognises the challenges faced by some countries in accessing climate finance and will continue to work with delivery partners and the multilateral funds to improve access. The UK will continue to push for greater transparency, efficiency, effectiveness, and impact of finance that is distributed through multilateral sources. While there will not be a single access point for developing countries to directly apply for ICF support, much of our ICF is spent through our teams based in developing countries. **UK Climate Finance programming is developed in partnership with developing countries, so that it addresses their needs.** We are also working in coordination with others to improve access to finance, for example through the NDC Partnership and the Taskforce on Access to Climate Finance launched at COP26.

Cumulative ICF results show that over the period 2011/12 – 2021/22 (2020 bracketed), UK ICF programmes have so far achieved:



6.3.2 Contribution to Multilateral Development Banks overview

The UK has worked very closely with the Multilateral Development Banks to scale up climate finance over the period and at COP26, with the UK's ICF noted for its positive impact on this multilateral architecture. Climate also plays a critical role across a number of UN SDGs and environmental agreements. The UK will pursue the following outcomes, using both bilateral and domestic relationships, and UK positions in multilateral fora and institutions, and diplomatic outreach:

- The UK will use its position in IFIs (including the multilateral development banks, development finance institutions, and the International Monetary Fund) to seek stronger mainstreaming of climate, nature and wider environmental considerations. This includes by better incorporating climate and environment risk, and encouraging additional, urgent action and scaling up of new instruments and approaches.
- Working through the IFIs, our in-country presence, and in new fora like the Coalition of Finance Ministers for Climate Action to support developing countries to embed climate change economy-wide.
- Maximising synergies between climate finance and Financing for Development (e.g., through the Addis Ababa Action Agenda) and multilateral environmental agreements.

6.3.3 UK and UNFCCC Mandatory and Voluntary Contributions overview

As a signatory to the UNFCCC, the UK pays contributions to the UNFCCC core budget to ensure the effective functioning of the Paris Agreement and the UNFCCC process. The UK also makes voluntary contributions each year to UNFCCC trust funds, including the Trust Fund for Supplementary Activities to support a range of priority activities, and the Trust Fund for Participation in the UNFCCC process to fund developing country participation.

Between 2019 and 2022, the UK contributed to the UNFCCC £4.5 million in voluntary contributions and EUR 4,466,318 in core contributions (Convention, Kyoto Protocol and International Transaction Log). These contributions were 61% ODA-funded in line with the OECD-DAC Annex 2 on ODA eligible international organisations. In addition, the UK provides small scale funding to help contribute to the costs of the OECD Climate Change Experts Group programme and to provide targeted support to the most progressive and vulnerable countries in the negotiations, including through the Cartagena Dialogue and the Climate Ambition Support Alliance (CASA) (see section 6.6.4). As a member of the IPCC the UK makes voluntary contributions each year to the IPCC's Trust Fund. The UK has contributed £115,000 per year between 2019 and 2021.

6.3.4 Research and development spending overview

The UK supports research and development through multiple channels (see Section 6.4.8) including a commitment to spend £1 billion on ODA funded research, development, and demonstration (RD&D) through the Ayrton Fund on clean energy over five years from April 2021. Other initiatives include the Newton Fund which supports bilateral and regional research and innovation partnerships between the UK and partner countries. From 2014–2021 a UK investment of up to £735 million was made with 'match' funding from partner countries.

6.4 UK International Climate Finance

This section explains how the UK directs its climate finance. Firstly, a high-level quantitative overview of UK ICF spend is shown, and the UK's overarching strategic approach set out. UK support for operating entities of the UNFCCC Financial Mechanism and other multilateral funds is explained, in addition to UK support for mitigation and adaptation activities. The UK succeeded in meeting its 2015 pledge to provide £5.8 billion in International Climate Finance (ICF) between 2016/17 and 2020/21 and is committed to delivering an additional £11.6 billion for the period 2021/22 and 2025/26. The £11.6bn is a new commitment which is on top of the £5.8bn spent up to March 2021.

6.4.1 Strategic approach

Table 6.1: Overview of UK ICF spend 2016 – 2020

	2016	2017	2018	2019	2020
Total climate spend	£1,051m	£902.5m	£1,169m	£1,183m	£1,329m
Multilateral spend	£268m	£154.3m	£217m	£199.2m	£524.8m
Bilateral spend	£783m	£748.2m	£951m	£984.4m	£803.8m
Mitigation spend	£517m	£452.6m	£591m	£702.2m	£701.5m
Adaptation spend	£533m	£447.9m	£564m	473.4m	£623.3m

Source: Relevant CTF tables submitted for UNFCCC reporting including those with NC8

UK ICF works through a mix of instruments, partners and delivery channels including bilateral programmes, multilateral contributions, private sector and civil society programmes. Within this, there is a growing role for bilateral partnerships and programming, reinforced by well-staffed country missions with delegated budgets. Much of UK ICF is spent through our teams based in developing countries. Through bilateral ICF programmes and broader ODA effort, the UK is developing and strengthening relationships with partner governments at technical and Ministerial level and across multiple ministries, enabling demand led support. Our in-country teams partner with government officials to support the development of strategies across various themes including climate adaption, NDCs and reversing biodiversity loss and ensure that our portfolios are supporting delivery of those strategies.

Furthermore, detailed country development diagnostics inform decision making and as a result, programming choices reflect the local context and need. Programmes are designed and delivered in consultation with local communities and in partnership with key institutions, local and national governments. As such, the UK is ensuring that programmes are designed to be responsive to country needs; adaptable to changing circumstances; to drive transformational change and offer value for money. Through our overseas networks, we also provide support to develop countries' climate change policies and strategies, as well as providing tailored and expert technical assistance. For example, one of the specific actions we are taking is to consider countries' revised NDCs as they are submitted over the course of this year. We then cross-check our map of technical assistance and capacity building support with countries' capital investment needs. We will also draw on the UNFCCC Standing Committee on Finance's Report on the Determination of the Needs of Developing Country Parties to inform future pipeline development (first published in 2021 and every four years thereafter). More broadly we continue supporting and engaging with organisations like the NDC Partnership, whose mission is to ensure effective support for the implementation of developing countries' NDCs and enable us to coordinate our support with that of other countries and organisations. The UK will also work closely with partner countries to plan and evaluate our programmes and identify ways to achieve greater impacts.

Over the period 2021 – 2025, UK ICF will focus on driving transformation and systemic shifts required to achieve the Paris Agreement goals and deliver on the Glasgow Climate Pact across four themes:

Clean Energy: A major focus of our ICF programming will be on accelerating the clean energy transition in developing countries so that they can provide access to affordable, reliable and clean energy for all and reduce or avoid high emissions pathways, making use of innovation, technology and carbon pricing and addressing social and gender barriers to clean energy access.

Nature for Climate and People: Through our ICF and in line with the recommendations from the Dasgupta Review, we will protect, restore and sustainably manage nature including through protection and restoration of critical ecosystems on land and in the ocean, reversing forest loss, and supporting sustainable food and water systems. We will also seek to ensure our global financial and economic systems support nature through sustainable production and consumption and management of risks, while supporting communities and livelihoods.

Adaptation and Resilience: UK ICF will ensure that countries and communities are supported to adapt to, prepare for and cope with the damaging effects of climate change and climate-linked disasters. Without action, hard won gains in areas such as health, nutrition and livelihoods risk being reversed. Those living in poverty, women and girls, Indigenous Peoples and Local Communities, people with disabilities and marginalised and crisis-affected groups are already being hit hardest by the impacts of a changing climate and they stand to suffer most unless action is taken.

Sustainable Cities, Infrastructure and Transport: In the context of rapid changes in urban development, UK ICF will focus on supporting the low-carbon, green and resilient urbanisation needed to promote sustainable cities, along with wider infrastructure across the transport, building, water and waste sectors. With 68% of the world population projected to live in urban areas by 2050 and cities accounting for 75% of global CO_2 emissions, investment in sustainable cities is key for meeting both our development and climate goals.

6.4.2 Support for cross cutting multilateral climate funds

The UK is one of the largest contributors to the major multilateral climate funds, with £724m provided over 2019 and 2020. The UK's contribution to the GCF will double to £1.44bn between 2020 and 2023, making the UK the largest contributor. £450m of this commitment was provided in 2020. The other main multilateral funds that that benefitted from UK support are the Climate Investment Funds (£200 million UK finance), and the Global Environment Facility with £50m climate specific support provided over 2019 and 2020.

Table 6.2: UK support to multilateral climate funds over past three years (2020, 2019 and 2018). GEF figure is over past four years).

Fund	£m	$m	Funding source	Financial Instrument	Sector	New and Additional
Global Environment Facility	150.5 general 106.46 climate specific	194.6 general 137.17 climate specific	ICF ODA	Grant	Cross-cutting	Support is new and additional to previous reported contributions.
Green Climate Fund	595.46 climate specific	837.53 climate specific				
Global Green Growth Institute	5.79 climate specific	7.30 climate specific				
Climate Investment Funds – Clean Technology Fund	200 climate specific	255.59 climate specific				
UN Convention to Combat Desertification General Fund – Assessed Contribution	0.31 climate specific	0.40 climate specific				
UNDP Climate Promise	3 climate specific	3.75 climate specific				

Source: Relevant CTF tables submitted for UNFCCC reporting including those with NC8

6.4.2.1 Global Environment Facility

The Global Environment Facility (GEF) is the principal multilateral agency supporting developing countries in tackling major environmental problems and supporting implementation of the international agreements covering biodiversity (including wildlife loss), land degradation, deforestation, chemical pollution, marine and freshwater degradation – including marine plastic – and climate change.

The GEF budget is replenished on 4-yearly cycles and a total of 28 countries contribute. It is currently in the seventh replenishment period (GEF7) from July 2018 until June 2022 which has a total budget of $4.1 billion (the GEF 8 replenishment negotiations will be finalised in June 2022). Of the GEF7 total, the UK is contributing up to £250 million in total (10.07% burden share of the total). The UK contribution makes the UK the third largest donor to GEF7 after Japan and Germany. Of this, 60% of programmes under GEF7 have clear climate benefits and so £150 million of our contribution is scored as ICF.

Since its inception in 1991 GEF has invested in improving the management of 3,300 protected areas covering an area of about 860m hectares, an area larger than Brazil. GEF has been instrumental in supporting national policy reform and planning frameworks that promote biodiversity considerations across sectors and geographies with globally significant biodiversity. This has resulted in legal, environmental, regulatory, governance and socio-economic additionalities beyond incremental cost benefits. GEF Sustainable Forestry Management interventions were estimated to have avoided 4,875km2 of deforestation, sequestering 1.33 tonnes of carbon per hectare per year and increasing household assets by USD$163-353. It has also supported management of 790 climate change mitigation projects contributing to 2.7 billion tonnes of greenhouse gas emission reductions and sustainable management of 34 of the world's major river basins and provided $131m to the Global Wildlife Programme to tackle the illegal wildlife trade.

6.4.2.2 Green Climate Fund

Since becoming operational in 2015, the Green Climate Fund (GCF) has become the key multilateral climate fund, with a mandate to make 'an ambitious contribution to the global efforts towards attaining the goals set by the international community to combat climate change'. The UK is a strong supporter of the GCF having committed £720 million

for the initial resource mobilisation period (2015-2019), and doubling this commitment to £1.44 billion for the first replenishment period (2020-2023). The UK is committed to ensuring that the GCF delivers maximum impacts in the developing countries it supports.

The GCF funds transformational projects with a strong focus on leveraging private finance, with a commitment to provide 50% of its resources for mitigation and 50% for adaptation. At least 50% of its adaptation support will be provided to particularly vulnerable countries including Least Developed Countries (LDCs), Small Island Developing States (SIDS) and African States. The GCF has continued to improve its programming and efficiency track record, tightening its policy framework, and building the Secretariat's capacity. In the eight years since it became operational, the GCF has committed $10 billion to climate projects (with an additional $27.2 billion leveraged in co-financing). $4 billion of this GCF commitment (that will mobilise $15 billion in co-financing) has been approved by the Board since June 2020. Around 70% of the GCF's adaptation funding is going to the most vulnerable countries (SIDS, LDCs and African States). 34% of GCF funds are now being delivered through its Private Sector Facility.

6.4.2.3 Climate Investment Funds

The UK is the largest investor in the $10.3 billion CIFs, having committed an additional £560 million over 2019/20 and 2020/21, to pilot low-emission and climate resilient development through projects implemented by the multilateral development banks in the areas of green recovery (£10 million), energy storage (£200 million), coal transition (£200 million) and renewable energy integration (£150 million); the latter two being key COP26 announcements and deliverables. From this commitment, the UK has spent £210m by the end of 2020 on green recovery and energy storage.

The CIFs now operate across 72 countries and have a total portfolio of 325 projects. The projects are unlocking finance flows in the green markets of developing countries and are expected to generate at least $61 billion of co-financing. With strong support from the UK the CIFs have also embarked on a new era of programming which targets key challenge areas that include coal transitions, renewable energy integration, nature-based solutions, cities and industry, and on implementing a Capital Markets Mechanism to raise billions in additional investment from the private sector.

6.4.2.4 Adaptation Fund

The UK pledged £15 million to the Adaptation Fund (AF) at COP26. Since 2010 the AF has committed $850m in support to nearly 100 countries. It has a growing pipeline with over $300 million of requests for support. This is three times the average annual disbursements from the Fund, demonstrating continued high demand from recipients. Funding for any single country was previously capped at $10 million, but this has now been increased to $20 million to allow countries additional support. The AF offers developing countries direct access to funding and often faster than other funds. This is in part because the AF funds projects alone, rather than co-financing with others, and so must cover the full cost of approved projects. This makes it a useful complement to mechanisms such as the GCF, as does its speed and lower project size, which allow for the trialling of innovative new approaches that can subsequently be taken to scale through support from other, larger funds

6.4.2.5 Least Developed Countries Fund

The Least Developed Countries Fund (LDCF) is administered by the Global Environment Facility (GEF) but operates and is funded separately. To date nine of GEF's eighteen implementing agencies have been involved in implementing LDCF projects and programmes: United Nations Development Programme (UNDP), United Nations Environment Programme

(UNEP) , African Development Bank (AfDB), Food and Agriculture Organisation (FAO), World Bank, International Fund for Agricultural Development (IFAD), Asian Development Bank (ADB), International Union for the Conversation of Nature (IUCN), and United Nations Industrial Development Organisation (UNIDO). The UK, through DFID contributed £30 million from December 2016 to March 2019. The UK no longer funds LDCF.

6.4.2.6 The Special Climate Change Fund

The Special Climate Change Fund (SCCF) is administered by the Global Environment Facility (GEF) but operates and is funded separately. The SCCF supports adaptation and technology transfer in all developing country parties to the United Nations Framework Convention on Climate Change (UNFCCC), supporting both long-term and short-term adaptation activities in water resources management, land management, agriculture, health, infrastructure development, fragile ecosystems, including mountainous ecosystems, and integrated coastal zone management. The UK does not fund SCCF.

6.4.2.7 Climate Promise

The UK has provided £3m as a voluntary contribution to the Climate Promise, to support UNDP in helping countries to scale up their efforts to protect and restore nature, and simultaneously address climate change, biodiversity loss and poverty. The funding will be used to support up to 8 countries to increase ambition and accelerate implementation against their targets on forests, land and nature under the Paris Agreement. The Climate Promise overall is building capacity in over 120 developing countries to enable them to strengthen and deliver national climate pledges under the Paris Agreement.

6.4.3 Contributions through bilateral, regional and other channels.

UK ICF includes significant bilateral programming drawing on the UK's experience of supporting and delivering high quality development interventions and sharing the UK's own expertise. This involves working with national and local governments, city authorities and other key public institutions, integrating climate and nature objectives into the design of wider development programmes and launching regional initiatives in Africa, Asia, Latin America that will seek to deliver impact at scale. We will seek to build capacity and provide technical assistance to key institutions to support:

- Partner governments to design, develop and deliver strategies, policies and programmes that will accelerate action on climate and environment; generate jobs and low carbon growth; and build resilience.
- Priority countries and regional groups to effectively contribute to climate negotiations, including technical, legal and strategic UNFCCC support as well as support for developing GHG inventories and reporting.
- The development and implementation of ambitious climate and nature action plans including high-quality, ambitious Nationally Determined Contributions, National Adaptation Plans and long-term, and nature positive development strategies.
- Dialogue between governments and private sector, increasing access to climate finance and building the capacity of markets to enable the clean growth transition.

6.4.4 Mitigation

UK ICF provides funding for over 100 programmes which support mitigation, including the aforementioned multilateral funds. Additionally, British International Investment (BII), formerly CDC group, has invested over £750 million (over $1 billion) in climate finance since 2017 and has set a climate finance target of 30% of new investment commitments over its next

5-year strategy – at least £3 billion. This is a step up from BII's four year average climate commitments (2017-2020) of 17%. BII's £3 billion of climate finance will be invested over the next five years across several different sectors, such as renewable power, infrastructure and agriculture, including forestry. BII continues to increase its commitments to renewable power, with BII's overall direct commitments to renewable energy at $894 million at the end of 2020. BII's portfolio of over 1,000 investments will be net zero by 2050 at the latest.

For example, in 2017 BII invested in:

- Ayana, an independent solar and wind generation company developing utility-scale renewable energy infrastructure in India;
- Zephyr Power, a renewable energy company in Pakistan that has developed a 50 megawatt wind-power plant; and,
- Benban Solar Park in Egypt, the largest solar park in Africa.

Below are some examples of UK programmes (this is not an exhaustive list).

6.4.4.1 Accelerating decarbonisation

Energy Transition: The UK has provided support for the International Energy Agency's (IEA) Clean Energy Transition Programme (CETP) which leverages the IEA's unique energy expertise across all fuels and technologies to accelerate global clean-energy transitions by providing independent, cutting-edge support to governments whose energy policies will significantly influence the prospects for – and the speed of – the global transition towards more sustainable energy production and use. Priority countries include Brazil, China, India, Indonesia, Mexico and South Africa, as well as other IEA Association countries and key regions such as Southeast Asia, Latin America and Africa.

The Renewable Energy Performance Platform (REPP) seeks to mobilise private sector development activity and investment in innovative small and medium scale renewable energy projects (up to 25MW / 50MW for wind) in sub-Saharan Africa. REPP aims to increase the number of sound 'bankable' smaller renewable energy projects by developing innovative and first of a kind transactions to set precedence. REPP does this by assisting project proponents throughout the project development stage, by financing Technical Assistance, drawing on existing risk mitigation instruments such as political risk insurance and providing results-based finance where necessary. The UK has committed £148 million for 2015 to 2023 of which £88m has been provided by end of 2021/22.

The Clean Energy Fund Technical Assistance Programme (CEF TA) – The UK has contributed £19.5 million to the Asian Development Bank's existing Clean Energy Fund (CEF) from 15/16 to 2019/20. The fund supports the development of renewable energy and energy efficiency projects in developing countries in the Asia-Pacific region. The fund focuses specifically on technical assistance activities including building the knowledge and skills base of the industries and governments in the supported countries, as well as undertaking feasibility studies of potential low carbon energy projects. Through a variety of projects, the programme aims to increase country-level (public and private sector) action to implement successful low carbon projects that improve access to clean energy and reduce greenhouse gas (GHG) emissions.

Innovation: since the last National Communication the UK has launched several programmes to accelerate decarbonisation internationally, through technology or financial innovation. The UK also supports decarbonisation in developing countries through its support for innovative research, development and deployment of low-carbon technologies, which are detailed within the '6.5 Technology development and transfer' section of this chapter "

Zero Emission Vehicles: To accelerate the decarbonisation of the road transport sector, the UK is working with a range of bilateral and multilateral partners. Bilaterally, the UK is working with partner countries through the UK Partnering for Accelerated Climate Transitions (UK PACT) Programme, which includes a variety of electromobility-related projects. For example, supporting electric vehicle readiness in Johannesburg, accelerating electric bus adoption in Colombian cities, and developing an action plan for electrification of two-wheelers in Jakarta. The UK also provided £177.5 million to the Sustainable Infrastructure Programme – see section 6.6.1.

At the multilateral level, in addition to supporting electromobility-focused projects through the CIF's Clean Technology Fund and Nationally Appropriate Mitigation Action (NAMA) Facility, the UK contributed an initial £4 million in 2021/22 to the World Bank's new Global Facility to Decarbonise Transport (GFDT). The GFDT, which launched at COP26, aims to mobilise US$200 million within the next decade to support Emerging Markets and Developing Economies (EMDEs) decarbonise their transport sectors. The UK is also working with countries in the ZEV Transition Council to identify further opportunities for a more strengthened and coordinated international support offer for EMDEs in the road transport decarbonisation space.

Buildings/industry: The Market Accelerator for Green Construction (MAGC) is a £103 million bilateral programme funded by UK ICF from 2018/19 to 2020/21 and delivered by the International Finance Corporation (IFC) to drive the financing and construction of more energy efficient buildings in emerging economies. The programme is supporting up to 24 countries across Latin America, Africa, Asia and the Middle East, aiming to build demonstration portfolios of green construction at scale, reducing emissions, mobilising new finance and inspiring markets to shift towards the new energy efficient buildings of the future. Primarily, MAGC provides concessional finance for sustainable building projects, where the perceived financial risk is high, and deploys technical assistance to incentivise local intermediaries to leverage larger volumes of private capital into low-carbon projects. It also builds capacity at the country-level increasing knowledge and ambition for green building projects, funds the improvement and enhancement of IFC's EDGE building standard and tool, as well as building evidence through a significant research project that quantifies the financial and emissions case for green construction in developing markets and further drive wider uptake.

UK Climate Investments: UK Climate Investments LLP was mandated to invest in up to £200 million of UK ICF in low carbon projects in emerging markets in its pilot phase (2015-2022). As of November 2021 UKCI's investment budget is now fully committed. The Investment Mandate requires UKCI to make equity investments into renewable energy and energy efficiency projects in India and Sub-Saharan Africa. Through investing a minority equity stake, UKCI aims to leverage additional private equity and debt investment into the projects. The central objectives of the pilot were to:

- Use a private sector actor to have a demonstration effect, build a successful track record and prove commerciality of low carbon investments to the broader market by making a strong return on investment; and
- Ensure additionality and transformational capacity of UKCI's resources by engaging with market barriers and avoiding displacement of private capital. UKCI's investments in India and Sub-Saharan Africa have each provided innovation in their markets. For example, UKCI has supported the creation of the first Renewable Energy YieldCos in India and South Africa, to increase capital recirculation, developed an innovative financing tool for Black Economic Empowerment investment – a potential market barrier – and supported an environmentally sustainable housing fund in Kenya – creating an entirely new asset class.

6.4.4.2 Carbon markets and carbon pricing

The UK Government considers that carbon pricing is crucial to support and raise the ambition needed to tackle the climate change challenge. Carbon pricing can provide a cost effective and technology-neutral way of reducing emissions, and it can help mobilise the private sector towards the achievement of the Paris Agreement goals. It is for this reason that the UK continues to promote the use of pricing instruments both domestically and internationally.

The UK Emissions Trading Scheme (UK ETS) came into force on 1 January 2021, replacing the UK's participation in the EU Emission Trading System (EU ETS). The system has been established to increase the climate ambition of the UK's carbon pricing policy, while mitigating the risk of carbon leakage through free allowances. The UK ETS will promote cost-effective decarbonisation, allowing businesses to cut carbon emissions where it is cheapest to do so. It will be the world's first net zero carbon cap and trade market, and a crucial step towards achieving the UK's target for net zero carbon emissions by 2050.

Internationally, the UK continues to support carbon pricing and carbon markets through a portfolio of programmes aimed at building capacity and piloting new approaches:

- The UK has invested £7 million since 2011 in the Partnership for Market Readiness (PMR) fund, supporting 19 countries to design and build readiness for domestic carbon pricing initiatives such as carbon taxes or ETSs.
- From 2021 the UK has committed a further £20 million to PMR's successor programme, the Partnership for Market Implementation (PMI), which will help developing countries to implement carbon pricing schemes, as well as to support related regional work, through the 2020s. At least 15 countries have applied for support.
- The UK is improving access to carbon finance in least developed countries through our involvement in the World Bank's Carbon Initiative for Development (Ci-Dev). Ci-Dev focusses mainly on the poorest countries in Africa to help them participate in the international carbon markets while providing clean energy for households and communities. The programme enables local developers to put their ideas into practice, for example by aggregating many small projects at household or community level and calculating the carbon that has been saved in order to unlock results-based finance. The UK committed £50 million to Ci-Dev since 13/14.
- In 2016, the UK contributed £60m to the Transformative Carbon Asset Facility. TCAF's purpose is to support scaled up crediting approaches in countries with sizeable mitigation potential, and to help enhance overall ambition. Almost 90% of the funding will be spent on results-based purchases of emission reductions from supported programmes.
- Lowering Emissions by Accelerating Forest Finance (LEAF), the largest initiative to date for scaling carbon markets (see Section 6.4.6).

In 2015 the Paris Agreement reiterated the importance of carbon markets in meeting international commitments by establishing a new framework for cooperation to enable countries to go further on their mitigation and adaptation actions, and to promote sustainable development and environmental integrity. COP26 finally saw consensus in this area ('Article 6'), completing the Paris Agreement rulebook. Building on this agreement, the above provisions will help make the UK vision for the future of the global carbon market a reality by providing the foundations to facilitate bottom-up cooperation while creating the necessary top-down structures.

The UK Government also supports international initiatives to ensure that voluntary carbon markets – in which carbon credits are voluntarily purchased by businesses and other non-state actors – develop with high levels of integrity. In particular, the UK Government welcomes and is closely engaging with the work of the Voluntary Carbon Markets Integrity Initiative[48] and the Integrity Council for Voluntary Carbon Markets[49]. These independent bodies are working to ensure that voluntary carbon markets drive credible, transparent action aligned with the Paris Agreement, across both the supply and demand of carbon credits.

6.4.5 Adaptation

Even if we stopped emissions rising today, the world would still need to deal with significant climate disruption. No-one is immune from the impacts of climate change and the poorest and most vulnerable are hardest hit. This includes young people, women and girls, people with disabilities and indigenous peoples. The need for action on adaptation and loss and damage resulting from climate impacts has never been greater. The UK is committed to a balance in ICF spend between Mitigation and Adaptation, recognising the importance of delivering an ambitious adaptation agenda. In a policy paper published before COP26, 'the Glasgow Imperative', the UK outlined plans to drive adaptation and resilience action through five pillars: i) Building resilience across all of society; ii) Effective Risk Management; iii) Transforming Finance; iv) Catalysing Locally Led Action; and v) Harnessing the power of nature.

The UK's ICF has to date helped 88 million people cope with the effects of climate change by assisting countries to better:

- Adapt to long term impacts well in advance, for example by changing or diversifying livelihoods and ensuring infrastructure is fit for purpose.
- Anticipate and reduce the impact of climate variability and extremes for example through effective forecasting and preparedness measures.
- Absorb the effects of climate extremes and disasters for example through effective and rapid response that enables people to cope with disaster and recover quickly.

Programmes supported by the UK may work across all three areas of action as set out above.

Some examples of UK activities in each of these areas are detailed below (not exhaustive):

Anticipate: The Risk Informed Early Action Partnership (REAP) brings together an unprecedented range of stakeholders across the climate, humanitarian and development communities with the aim of making 1 billion people safer from disaster by 2025. REAP does not create a new funding mechanism or directly implement ground-level projects, however, seeking instead to enable coherence, alignment and complementarity of existing initiatives, while learning together what new initiatives are needed to make 1 billion people safer.

Absorb: The Coalition for Climate Resilient Investment develops and pilots practical tools, solutions and financial instruments to support a more efficient integration of physical climate risks in investment decision-making.

Adapt: The Least Developed Countries Initiative for Effective Adaptation and Resilience (LIFE AR) has been supported by the UK since April 2020 and works closely currently with

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[48] https://vcmintegrity.org/

[49] https://icvcm.org/

6 'frontrunner countries' from the LDC Group at UNFCCC to transform the way that climate finance is accessed, managed and targeted with an objective that at least 70% of climate finance will support local level actions by 2030. This supports the LDC Vision that by 2030 all their (currently 46) countries will be climate resilient by 2030 and will reach net zero by 2050.

6.4.6 Crosscutting: nature, land use, and oceans

The UK supports a combination of climate mitigation and adaptation through cross-cutting activities that deliver protection and restoration of nature, both terrestrial and marine, and changes in land use.

Lowering Emissions by Accelerating Forest finance (LEAF) is an ambitious financing mechanism that is mobilising public and private finance for tropical forest protection using high integrity voluntary carbon markets. Companies providing finance must commit to deep emission cuts in their own value chains, while emissions reductions generated by reduced deforestation are independently verified using the stringent ART/TREES standard. So far, LEAF has mobilised $1bn (£700m) in results-based finance and is poised to grow to become one of the largest ever public-private efforts to protect tropical forests. The UK has committed £200m for results-based finance and technical assistance.

Mobilising Finance for Forests (MFF) is a new £150 million (2021-2036) UK blended finance programme aimed at increasing private sector investment in activities which protect and restore forests, whilst reducing deforestation associated with unsustainable land use practices over 15 years. It was launched in March 2021 and has already disbursed £100 million to the delivery partner (the Dutch Finance Institution FMO), who are responsible for selecting funds and projects aimed at creating value from standing forests and/ or incorporating forest protection and restoration into sustainable forms of agricultural production. The majority of the capital will be invested in existing sustainable land use funds, while some is reserved for direct investment in projects in tropical forest regions. MFF made its first investment in November 2021 into the Green Fund to issue debt to projects in Brazil, Colombia, Ecuador, Peru, Indonesia, Liberia, and Gabon.

The Biodiverse Landscapes Fund programme is providing £100m over seven years from 2021/22, mostly through international climate finance, to strengthen protection of six critical ecosystems across the KAZA region (Angola, Botswana, Namibia, Zambia and Zimbabwe), the Western Congo Basin, Madagascar, the lower Mekong, Mesoamerica and Ecuador and Peru. As well as reducing carbon emissions, it will help half and reverse loss of biodiversity and support sustainable livelihoods from resources in protected areas.

The **Biodiverse Landscapes Fund** (£100m over seven years from 2021/22) which aims to deliver biodiversity protection and conservation, poverty reduction, and climate change mitigation and adaptation outcomes across six highly biodiverse landscapes worldwide. The six landscapes covered are Kavango Zambezi Transfrontier Conservation Area, Mesoamerica, Congo Basin, Andes Amazon, Lower Mekong, and Madagascar.

The UK's **Blue Planet Fund** will deliver £500m (over five years) from 2021/22, mostly from international climate finance to protect marine environments (addressing climate change and biodiversity loss) and reduce poverty. It will, for instance, provide technical assistance through the UK Ocean Country Partnership Programme, support conservation of coral reefs (Global Fund for Coral Reefs), strengthen investment in critical marine ecosystems such as mangroves through the Ocean Risk and Resilience Action Alliance.

The UK is continuing to deliver a set of ongoing programmes funded from previous and current international climate finance:

The **UK Blue Carbon Fund**, managed by the Inter-American Development Bank, aims to encourage the sustainable management of mangrove forests in target countries across Latin America and the Caribbean by developing and embedding operational blue carbon markets. It seeks to mobilise public and private sector investment to support mangrove protection and fund projects in areas such as sustainable aquaculture, coastal zone management and eco-tourism to tackle the main drivers of mangrove degradation. The Fund is projected to sequester or avoid 2.9 million tonnes of greenhouse gas emissions; protect or restore 5,570 hectares of mangrove forest; and protect or restore £48 million of ecosystem services.

The £10.3 million **Blue Forests Initiative** (2016-2024), delivered by UK NGO Blue Ventures, works with local coastal communities in Madagascar and Indonesia to protect and restore mangrove habitat, create new sustainable livelihoods, support community health and women's empowerment, and increase climate resilience. The programme is projected to protect over 180,000 hectares of mangrove forests; deliver over 7.7 million tonnes of carbon savings; benefit 86,000 people through sustainable livelihoods, and create successful models to increase the resilience of coastal communities that are replicable and scalable.

The Low Carbon Agriculture for Avoided Deforestation and Poverty Reduction Programme in Brazil, through the Inter-American Development Bank, is restoring deforested and degraded land on small- and medium-sized farms in the Amazon, Atlantic Forests, Cerrado and Caatinga biomes, targeting the barriers experienced by farmers in accessing rural credit to support sustainable production.

The UK has contributed to the BioCarbon Fund, a multilateral project administered by the World Bank aiming to reduce greenhouse gas emissions from the land use sector through sustainable landscape management, whilst improving the livelihoods of forest communities. The Fund combines upfront technical assistance with results-based finance which rewards countries which implement landscape-level approaches that reduce emissions from the forest and land-use sector. It works with 5 countries: Colombia, Indonesia, Ethiopia, Mexico and Zambia.

The UK has contributed to the Eco.business fund for Latin America, a public-private partnership investment fund which aims to shift incentives in financial institutions (i.e. banks) towards investing in nature, by embedding social and environmental risk into investment decisions, catalysing transformational change in the financial sector. The UK has also invested in the Land Degradation Neutrality Fund which brings together public and private investors to support investments in financially viable private projects on land rehabilitation and sustainable land management worldwide, including sustainable agriculture, sustainable livestock management, agro-forestry and sustainable forestry.

The UK contributed £20m in 2020 to the World Bank's Global Programme on Sustainability. The programme supports the integration of natural capital into economic and financial decision making in selected countries. It began in early 2019, building on the World Bank's previous Wealth Accounting and Valuation or Ecosystem Services (WAVES) programme. The GPS budget is $34m with programme close due in 2025 and the UK is currently the largest donor. The programme is commencing activities in 6 Core Implementing Countries in 2022 with smaller grants being provided to 15 countries on sustainability linked themes.

The UK has contributed £4.4 million to the Cities4Forests Initiative (2021-2023), delivered by the World Resources Institute, to support initiatives that enable authorities and decision makers in several developing countries' cities to protect and restore forests in or around urban areas.

6.4.7 Mobilising private finance

Channelling the finance to enable climate action is a challenge faced by every country and organisation – the scale and speed of this transition will require all forms of finance: public and private; domestic and international. In the Convention and the Paris Agreement, developed country Parties have committed to provide financial resources to assist developing country Parties with respect to mitigation and adaptation. Public finance plays a crucial role in bearing risk and in catalysing action, but it cannot fund the transition alone. In Article 2.1c of the Paris Agreement, all Parties also committed to making finance flows consistent with a pathway towards low greenhouse gas and climate resilient development; this should catalyse the trillions of investment needed, but requires a fundamental shift in the global financial system. Taking climate and nature risk into account when making financial decisions should be seen as essential to economic, social and environmental sustainability. Whilst private finance is not a substitute for increased public finance flows, it will be vital in increasing the scale and reach of climate mitigation and adaptation actions, and ultimately in enabling this transition.

This transition requires all forms of finance, with ODA and domestic resources being used in a targeted, catalytic way to unlock the trillions which will drive this transition. We will use ICF to leverage and mobilise private finance by reducing the barriers preventing the deployment of commercial finance needed to drive low-carbon growth and economic transitions in developing countries. UK ICF will continue to place a strong emphasis on transformational change, through targeted investment in innovative projects and technologies with the potential to be scaled up and replicated by the private sector.

This work will include using and influencing instruments such as British International Investment (BII) International, the UK's development finance institution and the Private Infrastructure Development Group (PIDG) to offer direct and intermediated investment into climate-responsive companies, supporting both mitigation and adaptation-related private sector activity. This in turn can demonstrate to commercial investors that such opportunities can offer attractive risk-adjusted returns. Some examples include:

The **UK Sustainable Infrastructure Programme** (SIP) as detailed in Section 6.6.1, and **UK Climate Investments** (UKCI) LLP as detailed in Section 6.4.4.1.

Global Climate Partnership Fund (GCPF): The UK has invested £54.5 million from 13/14 to 18/19 in junior equity into the GCPF, providing a risk cushion to other investors. GCPF is a public-private partnership which seeks to mobilise investment flows in energy efficiency and renewable energy projects in developing and emerging markets, with the aim to reduce greenhouse gas emissions. GCPF primarily does this by providing debt finance via local Financial Institutions, extending credit lines so they can offer loans for small-scale low carbon projects. GCPF has so far invested in 23 countries and in about 30 financial institutions.

Get FiT Uganda: The UK has contributed £53.3 million in grants, since 2013/14. This finance is supporting small-scale, on grid projects in Uganda and building the capacity of Uganda institutions to attract private investment in the renewable energy sector.

The **Climate Public Private Partnership** (CP3) is an up to £130 million programme that aims to support clean energy and demonstrate the commercial viability of investments in climate related businesses in emerging markets. By acting as an anchor investor into two private equity climate funds, CP3 sought to catalyse new sources of climate finance from institutional investors such as pension funds and private wealth funds. CP3 currently supports a portfolio of 116 different investments, covering a diverse range of sectors across the globe. These investments are expected to increase clean energy generating capacity, reduce greenhouse gas emissions, increase resource efficiency and support job creation. CP3 invests across

developing countries in Asia, Africa and South and Central America. CP3 is expected to avoid 2.6 million tonnes of CO_2 equivalent over its lifetime (to 2026).

The **Global Innovation Lab** supports actionable, innovative, catalytic and financially sustainable ideas for the low-carbon economies of developing countries. The UK has already provided £1.57m since August 2011. The programme brings together public and private sector experts who scrutinise innovative climate finance projects and help develop them towards commercialisation. The Lab has contributed to mobilise $3.2 billion for Lab-endorsed proposals, 30% of which is private funding.

Mobilising Institutional Capital Through Listed Product Structures (MOBILIST) develops investment solutions to support global development and the climate transition. MOBILIST competitively sources and selects emerging and frontier market-dedicated investment products with the aim of listing on global and local public exchanges to respond to the prudential and investment regulations and mandates that institutional investors are subject to. MOBILIST invests capital, delivers technical assistance, conducts research and builds partnerships to catalyse investment in new listed products. The first set of products resulted in the first listing of an investment trust vehicle exclusively focused on emerging market renewable energy projects. UK ICF provided £24.5 million as an anchor investor and a further £63 million in private capital was raised from private investors bringing the total to £87.5 million (initial public offering in December 2021).

The UK is working with the African Development Bank (AfDB) and African Trade Insurance Agency (ATI) on the **Room to Run Sovereign guarantee** (R2R), which will unlock up to $2 billion of additional climate finance for Africa. This additional climate finance will be deployed across eligible AfDB member countries to support both government and private sector projects. The $400 million of R2R cover provided by ATI will be partly re-insured though firms in the City of London.

The **Private Infrastructure Development Group** (PIDG) operates across the infrastructure project life-cycle and capital structure by deploying expertise and small amounts of capital through equity, debt, guarantees, project development funds and grants. It addresses the early stage risks associated with infrastructure projects, making projects bankable and acting as a key enabler for other DFIs and private investors to co-invest. The UK committed £74.4 million to PIDG between 2018/19 and 2021/22. PIDG delivers high development impact in low-income countries and fragile and conflict-affected states that helps economies grow and combat poverty.

The **Climate Investment Funds (CIF)** Capital Market Mechanism (CCMM) initiative will leverage existing assets from the CIF's Clean Technology Fund (CTF) to issue investment-grade bonds of up to $6.2bn and raise significant new finance for scaling eligible private and public projects in clean energy and sustainable infrastructure in emerging economies. The bonds are planned to be issued in 2022 in the City of London and could mobilize up to $700 million annually. At its full potential, this initiative could leverage a further $70 billion from both the private and public sector at the project level, contributing significantly to the $100 billion goal.

6.4.8 Research and development spending

The **Global Challenge Research Fund** (GCRF) provides dedicated funding to research focused on addressing global challenges which most significantly impact upon developing countries. It achieves this by supporting challenge-led disciplinary and interdisciplinary research, strengthening capability for research and innovation within Low and Middle Income Countries, and providing an agile response to emergencies, where there is an urgent

research and on-the-ground need. From 2016–2021, this represents a UK investment of up to £1.5 billion.

The **Ayrton Fund** commitment was a new commitment announced by the UK Government as part of the doubling of UK International Climate Finance (ICF) announced by the Prime Minster at the UN Climate Action Summit in New York in 2019. It is a commitment to spend £1 billion on ODA funded research, development and demonstration (RD&D) for innovative clean energy technologies and business models for developing countries over five years from April 2021. Its vision is to help drive forward the clean energy transition in developing countries, by creating and demonstrating new technologies and business models to deploy them. The Ayrton Fund commitment will combine and co-ordinate a range of funding platforms and programmes targeting different aspects of the technology research, development and demonstration needs. This will include £100 million to fund research into clean energy storage, distribution and usage though existing funds such as GCRF and the Newton Fund, as well as support through a portfolio of new and existing programmes including, amongst others, Transforming Energy Access (TEA), the Clean Energy Innovation Facility (CEIF), Climate Compatible Growth (CCG), Modern Energy Cooking Services (MECS) and the Low Energy Inclusive Appliances (LEIA). At COP 26 in Glasgow, the UK announced the scale-up by £126.4 million, to March 2026, of TEA, one of the key delivery platforms for the commitment.

The Newton Fund supports bilateral and regional research and innovation partnerships between the UK and selected middle income countries agreed at a national level. The aim of this is to address specific global development challenges and build research and innovation capacity. It operates through matched funding, with partner countries contributing similar resources to support the partnership. From 2014–2021 a UK investment of up to £735 million was made with 'match' from partner countries.

The Gilbert Initiative provides an organising framework for a coherent UK Government portfolio in climate resilient food systems by providing an oversight structure that will enable coordination and communication on investment plans and existing programmes; a UK Government light-touch reporting on results from food systems investments and framework for collaboration on specific investments.

The Climate and Resilience Research Programme (CLARE) announced at COP26 (£100 million) is a partnership between UK ICF and the International Development Research Council. The programme will support research to improve our understanding of weather and climate systems across African and the likely impacts of future change. It will also support research and innovation focused on low-carbon and climate resilient technology as well as help strengthen local capacity to undertake and benefit from cutting edge climate research and evidence for development. The programme has three main objectives: firstly, to produce world-leading science to advance knowledge of African climate variability and change and enhance prediction of future African climate; secondly, to drive improved knowledge, methods and tools on how climate information and services can be better designed for, delivered and integrated into major decisions today and thirdly, to support international collaboration and the development of scientific capacity in Africa.

The **Global Centre on Biodiversity for Climate (GCBC)** announced at COP26 with £40 million over 2022/23 – 2024/25, is a UK-ICF funded research and development programme. The Global Centre will address critical research gaps in how the conservation and sustainable use of biodiversity can deliver climate solutions and improve livelihoods in developing countries, to be delivered through a partnership of research institutions and experts from the global north and south.

6.5 Technology development and transfer

Some illustrative examples include:

Global Energy Storage Programme (GESP): The UK was one of the main donors to the GESP (£200 million). Collective GESP funding is expected to mobilise an additional $2 billion public and private investments for vital technologies in energy storage.

Energy Sector Management Assistance Programme (ESMAP): the UK supports the ESMAP-IFC Offshore Wind (OSW) Development Programme which was launched in March 2019 with the aim of accelerating the adoption of offshore wind in emerging markets. As part of the programme, in 2019 delegates from 12 developing countries participated in a week-long offshore wind study tour to the UK to visit British research centres, ports, manufacturers, and industry experts. This study tour has helped a number of participating countries such as Vietnam [50] and the Philippines [51] to develop and publish offshore wind roadmaps.

The GSMA Innovation Fund for Climate Resilience and Adaptation: The UK committed £5 million to support this fund which will help accelerate the testing, adoption and scalability of digital innovations that enable the world's most vulnerable populations to adapt, anticipate and absorb the negative impacts of climate change. In addition, the UK provided £5.5m seed funding to the Global Innovation Fund to support the establishment the 'Innovating for Climate Resilience fund', which will invest, through grant, equity, and debt instruments, in innovations with the potential to scale and support the world's poorest to build resilience and adaptation.

Clean Energy Innovation Facility (CEIF): In 2019 the UK launched the £50 million Clean Energy Innovation Facility with this money being provided by end of 2021/22, which aims to accelerate the commercialisation of promising innovative clean technologies in key hard-to-abate sectors through four delivery partners: sustainable cooling (IFC), industrial decarbonisation (World Bank ESMAP), energy storage (Innovate UK) and smart energy (Asian Development Bank). CEIF contributed to the UK's pledge to double its public sector spending on clean energy innovation to £400 million in 2020/2021 through Mission Innovation. To date, CEIF has supported countries including India, Bangladesh, Vietnam, Kazakhstan, Ethiopia, Kenya, Liberia, Malawi, Mozambique, Namibia, Nigeria, South Africa, Somalia, Tanzania, Mexico and Colombia.

Carbon Capture Usage Storage: The Carbon Capture Usage and Storage Programme aims to support developing countries to develop both the technical and institutional knowledge necessary to enable the development of CCUS technologies. The UK has contributed £70m to this programme between 12/13 and 17/18. The programme delivers against that objective by providing technical assistance to support pilot project activities to enable legal, policy or regulatory change and technology demonstration in-country. It is supporting countries including South Africa, Mexico, India, Indonesia, China and Nigeria.

The Energy Catalyst programme accelerates the innovation needed to end energy poverty. Through financial and advisory support, and by building strategic partnerships and uncovering new insights, Energy Catalyst supports the development of technologies and business models that can improve lives in Africa and Asia. Energy Catalyst is an Innovate UK programme with co-funding from the Foreign, Commonwealth and Development Office, Global Challenges Research Fund, the Department of Business, Energy and Industrial Strategy and the Engineering and Physical Sciences Research Council. Over the two years

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[50] https://esmap.org/offshore-wind-devprogram_wind-roadmap-for-vietnam

[51] https://esmap.org/ESMAP-Offshore-Wind-Roadmap-for-the-Philippines

2019, when GCRF began funding Energy Catalyst, and 2020, £8.4 million GCRF funding was dispersed through the Energy Catalyst Programme.

UK ICF sought to support non-Annex I Parties with pollution abatement and remediation activities through the provision of air quality monitoring equipment through the World Bank **Pollution Management and Environmental Health** (PMEH) programme. However, as the programme moved into implementation, it was found that the target countries already had suitable equipment, and the programme was insufficiently flexible to allow for alternative activities (within the agree scope of the UK funding) to be supported. The UK's evidence collection at business case stage has since become more robust, with the UK collecting evidence of demand from a range of sources. Unused funds from the PMEH Programme were re-directed to other ICF Programmes.

6.5.1 Securing policy commitments to accelerate low carbon technology deployment

The UK is an active member of the **International Energy Agency** and has worked to ensure that the Agency has a strong focus on helping its members and the wider energy sector accelerate the clean energy transition drawing on its world-leading analysis and convening power. In 2021 the UK commissioned the production of the IEA's 2050 Net-Zero Road Map for the energy sector. The report is the world's first comprehensive study of how to transition to a net zero energy system by 2050 while ensuring stable and affordable energy supplies, providing universal energy access, and enabling robust economic growth.

6.6 Capacity building

Some illustrative examples include:

6.6.1 Capacity building for mitigation

Nationally Determined Contribution Partnership (NDCP): The UK is a key member, current Co-Chair and one of the largest donors to the **NDCP**, with £11.3m provided from 16/17 to 21/22, a programme which supports developing countries to turn climate commitments made through the Paris Agreement into action. These commitments are called Nationally Determined Contributions (NDCs). NDCP co-ordinates action to enhance and implement NDCs in developing countries, supporting countries to build their capacity in order to take effective climate action. This process provides a crucial forum for donor co-ordination at the country level, as NDCP has a broad membership of country, associate and institutional members that take part in the process, ensuring that there is no duplication of effort. NDCP provides demand-led support for action on both mitigation and adaptation, helping countries to implement the entirety of their NDC. The UK has led on the launch of the NDCP Partnership Action Fund at COP26. The multi-million dollar, multi-donor fund will improve NDCP's capacity to respond to country support requests, acting as backstop funding by providing support when partners are not able to respond with their own resources. It will enable the Partnership to build on their established country engagement process and support demand-led requests to improve and accelerate the implementation of NDCs and Long-Term Strategies.

As of the end of financial year 2020/2021, the UK has contributed £135 million to the **World Bank Energy Sector Management Assistance Programme (ESMAP)**. Specifically on Energy Transitions, the UK has contributed £37 million to ESMAP to provide technical assistance to support developing countries to shift away from unabated coal-fired power generation, and to be transformational in sustainably creating the conditions for alternatives to coal and hence reducing emissions. This includes focusing on the welfare of people and communities, and closing and repurposing mining lands and coal power plants. The high-performing programme has mobilised capital investments from the World Bank and increased

private sector support to renewable energy projects, with success in offshore wind, and decommissioning and repurposing four coal-fired power plants in South Africa. The UK also supports the global "Network of Energy Storage Testbeds" (NESTs) Initiative – in Morocco and South Africa – which is part of the Energy Storage Partnership under ESMAP; the testbeds enable countries to assess energy storage performance under realistic local grid conditions at low cost and at manageable scale.

The Sustainable Infrastructure Programme: In 2017 the UK established the Sustainable Infrastructure Programme (SIP) in Latin America in partnership with the Inter-American Development Bank. The purpose of the programme is to enable and accelerate the implementation of the Nationally Determined Contributions in Latin America, initially Brazil, Colombia, Mexico and Peru, focusing on supporting and catalysing private sector investments in low carbon infrastructure. The UK is providing up to £177.5 million from its ICF budget, with £111.5m being spent to date, to provide technical and financial support. This includes technical assistance to governments to help them shape their regulatory frameworks in a way that is attractive to private investors, support the development of local capital markets, while also investing in demonstration projects to show commercial viability.

UK Partnering for Accelerated Climate Transitions (UK PACT) is a flagship programme funded by the UK Government through its International Climate Finance (ICF) portfolio. The programme works in partnership with ODA-eligible countries with high emissions reduction potential to support low-carbon development and clean growth transitions and to respond to the critical global need for capacity building to address the gap between NDC targets and their implementation. UK PACT works bilaterally with partner countries to deliver demand-led, flexible support in line with country priorities and in areas of UK expertise that currently focuses on areas like green finance, clean energy, sustainable transport, sustainable livelihoods, forests and land-use (including nature-based solutions), and climate policy and regulation with projects in delivery across 16 ODA- eligible countries in Sub-Saharan Africa, Asia, and Latin America. In September 2021, the UK Prime Minister announced £200 million of new funding for UK PACT to continue its delivery and grow as a programme over the next four years to March 2026. This new funding is additional to the £60 million already committed to UK PACT up to March 2022.

As of March 2021, UK PACT projects have mobilised or invested a total of US$869.6 million for reducing greenhouse gas emissions. UK PACT has strengthened climate networks, such as in Mexico, where the creation of strong legislative networks alongside technical recommendations resulted in the approval of Mexico City's congress of a legally binding commitment to net zero by 2050 and other climate related policies. UK PACT has also trained over 30,000 individuals, for example through training delivered to the Government of Colombia on the Paris Agreement's transparency framework, and workshops delivered in China for public and private sector counterparts on ESG investment and TCFD disclosure.

The 2050 Calculator is a £3.5 million bilateral capacity building programme that supports countries to build their own versions of this energy and emissions planning tool. The 2050 Calculator is a uniquely open, transparent and interactive model, originally developed in 2010 to help the UK Government plan the country's low-carbon transition in an evidence-based way. Since 2012, UK International Climate Finance has supported the creation of 19 national and 6 regional energy models, which have been used to develop NDCs and action plans, raise awareness and inform long-term energy strategies. Calculators now cover 61 countries, territories, and cities. The current phase of the calculator programme is assisting India, Kenya, Malaysia, Nigeria, Thailand, Philippines, Vietnam, and Colombia.

The Climate Compatible Growth programme (£38 million) was announced at the African Investment Summit. It will provide tools and evidence (through a systems thinking approach)

that supports investment decision takers in countries in Africa and Asia take an integrated and climate compatible approach about deployment of critical infrastructure capital. With a focus on energy and transport the research addresses how the design of physical infrastructure, regulatory and market systems can promote decarbonisation and how different infrastructure systems interact and can evolve to secure low carbon futures.

The Taskforce for Nature-Related Financial Disclosures (TNFD) programme (£2.8m, 2021-2023) provides funding to support the establishment of the TNFD, contributing to the crucial transition to a nature positive economy. The TNFD aims to give financial institutions and companies a complete picture of their nature-related risks and opportunities to incorporate into their decision-making processes, and to incentivise a shift away from activities that harm nature towards nature-positive projects. Defra have also funded TNFD African Voice to strengthen African country engagement with the TNFD.

6.6.2 Capacity building for adaptation

Adaptation Research Alliance (ARA) has been co-developed with international partners from the Global North and South and was formally launched at COP26 by the UK. The Goal of ARA is to increase investment and research into developing and informing effective solutions to the impacts of climate change through action orientated research. UK ICF has provided leadership in its development and will provide money for the secretariat, and CLARE will deliver its principles. The ARA membership currently includes 129 organisations: 32 from Africa of which 31 Sub-Saharan Africa, 26 from Asia – largely led by India and Bangladesh (18 org), 43 from Europe, 5 from North America, including one from St. Lucia, 5 from South America, 6 International Organisations.

The Adaptation Action Coalition (AAC) supported by the UK, Bangladesh, Egypt, Malawi, the Netherlands and St Lucia has the intent is to get all 122 countries that have signed the UNCAS 'Call for Action' to join the coalition, and thereby commit to increasing action on adaptation and resilience. This is a major COP26 deliverable, demonstrating a shift in the focus being given to adaptation and resilience which a priority developing country ask. The UK specifically supports several key workstreams under the AAC including the Locally Led Adaptation initiative delivered by WRI and IIED and the Water Tracker managed by the Alliance for Global Water Adaptation (AGWA) to integrate water into national adaptation planning.

Infrastructure for Climate Resilient Growth (ICRG) in India: ICRG is a UK ICF funded, £25 million technical assistance programme, delivered in partnership with Government of India (GOI). ICRG interventions, at national and sub-national level, seek to facilitate more effective investment in natural resource management (NRM) infrastructure built under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) to support resilient livelihoods. By integrating climate information services and risk management into MGNREGS, ICRG helps improve abilities of poor and vulnerable people to cope with climate change impacts. MGNREGA is one of the world's largest social protection programme with an annual budget of £7-8 billion, supporting around 70 million households to cope with poverty and marginalisation every year.

The Centre for Disaster Protection programme: This programme is the UK's flagship Disaster Risk Finance (DRF) technical assistance programme. Total UK financing from the start in 2017 to March 2022 has been approximately £27 million. It supports developing countries and the humanitarian and development community to strengthen their pre-disaster planning and financial arrangements so they can better manage crisis and disaster risks, thereby reducing the impact on people and helping to safeguard economic development. It is a partnership between the UK Government, the World Bank, research

institutions and the private sector. It draws upon UK and global expertise in risk, finance and insurance to provide:

a. Advice and Analytics: impartial advice and analytics for developing countries, development and humanitarian agencies, civil society and other key actors, supporting them to design and implement risk financing arrangements and to embed them within effective systems for disaster preparedness, response and recovery.

b. Research and Evidence: investment in global public goods that develop best practice, methodologies and tools, and produce evaluations and evidence on what works.

c. Capacity Building: knowledge and training for developing country Ministries of Finance, national disaster management agencies and other line ministries, as well as humanitarian agencies, civil society and other relevant stakeholders.

d. Innovation: work to generate and incubate new and innovative solutions to development and humanitarian problems, including by bringing together experts from the public and private sectors and other fields.

e. Policy and Outreach: influencing the multilateral system and external partners to align policy and programming with emerging best DRF practice to optimise impact.

f. Domestic insurance market development: strengthening insurance regulation and supervision, work to ensuring appropriate products are available for people and businesses.

6.6.3 Capacity for technology transfer

Newton Fund (see above Section 6.4.8) independent evaluation has found at least 3,228 collaborations and partnerships have been formed under Newton Fund, which have led to over 5,700 publications. Award Holders strongly agreed that working in partnership has improved the quality of their work, developed their research and translational skills, and facilitated access to resources, while the usefulness and applicability of sampled research outputs were found to contribute to solving development challenges. An online survey revealed that:

- 84% of non-UK Award Holders from industry and technology sectors reported that their capacity to translate research into products, solutions or policies had improved;
- 83% had been able to establish new institutional and commercial links;
- 89% reported their profile was raised in the field of applied research and product development; and
- 76% indicated their capacity to commercialise innovative products or solutions had improved.

6.6.4 Capacity building for negotiations

Climate Ambition Support Alliance (CASA): The CASA programme aims to increase the capacity and capability of climatƒe-vulnerable country negotiators to engage in international climate negotiations, helping to preserve and enhance the rules-based international system and increase appetite for higher ambition. Phase 1 of CASA was launched in 2018 and runs until January 2024, building on the UK's previous Negotiations Support Programme. UK ICF

has committed £15.6 million, of which £8.45m has been spent to date, to the programme to provide legal, technical, strategic, diplomatic and media support before, during and after the negotiations. To date CASA has been providing in situ support to the Least Developed Countries (LDC) Group, the Alliance of Small Island States (AOSIS), the Republic of the Marshall Islands, the High Ambition Coalition (HAC) and individual developing country negotiators. At COP26, groups and negotiators supported by CASA were engaged; they secured a profile and made meaningful contributions towards the Summit's outcomes and the Glasgow Climate Pact. The support provided by the programme is highly valued by recipients, with the chair of the Alliance of Small Island States stating at COP26 that CASA had been critical in creating an enabling environment for AOSIS members to fulfil their technical work and foster collaboration.

6.7 Accelerating the alignment of finance flows and raising ambition

6.7.1 ODA alignment

In 2019 the UK made a commitment to align all UK ODA with the Paris Agreement. This commitment was outlined in the 2019 Green Finance Strategy, which also identified four key criteria for what it would mean for ODA to be Paris Aligned:

1. Using an appropriate carbon price in relevant bilateral programme appraisal;
2. Ensuring any investment support for fossil fuels affecting emissions is in line with the Paris Agreement temperature goals and transition plans;
3. Implementing a proportionate approach to climate risk assurance; and
4. Ensuring that relevant programmes do not undermine the ambition in countries' Nationally Determined Contributions (NDC) and adaptation plans.

A variety of approaches have been adopted to implement these requirements including the announcement of the cross-Government fossil fuel policy and within the FCDO an introduction of a new rule within the Programming Operating Framework to ensure that all new spend is aligning with the ambitions of the Paris Agreement. We have been working with our multilateral partners to increase their ambition and align with the Paris Agreement. By COP26 eight multilateral development banks (MDBs) had made timebound commitments to Paris alignment, with the majority planning to align by 2023. Discussions of approaches continue to be held between officials to maintain progress on the implementation of this world-leading commitment.

In addition to our commitment to align UK aid with the Paris Agreement, the UK Government has taken steps to integrate nature into its Official Development Assistance (ODA), ensuring that all new UK bilateral aid spending does no harm to nature. This is a step towards delivering on our commitment in the Integrated Review to investing in nature and a nature-positive economy. This commitment to 'do no harm' sits alongside our commitment to spend at least £3 billion of our International Climate Finance on Nature by 2026.

The UK also supports the alignment of financial flows and raising of ambition through the NDC Partnership (NDCP) – see Section 6.6.1.

6.7.2 Accelerating ambition and implementation internationally

The Climate Accelerator (CFA) is a £10.8 million UK International Climate Finance programme that works to support climate action at scale by supporting governments, project proponents seeking finance and the financial sector. It works with middle income countries to help them achieve their national climate plans and NDCs by helping to identify challenges and

blockages that prevent finance from flowing at the volume and speed required to have a meaningful impact on their climate ambitions.

By bringing together project proponents, finance providers (including experts from the City of London) and policymakers, the CFA seeks to enable a collaborative approach to unlocking a steady flow of blended funding for climate projects at scale and create a pipeline of 'investment ready' low-carbon projects, thereby strengthening countries' ambitions to limit global warming to 1.5°C. It does this in a number of ways including identifying and supporting projects, which will contribute to a country's NDC, to attract primary finance, which in many instances will involve blended finance products capable of funding projects at scale.

6.8 Monitoring and evaluation, lessons learnt and transparency

Designing effective programmes that respond to the needs of developing countries is a priority of UK ICF. The UK draws on evidence from commissioned studies and from its ICF monitoring and evaluation framework to enable continuous improvements in project selection, design and implementation.

6.8.1 Monitoring and evaluation

The UK's cross-departmental ICF monitoring and evaluation framework assesses the performance of ICF against intended outcomes, and supports the generation and use of evidence across the ICF portfolio to allow for continuous improvement. The framework includes programme and portfolio results-reporting, annual reviews of all programmes, and independent evaluations at both programme and portfolio level.

The monitoring aspect of the framework consists of 11 key performance indicators (KPI), covering achievements in adaptation, mitigation, nature, transformational change and mobilised finance. Programmes wholly or partly funded by ICF report results against relevant ICF KPIs. These are collected .and aggregated across the ICF portfolio for reporting publicly. The ICF key performance indicators, their detailed methodologies, and annual aggregate results are published on the UK Government website[52]. This suite of indicators is under review to ensure they capture the range of relevant benefits from ICF activities, including biodiversity benefits.

Programmes receiving UK International Climate Finance are reviewed annually. Results are compared with expected milestones and targets, and the opportunity is taken to reflect on evidence generated over the year – such as from independent evaluations. Lessons are documented and applied, and shared more widely across the portfolio as appropriate.

The UK's ICF monitoring and evaluation framework increases the impact of climate finance by filling key evidence gaps. It achieves this through the following objectives:

- Evaluate and monitor programmes to understand why, how and in what contexts our programmes are successful (or otherwise) in achieving their aims;
- Develop and use the evidence base to improve decision-making within the UK Government and influence the wider climate finance landscape; and
- Provide accountability for our ICF through understanding whether programme results are being achieved.

[52] https://www.gov.uk/government/publications/uk-climate-finance-results

The evaluation aspect of the framework ensures independent scrutiny and learning from a range of commissioned evaluations. At portfolio level, independent evaluations provide evidence and learning to increase the effectiveness and to measure the impact of the UK's international climate finance. At programme level, independent evaluations are commissioned to understand contextual factors around the effectiveness and value-for-money of interventions and to inform programming decisions such as whether to scale-up. For example, in 2020 the UK published an independent evaluation of our Carbon Market Finance Programme, implemented through the World Bank's Carbon Initiative for Development (Ci-Dev) programme, and in 2020 and 2021 the UK published independent Monitoring, Evaluation and Learning Reports for UK PACT.

The UK's ICF welcomes regular scrutiny from both the UK's Independent Commission on Aid Impact and the International Development parliamentary oversight committee. In particular, the UK's monitoring and evaluation framework has been well regarded by the UK's Independent Commission on Aid Impact, which stated in the 2019 review that: "The UK has made an important contribution to promoting better results measurement across the international climate finance architecture", and that "the UK has been a consistent champion of results measurement […] encouraging its multilateral partners to develop results frameworks and strengthen their monitoring and evaluation processes." The Commission also noted that "other actors in the climate finance area look to the UK as a thought leader on the monitoring and evaluation of climate finance."

6.8.2 Lessons learnt and evidence-based programming

Evidence is critical to designing climate finance programmes effectively and to ensure they deliver the greatest impact and respond effectively to the needs of developing countries. Evidence generated through the UK's ICF monitoring and evaluation is fed back into programme and portfolio level design decisions through the annual review process which all programmes undertake, management responses to evaluations recommendations, and analytical appraisal for future programming.

Two of the key lessons learnt from this process of evaluation were that technical assistance is crucial for longer term sustainable development and success requires local buy-in and commitment. The UK's Sustainable Infrastructure Programme was designed to reflect these lessons through its combination of technical assistance to address technical or regulatory barriers and investment capital. Experience demonstrates that when working together, these tools create the greatest opportunities to leverage public and private investment. To ensure that interventions are demand-led and sustainable, this programme works in close collaboration with partner governments and supports national plans.

The ICF portfolio has also yielded important lessons learnt around ensuring effective and efficient project implementation. The UK has been deploying these lessons in the following ways:

- Through the NAMA Facility, the UK identified that countries require greater support for the detailed project preparation phase, to increase the chances of projects progressing successfully through implementation; and
- Through the multilateral funds, such as the Climate Investment Funds, the UK has learned the value of flexible programming to respond to in-country circumstances such as shifts in the costs of technologies.

- The 2020 UK PACT programme evaluation suggested extending project timescales would increase impact and drive transformational change, through sustained action on emissions reductions. Since then, the first multi-year project was approved in April 2021, and following the SR outcome in October 2021 approving multi-year funding, new UK PACT programming from October 2021 will be offered as multi-year opportunities.

In addition to the evidence base drawn from the existing ICF portfolio, the UK's Knowledge, Evidence and Engagement Programme supports the development of effective climate finance by funding commissioned research to inform the focus and design UK ICF programmes and to build on lessons learned. The programme has helped to develop an evidence base on how to devise interventions that can be transformational and effectively respond to the needs and priorities of developing countries, and how to maximise the impact of UK support to ensure it delivers climate, poverty reduction and economic outcomes. Eleven research projects have been funded including:

- An ICF literature review which is providing an evidence base to be used at the ICF portfolio and programme level to inform business cases and strategy, as well as identifying evidence gaps and improved approaches to evaluations.
- The ongoing Economics of Energy Innovation and Systems Transitions research and engagement project aims to help large emerging economy governments accelerate energy innovation and system transitions by transforming the economic analysis that informs their decisions.

The UK has spent £7 million between April 2018 and March 2022 through this programme and further funding is currently being scoped.

The UK originally funded the CIF Evaluation and Learning Initiative, and then supported this initiative to be incorporated into the core activities of the CIFs. This initiative has drawn out learning from the last 12 years of CIF programmes, identifying the transformational impacts these have helped bring about and providing useful lessons for funds across the climate finance landscape.

6.8.3 Reporting and transparency

The UK has an ambitious aid transparency policy ensuring all aid spend data including climate finance, is published and externally assessed to international standards. All business cases and annual reports are published on Development Tracker[53].

In particular, the UK is committed to a conservative and accurate approach to climate finance accounting, giving confidence to developing countries and civil society that the levels of climate-specific support reported accurately reflect the levels of climate-specific support provided. A specific example is our approach to calculating the level of climate finance associated with integrated development projects. Rather than using a standardised co-efficient for calculating this, as most providers of support do, the UK calculates the specific climate related cost of each programme on a case-by-case basis, reflecting the real contribution of each activity to meeting climate goals.

The UK also works closely with the OECD in reporting climate finance and up to 2019 reported annually to meet the requirements under Article 16 of the EU GHG Monitoring Mechanism Regulation.

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[53] https://devtracker.fcdo.gov.uk/

In addition, the UK is committed to the avoidance of double counting, having played a key role in developing the Technical Working Group methodology used to enable OECD-CPI analysis of aggregate mobilisation of private finance. The UK is also committed to developing the evidence base on how public finance and policy measures can attract and measure private finance, including through participating in the OECD Research Collaborative for Tracking Private Finance.

Annex 2: Common Tabular Format Tables (CTF) supporting the UK's fifth biennial report to the UNFCCC

Table 1

Emissions trends: Summary

GREENHOUSE GAS EMISSIONS	*Base year[a]*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt CO_2 eq																																*(%)*
CO_2 emissions without net CO_2 from LULUCF	602,652.08	602,652.08	610,098.95	594,499.06	580,276.82	574,683.24	566,852.20	587,450.91	563,386.58	569,237.78	562,344.30	569,744.21	578,698.60	561,014.63	572,373.66	574,200.86	571,126.89	568,698.07	560,512.74	545,791.87	494,923.49	512,736.34	470,509.12	488,176.36	478,311.00	439,505.39	423,162.94	400,145.84	388,085.92	380,444.86	365,468.41	326,920.69	- 45.75
CO_2 emissions with net CO_2 from LULUCF	608,632.73	608,632.73	615,584.72	599,170.53	584,382.35	578,386.13	570,571.95	590,194.69	565,587.65	570,682.39	563,951.86	571,096.00	579,445.43	560,965.55	572,150.41	573,201.81	569,771.16	566,978.93	558,452.81	542,939.28	492,025.18	509,773.26	466,939.37	484,837.39	474,918.56	435,779.91	419,723.00	396,812.05	384,567.42	377,533.41	362,878.95	324,026.26	- 46.76
CH_4 emissions without CH_4 from LULUCF	129,824.71	129,824.71	130,586.88	130,467.64	129,018.34	122,160.74	123,790.66	123,024.70	120,599.98	117,203.37	111,684.53	106,417.60	101,650.85	99,232.32	94,320.12	89,824.53	85,387.72	81,117.92	77,308.44	71,521.20	67,166.47	62,459.40	59,789.10	58,172.73	54,001.01	52,032.40	51,023.50	49,257.55	49,656.35	49,131.55	48,833.32	46,759.99	- 63.98
CH_4 emissions with CH_4 from LULUCF	134,568.06	134,568.06	135,326.32	135,197.06	133,744.83	126,880.80	128,521.05	127,742.38	125,317.52	121,911.40	116,384.24	111,136.32	106,374.07	103,960.24	99,078.65	94,560.96	90,136.50	85,865.98	82,072.27	76,280.08	71,925.93	67,241.92	64,587.71	62,960.36	58,801.15	56,814.86	55,835.20	54,074.14	54,471.66	53,995.92	53,736.08	51,637.16	- 61.63
N_2O emissions without N_2O from LULUCF	47,288.89	47,288.89	47,521.11	42,585.56	38,345.68	38,990.76	37,650.46	37,731.24	38,090.24	38,117.56	28,599.35	27,969.48	26,564.33	24,864.62	24,400.75	25,015.25	24,128.27	22,984.83	23,028.50	22,217.43	20,764.72	21,195.38	20,290.46	20,042.92	20,144.73	20,692.18	20,351.08	20,048.49	20,533.62	20,374.23	20,367.79	19,298.29	- 59.19
N_2O emissions with N_2O from LULUCF	49,746.71	49,746.71	49,965.22	45,008.12	40,748.45	41,375.25	40,022.57	40,069.08	40,417.97	40,409.15	30,853.44	30,194.40	28,747.18	27,013.05	26,548.94	27,105.40	26,190.63	25,010.92	25,036.63	24,188.68	22,699.96	23,114.71	22,208.25	21,926.99	22,013.07	22,524.39	22,173.13	21,860.68	22,328.02	22,179.23	22,182.71	21,084.28	- 57.62
HFCs	14,400.73	14,400.73	15,010.26	15,628.26	16,403.61	17,307.95	18,569.54	19,484.30	21,712.13	18,053.95	9,765.32	7,796.64	8,464.52	8,785.48	9,575.81	8,412.49	9,194.99	10,058.10	10,492.48	10,924.15	11,464.91	12,072.04	12,722.60	13,381.30	13,835.38	14,029.25	14,056.39	14,081.18	13,998.89	13,676.46	13,034.55	12,208.81	- 15.22
PFCs	1,648.64	1,648.64	1,381.02	685.58	597.19	604.96	589.45	587.65	492.97	478.55	454.33	571.94	471.97	397.67	348.48	439.76	391.97	390.02	286.57	262.15	191.14	280.02	405.80	233.57	286.12	233.58	269.32	279.52	400.70	144.56	210.72	159.79	- 90.31
Unspecified mix of HFCs and PFCs	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	-
SF_6	1,200.60	1,200.60	1,258.84	1,322.72	1,156.10	1,200.36	1,245.33	1,290.95	1,265.39	1,313.19	1,481.38	1,800.45	1,426.29	1,462.77	1,285.78	1,078.95	1,017.80	844.18	802.38	647.56	554.53	655.06	545.95	520.79	460.14	421.62	402.54	432.01	437.36	535.19	474.50	406.94	- 66.10
NF3	0.12	0.12	0.14	0.16	0.20	0.23	0.27	0.32	0.38	0.44	0.51	0.58	0.36	0.36	0.33	0.31	0.35	0.38	0.39	0.39	0.38	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	207.29
Total (without LULUCF)	797,015.77	797,015.77	805,857.21	785,188.99	765,797.93	754,948.24	748,697.91	769,570.07	745,547.68	744,404.84	714,329.71	714,300.90	717,276.92	695,757.85	702,304.93	698,972.15	691,247.99	684,093.49	672,431.51	651,364.74	595,065.65	609,398.60	564,263.40	580,528.03	567,038.74	526,914.79	509,266.13	484,244.95	473,113.19	464,307.21	448,389.64	405,754.88	- 49.09
Total (with LULUCF)	810,197.59	810,197.59	818,526.53	797,012.44	777,032.72	765,755.67	759,520.17	779,369.38	754,794.03	752,849.08	722,891.08	722,596.33	724,929.81	702,585.11	708,988.40	704,799.69	696,703.41	689,148.50	677,143.54	655,242.28	598,862.04	613,137.37	567,410.04	583,860.76	570,314.78	529,803.96	512,459.94	487,539.94	476,204.41	468,065.12	452,517.86	409,523.61	- 49.45
Total (without LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Total (with LULUCF, with indirect)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year[a]*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt CO_2 eq																																*(%)*
1. Energy	597,956.40	597,956.40	608,347.24	593,152.22	577,825.72	562,394.87	554,936.12	572,108.91	548,181.54	553,647.00	542,930.15	551,550.51	562,385.37	546,529.71	552,428.24	552,193.49	548,268.73	544,731.23	534,494.52	521,981.65	479,449.51	497,066.39	456,195.43	472,663.74	457,593.64	418,091.56	403,570.12	384,690.25	372,553.38	366,186.48	350,548.93	312,304.97	- 47.77
2. Industrial processes and product use	85,047.03	85,047.03	83,186.41	77,999.35	74,326.25	77,471.32	77,825.23	80,371.11	81,348.34	75,558.51	58,933.78	54,817.68	51,384.05	47,109.03	50,488.69	51,560.51	50,593.87	51,082.52	53,171.66	50,291.44	40,701.09	41,725.20	39,564.97	41,280.91	45,907.60	45,890.98	43,884.26	38,682.21	38,751.87	36,892.23	36,466.63	34,892.59	- 58.97
3. Agriculture	48,866.71	48,866.71	48,572.93	48,065.36	47,153.14	48,263.67	48,094.85	48,970.35	48,329.41	48,557.01	48,585.65	46,470.13	44,181.49	43,886.46	44,732.55	44,879.32	44,663.38	43,550.11	43,043.70	41,897.48	41,587.22	41,875.97	41,842.89	41,389.58	41,208.01	42,731.34	42,261.27	42,017.15	42,525.16	41,997.59	42,263.15	40,702.74	- 16.71
4. Land Use, Land-Use Change and Forestry[b]	13,181.82	13,181.82	12,669.32	11,823.45	11,234.79	10,807.43	10,822.26	9,799.31	9,246.35	8,444.24	8,561.36	8,295.43	7,652.89	6,827.26	6,683.47	5,827.54	5,455.41	5,055.01	4,712.04	3,877.54	3,796.39	3,738.77	3,146.64	3,332.73	3,276.04	2,889.17	3,193.81	3,294.99	3,091.22	3,757.91	4,128.22	3,768.72	- 71.41
5. Waste	65,145.63	65,145.63	65,750.63	65,972.06	66,492.81	66,818.38	67,841.70	68,119.71	67,688.39	66,642.33	63,880.14	61,462.58	59,326.00	58,232.65	54,655.44	50,338.83	47,722.01	44,729.63	41,721.62	37,194.17	33,327.83	28,731.04	26,660.10	25,193.80	22,329.48	20,200.90	19,550.48	18,855.35	19,282.78	19,230.91	19,110.93	17,854.58	- 72.59
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	-
Total (including LULUCF)	810,197.59	810,197.59	818,526.53	797,012.44	777,032.72	765,755.67	759,520.17	779,369.38	754,794.03	752,849.08	722,891.08	722,596.33	724,929.81	702,585.11	708,988.40	704,799.69	696,703.41	689,148.50	677,143.54	655,242.28	598,862.04	613,137.37	567,410.04	583,860.76	570,314.78	529,803.96	512,459.94	487,539.94	476,204.41	468,065.12	452,517.86	409,523.61	- 49.45

Notes:

Further detailed information could be found in the common reporting format tables of the Party's greenhouse gas inventory, namely "Emission trends (CO2)", "Emission trends (CH4)", "Emission trends (N2O)" and "Emission trends (HFCs, PFCs and SF6)", which is included in an annex to this biennial report.

2020 is the latest reported inventory year.

1 kt CO2 eq equals 1 Gg CO2 eq.

Abbreviation: LULUCF = land use, land-use change and forestry.

a The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

b Includes net CO2, CH4 and N2O from LULUCF.

Table 1(a)

Emission trends (CO_2)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[a]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Change from base to latest reported year
	kt																																%
1. Energy	556,856.29	556,856.29	566,753.64	552,088.13	538,723.35	530,723.11	522,306.81	541,184.78	519,513.32	527,310.38	519,305.25	529,799.08	541,936.89	527,052.91	534,662.02	534,917.15	532,875.53	530,259.55	520,668.26	508,893.20	466,742.94	484,525.47	444,097.72	460,457.83	446,576.17	407,568.70	393,454.10	375,671.31	363,614.80	357,225.84	341,838.31	304,262.12	- 45.36
A. Fuel combustion (sectoral approach)	550,069.21	550,069.21	560,493.31	545,643.94	532,087.73	523,297.61	513,965.63	532,477.93	512,302.57	519,862.01	513,134.70	523,353.05	535,443.81	520,874.26	529,098.90	529,298.37	526,884.33	524,987.80	515,251.13	504,143.26	461,862.41	479,787.47	439,644.69	456,812.02	442,360.22	403,132.67	388,812.91	371,112.71	359,313.54	352,749.43	337,555.12	300,819.52	- 45.31
1. Energy industries	238,058.47	238,058.47	235,356.67	224,539.05	208,799.32	204,498.87	202,486.26	203,502.98	192,668.28	198,440.14	188,955.79	199,766.67	210,637.30	207,579.75	215,320.81	213,540.47	213,895.96	219,815.97	214,824.36	209,198.34	186,086.58	193,409.18	179,267.33	190,317.76	178,150.45	153,515.47	133,899.65	111,838.04	101,632.26	94,420.34	86,623.90	76,089.41	- 68.04
2. Manufacturing industries and construction	77,047.10	77,047.10	80,432.88	78,349.28	75,612.97	74,568.78	71,904.75	71,849.46	70,627.29	71,367.13	72,711.80	74,408.44	73,349.71	66,816.84	66,601.77	65,377.31	66,373.34	63,419.24	61,845.20	57,771.32	50,303.35	51,735.78	48,037.83	46,404.75	44,220.42	43,697.11	43,043.51	43,286.20	44,063.05	44,164.11	41,408.91	38,946.24	- 49.45
3. Transport	119,750.59	119,750.59	118,920.28	120,317.74	121,566.46	122,925.06	122,333.90	126,980.40	128,302.61	128,144.41	129,301.52	127,957.04	127,723.08	130,229.78	129,611.00	130,919.44	131,891.31	131,428.84	132,771.59	127,206.19	122,604.06	120,814.77	118,805.92	117,904.25	116,697.29	118,220.71	120,735.58	123,196.27	123,435.71	121,705.32	119,623.43	96,405.28	- 19.49
4. Other sectors	109,919.62	109,919.62	121,482.08	118,342.77	121,960.68	117,338.25	113,347.59	126,333.08	117,067.58	118,712.02	119,011.21	118,299.94	120,807.55	113,187.37	114,398.79	116,403.59	111,877.38	106,850.10	102,043.01	106,700.22	99,879.55	110,923.68	90,779.54	99,659.89	101,003.36	85,680.53	89,472.23	91,244.72	88,597.87	90,841.91	88,180.12	87,974.70	- 19.96
5. Other	5,293.44	5,293.44	4,301.40	4,095.09	4,148.31	3,966.64	3,893.13	3,812.02	3,636.80	3,198.32	3,154.39	2,920.97	2,926.18	3,060.52	3,166.53	3,057.57	2,846.33	3,473.66	3,766.97	3,267.20	2,988.87	2,904.07	2,754.07	2,525.38	2,288.70	2,018.86	1,661.93	1,547.48	1,584.64	1,617.76	1,718.76	1,403.89	- 73.48
B. Fugitive emissions from fuels	6,787.08	6,787.08	6,260.33	6,444.19	6,635.62	7,425.51	8,341.18	8,706.84	7,210.75	7,448.36	6,170.55	6,446.02	6,493.08	6,178.65	5,563.12	5,618.78	5,991.19	5,271.74	5,417.13	4,749.94	4,880.53	4,738.00	4,453.03	3,645.81	4,215.95	4,436.02	4,641.19	4,558.60	4,301.26	4,476.41	4,283.19	3,442.60	- 49.28
1. Solid fuels	1,698.56	1,698.56	1,312.13	1,122.56	1,022.21	791.77	737.42	553.75	631.17	296.94	214.32	190.26	197.63	194.31	185.42	227.73	161.45	190.87	245.67	324.97	239.68	296.74	379.76	148.57	278.38	435.48	451.84	349.00	360.35	320.07	163.11	197.11	- 88.40
2. Oil and natural gas and other emissions from energy production	5,088.52	5,088.52	4,948.19	5,321.63	5,613.41	6,633.74	7,603.76	8,153.09	6,579.58	7,151.42	5,956.23	6,255.77	6,295.45	5,984.34	5,377.70	5,391.05	5,829.75	5,080.87	5,171.45	4,424.98	4,640.86	4,441.26	4,073.27	3,497.24	3,937.58	4,000.54	4,189.35	4,209.60	3,940.91	4,156.34	4,120.08	3,245.49	- 36.22
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
2. Industrial processes	43,090.96	43,090.96	40,669.31	39,839.13	39,446.02	41,645.38	42,269.75	43,933.11	42,656.01	40,267.35	41,305.66	38,545.25	35,618.52	32,656.86	35,683.98	37,133.98	36,182.83	36,538.11	37,897.94	34,980.46	26,394.50	26,491.81	24,602.86	26,094.76	30,321.12	30,183.57	28,213.47	22,928.21	22,934.55	21,595.23	21,756.18	21,225.07	- 50.74
A. Mineral industry	10,133.32	10,133.32	8,434.53	7,902.36	7,903.04	9,005.61	9,193.67	9,406.22	9,679.57	9,849.09	9,289.97	9,141.08	8,698.33	8,678.06	8,755.39	9,062.97	9,021.22	9,026.26	9,268.10	8,110.97	5,829.13	6,178.65	6,552.25	6,209.56	6,625.58	6,744.22	6,667.77	6,442.68	6,449.29	6,341.66	6,329.85	5,659.21	- 44.15
B. Chemical industry	6,975.59	6,975.59	7,493.08	7,456.12	7,425.55	7,715.73	7,762.11	7,746.86	6,907.54	7,024.25	7,432.99	6,816.27	6,431.53	6,261.42	6,528.98	6,594.92	6,380.46	5,952.02	6,648.42	5,725.73	5,063.83	5,393.11	4,776.89	5,396.26	4,921.86	4,332.06	4,727.75	4,666.93	5,100.56	4,594.49	4,378.77	4,513.43	- 35.30
C. Metal industry	25,429.25	25,429.25	24,232.30	23,019.00	22,471.20	23,456.05	23,989.84	25,042.71	24,974.27	22,768.92	24,060.56	22,059.71	19,934.32	16,939.65	19,617.07	20,007.68	20,265.22	21,037.65	21,482.53	20,610.27	15,045.20	13,802.52	12,659.00	13,732.71	18,042.61	18,153.14	16,325.39	11,319.83	10,876.19	10,177.59	10,566.33	10,672.94	- 58.03
D. Non-energy products from fuels and solvent use	552.81	552.81	509.40	1,461.65	1,646.24	1,468.00	1,324.13	1,737.32	1,094.63	625.09	522.13	528.19	554.35	777.73	782.55	1,468.42	515.93	522.18	498.89	533.48	456.35	1,117.54	614.72	756.24	731.07	954.14	492.55	498.76	508.51	481.49	481.23	379.49	- 31.35
E. Electronic industry																																	
F. Product uses as ODS substitutes																																	
G. Other product manufacture and use	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
H. Other	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	NO, NE,IE	0
3. Agriculture	1,344.46	1,344.46	1,346.81	1,247.10	832.10	1,232.35	1,224.83	1,276.72	568.03	1,005.97	1,128.76	768.61	576.04	752.43	1,490.68	1,630.46	1,603.00	1,586.98	1,559.94	1,583.97	1,481.91	1,429.02	1,542.47	1,359.91	1,150.32	1,483.12	1,249.74	1,282.50	1,278.47	1,382.68	1,630.78	1,184.56	- 11.89
A. Enteric fermentation																																	
B. Manure management																																	
C. Rice cultivation																																	
D. Agricultural soils																																	
E. Prescribed burning of savannas																																	
F. Field burning of agricultural residues																																	
G. Liming	1,014.03	1,014.03	1,007.99	1,006.87	630.93	1,015.30	1,072.94	1,138.11	456.06	860.10	978.33	631.57	431.43	561.62	1,334.89	1,396.04	1,404.65	1,391.33	1,354.76	1,394.80	1,237.30	1,178.75	1,259.75	1,084.66	931.58	1,187.29	928.64	928.71	936.67	1,055.93	1,308.06	947.83	- 6.53
H. Urea application	326.88	326.88	335.25	236.94	197.94	213.80	148.85	135.60	109.00	142.83	147.39	134.04	141.65	187.75	152.80	231.21	195.19	192.61	202.04	186.06	241.37	246.99	279.38	272.22	215.87	292.74	317.89	350.58	338.65	323.62	319.60	233.59	- 28.54
I. Other carbon-containing fertilizers	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
J. Other	3.55	3.55	3.56	3.29	3.24	3.24	3.04	3.01	2.96	3.04	3.04	3.00	2.96	3.06	2.99	3.21	3.15	3.04	3.14	3.10	3.24	3.29	3.34	3.02	2.87	3.08	3.21	3.20	3.14	3.13	3.13	3.14	- 11.56
4. Land Use, Land-Use Change and Forestry	5,980.65	5,980.65	5,485.77	4,671.48	4,105.52	3,702.89	3,719.76	2,743.78	2,201.08	1,444.61	1,607.56	1,351.79	746.84	- 49.08	- 223.25	- 999.05	- 1,355.73	- 1,719.14	- 2,059.93	- 2,852.59	- 2,898.31	- 2,963.08	- 3,569.75	- 3,338.98	- 3,392.43	- 3,725.49	- 3,439.94	- 3,333.79	- 3,518.49	- 2,911.45	- 2,589.46	- 2,894.43	- 148.40
A. Forest land	- 13,992.50	- 13,992.50	- 14,533.82	- 15,009.88	- 15,406.14	- 15,394.24	- 15,494.45	- 15,968.62	- 16,091.74	- 16,547.76	- 16,667.49	- 16,873.56	- 17,360.36	- 17,659.70	- 17,835.42	- 18,253.24	- 18,528.70	- 18,830.18	- 18,915.42	- 19,522.03	- 19,706.04	- 19,583.74	- 19,354.46	- 18,430.17	- 18,593.20	- 18,742.79	- 18,182.76	- 18,386.03	- 18,413.32	- 18,205.86	- 17,942.70	- 17,933.72	28.17

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year*[a]	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt																																*%*
B. Cropland	15,947.46	15,947.46	15,942.08	15,912.08	16,059.05	16,041.26	16,235.51	16,111.18	16,076.21	16,024.66	15,963.97	15,833.29	15,676.94	15,590.81	15,465.00	15,330.79	15,153.66	15,125.10	14,920.31	14,733.19	14,954.89	14,882.77	14,804.09	14,811.55	14,650.40	14,570.75	14,456.89	14,514.05	14,472.92	14,389.97	14,375.78	14,403.93	- 9.68
C. Grassland	114.65	114.65	41.31	- 82.47	- 241.94	- 417.87	- 440.78	- 625.75	- 745.56	- 847.94	- 306.12	204.27	223.66	47.38	12.45	- 323.73	- 357.00	- 449.83	- 402.12	- 534.75	- 621.62	- 694.66	- 1,095.53	- 1,105.57	- 1,206.80	- 1,139.01	- 1,589.96	- 1,404.16	- 1,572.71	- 1,746.08	- 2,003.48	- 1,873.95	- 1,734.43
D. Wetlands	571.12	571.12	601.05	555.25	539.46	648.48	736.77	622.71	551.07	421.80	548.40	613.72	654.30	457.19	709.44	554.41	626.38	662.69	551.85	539.74	579.08	621.10	588.08	565.51	658.55	505.07	1,201.97	567.46	546.93	920.67	1,297.05	605.99	6.10
E. Settlements	5,427.63	5,427.63	5,324.15	5,222.83	5,128.42	5,041.20	4,959.40	4,821.80	4,806.37	4,681.85	4,590.99	4,350.47	4,174.74	4,096.21	4,132.54	4,195.18	4,158.48	3,923.65	4,056.09	3,900.74	3,787.08	3,906.49	3,804.24	3,740.48	3,668.31	3,561.44	3,580.55	3,966.16	3,829.33	3,968.26	3,984.85	4,032.04	- 25.71
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
G. Harvested wood products	- 2,087.72	- 2,087.72	- 1,889.00	- 1,926.34	- 1,973.33	- 2,215.95	- 2,276.69	- 2,217.53	- 2,395.28	- 2,288.00	- 2,522.19	- 2,776.41	- 2,622.44	- 2,580.97	- 2,707.28	- 2,502.47	- 2,408.54	- 2,150.57	- 2,270.64	- 1,969.48	- 1,891.70	- 2,095.05	- 2,316.17	- 2,920.79	- 2,569.69	- 2,480.93	- 2,906.63	- 2,591.27	- 2,381.63	- 2,238.40	- 2,300.94	- 2,128.72	1.96
H. Other	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	NO, IE	0
5. Waste	1,360.37	1,360.37	1,329.20	1,324.70	1,275.35	1,082.40	1,050.80	1,056.30	649.22	654.09	604.63	631.27	567.14	552.43	536.98	519.27	465.53	313.42	386.60	334.24	304.14	290.03	266.07	263.86	263.38	270.01	245.63	263.83	258.10	241.11	243.14	248.95	- 81.70
A. Solid waste disposal	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	0
B. Biological treatment of solid waste																																	
C. Incineration and open burning of waste	1,360.37	1,360.37	1,329.20	1,324.70	1,275.35	1,082.40	1,050.80	1,056.30	649.22	654.09	604.63	631.27	567.14	552.43	536.98	519.27	465.53	313.42	386.60	334.24	304.14	290.03	266.07	263.86	263.38	270.01	245.63	263.83	258.10	241.11	243.14	248.95	- 81.70
D. Waste water treatment and discharge																																	
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
6. Other (as specified in the summary table in CRF)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
Memo items:																																	
International bunkers	24,271.88	24,271.88	23,987.36	25,817.51	26,756.47	26,912.98	28,631.21	30,721.38	32,971.80	36,130.45	36,080.40	38,126.52	37,985.43	36,536.46	36,957.92	40,906.76	43,570.54	45,004.79	44,967.76	47,693.09	45,671.34	43,009.11	45,320.48	43,027.91	43,312.38	44,117.70	43,749.72	44,595.87	46,669.25	46,704.01	46,190.59	22,817.39	- 5.99
Aviation	15,392.61258	15,392.61258	15,151.13816	16,769.70702	17,961.11181	18,758.25802	19,963.32607	21,122.58417	22,466.32019	25,009.11215	27,170.22041	29,980.48	29,198.49	28,660.43	29,358.69	32,180.37	34,747.24	35,275.46	35,103.77	34,330.90	32,523.26	31,451.57	32,930.19	32,071.32	32,354.06	32,592.05	33,098.22	33,323.04	35,882.01	36,264.49	36,444.45	14,343.23	- 6.82
Navigation	8,879.26932	8,879.26932	8,836.22043	9,047.80088	8,795.36195	8,154.72492	8,667.88309	9,598.79686	10,505.47796	11,121.33823	8,910.18072	8,146.05	8,786.94	7,876.03	7,599.23	8,726.39	8,823.31	9,729.32	9,863.99	13,362.19	13,148.08	11,557.54	12,390.30	10,956.59	10,958.32	11,525.65	10,651.50	11,272.83	10,787.24	10,439.52	9,746.14	8,474.16	- 4.56
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0
CO_2 emissions from biomass	3,849.142767	3,849.142767	3,930.250609	4,251.634337	4,369.654477	6,161.591412	6,553.476469	6,701.947266	6,070.029874	6,786.437896	7,006.623875	6,830.16	7,131.89	7,754.54	8,812.42	10,137.71	11,702.42	12,404.83	12,331.96	14,568.70	16,130.08	18,298.02	18,902.84	19,474.32	23,108.75	27,599.46	32,830.32	34,606.10	36,788.06	42,024.79	45,640.49	47,197.54	1,126.18
CO_2 captured	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
Long-term storage of C in waste disposal sites	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
Indirect N_2O																																	
Indirect CO_2 (3)	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	0
Total CO_2 equivalent emissions without land use, land-use change and forestry	602,652.0784	602,652.0784	610,098.9537	594,499.0571	580,276.8227	574,683.2411	566,852.1959	587,450.9062	563,386.5771	569,237.7831	562,344.3012	569,744.21	578,698.60	561,014.63	572,373.66	574,200.86	571,126.89	568,698.07	560,512.74	545,791.87	494,923.49	512,736.34	470,509.12	488,176.36	478,311.00	439,505.39	423,162.94	400,145.84	388,085.92	380,444.86	365,468.41	326,920.69	- 45.75
Total CO_2 equivalent emissions with land use, land-use change and forestry	608,632.7334	608,632.7334	615,584.7222	599,170.5329	584,382.3463	578,386.1324	570,571.9546	590,194.6904	565,587.6523	570,682.3944	563,951.8619	571,096.00	579,445.43	560,965.55	572,150.41	573,201.81	569,771.16	566,978.93	558,452.81	542,939.28	492,025.18	509,773.26	466,939.37	484,837.39	474,918.56	435,779.91	419,723.00	396,812.05	384,567.42	377,533.41	362,878.95	324,026.26	- 46.76
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

a The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

b Fill in net emissions/removals as reported in CRF table Summary 1.A of the latest reported inventory year. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

Table 1(b)

Emission trends (CH_4)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base yeara*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt																																*%*
1. Energy	1,496.20	1,496.20	1,516.88	1,498.02	1,420.99	1,120.64	1,154.97	1,092.64	1,006.96	912.74	807.44	732.75	680.78	644.88	580.86	565.09	492.25	458.03	437.36	418.96	412.08	403.38	387.16	384.37	337.85	320.95	303.77	265.86	263.06	262.56	254.00	235.56	- 84.26
A. Fuel combustion (sectoral approach)	129.44	129.44	134.47	127.28	130.13	118.01	102.28	102.99	95.27	87.50	89.81	81.24	78.64	70.32	64.79	62.01	57.09	53.36	51.26	49.95	46.10	48.62	43.51	43.36	44.39	43.11	45.15	46.47	47.67	49.48	49.13	48.22	- 62.75
1. Energy industries	9.33	9.33	9.30	9.50	9.92	10.06	10.49	10.78	11.09	7.96	12.19	12.50	13.97	13.61	13.51	13.67	13.83	12.15	12.44	12.79	12.86	13.03	11.70	11.25	11.24	12.74	13.30	14.16	14.79	15.17	15.51	15.28	63.84
2. Manufacturing industries and construction	4.59	4.59	4.71	4.73	4.38	4.66	4.54	4.21	3.88	3.82	3.77	3.56	3.50	3.43	3.55	3.74	3.47	3.47	3.44	3.47	3.29	3.60	3.58	3.39	3.57	4.07	4.27	4.37	4.83	5.19	5.15	5.37	16.94
3. Transport	50.68	50.68	50.10	49.49	47.31	43.71	40.10	38.64	35.89	32.74	30.34	27.50	24.37	22.06	19.47	17.52	16.01	14.45	13.26	11.69	8.63	7.66	6.78	6.06	5.41	5.03	4.68	4.40	4.17	3.98	3.91	3.07	- 93.95
4. Other sectors	64.70	64.70	70.25	63.46	68.41	59.48	47.05	49.26	44.31	42.90	43.42	37.60	36.72	31.14	28.17	27.01	23.70	23.19	22.02	21.91	21.25	24.26	21.38	22.59	24.11	21.21	22.85	23.49	23.84	25.09	24.52	24.46	- 62.19
5. Other	0.14	0.14	0.11	0.10	0.11	0.11	0.10	0.10	0.09	0.09	0.08	0.07	0.08	0.08	0.08	0.08	0.07	0.09	0.10	0.09	0.08	0.08	0.07	0.07	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.04	- 73.75
B. Fugitive emissions from fuels	1,366.76	1,366.76	1,382.41	1,370.74	1,290.86	1,002.62	1,052.69	989.65	911.69	825.23	717.64	651.51	602.14	574.56	516.07	503.09	435.17	404.67	386.10	369.00	365.98	354.76	343.65	341.01	293.46	277.85	258.62	219.39	215.38	213.08	204.87	187.34	- 86.29
1. Solid fuels	873.07	873.07	897.83	890.36	829.10	550.96	602.52	557.61	534.51	455.34	377.12	324.44	288.14	283.20	233.32	209.56	154.76	139.90	113.44	113.70	109.95	102.27	97.98	98.67	68.18	67.28	55.38	20.26	19.51	18.83	19.56	18.99	- 97.83
2. Oil and natural gas and other emissions from energy production	493.68	493.68	484.58	480.37	461.76	451.66	450.17	432.04	377.18	369.90	340.52	327.07	314.00	291.36	282.75	293.53	280.41	264.77	272.66	255.30	256.03	252.49	245.67	242.33	225.28	210.57	203.24	199.13	195.87	194.26	185.31	168.35	- 65.90
C. CO_2 transport and storage																																	
2. Industrial processes	11.68	11.68	11.36	11.88	11.32	11.69	9.68	10.76	9.44	7.45	6.53	6.06	5.90	6.02	6.78	6.21	5.37	5.45	5.81	4.53	4.86	5.03	4.54	4.92	5.21	5.08	3.36	3.70	3.26	2.49	3.39	3.23	- 72.34
A. Mineral industry																																	
B. Chemical industry	8.87	8.87	8.87	9.44	9.02	9.24	7.20	8.36	7.06	5.16	4.39	4.12	4.02	4.24	4.89	4.34	3.74	3.44	3.80	3.05	3.78	4.15	3.68	4.06	4.24	3.98	2.40	2.98	2.56	1.80	2.74	2.69	- 69.68
C. Metal industry	1.57	1.57	1.48	1.54	1.54	1.60	1.63	1.62	1.65	1.58	1.55	1.36	1.30	1.19	1.27	1.26	1.12	1.18	1.12	1.05	0.82	0.61	0.62	0.70	0.79	0.90	0.76	0.48	0.46	0.47	0.44	0.44	- 72.13
D. Non-energy products from fuels and solvent use	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	NO,IE	0
E. Electronic industry																																	
F. Product uses as ODS substitutes																																	
G. Other product manufacture and use	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
H. Other	1.24	1.24	1.01	0.90	0.76	0.86	0.85	0.77	0.73	0.71	0.58	0.59	0.58	0.59	0.62	0.61	0.51	0.83	0.88	0.43	0.27	0.27	0.25	0.16	0.18	0.20	0.20	0.24	0.24	0.21	0.21	0.10	- 91.57
3. Agriculture	1,171.99	1,171.99	1,156.99	1,163.42	1,160.80	1,166.11	1,157.68	1,178.98	1,170.73	1,174.39	1,168.53	1,132.90	1,076.43	1,059.68	1,069.33	1,078.16	1,078.79	1,056.87	1,050.16	1,016.24	1,004.79	1,012.20	1,006.18	1,002.79	997.91	1,024.28	1,028.44	1,024.88	1,028.87	1,009.32	1,011.20	997.71	- 14.87
A. Enteric fermentation	987.32	987.32	974.69	982.02	982.94	985.66	979.18	996.46	987.87	991.47	988.59	960.06	909.01	894.53	904.11	910.86	913.24	893.21	886.15	856.41	846.21	851.63	846.42	844.18	837.91	860.14	864.45	862.33	865.90	848.67	849.62	837.50	- 15.17
B. Manure management	166.35	166.35	164.80	165.61	167.11	169.67	167.65	172.15	172.19	171.95	168.98	162.15	156.98	155.15	155.31	157.42	155.84	154.41	154.46	150.63	149.88	152.05	151.33	150.49	151.71	155.70	155.82	154.25	154.68	152.70	153.60	152.48	- 8.34
C. Rice cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
D. Agricultural soils	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
F. Field burning of agricultural residues	7.46	7.46	6.56	4.80	0.16	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	- 100.00
G. Liming																																	
H. Urea application																																	
I. Other carbon-containing fertilizers																																	
J. Other	10.85	10.85	10.93	10.99	10.59	10.78	10.84	10.37	10.67	10.98	10.95	10.70	10.45	10.00	9.91	9.89	9.71	9.26	9.55	9.21	8.70	8.52	8.43	8.12	8.29	8.44	8.17	8.30	8.29	7.95	7.97	7.73	- 28.78

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base yeara*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt																																%
4. Land use, land-use change and forestry	189.73	189.73	189.58	189.18	189.06	188.80	189.22	188.71	188.70	188.32	187.99	188.75	188.93	189.12	190.34	189.46	189.95	189.92	190.55	190.36	190.38	191.30	191.94	191.51	192.01	191.30	192.47	192.66	192.61	194.57	196.11	195.09	2.82
A. Forest land	3.50	3.50	3.64	3.50	3.58	3.60	4.26	3.96	4.11	3.93	3.72	3.85	3.93	3.90	3.89	3.94	4.12	4.12	4.08	4.05	3.74	3.99	4.23	4.30	4.58	3.70	3.69	3.78	3.75	4.53	4.83	4.13	17.81
B. Cropland	11.68	11.68	11.67	11.66	11.65	11.63	11.61	11.59	11.58	11.57	11.55	11.53	11.51	11.49	11.47	11.44	11.42	11.40	11.38	11.36	11.35	11.33	11.31	11.30	11.28	11.27	11.25	11.23	11.22	11.21	11.19	11.17	- 4.32
C. Grassland	95.43	95.43	95.10	94.79	94.56	94.24	93.98	93.72	93.49	93.26	93.04	93.61	93.62	93.70	94.80	93.69	93.92	93.99	94.52	94.23	94.51	94.97	95.40	94.89	95.17	95.43	95.43	95.79	95.92	96.18	96.61	96.84	1.47
D. Wetlands	78.47	78.47	78.52	78.58	78.63	78.69	78.74	78.80	78.85	78.91	78.97	79.18	79.32	79.45	79.54	79.63	79.72	79.82	79.92	80.03	80.13	80.18	80.20	80.23	80.18	80.17	81.27	80.64	80.65	81.47	82.28	81.74	4.18
E. Settlements	0.15	0.15	0.14	0.13	0.13	0.14	0.13	0.14	0.16	0.17	0.21	0.08	0.07	0.08	0.16	0.26	0.26	0.09	0.14	0.17	0.15	0.32	0.28	0.27	0.26	0.21	0.29	0.67	0.52	0.62	0.63	0.63	330.82
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
G. Harvested wood products																																	
H. Other	0.51	0.51	0.50	0.51	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.50	0.50	0.51	0.51	0.51	0.51	0.52	0.52	0.52	0.53	0.53	0.53	0.54	0.55	0.56	0.57	0.58	14.00
5. Waste	2,513.13	2,513.13	2,538.24	2,545.38	2,567.62	2,587.99	2,629.30	2,638.61	2,636.87	2,593.56	2,484.88	2,384.99	2,302.94	2,258.71	2,115.84	1,943.52	1,839.10	1,724.37	1,599.01	1,421.12	1,264.93	1,077.76	993.68	934.83	819.07	730.98	705.37	675.86	691.06	690.89	684.75	633.90	- 74.78
A. Solid waste disposal	2,415.58	2,415.58	2,439.78	2,443.08	2,464.41	2,485.86	2,530.61	2,538.57	2,530.88	2,490.90	2,380.50	2,281.48	2,232.90	2,185.85	2,038.58	1,863.36	1,755.66	1,628.88	1,496.88	1,323.45	1,166.67	977.93	889.88	831.34	712.49	615.87	592.49	563.40	570.61	573.90	566.08	516.49	- 78.62
B. Biological treatment of solid waste	0.73	0.73	1.64	2.56	3.48	4.40	5.32	6.24	7.16	8.08	8.99	9.91	11.12	12.05	12.94	14.03	15.48	16.71	19.58	19.50	23.02	27.06	30.56	32.68	35.58	40.76	42.13	45.90	48.55	48.11	48.49	48.67	6,610.67
C. Incineration and open burning of waste	5.45	5.45	5.34	5.11	4.56	3.51	3.46	3.51	1.08	1.05	1.14	1.05	1.05	1.02	1.09	0.94	0.91	0.88	0.84	0.72	0.63	0.54	0.48	0.42	0.41	0.37	0.37	0.37	0.36	0.34	0.32	0.30	- 94.58
D. Waste water treatment and discharge	91.37	91.37	91.48	94.63	95.18	94.22	89.92	90.29	97.75	93.52	94.25	92.55	57.87	59.80	63.23	65.20	67.04	77.90	81.71	77.45	74.60	72.23	72.76	70.39	70.59	73.98	70.37	66.19	71.55	68.53	69.86	68.45	- 25.08
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
6. Other (as specified in the summary table in CRF)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
Total CH_4 emissions without CH_4 from LULUCF	5,192.99	5,192.99	5,223.48	5,218.71	5,160.73	4,886.43	4,951.63	4,920.99	4,824.00	4,688.13	4,467.38	4,256.70	4,066.03	3,969.29	3,772.80	3,592.98	3,415.51	3,244.72	3,092.34	2,860.85	2,686.66	2,498.38	2,391.56	2,326.91	2,160.04	2,081.30	2,040.94	1,970.30	1,986.25	1,965.26	1,953.33	1,870.40	- 63.98
Total CH_4 emissions with CH_4 from LULUCF	5,382.72	5,382.72	5,413.05	5,407.88	5,349.79	5,075.23	5,140.84	5,109.70	5,012.70	4,876.46	4,655.37	4,445.45	4,254.96	4,158.41	3,963.15	3,782.44	3,605.46	3,434.64	3,282.89	3,051.20	2,877.04	2,689.68	2,583.51	2,518.41	2,352.05	2,272.59	2,233.41	2,162.97	2,178.87	2,159.84	2,149.44	2,065.49	- 61.63
Memo items:																																	
International bunkers	0.44	0.44	0.38	0.36	0.35	0.32	0.32	0.34	0.36	0.37	0.31	0.28	0.26	0.25	0.24	0.25	0.27	0.28	0.28	0.34	0.32	0.29	0.31	0.27	0.28	0.28	0.26	0.28	0.28	0.27	0.25	0.17	- 62.45
Aviation	0.31	0.31	0.25	0.23	0.22	0.20	0.19	0.20	0.19	0.20	0.18	0.16	0.14	0.13	0.13	0.12	0.13	0.13	0.13	0.12	0.11	0.10	0.11	0.10	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.05	- 84.93
Navigation	0.13	0.13	0.13	0.13	0.13	0.12	0.13	0.14	0.16	0.17	0.13	0.12	0.12	0.11	0.12	0.13	0.14	0.15	0.16	0.22	0.21	0.19	0.20	0.17	0.17	0.17	0.15	0.16	0.15	0.15	0.14	0.12	- 10.00
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0
CO_2 emissions from biomass																																	
CO_2 captured																																	
Long-term storage of C in waste disposal sites																																	
Indirect N_2O																																	
Indirect CO_2 (3)																																	

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

a The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

Table 1(c)

Emission trends (N_2O)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year[a]*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt																																*%*
1. Energy	12.40	12.40	12.32	12.13	12.01	12.27	12.60	12.11	11.73	11.81	11.54	11.52	11.51	11.26	10.89	10.57	10.36	10.14	9.71	8.77	8.07	8.24	8.12	8.71	8.63	8.39	8.46	7.96	7.93	8.04	7.92	7.23	- 41.71
A. Fuel combustion (sectoral approach)	12.25	12.25	12.17	11.98	11.85	12.08	12.40	11.90	11.54	11.62	11.39	11.35	11.34	11.11	10.76	10.44	10.21	10.01	9.57	8.65	7.94	8.11	7.95	8.59	8.51	8.27	8.34	7.84	7.80	7.92	7.80	7.12	- 41.84
1. Energy industries	4.82	4.82	4.77	4.62	4.17	4.06	3.99	3.84	3.60	3.79	3.55	3.75	4.05	4.06	4.07	3.94	4.05	4.13	3.87	3.70	3.33	3.41	3.30	3.84	3.72	3.33	3.21	2.55	2.39	2.42	2.40	2.35	- 51.21
2. Manufacturing industries and construction	1.06	1.06	1.05	1.04	1.01	1.05	1.01	0.97	0.92	0.91	0.88	0.84	0.84	0.82	0.83	0.87	0.83	0.83	0.82	0.79	0.69	0.71	0.68	0.69	0.63	0.70	0.75	0.75	0.83	0.88	0.84	0.84	- 20.53
3. Transport	4.84	4.84	4.77	4.85	5.13	5.58	6.20	5.85	5.86	5.81	5.86	5.77	5.47	5.34	5.02	4.81	4.58	4.28	4.12	3.43	3.22	3.24	3.29	3.36	3.45	3.58	3.71	3.85	3.91	3.92	3.87	3.26	- 32.65
4. Other sectors	1.34	1.34	1.43	1.32	1.39	1.25	1.06	1.10	1.02	0.99	0.98	0.89	0.88	0.77	0.73	0.71	0.66	0.64	0.62	0.61	0.59	0.65	0.59	0.61	0.63	0.59	0.61	0.62	0.62	0.64	0.63	0.62	- 53.70
5. Other	0.19	0.19	0.16	0.15	0.15	0.14	0.14	0.14	0.13	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.12	0.13	0.12	0.11	0.10	0.10	0.09	0.08	0.07	0.06	0.05	0.06	0.06	0.06	0.05	- 73.64
B. Fugitive emissions from fuels	0.15	0.15	0.15	0.15	0.15	0.19	0.20	0.21	0.19	0.19	0.15	0.16	0.16	0.15	0.13	0.13	0.15	0.13	0.14	0.12	0.13	0.13	0.16	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.12	0.10	- 30.97
1. Solid fuels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	- 81.86
2. Oil and natural gas and other emissions from energy production	0.15	0.15	0.15	0.15	0.15	0.19	0.20	0.21	0.19	0.19	0.15	0.16	0.16	0.15	0.13	0.13	0.15	0.13	0.14	0.12	0.13	0.13	0.16	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.12	0.10	- 30.86
C. CO_2 transport and storage																																	
2. Industrial processes	81.93	81.93	82.49	67.87	55.17	55.10	50.03	49.68	50.29	51.20	19.34	19.97	17.63	12.27	11.49	14.56	12.32	10.45	11.90	11.29	6.62	7.05	3.94	3.11	2.93	3.01	2.88	2.91	3.01	2.95	3.04	2.72	- 96.68
A. Mineral industry																																	
B. Chemical industry	79.86	79.86	80.42	65.81	53.10	53.03	47.96	47.66	48.27	49.17	17.29	17.88	15.53	10.17	9.39	12.09	9.51	7.64	8.89	8.10	3.86	4.25	0.67	0.13	0.15	0.14	0.10	0.09	0.13	0.09	0.13	0.17	- 99.79
C. Metal industry	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.05	0.06	0.06	0.06	0.05	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	- 65.64
D. Non-energy products from fuels and solvent use	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	NO, NE, IE	0
E. Electronic industry																																	
F. Product uses as ODS substitutes																																	
G. Other product manufacture and use	2.00	2.00	2.01	2.00	2.00	2.00	2.00	1.95	1.95	1.97	1.98	2.03	2.05	2.05	2.05	2.42	2.75	2.76	2.96	3.14	2.72	2.76	3.23	2.94	2.74	2.82	2.74	2.80	2.86	2.83	2.88	2.53	26.30
H. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
3. Agriculture	61.15	61.15	61.41	59.51	58.06	59.99	60.16	61.14	62.06	61.04	61.22	58.32	56.02	55.85	55.40	54.68	54.00	52.15	51.11	50.02	50.29	50.81	50.83	50.20	50.70	52.49	51.34	50.71	52.10	51.62	51.52	48.91	- 20.01
A. Enteric fermentation																																	
B. Manure management	11.52	11.52	11.45	11.49	11.56	11.67	11.69	12.15	12.32	12.18	11.83	11.49	11.11	10.77	10.80	10.98	10.93	10.72	10.51	10.16	10.09	10.14	9.92	9.79	9.76	9.80	9.78	9.76	9.71	9.58	9.56	9.44	- 18.06
C. Rice cultivation																																	
D. Agricultural soils	48.83	48.83	49.19	47.31	45.91	47.73	47.88	48.42	49.16	48.29	48.80	46.28	44.38	44.56	44.10	43.21	42.59	40.97	40.14	39.43	39.78	40.26	40.49	40.00	40.54	42.27	41.16	40.56	41.99	41.65	41.56	39.09	- 19.95
E. Prescribed burning of savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
F. Field burning of agricultural residues	0.19	0.19	0.17	0.12	0.00	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	- 100.00
G. Liming																																	
H. Urea application																																	
I. Other carbon containing fertlizers																																	
J. Other	0.60	0.60	0.60	0.58	0.58	0.59	0.59	0.57	0.58	0.58	0.59	0.55	0.53	0.51	0.50	0.49	0.48	0.45	0.45	0.43	0.42	0.41	0.41	0.41	0.41	0.41	0.40	0.40	0.40	0.39	0.40	0.38	- 36.59

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year*[a]	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt																																%
4. Land use, land-use change and forestry	8.25	8.25	8.20	8.13	8.06	8.00	7.96	7.85	7.81	7.69	7.56	7.47	7.32	7.21	7.21	7.01	6.92	6.80	6.74	6.61	6.49	6.44	6.44	6.32	6.27	6.15	6.11	6.08	6.02	6.06	6.09	5.99	- 27.33
A. Forest land	2.53	2.53	2.54	2.52	2.52	2.53	2.58	2.58	2.61	2.62	2.62	2.65	2.66	2.66	2.67	2.66	2.66	2.65	2.63	2.60	2.56	2.54	2.56	2.56	2.56	2.50	2.47	2.45	2.43	2.45	2.45	2.39	- 5.40
B. Cropland	2.47	2.47	2.46	2.45	2.43	2.39	2.35	2.30	2.25	2.19	2.11	2.03	1.96	1.88	1.81	1.75	1.68	1.63	1.59	1.56	1.52	1.48	1.47	1.45	1.42	1.39	1.38	1.37	1.36	1.33	1.33	1.34	- 45.76
C. Grassland	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.11	0.10	0.10	0.20	0.10	0.11	0.11	0.14	0.10	0.11	0.14	0.17	0.10	0.11	0.11	0.10	0.11	0.11	0.11	0.13	0.11	31.25
D. Wetlands	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.12	0.08	0.08	0.10	0.12	0.08	16.51
E. Settlements	1.48	1.48	1.45	1.43	1.40	1.38	1.35	1.31	1.30	1.27	1.24	1.19	1.15	1.12	1.12	1.11	1.10	1.07	1.05	1.04	1.02	1.01	1.00	0.98	0.96	0.94	0.93	0.96	0.95	0.97	0.97	0.98	- 33.41
F. Other land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
G. Harvested wood products																																	
H. Other	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.58	0.58	0.58	0.58	0.58	0.57	0.57	0.56	0.56	0.56	0.55	0.55	0.55	0.54	0.54	0.53	0.53	0.53	0.53	0.52	0.52	0.52	0.51	0.51	- 14.50
5. Waste	3.21	3.21	3.24	3.40	3.45	3.48	3.55	3.69	3.75	3.86	3.87	4.05	3.98	4.07	4.10	4.13	4.29	4.39	4.56	4.47	4.70	5.02	5.21	5.23	5.33	5.56	5.61	5.69	5.87	5.76	5.87	5.90	83.69
A. Solid waste disposal																																	
B. Biological treatment of solid waste	0.04	0.04	0.10	0.15	0.21	0.26	0.32	0.37	0.43	0.48	0.54	0.59	0.67	0.72	0.77	0.84	0.92	0.99	1.16	1.15	1.35	1.59	1.77	1.83	1.96	2.19	2.20	2.34	2.43	2.38	2.40	2.40	5,413.58
C. Incineration and open burning of waste	0.17	0.17	0.16	0.16	0.17	0.14	0.15	0.16	0.12	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.21	0.22	0.25	0.24	0.23	0.22	0.19	0.19	0.17	0.15	0.13	0.10	0.09	- 48.21
D. Waste water treatment and discharge	3.00	3.00	2.98	3.08	3.07	3.07	3.08	3.16	3.20	3.15	3.11	3.22	3.08	3.11	3.09	3.06	3.13	3.15	3.16	3.10	3.14	3.19	3.20	3.17	3.15	3.18	3.22	3.19	3.29	3.25	3.36	3.41	13.83
E. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
6. Other (as specified in the summary table in CRF)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0
Total direct N_2O emissions without N_2O from LULUCF	158.69	158.69	159.47	142.90	128.68	130.84	126.34	126.61	127.82	127.91	95.97	93.86	89.14	83.44	81.88	83.94	80.97	77.13	77.28	74.56	69.68	71.13	68.09	67.26	67.60	69.44	68.29	67.28	68.90	68.37	68.35	64.76	- 59.19
Total direct N_2O emissions with N_2O from LULUCF	166.94	166.94	167.67	151.03	136.74	138.84	134.30	134.46	135.63	135.60	103.54	101.32	96.47	90.65	89.09	90.96	87.89	83.93	84.02	81.17	76.17	77.57	74.52	73.58	73.87	75.59	74.41	73.36	74.93	74.43	74.44	70.75	- 57.62
Memo items:																																	
International bunkers	0.91	0.91	0.90	0.96	0.99	0.98	1.04	1.12	1.21	1.32	1.28	1.34	1.34	1.28	1.29	1.43	1.52	1.58	1.58	1.72	1.66	1.55	1.63	1.54	1.54	1.58	1.54	1.58	1.64	1.63	1.61	0.85	- 6.70
Aviation	0.49	0.49	0.48	0.53	0.57	0.60	0.63	0.67	0.71	0.79	0.86	0.95	0.93	0.91	0.93	1.02	1.10	1.12	1.11	1.09	1.03	1.00	1.05	1.02	1.03	1.03	1.05	1.06	1.14	1.15	1.16	0.46	- 6.82
Navigation	0.42	0.42	0.42	0.43	0.42	0.38	0.41	0.45	0.50	0.53	0.42	0.38	0.41	0.37	0.36	0.41	0.42	0.46	0.47	0.63	0.62	0.55	0.59	0.52	0.52	0.54	0.49	0.52	0.50	0.48	0.45	0.39	- 6.57
Multilateral operations	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	0
CO_2 emissions from biomass																																	
CO_2 captured																																	
Long-term storage of C in waste disposal sites																																	
Indirect N_2O	14.11	14.11	13.79	13.50	12.86	12.72	12.28	11.85	11.07	10.90	10.37	10.09	9.90	9.43	9.30	9.04	8.92	8.65	8.28	7.48	6.55	6.40	5.99	6.08	5.76	5.40	5.22	4.75	4.63	4.42	4.18	3.70	-73.80
Indirect CO_2 (3)																																	

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

a The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

Table 1(d)

Emission trends (HFCs, PFCs and SF_6)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year[a]*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt																																*%*
Emissions of HFCs and PFCs - (kt CO_2 equivalent)	17,250.09	17,250.09	17,650.26	17,636.73	18,157.09	19,113.50	20,404.59	21,363.23	23,470.88	19,846.14	11,701.53	10,169.62	10,363.14	10,646.28	11,210.40	9,931.52	10,605.11	11,292.67	11,581.83	11,834.25	12,210.97	13,007.49	13,674.71	14,136.02	14,582.00	14,684.81	14,728.61	14,793.07	14,837.31	14,356.57	13,720.12	12,775.91	- 25.94
Emissions of HFCs - (kt CO_2 equivalent)	14,400.73	14,400.73	15,010.26	15,628.26	16,403.61	17,307.95	18,569.54	19,484.30	21,712.13	18,053.95	9,765.32	7,796.64	8,464.52	8,785.48	9,575.81	8,412.49	9,194.99	10,058.10	10,492.48	10,924.15	11,464.91	12,072.04	12,722.60	13,381.30	13,835.38	14,029.25	14,056.39	14,081.18	13,998.89	13,676.46	13,034.55	12,208.81	- 15.22
HFC-23	0.97	0.97	1.01	1.05	1.09	1.13	1.19	1.22	1.33	1.03	0.41	0.22	0.20	0.17	0.16	0.03	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	- 99.83
HFC-32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.05	0.07	0.10	0.13	0.16	0.19	0.23	0.26	0.30	0.35	0.39	0.43	0.46	0.51	0.55	0.59	0.62	0.64	3,499,608.54
HFC-41	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-43-10mee	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
HFC-125	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.05	0.08	0.13	0.16	0.22	0.27	0.33	0.40	0.46	0.59	0.63	0.70	0.76	0.85	0.94	1.03	1.10	1.13	1.16	1.19	1.22	1.21	1.18	1.14	3,267,582.49
HFC-134	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-134a	0.01	0.01	0.02	0.03	0.16	0.37	0.58	0.83	1.07	1.37	1.68	1.97	2.29	2.49	2.70	2.89	3.14	3.36	3.48	3.56	3.66	3.75	3.87	4.01	4.13	4.18	4.18	4.16	4.11	4.00	3.74	3.41	52,798.79
HFC-143	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-143a	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.06	0.11	0.16	0.21	0.26	0.30	0.35	0.39	0.44	0.49	0.53	0.58	0.62	0.65	0.67	0.69	0.69	0.67	0.65	0.62	0.59	0.55	0.51	0.47	920,790.21
HFC-152	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-152a	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.07	0.10	0.12	0.14	0.19	0.25	0.22	0.21	0.21	0.22	0.19	0.14	0.13	0.19	0.25	0.26	0.28	0.30	0.32	0.34	0.37	0.39	0.43	50,293,179.54
HFC-161	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-227ea	NO,NA	NO,NA	NO,NA	NO,NA	NO,NA	0.00	0.00	0.00	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.13	0.12	0.13	0.13	0.12	0.13	0.13	0.14	0.15	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.00
HFC-236cb	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-236ea	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-236fa	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-245ca	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
HFC-245fa	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.01	0.01	0.02	0.04	0.06	0.07	0.07	0.08	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.09	0.10	0.10	0.10	0.10	0.00
HFC-365mfc	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00	0.01	0.02	0.04	0.07	0.11	0.13	0.14	0.15	0.16	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.12	0.13	0.13	0.14	0.14	0.13	0.00
Unspecified mix of HFCs(4) - (kt CO_2 equivalent)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Emissions of PFCs - (kt CO_2 equivalent)	1,648.64	1,648.64	1,381.02	685.58	597.19	604.96	589.45	587.65	492.97	478.55	454.33	571.94	471.97	397.67	348.48	439.76	391.97	390.02	286.57	262.15	191.14	280.02	405.80	233.57	286.12	233.58	269.32	279.52	400.70	144.56	210.72	159.79	- 90.31
CF_4	0.18	0.18	0.15	0.07	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	- 97.27
C_2F6	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	- 82.08
C_3F_8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.02	0.03	0.00	0.01	0.01	2,302.87
C_4F_{10}	NO	NO	NO	NO	NO	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
$c\text{-}C_4F_8$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	396.57
C_5F_{12}	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
C_6F_{14}	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
$C_{10}F_{18}$	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
$c\text{-}C_3F_6$	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0.00
Unspecified mix of PFCs(4) - (kt CO_2 equivalent)	13.45	13.45	13.45	13.52	33.58	60.45	87.32	67.00	25.97	18.00	7.39	9.62	4.21	6.43	1.56	2.52	3.08	2.52	1.53	0.33	0.32	1.08	2.44	2.38	3.95	2.08	3.58	3.80	6.55	1.03	2.68	1.69	- 87.42
Unspecified mix of HFCs and PFCs - (kt CO_2 equivalent)	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO	NO	NO	NO	NO	NO	NO	0.00

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year*[a]	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Change from base to latest reported year*
	kt																																%
Emissions of SF_6 - (kt CO_2 equivalent)	1,200.60	1,200.60	1,258.84	1,322.72	1,156.10	1,200.36	1,245.33	1,290.95	1,265.39	1,313.19	1,481.38	1,800.45	1,426.29	1,462.77	1,285.78	1,078.95	1,017.80	844.18	802.38	647.56	554.53	655.06	545.95	520.79	460.14	421.62	402.54	432.01	437.36	535.19	474.50	406.94	- 66.10
SF_6	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.08	0.06	0.06	0.06	0.05	0.04	0.04	0.04	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	- 66.10
Emissions of NF3 - (kt CO_2 equivalent)	0.12	0.12	0.14	0.16	0.20	0.23	0.27	0.32	0.38	0.44	0.51	0.58	0.36	0.36	0.33	0.31	0.35	0.38	0.39	0.39	0.38	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	207.29
NF3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	207.29

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

a The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

c Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO2 equivalent emissions.

d In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is kt of CO2 equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.)

Table 2(a)

Description of quantified economy-wide emission reduction target: base year[a]

Party	*United Kingdom*	
Base year/ base period	1990	
Emission reductions target (% of 1990)	% of base year/base period	% of 1990 [b]
	20.00%	20.00%
Period for reaching target	BY-2020	

Notes:

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b Optional.

Table 2(b)

Description of quantified economy-wide emission reduction target: gases and sectors covered[a]

Gases covered	Base Year
CO_2	1990
CH_4	1990
N_2O	1990
HFCs	1990
PFCs	1990
SF_6	1990
NF_3	
Other Gases (specify)	
Sectors covered[b]	
Energy	Yes
Transport[f]	Yes
Industrial processes[g]	Yes
Agriculture	Yes
LULUCF	No
Waste	Yes
Other sectors (specify)	
Other: Aviation	Yes

Abbreviations: LULUCF = land use, land-use change and forestry.

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b More than one selection will be allowed. If Parties use sectors other than those indicated above, the explanation of how these sectors relate to the sectors defined by the IPCC should be provided.

f Transport is reported as a subsector of the energy sector.

g Industrial processes refer to the industrial processes and solvent and other product use sectors.

Table 2(c)

Description of quantified economy-wide emission reduction target: global warming potential values (GWP)[a]

Gases	GWP values [b]
CO_2	4th AR
CH_4	4th AR
N_2O	4th AR
HFCs	4th AR
PFCs	4th AR
SF_6	4th AR
NF_3	
Other Gases (specify)	

Abbreviations: GWP = global warming potential

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b Please specify the reference for the GWP: Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) or the Fourth Assessment Report of the IPCC.

Table 2(d)

Description of quantified economy-wide emission reduction target: approach to counting emissions and removals from the LULUCF sector[a]

Role of LULUCF sector	
LULUCF in base year level and target	Excluded
Contribution of LULUCF is calculated using	

Abbreviation: LULUCF = land use, land-use change and forestry.

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

Table 2(e)I

Description of quantified economy-wide emission reduction target: market-based mechanisms under the Convention[a]

Market-based mechanisms	Possible scale of contributions
under the Convention	(estimated kt CO_2 eq)
CERs	0
ERUs	0
AAUs[i]	2,744,937,332[k]
Carry-over units[j]	111,184,320[l]
Other mechanism units under the Convention (specify)[d]	NA

Abbreviations: AAU = assigned amount unit, CER = certified emission reduction, ERU = emission reduction unit.

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

d As indicated in paragraph 5(e) of the guidelines contained in annex I of decision 2/CP.17 .

i AAUs issued to or purchased by a Party.

j Units carried over from the first to the second commitment periods of the Kyoto Protocol, as described in decision 13/CMP.1 and consistent with decision 1/CMP.8.

k A total of of 2,744,937,332 AAUs were issued to the UK registry in 2021. Note that this figure indicates units issued to the UK, in accordance with the UK's report to facilitate the calculation of the assigned amount ('initial reports') for the second commitment period (2013–2020). Under the terms of the Withdrawal Agreement, the UK remains committed to its shared targets and reporting with the EU under the Convention and the Kyoto Protocol.

l Carry-over was completed in 2018 as follows CERs: 25,882,305 and ERUs: 85,302,015. However, the UK does not plan to retire CERs or ERUs to meet its target for the second commitment period of the Kyoto Protocol.

Table 2(e)II

Description of quantified economy-wide emission reduction target: other market-based mechanisms[a]

Other market-based mechanismsb	Possible scale of contributions
(Specify)	(estimated kt CO_2 eq)
NA	NA

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b 'The UK does not plan to use units from other international credits to meet its quantified economy-wide emission reduction target. However, note that Under the Effort Sharing Decision, Member States are required to limit their greenhouse gas emissions between 2013 and 2020 by meeting binding annual limits which are set according to a linear path. The annual targets – known as annual emission allocations (AEAs) - follow a straight line between a defined starting point in 2013 and the target for 2020. Under the terms of the Withdrawal Agreement, the UK remains committed to its shared targets and reporting with the EU.

Table 2(f)

Description of quantified economy-wide emission reduction target: any other information[a,b]

Under the terms of the Withdrawal Agreement, the UK remains committed to its shared targets and reporting with the EU under the Convention and the Kyoto Protocol.

In December 2009, the European Council reiterated the conditional offer of the EU to move to a 30 % reduction by 2020 compared to 1990 levels as part of a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately according to their responsibilities and respective capabilities.

Under the second commitment period of the Kyoto Protocol (2013 – 2020) the EU has a collective target to reduce its emissions by 20% relative to base year (1990) levels over the period. The burden sharing agreement, set out for the Doha Amendment, translates efforts agreed under the EU 2020 Climate and Energy Package into the second commitment period of the KP. The Doha Amendment of the Kyoto Protocol entered into force on 31 December 2020. The calculation of the UK's Assigned Amount is set out in UK's Initial Report for the second commitment period, and results in an Assigned Amount of 2,744,937,332 assigned amount units (AAUs) over the commitment period, where one AAU is equivalent to one tCO_2eq.

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b This information could include information on the domestic legal status of the target or the total assigned amount of emission units for the period for reaching a target. Some of this information is presented in the narrative part of the biennial report.

Table 3
Progress in achievement of the quantified economy-wide emissions reductions target: information on mitigation actions and their effects

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Building Regulations Part L (2002+2005/6)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Implemented	Building Regulations set minimum energy performance standards for new buildings and when people carry out controlled 'building work' to existing properties including extensions, conversions and certain categories of renovation and replacement windows and boilers.	2002	Department for Levelling Up, Housing and Communities (DLUHC)	10,014	7,704	5,117	2,736	394
Building Regulations 2010 Part L*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	Building Regulations set minimum energy performance standards for new buildings and when people carry out controlled 'building work' to existing properties including extensions, conversions and certain categories of renovation and replacement windows and boilers.	2010	Department for Levelling Up, Housing and Communities (DLUHC)	5,014	6,414	4,928	3,843	3,005
Building Regulations 2013 Part L*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Implemented	Building Regulations set minimum energy performance standards for new buildings and when people carry out controlled 'building work' to existing properties including extensions, conversions and certain categories of renovation and replacement windows and boilers.	2013	Department for Levelling Up, Housing and Communities (DLUHC)	73	102	101	90	82
Sustainable Energy-Using Products*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement of appliances (Energy consumption)	Regulatory	Implemented	Sustainable Energy-Using Product regulations operate by setting minimum performance and information requirements (respectively) for energy-using products. They aim to take the least efficient products off the market and to give consumers clear energy use-related information to guide their purchasing decisions. This was previously implemented through product-specific EU regulations, but is now operated through UK regulation.	2008	Department for Business, Energy and Industrial Strategy (BEIS)	4,010	4,024	2,821	1,197	242
Energy Performance of Buildings Directive (EPBD; UK transposition)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	Energy Performance Certificates (EPCs) are required when any building is sold, rented out or constructed, and sometimes after refurbishment work. EPCs give information on a building's energy efficiency in a sliding scale from 'A' (very efficient) to 'G' (least efficient).	2007	Department for Levelling Up, Housing and Communities (DLUHC)	497	447	395	347	319

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Carbon Trust measures*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption), Efficiency improvement in services/ tertiary sector (Energy consumption), Efficiency improvement in industrial end-use sectors (Energy consumption), Demand management/reduction (Energy consumption)	Information	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	The Carbon Trust provided a range of measures from general advice to in-depth consultancy and accreditation, to reduce emissions and save energy and money to businesses and public sector organisations of all sizes.	2002	Companies acting on advice from Carbon Trust	307	67	0	0	0
Small and Medium Enterprises (SME) Loans*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption), Efficiency improvement in services/ tertiary sector (Energy consumption), Efficiency improvement in industrial end-use sectors (Energy consumption), Demand management/reduction (Energy consumption)	Economic	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	The Carbon Trust provided interest free loans of £3,000 – £400,000 for small and medium sized businesses to invest in energy efficiency equipment and renewable technologies. These loans were designed so that in most cases the forecast reduction in energy costs would be similar to the total repayment amount.	2004	Administered by the Carbon Trust, Department for Business, Energy and Industrial Strategy (BEIS)	70	31	0	0	0
Warm front*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Economic	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Warm Front installed heating and insulation measures to make homes warmer and more energy efficient for private sector households in England vulnerable to fuel poverty. The scheme offered a package of heating and insulation measures of up to £3,500 (or £6,000 where oil central heating or other alternative technologies are recommended).	2000	Carillion, Department for Business, Energy and Industrial Strategy (BEIS)	253	251	264	261	257
EEC1 (energy efficiency commitment), EEC2 (2002-2008) & Baseline Carbon Emissions Reduction Target (CERT) (2008-2010)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	EEC I: GB wide regulation that required all electricity and gas suppliers with 15,000 or more domestic customers to achieve a combined energy saving of 62 TWh by 2005 by incentivising their customers to install energy-efficiency measures in homes. EEC II – energy suppliers with more than 50,000 domestic customers required to deliver a total of 130 TWh lifetime energy use reductions in GB households, primarily through the promotion of energy efficiency measures. Carbon Emission Reduction Target (CERT) – GB regulation that required all domestic energy suppliers with a customer base in excess of 50,000 domestic customers to make savings in the amount of CO_2 emitted by householders.	2002	Office of Gas and Electricity Markets (Ofgem), Large domestic energy suppliers, Department for Business, Energy and Industrial Strategy (BEIS)	2,769	2,491	2,304	2,269	2,240

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									2020	*2025*	*2030*	*2035*	*2040*
Carbon Emissions Reduction Target (CERT) Uplift and Extension (2010-12)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	CERT extension – increased the targets originally set under CERT by 20% and required domestic energy suppliers with a customer base in excess of 50,000 (later increased to 250,000) to make savings in the amount of CO_2 emitted by householders. The extension also refocused subsidy towards insulation measures and away from electricity saving measures such as low energy lighting – and introduced a super priority group (households in receipt of certain means-tested benefits) to make energy reductions in low income and vulnerable households.	2010	Office of Gas and Electricity Markets (Ofgem), Larger Energy Suppliers, Department for Business, Energy and Industrial Strategy (BEIS)	1,600	1,426	1,329	1,251	1,241
Community Energy Saving Programme (CESP)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Community Energy Saving Programme (CESP) – area based regulation that targeted households across Great Britain, in areas of low income, to improve energy efficiency standards, and reduce fuel bills. CESP was funded by an obligation on larger energy suppliers and also the larger, electricity generators.		Office of Gas and Electricity Markets (Ofgem), Larger Energy Suppliers, Department for Business, Energy and Industrial Strategy (BEIS)	92	73	65	56	48
Energy company obligation (ECO_1)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory, Economic	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	The Energy Company Obligation (ECO_1) was a statutory obligation on energy suppliers with over 250,000 domestic customers and delivering over a certain amount of electricity or gas to make reductions in carbon emissions or achieve heating cost savings in domestic households. ECO_1 focused on insulation measures, and also heating improvements to low income and vulnerable households. It ran until March 2017.	2013	Large Energy Suppliers, Department for Business, Energy and Industrial Strategy (BEIS)	640	624	602	583	571
Smart Metering*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Demand management/reduction (Energy consumption)	Information, Regulatory	Implemented	The smart metering programme will replace 53 million meters with smart electricity and gas meters in all domestic properties, and smart or advanced meters in smaller non-domestic sites in Great Britain by the end of 2020. Smart meters will deliver consumers with near-real time information on their energy consumption to help them control energy use, so avoiding wasting energy and money. It will deliver energy networks with better information upon which to manage and plan current activities. Smart meters will also assist the move towards smart grids which support sustainable energy supply and will help reduce the total energy needed by the system.	2014	Department for Business, Energy and Industrial Strategy (BEIS)	1,179	2,006	1,987	1,936	1,924

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									2020	*2025*	*2030*	*2035*	*2040*
Renewable heat incentive (RHI)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Increase in renewable energy; switch to less carbon-intensive fuels	Economic	Implemented	The Non-Domestic Renewable Heat Incentive (RHI) provides financial incentives to increase the uptake of renewable heat by businesses, the public sector and non-profit organisations. Eligible installations receive quarterly payments for 20 years based on the amount of heat generated. The Domestic RHI is a government financial incentive to promote the use of residential renewable heat. Eligible installations receive quarterly payments for seven years for the estimated amount of renewable heat their system produces.	2011	Department for Business, Energy and Industrial Strategy (BEIS)	3,759	4,235	4,206	2,903	326
CRC (carbon reduction commitment) Energy Efficiency Scheme*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in services/ tertiary sector (Energy consumption)	Regulatory, Economic	Implemented	The CRC (formerly the Carbon Reduction Commitment) is a mandatory UK-wide emissions trading scheme (launched in 2010). It encourages the uptake of energy efficiency measures in large non-energy intensive private and public sector organisations that use energy not covered by the ETS or Climate Change Agreements. It covers 1,800-1,900 large users of energy across the business and public sector. The scheme is split into phases. Phase 1 ran from 1 April 2010 until 31 March 2014. Phase 2 runs from 1 April 2014 until 31 March 2019. In the 2016 Spring Budget, the Chancellor announced the closure of the CRC after Phase 2 (i.e. following the 2018/19 compliance year).	2010	Department for Business, Energy and Industrial Strategy (BEIS), Environment Agency (EA)	872	859	0	0	0
Climate Change Agreements (CCA)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in industrial end-use sectors (Energy consumption)	Regulatory, Economic	Implemented	Climate Change Agreements offer participating energy-intensive industries a discount from the Climate Change Levy in return for meeting targets for emission reductions. From 2013 these are a 90% discount for electricity and a 65% discount for other fuels. From 2019 this will increase to a 93% discount for electricity and 78% discount for other fuels. Target levels represent a cap on emissions if we assume compliance.	2013	Industry Associations, Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE

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									2020	*2025*	*2030*	*2035*	*2040*
Energy Savings Opportunity Scheme (ESOS)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Demand management/reduction (Energy consumption)	Regulatory, Information	Implemented	A mandatory energy assessment scheme for all large undertakings (non-SMEs) in response to requirements contained Article 8 of the EU Energy Efficiency Directive (2012/27/EU). Organisations which employ 250 or more people, or employ fewer than 250 people but have both an annual turnover exceeding £38.9m and an annual balance sheet total exceeding £33.4m, must measure their total energy consumption and carry out audits of the energy used by their buildings, industrial processes and transport to identify cost-effective energy saving measures, by 5 December 2015 and every four years thereafter. It is estimated that around 10,000 organisations will participate in the scheme.	2014	Department for Business, Energy and Industrial Strategy (BEIS). Environment Agency	540	470	420	369	336
Energy Performance of Buildings Directive (EPBD) Recast 2010*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Adopted	Extension of the Energy Performance of Buildings Directive (EPBD) requirement for public buildings to display Energy Performance Certificates to include buildings over 250 metres squared from 9 July 2015.	2015	Department for Levelling Up, Housing and Communities (DLUHC)	NE	NE	NE	NE	NE
Private Rented Sector (PRS) Energy Efficiency Regulations*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in services/tertiary sector (Energy consumption)	Regulatory, Economic	Adopted	From 1 April 2018 there is a requirement for any properties rented out in the private rented sector to have a minimum energy performance rating of E on an Energy Performance Certificate (EPC). The regulations came into force for new lets and renewals of tenancies with effect from 1 April 2018 and for all existing tenancies on 1 April 2020 (1 April 2023 for non-domestic properties). It will be unlawful to rent a property which breaches the requirement for a minimum E rating, unless there is an applicable exemption.	2018	Department for Business, Energy and Industrial Strategy (BEIS)	407	477	356	252	194
ECO Transition/ Help to Heat/ Future Supplier Obligation*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	The 2015 Spending Review announced that ECO will be replaced with a new, lower cost scheme that will run for 5 years (to March 2022) and will tackle the root causes of fuel poverty. The 5-year extension took place in the two phases, with the ECO Extension (April 2017 – Sept 2018) acting as a bridge between the expired ECO_1 scheme and the new fuel poverty focused scheme, ECO 3, which ran from December 2018 to March 2022.	2017	Department for Business, Energy and Industrial Strategy (BEIS), Large Energy Suppliers	194	189	189	187	186

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									2020	*2025*	*2030*	*2035*	*2040*
Public Sector Energy Efficiency Loans Scheme – 2014-2020*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in services/ tertiary sector (Energy consumption)	Economic	Implemented	The Public Sector Energy Efficiency Loans Scheme, managed by Salix Finance Ltd, provides interest-free loans in England to public sector organisations for energy efficiency schemes. These loans are intended to provide the capital cost of energy efficiency retrofit work and other measures to be installed. These loans have a payback period of five years (eight for schools) during which the repayments are met with the energy bill savings from the energy efficiency measures. Thus, once the loan has been paid off, the organisation continues to benefit from energy savings for the lifetime of those measures. This funding is then recycled: once it has been returned to the Scheme and it is loaned out once again. BEIS provides the largest amount of funding to the Scheme.	2014	Department for Business, Energy and Industrial Strategy (BEIS), Local government	159	350	347	232	86
Agricultural Action Plan*	Agriculture	Methane (CH_4), Nitrous oxide (N_2O)	Reduction of fertilizer/manure use on cropland (Agriculture), Improved animal waste management systems (Agriculture), Improved livestock management (Agriculture), Activities improving grazing land or grassland management (Agriculture), Improved management of organic soils (Agriculture)	Voluntary/ negotiated agreements	Implemented	The Agricultural Action Plan covers a range of resource-efficiency and land management measures to reduce emissions to meet UK carbon budgets.	2010	Department for Food, Environment and Rural Affairs (DEFRA), Industry Associations	1,174	1,507	1,841	1,974	1,974

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									2020	*2025*	*2030*	*2035*	*2040*
Car Fuel Efficiency Policies*	Transport	Carbon dioxide (CO_2)	Efficiency improvements of vehicles (Transport)	Regulatory, Fiscal, Economic, Information	Implemented	EC Regulation 443/2009 sets fuel efficiency targets for new cars to be achieved by 2015 and 2020. The regulation translates a fleet average CO_2 tailpipe emissions target for new vehicles sold in the EU market into specific targets for individual manufacturers according to the mass of their fleet. Heavy fines are imposed for non-compliance. The 2021 target is for a fleet average of 95g CO_2/km across the EU, with a transition period where 95% of a manufacturer's fleet must meet the 95g target by 2020. Complementary measures are a collection of technologies that could improve 'real world' fuel efficiency of cars which wouldn't be fully captured by the new car CO_2 target and which could improve fuel efficiency in the existing fleet. These include gear shift indicators, tyre pressure monitoring systems, more efficient mobile air-conditioning, and low rolling resistance tyres. EC Regulation 661/2009 sets minimum requirements and introduces labelling for the rolling resistance, wet grip and external rolling noise of tyres. Measures to support the uptake of ultra low emission vehicles include the Plug-in Car and Plug-in Van Grants towards ultra-low emission vehicle (ULEV) cars and vans, as well as various tax incentives including lower rates for Vehicle Excise Duty and Company Car Tax. EV infrastructure is directly supported through the Workplace Charging Scheme grants for EV chargepoints for employees and fleets, the Electric Vehicle Homecharge Scheme grants towards home EV chargepoints and the On-street Residential Charging Scheme. Highways England have committed £15m to ensure EV chargepoints are available every 20 miles on the Strategic Road Network.	2012	Department for Transport	3,306	9,794	18,898	29,327	37,343
Forestry policies*	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Enhanced forest management (LULUCF), Sustainable forest management	Voluntary/ negotiated agreements, Economic	Implemented	Range of policies aimed at driving afforestation and reforestation. Policies whose mitigation impacts are included in this grouping are labelled with '[2]' in the 'Name of mitigation action' field.	Various	Forestry Commission, Department for Food, Environment and Rural Affairs (DEFRA)	-212	-93	115	399	658

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									2020	*2025*	*2030*	*2035*	*2040*
Van Fuel Efficiency Policies*	Transport	Carbon dioxide (CO_2)	Efficiency improvements of vehicles (Transport)	Regulatory, Fiscal, Economic, Information	Implemented	EC Regulation 510/2011 sets fuel efficiency targets for new Light Commercial Vehicles (LCV) to be achieved by 2017 and 2020. EC Regulation 661/2009 sets minimum requirements and introduces labelling for the rolling resistance, wet grip and external rolling noise of tyres. The regulation translates a fleet average CO_2 tailpipe emissions target for new vehicles sold in the EU market into specific targets for individual manufacturers according to the mass of their fleet. Heavy fines are imposed for non-compliance. The 2020 target is for a fleet average of 147g CO_2 /km and represents a reduction of 19% from the 2012 average. Measures include the car and van grants towards ultra-low emission vehicle (ULEV) cars and vans, as well as various tax incentives including lower rates for Vehicle Excise Duty and Company Car Tax. EV infrastructure is directly supported through workplace charging scheme grants for EV chargepoints for employees and fleets, the Electric Vehicle Homecharge Scheme grants towards home EV chargepoints and the On-street Residential Charging Scheme. Highways England have committed £15m to ensure EV chargepoints are available every 20 miles on the Strategic Road Network.	2012	Department for Transport	1,117	2,062	3,562	5,171	6,281
Heavy goods vehicles Fuel Efficiency Policies*	Transport	Carbon dioxide (CO_2)	Efficiency improvements of vehicles (Transport), Low carbon fuels/ electric cars (Transport)	Economic, Regulatory, Research	Implemented	EC Regulation 661/2009 sets minimum requirements and introduces labelling for the rolling resistance, wet grip and external rolling noise of tyres. Industry and Government are taking a range of actions to reduce freight emissions, including the Freight Transport Association's Logistics Carbon Reduction Scheme, which encourages members to record, report and reduce emissions from freight. The Mode Shift Revenue Support scheme encourages modal shift from road to rail or inland waterway where the costs are higher than road, and where there are environmental benefits to be gained. It currently helps to remove around 800,000 lorry journeys a year from Britain's roads. A similar scheme, Waterborne Freight Grant, can provide assistance with the operating costs associated with coastal or short sea shipping.	2012	Department for Transport, Transport Association	57	257	1,247	2,539	2,819

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									2020	*2025*	*2030*	*2035*	*2040*
Public service vehicles Fuel Efficiency Policies*	Transport	Carbon dioxide (CO_2)	Low carbon fuels/electric cars (Transport), Efficiency improvements of vehicles	Economic	Implemented	The Green Bus Fund (GBF) allowed bus companies and local authorities in England to compete for funds to help them buy new low carbon emission buses. The four rounds of the fund, which ran from 2009- 2014, added around 1250 Low Carbon Emission Buses onto England's roads. The GBF has now been replaced by the Low Emission Bus Fund (LEBS) which offered £30m for bus operators and local authorities across England and Wales to bid for low emission buses and supporting infrastructure. This scheme funding is open from 2016-2019 and the successful bidders were announced in July 2016, adding more than 300 extra low emission buses to fleets.	2006	Department for Transport	136	199	291	297	295
Renewable Transport Fuel Obligation, (RTFO) – 5% by volume*	Transport	Carbon dioxide (CO_2)	Low carbon fuels/electric cars (Transport), Transport	Regulatory	Implemented	The RTFO set a 4.75% target for biofuel use by diesel and petrol suppliers to be achieved by 2014. Targets are by volume rather than by energy. Implemented the EU Renewables Directive (2009/28/EC).	2007	Department for Transport	2,986	3,051	3,134	3,202	3,270
Renewable Transport Fuel Obligation, (RTFO) – Increase target to meet RED*	Transport	Carbon dioxide (CO_2)	Low carbon fuels/electric cars (Transport), Efficiency improvement of vehicles	Regulatory	Implemented	This policy sets enhanced overall targets of 9.75% (by volume) for biofuel use by diesel and petrol suppliers by 2020 and at least 12.4% in 2032. It implements the EU Renewables Directive (2009/28/EC) as amended by the ILUC Directive (2015/1513).	2018	Department for Transport	2,899	3,594	3,743	3,619	3,361
Active travel spending*	Transport	Carbon dioxide (CO_2)				Committed active travel spending from 2011/12 onwards including from ring-fenced and non-ringfenced funds including the Local Growth Fund, Other Government Infrastructure Funds (e.g. the Housing Infrastructure Fund), Highways Maintenance Fund, Transforming Cities Fund, Integrated Transport Block, Local Sustainable Transport Fund and Cycling Ambition Cities Fund.	2011	Bids submitted to Department for Transport, Department for Transport	588	395	255	157	101

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									2020	*2025*	*2030*	*2035*	*2040*
Rail Electrification*	Transport	Carbon dioxide (CO_2)	Improved transport infrastructure (Transport), Transport, Reduce travel times and costs	Other	Implemented	Major programme of rail electrification underway to replace older diesel trains with modern, low-emission electric trains. This means that operators are contractually obliged to meet emissions levels based on running modern electric rather than diesel traction. Trans Pennine Express (TPE) and Northern are examples where 11% and 17% reductions in CO_2e emissions per vehicle km respectively where contracted based on electrification schemes. Reducing costs: electric trains tend to be cheaper to buy, operate and maintain than diesels. They are also lighter so do less damage to the track. So whilst there is clearly a large capital cost associated with installing new electrification infrastructure, this can be compensated over time by the lower operational costs of electric trains. Increasing capacity and reliability and reducing journey times: electric trains tend to outperform equivalent diesels in terms of reliability, acceleration and carrying capacity. Reducing environmental impacts: electric trains are quieter and more carbon efficient than diesels and zero emission at point of use which helps with local air quality.	2013	Department for Transport, Network Rail	NE	NE	NE	NE	NE
Renewables Obligation*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply)	Regulatory, Economic	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Set an annual obligation on electricity suppliers to produce a proportion of their generation from renewable sources. Targets can be met by renewable generation that accrue Renewable Energy Certificate (ROCs) or by paying a 'fine' into the RO Buy Out Fund, which is then redistributed to other energy suppliers who have met their obligation.	2002	Department for Business, Energy and Industrial Strategy (BEIS), Office of Gas and Electricity Markets (Ofgem)	IE	IE	IE	IE	IE
Feed-In Tariffs (FITs)*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply)	Regulatory, Economic	Implemented	Feed-in Tariffs (FITs) support organisations, businesses, communities and individuals to generate low-carbon electricity using small-scale (5 MW or less total installed capacity) systems. Electricity suppliers are obliged to pay the regulated tariffs to eligible generators.	2010	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Contract for Difference (2014-2020)*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic	Implemented	Offers Contracts for Difference (CfDs) in the electricity generation market for low carbon and renewable sources, CfDs will replace ROCs (which are due to be phased out to new capacity from 2017). Current policy offers CfD for new capacity through auctions should Government's choose to hold them. There is also a bilateral negotiation underway for Hinkley point C Nuclear plant.	2014	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE

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									2020	2025	2030	2035	2040
Contract for Difference (2021-2035)†[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic	Planned	Planned continuation of Contracts for Difference (CfDs) for new low carbon capacity after 2020.	2021	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Carbon Price Floor*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Fiscal	Implemented	The Carbon Price Floor (CPF) is designed to further reduce the use of emission-intensive fossil fuels and increase the proportion of electricity generation and supply from low carbon sources	2013	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
EU Emissions Trading System*	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic, Fiscal, Regulatory	Implemented	It sets an emissions target (cap) for installations covered by the system (across the EU), with the carbon market determining the carbon price, and therefore where emissions can be reduced most cheaply. It guarantees that total emissions in the sectors covered will not exceed the cap set, and in doing so drives investments in low-carbon technologies, leading to cutting emissions of carbon dioxide (CO_2) and other greenhouse gases at least cost.	2005	European Commission, Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE
New Energy Supply policies*	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Regulatory, Economic, Fiscal	Planned/ Implemented/ Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Combined impact of electricity supply and decarbonisation policies. Policies whose mitigation impacts are included in this grouping are labelled with '[1]' in the 'Name of mitigation action' field.	2002	Department for Business, Energy and Industrial Strategy (BEIS), Office of Gas and Electricity Markets (Ofgem)	32,388	52,521	44,630	55,074	69,159
Woodland Carbon Code*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF)	Voluntary/ negotiated agreements	Implemented	Voluntary Code and associated carbon registry (2013) for UK domestic woodland carbon schemes to encourage private sector funding for woodland creation projects. Recognised as component of net GHG emissions reporting for businesses in Government's Environmental Reporting Guidelines.	2011	Forestry Commission	IE	IE	IE	IE	IE
Revised UK Forestry Standard*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Sustainable forest management	Regulatory, Information	Implemented	Revised (2017) national standard for sustainable forest management, previously revised in 2011 to include a new guideline on climate change, covering both adaptation and mitigation.	2011	Forestry Commission	IE	IE	IE	IE	IE
Grown in Britain*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Sustainable forest management	Voluntary/ negotiated agreements, Information, Education	Implemented	Industry-led action plan announced in Government's Forestry and Woodlands Policy Statement (2013) which aspires to encourage businesses to invest in woodland creation and sustainable forest management practice.	2013	Department for Environment Food and Rural Affairs (DEFRA)	IE	IE	IE	IE	IE

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									2020	*2025*	*2030*	*2035*	*2040*
Rural Development Programme (2014)*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Sustainable forest management	Economic	Implemented	Woodland creation grants provided through EU co-financed Rural Development Programmes in England.	2014	Department for Food, Environment and Rural Affairs (DEFRA)	IE	IE	IE	IE	IE
Woodfuel Implementation Plan*[2]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production), Land use, land-use change and forestry	Carbon dioxide (CO_2)	Increasing biomass supply, primarily for small to medium scale heat applications.	Economic, Information, Education	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Initiative to develop supply chains, including through support for harvesting/processing and woodland access, to increase woodfuel supply from existing woodland.	2011	Forestry Commission	IE	IE	IE	IE	IE
Nitrates Action Plan*	Agriculture	Nitrous oxide (N_2O)	Reduction of fertilizer/manure use on cropland (Agriculture)	Regulatory, Information	Implemented	This ensures improved compliance with the Nitrate Directive (91/676/EEC). Designated revised "Nitrate Vulnerable Zones" (NVC) established a range of mandatory measures to reduce nitrate pollution to water in each NVC. It includes also code of good practice for areas outside NVZs.	2013	Department for Food, Environment and Rural Affairs (DEFRA), Environment Agency (EA)	NE	NE	NE	NE	NE
Catchment Sensitive Farming*	Agriculture	Nitrous oxide (N_2O)	Activities improving grazing land or grassland management (Agriculture), Improved management of organic soils (Agriculture)	Economic, Information	Implemented	Delivers practical solutions and targeted support to enable farmers and land managers to take voluntary action to reduce diffuse water pollution from agriculture to protect water bodies and the environment.	2006	Department for Food, Environment and Rural Affairs (DEFRA), Rural Development Programme for England (RDPE), Environment Agency (EA), Natural England (NE)	NE	NE	NE	NE	NE
Soils For Profit*	Agriculture	Nitrous oxide (N_2O)	Activities improving grazing land or grassland management (Agriculture), Improved management of organic soils (Agriculture)	Education	Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	Provides on farm reviews and training on soils manures and nutrients. The programme closed in 2013.	2009	Natural England (NE)	NE	NE	NE	NE	NE
Countryside Stewardship*	Agriculture	Nitrous oxide (N_2O)	Activities improving grazing land or grassland management (Agriculture), Improved management of organic soils (Agriculture)	Economic	Implemented	Provides income foregone support under Pillar 2 of the CAP for farmers to undertake management options that benefit biodiversity, resource protection and water quality.	2005	Department for Food, Environment and Rural Affairs (DEFRA), Rural Development Programme for England (RDPE)	NE	NE	NE	NE	NE

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									2020	*2025*	*2030*	*2035*	*2040*
Ozone depleting substances regulation*	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon)	Hydrofluorocarbons (HFC)	Reduction of emissions of fluorinated gases (Industrial processes), Installation of abatement technologies (Industrial processes), Replacement of fluorinated gases by other substances (Industrial processes), Improved control of fugitive emissions from industrial processes (Industrial processes)	Regulatory	Implemented	This regulation implements obligations under the Montreal Protocol and EU Regulation 1005/2009/EC on ozone depleting substances. With the exemption of some critical use exemptions, CFCs, HCFCs and halon use is banned. Most ozone depleting substances are potent greenhouse gases, so reductions in their use protects both the ozone layer and climate.	2009	Department for Environment, Food and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
F-gas regulation (2015)*	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), Other Sectors	Hydrofluorocarbons (HFC), Perfluorocarbons (PFC), Sulphur hexafluoride (SF6)	Reduction of emissions of fluorinated gases (Industrial processes)	Regulatory	Implemented	This introduced a 79% phase down in the quantities of hydrofluorocarbons that can be placed on the EU market and was delivered via a gradually reducing quota system; a number of bans on the use of certain F gases in some new equipment; a ban on the use of very high GWP HFCs for the servicing of certain types of refrigeration equipment; and some strengthening of obligations in the 2007 regulation relating to leak checking, repairs, F gas recovery and technician training.	2015	Department for Food, Environment and Rural Affairs (DEFRA)	3,638	7,491	11,072	13,267	13,764
Climate Change Levy (CCL)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Economic, Fiscal	Implemented	The Climate Change Levy (CCL) was introduced in 2001. It is levied on the supply of energy to business and public sector consumers to incentivise them to reduce energy consumption. Each of the four main groups of taxable commodities (electricity, gas, solid fuels, and liquefied petroleum gas [LPG]) has its own main rate per unit of energy. Eligible energy-intensive industries may pay reduced main rates of CCL through CCAs, or be exempt from the CCL (for mineralogical/metallurgical processes). Budget 2016 announced that CCL rates will increase from April 2019, moving to an electricity-to-gas ratio of 2.5:1 compared to the previous 2.9:1 ratio. In the longer term, the Government intends to rebalance the rates further, reaching a ratio of 1:1 by 2025. CCL rates to April 2022 were announced at Budget 2018, however changes between 2022 and 2025, as well as the rates from 2025 onwards, have not yet been announced.	2001	Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE

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									2020	*2025*	*2030*	*2035*	*2040*
Energy Performance of Buildings Directive (EPBD) 2017 Cost Optimal Review and Nearly Zero Energy Buildings (NZEB) (2018 and 2020)	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture), Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory, Information	Implemented	The Government is required to report to the European Commission by June 2017 to demonstrate that UK building standards for energy performance remain 'cost optimal'. Cost-optimal energy performance means that the lifetime cost-benefit analysis is positive. Minimum energy performance requirements must be compared against calculated cost-optimal levels using the Comparative Methodology Framework.	2017	Department for Levelling Up, Housing and Communities (DLUHC)	NE	NE	NE	NE	NE
Additional Renewables in Generation (Renewable Energy Strategy)*[1]	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply)	Regulatory, Economic	Implemented	Increases Renewable Obligation (RO) targets in electricity supply so as meet the UK's overall renewables target for 2020 as set out in the Renewables Directive (RED, 2009/28/EC).	2009	Department for Business, Energy and Industrial Strategy (BEIS), Office of Gas and Electricity Markets (Ofgem)	IE	IE	IE	IE	IE
Capacity Mechanism*	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply)	Economic	Implemented	Part of the Government's Electricity Market Reform package, the Capacity Mechanism ensures security of electricity supply by encouraging investments in electricity generation capacity.	2017	Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE
Heat Networks Investment Project*	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Switch to less carbon-intensive fuels (Energy supply)	Economic	Implemented	The heat networks investment project (HNIP) is a capital funding scheme across England and Wales to encourage the development of heat networks. The scheme will be open for applications from heat networks for up to three years and allocate commercialisation and construction funding through a competitive process. The key objective of the project is to build a sustainable market for heat networks to support the decarbonisation of heat in buildings, helping the UK reach the carbon budget targets.	2017	Department for Business, Energy and Industrial Strategy (BEIS)	0	-31	-32	68	103
Forestry Act Felling Licence Regulations and Environmental Impact (Forestry) regulations*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Prevention of deforestation (LULUCF)	Regulatory	Implemented	Strong regulatory framework that controls felling. It only allows deforestation for purposes of nature conservation and prevents the afforestation of deep peat. Legislation updated 1999 and 2017.	1999	Forestry Commission (FC)	IE	IE	IE	IE	IE

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									2020	2025	2030	2035	2040
Natural England's Strategic Approach to the Restoration of Blanket Bog	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Restoration of degraded lands (LULUCF)	Information	Implemented	Natural England published the Strategy for the Restoration of Blanket Bog in England in 2015. The approach sets out the extent, nature and importance of the blanket bog resource across England and what is currently being done to conserve it, as well as setting out the required management and timeframe for delivery to achieve an improvement in site condition across the resource at a strategic level.	2015	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Natural Environment White Paper (NEWP) targets on horticultural peat	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Restoration of degraded lands (LULUCF)	Other, Information	Implemented	The Sustainable Growing Media Taskforce was set up to look at ways in which the barriers to the use of peat alternatives could be overcome. The Government published its response to the Task Force's report and draft roadmap in 2013 which set out where our resources will be focused.	2011	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Peatland Area Designations	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Restoration of degraded lands (LULUCF)	Regulatory	Implemented	According to the UK's draft integrated National Energy and Climate Plan (NECP), 3 out of 12 Nature Improvement Areas (NIA, 2012) are focussed on peatland restoration. 47% England's wetlands are protected by Sites of Special Scientific Interest (SSSIs).	2004	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Peatland Code	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Restoration of degraded lands (LULUCF)	Voluntary/ negotiated agreements, Information, Economic	Implemented	A UK Voluntary Code to encourage and support private sector funding for peatland restoration projects. Provides standards and robust science to give business supporters confidence that their financial contribution is making a measurable and verifiable difference.	2011	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Rural Development Programme (2007)*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF), Enhanced forest management (LULUCF)	Economic	Implemented	Woodland creation grants provided through EU co-financed Rural Development Programmes in England.	2007	Department for Food, Environment and Rural Affairs (DEFRA)	IE	IE	IE	IE	IE
CAP Cross Compliance*	Agriculture, Land use, land-use change and forestry	Carbon dioxide (CO_2)	Improved management of organic soils (Agriculture)	Regulatory	Implemented	Good Agricultural and Environmental Conditions in place to ensure minimum soil cover, to maintain soil organic matter and to minimise erosion. Implementation of the Nitrates Directive Retention of permanent pasture (up to 2014 – now under Greening measures)	2015	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Woodland Carbon Fund*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF)	Economic	Implemented	The Woodland Carbon Fund is an exchequer-funded grant to support the creation of large-scale productive woodlands which also enhance natural capital.	2016	Forestry Commission (FC)	IE	IE	IE	IE	IE
Woodland Creation Planning Grant*[2]	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF)	Economic, Regulatory	Implemented	Grant to support the planning of large-scale productive woodlands, compliant with the UK Forestry Standard.	2015	Forestry Commission (FC)	IE	IE	IE	IE	IE

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Industrial Emissions Directive (as it applies to Large Combustion Plant Directive)*[1]	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O)	Improved control of fugitive emissions from industrial processes (Industrial processes), Efficiency improvement in industrial end-use sectors (Energy consumption)	Regulatory	Implemented	As transposed into UK law, the IED replaced the LCPD from 1 January 2016 with similar (although more stringent) provisions set out in chapter III of the Industrial Emissions Directive (2010/75/EU) (IED). Those provisions apply in respect to any plant newly permitted since 7 January 2013. Three compliance routes are available to generating plants; to abate emissions and comply with more stringent limits by 2020; to comply with less stringent limits but face a 1,500 hour per year load factor constraint; or to close by 2023.	2016	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Large Combustion Plant Directive*[1]	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O)	Efficiency improvement in industrial end-use sectors (Energy consumption)	Regulatory	Implemented	The Large Combustion Plant Directive (LCPD, 2001/80/EC) sets limits on emissions of sulphur dioxide, nitrogen oxides, and dust from combustion plants with a thermal capacity of 50 MW or greater. This has now been replaced by the Industrial Emissions Directive.	2007	Department for Business, Energy and Industrial Strategy (BEIS)	IE	IE	IE	IE	IE
Common Agricultural Policy (CAP) Greening*	Agriculture, Land use, land-use change and forestry	Carbon dioxide (CO_2)	Activities improving grazing land or grassland management (Agriculture)	Regulatory	Implemented	Obtain consent before improving grassland that has not been cultivated for 15 years or more (Environmental Impact Assessment/EIA). Select a range of Ecological Focus Area (EFA) measures to meet new standards: relevant actions include enhanced buffer strips, cover crops and growing N-fixing crops	2015	Department for Food, Environment and Rural Affairs (DEFRA)	NE	NE	NE	NE	NE
Amendments to Heat Networks Metering & Billing Regulations	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Planned	UK legislation requiring heat network operators to submit data on networks and to install heat meters/heat cost allocators in buildings on networks unless it is not cost-effective to do so. The amendments will revise the cost-effectiveness methodology and address ambiguities in the existing legislation	2020	Department for Business, Energy and Industrial Strategy (BEIS)	NE	NE	NE	NE	NE

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									2020	*2025*	*2030*	*2035*	*2040*
Energy company obligation 3 (ECO 3)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	The 2015 Spending Review announced that ECO will be replaced with a new, lower cost scheme that will run for 5 years (to March 2022) and will tackle the root causes of fuel poverty. The 5-year extension will take place in the two phases, with the ECO Extension (April 2017 – Sept 2018) acting as a bridge between the expired ECO scheme and the new fuel poverty focused scheme, ECO 3, which will run from December 2018 to March 2022.	2017	Department for Business, Energy and Industrial Strategy (BEIS)	199	261	247	256	253
Boiler Plus (technical standards for domestic boiler installations)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption)	Regulatory	Implemented	The policy objectives are to deliver additional energy and carbon savings from the domestic heating sector in England by lowering overall gas demand from domestic properties. It aims to do this by increasing the deployment of devices which increase the efficiency of domestic heating systems, through controls and measures to make gas boilers heat homes more efficiently. The policy instrument is a technical standard set through statutory guidance under the Building Regulations framework. This requires existing households in England to install an additional energy saving measure from a choice list at the point of installing a new or replacement combi gas boiler in an existing dwelling	2018	Department for Business, Energy and Industrial Strategy (BEIS)	147	391	635	586	342
Industrial Heat Recovery Support (IHRS)*	Industrial processes (comprising industrial activities that chemically or physically transform materials leading to greenhouse gas emissions, use of greenhouse gases in products and non-energy uses of fossil fuel carbon), Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2), Nitrous oxide (N_2O), Methane (CH_4)	Efficiency improvement in industrial end-use sectors (Energy consumption)	Information, Economic	Implemented	The policy aims to: increase industry confidence to invest in the technology potential to recover heat from industrial processes, and increase the deployment of such technologies across manufacturing and data centres in England and Wales. It establishes a fund for feasibility studies that examine the potential for industrial businesses to adopt heat recovery technologies and a fund to subsidise the deployment of heat recovery technologies.	2018	Department for Business, Energy and Industrial Strategy (BEIS)	118	115	91	10	0

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Streamlined energy and carbon reporting framework for business (SECR)*	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvement in industrial end-use sectors (Energy consumption)	Information, Regulatory	Adopted	SECR is a reporting framework which obligates all large (as defined by the Companies Act 2006) UK registered companies to report their energy use and associated emissions relating to electricity, gas and transport in their annual reports. Companies will also be required to provide an intensity metric and disclose any energy efficiency actions undertaken during the reporting period. Quoted companies will in addition be required to report their global energy use and GHG emissions.	2019	Department for Business, Energy and Industrial Strategy (BEIS)	526	464	409	351	316
Waste policies†	Waste management/ waste	Methane (CH_4)	Enhanced recycling (Waste), Reduced landfilling (Waste), Demand management / reduction (Waste), Enhanced CH_4 collection and use (Waste), Improved treatment technologies (Waste), Improved landfill management (Waste), Waste incineration with energy use (Waste)	Fiscal, Regulatory	Implemented (various, earliest 1996), Planned was added for EEP2019	There are a number of waste measures with the aim of increasing recycling/reuse and reduce harmful disposal. The Waste Framework Directive (2008/98/EC) is the general framework of waste management requirements and sets rules governing the separate collection of waste. The Landfill Directive (1999/31/EC) sets rules governing the disposal of waste to landfill. The UK Landfill Tax escalates tax on biodegradable waste sent to landfill. There are other waste measures targeting other waste streams, such as the Waste Incineration Directive (2000/76/EC). The overall effect is reducing environmental impacts of waste, such as landfilling biodegradable waste and its associated CH_4 emissions.	1996	Department for Food, Environment and Rural Affairs (DEFRA)	0	202	794	1,521	2,041
British Energy Security Strategy	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Regulatory, Economic, Fiscal	Planned/ Implemented/ Expired (only if the policy or measure has an effect, or is expected to continue to have an effect on greenhouse gas emissions)	The 2021 Net Zero Strategy set out a clear vision for how we will transform the production and use of energy, in a decisive shift away from fossil fuels. The British Energy Security Strategy accelerates this plan to deliver a more independent, more secure energy system and support consumers to manage their energy bills. It includes ambitions including a potential five-fold increase in deployment by 2035 in solar energy; delivering up to 50GW of offshore wind by 2030, including up to 5GW of innovative floating wind; deployment of civil nuclear to up to 24GW by 2050 – 3 times more than now and representing up to 25% of our projected electricity demand; establishing the Future System Operator as soon as practicable to drive our overall transition and oversee the UK energy system	2022	Department for Business, Energy and Industrial Strategy (BEIS)	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	

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									2020	*2025*	*2030*	*2035*	*2040*
New Nuclear	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic	Planned	Ambition to secure a final investment decision on a large-scale nuclear plant by the end of the 2019-2024 Parliament whilst taking measures to inform investment decisions during the following Parliament on further nuclear projects (including AMRs, SMRs). Setting up the Great British Nuclear Vehicle to support projects to get investment ready and through the construction phase. In 2022 we will launch the £120m Future Nuclear Enabling Fund competitive process, first announced in the Comprehensive Spending Review.	2022	Department for Business, Energy and Industrial Strategy (BEIS)	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	
Carbon Capture Useage and Storage (CCUS) Programme – Dispatchable Power Agreement	Gas fired power decarbonisation.	Carbon Dioxide (CO_2)	Power CCUS to provide non-weather dependent, dispatchable low carbon generation capacity.	Economic	Planned	A private law agreement based on the Contracts for Difference (CfD) model to incentivise the deployment of at least one Power CCUS facility by the mid 2020's in line with the Net Zero Strategy.	2027	Department for Business, Energy and Industrial Strategy (BEIS)					
Future System Operator	Energy System (including governance, co-ordination, transformation and integration of electricity and gas systems)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Information, regulatory, economic	Planned	Establishing the Future System Operator as soon as practicable to drive our overall transition and oversee the UK Energy System. It will be an expert, impartial body with responsibilities across both the electricity and gas systems, to drive progress towards net zero while maintaining energy security and minimising costs for consumers.	2022	HMG, Ofgem, National Grid Plc and NGESO will each have a key role in ensuring that this vision is realised as swiftly and successfully as possible, noting that this will be subject to legislation when parliamentary time allows.					
Energy system flexibility	Energy supply (comprising extraction, transmission, distribution and storage of fuels as well as energy and electricity production)	Carbon dioxide (CO_2)	Increase in renewable energy (Energy supply), Switch to less carbon-intensive fuels (Energy supply), Enhanced non-renewable low carbon generation (nuclear) (Energy supply)	Economic	Adopted	Deliver the actions in our recent Smart Systems and Flexibility Plan and Energy Digitalisation Strategy to maximise system flexibility. The plan sets out a suite of commitments to: support flexibility from consumers, remove barriers to flexibility on the grid, reform markets to reward flexibility and monitor flexibility across the system.	2021	Department for Business, Energy and Industrial Strategy (BEIS)	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	
Low Carbon Hydrogen Standard	Energy, Transport, Industry/Industrial Processes	Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), and sulphur hexafluoride (SF6	The Low Carbon Hydrogen Standard will initially help determine which hydrogen projects are eligible for government support through the Net Zero Hydrogen Fund and Hydrogen Business Model. It will be developed into a certification scheme by 2025. It may also be used by other government schemes wishing to define what is meant by "low carbon" hydrogen.	Information	Implemented	The Low Carbon Hydrogen Standard ('the standard') sets a maximum threshold for greenhouse gas emissions allowed in the production process for hydrogen to be considered 'low carbon hydrogen'. Compliance with the standard will help ensure new low carbon hydrogen production makes a direct contribution to the UK's carbon reduction targets.	2022	Department for Business, Energy and Industrial Strategy					

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									2020	*2025*	*2030*	*2035*	*2040*
Hydrogen Business Model	Energy, Transport, Industry/Industrial Processes	Carbon dioxide (CO_2)	The hydrogen business model will unlock private investment in new low carbon hydrogen production by delivering revenue support funded by the Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme.	Economic	Planned	The hydrogen business model will provide revenue support to producers to overcome the operating cost gap between low carbon hydrogen and high carbon counterfactual fuels. The hydrogen business model is one of a range of government interventions intended to stimulate investment in low carbon hydrogen projects that will be necessary to meet Carbon Budget 6 and net zero targets.	We are aiming to finalise the business model in 2022, enabling the first contracts to be allocated from 2023.	Department for Business, Energy and Industrial Strategy					
Net Zero Hydrogen Fund	Energy, Transport, Industry/Industrial Processes	Carbon dioxide (CO_2)	To support the commercial deployment of new low carbon hydrogen production	Economic	Implemented	The Net Zero Hydrogen Fund (NZHF) will provide up to £240 million for government co-investment to support new low carbon hydrogen production out to 2025. The aim of the Fund is to support commercial deployment of new low carbon hydrogen production projects during the early 2020s, by helping to address barriers related to commercial risk and high upfront costs relative to fossil fuel alternatives, unlocking private sector investment in projects.	2022	Department for Business, Energy and Industrial Strategy	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated
UK Emissions Trading Scheme (UK ETS)	Energy supply, industrial processes and energy consumption.	Carbon dioxide (CO_2), Perfluorocarbons (PFC), Nitrous oxide (N_2O)	Reduction of emissions of covered gases in covered sectors in line with the emissions cap. Policy is neutral on the question of how the abatement is achieved and where it falls within the covered sectors/activities. This is market driven and abatement should happen where most cost effective.	Economic, Fiscal, Regulatory	Implemented	It sets an emissions target (cap) for installations covered by the system (across the UK, excluding NI power generators), with the carbon market determining the carbon price, and therefore where emissions can be reduced most cheaply. It guarantees that total emissions in the sectors covered will not exceed the cap set, and in doing so drives investments in low-carbon technologies, leading to cutting emissions of carbon dioxide (CO_2) and other greenhouse gases at least cost. It replaces the UK participation to the EU ETS.	2021	The UK ETS Authority, comprising BEIS, Welsh Government, Scottish Government, and NI Government, HMT, DfT.					
Industrial Energy Transformation Fund (IETF)	All eligible industrial processes.	Carbon dioxide (CO_2)	Energy Efficiency and Deep Decarbonisation improvements to industrial processes.	Grant Funding	Implemented	The Industrial Energy Transformation Fund (IETF) supports industrial sites with high energy use to transition to a low carbon future. The fund targets existing industrial processes, helping industry to: • cut energy bills by investing in more efficient technologies; and • reduce emissions by bringing down the costs and risks associated with investing in deep decarbonisation technologies. It is open to a broad range of industrial sectors and will support applicants based in England, Wales, and Northern Ireland, both within and outside of industrial clusters.	2020	Department for Business, Energy and Industrial Strategy (BEIS)					

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									2020	*2025*	*2030*	*2035*	*2040*
National Design Guide 2019 & National Model Design Code 2021	Energy consumption, land use, energy supply	Carbon dioxide (CO_2)	Efficiency improvements of buildings, efficiency improvements of material supply and selection, increase in renewable energy	Information, Regulatory	Implemented	The National Model Design Code which builds on the 10 characteristics of well-designed places set out in the National Design Guide, provides tools and guidance to local councils for producing design codes. Design codes promote the use of high-quality design to shape and deliver environmentally responsive and sustainable places, with a consistent and high-quality standard of design. The National Model Design Code encourages the implementation of sustainable construction; that addresses climatic conditions, focuses on reducing embodied energy, embeds circular economy principles to reduce waste and is designed for disassembly and reuse.	2019 / 2021	Department for Levelling Up, Housing and Communities (DLUHC)					
Home Upgrade Grant (HUG)	Homes, heat and buildings	Carbon dioxide (CO_2) The Clean Growth Strategy (2017) committed government to phasing out high carbon fossil fuel heating systems for off gas grid homes	The Home Upgrade Grant (HUG) scheme will upgrade the energy performance of the worst performing off-gas grid homes in England by installing energy efficiency measures and low carbon heating into low income households. £1.1 billion has been allocated to HUG for delivery from 2022 to 2025.	Economic	Implemented/planned	The Home Upgrade Grant provides grants to low-income households to upgrade the energy performance of the worst quality, off gas grid homes in England by installing multiple energy efficiency measures and low carbon heating. In the summer of 2021, the Government announced the launch of HUG Phase 1. This pot of money is worth over £200m. e Applications closed on 4 August 2021 with delivery forecast to complete by March 2023. This funding will deliver energy efficiency upgrades to low-income households off the gas grid. Homes with an EPC rating of D and below are eligible. Government announced an additional £950m at the Autumn '21 spending review, which will be delivered between 2023 and March 2025.	Dec 2021 – March 2023	UK Government (BEIS), Local Government					

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Local Authority Delivery (LAD)	Homes, heat and buildings	Carbon dioxide (CO_2) The Clean Growth Strategy (2017) committed government to phasing out high carbon fossil fuel heating systems for off gas grid homes	The Local Authority Delivery Scheme (LAD) started as a £500m scheme that aims to support up to 50,000 low-income households that most need energy efficiency upgrades. The scheme is prioritising homes with low Energy Performance Certificate (EPC) ratings of D, E, F&G and targeted at households with a combined household annual low-income of no more than £30,000. A further £287 million has been allocated for a third phase of LAD funding to deliver energy efficiency measures to low-income households on the gas grid from early 2022 to March 2023.	Economic	Implemented.	The Local Authority Delivery Scheme (LAD) is focused on low-income households in homes that most need energy efficiency upgrades. The scheme is prioritising homes with low Energy Performance Certificate (EPC) ratings of D, E, F&G and targeted at households with a combined household annual low-income of no more than £30,000 who are most at risk of fuel poverty Phase 1 allocated £200m in grants to over 136 Local Authorities for delivery by March 2022, with a managed closure to September 2022. It is forecasted that up to 20,000 homes will be upgraded Phase 2, allocated £300m to the five Local Net Zero Hubs, who work with their regional Local Authorities to continue to deliver energy efficiency upgrades to up to 30,000 homes by June 2022. Phase 3, funding was allocated to successful LAs under the third phase of LAD (£287m) LAD Phase 2 is currently in delivery and BEIS will continue to work with the Net Zero HUBs to ensure that as many homes benefit from the scheme as possible.	Phase 1: Sept 2020- Sept 2022 Phase 2: March 2021 Phase 3: January 2022 – March 2023	UK Government (BEIS), Local Government					
Green Homes Grant Voucher Scheme	Homes, heat and buildings	Carbon dioxide (CO_2)	Scheme was designed to provide a short-term economic stimulus in response to the global pandemic, while tackling UK contribution to climate change. It aimed to help 600,000 households complete energy efficiency upgrades to their homes, saving up to £600 on their energy bills, while supporting jobs in green construction.	Economic	The scheme closed to new applications on 31 March 2021, with scheme closure date set at 30 November 2021.	Homeowners (both freehold and leasehold owner occupiers), and landlords could apply for vouchers of up to £5,000 towards the cost of installing energy efficient and low-carbon heating improvements in their homes. As of February 2022, the scheme had allocated £232 million through vouchers and has upgraded 43,400 homes with 49,500 measures. Some homeowners on income-based or disability benefits were eligible for vouchers covering the full cost of improvements, up to a value of £10,000. Scheme opened to applications on 30 September 2020. Initially £1.5 billion funding was available with the deadline of 31 March 2021 for vouchers to be redeemed, and home improvements to be completed. An extension to 31 March 2022 was announced in November 2020. It was subsequently announced the scheme would close to new applications on 31 March 2021.	2020	Department for Business, Energy and Industrial Strategy					

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Energy Company Obligation (ECO_4)	Homes, heat and buildings	Carbon dioxide (CO_2)	The Energy Company Obligation (ECO) is a Government energy efficiency scheme for low income and vulnerable energy customers which aims to reduce bills and improve the least energy efficient housing stock occupied by low income and vulnerable households across Great Britain. It contributes towards Government's statutory target of improving as many fuel poor homes as reasonably practicable to EPC band C by 2030, with an interim milestone of band D by 2025. The scheme is energy supplier led with costs recouped from their domestic customers.	Regulatory	ECO_3 ended on 31 March 2022; ECO_4 commenced in 2022 and will run to March 2026, (the consultation response for the new scheme, ECO_4, was published on 1 April 2022). The scheme requires affirmative regulations to come into force.	The 2021 Sustainable Warmth strategy announced a continuation of ECO from 2022 – 2026 and an expansion in the value of the scheme from £640mn/annum to £1bn/annum. In Summer 2021, government consulted on the 4-year £4bn successor scheme (ECO_4) and published the consultation response in April 2022. The scheme focuses support by installing energy efficiency measures in low income and vulnerable and fuel poor households across Great Britain, living in energy inefficient homes. A minimum level of energy efficiency upgrade is required, for deeper improvements to homes.	ECO_3 2018 – 2022 ECO_4 2022 -2026	Department for Business, Energy and Industrial Strategy					
Off grid heat decarbonisation (domestic)	Homes, heat and buildings	Carbon dioxide (CO_2)	To phase out the installation of high carbon fossil fuel heating systems in homes off the gas grid in England	Regulation	We have consulted on our proposals and will respond to that consultation later this year (2022).	Proposed regulation to phase out the installation of high carbon fossil fuel heating systems in homes off the gas grid in England, bringing forward low carbon heat at the point of boiler replacement.	2026 proposed	Department for Business, Energy & Industrial Strategy					
Off grid heat decarbonisation (non-domestic)	Homes, heat and buildings	Carbon dioxide (CO_2)	To phase out the installation of high carbon fossil fuel heating systems in non-domestic buildings in England	Regulation	Planned. We have consulted on our proposals and will respond to that consultation later this year (2022).	Proposed regulation to phase out the installation of high carbon fossil fuel heating systems (e.g. oil, liquefied petroleum gas (LPG), coal) in buildings off the gas grid in England, bringing forward low carbon heat at the point of boiler replacement.	2024 proposed for large buildings >1000m2. 2026 proposed for smaller buildings <1000m2.	Department for Business, Energy & Industrial Strategy					
Renewable Heat Incentive (RHI) (There are 2 RHI schemes, the Non-Domestic RHI (NDRHI) and Domestic RHI (DRHI)).	NDRHI scheme – industrial, commercial, public sector, agricultural and not-for-profit organisations – e.g. businesses, hospitals, and district heating schemes. DRHI – Domestic properties, primarily retrofit.	Carbon dioxide (CO_2)	To decarbonise the generation of heat in both industrial/commercial and domestic sectors. To develop a high quality supply chain that is able to carry out the mass deployment of low carbon heating systems in the 2020s and beyond. To contribute towards the UK's renewable energy and carbon targets.	Regulation	The NDRHI scheme launched in 2011 and closed to new applications in 2021, with final payments being made in 2041. The DRHI launched in 2014 and closes to new applications in 2022, with final payments being made in 2029.	The Non-Domestic Renewable Heat Incentive (RHI) provides financial incentives to increase the uptake of renewable heat by businesses, the public sector and non-profit organisations. Eligible installations receive quarterly payments for 20 years based on the amount of heat generated. The Domestic RHI is a government financial incentive to promote the use of renewable heat. Eligible installations receive quarterly payments for 7 years for the amount of renewable heat it is estimated their system produces.	NDRHI scheme launced in 2011. DRHI scheme launched in 2014.	UK government. Legislation is set by BEIS. Both DRHI and NDRHI schemes are administered by Ofgem.					

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Consultation on improving boiler standards and efficiency	Homes, heat and buildings	Carbon dioxide (CO_2)	Reducing domestic gas consumption: lowering consumer bills and carbon emissions, and improving our energy security, by ensuring new boilers meet the highest standards of efficiency. Preparing for the energy transition: Ensuring new boiler installations prepare the ground for the future transition of homes to low carbon heating, including for a potential hydrogen conversion and exploring the role of hybrid heating systems.	Regulatory	Consultation to be published in due course.	This consultation sets out proposals aimed at improving the efficiency of newly installed gas boiler systems, through product standards and improved installation practices. The consultation will also test the case for requiring that all newly installed gas boilers are hydrogen-ready, to support any future transition of the gas grid. Finally, the consultation also explores the role of hybrid heat pumps as a transitional technology on the journey to Net Zero.	2026	Department for Business, Energy & Industrial Strategy					
Heat Pump Investment Accelerator Competition	Homes, heat and buildings	Carbon dioxide (CO_2)	This £30m competition aims to bring forward private sector investment in the UK heat pump industry, building up product diversity and supply chain resilience, and efficiency gains and cost reductions from innovation and economies of scale.	Economic	Business case being drafted in June. PIC expected to be end of July 2022. Launch Summer 2022. Awards Q1 2023	This scheme will provide up to £30m worth of grants to bring forward/attract additional heat pump manufacturing capacity to the UK. Funding will be provided to companies for eligible capital costs, driven by additionality and VfM. At least two major investments that would otherwise not be made in the UK within this Spending Review period should be secured this year. This will encourage meeting UK heat pump demand and targets, and also creating export opportunities. There is potential to attract more than £250m of private investment, create new, commercially sustainable jobs, reduce unit costs for UK consumers, and cut heat pump delivery times from up to six months to one month.	2023	Department for Business, Energy & Industrial Strategy	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated	Mitigation impact not estimated
Market Obligation for Retrofit HP Deployment	Homes, heat and buildings	Carbon dioxide (CO_2)	Expand deployment of low-carbon heat pumps in order to reduce direct carbon dioxide emissions from gas and oil boilers, and indirect emissions from the use of electric heating appliances that are less energy-efficient than heat pumps.	Regulatory	Planned. (Consultation response published May 2022. Enabling legislation as part of Energy Security Bill)	Plan to introduce an obligation on the manufacturers of fossil fuel boilers sold in the UK to meet targets for a rising standard for low-carbon heat pumps as a proportion of their overall sales mix, either directly or through acquiring credits from other heat pump manufacturers. This will stimulate investment throughout the heat pump supply chain, and help to make a heat pump a more attractive, affordable and simpler choice for more consumers.	2024	UK Government					
Operational Energy Ratings (internally known as PEERS)	Homes, heat and buildings	Carbon dioxide (CO_2)	To provide businesses with information on the in-use energy usage of their buidlings and promote action through disclosure of ratings.	Regulatory	Planned	An operational energy rating would fill a gap in information on how a building performs once it is operational. In large and complex buildings, information failure is a critical barrier to ensuring businesses are aware of and accountable for their carbon emissions.	TBC	UK Government					

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Community trials of 100% hydrogen for heating	Homes, heat and buildings	Carbon dioxide (CO_2)	To support industry to deliver a neighbourhood trial by 2023, a village scale trial by 2025 in order to enable strategic decisions in 2026 on the role of hydrogen for heat	Research	The neighbourhood trial will be SGN's H100 Fife project in Levenmouth. Final decisions on the location of the village trial expected to be taken in 2023.	Trials of hydrogen heating will be key to evaluating the practicalities of converting to hydrogen. They will provide a wide range of evidence on costs, feasibility and the way in which consumers experience the conversion process and hydrogen for heating in their homes and workplaces.	2023	UK Government, Scottish Government, Ofgem, HSE, Gas network operators					
Hydrogen appliance testing	Homes, heat and buildings	Carbon dioxide (CO_2)	To determine the feasibility of hydrogen as a heating solution for various pruposes, specifically domestic heating and distribution appliances such as boilers and gas meters.	Research	Various appliances developed and under testing and review.	Numerous hydrogen devices developed and undergoing testing, with proposals from manufacturers regarding costs, production, and other technical factors.	2021	UK Government, regulators, arms length bodies as well as private manufacturers					
Social Housing Decarbonisation Fund Demonstrator	Homes, heat and buildings	Carbon dioxide (CO_2)	The Social Housing Decarbonisation Fund will upgrade a significant amount of the social housing stock currently below EPC C up to that standard, delivering warm, energy-efficient homes, reducing carbon emissions and fuel bills, tackling fuel poverty, and supporting green jobs.	Economic	The SHDF Demonstrator project was launched in 2020. It has awarded £61m of funding to social landlords across England and Scotland to test innovative approaches to retrofitting at scale.	Delivery in progress, expected to be completed by December 2022. The 2020 Summer Economic Update announced the SHDF Demonstrator project, launched in 2020, which has awarded £61m of funding to social landlords across England and Scotland to test innovative approaches to retrofitting at scale, seeing up to 2000 social homes improved to at least EPC band C and supporting up to 1,200 local jobs.	2020	UK Government (BEIS), Local Government, English & Scottish LA's					
Social Housing Decarbonisation Fund	Homes, heat and buildings	Carbon dioxide (CO_2)	The Social Housing Decarbonisation Fund will upgrade a significant amount of the social housing stock currently below EPC C up to that standard, delivering warm, energy-efficient homes, reducing carbon emissions and fuel bills, tackling fuel poverty, and supporting green jobs.	Economic	Wave 1 of the SHDF was launched in 2021. It will provide around £179m of funding in financial year 21/22	The first wave of the Social Housing Decarbonisation Fund (SHDF) was launched in August 2021. It is providing around £179m of BEIS funding and around £187m of co-funding from Registered Providers, equalling a total investment size of around £366m in financial year 21/22. A further £800 million funding was announced in the Net Zero Strategy for Wave 2, the competition launch for Wave 2 is scheduled for Autumn/Winter 2022.	2021	UK Government (BEIS), Local Government. English LA's					
EPC Disclosure and Targets for Lenders	Homes, heat and buildings	Carbon dioxide (CO_2)	The aim of the proposals is to incentivise mortgage lenders to develop new low cost green products aimed at improving energy performance and to raise awareness among their customers. The policy would function as an enabler to achieving our wider net zero targets, such as getting as many homes as possible to be upgraded to Energy Performance Certificate (EPC) Band C by 2035.	Regulatory	We have consulted extensively on these proposals and will publish the Government Response in due course	We have consulted on the role that mortgage lenders in England and Wales can play in helping homeowners to improve the energy performance of their homes. The consultation proposed that lenders disclose information related to the energy performance of their portfolios and sign up to meet an improvement target. The target could be achieved by lenders offering low cost green finance products to customers (e.g. green mortgages, further advances), offering incentives (e.g. cashbacks), and providing information and advice to customers on the changes they can make.	TBC	UK Government					

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Measures to improve the energy efficiency of social housing	Homes- heat and buildings	Carbon dioxide (CO_2)	All homes to EPC by 2035	Regulatory	Proposed. The Net Zero Strategy proposed tp considering setting a long-term regulatory standard to improve social housing to EPC Band C	Introduce standards to improve the energy efficiency of socially rented homes.	TBC	UK Government (Local Authorities in England and Wales)					
Measures to Improve the Energy Performance of Owner Occupier Homes (Domestic)	Homes, heat and buildings	Carbon dioxide (CO_2	All homes to EPC C by 2035	Regulatory	We commited in the HBS, NZS and Energy Security Strategy to develop proposals for consultation	Introduce minimum energy performance standards to improve the energy performance of owner-occupied homes linked to behaviour points where building upgrades are most likely	TBC	UK Government (Local authorities in Enland and Wales)					
PRS Minimum Energy Efficiency Regulations – Domestic	Homes, heat and buildings	Carbon dioxide (CO_2)	Amend PRS Regulations to require privately rented homes in England and Wales to reach EPC C by 2028	Regulatory	We consulted in the winter of 2020/21 and will publish a Government Response in due course	We committed in the Clean Growth Strategy to improve as many private rental homes as possible to EPC band C by 2030 where practical, affordable and cost effective. In the Net Zero strategy we committed to setting long-term regulatory standards to upgrade privately rented homes to EPC band C by 2028. The consultation proposed to apply to new tenancies from 1 April 2025 and to all tenancies by 1 April 2028.	TBC	UK Government (Local Authorities in England and Wales)					
Improve the Energy Performance of Owner Occupier Non-domestic properties	Homes, heat and buildings	Carbon dioxide (CO_2)	Improve the fabric energy efficiency of owner occupiers non-domestic properties	Regulatory	We commited in the HBS, NZS and Energy Secruity Strategy to develop proposals for consultation	Buyers of non-domestic buildings will need to upgrade the property's energy efficiency to EPC B within 24 months of purchase, with a 2030/2035 backstop.	TBC	UK Government (Local Authorities in England and Wales)					
PRS Minimum Energy Efficiency Regulations – Non Domestic	Homes, heat and buildings	Carbon dioxide (CO_2)	Amend PRS Regulations to require privately rented non-domestic in England and Wales to reach EPC B by 2030	Regulatory	We consulted in 2021 and will publish a Government response in due course	Rented non-domestic buildings will need to reach EPC B, with a 2030 backstop	TBC	UK Government (Local Authorities in England and Wales)					
Green Home Finance Innovation Fund (GHFIF)	Homes, heat and buildings	Carbon dioxide (CO_2)	The GHFIF competition was designed to encourage domestic energy efficiency retrofit amongst homeowners by promoting the establishment of green lending products and supporting lenders to overcome the barriers to innovation posed by high initial development costs in an untapped green finance market.	Economic	The three projects funded through the GHFIF competition completed end March 2022 (with two of the resulting 'green lending' products now continuing in a commercial capacity). Evaluation is currently underway and is due to be completed by March 2023.	Funded through the Energy Innovation Programme, the £1.8m GHFIF competition launched in September 2019, and awarded three organisations grant funding to support the initial development and piloting of green home finance products that aim to incentivise energy efficiency retrofit in homes. The funded projects were led by two retail lenders and one fintech company.	2019	Department for Business, Energy & Industrial Strategy (BEIS)					

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Green Home Finance Accelerator (GHFA)	Homes, heat and buildings	Carbon dioxide (CO_2)	The key objective of the GHFA programme is to drive innovation and diversification in the green lending market and support the establishment of a wide range of green finance products and services which incentivise domestic energy efficiency and low carbon heating retrofit amongst both owner occupiers and private landlords. A second objective is to support lenders to develop expertise in energy efficiency and low carbon heating, and build relationships with the energy efficiency installer supply chain, and with advice provision services to streamline and improve the consumer journey.	Economic	Due to launch in 2022	Up to £20m of innovation grant funding will be made available to support UK lenders to design, develop and pilot a range of innovative finance propositions, with a particular focus on non-mortgage related products. Through the GHFA competition, the range and depth of retrofit enabling green finance products and services available in the green finance market will be explored and developed to encourage and enable domestic energy retrofit and help a wide range of consumer segments meet future regulatory standards.	2022	Department for Business, Energy & Industrial Strategy (BEIS)					
Building Regulations 2021 Part L	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Coming into force June 2022.	An interim uplift to the 2013 building regulations will come into force in June 2022, when new homes and buildings constructed to this standard will be expected to produce significantly less CO_2, compared to those constructed to the 2013 standard. This applies to England.	2021	Department for Levelling Up, Housing and Communities (DLUHC)					
Future Homes Standard	Energy consumption (comprising consumption of fuels and electricity by end users such as households, services, industry and agriculture)	Carbon dioxide (CO_2)	Efficiency improvements of domestic buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Planned	When it is implemented in 2025, we expect the Future Homes Standard will ensure new homes are built not with fossil fuel technologies, but with heat pumps or heat networks. The technical specifications of the FHS will be subject to further consultation in 2023. This will apply to England.	2025	Department for Levelling Up, Housing and Communities (DLUHC)					
Future Buildings Standard	Non domestic buildings (excluding industrial buildings)	Carbon dioxide (CO_2)	Efficiency improvements of non-domestic buildings (Energy consumption), Efficiency improvement of appliances (Energy consumption)	Regulatory	Planned	When it is implemented in 2025, the Future Buildings Standard will deliver highly efficient non-domestic buildings which use low-carbon heat, ensuring they are better for the environment and fit for the future. The technical specifications of the FHS will be subject to further consultation in 2023. This will apply to England.	2025	Department for Levelling Up, Housing and Communities (DLUHC)					
Decent Homes Standard	Homes, heat and buildings	Carbon dioxide (CO_2)	All homes to EPC C by 2035, Fuel Poor Homes to Band C by 2030 (Fuel Poverty)	Regulatory	Setting goal stage	Social Housing White Paper committed to review the Decent Home Standard (DHS) to consider how it can better support the decarbonisation and energy efficiency of social Hosing. Initially based on EER C by 2035 (modelled subject to a £10k cost cap) but we will update the figures based on the final level of ambition once the policy is agreed.		Department for Business, Energy and Industrial Strategy (BEIS) and Department for Levelling Up, Housing and Communities (DLUHC)					

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Warm Home Discount	Homes, heat and buildings	Carbon dioxide (CO_2)	Reducing fuel poverty largely through requiring energy suppliers to provide rebates to low-income and vulnerable households.	Regulatory	Planned	The scheme obligates participating energy suppliers to provide rebates to low-income and vulnerable households. The scheme is being expanded to £475 milion per year from 2022/23 until 2025/26 least, providing £150 rebates to around 3 million households each winter, the majority automatically. Under the scheme, energy suppliers can also fund other measures such as energy advice, energy efficiency measures, and debt write-off. There will be separate WHD schemes in England and Wales and in Scotland. Government will shortly lay the regulations for England and Wales and publish a consultation for Scotland, which will be subject to separate regulations.	Current scheme: 2011-2022; Expanded scheme: 2022-2026	Policy owned by BEIS and implemented by BEIS, DWP and Ofgem					
Boiler Upgrade Scheme	Homes, heat and buildings	Carbon dioxide (CO_2)	Incentivise property owners to replace existing fossil fuel heating systems with low carbon heat alternatives, primarily heat pumps, to help grow demand for low carbon heat and build supply chains ahead of the introduction of regulations later in the decade.	Fiscal	The scheme has a confirmed budget of £450 million from April 2022 to March 2025 (£150 pa). The scheme will launch for account registration on April 11th 2022 and voucher applications will open from 23rd May 2022. Installations completed on or after 1st April will be eligible for support.	• The Boiler Upgrade Scheme will provide capital grants for the installation of low carbon heat technologies in domestic and small non-domestic properties. The grant model will help customers overcome the high upfront cost of low carbon technologies when replacing existing fossil fuel systems. BUS applies to England and Walse. • The BUS will provide grants of £5000 towards the installation and capital costs of air source heat pumps and biomass boilers, and grants of £6,000 for ground source heat pumps.	2022	BEIS The scheme will be delivered by Ofgem.					
Green Gas Support Scheme	homes, heat and buildings, industrial, commercial, public sector	Carbon dioxide (CO_2), Methane (CH_4)	The Green Gas Support Scheme is a tariff support scheme for biomethane (AD) injection to the gas grid (following closure of the Non Domestic RHI in March 2021). The length of the tariff will be 15 years, with applications starting Autumn 2021 until 2025.	Regulatory	The scheme is open to applicants in England, Scotland and Wales for four years from 30 November 2021.	Tariff support scheme for supporting new AD biomethane injection into the gas grid	2021	Department for Business, Energy and Industrial Strategy (BEIS)					
Green Gas Levy	Homes, heat and buildings, industrial, commercial, public sector	Carbon dioxide (CO_2), Methane (CH_4)	The Green Gas Levy is the funding mechanism for the Green Gas Support Scheme. The levy charges fossil fuel gas suppliers to raise funding for the tariff support payments to biomethane production plants.	Regulatory	The first levy collection took place in April 2022 and will run through to 2040 when the tariff support payments under the Green Gas Support Scheme cease	The Green Gas Levy operates as a fixed charge levied against every gas meter that supplies fossily fuel gas for the purposes of heat. The levy is reviewed annually to match the forecast expenditure of the Green Gas Support Scheme.	2021	Department for Business, Energy and Industrial Strategy (BEIS)	N/A	N/A	N/A	N/A	N/A

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Enablers – Public Engagement; SEA	Homes- heat and buildings	Enabler – no direct impact on GHGs	The Simple Energy Advice service launched in 2018, to provide homeowners with impartial and tailored advice on how to cut their energy bills and make their homes greener. This service has been accessed by over 1.8 million users	Information Fiscal	Implemented	Online advice service for homeowners to access correct information for energy efficiency measures which would suit their property type best	2019	Department for Business, Energy and Industrial Strategy (BEIS)					
Enablers- Consumer protection; Trustmark & PAS	homes	Enabler – no direct impact on GHGs	Drive forward industry led activity to stregthen and embed standards for retrofit, ensuring necessary protection is provided for consumers that have energy efficiency or heat measures installed, in accordance with the recommendations of the Each Home Counts review	Information Fiscal	Retrofit standards are in force, alongside an installer quality mark (TrustMark).	PAS 2035/PAS 2030:2019 came into force in November 2021. Installers must be certified to those standards and registered with TrustMark to particpate in government schemes. An small update to the standard was published in January 2022, taking into account lessons learned from implementation on the ground. A more substantial update is being considered for 2022/23.	2019	Industry activity with leadership (and funding for standards updates) from Department for Business Energy and Industrial Strategy					
Enablers- supply chain/skills; home retrofit & capacity building	homes, heat and buildings	Enabler – no direct impact on GHGs	To reduce supply chain risk to our current delivery schemes and understand and plan for future strategic supply chain needs, supporting the supply chain to grow and upskill in the key trades needed both now and in the future.	Information Fiscal	An ongoing programme of work	An ongoing programme of work including skills funding, working with industry to help them make better use of existing avenues for capacity building/understand the issues with those (non fiscal measures), and improving our knowledge and understanding via research to inform future interventions.	2021	Department for Business, Energy and Industrial Strategy (BEIS)					

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Energy-related Products Policy	Domestic and non-domestic buildings; manufacturing; retail.	CO_2	Sets minimum energy performance standards and implements energy labels for a range of energy-related products to increase the uptake of the most energy efficient products on the market, reduce energy bills and remove the least energy efficient products from the market. Since 2019, this has involved: - introducing ecodesign requirements for servers, power transformers and external power supplies - introducing an energy label for commercial refrgieration - updating ecodesign requirements for welding equipment, electric motors and variable speed drives, washing machines, dishwashers, refrigeration, commercial refrigeration, lighting products and electronic displays - rescaling the energy label for lighting products, electronic displays, washing machines, refrigeration and dishwashers to aid consumer understanding and reflect technological progress - introducing circular economy requirements for a range of products	Regulatory (implemented)	In force	These measures help save consumers money on their energy bills by incentivising them to purchase the most energy efficient products on the market and removing the least energy efficient products from the market. This in turn spurs innovation within the market. More recently, circular economy principles have been introduced to reduce material waste by supporting consumers to repair products, keeping them in use for longer.	2019	Department for Business, Energy and Industrial Strategy (BEIS)					
Heat Networks Market Framework	Domestic and non-domestic buildings; manufacturing; retail.	Carbon Dioxide (CO_2)	Deveop a regulatory framework for heat networks to protect consumers and support growth of the wider market	Regulatory	Government Response to consultation published in December 2021	Measures are intended to protect consumers by ensuring fair pricing and deliver growth in the sector. Examples of measures include: establishing a framework for consumer protections similar to those for gas and electricity customers, proposals for more transparent pricing and proposals for giving heat networks equivalent rights and powers to utilities.	Subject to parliamentary timetable for Energy Security Bill, regulations will be introduced as early as 2024	Department for Business, Energy and Industrial Strategy (BEIS) and Ofgem					
Heat Network Zoning	Domestic and non-domestic buildings; manufacturing; retail.	Carbon Dioxide (CO_2)	Introduction of heat network zoning in England, to help overcome barriers to deployment by identifying and designating areas where heat networks are the lowest cost solution for decarbonising heat.	Regulatory	Consulted on proposals in Autumn 2021- consultation results to be published late June 2022	Our proposals for heat network zoning involve central and local government working together with industry and local stakeholders to identify and designate areas within which heat networks are the lowest cost solution for decarbonising heat. Certain buildings within zones would be required to connect to the heat network. This will help accelerate the deployment of heat networks where they are most appropriate and help heat networks increase their contribution towards our net zero commitments.	2025	Department for Business, Energy and Industrial Strategy (BEIS)					

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Heat Network Transformation Programme	Domestic and non-domestic buildings; manufacturing; retail.	Carbon dioxide (CO_2)	Grow and decarbonise the UK heat network market, helping to overcome barriers to heat network market entry. £338M invested over 2022/23-2024/25. The Green Heat Network Fund has £328m invested (including £40m tail period in 2025/6).	Fiscal	An ongoing programme of work	Green Heat Network Fund is the largest element, providing grants for large district heat networks for low carbon heat sources (e.g. heat pumps and waste-heat recovery). It replaces the Heat Networks Investment Project (HNIP).	2022	Department for Business, Energy and Industrial Strategy (BEIS)					
Games Console Voluntary Agreement	Domestic and non-domestic buildings; manufacturing; retail.	Carbon dioxide (CO_2)	Reduce energy consumption of games consoles	Voluntary Agreement (non-regulatory)	Implemented	Aims to encourage manufacturers to increase the energy and resource efficiency of games consoles and provide consumers and repairers information on repair and spare parts.	2021	Department for Business, Energy and Industrial Strategy (BEIS)					
Measures to drive bus and coach decarbonisation	Transport	Carbon dioxide (CO_2)	Transition to zero emission road vehicles.	Regulatory, Fiscal	Adopted	Invest £3 billion in the National Bus Strategy, creating integrated networks, more frequent services, and bus lanes to speed journeys, and support delivery of 4,000 new zero emission buses and the infrastructure needed to support them. This will represent the replacement of nearly 12% of England's local operator bus fleet. This included £71m in 2021 to support 335 new zero emission buses in 5 areas and £198.3m in 2022 to provide 943 buses.	National Bus Strategy published in March 2021.	Department for Transport					
Changes to the RTFO	Transport	Carbon dioxide (CO_2)	Low carbon fuels.	Regulatory	Adopted	Maximise carbon savings from the use of low carbon fuels, including by increasing the main Renewable Transport Fuel Obligation (RTFO) target. We have increased the RTFO main obligation (the percentage of transport fuel in the UK that suppliers must show comes from renewable or sustainable sources) from 9.6% in 2021 to 14.6% in 2032.	RTFO originally came into force in 2008. Changes to the main obligation have been announced since.	Department for Transport					
Regulation to phase out non-zero emission cars and vans	Transport	Carbon dioxide (CO_2)	Transition to zero emission road vehicles.	Regulatory	Planned	End the sale of new petrol and diesel cars and vans from 2030; from 2035, all new cars and vans must be zero emission at the tailpipe. Introduce a zero emission vehicle mandate setting targets for a percentage of manufacturers' new car and van sales to be zero emission each year from 2024.	Cars and vans phase out dates – 2030. ZEV mandate – 2024.	Department for Transport					
Regulation to phase out all new non-zero emission road vehicles	Transport	Carbon dioxide (CO_2)	Transition to zero emission road vehicles.	Regulatory, Research	Planned	Take forward our pledge to end the sale of all new, non-zero emission road vehicles by 2040, from motorcycles to buses and HGVs, subject to consultation. At COP26, we announced that following consultation we will end the sale of new, non-zero emission HGVs less than or equal to 26 tonnes by 2035, and that from 2040, all new HGVs must be fully zero emission at the tailpipe.	From 2030, although we have announced different phase out dates for different types of non-zero emission vehicle.	Department for Transport					

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Investment in charging infrastructure and the transition to electric vehicles	Transport	Carbon dioxide (CO_2)	Transition to zero emission road vehicles.	Regulatory, Fiscal	Planned	Ensure the UK's charging infrastructure network is reliable, accessible, and meets the demands of all motorists. We have published an EV infrastructure strategy, setting out our vision for infrastructure rollout, and roles for the public and private sectors in achieving it. Building on the £1.9 billion from Spending Review 2020, the Government has committed an additional £620 million to support the transition to electric vehicles. The funding will support the rollout of charging infrastructure, with a particular focus on local on-street residential charging, and targeted plug-in vehicle grants.	From 2030, although we have announced different phase out dates for different types of non-zero emission vehicle.	Department for Transport					
Further rail electrification	Transport	Carbon dioxide (CO_2)	Improved transport infrastructure	Fiscal	Planned	Electrify more railway lines as part of plans to deliver a net zero rail network by 2050, with the ambition to remove all diesel-only trains by 2040.		Department for Transport					
Investment in cycling and walking	Transport	Carbon dioxide (CO_2)	Increase the share of journeys taken by public transport, cycling and walking.	Regulatory, Fiscal	Planned	Invest £2 billion in cycling and walking, building first hundreds, then thousands of miles of segregated cycle lane and more low-traffic neighbourhoods with the aim that half of all journeys in towns and cities will be cycled or walked by 2030. As announced in the Transport Decarbonisation Plan, we will create at least one zero emission transport city.	£2bn announced in May 2020.	Department for Transport					
Launch of UK SHORE	Transport	Carbon dioxide (CO_2)	Tackle shipping emissions and advance the UK towards a sustainable shipping future	Research, Fiscal	Adopted	New unit, UK SHORE, to tackle shipping emissions and advance the UK towards a sustainable shipping future. £206 million new funding to accelerate research into and development of clean maritime technologies and create skilled jobs across the country.	UK SHORE launched in March 2022.	Department for Transport					
Measures to decarbonise the maritime sector	Transport	Carbon dioxide (CO_2)	Maritime decarbonisation	Regulatory, Fiscal	Planned	Plot a course to net zero for the UK domestic maritime sector, phase out the sale of new non-zero emission domestic shipping vessels and accelerate the development of zero emission technology and infrastructure in the UK. We will engage with industry to explore establishing a UK Shipping Office for Reducing Emissions (UKSHORE) to transform the UK into a global leader in the design and manufacturing of clean maritime technology.		Department for Transport					
Measures to decarbonise the aviation sector	Transport	Carbon dioxide (CO_2)	Aviation decarbonisation	Regulatory, Fiscal	Planned	Become a leader in zero-emission flight, kick-starting commercialisation of UK sustainable aviation fuels (SAF), and developing a UK SAF mandate, to enable the delivery of 10% SAF by 2030, and we will be supporting UK industry with a £180m funding to support the development of SAF plants.		Department for Transport					

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HS2 Woodland Fund	Land use, land-use change and forestry	Carbon dioxide (CO_2)	Afforestation and reforestation (LULUCF)	Economic	Implemented	Grant to support woodlands to create a green corridor of connected wildlife habitats alongside the railway and restore degraded ancient woodlands.	2017	Forestry Commission					
Nature for Climate Fund	Land use, land-use change and forestry	Carbon dioxide (CO_2), Nitrous oxide (N_2O), Methane (CH_4)	Afforestation, reforestation and restoration (LULUCF)	Economic	Adopted	2020 Spending review announced the Nature for Cliamte Fund which provides Grants to support woodland creation and peatland restoration over a 5 year period.	2020	Department for Food, Environment and Rural Affairs (DEFRA)					
The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020	Residential	Carbon dioxide (CO_2)	Reduction of particular fuels for domestic burning (Residential)	Regulation	Implemented	This regulation aims to regulate the sales, distribution and marketing of we wood (>20% moisture), Bituminous house coal and manufactured solid fuels with sulphur content over 2%	2022	Department for Food, Environment and Rural Affairs (DEFRA)					
Direct Air Capture and Greenhouse Gas Removal Programme	Cross-cutting (removals)	Carbon dioxide (CO_2), Methane (CH_4)	In the first phase of the competition, to produce designs for GGR Projects which are of high quality and represent proposals which, if implemented, would advance the development of GGRs in the UK. In the second phase of the competition, to apply the best of these designs to successfully construct, operate, test, refine and evaluate processes and technologies which can be used to remove GHGsfrom the atmosphere at scale.	Fiscal	Adopted	In the first phase of the competition, to produce designs for GGR Projects which are of high quality and represent proposals which, if implemented, would advance the development of GGRs in the UK. In the second phase of the competition, to apply the best of these designs to successfully construct, operate, test, refine and evaluate processes and technologies which can be used to remove GHGs from the atmosphere at scale.	2021	Department for Business, Energy and Industrial Strategy (BEIS)					
Greenhouse gas removal policy	Cross-cutting (removals)	All	UK government has an ambition of at least 5Mt of CO_2e removals by 2030 (announced in Net Zero Strategy). To support this ambition, government will consult on policy measures to incentivise investment in GGRs in spring 2022. BEIS launched a £70m innovation competition in 2021 for Direct Air Capture and other GGRs.	Government to consult on instruments	Planned	Ambition of 5Mt of CO_2e removals per annum by engineered GGRs by 2030 (announced in Net Zero Strategy) To support this ambition, government will consult on policy measures to incentivise investment in GGRs in spring 2022. BEIS launched a £70m innovation competition in 2021. In Phase 1 23 projects were supported up to £250,000 each and around 15 of these will be going forward to Phase 2 of the competition. Phase 2 applicants can recieve up to £5million each to build their demonstration project based on the feasibility and design from Phase 1. Phase 2 demonstration projects will need to demonstrate a removal rate of up to 1000t CO_2e/yr and indicate how costs of CO_2 removal can be reduced through scaling up to 50,000t CO_2e/yr removal by 2030.	2021	The national government set the ambition of 5Mt of CO_2e removals per annum by 2030. BEIS is responsible for developing policy to enable this ambition.					

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Cross-government portfolio of innovation funding support (£1.5bn) over period to 2025, including £1bn Net Zero Innovation Portfolio	All	Carbon dioxide (CO_2)	Accelerate the commercialisation of low carbon technologies, systems and business models across the economy.	Economic	Implemented	Funding BEIS-led programmes on power, buildings and industry; DFT-led programmes across transport; and DEFRA-led programmes on natural resources, waste, and F_gases.	2021	Department for Business, Energy, and Industrial Strategy (BEIS); Department for Transport (DfT), DEFRA					
Net Zero Research and Innovation Framework	All	All	Sets out key research and innovation challenges for the next 5-10 years	Information	Implemented	Sets out critical net zero research and innovation challenges across the UK that require development over the next 5-10 years, and presents timelines of short, medium and longer-term priorities. Will help align current and future government funding around agreed priorities and to crowd-in effort and investment from the private sector and research communities by providing a clear signal on our areas of focus.	2021	Led by BEIS; contributions from DfT, Defra, UKRI					
Public Sector Decarbonisation Scheme	Public Sector	CO_2	A capital funding scheme for heat decarbonisation and energy efficiency improvements in public sector organisations.	Grant funding, implemented	Delivery (until 31 March 2025)	The Public Sector Decarbonisation Scheme offers grants to public sector bodies to fund energy efficiency and low carbon heat measures. The scheme has already made available over £1bn during 2020/21 and 2021/2, and will invest a further £1.425bn over 2022/23 to 2024/45. The scheme aims to support the decarbonisation of public sector buildings by 75% (against a 2017 basline) by the end of Carbon Budget 6. The quantitative impacts on emissions have been estimated using BEIS's non-domestic buildings model. It models the deployment of low carbon heat and energy efficiency measurest in the UK's non-domestic building stock.	2020	Overseen by BEIS and deliverd by Salix Finance Ltd, a BEIS non-departmental public body. The scheme is open to all public sector bodies in England and for public services that are reserved rather than devolved, funds may be spent anywhere in the UK.					
Public Sector Low Carbon Skills Fund	Public Sector	CO_2	The Public Sector Low Carbon Skills Fund provides grants for public sector bodies to access skills and expertise to unlock heat decarbonisation on their estate.	Economic	Delivery (until 31 March 2023)	Launched alongside the Public Sector Decarbonisation Scheme, providing funding to public sector organisations lacking the skills to develop and deliver decarbonisation projects. Investment of up to £32m for Phase 1 (2020/21); investment of up to £15m for Phase 2 (2021/2022); investment of up to £14m for Phase 3 (2022/23)	2020	Overseen by BEIS and delivered by Salix Finance Ltd. Geographical scope as for PSDS above.					

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Local Net Zero Programme	Local delivery of net zero	Carbon dioxide (CO_2)	Support local authorities and local actors across England to build capability and capacity to meet net zero.	Fiscal	Delivery ongoing	The Local Net Zero Programme supports local authorities and communities across England in build capability and capacity to meet net zero, and ensure they play a leading role in decarbonisation. The programme includes: The Local Net Zero Hubs to support all areas of England to reach net zero, including those lacking capacity and capability, or those facing unique challenges. The Hubs promote best practice and support local authorities to develop net zero projects that can attract commercial investment. Promoting best practice and support local authorities to develop net zero projects that can attract commercial investment. Increasing knowledge sharing to demonstrate and share successful net zero system solutions. Delivery of the Rural Community Energy Fund. This is a £10 million scheme which supports rural communities in England to develop renewable energy projects.	2017	Department for Business, Energy and Industrial Strategy (BEIS)					
Northern Ireland: Climate Change Act (Northern Ireland) 2022	All sectors	Carbon dioxide; methane; nitrous oxide; hydrofluorocarbons; perfluorocarbons; sulphur hexafluoride; nitrogen triflouride	Legislation will underpin all Northern Ireland Executive climate change policy going forward.	Primary legislation	Implemented Received Royal Assent 6 June https://www.legislation.gov.uk/nia/2022/31/contents/enacted	Climate change legislation for Northern Ireland which includes a 2050 Net Zero target for Northern Ireland.	Royal Assent June 2022	Northern Ireland Executive					
Northern Ireland: Green Growth Strategy	Energy, agriculture, transport, economy, industry, forestry, waste, land use, cross cutting across all sectors	Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), F-Gases	This Green Growth Strategy will set out a framework for a future where Northern Ireland transitions from being a high to a low emissions society; where NI can enjoy the longer term economic, social, health and environmental benefits that this brings	Other	Planned The strategy is currently in a redrafting stage following the public consultation exercise. The responses to the consultation are currently being analysed and, alongside the legislative requirements of The Climate Change Act (Northern Ireland) 2022, will inform the redrafting of the Strategy.	The Green Growth Strategy is the Northern Ireland Executive's multi-decade strategy, balancing climate, environment and the economy in Northern Ireland. It sets out the long-term vision and a solid framework for tackling the climate crisis in the right way.	Awaiting Executive Sign Off	Northern Ireland Executive					

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Northern Ireland: Regional Development Strategy 2035 & Strategic Planning Policy Statement for Northern Ireland	Cross Cutting	Multiple, including Methane (CH_4) and Nitrous Oxide (N_{20})	To provide key guiding principles for planning in Northern Ireland and both recognise the need to mitigate and adapt to climate change. To ensure existing planning strategy, policy and legislation continue to address the climate change challenge.	Regulatory and Economic	Implemented	The overall objective of the planning system is to further sustainable development. The Regional Development Strategy 2035 (RDS) and the Strategic Planning Policy Statement for Northern Ireland (SPPS) provide the key guiding principles for planning in Northern Ireland and both recognise the need to mitigate and adapt to climate change.Engaging with a range of stakeholders; and applying best practice will ensure that the planning system is fit for purpose; evolves to reflect key developments in respect of sustainable development and climate change and that existing planning strategy, policy and legislation continue to address the climate change challenge.	RDS – 2010, SPPS – 2015	Northern Ireland Executive					
Northern Ireland: Energy Management Strategy and Action Plan to 2030 for Northern Ireland Central Government	Cross Cutting	Carbon Dioxide (CO_2)	To lower the net energy consumption by 30% by 2030 (with 2016/17 as the baseline) and to establish effective energy management processes that unlock value	Strategy and Action Plan	Implemented	Central government is the largest aggregated energy consumer in Northern Ireland. The EMS offers the opportunity to: 1. provide leadership on energy efficiency; 2. drive downward pressure on costs; 3. improve decarbonisation efforts In a context of rising energy prices – in which maintaining the status quo will guarantee cost increases – embracing energy management is an imperative to ensure Government achieves value for taxpayers. Apart from the financial benefits, energy management also contributes to the draft Programme for Government (PfG) through reduction of greenhouse gas emissions and enhancing security of energy supply. In addition, it directly supports wider UK Government objectives on energy and climate action.	2019-2030	Northern Ireland Executive					
Northern Ireland: 80% Renewable Electricity Consumption target	Energy	CO_2, (CH_4, N_2O)	To increase renewable electricity generation and to reduce reliance on fossil fuel generation in Northern Ireland in the transition towards Net Zero carbon energy by 2050 (aim of the Energy Strategy for Northern Ireland).	Economic	Implemented Received Royal Assent 6 June https://www.legislation.gov.uk/nia/2022/31/contents/enacted	A revised renewable electricity consumption target for Northern Ireland of 80% by 2030, as defined by the Climate Change Act (Northern Ireland) 2022, soon to become legislation. The Article in relation to the target states: The Department for the Economy must ensure that at least 80% of electricity consumption from renewable sources by 2030.	2022	Northern Ireland Executive					
Northern Ireland: Northern Ireland Renewables Obligation	Energy	CO_2, (CH_4, N_2O)	Until it's closure in March 2017, the NIRO was the Department for the Economy's (DfE) main policy instrument for incentivising renewable electricity generation.	Economic	Implemented. Closed to new applications since 31st March 2017. Projects already accredited will receive payments for 20 years from their accreditation date, or until 31st March 2037, whichever is earlier.	The Northern Ireland Renewables Obligation (NIRO) has been the main support mechanism for encouraging increased renewable electricity generation in Northern Ireland. It operates in tandem with the Renewables Obligations in Great Britain – the 'ROS' in Scotland and the 'RO' in England & Wales – in a UK-wide market for Renewables Obligation Certificates (ROCs) issued to generators under the Obligations.	2005	Northern Ireland Executive					

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Northern Ireland: Biomethane injection into the natural gas grid in Northern Ireland	Energy/heat, transport, industrial processing, agriculture, waste/waste management.	Methane (CH_4)	To replace a significant proportion of natural gas used in the gas distribution network in Northern Ireland with locally produced biomethane to reduce emissions and dependence on imported fossil fuels.	Regulatory, economic (consideration of the need for financial support/ incentives for biomethane production), research, and education.	Planned Policy is at the planning/ development stage, with good progress on regulatory arrangements and research being taken forward in spring 2022 into the biomethane resource in Northern Ireland and completion of an economic assessment.	The aim of the policy is to utilise excess agricultural and other waste in Northern Ireland to produce biomethane for injection into the natural gas grid to support, primarily, the decarbonisation of heating and also transport.	2022	Northern Ireland Executive					
Northern Ireland: Rural-led Energy Transition (RULET) pilot	Energy, Power, Heat and Buildings	CO_2	To reduce or eliminate the risk of low-income households lagging behind in the energy transition.	Research	Implemented Commenced Winter 2021, and monitoring will continue over the next two heating seasons	A joint initiative between the Northern Ireland Housing Executive and Ulster University and an EU Funded project. Its focus is considering combining domestic electrical heating systems with energy storage, and determining if this could be delivered and operated at scale. Also considering combining high levels of wind penetration into the electric network. Northern Ireland is renowned for its wind energy, and when dispatched down, i.e, when generation exceeds demand, has the potential to benefit low income householders. In 2020 15% of available wind energy with a retail value of over £80m.	2021	Northern Ireland Executive					
Northern Ireland: Building Regulations Northern Ireland- Part F (Conservation of fuel and power) and related parts	Energy, other sectors and cross cutting	CO_2, CH_3 and NOx	Phased plan of uplifts with a view to reducing operational emissions from newly erected buildings by 75-80% by 2026/27. At this point new buildings should be 'net zero ready' with net zero operational emissions achieved over time, as the electrical grid decarbonises.	Regulatory	Phase 1 implemented to come into effect 30 June 2022. Subsequent phases are in planning stages	As an interim step to move towards net zero for 2050, phase 1 provides an uplift to new build standards to take effect from June 2022. A phase 2 discussion exercise will gather evidence, including whether an early introduction of requirements based on low carbon heating could be feasible for a phase 3 uplift in 2023. Full implementation of 'net zero ready' is anticipated no later than in 2026/27. These later phases will also take into account developments in other administrations to address standards for work to existing buildings and in related areas, such as ventilation, overheating and, potentially, in collaboration with the Department for Infrastructure, electric vehicle charge-point provisions. We will, meanwhile, continue to remain alert to emerging developments in areas such as embodied carbon, fuel price assumptions and grid impacts.	2022	Northern Ireland Executive					

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Northern Ireland: Affordable Warmth Scheme (Department for Communities)	Those most at risk of fuel poverty in the owner occupied and private rented sectors	CO_2 emissions	Primarily a fuel poverty scheme which offers energy efficiency measures to improve the thermal comfort of a property.	Grant-based scheme as per the Domestic Energy Efficiency Grants Regulations (Northern Ireland) 2009 as amended 2014, 2016 and 2021	Implemented	The Affordable Warmth Scheme is the NI Executive's main fuel poverty scheme. It is a grant based scheme delivered in partnership between the Department for Communites, local Councils and the Northern Ireland Housing Executive. It has a targeted approach, aimed at private sector households most at risk of fuel poverty with an annual household income of less than £23,000. It provides a range of energy efficiency measures to improve thermal comfort.	2015	Northern Ireland Executive					
Northern Ireland: Boiler Replacement Scheme (Department for Communities)	Those with old and inefficient boilers in the owner occupied sector.	CO_2 emissions	Primarily a scheme which offers an energy efficiency measure to improve the thermal comfort of a property	Grant-based scheme as per the Domestic Energy Efficiency Grants Regulations (Northern Ireland) 2009 as amended 2014, 2016 and 2021	Implemented	The Boiler Replacement Scheme is a grant based scheme funded by the Department for Communities and administered by the Northern Ireland Housing Executive. It assists privately owned households who meet the eligibility criteria to replace old and inefficient boilers that are more than 15 years old.	2012	Northern Ireland Executive					
Northern Ireland: Domestic Energy Efficiency scheme	Residential	CO_2, (CH_4, N_2O)	To improve the energy efficiency of building fabric across the Northern Ireland housing stock	Economic	Planned. Scheme is at the planning/ development stage with commitment to launch a pilot scheme in 2022.	Improving the energy efficiency of the Northern Ireland housing stock will seek to provide energy savings for households and support the reduction of carbon emissions.	2022	Northern Ireland Executive					
Northern Ireland: Housing Supply Strategy	Other sectors (Housing – residential and retrofit)	CO_2	The Strategy will provide a framework that can create better places to live and stronger communities through a housing system that can deliver up to 150,000 homes over its 15 year lifetime, if required.	Economic, Other	Planned. The draft Strategy is currently being reviewed following a public consultation exercise.	The overarching vision for the Strategy is that "Everybody has access to a good quality, affordable and sustainable home that is appropriate for their needs and is located within a thriving and inclusive community". The vision is supported by 5 key objectives and 16 long term policy commitments.		Northern Ireland Executive					
Northern Ireland: 300 Unit Low Carbon Programme	Housing, energy, power	CO_2	To deliver a thermal improvement and decarbonised heating programme.	Information, Economic, Other	Planned. The strategy is due to commence in winter 2022/23, complete installations by winter 2023/24 and monitor till late 2024.	The Housing Executive will collaborate with its sponsoring department Department for Communities, industry, academia, other government bodies, the regulator and householders to deliver a thermal improvement programme focused on improved energy efficiency measures, low carbon heating, electric tariff changes and improved householder education to effect behaviour change.	2022/23	Northern Ireland Executive					

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Northern Ireland: Housing Executive New Build Pilot	Housing, Public, Local	CO_2	The scheme will explore if a building can produce net zero greenhouse gas emissions in use, known as 'zero carbon in use'. The standards explored in the pilot will far exceed current building regulations. The objective is that building to high energy standards now will futureproof new builds.	Research, Economic, Other	Adopted	The Housing Executive is undertaking the construction of a small development of new social housing units in North Belfast. This scheme will provide 6 semi-detached dwellings (2 bed, 3 person) and will incorporate Modern Methods of Construction (MMC), ultra-low energy building techniques and mechanical ventilation and heat recovery system with integral heat pump.		Northern Ireland Executive					
Northern Ireland: Hybrid Working Policy	Transport	Carbon dioxide (CO_2) and nitrous oxide (N_{20})	To enable departments to achieve their carbon reduction objectives with the associated environmental benefits. The contributing factors are expected to be reduced daily commuting and less staff travel.	Environmental	Adopted. A Hybrid Working policy will be implemented across the Northern Ireland Civil Service from June 2022 after the Covid guidance on working from home was lifted on 6th June 2022.	The COVID-19 response has demonstrated Northern Ireland Civil Service ' ability to successfully adapt and innovate and effective new ways of working and communicating have emerged.This will facilitate the majority of employees (c.75%) to adopt a mix of workplace-based and remote/home working. The Service is also proposing to launch in April 2022 a number of Connect2 hubs that will provide drop-in facilities in key locations for staff right across the Northern Ireland Civil Service. One of the many advantages of these new ways of working is that it enables departments to achieve their carbon reduction objectives with the associated environmental benefits. The contributing factors are expected to be reduced daily commuting and less staff travel.	Will be implemented in June 2022 after the Covid guidance on working from home has lifted.	Northern Ireland Executive					
Northern Ireland: Transport Decarbonisation	Transport and Energy	Carbon dioxide (CO_2) and nitrous oxide (N_{20})	Reducing the carbon impact of Transport by facilitating modal shift	Economic and Regulatory	Implemented	Hierarchical approach to achieving modal switch to walking, wheeling and cycling, investment in clean public transport, park and ride sites and the provision of infrastructure to support the electrification of transport.	ongoing	Northern Ireland Executive					
Northern Ireland: Waste & Circular Economy Package Targets	Waste	Methane, Carbon	Introduction of new recycling targets	Legislation	Ongoing	Incrementally increasing recycling targets (65% for municipal waste by 2035 with interim targets of 55% by 2025 and 60% by 2030). A target of a maximum of 10% of municipal waste going to landfill by 2035; and minimum requirements for extended producer responsibility schemes including shifting collection, recycling and disposal costs from the end user or councils to manufacturers and brand owners	2020	Northern Ireland Executive					
Northern Ireland: Household Waste Collaborative Change Programme	Waste	Methane, Carbon	To improve the quality and quantity of household recycling	Fiscal	Implemented. Fund is currently undergoing a review to ensure it is future proofed against waste policy direction	it provides assistance to Councils to transform kerbside recycling and Household Waste Recycling Centres infrastructure and services	2019	Northern Ireland Executive					

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Northern Ireland: Waste Prevention Programme	Waste	Methane, Carbon	To increase awareness of waste prevention	Information, Research	Implemented	Key waste prevention measures that have been undertaken include; the carrier bag levy and Prosperity Agreements as well as the extensive waste prevention initiatives undertaken by the third sector through Department of Agriculture, Environment and Rural Affairs funded projects.	2020	Northern Ireland Executive					
Northern Ireland: Climate Change Act (Northern Ireland) 2022 : Recycling target of 70%	Waste	Methane, Carbon	To increase recycling	Legislation	Implemented. Received Royal Assent 6 June https://www.legislation.gov.uk/nia/2022/31/contents/enacted	Climate change legislation for Northern Ireland which includes a 2050 Net Zero target for Northern Ireland.	Royal Assent June 2022	Northern Ireland Executive					
Northern Ireland: Forests for Our Future afforestation framework.	Agriculture and Forestry/ LULUCF	CO_2 and CH_4 (by substitution)	Develop an afforestation programme to take forward Forests for Our Future commitments for 9,000 hectares of new woodland by 2030 contributing to forest strategy aim to achieve 12% forest cover by 2050.	Grant Aid	Implemented. Year 3 of a 10 year programme	Establishment of new woodland on land controlled by private individuals, businesses, charities and Councils	2020	Northern Ireland Executive					
Northern Ireland: Northern Ireland Peatland Strategy	Agriculture, Forestry/ LULUCF	CO_2	The Vision of the Strategy is that our peatland habitats in Northern Ireland are protected, enhanced and managed sustainably, are recognised for their intrinsic value and for the benefits they provide – for wildlife, people and climate.	Voluntary Agreement, Regulatory	Planned. Draft Policy at this stage. Publication anticipated in 2022	Framework for conservation and restoration of peatlands in Northern Ireland.	2022	Northern Ireland Executive					
Northern Ireland: Soil Nutrient Health Scheme (SNHS)	Agriculture / LULUCF	CO_2, N_2O, CH_4.	To provide verifiable Northern Ireland baselines of: 1. Soil nutrient levels at field scale; 2. Estimates of carbon stored in soils & above ground biomass in the farmed landscape; 3. LiDAR based field & catchment level mapping of run-off risk areas.	Scheme provides mixture of instruments including information provision (to farmers & government), education (farmer training) and research (on soil carbon & phosphorus).	Implemented. The Soil Nutrient Health Scheme opened in March 2022 and will roll out in stages across Northern Ireland over the four year period 2022/23 to 2025/26. It is anticipated the scheme will cost up to £45m (depending on uptake) over the four years.	A new initiative aimed at verifiably baselining soil nutrient levels and estimating farm carbon stocks, right across Northern Ireland (NI). Farmers will have all their fields soil sampled and analysed by contractors. Results will be provided along with training, enabling farmers to match nutrient applications to crop need, thereby increasing efficiency, reducing excess nutrient run-off to watercourses and improving farm economic and environmental sustainability. Baseline carbon stocks in Northern Ireland's soils and above ground biomass (AGB) will be estimated at farm level for farmers and catchment/Northern Ireland scale for government. A full LiDAR scan of Northern Ireland will be carried out to assist in estimating AGB carbon stocks and field scale mapping of surface run-off risk areas. Additionally, baselines established through the Soil Nutrient Health Scheme will facilitate future monitoring and measurement of progress in managing nutrients and carbon, by farmers (at farm level) and government (at catchment / Northern Ireland wide level).	2022	Northern Ireland Executive					

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Northern Ireland: The Fluorinated Greenhouse Gases Regulations (Northern Ireland) 2015 – https://www.legislation.gov.uk/nisr/2015/425/contents/made	F-Gases	F-gases – hydrofluorocarbons ("HFCs"), perfluorocarbons ("PFCs") and sulphur hexafluoride ("SF6")	To bring into Northern Ireland law the requirements of European Union laws on F-gases, to limit Northern Ireland emissions of greenhouse gases which exacerbate climate change.	Regulatory	Implemented. In place, but future European Union laws are anticipated in 2023/24, requiring legislative updates.	Northern Ireland is required to continue adhering to the requirements of future European Union laws on both F-gases and ODS because of the terms of the Northern Ireland Protocol.	2009	Northern Ireland Executive					
Northern Ireland: Ozone Depleting Substances ("ODS")	F Gases and ODS	chlorofluorocarbons (“CFCs”), halons, carbon tetrachloride, 1,1,1-Trichloroethane (methyl chloroform), Hydrochlorofluorocarbons (HCFCs)	To bring into Northern Ireland law the requirements of European Union laws on Ozone Depleting Substances, to help limit Northern Ireland's emissions of ODS, which can deplete the ozone layer.	Regulatory	Implemented. In place, but future European Union laws are anticipated in 2023/24, requiring legislative updates.	Northern Ireland is required to continue adhering to the requirements of future European Union laws on both F-gases and ODS because of the terms of the Northern Ireland Protocol.	2003	Northern Ireland Executive					
Northern Ireland: Carbon literacy for Northern Ireland	Education, Local Action	Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), F-Gases	The Carbon Literacy Project aims to raise awareness of climate change and the impacts of everyday actions on an individual, community and organisational basis to encourage action to tackle climate change.	Education	Implemented	In December 2020, the Department of Agriculture Environment and Rural Affairs (DAERA) initiated a project with Keep Northern Ireland Beautiful (KNIB) to develop and deliver carbon literacy training specific to Northern Ireland. building upon the pre-existing Carbon Literacy Project ran in other parts of the UK. Accredited carbon literacy courses are being delivered to teachers across Northern Ireland utilising the existing eco-schools network. It is also being made available to youth and community leaders via a train the trainer approach. Work has also been undertaken to develop a new Open College Network (OCN) Award in reducing carbon footprints through environmental action. Northern Ireland Housing Executive have also joined the partnership to provide awareness of the 2020/21 Schools' Energy Awareness Programme (SEEAP), including a ‘Design an Eco-hero Competition'.	2021	Northern Ireland Executive					

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Northern Ireland: Climate Action Programme	Implemented	CO_2	Aims to help participating businesses build capacity, assist with net-zero planning and progress reporting to enable delivery of immediate and long-term climate action.	Policy	Implemented	The programme will involve 15 larger established businesses (Champions) engaging with SMEs (businesses employing less than 500) in their value chain and supporting them on a journey to net zero, with funding obtained from UK Community Renewal Fund by Business in the Community. It will also support increasing the number of businesses that have signed Climate Action pledges and is due for completion in June 2022. It is based on an initial micro pilot, co-developed by Business in the Community and Danske Bank, which was the first initiative of its kind in the UK or Ireland, and was designed to help companies understand their environmental impact and work towards implementing sustainable business strategies.	2021	Northern Ireland Executive					
Northern Ireland: Department of Justice Sustainability Strategy	Cross-cutting : Travel & Transport, Energy and Carbon emissions, Water management, waste management, procurement, biodiversity and ecosystem, corporate social responsibility	CO_2	To ensure that the Department is suffiently addressing it's role within the current climate emergency.	Policy	Planned. The DoJ Sustainability Strategy is currently under development. It is anticipated that the Strategy will be submitted to the DoJ Board for approval in late spring 2022.	Sustainability strategy covering: Travel & Transport, Energy & Carbon Emisssions(non-travel), Water Management, Waste Management, Procurement, Biodiversity & Ecosystem, Corporate Social Responsibility.	2022	Northern Ireland Executive					
Northern Ireland: To reduce the Governments Carbon footprint from Metered Electricity at no additional cost	Energy – Renewable Energy Sector, Public	CO_2	The current contract is sourced from 100% renewable electricity. This contract commenced on 1 April 2020 and expires 31 March 2022. The replacement collaborative contract commences on 1 April 2022, through to 2025. It will continue to be sourced from 100% renewable electricity.	Economic	Implemented. This is an established approach which is now considered business as usual.	This is curently being implemented as best practice but becomes regulatory under the terms of the Climate Change (Northern Ireland) Act 2022, which received Royal Assent on 6 June 2022	Apr-20	Northern Ireland Executive					

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Northern Ireland: Scoring Social Value	Supply chain sectors involved in delivering government construction projects and outsourced services.	CO_2	The Executive has implemented a policy to enhance the delivery of social value from public procurement. The Policy includes themes and outcomes to target zero carbon in supply chains. From 1 June 2022 all public sector tenders for works and services must include a minimum weight of 10% for social value in assessing and awarding contracts. This 10% minimum will apply to contracts for services and works above the threshold where the Procurement Regulations apply. Measures, impacts and outcomes will be reported annually. The first report will be published in June 2023.	Policy	Implemented	The social value policy targets procurement strategies and specifications that: - Deliver additional environmental benefits in the performance of the contract including working towards net zero greenhouse gas emissions. - contract specifications that support environmental protection and improvement. - supply chains that minimise carbon footprint and emissions. - companies employ low or zero-carbon practices and/or materials. - assessing and minimising embodied carbon.	Jun-22	Northern Ireland Executive					
Northern Ireland: Department Of Health-Infrastructure Investment Directorate – Invest to Save Scheme	Public	CO_2	Invest to save schemes to upgrade heating and lighting sytems, including Electric Vehicle charging points to deliver carbon emissions savings across the Health Estate, especially in Health trusts.	Economic	Implemented	Upgrade heating and lighting systems, including Electric Vehicle charging points to deliver carbon emissions savings across the Health Estate, especially in Health trusts.	2020	Northern Ireland Executive					
Northern Ireland: Department for the Economy-Strategic Investment Board Energy Efficiency Scheme	Public	CO_2	Promoting energy efficiency across the Health estate which will make a contribution to the delivery of the central government emissions reduction	Economic	Implemented	Energy efficiency schemes being carried out to deliver carbon emissions savings across public services including the Health Estate, especially in hospitals	2021	Northern Ireland Executive					
Northern Ireland: A Long Term Water Strategy for Northern Ireland (2015-2040)	Cross -cutting	CO_2	Cross-Departmental strategy contains a long-term vision to manage flood risk and drainage in a sustainable manner, which will help to address the future risks from climate change	Regulatory and Economic	Implemented	Development of future policy on the introduction of more sustainable, environmentally friendly and green solutions to managing our water. Northern Ireland Water is undertaking an innovative Oxygen and Hydrogen Demonstrator Project that will deploy a state-of-the-art one megawatt electrolyser at wastewater treatment works; use of this technology can assist in addressing the climate emergency by cutting carbon emissions.	2016	Northern Ireland Executive					

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Northern Ireland: Northern Ireland Investment Fund	Energy, waste/waste management	CO_2	To contribute to economic regeneration through supporting private sector led development in key sectors of the Northern Ireland economy.	Economic	Implemented. Fund introduced in 2017. Initial size of Fund £100m. Around £80m has been invested to date, which includes approximately £25m recycled investments. Fund is due to last for 15 years. The Fund has yet to make its first investment in the Green space.	The Fund exists to provide debt or equity support to provide sector led developments in a number of key economic sectors within the Northern Ireland economy. The overarching Investment Strategy identifies the sectors which are eligible for support and includes energy efficiency, energy storage and generation projects, including heat networks, non-domestic and domestic energy efficiency, photovoltaic, wind and hydro energy generation and waste to energy projects	2017	Northern Ireland Executive					
Northern Ireland: Energy Efficiency in Social Housing Project	Energy, Homes	CO_2	The Energy Efficiency Social housing project is a multi-million pound investment programme to improve the energy performance of almost 2700 of its homes	Fiscal, Economic, research, other	Planned. The 6 year €45million programme is expected to be completed by September 2023.	This investment programme was to improve the energy performance of almost 1,900 homes. €23 million has been secured from the European Regional Development Fund (ERDF) through its Investment for Growth and Jobs Programme for NI 2014-2020, and a further €22 million invested by the NI Housing Executive. Several schemes have already been completed or are currently underway. The schemes include: no fines properties improving thermal efficiency in aluminium bungalows through the provision of external wall cladding, new double glazing and improved insulation measures.	2017	Northern Ireland Housing Executive					
Northern Ireland: Northern Ireland Housing Executive's Sustainable Development Strategy and Action Plan	Housing, transport and energy	CO_2	To secure a sustainable future, as a Strategic Housing Authority and as Northern Ireland's largest landlord. Policy in development to support a Vision of Green Growth and Healthier Households.	Regulatory, Fiscal, Economic	Planned. 5 year Action Plan, Guided by Policy, including the Northern Ireland Energy Strategy 'Path to Net Zero Energy'	It provides a framework for tackling environmental and social challenges over the next five years, including the climate emergency. This Strategy was approved by the Housing Executive's Board in March 2022 and will be launched publicly later in 2022 with a long term end-state to retrofit Housing Executive stock, and to support the social housing development programme to support sustainable communities. The social and economic effects of this investment will be long-lasting, create jobs and support innovation across the industry. Most importantly, it will reduce fuel poverty, improve energy resilience, and help tackle climate change.	Policy in development	Northern Ireland Housing Executive					

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An accessible and digitised energy system where data provides value for consumers and system operation	Energy	CO_2	Carry out a cost benefit analysis of electricity and gas smart meters and other technologies in order to access half-hourly and daily consumption information	Information, Research	Planned	Data is at the heart of our future energy system. Gathering better quality data, and enabling appropriate access to it, will provide important benefits for consumers, network operation and market participants. It will also enable greater participation in the electricity system. Safely accessing this data will require the introduction of a range of technologies, regulation and consumer protection. Our approach to a digitised system will focus on consumer data, system data and accessibility and smart technologies.	TBD	Department for Economy and Utilty Regulator.					
Decentralised solutions that enable people and communities to be active participants in the energy transition	Energy	CO_2	Adopt policies that facilitate active consumers and energy communities	Regulatory, economic, information and education.	Policy development is in its early stage.	If individuals and communities have an active stake in the energy transition they can also access more of the value generated within the energy system and be rewarded for the services that they may provide such as demand flexibility or data. We will develop enabling frameworks for both active consumers and Citizen Energy Communities. These frameworks will enable them to engage in a range of energy services including generation, supply, consumption and aggregation and consider what financial support or access to new revenue streams can be provided.	TBD	Department for Economy and Utilty Regulator.					
The Path to Net Zero Energy Strategy	Energy	CO_2	Net zero carbon and affordable energy. - Placing the consumer at the heart of energy future - Grow the green economy through innovation, support and focusing on competitive strengths. - Set clear targets, standards and regulations that drive improvements in energy efficiency including consumer behaviour, supporting investment in building improvements. - Replace fossil fuels with renewable energy supported by sustainable renewable imports and using these to decarbonise heat, power and transport. - Create a flexible, resilient and integrated energy system that integrates renewables across heat, power and transport, creating value for consumers and enhancing security of supply.	Broad range of tools, including economic, fiscal, voluntary agreement, regulatory, information, education, research	Under implementation and at an early stage	Net zero carbon energy means that overall greenhouse gas emissions from energy are zero. It means reducing emissions from the energy we use for transport, electricity generation, industry and our build environment, as well as removing any remaining emissions with schemes that offset an equivalent amount from the atmosphere. We will improve our evidence base from all energy sectors to support monitoring of our policy impact. - Affordable energy – Energy provides value in enabling our comfort, leisure and basic needs. However, affordable energy can mean different things to different groups of consumers, for example energy bills can be a major concern for households on lower incomes, or help to ensure that businesses can be competitive in changing markets. We will review the drivers and definitions of energy affordability. This will include the balance of upfront investment and long-term energy bills as well as data development. Throuhg sustained engagement we will assess their impacts on our identified consumer 'Cross-Cutting Measures'	2022	This is a wide ranging strategy which will involve input from across the Northern Ireland Civil Service, local government, ALB's, academic institutions, businesses and consumers and others.					

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Scotland: Supporting the development of a wide range of renewable technologies	Energy	CO_2, CH_4, N_2O	The electricity system will be powered by a high penetration of renewables, aided by a range of flexible and responsive technologies.	Research	Implemented.	The Scottish Governnment continues to maintain its focus on tackling barriers to development of renewables, such as aircraft and seismological radar issues, working in partnership with the industry and other stakeholders.	2018	Scottish Government					
Scotland: Supporting improvements to electricity generation and network asset management that encourage the deployment and viability of renewables projects in Scotland.	Energy	CO_2, CH_4, N_2O	The electricity system will be powered by a high penetration of renewables, aided by a range of flexible and responsive technologies.	Other	Implemented.	The Scottish Government supports the development of technologies which can deliver sustainable security of supply to the electricity sector in Scotland and ensure that Scottish generators and flexibility providers can access revenue streams to support investments	2018	Scottish Government					
Scotland: Introduce new requirements for developers to include supply chain commitments when applying to the ScotWind leasing process run by Crown Estate Scotland	Energy	CO_2, CH_4, N_2O	Scotland secures maximum economic benefit from the continued investment and growth in electricity generation capacity and support for the new and innovative technologies which will deliver decarbonisation goals.	Other	Implemented.	Crown Estate Scotland announced the outcome of its application process for ScotWind Leasing, the first Scottish offshore wind leasing round in over a decade, in January 2022. As part of the bidding process, all applications had to submit a Supply Chain Development Statement outlining how they will deliver benefits to Scotland. The commitment made by developers secured investment in the Scottish supply chain of at least £1 billion for every gigawatt generated via ScotWind projects.	2022	Scottish Government					
Scotland: Develop and publish a Hydrogen Policy Statement and Hydrogen Action Plan	Energy	CO_2, CH_4, N_2O	The electricity system will be powered by a high penetration of renewables, aided by a range of flexible and responsive technologies	Other	Implemented	The Scottish Government's Hydrogen Policy Statement (December 2020) sets out Scotland's support for a strategic approach to the development of the hydrogen economy in Scotland, setting a 2030 5GW production capacity ambition, while the draft Hydrogen Action Plan (November 2021) articulates the actions that will be taken over the next five years.	2020	Scottish Government					
Scotland: Energy Transition Fund (ETF)	Industry	CO_2, CH_4, N_2O	As above.	Economic	Implemented.	Will provide support for a sustainable, secure and inclusive energy transition in the North East of Scotland. It is planned to invest £75m over a five year period to 2024/5.	2020	Scottish Government					
Scotland: Scottish Industrial Energy Transformation Fund (SIETF)	Industry	CO_2, CH_4, N_2O	As above.	Economic	Implemented	The SIETF provides grant funding to reduce energy costs and emissions through increased energy efficiency. Decisions on funding awards are weighted towards energy and/or carbon savings, therefore it is primarily aimed at businesses with high energy use.	2020	Scottish Government					

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Scotland: CO_2 Utilisation Challenge Fund	Industry	CO_2	Technologies critical to further industrial emissions reduction (such as carbon capture and storage and production and injection of hydrogen into the gas grid) will be operating at commercial scale by 2030.	Economic	Implemented	The CO_2 Utilisation Challenge Fund will help businesses and organisations develop and commercialise the technology, which involves harnessing and converting CO_2 and using it to produce products such as synthetic fuels and proteins for use in aquaculture. The Fund will be administered by Scottish Enterprise and match-funded by industry, meaning over £10 million could be invested in the initiative over its two-year lifetime.	2022	Scottish Government					
Scotland: Energy Efficient Scotland Delivery Schemes	Energy	CO_2, CH_4, N_2O	The heat supply to Scotland's homes and non-domestic buildings will be very substantially decarbonised, with high penetration rates of renewable and zero emissions heating and, Scotland's homes and buildings will be highly energy efficient, with all buildings upgraded where it is appropriate to do so, and new buildings achieving ultra-high levels of fabric efficiency	Economic	Implemented	Area Based Schemes provide funding for whole house retrofits, zero/ low carbon heating and microgeneration. Through Warmer Homes Scotland, the Scottish Government has made available renewable and micro generation heat measures and new insulation measures. Grant funding has also been increased to incentivise uptake on more expensive low carbon and renewable measures	2018	Scottish Government					
Scotland: Low Carbon Infrastructure Transition Programme (LCITP)	Energy	CO_2, CH_4, N_2O	As above.	Economic	Implemented	The LCITP supports investment in decarbonisation of business and the public sector. Launched in September 2020 the Green Recovery: Low Carbon Energy Project Capital Funding Invitation targeted £50 million of support for projects that demonstrate innovative low carbon heat solutions for buildings.	2015	Scottish Government					
Scotland: Develop the capacity of the electric vehicle charging network	Transport	CO_2, CH_4, N_2O	To phase out the need for new petrol and diesel cars and vans by 2030	Economic via funding, regulatory via ultra low emission zones	Implemented	Phase out petrol and diesel cars and vans by encouraging electric vehicle uptake and actions such as switching the public sector fleet. Draft vision on Scotland public charging network presented to Scottish Parliament, funding announced	2020	Scottish Government, Energy Saving Trust, public bodies, Scottish Enterprise, Scottish Cities Alliance					
Scotland: Majority of new buses purchases from 2024 are zero-emission	Transport	CO_2, CH_4, N_2O	To reduce emissions from buses by introducing significantly more zero-emission buses	Voluntary agreement, information, education, financial support and convening collaboration	Implemented	Established a Bus Decarbonisation Taskforce to co-design a pathway to zero emission buses, and developed Scotland's subsidy model to phase out as the market for zero emission buses becomes self-sustaining. Several large operators have committed to transition by particular dates, range of guides published, £113 million Scottish Government support awarded	2020	Scottish Government, local government, energy sector, bus operating sector, finance sector and enegy sector all working in collaboration					

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Scotland: Decarbonised passenger rail services by 2035	Transport	CO_2, CH_4, N_2O	To make Scotland's rail passenger services carbon free by 2035 through increased electrification of the network and through alternative traction	Economic and regulatory through Scottish government funding	Adopted	Removal of diesel passenger trains and replacement with electric, battery or hydrogen trains by 2035. Development and delivery of rolling programme of electrification ongoing, with construction on some rail routes starting in 2023/4 and others in latter stages of business case development. International rail cluster has been established, with 900 members.	2020	Scottish Government, Network Rail, Scottish Engineering					
Scotland: Zero Emission heavy duty vehicle programme	Transport	CO_2, CH_4, N_2O	To reduce emissions in the freight sector, and remove the need for new petrol and diesel heavy vehicles by 2035	Other	Planned	Phase out petrol and diesel heavy vehicles by encouraging uptake of zero emission vehicles, including public sector fleet heavy duty vehicles Reduce emissions from HGVs and HDVs by transitioning to zero emission vehicles. Project group established to connect activity with energy suppliers, manufacturers, finance etc. to incentivise/facilitate transition as technology permits	Preparatory work is underway, secotral analysis research etc. Transition, particularly in respect of HGVs, is largely dependent on manufacturers developing a viable alternative to diesel	Scottish Government, vehicle manufacturers, local authorities, logistics sector, finance sector and energy sector					
Scotland: To create the world's first zero emission aviation	Transport	CO_2, CH_4, N_2O	To decarbonise scheduled passenger flights within Scotland by 2040	Other	Implemented	Highlands and Islands Airports Limited, in partnership with a number of other organisations, have created a sustainable aviation test environment at Kirkwall Airport on Orkney. Ampaire successfully demonstrated their hybrid-electric aircraft there in August 2021, flying between Wick and Kirkwall.	2021	Scottish Government					
Scotland: Vessel replacement programme	Transport	CO_2, CH_4, N_2O	To increase proportion of low emission ferries in Scottish Government ownership to 30% by 2032	Other	Implemented	Continue to examine the scope for utilising hybrid and low carbon energy sources in the public sector marine fleet as part of Scottish Government's vessel replacement programme.	2021	Scottish Government					
Scotland: Bring forward Scottish Agriculture Bill	Agriculture	CO_2, CH_4, N_2O	A more productive, sustainable agriculture sector that significantly contributes towards delivering Scotland's climate change, and wider environmental, outcomes through an increased uptake of climate mitigation measures by farmers, crofters, land managers and other primary food producers	Regulatory	Planned	A new Scottish Agriculture Bill will be brought forward in 2023 to provide a replacement for the Common Agricultural Policy (CAP).	A consultation will run in 2022 to inform the introduction of a Scottish Agriculture Bill in 2023.	Scottish Government and local government working in partnership					

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									2020	*2025*	*2030*	*2035*	*2040*
Scotland: Reducing Scotland's emissions from nitrogen fertiliser.	Agriculture	N_2O	Nitrogen emissions, including from nitrogen fertiliser, will have fallen through a combination of improved understanding, efficiencies and improved soil condition	Regulatory	Implemented	The Climate Change (Nitrogen Balance Sheet) (Scotland) Regulations 2022 came into force on 11 March 2022. The Scottish Nitrogen Balance Sheet will be reviewed and updated on an annual basis from 2023 onwards.	The Climate Change (Nitrogen Balance Sheet) (Scotland) Regulations 2022 came into force on 11 March 2022. The Scottish Nitrogen Balance Sheet will be reviewed and updated on an annual basis from 2023 onwards.	Scottish Government					
Scotland: Encourage improved emissions intensity from red meat and dairy	Agriculture	CO_2, CH_4, N_2O	Emissions from red meat and dairy will be reduced through improved emissions intensity	Other	Implemented	As part of the National Test Programme (announced October 2021), Scotland has put in place livestock data and performance systems to support collation of data and performance information for every cattle farmer.	The National Test Programme is expected to launch in Spring 2022. Initial evaluations for maternal performance in Beef Efficiency Scheme (BES) born animals may be available in Spring 2022.	Scottish Government					
Scotland: Improve the use and storage of manure and slurry	Agriculture	CH_4, N_2O	Emissions will be reduced from the use and storage of manure and slurry	Regulatory	Implemented	Amendments have been made to the Water Environment (Controlled Activities) (Scotland) Regulations 2011 which include improving controls on the storage of slurry and digestate to reduce leakage, and more targeted spreading to maximise the nutrient benefit and reduce emissions.The Water Environment (Controlled Activities)(Scotland) Amendment Regulations 2021 came into force from 1 January 2022.	Regulations came into force from 1 January 2022	Scottish Government and local government working in partnership					
Scotland: Explore how to increase planting of trees and hedgerows.	Agriculture, Forestry	CO_2	Carbon sequestration and existing carbon stores on agricultural land will help to increase and maintain Scotland's carbon sink	Research/ information	Implemented	The Scottish Government and Scottish Forestry launched the Integrating Trees Network to raise awareness of the multiple benefits that planting trees can bring to agricultural businesses. The Scottish Government also committed (July 2020) an additional £1.5 million to further support the integration of small woodlands on farmers and crofts across Scotland.	2020	Scottish Government					

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									2020	*2025*	*2030*	*2035*	*2040*
Scotland: Enable at least 20,000 hectares of peatland restoration per year	LULUCF	CO_2, CH_4, N_2O	To enhance the contribution of peatland to carbon storage with an increase in the annual rate of peatland restoration	Economic	Implemented	Scottish Government will provide grant funding to support eligible land managers to deliver peatland restoration. The Scottish Government will undertake research to inform where restoration can deliver the greatest emission savings per hectare.	2018	Scottish Government					
Scotland: Pilot Regional Land Use Partnerships	LULUCF	CO_2, CH_4, N_2O	To maximise the potential of land to help achieve net zero.	Research	Implemented	The pilots will begin development of their Regional Land Use Frameworks, which will be finalised by end-2023.	2021	Scottish Government					
Scotland: End landfilling of biodegradable municipal waste by 2025, reduce the percentage of all waste sent to landfill to 5% by 2025 and recycle 70% of all waste by 2025.	Waste management/ waste	CH_4	A reduction in waste sent to landfill	Economic	Implemented	Route Map to reduce waste, and meet 2025 targets and beyond, has been under development, and a formal consultation will be published in May 2022. £70m Recycling Improvement Fund was launched in March 2021.	2021	Scottish Government and local government working in partnership					
Scotland: Accelerate Landfill Gas Capture and Landfill Legacy Management	Waste management/ waste	CH_4 (with some CO_2 if captured CH_4 is burned)	A reduction in emissions from closed landfill sites	Regulatory	Planned	Scottish Government will work with SEPA and key industry partners to scale up the existing landfill gas capture programme to mitigate effects of landfill and environmental impact of closed landfill sites	2022	Scottish Government					
Scotland: Lead delivery of Scotland's landmark Food Waste Reduction Action Plan	Waste management/ waste	CH_4, N_2O	A reduction in food waste	Economic.	Implemented	Scottish Government provided £200,000 of funding in 21/22 for FareShare's Surplus with Purpose scheme to support food redistribution. The programme works with farmers, growers and manufacturers to cover the additional costs involved with getting their unsold good-to-eat food	2019	Scottish Government					
Scotland: Measures to encourage more sustainable consumer purchasing.	Waste management/ waste	CO_2, CH_4, N_2O, HFC, PFC, NF3, SF6	To reduce waste and establish a more circular economy, where goods and materials are kept in use for longer	Regulatory	Implemented	Regulations to increase carrier bag charge passed by Parliament and came into force on 1 April 2021. Further work is underway to consult on a minimum charge on single-use disposable beverage containers.	2021	Scottish Government and local government working in partnership					

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Scotland: Climate Emergency Skills Action Plan (CESAP)	Energy transition (including oil and gas, on and offshore wind, hydrogen, electricity, carbon capture and storage), Construction (including the retrofitting of housing and non-residential properties), Transport (including road transport, railways, domestic aviation, shipping and aircraft support vehicles), Manufacturing (with a focus on engineering), Agriculture and land use management (including forestry).	CO_2, CH_4, N_2O, HFC, PFC, NF3, SF8	To create a future workforce that can support a Just Transition to a net zero economy.	Economic	Under implementation from 2020-2025. Funds for 22/23 – £3m within skills budget to deliver CESAP, including Green Jobs Workforce Academy, Green Jobs Skills Hub and Heat in Buildings.	The Climate Emergency Skills Action Plan sets out the government's plan to maximise the transition to net-zero for Scotland, ensuring that Scotland's workforce has the skills required to make the transition to net-zero a just transition, fair and inclusive to all. It focuses on both immediate action as well as the longer-term systemic change that will need to take place by 2045. It sets out a clear direction for the changes needed in the skills system, and signals the role that industry, communities and individuals across Scotland will play in achieving this.	2020	Scottish Government, Skills Development Scotland, Scottish Funding Council, Local Authorities, Private and Third Sector Organisations, Industry and Independent Experts.					
Scotland: Green Jobs Workforce Academy	Construction and built environment, Transport, Nature, Energy, Engineering, Life and Chemical Sciences.	CO_2, CH_4, N_2O, HFC, PFC, NF3, SF9	To help people take a greener approach to their careers, from accessing training and learning new skills, to finding a new green job.	Economic	Under implementation from 2020-2025. Funds for 22/23 – £3m within skills budget to deliver CESAP, including Green Jobs Workforce Academy, Green Jobs Skills Hub and Heat in Buildings.	The new Green Jobs Workforce Academy, delivered by Skills Development Scotland, will provide green Integrated Careers and Skills Assessments enabling individuals to draw on digital and appropriate face-to-face support; access to short, sharp industry certified course provision aligned to economic investment; development of a Skills Wallet providing access to targeted funding to individuals not in employment, those in low paid or insecure jobs and those in higher level jobs with the potential to progress; targeted and co-designed upskilling and reskilling measures and commitment to engagement with individuals, employers and skills providers from design stage.	2021	Scottish Government, Skills Development Scotland, Scottish Funding Council, Local Authorities, Private and Third Sector Organisations, Industry and Independent Experts.					
Scotland: Green Jobs Fund	There are 5 main sectors: energy, transport, manufacturing, construction, agriculture and land use.	CO_2, CH_4, N_2O, HFC, PFC, NF3, SF10	To secure and create jobs by supporting businesses and their supply chains to develop and grow.	Economic	Under implementation from 2021-2026. £14m has been allocated in 2021/22. £23.5m is available for 22/23.	The Green Jobs Fund will invest £50 million through Scottish Enterprise, Highlands and Islands Enterprise, and South of Scotland Enterprise to help businesses which provide sustainable and/or low carbon products and services to develop, grow and create jobs. A further £50 million will be invested to support businesses and supply chains across a range of sectors – such as manufacturing, tech, and land based organisations – to take advantage of public and private investment in low carbon infrastructure, and the transition to a low carbon economy in Scotland and beyond, boosting green employment.	2021	Scottish Government, Scottish Enterprise, Highlands and Islands Enterprise, South of Scotland Enterprise.					

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Wales: Just Transition	All	Information not available	Over the period of Carbon Budget 2 we will work closely with our key partners such as the Well-being of Future Generations Office and Wales TUC to develop our evidence base and further improve our understanding around the transition.	Research	Implemented	We need to ensure the transition to a cleaner, fairer future in Wales is carefully managed. The changes driven by the need to decarbonise our economy will have impacts on industries, sectors of the workforce and socio-economic groups in different ways, depending on the pathways, policies and actions we choose. It could help to resolve existing inequalities, but there is a risk it could also exacerbate them.	2021	Welsh Government					
Wales: Nature Emergency	All	Information not available	Welsh Government will: • Act to tackle the drivers of biodiversity loss, including pollution, climate change and unsustainable consumption. • Restore the damage done to our protected sites, habitats and species, and future proof them against further decline. • Change behaviour at all levels to support more sustainable management of natural resources (e.g. Circular Economy).	Research, information, fiscal and regulatory	Implemented	This policy drives action across Welsh Government and also through Natural Resources Wales' area statements, which delivers the policy in a local context. Action to tackle biodiversity loss is taken across the Welsh Government, but rooted in the actions set out in the Nature Recovery Action Plan (NRAP), its National Biodiversity Strategy and Action plan.	2015	Welsh Government					
Wales: The Clean Air Plan	All	Information not available	We will ensure air quality, decarbonisation and natural resources policies are closely integrated to achieve complementary outcomes, consistent with our well-being goals and our Sustainable Development and Socio-Economic Duty.	Research	Implemented	Significant and irreversible changes to our climate and weather patterns are predicted to continue to develop over the next few decades, even as we reduce greenhouse gas emissions. Welsh overnment recognises and will proactively manage the nterdependency between decarbonisation and managing climate risk.	2020	Welsh Government					
Wales: A Circular Economy	All	Information not available	Our ambition is to implement systemic change in consumption emissions and to make the circular economy a reality. This is set out Beyond Recycling (2021), which states we will increase resource efficiency across all sectors, moving away from high carbon, non-recyclable materials and continuing to reduce waste. By 2050, we aim to use only our fair share of the planet's resources and have 100% recycling (zero waste). The global biodiversity and climate systems will be the key beneficiaries, but the environment of Wales itself will also benefit, for example, from reductions in direct plastic pollution.	Regulatory	Implemented	We must address the unsustainable consumption of resources as a root cause. Given 45% of global emissions come from the goods and products made and used every day, we need an approach which keeps resources in use and avoids all waste: a circular economy. This means accelerating actions to increase resource efficiency, re-use, repair and re-manufacture across all sectors of the economy, seeking to retain and increase good quality jobs across Wales, and where appropriate, substitute high carbon, energy intensive materials with sustainable ones, including natural materials.	2021	Welsh Government					

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Wales: A place based approach – Planning Policy Wales	All	Information not available	During Carbon Budget 2 Planning Policy Wales (PPW) will continue to facilitate decarbonisation through the planning system by providing an ambitious and comprehensive policy framework to address the causes and effects of climate change. It will help to shape development plans, including Future Wales, Strategic Development Plans and Local Development Plans, to ensure they are maximising the opportunities to decarbonise through a place based approach to sustainable development.	Regulatory, research	Implemented	Welsh Governments national planning policy is set out in Planning Policy Wales (PPW). It puts emphasis on people and places and ensures developments built today leave a legacy of well-designed, sustainable places which improve lives. PPW has a firm focus on 'placemaking' – an approach to development which ensures communities have all the services they need within easy reach and development is of high quality. This includes planning policies, which are designed to help Wales lower its carbon emissions at the same time as creating places where people can live well.	2018	Welsh Government					
Wales: Regional Economic Frameworks	All	Information not available	By 2025 all new City and Growth Deals will have carbon eduction at their core and will contain carbon reduction outputs as key metrics for monitoring and evaluation.	Regulatory, research	Implemented	Regional Economic Frameworks (REFs) are a key component of Welsh Governments approach to regional economic development and are being developed in partnership with key regional stakeholders, including local authorities. REFs are intended as a vehicle to help promote collaborative regional planning and delivery amongst public, private and third sector partners, setting a shared vision and a set of common economic development objectives in relation to their areas. Tackling climate change and decarbonisation is central to the ambitions of the REFs.	2021	Welsh Government					
Wales: Infrastructure Investment Strategy	All	Information not available	Welsh Governments new infrastructure investment strategy will be the successor to the current Wales Infrastructure Investment Plan, and will be published alongside our 2022-23 Draft Budget.	fiscal	Planned	The infrastructure investment strategy will set the framework for Welsh Government investment in infrastructure and will be designed around the four well being themes of economic, nvironmental, social and cultural well-being. At its heart will be the Welsh Government's response to the climate emergency, including the commitment to net zero and tackling the decline in biodiversity, and the strategy has been designed specifically to support the delivery of a net zero carbon economy.	2022	Welsh Government					
Wales: Skills Action Plan	All	Information not available	Welsh Government will develop a Net Zero Wales Skills Action Plan, which it intends to publish in spring 2022.	reseach, information	Planned	Government have an important part to play in ensuring that skills are a key enabler for net zero, promoting fair work alongside good and safe employment in social partnership with trade unions and employers.	2022	Welsh Government					
Wales: Innovation for a net zero economy	All	Information not available	Welsh Government will put the net zero challenge at the heart of a new Welsh Government Innovation Strategy, which it expects to launch in 2022.	reseach, information	Planned	This will sit alongside and complement the UK Government's innovation strategy launched in July 2021, which focuses on prosperity through innovation.	2022	Welsh Government					

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									2020	*2025*	*2030*	*2035*	*2040*
Wales: Digital	All	Information not available	The Digital Strategy for Wales can support our journey to net zero.	reseach, information	Implemented	The Digital Strategy for Wales will: › Support remote working, reducing the need for travel › Support public sector organisations in delivering efficient services designed around the citizen › Promoting the use of modern and efficient digital cloud infrastructure › Promoting the effective use of data	2021	Welsh Government					
Wales: International action to support decarbonisation at home and abroad	All	Information not available	Over the course of Carbon Budget 2 Welsh Governemnt will: › Deliver Priority Regional Relationships and Networks Action Plan › Share experience and learnings › Demonstrate and promote how a well-being of future generations approach can help drive positive action on the world's greatest problems › Deliver the Wales/Ireland action plan, with climate change and sustainability at its heart. › Continue to look at innovative ways to engage internationally	reseach, information	Implemented	Aligned with its International Strategy, Welsh Government have developed a series of action plans to set out how we will establish Wales as a globally responsible nation, which is making a fair contribution to tackling climate change.	2010	Welsh Government					
Wales: Reducing Emissions from the Combustion of Fuels for Electricity Generation	Electricity & Heat generation & Industry & Business	Information not available	Welsh Government aims to reduce carbon emissions from the power sector in Wales whilst maintaining security of supply in a high renewables system.	regulatory	Implemented	Later this year Welsh Government will publish its strategic policy position on combustion of fuels for electricity generation. It will set out a strong presumption against new fossil fuelled power plant, nor replacing current fleet of plant with alternatives which may themselves be the source of greenhouse gas emissions.	2021	Welsh Government					
Wales: Planning frameworks to restrict fossil fuel extraction	Electricity & Heat generation, Industry & Business, Cross cutting	Information not available	Wherever possible we must prevent further extraction of fossil fuels. Welsh Government have placed all forms of fossil fuels at the bottom of the energy hierarchy within our strategic planning document, Planning Policy Wales (PPW).	regulatory	Implemented	In December 2018, Welsh Government committed to not issuing any new petroleum licensing in Wales, or support applications for hydraulic fracturing petroleum licence consents. The continued extraction of all fossil fuels, including coal and petroleum, is not compatible with our challenging targets for decarbonisation.	2021	Welsh Government					

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Wales: Reducing emission growth from new Energy from Waste plants in Wales	Electricity & Heat generation, Industry & Business, Cross cutting, waste, Public Sector, transport, Residential Buildings	Information not available	An updated strategic assessment shows, apart from a modest potential need for smaller scale energy from waste capacity for non-recyclable waste and to properly dispose of dangerous wastes such as clinical waste, the success of our recycling and the decrease in waste generated in Wales means no further large scale energy from waste plants are required.	regulatory	Implemented	Following the publication of Beyond Recycling in March 2021, Welsh Government have brought forward an immediate moratorium on any future large scale energy from waste developments, as laid out in the Written Statement from March 2021, together with the accompanying updated Strategic Assessment on the need for new energy from waste capacity across the three economic regions in Wales. As laid out in our Written Statement, small scale energy from waste plants (of less than 10MW) must also supply heat, and where feasible, be carbon capture and storage enabled or ready	2021	Welsh Government					
Wales: De-risking and Integrating Investment in Wales through Energy Planning	Electricity & Heat generation, Industry & Business, Cross cutting, waste, Public Sector	Information not available	The only way to deliver an affordable net zero energy system is by pursuing a joined-up whole-systems approach – and by ensuring full public engagement across the whole spectrum of actions needed.	fiscal, research, information	Implemented	Welsh Government have initiated, funded, resourced and supported our Regional Energy Strategies, which start to identify the scale of change needed to reach a low carbon energy system and establish regional priorities for a low carbon energy system. This work models future demand for power, heat and transport and contains an economic assessment of the impact of delivering the proposed ambitions.	2021	Welsh Government					
Wales: Planning the delivery of the electricity and gas grid we need for Wales	Electricity & Heat generation, Industry & Business, Cross cutting, Public Sector, transport, Residential Buildings	Information not available	The focus of this policy will be to achieve a joint view across all participants of the likely future energy needs in Wales to 2050, building on existing modelling. Bringing together thinking across the gas and electricity networks and across the transmission and distribution networks in this way, we aim to be the first country to have a joined-up approach to developing gas and electricity networks, enabling opportunities for additional prosperity in Wales	Research	Implemented	Welsh Government have established a project with all the energy network operators in Wales, and Ofgem, to develop a long term plan for the energy networks in Wales. It will look out to 2050 to understand what networks we need to support a net zero energy system and best serve the communities and places they support. The work will help to inform Future Wales, Wales' National Plan.	2021	Welsh Government					
Wales: Increasing renewable energy developments on land through our planning regime	Electricity & Heat generation, transport, residential buildings, industry & Business, Public Sector	Information not available	Our aim is to provide better certainty of outcomes for renewable energy developers in Wales, while also enabling decisions to be made within a statutory timeframe, and the potential to include other ancillary authorisations as part of a single consent. Our process will complement the BEIS Offshore Transmission Network Review.	research, regulatory	Implemented	Welsh Government will improve and unify the consenting of energy generation projects in Wales to provide a quicker and more roportionate consenting regime for energy infrastructure. It intends to introduce legislation that explores providing an integrated system for consenting devolved infrastructure projects, including low carbon and enewable energy projects, on land and offshore.	2021	Welsh Government					

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Wales: Consenting storage projects to support a flexible and responsive energy system	Electricity & Heat generation, transport, residential buildings, industry & Business, Public Sector	Information not available	Changes have been made to the consenting of energy storage in Wales to provide a quicker and more proportionate consenting regime. Welsh Government have delegated all planning applications for the consenting of storage (with the exception of pumped hydroelectric schemes) to Welsh Local Planning Authorities.	regulatory	Implemented	The UK Government has made changes in relation to previously non-devolved projects, which have resulted in the full devolution of storage consenting (with the exception of pumped hydroelectric schemes) to Welsh Local Planning Authorities. These changes took effect in April 2019 and will impact on consenting during Carbon Budget 2 and into the future.	2019	Welsh Government					
Wales: Marine evidence, planning and licencing: supporting offshore and marine renewable energy deployment	Electricity & Heat generation, transport, residential buildings, industry & Business, Public Sector	Information not available	By November 2022, Welsh Government will report on the effectiveness of the Welsh National Marine Plan, including progress being made towards securing plan objectives and the effects of the policies in the plan with respect to our support for marine renewable energy.	research, information, regulatroy	Planned	Natural Resources Wales (NRW) has a key role to play in advising on future opportunities for marine renewable energy and Welsh overnment are working with NRW to continue the Offshore Renewable Energy Programme (OREP). Its policy will be to streamline consenting herever possible, joining up regulatory processes and seeking win-win outcomes.	2021	Welsh Government					
Wales: Innovation in new renewable energy technology to drive faster and deeper decarbonisation and support the green economy	Electricity & Heat generation, transport, residential buildings, industry & Business, Public Sector	Information not available	In Wales, the Whole system Business Research Innovation for Decarbonisation (WBRID) scheme challenges businesses to help communities and the public sector adapt to the challenge of net zero on a whole system basis.	research, information,	Implemented	The Welsh Government PfG includes a commitment to further support innovation in new renewable energy technology, which will support the transformation of the energy system. Welsh Government have already supported Welsh businesses and academia to work together to build capability and develop solutions to drive forward net zero solutions. The increasing availability of “smart” data and use of data driven innovation techniques can ensure we better understand energy use and balance supply and demand on the local and national scale and we will pursue this with academic and business partners.	2022	Welsh Government					
Wales: Locally Owned Energy Developments to Secure an Economic Return for Wales	Electricity & Heat generation, cross cutting, public sector	Information not available	Welsh Government is on its our way to meetings its target for 1 GW of renewable energy generation capacity to be locally owned by 2030. By 2019, 825 MW of renewable energy generation capacity was locally owned. It also have a target to expand renewable energy generation by public bodies and community groups in Wales by over 100MW between 2021 and 2026. Together with its commitment to review the target for renewable generation in Wales Welsh Government will review its 1 GW target to ensure this still meets the scale of our ambition.	research, information	Implemented	Welsh Government will develop new approaches to support new generation it will: › Review the Welsh Government Energy Service, to consider the evolving needs of places, as we shape service provision beyond the existing four year service. › Explore new models connecting people and developments, so communities have a stronger relationship with them and can see benefits. › Support communities to explore partnerships with commercial developers. › Assess options for other innovative ways of funding locally owned low carbon generation, building on the strong track record of community share offers in Wales.	2020	Welsh Government					

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Wales: Maximising Welsh benefit from Commercially Operated infrastructure projects in Wales	Electricity & Heat generation, cross cutting, public sector, industry & Business	Information not available	Welsh Government's aim is to ensure maximum possible benefit is retained in Wales from new energy generators.	research, information	Implemented	It will look for opportunities to work with the private sector to deliver local priorities in support of net zero, and support Welsh businesses to take up supply chain opportunities and build the necessary skills in Wales to generate local social and economic benefits.	2021	Welsh Government					
Wales: Scope out the challenges and opportunities around low-carbon heat	Electricity & Heat generation, Residential Buildings, Industry & Business, Public Sector	Information not available	Welsh Government will: › Consolidate these evidence bases with UK Gov, identify any gaps, and commission work where necessary to fill these evidence gaps. › Publish a heat strategy for Wales in 2023.	Reseach	Implemented	Welsh Government will explore heat networks in the most appropriate areas within Future Wales. It has also worked with regions to develop ambition in relation to low carbon heat through the emerging regional energy strategies and heat will be a key consideration for local area energy planning.	2023	Welsh Government					
Wales: Increase the use of Waste Heat and low carbon heat sources	Electricity & Heat generation, Cross cutting, Residential Buildings, Industry & Business	Information not available	Welsh Government will update the current national heat map for Wales to identify heat consumption and generation at sites across Wales. This will build on the work commissioned by the UK Government to update the National Comprehensive Assessment of heating and cooling published in September. In 2022, Welsh Government will also incorporate evidence from its work on Local Area Energy Planning.	Reseach	Implemented	Welsh Government need to identify sources of waste heat, which could be used to heat buildings. Welsh Government have supported the development of low carbon heat network projects in Cardiff and Bridgend, which have then secured UK Government funding.	2022	Welsh Government					
Wales: Drive Decarbonisation through the Manufacturing Sector	Industry & Business, cross cutting, electirity & Heat generation, Residential Buildings, waste	Information not available	In 2021, Welsh Government published a new Manufacturing Action Plan. Through the plan it will futureproof manufacturing in Wales, make use of new technologies and importantly, drive down emissions. Supporting manufacturers to export is an important part of the Manufacturing Action Plan, and the Export Action Plan sets out how it will be chieved. Export Clusters will help businesses transition from a reliance on sales to fossil fuel sectors overseas.	education, economic	Implemented	Welsh Government will work with its manufacturing companies to develop a true circular economy within Wales through support provided by Business Wales and Food & Drink Wales. Industrial decarbonisation clusters will play a key role in this effort.	2021	Welsh Government					
Wales: Increased resource efficiency in business and industry through regulation and funding	Industry & Business, electricity & Heat generation, waste	Information not available	Welsh Government will secure greater recycling in businesses through the introduction of the new Business Recycling Regulations in 2023 and the introduction of extended producer responsibility for packaging in 2024 (which will also secure an increase in the recycling of business-to-business packaging).	regulatory, fiscal	Planned	Remaining competitive, resource efficient and energy efficient are a key component of Welsh Governments business support programmes, including Business Wales, and Food and Drink Wales. Businesses will also be able to more closely monitor their wastes, helping them to reduce and recycle more, through the introduction of a mandatory waste tracking system, including the specific reporting of food waste by food businesses.	2021	Welsh Government					

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Wales: Business Wales – using our financial and advice services to encourage business emission reduction	Industry & Business, electricity & Heat generation, transport, waste	Information not available	Business Wales supports new entrepreneurs, micro-businesses and SMEs to embed sustainable development practices in the fabric of their venture.	fiscal, information	Implemented	This helps Welsh businesses exploit new opportunities and take proactive steps to realise the business benefits of resource and energy efficiency, as well as joining a growing community of forward-thinking organisations working towards a zero carbon uture.	2021	Welsh Government					
Wales: Economy Futures Fund (EFF)	Industry & Business, Electricity & Heat Generation, waste	Information not available	Welsh Government will seek to prioritise the decarbonisation all to action, where Welsh Government are looking for applications that enable more of the business base to become carbon light or free.	research, fiscal	Implemented	The Economy Futures Fund (EFF), which is discretionary and demand led, was established in May 2018 by consolidating a number of existing funding streams into one fund. As part of the EFF application process, businesses that wish to apply for support must set out how their investment proposal addresses one of the five Calls to Action outlined in the Economic Action Plan.	2018	Welsh Government					
Wales: The Optimised Retrofit Programme(ORP)	Residential Buildings, cross cutting, electricity & heat generation	Information not available	The ORP underpins Welsh Governments ongoing development of retrofit policy and practice across all sectors.	fiscal	Implemented	The ORP seeks to understand the best value combination of fabric, space and water heating improvements for individual properties and set out a route to net zero for each home. This draws on the principles set out in the Better Homes, Better Wales, Better World report	2018	Welsh Government					
Wales: Welsh Housing Quality Standard (WHQS) –. Improving energy efficiency for existing social homes	Residential Buildings, cross cutting, electricity & heat generation	Information not available	Welsh Government will continue to invest £108m per annum as a minimum, to support social landlords in meeting the new WHQS standard. Drawing on evidence from ORP the new WHQS 2022 standard will focus on Fabric First principles and seek to bring all social housing as close as feasible to EPC A or equivalent within a decade.	fiscal	Implemented	The new standard will require the achievement of both affordable warmth and decarbonisation of homes, with a target date of 2033. It will also andate a process and route map for each social landlord to achieve the standard. By 2023 a PAS 2035 survey (the Publicly Available pecification that lays out a consistent assessment for energy retrofit measures) and a clear plan for individual homes will be required.	2023	Welsh Government					
Wales: Part L Building Regulations	Residential Buildings, cross cutting, electricity & heat generation	Information not available	Part L of the Building Regulations provides guidance on the conservation of fuel and power. It is Welsh Governments primary tool for raising minimum standards for new build housing and conversions.	regulatory	Implemented	Welsh Government have published its response to the 2020 review of Part L for new homes setting out our decision to introduce a 37% reduction (compared with current standards) in carbon emissions for new dwellings from 2022. On 20th May Welsh Government implemented changes to Part L of the Building Regulations, which will come into force in November 2022 and will deliver a significant reduction in carbon emissions. Welsh Government will make further changes to energy efficiency in Building Regulations in 2025 raising the bar to require new homes to produce a minimum of 75% less CO_2 emissions than ones built to current requirements.	2022	Welsh Government					

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Wales: Social Homes will lead by example being built to standards in excess of Part L	Residential Buildings, cross cutting, electricity & heat generation	Information not available	Welsh Government have made a commitment in its Programnme for Government (PfG) and it will build 20,000 low carbon, social homes during this government term.	fiscal	Implemented	Welsh Government consulted on new, higher DQR standards in 2020 and published the outcome of that consultation in July 2021. The revised standards will be effective from 1st October 2021 and will drive change beyond the social housing sector.	Unsure	Welsh Government					
Wales: Developing Innovative construction techniques and increasing the use of sustainable materials	Residential Buildings, cross cutting, electricity & heat generation, industry & business, waste	Information not available	While Part L sets the standard for what needs to be achieved in the construction of new build homes, Welsh Government have also invested £145m in the Innovative Housing Programme (IHP) over the last four years to work out how to best meet these standards.	fiscal	Implemented	Welsh Government are now mainstreaming the lessons learned in our affordable housing capital programmes to ensure the best practices identified becomes the default way we build future homes going forward.	Unsure	Welsh Government					
Wales: Incentivising energy efficiency of homes through our Help to Buy – Wales	Residential Buildings, cross cutting, electricity & heat generation	Information not available	Homes purchased using a Help to Buy Wales (HtBW) loan are market homes; they are not specifically developed for the scheme. this means builders will need to ensure all market homes meet new standards.	fiscal	Implemented	HtBW allows eligible purchasers to buy new-build homes with assistance from Welsh Government in the form of a shared equity loan. These homes must meet any terms and conditions set by the Welsh Government and so offer an opportunity to drive up standards and promote best practice in the wider housing market.	Unsure	Welsh Government					
Wales: Piloting Smart Flexible and Digitalised Systems to [maximise use of assets] and help reduce demand	Residential Buildings, cross cutting, electricity & heat generation, industry & business, Public sector	Information not available	The Welsh Government's Smart Living (SL) initiative provides early support to develop place-based and innovative solutions to supply flexible, digital development pathways across Wales.	research, information	Implemented	The SL inititaive aims to make life more efficient, more controllable, economically productive, integrated and sustainable by using smart technologies to reduce demand for energy and associated greenhouse gas emissions for low carbon heat.	Unsure	Welsh Government					
Wales: Develop behaviour change interventions alongside our wider programmes	All	Information not available	Welsh Government will continue to invest in specific behaviour change research relating to low carbon living	fiscal, research	Implemented	Welsh Government will invest £350,000 with University College London over the next 2 years to understand pull and push factors to win hearts and minds about having low carbon measures installed in homes. It will look to secure a further £600,000 to examine how residents with heat pumps can benefit from low carbon energy.	2021	Welsh Government					
Wales: Enable people to work at or near to home	Transport, Cross Cutting, Industry & Business, Public Sector	Information not available	Welsh Government has stated its long-term ambition to enable around 30% of Welsh workers to work remotely, at or near to home, on a regular basis beyond Covid.	Research, information. Fiscal	Implemented	This will be achieved by helping to give more people the choice to work in a way that helps their productivity as well as their work-life balance. As fewer car miles are driven in peak periods, it is likely that there will be additional benefits in terms of reduced noise, air pollution and congestion.	2021	Welsh Government					

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Wales: Increase trip mode share of Active Travel from a current estimated proportion of 27% to 33% by 2030 and at leaset 35% by 2040	Transport, Cross Cutting, Public Sector	Information not available	Welsh Government are continuing to invest more than ever in active travel routes and facilities to help local authorities create a comprehensive network of routes. It has an ambition to invest significantly in active travel between now and 2040.	Fiscal	Implemented	This funding will deliver very significant increases in the quantity and quality of cycling and walking routes and infrastructure by investment in area-wide networks of better, safer cycling tracks – physically separated from traffic, including hub-and-spoke networks linking villages to towns in rural areas. For example, this could include support for workplace travel schemes that incentivise cycling and walking, funding to secure all weather cycle parking at railway stations, investment in public bike hire and e-bike hire schemes and campaigns to encourage more people to walk and to cycle.	2021	Welsh Government					
Wales: Increase trip mode share of public transport from a current estimated proportion of 5%1 to 7% by 2030 and 13% by 2040	Transport, Cross Cutting	Information not available	Welsh Government are prepared to take significant action in both bus and rail as the core network of services, as well as embracing technology and emerging modes of shared transport to make public transport a more attractive, practical and affordable alternative to car travel.	Fiscal	Implemented	Enabling people to switch from private cars to lower carbon modes of travel will be important to meet near term carbon budgets. This will be enabled by developing an integrated, multi-modal public transport system, which results in a seamless and effortless experience for passengers.	2021	Welsh Government					
Wales: Plan for and invest in Electric Vehicle charging infrastructure	Transport, Cross Cutting	Information not available	The Welsh Governments Electric Vehicle charging strategy was published in March 2021. Its approach to EV charging will ensure that the charging infrastructure in Wales is on a par with the best in comparable areas of the UK.	fiscal	Implemented	Improvements in this area will not be driven by government alone and we will need to work closely with partners across the public, private and third sectors in developing the infrastructure needed to give people confidence in using electric vehicles.	2021	Welsh Government					
Wales: Zero emission bus fleet	Transport, Cross Cutting	Information not available	In addition to the actions to reform bus governance, we are committed to deliver on our targets to decarbonise the bus fleet. We will also reform the Bus Services Support Grant (BSSG) to encourage the decarbonisation of the bus fleet and continue to allocate funds, which enable our ambition. In addition, legislative provisions which support the decarbonisation of the bus fleet will be considered.	fiscal, research	Implemented	We estimate that delivery of the 2028 zero emission bus target will result in cumulative carbon savings of 1.32 $MtCO_2e$ between now and 2040. This assumes increased bus miles associated with improved service and additional bus mode share, which will be achieved through actions outlined in the above section on demand reduction and mode shift.	Unsure	Welsh Government					
Wales: All taxis and private hire vehicles to be zero emission by 2028	Transport, Cross Cutting	Information not available	Welsh Government have committed to deliver a zero tailpipe emission taxi and private hire fleet by 2028.	fiscal	Implemented	Reducing emissions from taxi and private hire vehicles will contribute to improving air quality in our towns and cities as well as contributing to our carbon budgets.	2021	Welsh Government					

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Wales: Decarbonise the Rail network	Transport, Cross Cutting	Information not available	In line with rail industry recommendations, a rolling programme of OLE electrification in Wales is recommended to form the backbone of the rail network, supported using alternative technologies where not feasible.	fiscal	Implemented	A comprehensive programme to introduce new train fleets across the Wales and Borders routes is underway. This will include electric/ battery Stadler fleets for the core valley lines services and new diesel fleet which is expected to be in the region of 20% more efficient than the existing fleet.	2021	Welsh Government					
Wales: Regulations to reduce agricultural pollution	Land Use and waste	Information not available	Whilst the Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021 have been developed primarily to prevent the pollution of watercourses, the Regulations are also a key part of reducing atmospheric emissions from agriculture.	Regulatory	Implemented	The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021 came into force on 1 April 2021. The Regulations include transitional periods and will be fully implemented by 1 August 2024 and apply across the whole of Wales.	2021	Welsh Government					
Wales: Glastir	Agriculture	Information not available	Glastir is the current five year whole-farm sustainable land management scheme, offering payment for the delivery of specific environmental goods and services and contributes towards tackling emissions from agriculture.	Fiscal	Implemented	The main aims of the Glastir scheme are to reduce the impacts of climate change within agriculture and reverse biodiversity loss, whilst improving water, air and soil quality. Whilst the majority of Glastir Advanced contracts expire in December 2021, any remaining contracts will come to an end by 2023.	2012	Welsh Government					
Wales: Farm Business Grant (FBG)	Land use, waste, Electicity and Heat Generation and Transport	Information not available	A total of £40m was made available under the FBG through the EU Rural Development Programme to help farmers invest in new equipment and machinery.	Fiscal	Implemented	Grants of up to £12,000 were available to buy equipment to support farm efficiencies such as animal handling, energy efficiency, storage and management of nutrients – all of which contribute to lowering on farm emissions.	2014	Welsh Government					
Wales: Sustainable Production Grant (SPG)	Waste	Information not available	The scheme offered a maximum 40% grant contribution (from £12,000 to £50,000) towards capital investments in equipment and machinery which have been pre-identified to specifically support famers to address and safeguard nutrient management and improve water, soil and air quality by reducing the impacts of agriculture pollution.	Fiscal	Implemented	A total of £22m was made available through the last three rounds of the SPG, with the last funding window having closed in March 2021.	2014	Welsh Government					
Wales: Wales Animal Health and Welfare Framework (WAHWF)	Land Use and waste	Information not available	The WAHWF sets out our plan for continuing and lasting improvements in standards of animal health and welfare for kept animals, whilst also helping to protect public health and contributing to tackling the climate emergency.Our goal is for all livestock farms in Wales to use Animal Health Planning as an integral part of their business management.	Fiscal, Information, Eduaction	Implemented	Improving the health status of farmed animals can significantly reduce their carbon footprint, particularly when managed alongside actions to optimise feeding and breeding of animals for longevity – health benefits accrue most if animals are correctly fed, bred and accommodated.	2015	Welsh Government					

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Wales: Red Meat Development Programme	Land Use and waste	Information not available	The Red Meat Development programme has three strands crucial to the red meat sector's future competitiveness, success and sustainability. From farm to fork, the projects contribute to an efficient red meat industry, leading to less wastage and therefore a reduction in greenhouse gases emitted from the supply chain.	research & fiscal	Implemented	Hybu Cig Cymru are delivering the five year, £9.2m Red Meat Development Programme funded by the EU Rural Development Programme, which comes to an end in 2023. Identifying optimal genetics is crucial for the long term sustainable objective for improving the overall performance of any farming business, and offers both economic and environmental benefits enabling lambs to reach market specification sooner and with less inputs, thus improving a farm business's carbon footprint.	2018	Welsh Government					
Wales: Dairy Improvement Programme (DIP)	Land Use, waste and Cross Cutting	Information not available	The DIP, funded by the Welsh Government through the Rural Development Programme is a £6.5m, five year programme (2014-2020) delivered by the Agricultural and Horticultural Development Board (AHDB). It delivers two distinct projects, Herd Advance and Strategic Dairy Farms which aim to increase the performance, health and resilience of the Welsh dairy sector.	research & fiscal	Implemented	Healthy animals help protect the productivity and production levels of farmers, reduce capital losses, minimise negative trade impacts as well as reducing pollution and CO_2 emissions. With funding available until 2023, AHDB Dairy will embark on several additional work packages from 2021.	2014	Welsh Government					
Wales: Farming Connect	Land Use, waste and Cross Cutting	Information not available	Contracted from October 2015 until August 2022, Farming Connect is a £28m programme, providing subsidised independent, tailored business support and technical advice. The Advisory Service, an element of the wider Farming Connect Programme, provides advice on how to achieve optimum results from livestock, which in turn helps to reduce emissions.	Fiscal, information and education	Implemented	Outcomes from projects and trials are shared widely to raise awareness amongst famers of the importance of emission reduction activities, changing behaviours and improving farming practices. Also available through Farming Connect is the Greenhouse Gas Emissions Interactive Farm – a tool developed to demonstrate different examples of how a typical Welsh farm could reduce its greenhouse gas emissions (demonstrated as carbon dioxide equivalents, CO_2e) while also increasing profitability (either through saving money or increasing revenue).	2015	Welsh Government					
Wales: Agriculture Bill	Agriculture	Information not available	Welsh Government will introduce the Agriculture Bill to create a new system of farm support that will maximise the protective power of nature through farming.	Regulatory	Implemented	It is proposed that this new system will reward farmers who take action to meet the challenges of responding to the climate and nature emergencies, supporting them to produce food in a sustainable way. We will also seek to replace the time limited powers in the Agriculture Act 2020 which we took to provide continuity and some much needed stability for our farmers as we left the EU.	2022	Welsh Government					

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Wales: Sustainable Farming Scheme (SFS)	Land Use, waste and Cross Cutting	Information not available	The proposed SFS will provide support to farmers – both financial and advisory – which will be targeted at outcomes not currently rewarded by the market. It is proposed the fundamental change to the current Basic Payment Scheme will be the level of payment being linked to the outcomes delivered by a farmer through undertaking a range of management actions on farm.	Fiscal, information and education	Planned	The proposal is to go beyond an income foregone/costs incurred model and reflect the value of environmental goods provided through future payments. It is also proposed outcomes from existing good practice requiring continued maintenance should be recognised and rewarded as well as creation of new outcomes. This will ensure active farmers who are working to benefit the environment are supported.	2025	Welsh Government					
Wales: transition schemes	Agriculture	Information not available	On 31 March, Welsh Government announced a package of support for farmers, foresters, land managers and food businesses worth over £227 million over the next three financial years to support the resilience of the rural economy and our natural environment.	Fiscal	Parts of this are planned, other parts implemented	Funding will be made available for a transitional scheme to provide financial support to farmers who are converting their operations to organic farming. The Horticulture Development Scheme (the indicative budget allocation for this application window, between 4 April and 27 May, is £1.5m) and Horticulture Start Up Schemes (an Expression of interest window for the new Horticulture Start Up scheme will open on 23 May 2022 and close on 25 June 2022) are part of the transition scheme package. Additional investment in the rural economy will be announced over the next three years, as we continue the transition to the Sustainable Farming Scheme, promoting the sustainable production of food, and support the rural economy on the path to a net zero, nature positive Wales.	2022	Welsh Government					
Wales: Create a National Forest for Wales	Land Use, Cross cutting	Information not available	Over the next five years we plan to create 30 new woodlands and 100 Tiny Forests to form part of the National Forest. This year we will consult on the long term strategy, organisational principles, delivery and funding models for the National Forest.	Fiscal, information, education, research	Implemented	The National Forest will be made up both of woodlands on Welsh Government land and those planted by others, and will require a range of interventions and actions to create. In part it will be funded through existing woodland support schemes, and the woodland creation scheme. However, it will also require standalone delivery and funding mechanisms to enhance and deliver areas of woodland that would otherwise not be supported.	2021	Welsh Government					
Wales: Woodland Creation Scheme	Land Use, Cross cutting, Agriculture	Information not available	The scheme will provide payments to landowners to plant trees in Wales over the next two years. We opened a new window in September 2021 to allow more applications for this funding and ensure the full budget is spent.	Fiscal	Implemented	The Welsh Government currently funds woodland creation through the Glastir Woodland Creation scheme, which provides grants to farmers and land managers to support planting of woodlands. In 2020 the Welsh Government allocated £17m to woodland creation through the Glastir Woodland Creation scheme – the largest allocation since devolution.	2020	Welsh Government					

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Wales: Implementing a Peatland Restoration Programme	Land Use, Cross cutting, Agriculture	Information not available	Wales' first national peatland action progamme (NPAP) outlines a plan of action to be taken over the next five years with six priority themes. The programme will target those peatland bodies most in need of restoration with the aim of delivering 600-800 hectares of restoration per year.	Fiscal, information, education, research	Implemented	Welsh Government has allocated £1.5m for year 1, with a further £1m per annum for the remaining 4 years. Works began in September 2020. In addition, from July 2021 Welsh Government funded NRW to establish a National Peatland Team in NRW to deliver the NPAP.	2020	Welsh Government					
Wales: New Sustainable Farming Scheme (woodland strand)	Land Use, Cross cutting, Agriculture	Information not available	Welsh Government intends for the new sustainable farming scheme to provide payments to farmers who choose to deliver positive benefits from planting and managing woodland on their farms.	Fiscal	Planned	This support will build upon the progress which will be made under the new woodland creation funding scheme over the next four years. Welsh Government also want to support farmers in planting 'hedges and edges'. It will develop and implement mechanisms to improve support for this ahead of the Sustainable Farming Scheme being introduced.	2024	Welsh Government					
Wales: Develop a new Timber Industrial Strategy for Wales	Land Use, Cross cutting, Industry & Business	Information not available	The Timber Industrial Strategy will seek to identify priority interventions across the timber supply chain to develop a wood economy and encourage greater use of timber in construction.	research & information	Planned	We will take action to increase the supply of timber available for long-life uses, including graded structural timber. We will publish the strategy by the end of 2022.	2022	Welsh Government					
Wales: Reduce waste sent to landfill	Waste, Public Sector, Cross Cutting	Information not available	For Carbon Budget 2, as part of our action to reduce landfill overall we will halve the amount of avoidable food waste and reduce the landfilling of biodegradable waste in Wales to zero by 2025.	Regulatory, information and education	Implemented	We have been on a trajectory of reducing landfill in Wales and this will continue. We are now targeting wastes which contribute the most emissions, such as food. By significantly reducing food waste and increasing the recycling of any biodegradable waste generated (for example through anaerobic digestion), we can reduce the damaging methane emissions caused by burying it in landfill. Anaerobic digestion also has the added benefit of generating renewable energy, thus contributing to renewable energy generation targets and decarbonising energy supply.	2021	Welsh Government					
Wales: Further increase recycling	Waste, Public Sector, Cross Cutting	Information not available	Welsh Governments Beyond Recycling Strategy highlights how it will strive to achieve the highest rates of recycling in the world. For Carbon Budget 2, this means it will achieve at least a 70% recycling rate for all major waste streams (household, industrial, commercial and construction).	Regulatory, information and education	Implemented	Actions will link with specific action in other emission sectors, such as the new recycling regulations for non-domestic premises, Extended Producer Responsibility (EPR) scheme for packaging and Deposit Return Scheme.	2021	Welsh Government					

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Wales: Be Mighty Campaign	Waste, Public Sector, Cross Cutting	Information not available	In 2020, Welsh Government launched the Be Mighty Campaign which asked everyone to make small but important changes in how they recycle with the aim of becoming number one in the world rankings.	Information and education	Implemented	The campaign was co-developed and delivered in conjunction with local authorities as a coordinated national and local campaign, receiving significant traditional and social media coverage.	2020	Welsh Government					
Wales: Further increase CH_4 Capture and utilisation in Welsh landfill sites by 2030	Waste, Public Sector, Cross Cutting	Information not available	All operational landfills in Wales have been required to capture and utilise landfill gas since 1999. In Wales, this is implemented through the Environmental Permitting (England and Wales) Regulations 2016.	Regulatory, information, research and education	Planned	These regulations mean that landfill sites need to control the gas generated on their sites and must collect, treat it and use it in a way that minimises environmental damage. This includes the requirement to flare gas which cannot be used to produce energy. As current methane capture and reporting systems are variable in their effectiveness, we will work with NRW within this budget period to improve the controls and reporting around the release of landfill gas from operational landfills.	2021	Welsh Government					
Wales: Public Sector Routemap and Reporting Guides	Public Sector, Cross cutting	Information not available	All public sector organisations should use the Routemap and Reporting Guide to develop and publish plans by March 2023 to achieve a collective Net Zero public sector by 2030.	Regulatory, information and education	Implemented	All public sector organisations should use the Routemap and Reporting Guide to develop and publish plans by March 2023 to achieve a collective Net Zero public sector by 2030.	2021	Welsh Government					
Wales: Public Sector Net Zero Plan	Public Sector, Cross cutting	Information not available	The Welsh Government's plan to achieve net zero as an organisation by 2030 will be published before March 2023.	Regulatory, information and education	Implemented	The Welsh Government's plan to achieve net zero as an organisation by 2030 will be published before March 2023.	2021	Welsh Government					
Wales: Welsh Public Bodies commitment to Net Zero	Public Sector, Cross cutting	Information not available	The Welsh Government to include Net Zero Wales commitments in our remit letters and sponsor arrangements with public bodies in Wales	Regulatory, information and education	Implemented	The Welsh Government to include Net Zero Wales commitments in our remit letters and sponsor arrangements with public bodies in Wales	2022	Welsh Government					
Wales: Mandatory Carbon Reduction Plans in Public Procurement contracts	Public Sector, Industry & Business and waste	Information not available	Make Carbon Reduction Plans a mandatory part of tenders for appropriate public procurement contracts and prioritise products which are fully recyclable, multi-use or able to be re-purposed as part of a more circular approach to waste.	Regulatory, information and education	Planned	Make Carbon Reduction Plans a mandatory part of tenders for appropriate public procurement contracts and prioritise products which are fully recyclable, multi-use or able to be re-purposed as part of a more circular approach to waste.	2023	Welsh Government					
Wales: Net zero/ultra-low emission public sector cars	Public Sector & Transport	Information not available	All new public sector cars and light goods vehicles should be zero/ultra-low emission by 2025 and heavy goods by 2030	Regulatory, information and education	Implemented	All new public sector cars and light goods vehicles should be zero/ultra-low emission by 2025 and heavy goods by 2030	2021	Welsh Government					

Name of Mitigation Action	*Sectors affected*	*GHG affected*	*Objective and or activity affected*	*Type of Instrument*	*Status of implementation*	*Brief Description*	*Start Year of Implementation*	*Implementing Entity or Entities*	*Estimate of mitigation impact by gas (for a particular year, not cumulative in $ktCO_2$ eq.)*				
									2020	*2025*	*2030*	*2035*	*2040*
Wales: Public Sector sequestration of land	Public Sector & Land Use	Information not available	All public sector organisations should understand the sequestration potential of land in their ownership by March 2023 and commit to taking action to realise this potential by March 2030	Regulatory, information and education	Implemented	All public sector organisations should understand the sequestration potential of land in their ownership by March 2023 and commit to taking action to realise this potential by March 2030	2021	Welsh Government					
Wales: NHS Wales commitment to Net Zero	Public Sector, Land Use, Transport, Electricity & Heat generation	Information not available	NHS Wales is committed to the collective net zero ambition by 2030 delivering through the NHS Decarbonisation Strategic Delivery Plan	Regulatory, information and education	Implemented	NHS Wales is committed to the collective net zero ambition by 2030 delivering through the NHS Decarbonisation Strategic Delivery Plan	2021	Welsh Government					
Wales: Joint NHS Wales and LG Social Care Decarbonisation Plan	Public Sector, Land Use, Transport, Electricity & Heat generation & Waste	Information not available	A joint NHS Wales and LG Social Care Decarbonisation Plan should be created to support the achievement of a collective net zero by 2030	Regulatory, information and education	Implemented	A joint NHS Wales and LG Social Care Decarbonisation Plan should be created to support the achievement of a collective net zero by 2030	2021	Welsh Government					
Wales: Local Government commitment to net zero	Public Sector, Land Use, Transport, Electricity & Heat generation & Waste	Information not available	The Local Government Decarbonisation Strategy Panel and WLGA will support the commitments made by Local Government organisations to meet the collective net zero ambition by 2030	Regulatory, information and education	Implemented	The Local Government Decarbonisation Strategy Panel and WLGA will support the commitments made by Local Government organisations to meet the collective net zero ambition by 2030	2021	Welsh Government					

Table 4
Reporting on progress[a, b]

	Total emissions excluding LULUCF	*Contribution from LULUCF[d]*	*Quantity of units from market based mechanisms under the Convention (1)*		*Quantity of units from other market based mechanisms*	
Year[c]	*(kt CO_2 eq)*	*(kt CO2 eq)*	*(number of units)*	*(kt CO_2 eq)*	*(number of units)*	*(kt CO_2 eq)*
Base year/period (1990)	797,015.7664					
2010	609,398.6017		NA	NA	NA	NA
2011	564,263.3973		NA	NA	NA	NA
2012	580,528.0333		NA	NA	NA	NA
2013	567,038.7356		0	0	NA	NA
2014	526,914.7856		0	0	NA	NA
2015	509,266.1305		0	0	NA	NA
2016	484,244.9524		0	0	NA	NA
2017	473,113.1870		0	0	NA	NA
2018	464,307.2069		0	0	NA	NA
2019	448,389.6384		0	0	NA	NA
2020	405,754.8834		0	0	NA	NA

Abbreviation: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b For the base year, information reported on the emission reduction target shall include the following: (a) total GHG emissions, excluding emissions and removals from the LULUCF sector; (b) emissions and/or removals from the LULUCF sector based on the accounting approach applied taking into consideration any relevant decisions of the Conference of the Parties and the activities and/or land that will be accounted for; (c) total GHG emissions, including emissions and removals from the LULUCF sector. For each reported year, information reported on progress made towards the emission reduction targets shall include, in addition to the information noted in paragraphs 9(a–c) of the UNFCCC biennial reporting guidelines for developed country Parties, information on the use of units from market-based mechanisms.

c Parties may add additional rows for years other than those specified below.

d Information in this column should be consistent with the information reported in table 4(a)I or 4(a)II, as appropriate. The Parties for which all relevant information on the LULUCF contribution is reported in table 1 of this common tabular format can refer to table 1.

Table 4(a)II

Progress in achievement of the quantified economy-wide emission reduction targets – further information on mitigation actions relevant to the counting of emissions and removals from the land use, land-use change and forestry sector in relation to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol [a,b,c]

GREENHOUSE GAS SOURCE AND SINK ACTIVITIES	*Base year[d]*	*Net emissions/removals*									*Accounting Parameters[h]*	*Accounting Quantity[i]*
		2013	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Total[g]*		
	(kt CO_2 eq)											
A. Article 3.3 activities												
A.1. Afforestation/reforestation		-1,245.82	-1,626.22	-1,941.92	-2,316.96	-2,650.69	-2,919.63	-3,210.45	-3,526.63	-19,438.33		-19,438.33
Excluded emissions from natural disturbances(5)		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances(6)		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
A.2. Deforestation		1,561.97	1,581.81	2,172.31	2,017.33	1,846.95	2,359.77	2,769.59	2,250.26	16,559.99		16,559.99
B. Article 3.4 activities												
B.1. Forest management										-137,814.09		2,993.91
Net emissions/removalse		-18,868.92	-18,583.07	-17,972.23	-17,593.69	-17,119.52	-16,380.05	-15,800.63	-15,495.98	-137,814.09		
Excluded emissions from natural disturbances(5)		NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
Excluded subsequent removals from land subject to natural disturbances(6)		NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
Any debits from newly established forest (CEF-ne)(7),(8)		NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
Forest management reference level (FMRL)(9)											-8,268.00	
Technical corrections to FMRL(10)											-9,333.00	
Forest management capl											224,824.68	2,993.91
B.2. Cropland management (if elected)	16,693.63	15,948.35	15,920.39	15,836.57	15,889.88	15,952.62	15,890.87	15,896.22	15,949.41	127,284.32		-6,264.63
B.3. Grazing land management (if elected)	3,988.78	2,916.70	2,865.19	2,687.24	2,784.06	2,663.77	2,597.01	2,438.93	2,474.67	21,427.56		-10,482.65
B.4. Revegetation (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. Wetland drainage and rewetting (if elected)	286.44	225.58	225.38	224.69	223.38	223.03	210.71	210.36	204.59	1,747.71		-543.78

Note: 1 kt CO_2 eq equals 1 Gg CO_2 eq.

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b Developed country Parties with a quantified economy-wide emission reduction target as communicated to the secretariat and contained in document FCCC/SB/2011/INF.1/Rev.1 or any update to that document, that are Parties to the Kyoto Protocol, may use table 4(a)II for reporting of accounting quantities if LULUCF is contributing to the attainment of that target.

c Parties can include references to the relevant parts of the national inventory report, where accounting methodologies regarding LULUCF are further described in the documentation box or in the biennial reports.

d Net emissions and removals in the Party's base year, as established by decision 9/CP.2.

e All values are reported in the information table on accounting for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, of the CRF for the relevant inventory year as reported in the current submission and are automatically entered in this table.

f Additional columns for relevant years should be added, if applicable.

g Cumulative net emissions and removals for all years of the commitment period reported in the current submission.

h The values in the cells "3.3 offset" and "Forest management cap" are absolute values.

i The accounting quantity is the total quantity of units to be added to or subtracted from a Party's assigned amount for a particular activity in accordance with the provisions of Article 7, paragraph 4, of the Kyoto Protocol.

j In accordance with paragraph 4 of the annex to decision 16/CMP.1, debits resulting from harvesting during the first commitment period following afforestation and reforestation since 1990 shall not be greater than the credits accounted for on that unit of land.

k In accordance with paragraph 10 of the annex to decision 16/CMP.1, for the first commitment period a Party included in Annex I that incurs a net source of emissions under the provisions of Article 3 paragraph 3, may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

l In accordance with paragraph 11 of the annex to decision 16/CMP.1, for the first commitment period of the Kyoto Protocol only, additions to and subtractions from the assigned amount of a Party resulting from Forest management under Article 3, paragraph 4, after the application of paragraph 10 of the annex to decision 16/CMP.1 and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

Section 11 of the UK national inventory report has further details on accounting methodologies.

LULUCF is not covered by the joint EU quantified economy-wide emission target therefore this sector is not accounted for in the assessment of progress towards achievement of the target.

Table 4(b) – Reporting on progress[a,b,c]

Units of market based mechanisms			*Year*	
			2019	*2020*
Kyoto Protocol units[d]	*Kyoto Protocol units*	*(number of units)*		
		(kt CO_2 eq)		
	AAUs	*(number of units)*	0	0
		(kt CO_2 eq)	0	0
	ERUs	*(number of units)*	NA	NA
		(kt CO_2 eq)	NA	NA
	CERs	*(number of units)*	NA	NA
		(kt CO_2 eq)	NA	NA
	tCERs	*(number of units)*	NA	NA
		(kt CO_2 eq)	NA	NA
	lCERs	*(number of units)*	NA	NA
		(kt CO_2 eq)	NA	NA
Other units[d,e]	*Units from market-based mechanisms under the Convention*	*(number of units)*	NA	NA
		(kt CO_2 eq)	NA	NA
	Units from other market-based mechanisms	*(number of units)*	NA	NA
		(kt CO_2 eq)	NA	NA
Total		*(number of units)*	0	0
		(kt CO_2 eq)	0	0

Notes:

Abbreviations: AAUs = assigned amount units, CERs = certified emission reductions, ERUs = emission reduction units, lCERs = long-term certified emission reductions, tCERs = temporary certified emission reductions.

Note: 2022 is the latest reporting year.

a Reporting by a developed country Party on the information specified in the common tabular format does not prejudge the position of other Parties with regard to the treatment of units from market-based mechanisms under the Convention or other market-based mechanisms towards achievement of quantified economy-wide emission reduction targets.

b For each reported year, information reported on progress made towards the emission reduction target shall include, in addition to the information noted in paragraphs 9(a-c) of the reporting guidelines, on the use of units from market-based mechanisms.

c Parties may include this information, as appropriate and if relevant to their target.

d Units surrendered by that Party for that year that have not been previously surrendered by that or any other Party.

e Additional rows for each market-based mechanism should be added, if applicable.

Table 5
Summary of key variables and assumptions used in the projection analysis

		Historical										*Projected*				
Key Underlying assumptions	*Unit*	*1990*	*1995*	*2000*	*2005*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2020*	*2025*	*2030*	*2035*	*2040*
EU ETS carbon price	EUR/EUA, 2019 prices	NO	NO	NO	23.48	16.88	15.00	8.35	4.96	6.50	8.33	26.50	31.81	50.12	52.19	52.19
Electricity generation carbon price - includes Carbon Price Support Levy	EUR/EUA, 2019 prices	NO	NO	NO	23.48	16.88	15.00	8.35	9.80	17.87	32.15	46.34	49.21	54.40	60.00	63.36
Pound Sterling to Euro exchange rate	EUR per GBP	1.52	1.52	1.64	1.46	1.17	1.15	1.23	1.18	1.24	1.38	1.12	1.10	1.15	1.20	1.20
Pound Sterling to US Dollars exchange rate	USD per GBP	1.79	1.58	1.52	1.82	1.55	1.60	1.59	1.56	1.65	1.53	1.32	1.39	1.45	1.50	1.50
UK GDP growth rate per cent/per annum	per cent/per annum	NO	2.53	3.44	3.18	1.95	1.54	1.48	2.14	2.61	2.36	1.45	1.85	2.27	2.23	2.26
Crude oil - Brent 1 month	GBP/bbl, 2019 prices	23.44	16.86	27.07	38.54	60.77	79.28	79.19	76.77	65.41	37.60	43.04	48.85	54.63	60.00	60.00
Coal - CIF ARA	GBP/tonne, 2019 prices	43.25	44.39	34.42	43.07	70.19	87.44	65.99	58.06	49.84	39.88	48.36	49.13	50.29	51.37	51.37
Gas - NBP	GBP/MWh, 2019 prices	NE	NE	8.68	18.15	17.00	22.09	23.05	25.74	18.60	15.75	16.04	18.08	20.13	21.84	21.84
Number of households	millions	22.64	23.51	24.32	25.23	26.17	26.35	26.54	26.72	26.95	27.17	28.17	29.13	30.06	30.94	31.77
Population	thousands	57,238	58,025	58,886	60,413	62,760	63,285	63,705	64,106	64,597	65,110	67,255	68,928	70,370	71,589	72,688

Abbreviations: NE = not estimated, NO = not occurring.

Table 6(a)

Information on updated greenhouse gas projections under a 'with existing measures' scenario

	GHG Emissions & Removals[3]								*GHG Projections[4]*			
	(kt CO_2 eq)								*(kt CO_2 eq)*			
Sector	*Base Year[1]*	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*	*2030*	*2035*	*2040*
Other: Energy Supply[2]	280,729	280,729	238,810	224,191	232,663	208,777	146,600	85,333	62,007	61,566	62,216	64,254
Other: Business[2]	113,444	113,444	111,140	113,636	105,628	89,768	83,449	74,128	60,611	55,190	52,702	53,797
Other: Industrial Processes[2]	60,413	60,413	51,405	27,489	20,988	12,847	12,718	9,550	9,388	8,946	8,668	8,493
Other: Transport[2]	129,552	129,552	131,002	134,849	137,705	126,026	124,888	99,779	112,970	102,664	91,534	85,018
Other: Residential[2]	80,387	80,387	81,962	89,403	86,185	87,942	67,628	66,649	68,130	70,705	73,761	77,719
Other: Public[2]	13,325	13,325	13,154	12,077	11,171	9,515	7,983	7,441	8,207	8,663	8,951	9,367
Other: Agriculture[2]	54,078	54,078	53,441	51,246	49,255	45,888	46,544	45,118	48,417	47,965	47,994	48,148
Other: LULUCF[2]	13,182	13,182	10,822	8,295	5,455	3,739	3,194	3,769	-8,016	-5,371	-2,564	-493
Other: Waste[2]	65,088	65,088	67,784	61,410	47,653	28,635	19,455	17,758	15,857	15,075	14,771	14,757
Gas												
CO_2 Emissions including Net CO_2 from LULUCF	608,633	608,633	570,572	571,096	569,771	509,773	419,723	324,026	303,080	296,021	291,087	294,747
CO_2 excluding Net CO_2 from LULUCF	602,652	602,652	566,852	569,744	571,127	512,736	423,163	326,921	312,822	303,181	295,511	297,143
CH_4 Emissions including Net CH_4 from LULUCF	134,568	134,568	128,521	111,136	90,137	67,242	55,835	51,637	45,954	44,150	43,462	43,282
CH_4 excluding Net CH4 from LULUCF	129,825	129,825	123,791	106,418	85,388	62,459	51,023	46,760	45,924	44,123	43,439	43,264
N_2O Emissions including Net N_2O from LULUCF	49,747	49,747	40,023	30,194	26,191	23,115	22,173	21,084	20,593	20,265	20,187	20,109
N_2O excluding Net N_2O from LULUCF	47,289	47,289	37,650	27,969	24,128	21,195	20,351	19,298	18,898	18,504	18,350	18,224
HFCs	14,401	14,401	18,570	7,797	9,195	12,072	14,056	12,209	7,093	4,078	2,365	1,990
PFCs	1,649	1,649	589	572	392	280	269	160	371	371	371	371
SF_6	1,201	1,201	1,245	1,800	1,018	655	403	407	478	516	559	559
NF_3	0	0	0	1	0	0	0	0	0	0	0	0
Total with LULUCF	**810,198**	**810,198**	**759,520**	**722,596**	**696,703**	**613,137**	**512,460**	**409,524**	**377,570**	**365,402**	**358,032**	**361,059**
Total without LULUCF	**797,016**	**797,016**	**748,698**	**714,301**	**691,248**	**609,399**	**509,266**	**405,755**	**385,586**	**370,773**	**360,597**	**361,552**

Notes:
1. Base year of 1990
2. UK National Communication sectors
3. GHG Emissions and Removals reported for UNFCCC coverage from UK 1990-2020 GHG Inventory
4. Projections modelling includes trend data from UK 1990-2018 GHG Inventory

Table 6(b)
Information on updated greenhouse gas projections under a 'with additional measures' scenario

				GHG Emissions & Removals[3]						*GHG Projections[4]*		
				(kt CO_2 eq)						*(kt CO_2 eq)*		
Sector	*Base Year[1]*	*1990*	*1995*	*2000*	*2005*	*2010*	*2015*	*2020*	*2025*	*2030*	*2035*	*2040*
Other: Energy Supply[2]	280,729	280,729	238,810	224,191	232,663	208,777	146,600	85,333	61,473	57,423	55,128	53,655
Other: Business[2]	113,444	113,444	111,140	113,636	105,628	89,768	83,449	74,128	60,512	55,070	52,579	53,667
Other: Industrial Processes[2]	60,413	60,413	51,405	27,489	20,988	12,847	12,718	9,550	9,384	8,943	8,664	8,489
Other: Transport[2]	129,552	129,552	131,002	134,849	137,705	126,026	124,888	99,779	112,969	102,651	91,512	84,982
Other: Residential[2]	80,387	80,387	81,962	89,403	86,185	87,942	67,628	66,649	68,130	70,705	73,761	77,719
Other: Public[2]	13,325	13,325	13,154	12,077	11,171	9,515	7,983	7,441	8,207	8,663	8,951	9,367
Other: Agriculture[2]	54,078	54,078	53,441	51,246	49,255	45,888	46,544	45,118	48,416	47,964	47,993	48,147
Other: LULUCF[2]	13,182	13,182	10,822	8,295	5,455	3,739	3,194	3,769	-8,016	-5,371	-2,564	-493
Other: Waste[2]	65,088	65,088	67,784	61,410	47,653	28,635	19,455	17,758	15,655	14,281	13,250	12,715
Gas												
CO_2 Emissions including Net CO_2 from LULUCF	608,633	608,633	570,572	571,096	569,771	509,773	419,723	324,026	302,443	291,746	283,854	283,983
CO_2 excluding Net CO_2 from LULUCF	602,652	602,652	566,852	569,744	571,127	512,736	423,163	326,921	312,184	298,905	288,277	286,379
CH_4 Emissions including Net CH_4 from LULUCF	134,568	134,568	128,521	111,136	90,137	67,242	55,835	51,637	45,752	43,354	41,938	41,238
CH_4 excluding Net CH4 from LULUCF	129,825	129,825	123,791	106,418	85,388	62,459	51,023	46,760	45,721	43,327	41,916	41,220
N_2O Emissions including Net N_2O from LULUCF	49,747	49,747	40,023	30,194	26,191	23,115	22,173	21,084	20,592	20,263	20,185	20,106
N_2O excluding Net N_2O from LULUCF	47,289	47,289	37,650	27,969	24,128	21,195	20,351	19,298	18,898	18,501	18,348	18,221
HFCs	14,401	14,401	18,570	7,797	9,195	12,072	14,056	12,209	7,093	4,078	2,365	1,990
PFCs	1,649	1,649	589	572	392	280	269	160	371	371	371	371
SF_6	1,201	1,201	1,245	1,800	1,018	655	403	407	478	516	559	559
NF_3	0	0	0	1	0	0	0	0	0	0	0	0
Total with LULUCF	**810,198**	**810,198**	**759,520**	**722,596**	**696,703**	**613,137**	**512,460**	**409,524**	**376,730**	**360,328**	**349,274**	**348,248**
Total without LULUCF	**797,016**	**797,016**	**748,698**	**714,301**	**691,248**	**609,399**	**509,266**	**405,755**	**384,746**	**365,699**	**351,838**	**348,741**

Notes:
1. Base year of 1990
2. UK National Communication sectors
3. GHG Emissions and Removals reported for UNFCCC coverage from UK 1990-2020 GHG Inventory
4. Projections modelling includes trend data from UK 1990-2018 GHG Inventory

Table 7(i)

Provision of public financial support: summary information in 2019

2019	*Domestic currency (£m)*					*USD ($m)*				
Allocation channels	*Core/general*	*Climate-specific*				*Core/general*	*Climate-specific*			
		Mitigation	*Adaptation*	*Cross-cutting*	*Other*		*Mitigation*	*Adaptation*	*Cross-cutting*	*Other*
Total contributions through multilateral channels: Multilateral climate change funds	25	12.38	12.38			31.93	15.81	15.81		
Other multilateral climate change funds		166.50		4.79			212.64		6.11	
Multilateral financial institutions, including regional development banks	1,146.25			0.01		1,463.92			0.01	
Specialised United Nations bodies	112.92			3.17		144.21			4.08	
Total contributions through bilateral, regional and other channels		523.32	461.07				668.35	588.85		
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)	**1,284.17**	**702.20**	**473.45**	**7.96**		**1,640.06**	**896.81**	**604.66**	**10.20**	
Total climate specific finance			**1,183.61**							**1,511.67**

2019 Exchange rate $1 = £0.783 (source: Annual exchange rates for DAC donor countries)

Provision of information on definitions or methodologies used for reporting information in the following reporting parameters:

1: Core/general	The UK has reported the core contributions it has made to the listed multilaterals, plus some other contributions. These contributions are to the core budget and the UK cannot specify these as climate specific.
2: Climate-specific	The UK has reported climate specific contributions through multilateral channels. For the Clean Technology Fund, we have counted 100% of our contribution as climate specific. For the Global Environment Facility, this has a wider remit than climate and therefore have accounted for this in the amount scored as climate specific. For the purposes of reporting we have scored these climate specific contributions as split 50% adaption and 50% mitigation. Our contributions through other channels are identfied as climate specific as they are assessed as having clear climate change objectives. Building on the provision of £3.87 billion in International Climate Finance (ICF) between 2011/12- 2015/16, the UK committed to further scale up climate finance to at least £5.8 billion between 2016/17-2020/21. Since parties to the UNFCCC committed to providing new and additional fast-start finance from 2010, the scale up in climate finance has been accompanied by a significant scale up in UK ODA from £7.3 billion in 2009 to £15.2 billion in 2019. UK Climate Finance committments therefore represents a new, dedicated climate commitment which is additional to historic ODA levels. We have furthered this commitment through an announcement made in 2019 of £11.6bn in ICF from 2021-2025.
3: Status - disbursed and committed	The UK has categorised spend to multilaterals and bilaterals as 'committed'. The reported finance is the amount recorded as spent for UK Government budgetary purposes. Therefore we do not account for spend that has been pledged or committed for future years, but we do account for spend using promissory notes. These represent a legal promise for the UK to provide to total value of the promissory note, to the note's recipient.
4: Funding source	The UK has reported annual spend from its ODA budget that it has assessed as having clear climate change objectives.
5: Financial instrument	The UK has provided the majority of it's climate finance via grants. The exceptions to this are five bilateral contributions that are marked as equity, one bilateral contribution marked as equity/grant and one bilateral contribution marked as a loan. The spend for these instruments is accounted for in accordance with OECD-DAC requirements.
6: Type of support	All of reported UK climate finance is ODA. As part of our return, the UK has reported reflows of climate finance for example due to programmes closing down or no longer requiring UK finance. These reflows count as negative ODA and therefore affect the overall spend totals. We have grouped these reflows under the appropriate thematic area in order to properly account for their impact on the reported spend.
7: Sector	The UK has reported the same sector for each programme as per its overall ODA reporting to the OECD-DAC that took place earlier in the year.

Table 7(ii)
Provision of public financial support: summary information in 2020

2020	*Domestic currency (£m)*					*USD ($m)*				
Allocation channels	*Core/general*	*Climate-specific*				*Core/general*	*Climate-specific*			
		Mitigation	*Adaptation*	*Cross-cutting*	*Other*		*Mitigation*	*Adaptation*	*Cross-cutting*	*Other*
Total contributions through multilateral channels: Multilateral climate change funds	62.5	243.75	243.75			80.12820513	312.5	312.5	0	
Other multilateral climate change funds		33.5		1			42.94871795		1.28	
Multilateral financial institutions, including regional development banks	1,242.38					1,592.79				
Specialised United Nations bodies	87.84			2.81		112.62			3.602564103	
Total contributions through bilateral, regional and other channels		424.30	379.52				543.974359	486.56		
Total climate specific by funding type (total for mitigation, adaptation, crosscutting, other)		**701.55**	**623.27**	**3.81**			**899.42**	**799.06**	**4.88**	
Total climate specific finance			**1328.63**					**1703.37**		

2020 Exchange rate $1 = £0.780 (source: Annual exchange rates for DAC donor countries)

Provision of information on definitions or methodologies used for reporting information in the following reporting parameters:

1: Core/general	The UK has reported the core contributions it has made to the listed multilaterals, plus some other contributions. These contributions are to the core budget and the UK cannot specify these as climate specific.
2: Climate-specific	The UK has reported climate specific contributions through multilateral channels. For the Green Climate Fund, we have counted 100% of our contribution as climate specific. For the Global Environment Facility, this has a wider remit than climate and therefore have accounted for this in the amount scored as climate specific. For the purposes of reporting we have scored these climate specific contributions as split 50% adaption and 50% mitigation. Our contributions through other channels are identfied as climate specific as they are assessed as having clear climate change objectives. Building on the provision of £3.87 billion in International Climate Finance (ICF) between 2011/12- 2015/16, the UK committed to further scale up climate finance to at least £5.8 billion between 2016/17-2020/21. We have furthered this commitment through an announcement made in 2019 of £11.6bn in ICF from 2021-2025.
3: Status - disbursed and committed	The UK has categorised spend to multilaterals and bilaterals as 'committed'. The reported finance is the amount recorded as spent for UK Government budgetary purposes. Therefore we do not account for spend that has been pledged or committed for future years, but we do account for spend using promissory notes. These represent a legal promise for the UK to provide to total value of the promissory note, to the note's recipient.
4: Funding source	The UK has reported annual spend from its ODA budget that it has assessed as having clear climate change objectives.
5: Financial instrument	The UK has provided the majority of it's climate finance via grants. The exceptions to this are two bilateral contributions that are marked as equity, one bilateral contribution marked as equity/grant and one bilateral contribution marked as a loan. The spend for these instruments is accounted for in accordance with OECD-DAC requirements.
6: Type of support	All of reported UK climate finance is ODA. As part of our return, the UK has reported reflows of climate finance for example due to programmes closing down or no longer requiring UK finance. These reflows count as negative ODA and therefore affect the overall spend totals. We have grouped these reflows under the appropriate thematic area in order to properly account for their impact on the reported spend.
7: Sector	The UK has reported the same sector for each programme as per its overall ODA reporting to the OECD-DAC that took place earlier in the year.

Table 7a (i)
Provision of public financial support: contribution through multilateral channels in 2019

Donor funding	*Total amount*				*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*
	Core/general		*Climate specific*		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*
	Domestic currency (£m)	*USD ($m)*	*Domestic currency (£m)*	*USD ($m)*					
Multilateral climate change funds									
1. Global Environment Facility	25.00	31.93	12.38	15.81	Committed	ODA	Grant	Mitigation	Unspecified
2. Least Developed Countries Fund			12.38	15.81	Committed	ODA	Grant	Adaptation	Unspecified
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund									
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other multilateral climate change funds									
i) Global Green Growth Insitute			4.79	6.11	Committed	ODA	Grant	Cross-cutting	Unspecified
ii) Climate Investment Funds- Clean Technology Fund			166.50	212.64	Committed	ODA	Grant	Mitigation	Unspecified
Sub-total	25.00	31.93	196.05	250.38					
Multilateral financial institutions, including regional development banks									
1. World Bank	959.43	1,225.32			Committed	ODA	Grant		Unspecified
2. International Finance Corporation									
3. African Development Bank	154.12	196.83	0.01	0.01	Committed	ODA	Grant	Cross-cutting	Unspecified
4. Asian Development Bank	27.50	35.12			Committed	ODA	Grant		Unspecified
5. European Bank for Reconstruction and Development									
6. Inter-American Development Bank	0.70	0.89							
7. Other	4.50	5.75			Committed	ODA	Grant		Unspecified
Sub-total	1,146.25	1,463.92	0.01	0.01					

Donor funding	*Total amount*				*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*
	Core/general		*Climate specific*		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*
	Domestic currency (£m)	*USD ($m)*	*Domestic currency (£m)*	*USD ($m)*					
Specialised United Nations bodies									
1. United Nations Development Programme (specific programmes)	55.00	70.24			Committed	ODA	Grant		Unspecified
2. United Nations Environment Programme (specific programmes)									
3. Other	57.92	73.97	3.17	4.04	Committed	ODA	Grant	Cross-cutting	Unspecified
Sub-total	112.92	144.22	3.17	4.04					
Total	**1,284.17**	**1,640.06**	**199.22**	**254.43**					

Note:
Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

Table 7a (ii)
Provision of public financial support: contribution through multilateral channels in 2020

Donor funding	*Total amount*				*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*
	Core/general		*Climate specific*		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*
	Domestic currency (£m)	*USD ($m)*	*Domestic currency (£m)*	*USD ($m)*					
Multilateral climate change funds									
1. Global Environment Facility	62.5	80.13	37.50	48.08	Committed	ODA	Grant	Cross-cutting*	Unspecified
2. Least Developed Countries Fund									
3. Special Climate Change Fund									
4. Adaptation Fund									
5. Green Climate Fund			450.00	576.92	Committed	ODA	Grant	Cross-cutting*	Unspecified
6. UNFCCC Trust Fund for Supplementary Activities									
7. Other multilateral climate change funds									
i) Global Green Growth Insitute			1.00	1.28	Committed	ODA	Grant	Cross-cutting	Unspecified
ii) Climate Investment Funds - Clean Technology Fund			33.50	42.95	Committed	ODA	Grant	Mitigation	Unspecified
iii) United Nations Convention to Combat Desertification General Fund Assessed Contribution			0.31	0.40	Committed	ODA	Grant	Cross-cutting	Unspecified
Sub-total			522.31	669.63					
Multilateral financial institutions, including regional development banks									
1. World Bank	981.53	1258.37			Committed	ODA	Grant	Cross-cutting	Unspecified
2. International Finance Corporation									
3. African Development Bank	188.10	241.15			Committed	ODA	Grant	Cross-cutting	Unspecified
4. Asian Development Bank	27.50	35.26			Committed	ODA	Grant	Cross-cutting	Unspecified
5. European Bank for Reconstruction and Development									

Donor funding	*Total amount*				*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*
	Core/general		*Climate specific*		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*
	Domestic currency (£m)	*USD ($m)*	*Domestic currency (£m)*	*USD ($m)*					
6. Inter-American Development Bank	0.70	0.90			Committed	ODA	Grant	Cross-cutting	Unspecified
7. Other									
i) Caribbean Development Bank	4.50	5.77			Committed	ODA	Grant	Cross-cutting	Unspecified
ii) International Financial Institutions	40.00	51.28			Committed	ODA	Grant	Cross-cutting	Unspecified
Sub-total	1,242.33	1,592.73	0.00	0.00					
Specialised United Nations bodies									
1. United Nations Development Programme (specific programmes)	55.00	70.51			Committed	ODA	Grant	Cross-cutting	Unspecified
2. United Nations Environment Programme (specific programmes)			2.5	3.21	Committed	ODA	Grant	Cross-cutting	Unspecified
3. Other									
i) Food and Agriculture Organisation	15.65	20.06			Committed	ODA	Grant	Cross-cutting	Unspecified
ii) United Nations Educational, Scientific and Cultural Organisation	12.19	15.63			Committed	ODA	Grant	Cross-cutting	Unspecified
iii) World Health Organisation	5.00	6.41			Committed	ODA	Grant	Cross-cutting	Unspecified
Sub-total	87.84		2.50	3.21					
Total	**1,330.17**	**1,592.73**	**524.81**	**672.83**					

Note:
** We will split this spend as 50% mitigation and 50% adaptation.*
Abbreviations: ODA = official development assistance, OOF = other official flows, USD = United States dollars.

Table 7b (i)

Provision of public financial support: contribution through bilateral, regional and other channels 2019

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
203444 CDC Programme of Support in Africa and South Asia (2015-2023)	179.85	229.69	Committed	ODA	Equity	Mitigation	Banking & Financial Services	To enable CDC to scale up its activity of investing and lending to support the building of businesses in developing countries, to create jobs and make a lasting difference to people's lives in some of the world's poorest places. CDC is FCDO's main vehicle for investing in private companies in Africa and South Asia. CDC encourages capital investments, including in renewable energy, from other private investors by being a first mover, demonstrating to other investors that commercial returns are possible in these frontier markets, and by sharing risk and expertise. The additional equity from FCDO will enable CDC to meet demand for capital in its target markets and allow CDC to sustain a higher volume of more developmental investments across priority regions and business sectors. Geography over programme lifetime: Multiple countries
300751 Global Risk Financing Facility [GRIF]	35.00	44.70	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To save lives and reduce the impacts of shocks, like droughts, hurricanes and floods through enabling earlier and more effective response and faster recovery. It provides finance to support governments and humanitarian agencies to use risk financing instruments, like insurance and contingent credit, to access more rapid finance in emergencies, and to strengthen preparedness of local systems for disaster response and recovery. It will focus on disasters, but will develop over time to cover a wider range of risks, including famine. Geography over programme lifetime: Jamaica, Malawi
201724 Forest Governance, Markets and Climate	14.23	18.18	Committed	ODA	Grant	Adaptation	Forestry	A global programme supporting governance and market reforms aimed at reducing the illegal use of forest resources, benefitting poor forest-dependent people and promoting sustainable growth in developing countries. Geography over programme lifetime: Indonesia, Ghana, Liberia, Dem. Rep. of Congo, Guyana, Ivory Coast, Cameroon, Vietnam, Laos, Gabon, Central African Republic
	14.23	18.18	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
300363 Building Resilience in Ethiopia (BRE)	28.23	36.06	Committed	ODA	Grant	Adaptation	Emergency Response	To build Ethiopia's resilience to climate and humanitarian shocks by seeking to support the Government of Ethiopia to lead an effective and accountable humanitarian response system. It will have four key strands: Providing technical assistance to the Government of Ethiopia to lead and deliver an effective and accountable humanitarian response , delivering food and cash to people in humanitarian need in the most effective way, respond to emergency humanitarian needs in the most effective way and monitoring, evaluation and learning to strengthen humanitarian delivery in Ethiopia. Geography over programme lifetime: Ethiopia
203842 Managing Climate Risks for Urban Poor	24.12	30.80	Committed	ODA	Grant	Adaptation	Urban development and management	This programme will help cities plan for and invest in reducing the impacts of weather-related changes and extreme events, through a partnership with the Rockefeller foundation and the Asian Development Bank, on 2 million urban poor and vulnerable people in 25 medium-sized cities in 6 Asian countries (initially Pakistan, Bangladesh, India, Vietnam, Indonesia) by improving planning processes so that they consider climate change risks, for developing and funding new investment and infrastructure opportunities, and for knowledge and lesson sharing by 2018. Geography over programme lifetime: Asia Regional including Pakistan, Bangladesh, India, Vietnam, Indonesia
204764 CGIAR 2017-21, Support to develop and deploy the next generation of agriculture technology to support poor farmers by the international agriculture research organisation the CGIAR, 2017-21	21.60	27.59	Committed	ODA	Grant	Adaptation	Agriculture	To enable the CGIAR to scale up its research, contributing to the development of new crop varieties which are more productive and tolerant of biotic and abiotic stress. Development of farming systems which are more resilient, including to the effects of climate change, and more productive, the development of markets and value chains which are better able to deliver benefits to poor people and policies and technology which will directly support better nutritional and health outcomes for the poor. Geography over programme lifetime: Multiple countries
	2.40	3.07	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204270 Africa Division funding to the African Agriculture Development Company (AgDevCo)	23.13	29.54	Committed	ODA	Grant	Adaptation	Agriculture	AgDevCo is a specialised investor and project developer focused exclusively on early stage Small and Medium Enterprise agribusiness in Sub Saharan Africa. AgDevCo deploys patient capital and technical assistance to build profitable businesses that contribute to food security, drive economic growth and create jobs and income in rural areas and contribute to farmers' resilience to climate change. Geography over programme lifetime: Kenya, Sierra Leone, Ghana, Malawi, Mozambique, Tanzania, Uganda, Zambia
204290 Productive Safety Net Programme Phase 4	21.49	27.45	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	To reduce hunger, improve livelihoods and reduce the risk of famine in rural Ethiopia by (i) providing cash and food transfers, livelihoods advice and access to microfinance to 1.2 million extremely poor Ethiopians and (ii) creating local infrastructure which reverses environmental degradation and improves access to markets and basic services. 85% of participant households receive transfers as wages for labour on public works projects (including 32,000 km of hillside terraces, 3,000 km of rural roads and 400 new or expanded schools); while the remainder (the elderly, those with disabilities, and pregnant women) receive cash and / or food without a labour requirement. This programme contributes towards national and international development goals and FCDO's own targets for reducing poverty and hunger and for building household resilience to climate change and other shocks. Geography over programme lifetime: Ethiopia

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
300113 Building Resilience and adapting to climate change in Malawi	20.47	26.15	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	This programme aims to strengthen the resilience of poor households in Malawi to withstand current and projected weather and climate-related shocks and stresses. This will in turn halt the annual cycle of humanitarian crises that blights people's lives, harms poverty reduction efforts and swallows up resources. The UK will invest up to £70 million over five years (2018-2023) to provide direct benefits to 1.7 million poor and vulnerable people in Malawi (approximately 300,000 households). Geography over programme lifetime: Malawi
202745 Investments in Forests and Sustainable Land Use	9.00	11.49	Committed	ODA	Grant	Adaptation	Forestry	To support public-private partnerships that demonstrate how companies, communities, smallholders and governments can work collaboratively to reduce deforestation and benefit forest dependent communities. Geography over programme lifetime: Multiple countries including Dem. Rep. of Congo, Rep. of Congo, Cote d'Ivoire, Cameroon, Ethiopia, Gabon, Ghana, Indonesia, Kenya, Liberia, Mozambique, Tanzania, Sierra Leone, Central African Republic
	9.00	11.49	Committed			Mitigation		
202571 Support to the Global Agriculture and Food Security Programme (GAFSP)	11.68	14.92	Committed	ODA	Grant	Adaptation	Agriculture	To improve agricultural productivity in developing countries and to increase farmers' access to markets whilst increasing the economic resilience of poor people globally. Geography over programme lifetime: Multiple countries
	3.89	4.97	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
300418 UK-INDIA Partnership on National Investment and Infrastructure Fund -Green Growth Equity Fund	15.53	19.84	Committed	ODA	Equity / Grant	Mitigation	Energy generation, renewable sources	The NIIF sub-fund will use UK government finance to catalyse private sector investments from global UK investors, through the City of London to infrastructure projects in India. To help India address a key constraint to inclusive growth by boosting investment into infrastructure - which will lead to growth, job creation and poverty reduction in India. The fund is fully attributed to climate change mitigation - ie low carbon development, reducing greenhouse gas emissions. The fund will primarily invest in sectors like Renewable Energy, Clean Transportation, Water Treatment, and Waste Management. The success of this intervention will lead to follow on private investment that will have a transformational impact on India's economic development. Geography over programme lifetime: India
300667 Supporting Economic Empowerment and Development in the Occupied Palestinian Territories (SEED OPTs)	7.55	9.64	Committed	ODA	Grant	Adaptation	Energy policy	This programme will focus FCDO economic development assistance in the areas of sustainable supply of water and electricity, access & movement and trade, and fiscal losses and customs. Programme activities will support institutional capacity building and infrastructure development, working closely with the Palestinian Authority and Government of Israel. The overarching goal is to support economic growth and job creation in the OPTs. Geography over programme lifetime: Occupied Palestinian Territories
	7.55	9.64	Committed			Mitigation		
300143 Hunger Safety Net Programme (HSNP Phase 3)	14.50	18.52	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	To reduce poverty, hunger and vulnerability by providing 100,000 of the poorest households (approximately 600,000 people) in Kenya's arid and semi-arid lands with cash transfers and up to an additional 250,000 households (approximately 1,250,000 people) during drought emergencies. In addition, this final phase of the programme will ensure a transition of the Hunger Safety Net Programme to full Government of Kenya ownership and financing to guarantee the sustainability of the programme after a UK exit. Geography over programme lifetime: Kenya

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
202921 Building Resilience and Adaptation to Climate Extremes and Disasters	13.68	17.47	Committed	ODA	Grant	Adaptation	General Environment Protection	To help up to 10 million people, especially women and children, in developing countries cope with extreme climate and weather events such as droughts, cyclones and floods (climate extremes). This will be achieved by doing three things. By making grants to civil society organisations to scale up proven technologies and practices in the Sahel, sub-Saharan Africa and South Asia that help people withstand, and more quickly recover, from climate extremes. By identifying the best ways of doing this, and share this knowledge globally to increase the programme's overall impact. By supporting national governments to strengthen their policies and actions to respond to climate extremes. These will all contribute to the Millennium Development Goals on the eradication poverty and hunger, and environmental sustainability, and also respond to the Humanitarian and Emergency Response Review recommendation that FCDO should integrate the threat from climate change into a Disaster Risk Reduction. Geography over programme lifetime: Myanmar, Ethiopia, Burkina Faso, Kenya, Mali, Mauritania, Niger, Nepal, Sudan, Senegal, South Sudan, Chad, Uganda
204888 Building Resilience Through Asset Creation and Enhancement II – South Sudan (ICF Programme)	11.68	14.92	Committed	ODA	Grant	Adaptation	Agriculture	To reduce hunger gaps, improve long-term food security and mitigate conflict among 400,000 rural poor in five states of South Sudan. By working together beneficiaries earn food or cash in return for identifying and building community assets (such as irrigation ponds). This enables communities to develop and manage their resources against extreme climate damage and shocks. This will contribute to Sustainable Development Goals 1, 2, 13, 15 and 16 to end poverty and hunger; take action on climate; protect life on land and; promote peaceful and inclusive societies for sustainable development. Geography over programme lifetime: South Sudan

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204637 Africa Clean Energy Programme (ACE)	11.44	14.61	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	The programme will catalyse a market based approach for private sector delivery of solar home system (SHS) products and services. This will lead to improved energy access for people in sub-Saharan Africa currently who are currently without modern energy. The programme will support: 1) Technical assistance to improve the enabling environment for a market based approach for private sector delivery of solar home system (SHS) products and services (Policy and Regulatory Reform, investment readiness, learning and Coordination) 2) Finance for businesses wanting to enter new and emerging SHS markets in sub-Saharan Africa for their start up and early commercialisation of ideas 3) Test innovative approaches to stimulating private sector investment and a market development. Geography over programme lifetime: Africa Regional including Mozambique, Malawi, Zambia, Zimbabwe, Tanzania, Rwanda, Uganda, Kenya, Ethiopia, Somalia, Nigeria, Ghana, Sierra Leonne, Senegal

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204867 TEA - Transforming Energy Access	10.98	14.03	Committed	ODA	Grant	Mitigation	Energy Policy	The project is up to £65 million over five years, to support early stage testing and scale up of innovative technologies and business models that will accelerate access to affordable, clean energy services for poor households and enterprises, especially in Africa. The programme will include: i) partnership with Shell Foundation, enabling support to another 30+ early stage private sector innovations. ii) Innovate UK's Energy Catalyst to stimulate technology innovation by UK enterprises; iii) build other strategic clean energy innovation partnerships (e.g. testing a new 'P2P Solar' crowdfunding platform; and scoping a potential new partnership with Gates Foundation on Mission Innovation); iv) skills and expertise development. To support early stage testing and scale up of innovative technologies and business models that will accelerate access to affordable, clean energy services for poor households and enterprises, especially in Africa. Geography over programme lifetime: Sub Saharan Africa, South Asia
204019 Humanitarian Assistance and Resilience in South Sudan (HARISS) 2015 - 2021	9.26	11.83	Committed	ODA	Grant	Adaptation	Emergency Response	To help approximately three million South Sudanese by providing critical life-saving support and helping people to better cope with shocks from conflict, drought and flooding. This programme aims to save the lives of an estimated two million people who will receive at least one form of humanitarian assistance; and build the capacity of an estimated one million people to recover and cope better with shocks. Over five years this programme will provide food, shelter and access to water and health services to millions of vulnerable people, including women and children. Geography over programme lifetime: South Sudan

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204624 WISER - Weather and climate Information and SERvices for Africa	7.35	9.39	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	WISER will help at least 24 million people across Africa (focusing initially on East Africa) to be more resilient to natural disasters and climate change by 2030 by improving early warning systems (giving more time to prepare for heavy rains for example) as well as helping them make better decisions by knowing what the weather and climate is likely to be (enabling them to make better crop choices or alter planting times in farming, for example). We estimate that this will save over £190 million in terms of avoided damage to health, homes, livelihoods and infrastructure between now and 2030. The WISER programme will initially benefit the East African fishing and farming communities, as well as a wide range of African people, including young, old, men and boys and women and girls. Geography over programme lifetime: Africa Regional including Ethiopia, Kenya, Tanzania, Uganda, Rwanda, Burundi
	1.84	2.35	Committed			Mitigation		
203272 Strengthening Health Facilities in the Caribbean	8.65	11.04	Committed	ODA	Grant	Adaptation	Health, General	To provide safer, greener health facilities to deliver care in disasters, generate operational savings and reduce disaster losses. Geography over programme lifetime: Belize, Dominica, Grenada, Guyana, Jamaica, St Lucia, Saint Vincent and the Grenadines
	0.46	0.58	Committed			Mitigation		
205128 Somalia Humanitarian and Resilience Programme (SHARP) 2018-2022	8.97	11.45	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To meet the most urgent humanitarian needs of conflict and disaster affected populations through provision of life-saving assistance and contribute to resilience building of benefitting households to withstand shocks. Geography over programme lifetime: Somalia

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204012 Northern Uganda: Transforming the Economy through Climate Smart Agribusiness (NU-TEC)	7.89	10.07	Committed	ODA	Grant	Adaptation	Agriculture	To increase the resilience to climate change of poor farmers in Northern Uganda, and to increase their incomes. This will be achieved by working with agricultural businesses to supply farmers with cheaper, better and more varied agricultural inputs and services, and to create stronger markets for farmer produce. This will benefit 250,000 households in Northern Uganda, who will adopt new practices, products and markets that will make them more resilient to climate change, while 150,000 households will see measurable increases to income. This will contribute to the MDGs (and their successor targets) by reducing poverty in Uganda. Geography over programme lifetime: Uganda
	0.88	1.12	Committed			Mitigation		
203473 Productive Social Safety Net Programme	8.50	10.86	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	To support the scale up of the Productive Social Safety Net which will reach 1 million households, and these households are the poorest 15%. through the provision of conditional Cash Transfers, Green Public Works and Livelihood Enhancement. This programme will aim to improve the opportunities available to the poorest communities by reducing the depth of income poverty, improving food consumption and increasing their resilience to climate-related shocks. FCDO will also support central government to develop and strengthen systems and institutions to deliver more comprehensive social protection provision that can respond to any future economic, food or climate shocks in Tanzania Geography over programme lifetime: Tanzania
203264 Building Disaster Resilience in Pakistan	8.29	10.58	Committed	ODA	Grant	Adaptation	Emergency Response	FCDO support will strengthen community and household resilience to emergencies and disasters over six years. The programme will aim to build resilience in communities and households in Pakistan to manage the impact of disasters by maintaining or transforming living standards in the face of shocks and stresses without compromising their long-term prospects. Geography over programme lifetime: Pakistan

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
201879 I2I - Ideas to Impact - Testing new technologies and innovative approaches to address development challenges.	3.72	4.75	Committed	ODA	Grant	Adaptation	Industry	I2I stimulates technological innovations addressing intractable development challenges, initially in the focal areas of energy, water and climate, and then increasingly in emerging “frontier” technologies with broader applicability. It tests different funding mechanisms and approaches - including prizes, peer-to-peer financing, Frontier Technology Livestreaming, and innovative cross-government partnerships - for ensuring technology ideas lead to a real-world development impact. Geography over programme lifetime: Developing countries unspecified
	4.55	5.81	Committed			Mitigation		
300230 Transboundary Water Management in Southern Africa	7.39	9.44	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	The project will support countries in Southern Africa to manage their shared water resources, thereby helping 2-3 million poor people to better cope with the impacts of existing climate variability and climate change (especially floods and drought). It will do this by improving assessment and planning concerning these resources, and designing and building water infrastructure such as irrigation schemes, water supply or hydropower schemes. This will help poor and vulnerable people gain access to clean and safe water, produce a predictable agricultural yield and store water for when it is needed during the dry months of the year. The programme will also help countries to communicate hydrological data between themselves – thus providing downstream countries with advance notice of floods and enabling countries to optimise how much water is stored in each country to ensure each has enough to meet their basic requirements. Geography over programme lifetime: Angola, Botswana, Dem. Rep of Congo, Tanzania,Swaziland, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
300303 Rural Electrification in Sierra Leone	7.30	9.33	Committed	ODA	Grant	Mitigation	Energy distribution	To increase access to clean energy through the creation of environmentally and economically sustainable electric mini-grid systems for small remote rural communities in Sierra Leone by 2020. This is expected to directly benefit around 360,000 people in rural Sierra Leone, and indirectly help up to 1.8 million people access low carbon electricity. This will add more than 10 Mega Watts (MW) to the country's power generation capacity of an estimated average peak demand requirement of 300-500 MW. There will be a welfare increase in rural communities in terms of saved fuel costs, improved health and education outcomes, improved communications and access to information and health and safety. The project will also result in a significant reduction in Sierra Leone's future Green House Gas emissions through supported private investment in the installation and operation of renewably-powered mini-grids. Geography over programme lifetime: Sierra Leone
205082 Rural Water for Sudan (RW4S)	6.93	8.84	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	This programme will address the root causes of crisis in Darfur by tackling one of the main drivers of local conflict and poverty – availability of water. Water is scarce and there is competition over its use. This can result in conflict and lead to unsustainable livelihoods, forcing people to migrate to find alternatives. The climate is likely to get hotter and drier, further increasing scarcity of water. The programme will increase the availability of water for drinking and livelihoods for 250,000 people, and will support communities to sustainably manage their water resources for the benefit of all users. This will increase communities' resilience to the impacts of drought, contributing to more sustainable livelihoods and reducing the risk of conflict, overall improving stability in Darfur and reducing the pressure to migrate. In addition, the programme will improve sanitation and hygiene behaviour, improving the health and well-being of communities. Geography over programme lifetime: Sudan

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
205195 Rehabilitation of Freetown's Water Supply System	6.52	8.33	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	The project will increase sustainable access to safe water in Freetown, the capital city, and safe-guard water security and reduce climate change vulnerability. This will be achieved through rehabilitation of water infrastructure for improved public service delivery of water. Geography over programme lifetime: Sierra Leone
203491 Support to Bangladesh's National Urban Poverty Reduction Programme (NUPRP)	5.58	7.13	Committed	ODA	Grant	Adaptation	Urban development and management	Improvement in the integration of poor communities into municipal planning, budgeting and management, with a particular focus on women and girls and climate resilience; piloting of options for scale up and lesson learning at national level to inform overall urban policy and poverty reduction. Geography over programme lifetime: Bangladesh
	0.62	0.79	Committed			Mitigation		
204640 Zambia Health Systems Strengthening Programme	6.07	7.75	Committed	ODA	Grant	Adaptation	Population Policies/ Programmes & Reproductive Health	The Zambia Health Systems Strengthening programme aims improve the health of women and girls in Zambia across the continuum of care from birth, childhood and motherhood. This together with our other parallel interventions to strengthen the health system, will by 2021 result in a reduction in child and maternal deaths by 25% and 15% respectively and contribute towards attainment of the sustainable development goal for health. The nutrition status of 500,000 children, women and young girls will be improved and 270,000 girls and women gain access to family planning. It will ensure that Zambia is able to prevent, detect, and raise a comprehensive response to disease outbreaks and the effects of climate change such as drought. Geography over programme lifetime: Zambia
300102 The Future of Agriculture in Rwanda (FAiR)	5.95	7.60	Committed	ODA	Grant	Adaptation	Agriculture	The programme will sustainably increase agricultural productivity and benefit poor farming households, through greater commercialisation of Rwandan agriculture. This will lead to an enhanced contribution of agriculture to economic growth, food security and less vulnerability to climate shocks and variablity and poverty reduction Geography over programme lifetime: Rwanda

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	Domestic currency (£m)	*USD ($m)*						
205188 Increasing access to electricity in Sierra Leone	5.61	7.17	Committed	ODA	Grant	Mitigation	Energy distribution	To increase access to improved, affordable and sustainable electricity supply for human development and wealth creation in Sierra Leone by 2018. through a combination of interventions supporting hard infrastructure, institutional reform and operational improvement. Geography over programme lifetime: Sierra Leone
204033 Support to Rural Water Supply, Sanitation & Hygiene in Tanzania	5.00	6.39	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To improve the health and socio-economic status of poor people by providing access to clean water, sanitation and hygiene services in rural areas of Tanzania including the resilience of supply and infrastructure to the effects of climate change. This will benefit 2.8 million people. This contributes towards our MDGs by supporting development of water infrastructure and promotion of hygiene and sanitation services. And will result in sustainability of water and sanitation services by 2022. Geography over programme lifetime: Tanzania
205271 Support to the International Agriculture Research Centres developing and delivering agriculture technologies and knowledge to reduce poverty, hunger and adapt to climate change.	4.92	6.28	Committed	ODA	Grant	Adaptation	Agriculture	To contribute to poverty reduction, improvements in nutritional status, and adaptation to climate change in South Asia and Africa in the face of climate change and resource scarcity, by developing new technologies, products and knowledge which promote agricultural productivity and increase the resistance of crops to diseases and pests. The programme will lead to increased agricultural productivity; increased production and consumption of nutritious vegetables; and improved food security and incomes for rural households in Africa and South Asia. Geography over programme lifetime: Multiple countries

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204603 Multi-Year Humanitarian Programme in Pakistan	4.71	6.01	Committed	ODA	Grant	Adaptation	Emergency Response	Support for up to three million of the most vulnerable people affected by natural disaster and conflict. This will cover both immediate relief and early recovery interventions for shelter, food, non-food items, water and sanitation, livelihood and protection needs, depending on the emergency, including enhancing resilience of the beneficiary communities to climate extremes such as floods and droughts. This programme will also support developments in the UN and local civil society which are required for humanitarian responses to be more locally owned and effective in future, as well as effective monitoring and evaluation, targeted active research and piloting. Geography over programme lifetime: Pakistan
202098 Rural and Agriculture Markets Development programme for Northern Nigeria (PrOpCom Mai-karfi)	4.16	5.31	Committed	ODA	Grant	Adaptation	Industry	To increase employment and improve productivity in selected rural and agricultural market systems in northern Nigeria. Improve resilience of poor men and women, in selected rural markets in northern Nigeria, to the negative impacts of climate change and encourage low carbon growth. To increase the incomes by between 15% and 50% of over 710,000 poor people in the north of Nigeria through facilitating change in key market sectors by March 2021. Geography over programme lifetime: Nigeria
	0.51	0.66	Committed			Mitigation		
204842 Promoting Conservation Agriculture in Zambia	3.05	3.90	Committed	ODA	Grant	Adaptation	Agriculture	To raise agricultural productivity in Zambia, particularly small scale farmers, using climate smart agriculture techniques and facilitating commercial relationships with agriculture companies Geography over programme lifetime: Zambia
	1.31	1.67	Committed			Mitigation		
204623 Forestry, Land-use and Governance in Indonesia	4.32	5.52	Committed	ODA	Grant	Mitigation	Forestry	To reduce greenhouse gas emissions and deforestation in Indonesia as part of the UK's efforts to avoid catastrophic climate change that would hit the very poorest first and set back global efforts at poverty reduction Geography over programme lifetime: Indonesia

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
300351 Second phase of FCDO's Support to the Private Infrastructure Development Group (PIDG).	4.23	5.40	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	The aim of PIDG is to mobilise private investment in infrastructure, including renewable energy, in order to increase service provision for the poor, boost economic growth, trade and jobs to alleviate poverty in the world's poorest countries. Geography over programme lifetime: Multiple countries
203624 On and off Grid Small Scale Renewable Energy in Uganda	4.15	5.30	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To improve the environment for private investment in Uganda's renewable energy sector by accelerating the market for off grid solar energy and supporting the construction of at least 15 on-grid small scale power plants. This will increase Uganda's energy production by approximately 20%, improve access to clean and modern energy for over 200,000 households and businesses or 1.2m people; mobilise up to £240 million in private finance and stabilise Uganda's power sector finances by saving approximately $260m to 2.7bn during the period 2013-35, and lead to greenhouse gas emission savings of between 1 and 10 $MtCO_2e$. Geography over programme lifetime: Uganda
203185 Asia Regional Resilience to a changing climate (ARRCC)	4.14	5.29	Committed	ODA	Grant	Adaptation	General Environment Protection	A regional partnership in South Asia among the research community, its funders, and users foster a more coordinated and interactive climate research environment that supports good decision making Geography over programme lifetime: Asia Regional

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204984 Climate Smart Development for Nepal	2.05	2.61	Committed	ODA	Grant	Adaptation	Government & Civil Society	This will help Nepal to cope with impacts of climate change (CC) and promote clean development. It will provide strategic support to the Govt of Nepal to design and implement CC policies, to integrate resilience throughout government planning. This will:Improve resilience of 700,000 poor & vulnerable people (especially women) to floods, landslides, droughts in most remote districts;Improve resilience of businesses in 5 growing urban centres & 3 river basins through investments in urban planning, large scale irrigation systems & flood management;Facilitate connection of over 25,000 households to new micro-hydro power installations; connect over 70,000 homes to solar power & install RET in more than 200 schools/health clinics;Develop industry standard for 'clean' brick production and enable over half of the brick kilns (at least 400) to adopt more efficient technologies;Improve design of future CC programming & beyond through generation of world class evidence Geography over programme lifetime: Nepal
	2.05	2.61	Committed			Mitigation		
300111 Low Energy Inclusive Appliances	3.91	4.99	Committed	ODA	Grant	Mitigation	Energy Policy	To undertake research to accelerate the availability, affordability, efficiency and performance of Low Energy Inclusive Appliances (LEIA) suited to developing country contexts. Domestic and small-industrial electrical appliances are key to increasing the impact of energy access for poor consumers, expanding the markets for household solar and mini-grid systems, and enabling the most efficient use of available power where the grid is unreliable. Geography over programme lifetime: Developing countries unspecified

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
205138 Post-Earthquake Reconstruction in Nepal - Building Back Better	3.82	4.87	Committed	ODA	Grant	Adaptation	Reconstruction Relief & Rehabilitation	Establish partnerships with local & central government, communities and businesses to support the (i) districts effected by the Earthquake to “build back better” including leading to more resilient (including climate resilient) infrastructure and institutions; (ii) the most vulnerable recover their livelihoods and assets; and (iii) the Government of Nepal to plan for and manage the response to the earthquake. Geography over programme lifetime: Nepal
300126 CLARE - CLimate And REsilience Framework Programme	2.96	3.78	Committed	ODA	Grant	Adaptation	General Environment Protection	To develop new, more demand responsive evidence, innovation and capacity to enable developing country governments and communities to better address climate change challenges and opportunities and develop more effective disaster risk management and recovery. The programme will support research to improve our understanding of weather and climate systems across African and the likely impacts of future change. It will also support research and innovation focused on low-carbon and climate resilient technology as well as help strengthen local capacity to do and use cutting edge climate research and evidence for development. Geography over programme lifetime: Developing countries unspecified
	0.74	0.94	Committed			Mitigation		

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
300137 Regional Economic Development for Investment and Trade (REDIT) Programme	1.80	2.30	Committed	ODA	Grant	Adaptation	Trade Policies & Regulations	The programme aims to increase sustainable and shared prosperity in Kenya by increasing Kenya's trade with the region and the rest of the world. Specifically, the programme will (i) invest in improving the efficiency and capacity of transport, logistics and trade infrastructure at Mombasa Port and key border points; (ii) invest in systems to improve trading standards, reduce non-tariff barriers and enhance transparency in trade processes; (iii) improve the regulatory and policy environment for trade; and (iv) support private sector advocacy for trade competitiveness, the export capacity of Kenyan businesses and the greater participation of women and small and growing businesses in trade. ICF component is supporting Kenya Ports Authority to develop and implement a Green Port Policy to help the port adapt and become resilient to climate change. Key objectives include introducing new climate friendly technologies into the port's operations. Geography over programme lifetime: Kenya
	1.80	2.30	Committed			Mitigation		
204437 Deepening Democracy Programme	2.46	3.14	Committed	ODA	Grant	Adaptation	Government & Civil Society	To improve the Kenyan Government's accountability to its citizens by delivering peaceful, transparent, inclusive elections and providing support to non-governmental organisations, oversight bodies and independent commissions that can influence and deliver reforms thereby supporting the goal of making Kenya a more stable democracy. The project aims to improve county government planning, budgeting, human resource management, results, performance management and citizen engagement. In each of these areas, UK support will focus on governance, health, climate change and local economic development. Geography over programme lifetime: Kenya
	1.05	1.34	Committed			Mitigation		

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
205045 Zimbabwe Resilience Building Fund Programme(ZRBF)	2.80	3.58	Committed	ODA	Grant	Adaptation	General Environment Protection	To improve the resilience capacity of households affected by climatic shocks and trends through inclusive economic development. The programme will have a risk financing mechanism to make timely, appropriate and predictable funding available for communities that experience large scale humanitarian shocks. The program will also build evidence to improve the policy environment and stimulate service provision to enhance household and community resilience. Geography over programme lifetime: Zimbabwe
	0.70	0.89	Committed			Mitigation		
203835 FCFA - Future Climate For Africa	2.23	2.85	Committed	ODA	Grant	Adaptation	General Environment Protection	The Future Climate for Africa programme supports world-leading science and technology to enhance understanding and prediction of sub-Saharan African climate and, through working closely with African stakeholders, bring this knowledge into use in informing major decisions, such as infrastructure investments, urban planning and national policy. The programme has three main objectives: firstly, to produce world-leading science to advance knowledge of African climate variability and change and enhance prediction of future African climate; secondly, to drive improved knowledge, methods and tools on how climate information and services can be better designed for, delivered and integrated into major decisions today and thirdly, to support international collaboration and the development of scientific capacity in Africa. Geography over programme lifetime: Multiple countries
	0.96	1.22	Committed			Mitigation		
205268 Strengthening humanitarian preparedness and response in Bangladesh	3.13	3.99	Committed	ODA	Grant	Adaptation	Emergency Response	This programme will deliver improvement in disaster preparedness and response for large-scale catastrophic emergencies (e.g. earthquakes and cyclones) and recurrent, predictable events such as flooding as well as providing predictable support to Rohingya refugees and vulnerable refugee hosting communities. Geography over programme lifetime: Bangladesh

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	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
300161 Zambia Social Protection Expansion Programme Phase II	3.00	3.83	Committed	ODA	Grant	Adaptation	Emergency Response	To provide small grants to vulnerable households especially those with disabled and elderly persons in order for them to have regular monthly income to take care of their basic needs and increase resilience to climate shocks. Geography over programme lifetime: Zambia
204059 Supporting Structural Reform in the Indian Power Sector	2.57	3.28	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	In line with the UK government's aid policy and new development partnership with India, the 'Supporting Structural Reform in the Indian Power Sector' programme will improve the efficiency, reliability and sustainability of electricity supply in India through technical expertise, not through traditional grant support. It will provide world class expertise to support the market reforms and scale up of renewable energy supply that the Indian power sector needs to support growth and create jobs. It will work at the Central level and in upto three States which may include FCDO focus states such as Odisha, Andhra Pradesh and Madhya Pradesh. Geography over programme lifetime: India
202328 Khyber Pukhtunkhwa Education Sector Programme	2.44	3.12	Committed	ODA	Grant	Mitigation	Basic Education	To improve primary and secondary education in Khyber Pakhtunkhwa by providing up to £283.2million in technical assistance, financial aid and infrastructure which aims to benefit all primary and lower secondary children in the province by 2020. Infrastucture will aim to have a lower carbon footprint and be sited away from flood prone areas. This programme targets primary enrolment specifically girl child enrolment and female literacy which contributes towards Millennium Development Goals 2 and 3 Geography over programme lifetime: Pakistan

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204956 CONGO - Improving Livelihoods and Land Use in Congo Basin Forests	1.21	1.55	Committed	ODA	Grant	Adaptation	Forestry	To improve the the livelihoods of forest dependent communities and reduce deforestation in the Congo Basin by providing support to forest zoning, independent forest monitoring, civil society advocacy and the strengthening of legal frameworks for community forestry, as well as direct investments in community forest enterprises. The programme is expected to benefit 2.4million beneficiaries (direct and indirect). The programme will also have a demonstration effect, building a body of evidence on Community Forestry in the Congo Basin. Geography over programme lifetime: Cameroon, Rep. of Congo, Dem. Rep. of Congo, Central African Republic, Gabon
	1.21	1.55	Committed			Mitigation		
205027 Delivering climate resilient Water, Sanitation and Hygiene in Africa and Asia	2.40	3.06	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	This programme will improve the resilience of water and sanitation services supports development of health surveillance systems to identify and respond to climate-related changes in the incidence of water and sanitation related diseases. Geography over programme lifetime: Ethiopia, Bangladesh, Nepal, Malawi, Mozambique
204656 Building Urban Resilience to Climate Change in Tanzania	2.40	3.06	Committed	ODA	Grant	Adaptation	Urban development and management	To build urban resilience to current climate variability and future climate change in Tanzania's cities and towns through improved data and evidence, urban planning, and infrastructure provision for sustainable economic growth and development. Geography over programme lifetime: Tanzania
300185 Supporting a Sustainable Future for Papua's Forests	0.48	0.61	Committed	ODA	Grant	Adaptation	Forestry	To catalyse a number of urgent climate initiatives that will accelerate the transition to a low carbon economy and prevent planned deforestation in the Indonesian provinces of Papua. Geography over programme lifetime: Indonesia
	1.90	2.43	Committed			Mitigation		

Recipient country/region/project/programme	Total amount: Climate-specific: Domestic currency (£m)	Total amount: Climate-specific: USD ($m)	Status: Provided, Committed, Pledged	Funding source: ODA, OOF, Other	Financial instrument: Grant, Concessional loan, Non-concessional loan, Equity, Other	Type of support: Mitigation, Adaptation, Cross-cutting, Other	Sector: Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	Additional Information
202698 Kenya Market Assistance Programme (MAP)	1.76	2.25	Committed	ODA	Grant	Adaptation	Agriculture	To reduce poverty in Kenya by enabling poor people to benefit from better functioning markets, including through mainstreaming climate resilience into market interventions, and by building greater awareness among influential decision makers of how markets can work better for the poor. This will increase household incomes of 148,000 small scale farmers and entrepreneurs - of whom 33% are women - by an average of over 20% by 2018. 36,000 jobs for women and 73,000 for men and male youth will also be created. Geography over programme lifetime: Kenya
	0.59	0.75	Committed			Mitigation		
204788 Kenya Devolution Support Programme	1.62	2.06	Committed	ODA	Grant	Adaptation	Government & Civil Society	The Kenyan Constitution, adopted by referendum in 2010, introduced far reaching devolution to 47 newly-established counties. Hopes are high that devolution will improve accountability and service delivery and contribute to poverty reduction. The purpose of this programme is to build and improve public services for Kenyan citizens, particularly focusing at the county level where poverty exists and where public service delivery is poor. The programme will improve the ability of county governments to better plan, deliver and monitor the delivery of public services. This includes working with county governments to strengthen public financial management systems (e.g. improving accounting, audit and procurement systems) to ensure that public money is effectively spent and can be accounted for. It also includes a focus on critical services for example health and natural resource management (such as water scarcity due to climate change). The programme will help county governments to improve planning and allocation of budgets Geography over programme lifetime: Kenya
	0.69	0.88	Committed			Mitigation		

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
205222 Cities and Infrastructure for Growth (CIG)	2.11	2.69	Committed	ODA	Grant	Mitigation	Energy Policy	The programme will provide technical support on city and regional interventions resulting in increased inclusive economic growth and job creation. The interventions will help city economies to become more productive, deliver access to reliable, affordable, renewable power for businesses and households, and strengthen investment into infrastructure services, including from the UK. Geography over programme lifetime: Myanmar, Uganda, Zambia, Ethiopia
300705 Delivering ambition of the United Nations Secretary General's Climate Summit 2019 to build resilience to climate change	2.11	2.69	Committed	ODA	Grant	Adaptation	General Environment Protection	Delivering ambition of the United Nations Secretary General's Climate Summit 2019 to build resilience to climate change Geography over programme lifetime: Developing countries unspecified
204988 African Agriculture Technology Foundation (AATF) Phase III (2015-2020)	2.05	2.62	Committed	ODA	Grant	Adaptation	Agriculture	The expected impact of support to the proposed intervention is increased productivity of small-holder farmers in Sub-Saharan Africa, including scaling up of crops resilient to climate shocks such as drought. This impact will be achieved through two outcomes a. Increased access/availability of appropriate agricultural technologies for small-holder farmers in targeted countries in Sub-Saharan Africa. b. A financially sustainable organisation/mechanism that is responsive to the needs of small-holder farmers in ensuring that market failures in the development and adoption of appropriate agricultural technologies continue to be addressed. Geography over programme lifetime: Africa

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
202697 Punjab Education Support Programme II	2.03	2.59	Committed	ODA	Grant	Mitigation	Basic Education	To improve access, retention and the quality of education for all children in primary and secondary schools of Punjab Province in Pakistan. All government school children (6 million primary, 4 million secondary) and children attending school through the Punjab Education Foundation (around 2.2 million) will have benefited from UK support in Punjab by March 2019. Buildings will be sited and constructed in environmentally sound and climate resilient ways (such as to build resilient to floods), testing new approaches including using climate-friendly local materials. Geography over programme lifetime: Pakistan
202844 Southern Agriculture Growth Corridor Programme in Tanzania	2.01	2.57	Committed	ODA	Grant	Adaptation	Transport & Storage	To raise rural incomes and increase food security by contributing to the improvements in the business environment for commercial agriculture in Tanzania (especially the southern corridor), as well as growth in number and scale of commercial agribusinesses and substantial improvement in the market operations of a number of agricultural commodity markets. This includes ensuring infrastructure is climate resilient, such as no weather-related road closures. The programme is expected to benefit 100,000 rural households by March 2015 and over 230,000 households by end of the Programme in 2017 Geography over programme lifetime: Tanzania

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
300237 Strengthening Climate Resilient Systems for Water, Sanitation and Hygiene Services in Ethiopia (SCRS - WASH)	1.00	1.28	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	Improve access to climate-resilient water and improved sanitation services and good hygiene practices for 1.2m people in the prioritised drought-affected and drought-prone areas of Ethiopia. The proposed Strengthening Climate Resilient Systems for Water, Sanitation and Hygiene Services in Ethiopia (SCRS-WaSH) programme will contribute to the Government of Ethiopia's Climate Resilient WaSH provision to drought-prone areas. the programme aims to realise this through a combination of targeted Financial Aid and Technical Assistance support. The FA will focus primarily on improving climate-resilient WaSH facilities which ensure year-round access to resilient WaSH services at household, community and institution levels in the targeted intervention areas. This will be complemented with TA support that focuses on strengthening the WaSH delivery systems. Geography over programme lifetime: Ethiopia
	1.00	1.28	Committed			Mitigation		
300489 Africa Food Trade and Resilience programme	1.96	2.50	Committed	ODA	Grant	Adaptation	Agriculture	The programme will stimulate an increase in regional food trade in sub Saharan Africa (SSA), contributing to satisfying a growing food demand and to addressing food shortages through regional food production, processing and trade, and generating more rural jobs, climate resilience and income for farmers. The programme will: (i) work with companies that source, process, and trade food in the region, to maximise investment, coordination and benefits to smallholder farmers and (ii) contribute to improve the transparency and predictability of government policies to unlock regional food trade. By 2023, we expect the programme will increase income for 1.8 million farming families. UK funding will de-risk and stimulate over £100 million in private sector investment aimed at enhancing smallholder farmers' productivity and resilience. Geography over programme lifetime: Africa Regional

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204338 Sustainable Urban Economic Development Programme (SUED)	1.16	1.48	Committed	ODA	Grant	Adaptation	Urban development and management	FCDO is supporting emerging urban centres in Kenya to put in place sustainable urban economic plans; improve the investment climate and draw in investment for key climate-resilient infrastructure and value chain projects. This will include integrating digital technologies to build 'smart' towns/cities that improve the quality and performance of urban services and enable a better quality of life. Geography over programme lifetime: Kenya
	0.77	0.99	Committed			Mitigation		
300166 Khyber Pakhtunkhwa Merged Districts (KPMD) Support Programme	1.93	2.46	Committed	ODA	Grant	Adaptation	Conflict, Peace & Security	The programme will work on the Basic Heath, Education, Rule of law, Civilian Peace-Building, Conflict Prevention and Resolution, Public Sector Financial Management, Climate Change and Economic and Development Policy/Planning for the Tribal Districts of Khyber Pakhtunkhwa (previously called the Federally Administered Tribal Areas) in Pakistan. Geography over programme lifetime: Pakistan
205231 Centre for Disaster Protection (CDP)	1.92	2.45	Committed	ODA	Grant	Adaptation	Banking & Financial Services	To protect poor and vulnerable people, save lives and help developing countries to get back on their feet more quickly after a disaster by working with governments to strengthen planning, embed early action, and use "risk financing" tools like insurance and contingent credit to finance more cost-effective, rapid and reliable response to emergencies. It aims to empower governments to build resilience to natural disasters and climate change, and take ownership of their risks, with more assistance delivered through pre-financed government-led systems. Funded by the UK Government Prosperity Fund. Geography over programme lifetime: Belize, Sierra Leone, Grenada, Jamaica, St Lucia, Pakistan, Indonesia, Philippines, Sri Lanka, Myanmar, Kenya, Nigeria, Ghana, Zambia, Mozambique, Malawi, Bangladesh, Montserrat, St Vincent & The Grenadines, Laos, Ethiopia, Somalia, Takjikistan, Nepal, Ivory Coast

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
205115 Adapt Environmental and Climate Resilience in Sudan	1.75	2.23	Committed	ODA	Grant	Adaptation	General Environment Protection	To increase understanding and integration of climate resilience and environmental management into delivery, plans and policy in Sudan. Geography over programme lifetime: Sudan
205258 Green Economic Growth for Papua	1.62	2.07	Committed	ODA	Grant	Mitigation	Forestry	The programme aims to promote green growth in Papua. It will contribute to the government of Papua's vision and spatial plan that intends to preserve 90 per cent forest cover in the province. In doing so the programme will support the provinces transition away from a high carbon business as usual growth trajectory onto a low carbon development pathway. The programme is designed to address the key barriers to private sector development in Papua that will enable firms to pursue low carbon business opportunities. It will work directly with firms, the financial sector, and the public sector to improve the commercial and environmental sustainability of small and medium sized enterprises. In addition, the programme will generate knowledge on how green growth can be implemented in Indonesia and globally. Geography over programme lifetime: Indonesia
203180 Climate Proofing Growth and Development in South Asia	1.52	1.94	Committed	ODA	Grant	Adaptation	Government & Civil Society	Integrate climate change into development planning, budgeting and delivery in national and sub-national governments.This will done by strengthening planning, budgeting, delivery mechanisms, building awareness and capacity of stakeholders through technical and some implementation support. It will help to mobilise domestic and International finance. Sharing lesssons and knowledge in South Asia is a key element of the project. Geography over programme lifetime: Afghanistan, India, Nepal, Pakistan

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
205071 Central Asia South Asia (CASA 1000) Electricity Transmission Project	1.50	1.92	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	Increased energy trade between Central Asia (initially Tajikistan and Kyrgyz Republic) and South Asia (initially Afghanistan and Pakistan) for improved energy services leads to improved productivity, private investment, regional trade, and pro-poor growth through access to jobs and services. Geography over programme lifetime: Asia Regional
203871 Energy Security and Resource Efficiency in Somaliland	1.19	1.52	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To support Somaliland in diversifying its energy mix, enhancing resilience and facilitating an enabling institutional and regulatory environment for the expansion of access to electricity. Geography over programme lifetime: Somalia
	0.30	0.38	Committed			Mitigation		
300067 Water, Environmental Sanitation and Hygiene Programme	1.45	1.86	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To provide sanitation and hygiene services in Freetown. Establishing and expanding sustainable waste management services in three large towns and improving water, sanitation and hygiene services in rural areas and in two small towns. Includes increasing water security and building resilience to future water scarcity as a result of climate change. Geography over programme lifetime: Sierra Leone
300187 Strengthening Palm Oil Sustainability in Indonesia	1.35	1.72	Committed	ODA	Grant	Mitigation	Forestry	The programme will support the government of Indonesia to strengthen sustainability in the palm oil sector, and in doing so aim to reduce the risk of further palm-oil driven deforestation. To achieve this the programme will address concerns that undermine sustainability, such as illegality and unsustainable practices, and implement measures that aim to encourage greater market acceptance for sustainably produced palm oil. The programme will focus largely on independent smallholder producers, with the aim of improving their prosperity. Geography over programme lifetime: Indonesia

Recipient country/region/project/programme	Total amount: Climate-specific: Domestic currency (£m)	Total amount: Climate-specific: USD ($m)	Status: Provided, Committed, Pledged	Funding source: ODA, OOF, Other	Financial instrument: Grant, Concessional loan, Non-concessional loan, Equity, Other	Type of support: Mitigation, Adaptation, Cross-cutting, Other	Sector: Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	Additional Information
300003 Strengthening disaster resilience in Nepal	1.33	1.70	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	This project will strengthen disaster resilience in Nepal by working with urban centres to build and plan more safely; supporting the strengthening of critical public infrastructure to earthquakes; working to strengthen national capacity to respond to crises and ensure that the international community is prepared; and ensuring that the UK is able to support a humanitarian response should a crises hit. Geography over programme lifetime: Nepal
205165 Karamoja Nutrition Programme (KNP)	1.30	1.65	Committed	ODA	Grant	Adaptation	Health, General	The Karamoja Nutrition Programme will deliver services to treat acute malnutrition; strengthen health service planning and delivery; improve access to supplements that prevent micronutrient deficiencies for mothers and children; and test and scale initiatives to prevent malnutrition in Karamoja – including through crop bio-fortification. It will strengthen climate resilience through operation & maintenance of water supply and sanitation systems in selected health centers in the semi- arid region of Karamoja Uganda. Geography over programme lifetime: Uganda
204495 Support to Trademark East Africa Rwanda (TMEA) Rwanda Country Programme - Strategy II	0.51	0.65	Committed	ODA	Grant	Adaptation	Trade Policies & Regulations	TMEA will strengthen climate resilience by supporting climate-smart infrastructure development and export diversification. Examples include supporting the government and private sector to develop more efficient – and climate resilient – port infrastructure that saves energy and reduces emissions, at the same time as increasing trade flows; creation of logistics hubs in secondary cities, reducing inefficient empty backhaul truck journeys, so reducing average emissions per tonne-km transported; and supporting better data on trade-related carbon emissions gathered through our ICT4 trade programme. Geography over programme lifetime: Rwanda
	0.77	0.98	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
203674 Solar Nigeria Programme	0.19	0.24	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To improve the welfare outcomes of the currently underserved communities in Lagos state and Northern Nigeria by making a significant financial contribution towards the solar power electrification of public institutions, such as schools and hospitals. The intervention is expected to, by year 2020, ensure improved welfare outcomes for more than 2.8 million people using domestic solar photovoltaic (PV) systems, with 190,000 school pupils and 4.7 million clinic patients benefiting from public institutions with PV systems, create more than 3000 jobs and ensure greater effectiveness of FCDO's other health and educational sector intervention in Nigeria. Geography over programme lifetime: Nigeria
	1.08	1.38	Committed			Mitigation		
203488 Transparency and Right to Information	1.27	1.62	Committed	ODA	Grant	Adaptation	Government & Civil Society	To increase transparency and accountability in Bangladesh by improving systems for management and proactive publication of official information that is relevant and accessible, timely and accurate, and by enabling state reformers, businesses and social activists to hold officials and decision makers answerable for their actions across a range of services including health, education, local government, climate finance and land administration Geography over programme lifetime: Bangladesh
203904 Multi-Year Humanitarian Support to Afghanistan	1.13	1.44	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To provide support to the most vulnerable groups in Afghanistan to have access to timely, appropriate and cost-effective humanitarian aid, have fewer life-critical needs, build the capacity of communities to mitigate the risk of natural disasters, including climate risk mitigation, and to better respond to these events when they occur. Geography over programme lifetime: Afghanistan
	0.13	0.16	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
203427 Accelerating Investment and Infrastructure in Nepal	1.09	1.40	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To accelerate private investment and economic growth in Nepal by providing technical expertise to help Nepalese institutions develop major infrastructure (including renewable energy); improve the business climate for domestic and foreign investors; improve the implementation of economic policy and test new approaches for local economic development. This will result in at least £600 million of private investment into growth-boosting sectors and a reduction by at least 10% in time or cost for at least five regulatory processes perceived as burdensome by the private sector. Geography over programme lifetime: Nepal
203516 Monitoring , Evaluation and Learning from the International Climate Fund	0.54	0.69	Committed	ODA	Grant	Adaptation	General Environment Protection	The purpose of the programme is to provide the evidence and learning to increase the effectiveness and measure the impact of the UK's international climate funding. Geography over programme lifetime: Developing countries unspecified
	0.54	0.69	Committed			Mitigation		
203998 Green Mini-Grids Kenya	1.06	1.35	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	Support for project preparation and leveraging of private investment in Green Mini-Grids (GMGs) in Kenya Geography over programme lifetime: Kenya
300298 Humanitarian Response in Mozambique	1.03	1.32	Committed	ODA	Grant	Adaptation	Emergency Response	To improve the long term needs of the people of Mozambique to the impact of drought exacerbated by the El Nino. This project will improve poor people access to a wide range of essential services in the short and long term including clean water, access to food (short and long term) and livelihoods. The programme will improve the sustainability of farmers to protect their crops against drought. Geography over programme lifetime: Mozambique

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204773 Applied Research on Energy and Growth	0.20	0.25	Committed	ODA	Grant	Adaptation	Energy Policy	Assisting policy makers in Low Income Countries to make better decisions about when, and how, to prioritise investment in high cost energy infrastructure. Through improved research and evidence on how to maximise the economic benefits of large scale energy projects, and a better understanding of how to bring the benefits of modern energy services to poorer people in those countries. Geography over programme lifetime: Developing countries unspecified
	0.80	1.02	Committed			Mitigation		
202038 Sustainable Crop Production Research for International Development (SCPRID)	0.95	1.21	Committed	ODA	Grant	Adaptation	Agriculture	The purpose of the project is to develop new science and technology to support the development of new crop varieties with more resistance and less vulnerability to biotic and abiotic shocks which will result from new and emerging crop pests and diseases, climate change and water stress. Geography over programme lifetime: Developing countries unspecified
203911 India: Infrastructure Equity Fund - Investment in small infrastructure projects in India's poorest states	0.94	1.20	Committed	ODA	Equity	Mitigation	Energy generation, renewable sources	To improve access to better quality transport, clean energy and basic urban services for households and businesses, by investing in equity to private sector-led infrastructure projects. This will benefit an estimated 280,000 people with improved infrastructure services. Geography over programme lifetime: India
300245 Regional Vulnerability Assessment and Analysis Programme	0.94	1.20	Committed	ODA	Grant	Adaptation	General Environment Protection	Supporting countries in the Southern Africa Development Community to measure vulnerability to climate change and use this to inform and strengthen emergency and development responses. Geography over programme lifetime: Angola, Botswana, Dem. Rep. of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
201857 Market Development in Northern Ghana	0.94	1.20	Committed	ODA	Grant	Adaptation	Agriculture	To improve incomes and increase resilience of poor farmers and small-scale rural entrepreneurs in Northern Ghana Geography over programme lifetime: Ghana
300686 Support for the Climate Resilience Execution Agency of Dominica	0.94	1.19	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To provide support for the operation of the Climate Resilience Execution Agency of Dominica from 2019-2023 in order to implement Dominica's climate resilience and recovery plan. The Climate Resilience Execution Agency of Dominica is expected to support delivery of key recovery and reconstruction projects, build capacity and transform systems in the public sector so that Dominica is able build back better post Hurricane Maria and quickly recover from future disasters. Geography over programme lifetime: Dominica
300524 Strengthening Disaster Recovery and Resilience in the Caribbean	0.53	0.67	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	The programme will help protect poor and vulnerable people, ensuring action is gender responsive and inclusive, save lives and assist countries to get back on their feet more quickly after a disaster, by working with ODA-eligible Caribbean governments to strengthen preparedness and public financial investment, speed up recovery and reconstruction, as well as deliver more cost-effective, rapid and reliable response to emergencies. This programme is part of a £19m package of support to the Caribbean region following the devastating impacts of 2017 hurricane season which collectively will strengthen resilience of the region to future disaster events and climate change. Geography over programme lifetime: Multiple countries
	0.35	0.45	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204916 Strategic Partnership Arrangement II between FCDO and BRAC	0.74	0.95	Committed	ODA	Grant	Adaptation	Basic Education	To provide support to BRAC's development programmes to improve access to quality basic services (health, education, water and sanitation), help the poorest, most marginalised people across the whole of Bangladesh graduate from extreme poverty, support inclusive growth and help build effective formal and informal institutions. Climate finance will be integrated across BRAC's programmes to strengthen the resilience of BRAC's investments and the communities they serve. UK support will include: helping over 950,000 children (600,000 girls) gain a decent education; providing additional nutritional support to 11 million people (7 million women and girls); helping 5.7 million girls and women gain access to family planning services; providing at least 75,000 people with sustainable access to clean water and sanitation; supporting over 80,000 women to better cope with the effects of climate change; and lifting 240,000 women and their families (over 960,000 people) out of extreme poverty. Geography over programme lifetime: Bangladesh
300110 Smart Urban Development in Indian States (SmUDI)	0.28	0.35	Committed	ODA	Grant	Adaptation	Urban development and management	Provide UK support on urban governance, planning, finance and city partnerships to deliver Government of India's urban development programmes in select UK-India partner cities. The support will bring the best expertise from the UK to help create economically vibrant, safe and climate resilient cities in India. Geography over programme lifetime: India
	0.41	0.53	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
300424 Reducing Deforestation Through Improved Spatial Planning in Papua Provinces, Indonesia	0.63	0.80	Committed	ODA	Grant	Mitigation	Forestry	The objective of the programme is to support Indonesia and the provinces of Papua and West Papua to improve spatial plan processes and implementation in order to prevent deforestation and reduce greenhouse gas emissions. Technical assistance will be provided to improve the revision and implementation of Papua and West Papua provincial spatial plans; to improve transparency and build constituency in spatial planning at provincial level; and to foster national policy dialogue and engagement to support Papua's commitment to protect its forest. Support will be focused largely on two provinces – Papua and West Papua – and relevant national ministries (particularly Ministry of Home Affairs and Ministry of Agrarian and Spatial Planning), which offer the potential to realise significant reductions in emissions through improved land use planning and economic development strategies which recognise the value of forests to the provincial economies. Geography over programme lifetime: Indonesia
300186 Economics of Low Carbon Development for Indonesia	0.62	0.80	Committed	ODA	Grant	Mitigation	General Environment Protection	To contribute to national debate on economic costs and benefits of unilateral and regional actions on mitigation and adaptation; to raise awareness about the urgency of climate change challenges and their potential socioeconomic impact on Indonesia, while informing other stakeholders (e.g., civil society, academia, media, nongovernment organizations, private sector, and aid agencies) of the same; and to indirectly support government and private sector actions in Indonesia to mitigate and adapt to climate change. Geography over programme lifetime: Indonesia
204837 BRILHO - Energy Africa Mozambique	0.18	0.23	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To increase domestic and business energy access through private sector innovation and investment, and government support, through supply of dispersed off-grid energy solutions and improved cook stoves. Geography over programme lifetime: Mozambique
	0.42	0.53	Committed			Mitigation		

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
204020 Climatescope - Clean Energy Investment Index	0.59	0.75	Committed	ODA	Grant	Mitigation	Energy Policy	To increase private investment in renewable energy projects in developing countries by providing investors with comparable and robust policy and market information in an easily accesible data tool. Renewable energy is becoming a cheaper solution than fossil fuels in many developing countries and by providing better information to potential investors, Climatescope supports increasing investment in renewable energy in developing countries. This in turn will support economic growth through greater access to sustainable energy and allow businesses to prosper. Geography over programme lifetime: Developing countries unspecified
203469 African Risk Capacity (ARC)	0.58	0.74	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To support a parametric (index-based) weather risk insurance pool that will provide participating African countries with predictable, quick-disbursing funds with which to implement pre-defined contingency response plans in the case of a drought. Geographic footprint over duration of programme: Gambia, Mauritania, Mali, Senegal, Burkina Faso, Kenya, Niger, Malawi
201733 Climate Public Private Partnership Programme (CP3)	0.55	0.70	Committed	ODA	Grant	Mitigation	Banking & Financial Services	CP3 aims to demonstrate that climate friendly investments in developing countries, including in renewable energy, water, energy efficiency and forestry are not only ethically right but also commercially viable. It aims to attract new forms of finance such as pension funds and sovereign wealth funds into these areas by creating two commercial private equity funds of funds which will invest in subfunds and projects in developing countries, creating track records of investment performance which should in turn encourage further investments and accelerate the growth of investment in climate. Geography over programme lifetime: Developing countries unspecified

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
203506 CARIAA - Collaborative Adaptation Research Initiative in Africa and Asia	0.52	0.66	Committed	ODA	Grant	Adaptation	General Environment Protection	Research to identify what works and what doesn't in terms of cost-effective and sustainable ways to improve the resilience and capacity to adapt to climate change of the poorest and most vulnerable people and communities in three climate change 'hot spots' – semi-arid regions of Africa and Central and South Asia; low-lying heavily populated deltas of Africa and South Asia and; densely populated river basins dependent on snow-pack or glaciers. Geography over programme lifetime: Multiple countries
204804 Accountability in Tanzania Programme - Phase II	0.36	0.46	Committed	ODA	Grant	Adaptation	Government & Civil Society	To empower Tanzanian citizens and strengthen civil society by providing grants and capacity building support to selected civil society organisations, to increase the accountability and responsiveness of government and the resilience of citizens to climate change. This contributes towards the Millenium Development Goals by ensuring Tanzanians are increasingly able to exercise their rights as citizens. Geography over programme lifetime: Tanzania
	0.12	0.15	Committed			Mitigation		

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
204940 Improving Market Systems for Agriculture in Rwanda IMSAR	0.48	0.61	Committed	ODA	Grant	Adaptation	Agriculture	IMSAR will commercialise agriculture through improving the way agricultural market systems function. It will identify market failures and provide the necessary agricultural expertise and finance required to help address them. This will benefit the poor as producers, employees and consumers, and small and medium size business, resulting in increased sales among farmers and agro-enterprises, increase in the percentage of Rwandan agricultural produce that has value-added and an increase in export diversification. Given the strong link between income, income diversity, and the ability to adapt to the effects of climate change, IMSAR will help building poor households' resilience to current and future climate threats through improving access to input and output markets, increasing opportunities to diversify their production, and increasing non-farm income sources as an alternative to agriculture. This will help decreasing their sensitivity to climate change and improving their adaptive capacity. Geography over programme lifetime: Rwanda
203186 Rural Access Programme 3	0.47	0.60	Committed	ODA	Grant	Adaptation	Transport & Storage	To improve road access for 800,000 members of rural communities in the Western Region of Nepal, thereby improving economic opportunities and increasing access to markets and social services throughout the year. The project will lift 20,000 people out of poverty through access to work, skill trainings, and will promote equal opportunities for women. The project aims to contribute towards sustainable poverty reduction through investments in high value crops and will lay the foundations for private sector led development in the poorest region in the country. Climate variability and climate change are integrated in building new roads and maintaining existing roads through the programme. Geography over programme lifetime: Nepal

Recipient country/region/project/programme	Total amount: Climate-specific: Domestic currency (£m)	Total amount: Climate-specific: USD ($m)	Status: Provided, Committed, Pledged	Funding source: ODA, OOF, Other	Financial instrument: Grant, Concessional loan, Non-concessional loan, Equity, Other	Type of support: Mitigation, Adaptation, Cross-cutting, Other	Sector: Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	Additional Information
204250 Infrastructure and Cities for Economic Development (ICED)	0.23	0.29	Committed	ODA	Grant	Adaptation	Urban development and management	To improve the enabling environment for sustainable, inclusive growth-enhancing infrastructure service delivery in focus countries; and, Harness the benefits of cities for sustainable economic growth and poverty reduction in focus countries. The ICED programme can help deliver low carbon growth and resilient economic growth which sustainably manage our natural resources. Geography over programme lifetime: Developing countries unspecified
	0.23	0.29	Committed			Mitigation		
204941 Sustainable Inclusive Livelihoods through Tea Production in Rwanda	0.46	0.59	Committed	ODA	Grant	Adaptation	Trade Policies & Regulations	The project supports job creation and increased incomes by working with smallholder farmers to develop greenfield tea. The Wood Foundation Africa (TWFA) will set up and run two Services Companies supporting approximately 12,000 smallholder tea farmers over 7,500 hectares. Farmers will be supported to produce tea for the first time, employing best farming practices, including understanding and managing climate risk and variability.The Services Company will be co-owned by the farmers. This will lead to improved incomes and livelihoods (in particular nutrition and education) for the farmers and their families. Unilever and Luxmi will build a factory which will heavily rely on the tea supplied by the smallholder farmers with support from The Wood Foundation Africa. Geography over programme lifetime: Rwanda
201980 Private Enterprise Programme in Zambia	0.09	0.12	Committed	ODA	Grant	Adaptation	Industry	To create jobs and investment in Zambia by building the capacity of micro, small and medium enterprises, including for example those which use climate resilient technology or promote soil conservation. The programme will help to create over 26,500 jobs by 2019 Geography over programme lifetime: Zambia
	0.37	0.47	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
203809 Disaster Risk Insurance	0.45	0.57	Committed	ODA	Loan	Adaptation	Banking & Financial Services	To improve the resilience of the private sector in poor countries to natural disasters by improving access to insurance products. By supporting the development of a market for private sector disaster risk insurance in developing countries, the project will sustainably help strengthen resilience, mitigate the effects of climate change and supporting economic development through private sector growth. Geography over programme lifetime: Multiple countries
300109 Technical Assistance for Smart Cities (TASC)	0.18	0.23	Committed	ODA	Grant	Adaptation	Urban development and management	To enhance the potential of Indian cities in poorer and developing states such as Madhya Pradesh, Bihar, Andhra Pradesh, Odisha, Maharashtra to promote growth and jobs creation. UK support will achieve this by developing partnerships with UK urban planning, research and business organisations to help India cities develop investment plans, attract finance and deliver smart urban solutions that create jobs for the urban poor. Activities including climate resilient infrastructure, climate and disaster risk insurance, renewable energy and water management. Geography over programme lifetime: India
	0.27	0.34	Committed			Mitigation		
202817 Adaptation for Smallholder Agricultural Programme (ASAP)	0.30	0.38	Committed	ODA	Grant	Adaptation	Agriculture	To provide knowledge and best practices to help over 6 million smallholder farmers in up to 43 countries adapt to climate change. Grants will be made to: build small scale water-harvesting, water storage and irrigation systems for farmers; provide farmers with improved seeds that are drought tolerant; help farmers access markets to sell their crops; to plant trees on farms and introduce soil and water conservation practices; and, enable farmers to access daily and seasonal weather forecasts (e.g. using text messages) so they know when best to plant and harvest crops." Geography over programme lifetime: Multiple countries
	0.07	0.10	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
203927 Rwanda Multi-Donor Civil Society Support Programme (2015-2021)	0.19	0.24	Committed	ODA	Grant	Adaptation	Government & Civil Society	Strengthened civil society engagement on critical social cohesion, reconciliation and governance issues in Rwanda, prioritising four policy areas: (i) access to services amongst people with disabilities; (ii) sustainable agriculture; (iii) coordination of responses to gender-based violence (GBV); and (iv) promoting reconciliation in relation to the 1994 Genocide. UK will provide funding and technical support to Rwandan civil society organisations to support the design and implementation of governance and reconciliation focused initiatives, and to support more effective engagement (influencing) with government on these issues. Geography over programme lifetime: Rwanda
	0.19	0.24	Committed			Mitigation		
205061 Increasing renewable energy and energy efficiency in the Eastern Caribbean	0.07	0.09	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To increase the use of renewable energy and energy efficiency measures and to improve energy security in the Eastern Caribbean Geography over programme lifetime: Caribbean including Antigua & Barbuda, Dominica, Grenada, St Lucia, St Vincent & the Grenadines
	0.29	0.37	Committed			Mitigation		
204135 Bihar Agriculture Growth and Reform Initiative (BAGRI)	0.32	0.41	Committed	ODA	Grant	Adaptation	Agriculture	To significantly improve the performance of the agriculture sector in Bihar by improving access to markets for identified agriculture and horticulture products, access to finance, knowledge and technology, and institutional capacity for market regulation and support farmers in building resilience to the impacts of climate change such as drought and flooding. This will reflect higher private sector investment, higher production and higher price realisation by 1,00,000 farmers. Geography over programme lifetime: India

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
204456 Programme of Support to Agriculture in Rwanda	0.28	0.36	Committed	ODA	Grant	Adaptation	Agriculture	To sustainably increase the agricultural productivity of poor farmers by transforming Rwandan agriculture from a subsistence-based to a more commercial-based sector that accelerates agricultural growth. This will help address challenges that may limit agriculture productivity, reduce the rate at which poverty is falling, increase inequality and hamper improvements in food security and malnutrition. The programme will build resilience to climate variability and improve sustainable management of agricultural land by increasing soil erosion control, small scale irrigation and strengthening sustainability and resilience strategies. The programme will result in increased agricultural productivity, food security and incomes of poor households and contributes towards the MDG's by helping to eradicate extreme poverty and hunger and; promoting gender equality and empowering women. Geography over programme lifetime: Rwanda
	0.03	0.04	Committed			Mitigation		
203844 Research on Growth and High Volume Transport in Low Income Countries	0.09	0.12	Committed	ODA	Grant	Adaptation	Transport & Storage	To generate robust evidence on the role that different forms of high volume transport play in promoting growth in Low Income Countries in both a rural and urban setting. The research programme will have four themes carrying out engineering and technical research around road and rail strategic corridors, urban transport, low carbon transport and inclusive transport Geography over programme lifetime: Multiple countries
	0.14	0.18	Committed			Mitigation		
204202 Sustainable Energy for Women and Girls (SEWG)	0.06	0.08	Committed	ODA	Grant	Adaptation	Energy Policy	Programme aims to shift clean energy markets and delivery systems towards improving the health, safety and economic opportunities of low income girls and women in developing countries. Geography over programme lifetime: Developing countries unspecified
	0.15	0.19	Committed			Mitigation		

Recipient country/region/project/programme	Total amount: Climate-specific: Domestic currency (£m)	Total amount: Climate-specific: USD ($m)	Status: Provided, Committed, Pledged	Funding source: ODA, OOF, Other	Financial instrument: Grant, Concessional loan, Non-concessional loan, Equity, Other	Type of support: Mitigation, Adaptation, Cross-cutting, Other	Sector: Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	Additional Information
203864 Better Health in Bangladesh	0.16	0.20	Committed	ODA	Grant	Adaptation	Health, General	To deliver more and higher quality services and better health now and in the long term, including building resilience in coastal districts vulnerable to flooding. It will prevent over 2,800 women dying in pregnancy or childbirth, safely deliver 69,500 babies, provide 1 million users with modern family planning, screen over 900,000 women for cervical cancer, and provide 1.7 million young children and 300,000 pregnant women with essential nutritional care. Geography over programme lifetime: Bangladesh
	0.04	0.05	Committed			Mitigation		
202042 Research Programme Consortium on Leveraging Agriculture for Nutrition in South Asia (LANSA)	0.17	0.22	Committed	ODA	Grant	Adaptation	Health, General	The purpose of this research programme is to answer the question "how can South Asian agriculture and related food security policies and interventions best be designed and implemented to increase their impacts on nutrition, especially the nutrition status of children and adolescent girls"? This programme will contribute to the acceleration in reductions in poverty and under nutrition of women and children by generating a body of high quality evidence in this area, working closely with policy makers and programme decision makers in the region to get this evidence into use in making agriculture pro poor and pro nutrition and supporting development of climate resilient agriculture. Work is undertaken in four countries with high levels of malnutrition. Geography over programme lifetime: Afghanistan, Bangladesh, India and Pakistan
202775 South Asia Water Governance Programme (SAWGP)	0.17	0.22	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To improve the management of water within and between South Asian countries, reducing poverty by enabling adaptation to climate change and reducing the risk of conflict over water resources. By 2018, 500 million people living in river basins will benefit from improved water management by reducing their risk of exposure to flooding and drought and enhancing regional security by improving cooperation between governments Geography over programme lifetime: Asia Regional

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
203705 Humanitarian Innovation and Evidence Programme: greater use of evidence and innovation in humanitarian responses	0.16	0.20	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	This programme will develop and test innovative approaches to humanitarian practice; provide evidence of the cost effectiveness of investments in disaster risk reduction; provide new evidence on the scaling up of cash-based approaches; support better evidence on insurance as a risk management tool; and create new evidence on the best intervention to improve health and nutrition in emergencies. Geography over programme lifetime: Developing countries unspecified
204468 Strengthening Economic Systems in Bangladesh	0.07	0.09	Committed	ODA	Grant	Adaptation	Government & Civil Society	To increase the dialogue on economic reforms, and support the Government of Bangladesh to make more pro-poor economic policies, including building evidence on the macro-economic impact of climate change and the economic impact of climate-induced migration. Geography over programme lifetime: Bangladesh
	0.07	0.09	Committed			Mitigation		
300674 Building the capacity of the Caribbean Disaster Emergency Management Agency (CDEMA)	0.13	0.16	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To provide operational support to the CDEMA coordinating unit and national disaster offices for strengthening procurement, contract and logistics management during emergencies. Geography over programme lifetime: Caribbean

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205052 Sustainable Development of Mining in Rwanda (SDMR)	0.02	0.02	Committed	ODA	Grant	Adaptation	Mineral Resources & Mining	SDMR aims to improve the livelihoods of over 40,000 Rwandans involved in the artisanal and small scale mining industry. Moreover, it will tackle Rwanda's growing trade deficit by increasing exports, help to attract much-needed private investment in the industry, and ultimately support Rwanda's path to economic transformation by creating more, higher paid, safer jobs for poor Rwandans. The outcome of the programme will be an economically, socially and environmentally sustainable ASM in target areas.This will contribute to the impact of an increased contribution of the mining sector to economic growth and improving livelihoods among ASM communities and improved management and operations of mines will reduce climate change related flooding and landslide risks. Geography over programme lifetime: Rwanda
	0.10	0.13	Committed			Mitigation		
202956 Global Network of Climate Technology Innovation Centres	0.06	0.07	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	The purpose is to build a global community of practice of entrepreneurs and innovators dedicated to develop and deploy climate smart technologies providing clean, safe, reliable and sustainable access to energy, water and other natural resources to poor communities in developing countries Geography over programme lifetime: Developing countries unspecified
	0.06	0.07	Committed			Mitigation		

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
202957 Results Based Financing for Low Carbon Energy Access	0.03	0.03	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To increase access to clean energy through the creation of an expanding market of green mini-grid installations in Africa serving rural villages unconnected to the main grid. This is expected to benefit around 1.3m people by 2018, while reducing carbon emissions by around 260,000 Tonnes of carbon dioxide, through supported private investment in the installation and operation of over 110 renewably-powered mini-grids (figures to be updated after Business Case completion). Electricity access for lighting, communications and productive uses creates jobs, enables studying at night and enhances public services (such as clinics) and public safety (eg through streetlighting). This project also addresses the post-2015 High Level Panel's recommendation on a development goal entitled Secure Sustainable Energy, which includes energy access and renewable energyThe Results-Based Financing for Low Carbon Energy Access Programme aims to accelerate access to sustainable energy services in developing countries. The funding generates and tests different forms of Results-Based Financing (RBF) mechanism, which aim to stimulate decentralised energy markets and to leverage private investment to increase access to clean energy products and services. Geography over programme lifetime: Developing countries unspecified
	0.08	0.10	Committed			Mitigation		
202884 The Water Security Programme	0.09	0.11	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To increase the resilience of poor people to climate change through secure and sustainable access to water resources. We will work with the Global Water Partnership, World Bank Water Partnership Programme and GIZ International Water Stewardship Programme to support increased investment in the information, institutions and infrastructure required to deliver water security. Geography over programme lifetime: Developing countries unspecified

Recipient country/region/project/programme	Total amount: Climate-specific: Domestic currency (£m)	Total amount: Climate-specific: USD ($m)	Status: Provided, Committed, Pledged	Funding source: ODA, OOF, Other	Financial instrument: Grant, Concessional loan, Non-concessional loan, Equity, Other	Type of support: Mitigation, Adaptation, Cross-cutting, Other	Sector: Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	Additional Information
204784 Green Mini-Grids Africa Regional Facility for Market Preparation, Evidence and Policy Development	0.02	0.02	Committed	ODA	Grant	Adaptation	Energy Policy	The Green Mini-Grids programme aims to help transform the mini grid sector from a growing and sporadic series of pilot projects, to a thriving industry. Work includes development of small-scale electricity generation which serves a limited number of consumers via a distribution grid that can operate in isolation from national electricity transmission network. Transformation is to be achieved through the creation of a critical mass of experience and evidence of success in two countries (Kenya and Tanzania), coupled with improved policy and market conditions for investments regionally. Geography over programme lifetime: Africa Regional
	0.07	0.08	Committed			Mitigation		
300724 Water Resource Accountability in Pakistan (WRAP)	0.08	0.10	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To improve water governance and management issues in Pakistan to be able to adapt to changing climate while ensuring environmental sustainability, with a focus on collaboration and engagement with provinces, research and media engagement. Geography over programme lifetime: Pakistan
202539 Regional Transboundary Water Resources Programme - Phase 3	0.06	0.07	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To improve governance of shared water resources in Southern Africa, by sustainably improving local water-management capability and supporting development of key water infrastructure. This will indirectly benefit populations in the 13 shared river basins of the SADC region, in which 95 million people reside, through more equitable sharing of water resources, reduced vulnerability to flooding, improved access to drinking water, as well as reducing risk of conflict and better food security. These outcomes will contribute to MDG 1 (“Eradicate Extreme Poverty and Hunger”) and MDG7 (“Ensure Environmental Sustainability”). Geography over programme lifetime: Africa Regional
	0.01	0.01	Committed			Mitigation		

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
204024 Stability and Growth Programme	0.06	0.08	Committed	ODA	Grant	Mitigation	Government & Civil Society	To improve macro-economic stability and growth in Pakistan by providing the Government with financial aid and technical assistance in support of the International Monetary Fund Extended Financing Facility. Energy subsidy reforms under the EFF should contribute to increased investment in green energy and less waste and carbon emissions. This will benefit the people of Pakistan by establishing the conditions for faster and more equitable growth. This contributes towards our MDGs by enabling the Government of Pakistan to finance essential public expenditure and protect the poor from the adverse impact of structural reforms. Geography over programme lifetime: Pakistan
300141 Sustainable Energy and Economic Development (SEED) Programme	0.01	0.02	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To support provincial economic development and sustainable energy in Pakistan. The programme objective is to address two binding constraints to economic and urban development in Pakistan: weak planning; and energy. The programme aims to support Pakistan's poorest province, Khyber Pakhtunkhwa to plan and finance the infrastructure and investment it needs for growth, jobs and prosperity and to address Pakistan's energy crisis by providing innovative financial solutions to industry for the adoption of sustainable energy practices. Geography over programme lifetime: Pakistan
	0.04	0.05	Committed			Mitigation		
205142 The India-UK Global Partnership Programme on Development	0.02	0.02	Committed	ODA	Grant	Adaptation	Energy Policy	Strengthened UK-India global development partnership that will facilitate the sharing of development experience, expertise and policy positions including scaling up solar power and the improving the resilience of infrastructure systems to climate and disaster risks. Geography over programme lifetime: developing countries unspecified
	0.02	0.03	Committed			Mitigation		
202976 Providing Clean Energy to the Rural Poor of Bangladesh	0.03	0.04	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	Climate change mitigation and access to clean energy to improve the livelihoods of rural poor in off- grid areas in Bangladesh Geography over programme lifetime: Bangladesh

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
203574 Strengthening Adaptation and Resilience to Climate Change in Kenya Plus (StARCK+)	0.01	0.02	Committed	ODA	Grant	Adaptation	Industry	To achieve transformational change by helping Kenya to scale up private sector innovation and investment in low carbon and adaptation products, services and assets (e.g. clean energy, sustainable agriculture, water management, weather forecasting). Enabling this change will require targeted support to critical aspects of climate change governance, and stimulation of civil society demand. This contributes to the UK Government's International Climate Fund (ICF) commitments and will benefit 828,000 people able to cope with the effects of climate change and 17,600 people with improved access to clean energy. Geography over programme lifetime: Kenya
	0.01	0.01	Committed			Mitigation		
203153 East Africa Geothermal Energy (EA-Geo)	0.00	0.00	Committed	ODA	Grant	Adaptation	Energy Policy	The programme aims to increase investment in geothermal energy in East Africa, contributing to economic development and growth, by addressing market failures which hinder the very early stages of geothermal market development, including: • reducing the risk of exploratory test drilling, leading to increased investor confidence in under exploited East Africa geothermal energy; and, • improving geothermal strategy, policy and regulations that facilitate investment. Geography over programme lifetime: Africa Regional
	0.02	0.02	Committed			Mitigation		

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203582 Provision of finance to the Rwanda Fund for Climate Change and Environment	0.01	0.01	Committed	ODA	Grant	Adaptation	Agriculture	To improve climate adaptation and low carbon development by providing finance to the Rwanda Fund for Climate Change and Environment from the UK International Climate Fund. This will benefit 15 000 people to cope better with climate change impacts, 2000 people gain access to clean energy especially in rural areas, protect 1200 hectares of land against soil erosion, create 2000 green jobs as well as mobilise £8 million of additional finance from the private sector by July 2015. This contributes towards the MDG on environmental sustainability and ensuring an effective response to the impacts of climate change, thus securing current and future development gains as well as protection of the livelihoods of the poorest people. Geography over programme lifetime: Rwanda
	0.00	0.00	Committed			Mitigation		
204365 Improving Energy Access in Tanzania through Green Mini-Grids	0.00	0.00	Committed	ODA	Grant	Mitigation	Energy distribution	To improve access to clean, safe and reliable energy for Tanzanians, particularly the rural poor. This includes support for green mini-grids and technical assistance for energy access companies and project developers. Geography over programme lifetime: Tanzania
300826 REACH - Supporting economic development in conflict and climate affected regions in Nigeria.	0.00	0.00	Committed	ODA	Grant	Adaptation	Rural development	To improve resilience in rural livelihoods in Nigeria. It will build on tried and tested agricultural market interventions with a view to taking these to scale; and exploit new innovations that help side-step traditional barriers to agricultural markets. Geography over programme lifetime: Nigeria
	0.00	0.00	Committed			Mitigation		
300128 ASEAN Catalytic Green Finance Facility	0.00	0.00	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	This programme supports ODA-eligible Association of South East Asia Nations members grow sustainably and meet the Paris Agreement and the Sustainable Development Goals by financing infrastructure investments linked to clear, measurable green targets. Geography over programme lifetime: Asia Regional
	0.00	0.00	Committed			Mitigation		
Negative ODA flow	- 0.01	- 0.01	Committed	ODA	Grant	Adaptation	Emergency Response	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
Negative ODA flow	- 0.01	- 0.02	Committed	ODA	Grant	Adaptation	Government & Civil Society	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.
	- 0.00	- 0.00	Committed			Mitigation		
Negative ODA flow	- 0.01	- 0.02	Committed	ODA	Grant	Adaptation	General Environment Protection	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.
	- 0.00	- 0.00	Committed			Mitigation		
Negative ODA flow	- 0.16	- 0.20	Committed	ODA	Grant	Adaptation	Agriculture	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.
	- 0.09	- 0.11	Committed			Mitigation		
Negative ODA flow	- 0.17	- 0.22	Committed	ODA	Grant	Adaptation	Energy distribution	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.
	- 0.17	- 0.22	Committed			Mitigation		
Negative ODA flow	- 0.55	- 0.70	Committed	ODA	Grant	Adaptation	Rural development	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.
Negative ODA flow	- 0.12	- 0.16	Committed	ODA	Grant	Adaptation	Energy distribution	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.
	- 0.49	- 0.62	Committed			Mitigation		
Negative ODA flow	- 8.06	- 10.30	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.
	- 0.90	- 1.14	Committed			Mitigation		
Negative ODA flow	- 12.00	- 15.33	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
Fiji Support Programme - GB-GOV-13-ICF-0023-FijiCOP	0.30	0.38	Committed	ODA	Grant	Mitigation	Public sector policy and administrative management	A capacity-building programme for the Fijian government, it will deliver a series of technical workshops focused on problems important to Fiji, SIDS and the UK, such as raising global ambition to tackle climate change through UN negotiations.
Intergovernmental Panel on Climate Change Working Group III (Mitigation) Technical Support Unit - 2019 DECC 17	0.23	0.30	Committed	ODA	Grant	Mitigation	Environmental research	The Working Group III assesses the options for mitigating climate change. ODA funds are used to support TSU staff in India and to support other developing country participation.
Climate Leadership In Cities (CLIC) - GB-GOV-13-ICF-0003-CLIC	6.46	8.25	Committed	ODA	Grant	Mitigation	Urban development	CLIC aims to support cities in developing countries to plan for, and implement, ambitious climate actions. It will provide technical assistance to 15 megacities in Asia and South America to develop climate action plans consistent with the Paris Agreement, support 10 – 12 cities to develop investable business cases for climate action through the C40 Cities Finance Facility, and fund a global research and national advocacy component (in China and Mexico) to help remove barriers to city action.
Renewable Energy Performance Platform (REPP) - GB-GOV-13-ICF-0013-REPP	20.00	25.54	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	The REPP programme provides support to private sector developers of small scale renewable energy projects in sub-Saharan Africa. REPP supports solar, hydro, biomass, biogas, geothermal, and wind projects up to 25MW installed capacity (up to 50MW for wind). REPP provides technical assistance direct to project developers, provides pre-construction and bridging loans, post-construction financing, and equity financing.
Partnerships for Forests (P4F) - GB-GOV-13-ICF-0018-P4F	9.40	12.01	Committed	ODA	Grant	Mitigation	Forestry policy and administrative management	A programme designed to connect governments with private and public sectors. It offers technical assistance and grants to support new business models that can transform supply chains at risk from deforestation.

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
Clean Energy Fund Technical Assistance (CEF TA) Programme - GB-GOV-13-ICF-0002-CEFTA	9.00	11.49	Committed	ODA	Grant	Mitigation	Energy policy and administrative management	This fund supports the development of renewable energy and energy efficiency projects in developing countries in the Asia-Pacific region, in order to contribute to the mitigation of climate change impacts in those countries by reducing their carbon emissions. The fund focuses specifically on technical assistance, which involves building the knowledge and skills base of the industries and governments in the supported countries, as well as undertaking feasibility studies of potential low carbon energy projects.
Clean Energy Transition Programme (CETP) - GB-GOV-13-ICF-0006-CETP	1.44	1.84	Committed	ODA	Grant	Mitigation	Energy research	The Clean Energy Transitions Programme (CETP) leverages the IEA's unique energy expertise across all fuels and technologies to accelerate global clean-energy transitions, particularly in major emerging economies. The Programme includes collaborative analytical work, technical cooperation, training and capacity building and strategic dialogues.
Nationally Appropriate Mitigation Actions (NAMA) Facility - GB-GOV-13-ICF-0007-NAMA	61.20	78.16	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management	This facility supports developing countries that show strong leadership on tackling climate change and who want to implement transformational Nationally Appropriate Mitigating Actions.
The Global Innovation Lab - GB-GOV-13-ICF-0012-CMCI	0.13	0.17	Committed	ODA	Grant	Mitigation	Business Policy and Administration	The Global Innovation Lab will identify, design, and support the piloting of new climate finance instruments with the aim of unlocking billions of dollars of fresh private investment for climate change mitigation and adaption in developing countries.
UK Climate Investments (UKCI) - GB-GOV-13-ICF-0015-UKCI	32.24	41.17	Committed	ODA	Equity	Mitigation	Energy generation, renewable sources - multiple technologies	UK Climate Investments UKCI is a joint venture between the Green Investment Group (GIG) and the UK Government to invest in renewable energy and energy efficiency projects in developing countries.

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	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
UK Partnering for Accelerating Climate Transitions (UK PACT) - GB-GOV-13-ICF-0021-UKPACT	3.18	4.06	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management	UK PACT will support a programme of activities which will provide low-carbon related technical assistance to a number of strategically important developing countries. Our goal is to improve the effectiveness of key institutions (public, private, civil society) in these countries so that they can deliver accelerated emission reductions. We will seek to do this in part by leveraging the skills and expertise developed in the UK over decades of experience with our own transition to a lower-carbon economy.
Carbon Initiative For Development (Ci-Dev) - GB-GOV-13-ICF-0025-CiDev	1.12	1.43	Committed	ODA	Grant	Mitigation	Energy policy and administrative management	Ci-Dev will invest in low carbon technologies that deliver community and household level benefits, particularly focused on improving poor peoples' access to clean energy. By successfully demonstrating the ability of carbon finance to deliver low carbon development in least developed countries. Ci-Dev hopes to increase future carbon finance flows to these countries.
2050 Calculator - GB-GOV-13-ICF-0028-2050C	0.76	0.97	Committed	ODA	Grant	Mitigation	Energy research	Working directly with 10 developing country governments to help them build their own version of the UK's 2050 calculator. The calculator will also be developed to explore global scenarios, illustrating the impacts of these scenarios on climate change.
Knowledge, Evidence and Engagement Portfolio (KEEP) - GB-GOV-13-ICF-0029-KEEP	0.81	1.03	Committed	ODA	Grant	Mitigation	Environmental research	KEEP will commission a portfolio of bespoke research and engagement activities needed by HMG to maximise the impact of BEIS International Climate Finance projects in developing countries and to showcase our work to inspire wider action.
Market Accelerator for Green Construction (MAGC) - GB-GOV-13-ICF-0032-MAGC	12.48	15.94	Committed	ODA	Grant	Mitigation	Urban development and management	UK is providing funding to a major new programme (Market Accelerator for Green Construction) with the International Finance Corporation (IFC) to build demonstration portfolios of green construction at scale, reducing emissions, mobilising new finance and inspiring markets to shift towards the new energy efficient buildings of the future.

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	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
Energy Sector Management Assistance Programme (ESMAP) - GB-GOV-13-ICF-0033-ESMAP	0.85	1.09	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	The World Bank's Energy Sector Management Assistance Programme (ESMAP) has developed an Energy Transitions programme that targets six Asian countries (China, India, Indonesia, the Philippines, Pakistan and Vietnam) where the most new, unabated coal-fired power generation is due to begin operation (from 2018 to 2020). ESMAP is influential in advising countries on the clean energy transition, with significant demand for its technical assistance.
Climate Ambition Support Alliance (CASA) GB-GOV-13-ICF-0034-CaBIN	1.65	2.11	Committed	ODA	Grant	Mitigation	Energy policy and administrative management	The Climate Ambition Support Alliance (CASA) programme will work through secondary providers to provide training, in addition to technical, legal and logistical support for developing country negotiators, in order to build the capacity of the least developed and most climate vulnerable states to participate in the international negotiations process and be more effective in influencing its outcomes.
Climate Finance Accelerator (CFA) - GB-GOV-13-ICF-0036-CFA	0.03	0.03	Committed	ODA	Grant	Mitigation	Financial policy and administrative management	The Climate Finance Accelerator (CFA) is an innovative international initiative aimed to accelerate the transformation of NDCs into Climate Investment Plans supported by pipelines of bankable projects needed to attract investment at scale from the private sector.
Clean Energy Innovation Facility (CEIF) - GB-GOV-13-ICF-0037-CEIF	4.00	5.11	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	ODA grant funding that supports clean energy research, development & demonstration (RD&D) to help improve the performance of innovative technologies, and to accelerate the clean energy transition to avoid the most severe impacts of climate change in developing countries.
Due Diligence Costs - 2019 DECC 12	0.33	0.42	Committed	ODA	Grant	Mitigation	Administrative costs (non-sector allocable)	Expenditure on external legal advice, evaluation and auditing services to support ODA spend.
Miscellaneous Administrative Costs - 2019 DECC 19	0.10	0.12	Committed	ODA	Grant	Mitigation	Administrative costs (non-sector allocable)	ODA eligible costs associated with the management and delivery of programmes.

Recipient country/region/project/programme	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
Sustainable Infrastructure Programme-Asia scoping	0.18	0.23	Committed	ODA	Grant	Mitigation	Energy policy and administrative management	Funding by the UK International Climate Finance (ICF) scoping to support partner countries achieve their emission reduction commitments by mobilising private investment into low-carbon infrastructure.
Staff Costs	5.60	7.15	Committed	ODA	Grant	Mitigation	Administrative costs (non-sector allocable)	ODA eligible costs associated with the management and delivery of programmes.
Negative ODA flow	- 7.98	- 10.19	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.
	- 0.30	- 0.39	Committed	ODA	Grant	Mitigation	Forestry	
(UKSA_NS_UKSA-035) Ecometrica Forests2020	5.66	7.23	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	This project addresses critical gaps in current forest monitoring systems by providing a sustained and effective forest monitoring system capable of measuring forest change and providing information on the risks and drivers of forest loss.
(UKSA_NS_UKSA-042) Drought and Flood Mitigation Service	0.82	1.04	Committed	ODA	Grant	Adaptation	Research/ scientific institutions	This project aims to provide accurate flood and drought predictions to farmers in Uganda and Kenya so that they are able to use that information to adjust their farming and livestock activities, with the ultimate impact of reducing the losses they would otherwise suffer from flood and drought impacts. The system is enabled through use of data with improved quality, detail and frequency from the Sentinel 1, 2 and 3 satellites (to ensure low cost) combined with SMOS/ SMAP and climate modelling/meteorological data.

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	Domestic currency (£m)	USD ($m)						
(UKSA_GT_UKSA-045) Astrostat Forest Management and Protection (FMAP) System	0.34	0.43	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	The key aims of this project are to provide Guatemala with a centralised Forestry Management support tool that allows them to; monitor changes in the forestry canopy to look for deforestation or logging activities, identify illegal logging sites to facilitate intervention and prosecution provide information for evidence in legal proceedings. This will support Guatemala in their abilities to manage forests through knowledge exchange, capacity building and training. It will also establish a certified product for sustainable forestry management in the Central American region enabling wider roll out of the system to neighbouring countries.
(RCUK_NS_EP/P032591/1) Growing research capability to meet the challenges faced by developing countries - SUNRISE network	1.24	1.58	Committed	ODA	Grant	Mitigation	Education policy and administrative management	The SUNRISE network unites several leading universities and industrial collaborators from the UK and India in a transdisciplinary research collaboration. This international network will develop and implement the technology necessary to build a minimum of five solar-powered building demonstrators in rural India.
(NERC_NS_NOC_NE/R000123/1) Addressing Challenges of Coastal Communities through Ocean Research for Developing Economies (ACCORD)	1.41	1.80	Committed	ODA	Grant	Adaptation	Environmental research	Our aim is to deliver high quality science outcomes required to improve the environmental information available to support two development challenges in coastal states on the DAC list of Official Development Aid recipients: a) Sustainable growth of, and resilience to change for, the blue economies of partner countries and b) Resilience to natural hazards including impact-based, climate-proof coastal flood warning systems.
(RCUK_NS_ES/P011306/1) Growing research capability to meet the challenges faced by developing countries - DAMS 2.0 project	2.13	2.72	Committed	ODA	Grant	Adaptation	Education policy and administrative management	The DAMS 2.0 project is building links between UK research bodies and institutes in Ethiopia, Ghana, India, Jordan and Myanmar, as well as influential international environmental organisations and is working to provide transformative research and knowledge on how to design and plan the complex water-energy systems that minimises impact on poor people, avoids environmental degradation and provides water and energy security for all.

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	Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
	Domestic currency (£m)	*USD ($m)*						
(IUK_MYS_15040) - Malaysia/UK research collaboration	0.92	1.17	Committed	ODA	Grant	Adaptation	Small and medium-sized enterprises (SME) development	Supporting R&D projects involving Malaysian and UK business and research collaborations, that propose innovative commercial solutions to key challenges related to climate change and its impact on urbanisation.
(UKSA_SC_UKSA-046) - Renewable Energy Space Analytics Tool (RESAT)	1.10	1.41	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	The project aims to assess the feasibility (using EO data) of small island developing states to move away from fossil fuel and onto renewable energy as their primary power source. The project will use historic Earth Observation data combined with ground observations and weather models to develop a proof-of-concept energy planning tool – RE-SAT.
(BBSRC_VN_BB/P022685/1) Cascade processes for integrated bio-refining of agricultural waste in India and Vietnam	0.06	0.08	Committed	ODA	Grant	Adaptation	Agricultural research	Collaborative research grant with Vietnamese partners exploring the impact of environmental change on the sustainability of rice cultivation and the socio-economic development of highly vulnerable Asia's river mega deltas. Aims to drive farm adaptation strategies (i.e. flood management), livelihood change, and define agricultural policy.
(MO_BRA_491) Climate Science for Service Partnership (CSSP - Brazil)	1.18	1.51	Committed	ODA	Grant	Mitigation	Environmental research	To strengthen the climate science and research relationship between Brazil and the UK. To work in partnership with Brazilian research institutes with the aim of improving climate and carbon cycle modelling to help inform future policy and climate service.
(MO_BRA_512) Climate Science for Service Partnership (CSSP - Brazil)	0.62	0.79	Committed	ODA	Grant	Mitigation	Environmental research	Collaborative climate science research programme between Brazilian and UK to improve understanding of recent climate changes and Brazil's role in mitigation activities to inform international negotiations; to enhance projections of future weather and climate extremes and impacts to inform decision making and contribute to disaster risk reduction in Brazil.
	0.62	0.79				Adaptation		

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	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
(MO_CHN_479 & 481) Increase the understanding of East Asian climate variability and assessment of its predictability for improving climate prediction skills over East Asia on seasonal to decadal timescales.	0.98	1.26	Committed	ODA	Grant	Adaptation	Environmental research	Climate change research focused on impacts on regional water cycle and climate extremes within East Asia. Collaboration between scientists in UK and China to strengthen research capacity and increase understanding of drivers of regional drought and flooding, thus contributing to developing the capability of early warning methodology.
(MO_CHN_488 & 485) Integration of all activities across Climate Science for Service Partnership-China	1.74	2.22	Committed	ODA	Grant	Adaptation	Environmental research	China and UK collaborative development of translational science - a multi-disciplinary approach to bridge the gap between climate science and society to produce useable knowledge and applications. Development of case studies to demonstrate the value of climate science for services by translating climate information into beneficial decisions.
(MO_CHN_473) Improve the observational basis for understanding East Asian climate variability and change	0.55	0.70	Committed	ODA	Grant	Adaptation	Environmental research	Collaborative climate science research between Chinese and UK researchers to help better understand the likely causes of climate-related extreme events and long-term climate trends in China and East Asia region. Increased scientific understanding will help to better mitigate the risks arising from climate variability and change.
(MO_CHN_478 & 476) Assess model simulations of European and Chinese regional climate	0.99	1.26	Committed	ODA	Grant	Adaptation	Environmental research	Collaborative climate science research programme between Chinese and UK to develop an enhanced understanding of underpinning climate dynamics and use of this to critically examine the performance of China and UK climate models and predictions. These models underpin climate services needed to support economic development and welfare.
(MO_CHN_484) Accelerated improvements to climate models through collaborative climate science research between China and UK researchers.	0.64	0.81	Committed	ODA	Grant	Adaptation	Environmental research	Grants to develop methods to derive robust information on uncertainties in future climate variability and change in East Asia during the 21st century to help inform decision making and impacts analysis.

Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
(MO_CHN_475) Improve the observational basis for understanding East Asian climate variability and change	0.54	0.69	Committed	ODA	Grant	Adaptation	Environmental research	Improve the observational basis for understanding East Asian climate variability and change by including early years' data through digitisation, and by developing techniques, software and tools to improve gridded datasets, including at higher temporal and spatial resolution and to assess their uncertainties. One focus could be on precipitation, to better enable the understanding of the East Asian Summer Monsoon and the wider hydrological cycle.
(MO_CHN_482) Collaborative climate science research programme between China and UK focused on climate model development and climate prediction systems	0.50	0.64	Committed	ODA	Grant	Adaptation	Environmental research	Research into near term climate projections in China and projections of 21st century hydrological change in China aims to enable better business planning and help inform climate adaptation choices.
(GCRF_ESRC_AA_ES/P011306/1) Social and Environmental Trade-offs in African Agriculture	1.41	1.80	Committed	ODA	Grant	Adaptation	Environmental research	SENITAL is a collaboration of research organisations from the UK, Ethiopia, Ghana, Uganda and Zambia that is working to enhance knowledge about impacts, risks & trade-offs among social, economic & environmental dimensions of different agricultural development pathways through high quality research. SENITAL will also work to build linkages and research capacity across all partner countries.
UK Blue Carbon Fund	4.97	6.35	Committed	ODA	Grant	Mitigation	Forestry development	The Fund will promote the sustainable management, conservation and restoration of mangrove habitats by developing and embedding operational blue carbon markets across the Caribbean and Latin America that provide local communities with a sustainable income and assist in moving low-income countries towards low-emission, climate-resilient development. Includes capactiy building. https://devtracker.fcdo.gov.uk/projects/GB-GOV-7-ICF-PO008-UKBLUECARBONFUND

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	Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
	Domestic currency (£m)	USD ($m)						
Blue Forests Initiative	0.80	1.02	Committed	ODA	Grant	Mitigation	Forestry development	The project aims to design a holistic model for mangrove forest conservation and sustainable development. Operating in Madagascar and Indonesia, the project seeks to reduce the deforestation of mangrove habitat, create new sustainable livelihoods, support community health and women's empowerment and increase climate resilience in coastal communities. https://devtracker.fcdo.gov.uk/projects/GB-GOV-7-ICF-P0001-BV
	0.80	1.02	Committed	ODA	Grant	Adaptation	Forestry development	
Land degradation neutrality fund	5.00	6.39	Committed	ODA	Equity	Mitigation	Forestry development	The LDN Fund invests in projects which reduce or reverse land degradation and thereby contribute to 'Land Degradation Neutrality'. The LDN Fund is co-promoted by the Global Mechanism of the United Nations Convention to Combat Desertification (UNCCD) and Mirova. It is a public-private partnership using public money to increase private sector investment in sustainable development. The fund invests in sustainable agriculture, forestry and other land uses globally. The Fund was launched at the UNCCD's COP 13 in China in 2017.
	5.00	6.39	Committed	ODA	Equity	Adaptation	Forestry development	
Eco.business Fund	6.32	8.07	Committed	ODA	Equity	Mitigation	Biodiversity	A public-private partnership investment fund. It aims to promotes lending practices with business and consumption that contributes to biodiversity conservation, sustainable use of natural resources, climate change mitigation and adaption to its impacts. The Fund will secure private sector investments and support both financial instruments and non-financial instruments, such as technical assistance across South America: Ecuador, Costa Rica, Nicaragua, El Salvador, Columbia, Panama & Honduras. The fund is designed to leverage existing financial sector infrastructure and promote the investment integration of conservation investment finance into mainstream financial products.
	6.32	8.07	Committed	ODA	Equity	Adaptation	Biodiversity	

Note
Monetary figures are rounded to the nearest (£/$)100,000.

Table 7b

Provision of public financial support: contribution through bilateral, regional and other channels 2020

Project ID	*Recipient country/region/project/ programme*	*Total amount*		*Status*	*Funding source*	*Financial instrument*	*Type of support*	*Sector*	*Additional Information*
		Climate-specific		*Provided, Committed, Pledged*	*ODA, OOF, Other*	*Grant, Concessional loan, Non-concessional loan, Equity, Other*	*Mitigation, Adaptation, Cross-cutting, Other*	*Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable*	
		Domestic currency (£m)	*USD ($m)*						
203444	203444 CDC Programme of Support in Africa and South Asia (2015-2023) Geography over programme lifetime: Multiple countries	130	166.67	Committed	ODA	Equity	Mitigation	Banking & Financial Services	To enable CDC to scale up its activity of investing and lending to support the building of businesses in developing countries, to create jobs and make a lasting difference to people's lives in some of the world's poorest places. CDC is FCDO's main vehicle for investing in private companies in Africa and South Asia. CDC encourages capital investments, including in renewable energy, from other private investors by being a first mover, demonstrating to other investors that commercial returns are possible in these frontier markets, and by sharing risk and expertise. The additional equity from FCDO will enable CDC to meet demand for capital in its target markets and allow CDC to sustain a higher volume of more developmental investments across priority regions and business sectors.
300751	300751 Global Risk Financing Facility [GRIF] Geography over programme lifetime: Jamaica, Malawi	20	25.64	Committed	ODA	Grant	Adaptation	Banking & Financial Services	To save lives and reduce the impacts of shocks, like droughts, hurricanes and floods through enabling earlier and more effective response and faster recovery. It provides finance to support governments and humanitarian agencies to use risk financing instruments, like insurance and contingent credit, to access more rapid finance in emergencies, and to strengthen preparedness of local systems for disaster response and recovery. It will focus on disasters, but will develop over time to cover a wider range of risks, including famine.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
201724	201724 Forest Governance, Markets and Climate Geography over programme lifetime: Indonesia, Ghana, Liberia, Dem. Rep. of Congo, Guyana, Ivory Coast, Cameroon, Vietnam, Laos, Gabon, Central African Republic	12	15.38	Committed	ODA	Grant	Adaptation	Forestry	A global programme supporting governance and market reforms aimed at reducing the illegal use of forest resources, benefitting poor forest-dependent people and promoting sustainable growth in developing countries.
201724	201724 Forest Governance, Markets and Climate Geography over programme lifetime: Indonesia, Ghana, Liberia, Dem. Rep. of Congo, Guyana, Ivory Coast, Cameroon, Vietnam, Laos, Gabon, Central African Republic	12	15.38	Committed	ODA	Grant	Mitigation	Forestry	A global programme supporting governance and market reforms aimed at reducing the illegal use of forest resources, benefitting poor forest-dependent people and promoting sustainable growth in developing countries.
300363	300363 Building Resilience in Ethiopia (BRE) Geography over programme lifetime: Ethiopia	22.88	29.33	Committed	ODA	Grant	Adaptation	Emergency Response	To build Ethiopia's resilience to climate and humanitarian shocks by seeking to support the Government of Ethiopia to lead an effective and accountable humanitarian response system. It will have four key strands: Providing technical assistance to the Government of Ethiopia to lead and deliver an effective and accountable humanitarian response , delivering food and cash to people in humanitarian need in the most effective way, respond to emergency humanitarian needs in the most effective way and monitoring, evaluation and learning to strengthen humanitarian delivery in Ethiopia.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203842	203842 Managing Climate Risks for Urban Poor Geography over programme lifetime: Asia Regional including Pakistan, Bangladesh, India, Vietnam, Indonesia	10.11	12.96	Committed	ODA	Grant	Adaptation	Urban development and management	This programme will help cities plan for and invest in reducing the impacts of weather-related changes and extreme events, through a partnership with the Rockefeller foundation and the Asian Development Bank, on 2 million urban poor and vulnerable people in 25 medium-sized cities in 6 Asian countries (initially Pakistan, Bangladesh, India, Vietnam, Indonesia) by improving planning processes so that they consider climate change risks, for developing and funding new investment and infrastructure opportunities, and for knowledge and lesson sharing by 2018.
204764	204764 CGIAR 2017-21, Support to develop and deploy the next generation of agriculture technology to support poor farmers by the international agriculture research organisation the CGIAR, 2017-21 Geography over programme lifetime: Multiple countries	22.53	28.88	Committed	ODA	Grant	Adaptation	Agriculture	To enable the CGIAR to scale up its research, contributing to the development of new crop varieties which are more productive and tolerant of biotic and abiotic stress. Development of farming systems which are more resilient, including to the effects of climate change, and more productive, the development of markets and value chains which are better able to deliver benefits to poor people and policies and technology which will directly support better nutritional and health outcomes for the poor.
204764	204764 CGIAR 2017-21, Support to develop and deploy the next generation of agriculture technology to support poor farmers by the international agriculture research organisation the CGIAR, 2017-21 Geography over programme lifetime: Multiple countries	2.5	3.21	Committed	ODA	Grant	Mitigation	Agriculture	To enable the CGIAR to scale up its research, contributing to the development of new crop varieties which are more productive and tolerant of biotic and abiotic stress. Development of farming systems which are more resilient, including to the effects of climate change, and more productive, the development of markets and value chains which are better able to deliver benefits to poor people and policies and technology which will directly support better nutritional and health outcomes for the poor.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204270	204270 Africa Division funding to the African Agriculture Development Company (AgDevCo) Geography over programme lifetime: Kenya, Sierra Leone, Ghana, Malawi, Mozambique, Tanzania, Uganda, Zambia	8.6	11.03	Committed	ODA	Grant	Adaptation	Agriculture	AgDevCo is a specialised investor and project developer focused exclusively on early stage Small and Medium Enterprise agribusiness in Sub Saharan Africa. AgDevCo deploys patient capital and technical assistance to build profitable businesses that contribute to food security, drive economic growth and create jobs and income in rural areas and contribute to farmers' resilience to climate change.
300113	300113 Building Resilience and adapting to climate change in Malawi Geography over programme lifetime: Malawi	15.18	19.46	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	This programme aims to strengthen the resilience of poor households in Malawi to withstand current and projected weather and climate-related shocks and stresses. This will in turn halt the annual cycle of humanitarian crises that blights people's lives, harms poverty reduction efforts and swallows up resources. The UK will invest up to £70 million over five years (2018-2023) to provide direct benefits to 1.7 million poor and vulnerable people in Malawi (approximately 300,000 households).
202745	202745 Investments in Forests and Sustainable Land Use Geography over programme lifetime: Multiple countries including Dem. Rep. of Congo, Rep. of Congo, Cote d'Ivoire, Cameroon, Ethiopia, Gabon, Ghana, Indonesia, Kenya, Liberia, Mozambique, Tanzania, Sierra Leone, Central African Republic	6.33	8.12	Committed	ODA	Grant	Adaptation	Forestry	To support public-private partnerships that demonstrate how companies, communities, smallholders and governments can work collaboratively to reduce deforestation and benefit forest dependent communities

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202745	202745 Investments in Forests and Sustainable Land Use Geography over programme lifetime: Multiple countries including Dem. Rep. of Congo, Rep. of Congo, Cote d'Ivoire, Cameroon, Ethiopia, Gabon, Ghana, Indonesia, Kenya, Liberia, Mozambique, Tanzania, Sierra Leone, Central African Republic	6.33	8.12	Committed	ODA	Grant	Mitigation	Forestry	To support public-private partnerships that demonstrate how companies, communities, smallholders and governments can work collaboratively to reduce deforestation and benefit forest dependent communities
300418	300418 UK-INDIA Partnership on National Investment and Infrastructure Fund -Green Growth Equity Fund Geography over programme lifetime: India	23.27	29.83	Committed	ODA	Equity/Grant	Mitigation	Energy generation, renewable sources	The NIIF sub-fund will use UK government finance to catalyse private sector investments from global UK investors, through the City of London to infrastructure projects in India. To help India address a key constraint to inclusive growth by boosting investment into infrastructure - which will lead to growth, job creation and poverty reduction in India. The fund is fully attributed to climate change mitigation - ie low carbon development, reducing greenhouse gas emissions. The fund will primarily invest in sectors like Renewable Energy, Clean Transportation, Water Treatment, and Waste Management. The success of this intervention will lead to follow on private investment that will have a transformational impact on India's economic development.
300667	300667 Supporting Economic Empowerment and Development in the Occupied Palestinian Territories (SEED OPTs) Geography over programme lifetime: Occupied Palestinian Territories	1.02	1.31	Committed	ODA	Grant	Adaptation	Energy policy	This programme will focus FCDO economic development assistance in the areas of water, electricity, access & movement and trade, and fiscal losses and customs. Programme activities will support institutional capacity building and infrastructure development, working closely with the Palestinian Authority and Government of Israel. The overarching goal is to support economic growth and job creation in the OPTs.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300667	300667 Supporting Economic Empowerment and Development in the Occupied Palestinian Territories (SEED OPTs) Geography over programme lifetime: Occupied Palestinian Territories	1.02	1.31	Committed	ODA	Grant	Mitigation	Energy policy	This programme will focus FCDO economic development assistance in the areas of water, electricity, access & movement and trade, and fiscal losses and customs. Programme activities will support institutional capacity building and infrastructure development, working closely with the Palestinian Authority and Government of Israel. The overarching goal is to support economic growth and job creation in the OPTs.
300143	300143 Hunger Safety Net Programme (HSNP Phase 3) Geography over programme lifetime: Kenya	7.6	9.74	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To reduce poverty, hunger and vulnerability by providing 100,000 of the poorest households (approximately 600,000 people) in Kenya's arid and semi-arid lands with cash transfers and up to an additional 250,000 households (approximately 1,250,000 people) during drought emergencies. In addition, this final phase of the programme will ensure a transition of the Hunger Safety Net Programme to full Government of Kenya ownership and financing to guarantee the sustainability of the programme after a UK exit.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202921	202921 Building Resilience and Adaptation to Climate Extremes and Disasters Geography over programme lifetime: Myanmar, Ethiopia, Burkina Faso, Kenya, Mali, Mauritania, Niger, Nepal, Sudan, Senegal, South Sudan, Chad, Uganda	-0.1	- 0.13	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	To help up to 10 million people, especially women and children, in developing countries cope with extreme climate and weather events such as droughts, cyclones and floods (climate extremes). This will be achieved by doing three things. By making grants to civil society organisations to scale up proven technologies and practices in the Sahel, sub-Saharan Africa and South Asia that help people withstand, and more quickly recover, from climate extremes. By identifying the best ways of doing this, and share this knowledge globally to increase the programme's overall impact. By supporting national governments to strengthen their policies and actions to respond to climate extremes. These will all contribute to the Millennium Development Goals on the eradication poverty and hunger, and environmental sustainability, and also respond to the Humanitarian and Emergency Response Review recommendation that FCDO should integrate the threat from climate change into a Disaster Risk Reduction.
204888	204888 Building Resilience Through Asset Creation and Enhancement II – South Sudan (ICF Programme) Geography over programme lifetime: South Sudan	8.61	11.04	Committed	ODA	Grant	Adaptation	Agriculture	To reduce hunger gaps, improve long-term food security and mitigate conflict among 400,000 rural poor in five states of South Sudan. By working together beneficiaries earn food or cash in return for identifying and building community assets (such as irrigation ponds). This enables communities to develop and manage their resources against extreme climate damage and shocks. This will contribute to Sustainable Development Goals 1, 2, 13, 15 and 16 to end poverty and hunger; take action on climate; protect life on land and; promote peaceful and inclusive societies for sustainable development.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204637	204637 Africa Clean Energy Programme (ACE) Geography over programme lifetime: Africa Regional including Mozambique, Malawi, Zambia, Zimbabwe, Tanzania, Rwanda, Uganda, Kenya, Ethiopia, Somalia, Nigeria, Ghana, Sierra Leonne, Senegal	7.76	9.95	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	The programme will catalyse a market based approach for private sector delivery of solar home system (SHS) products and services. This will lead to improved energy access for people in sub-Saharan Africa currently who are currently without modern energy. The programme will support: 1) Technical assistance to improve the enabling environment for a market based approach for private sector delivery of solar home system (SHS) products and services (Policy and Regulatory Reform, investment readiness, learning and Coordination) 2) Finance for businesses wanting to enter new and emerging SHS markets in sub-Saharan Africa for their start up and early commercialisation of ideas 3) Test innovative approaches to stimulating private sector investment and a market development.
204867	204867 TEA - Transforming Energy Access Geography over programme lifetime: Sub Saharan Africa, South Asia	17.47	22.40	Committed	ODA	Grant	Mitigation	Energy Policy	The project is up to £65 million over five years, to support early stage testing and scale up of innovative technologies and business models that will accelerate access to affordable, clean energy services for poor households and enterprises, especially in Africa. The programme will include: i) partnership with Shell Foundation, enabling support to another 30+ early stage private sector innovations. ii) Innovate UK's Energy Catalyst to stimulate technology innovation by UK enterprises; iii) build other strategic clean energy innovation partnerships (e.g. testing a new 'P2P Solar' crowdfunding platform; and scoping a potential new partnership with Gates Foundation on Mission Innovation); iv) skills and expertise development. To support early stage testing and scale up of innovative technologies and business models that will accelerate access to affordable, clean energy services for poor households and enterprises, especially in Africa

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204019	204019 Humanitarian Assistance and Resilience in South Sudan (HARISS) 2015 - 2021 Geography over programme lifetime: South Sudan	8.14	10.44	Committed	ODA	Grant	Adaptation	Emergency Response	To help approximately three million South Sudanese by providing critical life-saving support and helping people to better cope with shocks from conflict, drought and flooding. This programme aims to save the lives of an estimated two million people who will receive at least one form of humanitarian assistance; and build the capacity of an estimated one million people to recover and cope better with shocks. Over five years this programme will provide food, shelter and access to water and health services to millions of vulnerable people, including women and children.
204624	204624 WISER - Weather and climate Information and SERvices for Africa Geography over programme lifetime: Africa Regional including Ethiopia, Kenya, Tanzania, Uganda, Rwanda, Burundi	5.45	6.99	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	WISER will help at least 24 million people across Africa (focusing initially on East Africa) to be more resilient to natural disasters and climate change by 2030 by improving early warning systems (giving more time to prepare for heavy rains for example) as well as helping them make better decisions by knowing what the weather and climate is likely to be (enabling them to make better crop choices or alter planting times in farming, for example). We estimate that this will save over £190 million in terms of avoided damage to health, homes, livelihoods and infrastructure between now and 2030. The WISER programme will initially benefit the East African fishing and farming communities, as well as a wide range of African people, including young, old, men and boys and women and girls.
203272	203272 Strengthening Health Facilities in the Caribbean Geography over programme lifetime: Belize, Dominica, Grenada, Guyana, Jamaica, St Lucia, Saint Vincent and the Grenadines	9.86	12.64	Committed	ODA	Grant	Adaptation	Health, General	To provide safer, greener health facilities to deliver care in disasters, generate operational savings and reduce disaster losses.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203272	203272 Strengthening Health Facilities in the Caribbean Geography over programme lifetime: Belize, Dominica, Grenada, Guyana, Jamaica, St Lucia, Saint Vincent and the Grenadines	0.52	0.67	Committed	ODA	Grant	Mitigation	Health, General	To provide safer, greener health facilities to deliver care in disasters, generate operational savings and reduce disaster losses.
205128	205128 Somalia Humanitarian and Resilience Programme (SHARP) 2018-2022 Geography over programme lifetime: Somalia	8.15	10.45	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To meet the most urgent humanitarian needs of conflict and disaster affected populations through provision of life-saving assistance and contribute to resilience building of benefitting households to withstand shocks.
204012	204012 Northern Uganda: Transforming the Economy through Climate Smart Agribusiness (NU-TEC) Geography over programme lifetime: Uganda	4.63	5.94	Committed	ODA	Grant	Adaptation	Agriculture	To increase the resilience to climate change of poor farmers in Northern Uganda, and to increase their incomes. This will be achieved by working with agricultural businesses to supply farmers with cheaper, better and more varied agricultural inputs and services, and to create stronger markets for farmer produce. This will benefit 250,000 households in Northern Uganda, who will adopt new practices, products and markets that will make them more resilient to climate change, while 150,000 households will see measurable increases to income. This will contribute to the MDGs (and their successor targets) by reducing poverty in Uganda.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204012	204012 Northern Uganda: Transforming the Economy through Climate Smart Agribusiness (NU-TEC) Geography over programme lifetime: Uganda	0.51	0.65	Committed	ODA	Grant	Mitigation	Agriculture	To increase the resilience to climate change of poor farmers in Northern Uganda, and to increase their incomes. This will be achieved by working with agricultural businesses to supply farmers with cheaper, better and more varied agricultural inputs and services, and to create stronger markets for farmer produce. This will benefit 250,000 households in Northern Uganda, who will adopt new practices, products and markets that will make them more resilient to climate change, while 150,000 households will see measurable increases to income. This will contribute to the MDGs (and their successor targets) by reducing poverty in Uganda.
203264	203264 Building Disaster Resilience in Pakistan Geography over programme lifetime: Pakistan	9.84	12.62	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	FCDO support will strengthen community and household resilience to emergencies and disasters over six years. The programme will aim to build resilience in communities and households in Pakistan to manage the impact of disasters by maintaining or transforming living standards in the face of shocks and stresses without compromising their long-term prospects.
201879	201879 I2I - Ideas to Impact - Testing new technologies and innovative approaches to address development challenges. Geography over programme lifetime: Developing countries unspecified	-0.15	- 0.19	Committed	ODA	Grant	Adaptation	Industry	I2I stimulates technological innovations addressing intractable development challenges, initially in the focal areas of energy, water and climate, and then increasingly in emerging “frontier” technologies with broader applicability. It tests different funding mechanisms and approaches - including prizes, peer-to-peer financing, Frontier Technology Livestreaming, and innovative cross-government partnerships - for ensuring technology ideas lead to a real-world development impact.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
201879	201879 I2I - Ideas to Impact - Testing new technologies and innovative approaches to address development challenges. Geography over programme lifetime: Developing countries unspecified	-0.18	- 0.23	Committed	ODA	Grant	Mitigation	Industry	I2I stimulates technological innovations addressing intractable development challenges, initially in the focal areas of energy, water and climate, and then increasingly in emerging “frontier” technologies with broader applicability. It tests different funding mechanisms and approaches - including prizes, peer-to-peer financing, Frontier Technology Livestreaming, and innovative cross-government partnerships - for ensuring technology ideas lead to a real-world development impact.
300230	300230 Transboundary Water Management in Southern Africa Geography over programme lifetime: Angola, Botswana, Dem. Rep of Congo, Tanzania,Swaziland, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe	4.64	5.95	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	The project will support countries in Southern Africa to manage their shared water resources, thereby helping 2-3 million poor people to better cope with the impacts of existing climate variability and climate change (especially floods and drought). It will do this by improving assessment and planning concerning these resources, and designing and building water infrastructure such as irrigation schemes, water supply or hydropower schemes. This will help poor and vulnerable people gain access to clean and safe water, produce a predictable agricultural yield and store water for when it is needed during the dry months of the year. The programme will also help countries to communicate hydrological data between themselves – thus providing downstream countries with advance notice of floods and enabling countries to optimise how much water is stored in each country to ensure each has enough to meet their basic requirements.

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		Domestic currency (£m)	USD ($m)						
300303	300303 Rural Electrification in Sierra Leone Geography over programme lifetime: Sierra Leone	6.94	8.90	Committed	ODA	Grant	Mitigation	Energy distribution	To increase access to clean energy through the creation of environmentally and economically sustainable electric mini-grid systems for small remote rural communities in Sierra Leone by 2020. This is expected to directly benefit around 360,000 people in rural Sierra Leone, and indirectly help up to 1.8 million people access low carbon electricity. This will add more than 10 Mega Watts (MW) to the country's power generation capacity of an estimated average peak demand requirement of 300-500 MW. There will be a welfare increase in rural communities in terms of saved fuel costs, improved health and education outcomes, improved communications and access to information and health and safety. The project will also result in a significant reduction in Sierra Leone's future Green House Gas emissions through supported private investment in the installation and operation of renewably-powered mini-grids.

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		Domestic currency (£m)	USD ($m)						
205082	205082 Rural Water for Sudan (RW4S) Geography over programme lifetime: Sudan	7.42	9.51	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	This programme will address the root causes of crisis in Darfur by tackling one of the main drivers of local conflict and poverty – availability of water. Water is scarce and there is competition over its use. This can result in conflict and lead to unsustainable livelihoods, forcing people to migrate to find alternatives. The climate is likely to get hotter and drier, further increasing scarcity of water. The programme will increase the availability of water for drinking and livelihoods for 250,000 people, and will support communities to sustainably manage their water resources for the benefit of all users. This will increase communities' resilience to the impacts of drought, contributing to more sustainable livelihoods and reducing the risk of conflict, overall improving stability in Darfur and reducing the pressure to migrate. In addition, the programme will improve sanitation and hygiene behaviour, improving the health and well-being of communities.
205195	205195 Rehabilitation of Freetown's Water Supply System Geography over programme lifetime: Sierra Leone	11.85	15.19	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	The project will increase sustainable access to safe water in Freetown, the capital city, and safe-guard water security and reduce climate change vulnerability. This will be achieved through rehabilitation of water infrastructure for improved public service delivery of water.
203491	203491 Support to Bangladesh's National Urban Poverty Reduction Programme (NUPRP) Geography over programme lifetime: Bangladesh	5.45	6.99	Committed	ODA	Grant	Adaptation	Urban development and management	Improvement in the integration of poor communities into municipal planning, budgeting and management, with a particular focus on women and girls and climate resilience; piloting of options for scale up and lesson learning at national level to inform overall urban policy and poverty reduction

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203491	203491 Support to Bangladesh's National Urban Poverty Reduction Programme (NUPRP) Geography over programme lifetime: Bangladesh	0.61	0.78	Committed	ODA	Grant	Mitigation	Urban development and management	Improvement in the integration of poor communities into municipal planning, budgeting and management, with a particular focus on women and girls and climate resilience; piloting of options for scale up and lesson learning at national level to inform overall urban policy and poverty reduction
204640	204640 Zambia Health Systems Strengthening Programme Geography over programme lifetime: Zambia	2.27	2.91	Committed	ODA	Grant	Adaptation	Population Policies/ Programmes & Reproductive Health	The Zambia Health Systems Strengthening programme aims improve the health of women and girls in Zambia across the continuum of care from birth, childhood and motherhood. This together with our other parallel interventions to strengthen the health system, will by 2021 result in a reduction in child and maternal deaths by 25% and 15% respectively and contribute towards attainment of the sustainable development goal for health. The nutrition status of 500,000 children, women and young girls will be improved and 270,000 girls and women gain access to family planning. It will ensure that Zambia is able to prevent, detect, and raise a comprehensive response to disease outbreaks and the effects of climate change.
300102	300102 The Future of Agriculture in Rwanda (FAiR) Geography over programme lifetime: Rwanda	1.24	1.59	Committed	ODA	Grant	Adaptation	Agriculture	The programme will sustainably increase agricultural productivity and benefit poor farming households, through greater commercialisation of Rwandan agriculture. This will lead to an enhanced contribution of agriculture to economic growth, food security and poverty reduction
204033	204033 Support to Rural Water Supply, Sanitation & Hygiene in Tanzania Geography over programme lifetime: Tanzania	1.74	2.23	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To improve the health and socio-economic status of poor people by providing access to clean water, sanitation and hygiene services in rural areas of Tanzania. This will benefit 2.8 million people. This contributes towards our MDGs by supporting development of water infrastructure and promotion of hygiene and sanitation services. And will result in sustainability of water and sanitation services by 2022.

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		Domestic currency (£m)	USD ($m)						
205271	205271 Support to the International Agriculture Research Centres developing and delivering agriculture technologies and knowledge to reduce poverty, hunger and adapt to climate change. Geography over programme lifetime: Multiple countries	5.67	7.27	Committed	ODA	Grant	Adaptation	Agriculture	To contribute to poverty reduction, improvements in nutritional status, and adaptation to climate change in South Asia and Africa in the face of climate change and resource scarcity, by developing new technologies, products and knowledge which promote agricultural productivity and increase the resistance of crops to diseases and pests. The programme will lead to increased agricultural productivity; increased production and consumption of nutritious vegetables; and improved food security and incomes for rural households in Africa and South Asia.
204603	204603 Multi-Year Humanitarian Programme in Pakistan Geography over programme lifetime: Pakistan	2.76	3.54	Committed	ODA	Grant	Adaptation	Emergency Response	Support for up to three million of the most vulnerable people affected by natural disaster and conflict. This will cover both immediate relief and early recovery interventions for shelter, food, non-food items, water and sanitation, livelihood and protection needs, depending on the emergency, including enhancing resilience of the beneficiary communities to climate extremes such as floods and droughts. This programme will also support developments in the UN and local civil society which are required for humanitarian responses to be more locally owned and effective in future, as well as effective monitoring and evaluation, targeted active research and piloting.
202098	202098 Rural and Agriculture Markets Development programme for Northern Nigeria (PrOpCom Mai-karfi) Geography over programme lifetime: Nigeria	6.99	8.96	Committed	ODA	Grant	Adaptation	Industry	To increase employment and improve productivity in selected rural and agricultural market systems in northern Nigeria. Improve resilience of poor men and women, in selected rural markets in northern Nigeria, to the negative impacts of climate change and encourage low carbon growth. To increase the incomes by between 15% and 50% of over 710,000 poor people in the north of Nigeria through facilitating change in key market sectors by March 2021.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202098	202098 Rural and Agriculture Markets Development programme for Northern Nigeria (PrOpCom Mai-karfi) Geography over programme lifetime: Nigeria	0.53	0.68	Committed	ODA	Grant	Mitigation	Industry	To increase employment and improve productivity in selected rural and agricultural market systems in northern Nigeria. Improve resilience of poor men and women, in selected rural markets in northern Nigeria, to the negative impacts of climate change and encourage low carbon growth. To increase the incomes by between 15% and 50% of over 710,000 poor people in the north of Nigeria through facilitating change in key market sectors by March 2021.
204842	204842 Promoting Conservation Agriculture in Zambia Geography over programme lifetime: Zambia	1.76	2.26	Committed	ODA	Grant	Adaptation	Agriculture	To raise agricultural productivity in Zambia, particularly small scale farmers, using climate smart agriculture techniques and facilitating commercial relationships with agriculture companies
204842	204842 Promoting Conservation Agriculture in Zambia Geography over programme lifetime: Zambia	0.75	0.96	Committed	ODA	Grant	Mitigation	Agriculture	To raise agricultural productivity in Zambia, particularly small scale farmers, using climate smart agriculture techniques and facilitating commercial relationships with agriculture companies
204623	204623 Forestry, Land-use and Governance in Indonesia Geography over programme lifetime: Indonesia	0.9	1.15	Committed	ODA	Grant	Mitigation	Forestry	To reduce greenhouse gas emissions and deforestation in Indonesia as part of the UK's efforts to avoid catastrophic climate change that would hit the very poorest first and set back global efforts at poverty reduction
300351	300351 Second phase of FCDO's Support to the Private Infrastructure Development Group (PIDG). Geography over programme lifetime: Multiple countries	22.17	28.42	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	The aim of PIDG is to mobilise private investment in infrastructure, including renewable energy, in order to increase service provision for the poor, boost economic growth, trade and jobs to alleviate poverty in the world's poorest countries.

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		Domestic currency (£m)	USD ($m)						
203624	203624 On and off Grid Small Scale Renewable Energy in Uganda Geography over programme lifetime: Uganda	1.79	2.29	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To improve the environment for private investment in Uganda's renewable energy sector by accelerating the market for off grid solar energy and supporting the construction of at least 15 on-grid small scale power plants. This will increase Uganda's energy production by approximately 20%, improve access to clean and modern energy for over 200,000 households and businesses or 1.2m people; mobilise up to £240 million in private finance and stabilise Uganda's power sector finances by saving approximately $260m to 2.7bn during the period 2013-35, and lead to greenhouse gas emission savings of between 1 and 10 $MtCO_2e$.
203185	203185 Asia Regional Resilience to a changing climate (ARRCC) Geography over programme lifetime: Asia Regional	6.88	8.82	Committed	ODA	Grant	Adaptation	General Environment Protection	A regional partnership in South Asia among the research community, its funders, and users foster a more coordinated and interactive climate research environment that supports good decision making

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204984	204984 Climate Smart Development for Nepal Geography over programme lifetime: Nepal	3.86	4.95	Committed	ODA	Grant	Adaptation	Government & Civil Society	This will help Nepal to cope with impacts of climate change (CC) and promote clean development. It will provide strategic support to the Govt of Nepal to design and implement CC policies, to integrate resilience throughout government planning. This will:Improve resilience of 700,000 poor & vulnerable people (especially women) to floods, landslides, droughts in most remote districts;Improve resilience of businesses in 5 growing urban centres & 3 river basins through investments in urban planning, large scale irrigation systems & flood management;Facilitate connection of over 25,000 households to new micro-hydro power installations; connect over 70,000 homes to solar power & install RET in more than 200 schools/health clinics;Develop industry standard for 'clean' brick production and enable over half of the brick kilns (at least 400) to adopt more efficient technologies;Improve design of future CC programming & beyond through generation of world class evidence

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204984	204984 Climate Smart Development for Nepal Geography over programme lifetime: Nepal	3.86	4.95	Committed	ODA	Grant	Mitigation	Government & Civil Society	This will help Nepal to cope with impacts of climate change (CC) and promote clean development. It will provide strategic support to the Govt of Nepal to design and implement CC policies, to integrate resilience throughout government planning. This will:Improve resilience of 700,000 poor & vulnerable people (especially women) to floods, landslides, droughts in most remote districts;Improve resilience of businesses in 5 growing urban centres & 3 river basins through investments in urban planning, large scale irrigation systems & flood management;Facilitate connection of over 25,000 households to new micro-hydro power installations; connect over 70,000 homes to solar power & install RET in more than 200 schools/health clinics;Develop industry standard for 'clean' brick production and enable over half of the brick kilns (at least 400) to adopt more efficient technologies;Improve design of future CC programming & beyond through generation of world class evidence
300111	300111 Low Energy Inclusive Appliances Geography over programme lifetime: Developing countries unspecified	3.77	4.83	Committed	ODA	Grant	Adaptation	Energy Policy	To undertake research to accelerate the availability, affordability, efficiency and performance of Low Energy Inclusive Appliances (LEIA) suited to developing country contexts. Domestic and small-industrial electrical appliances are key to increasing the impact of energy access for poor consumers, expanding the markets for household solar and mini-grid systems, and enabling the most efficient use of available power where the grid is unreliable.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300111	300111 Low Energy Inclusive Appliances Geography over programme lifetime: Developing countries unspecified	1.26	1.62	Committed	ODA	Grant	Mitigation	Energy Policy	To undertake research to accelerate the availability, affordability, efficiency and performance of Low Energy Inclusive Appliances (LEIA) suited to developing country contexts. Domestic and small-industrial electrical appliances are key to increasing the impact of energy access for poor consumers, expanding the markets for household solar and mini-grid systems, and enabling the most efficient use of available power where the grid is unreliable.
205138	205138 Post-Earthquake Reconstruction in Nepal - Building Back Better Geography over programme lifetime: Nepal	2.65	3.40	Committed	ODA	Grant	Adaptation	Reconstruction Relief & Rehabilitation	Establish partnerships with local & central government, communities and businesses to support the (i) districts effected by the Earthquake to “build back better” including leading to more resilient (including climate resilient) infrastructure and institutions; (ii) the most vulnerable recover their livelihoods and assets; and (iii) the Government of Nepal to plan for and manage the response to the earthquake.
300126	300126 CLARE - CLimate And REsilience Framework Programme Geography over programme lifetime: Developing countries unspecified	1.75	2.24	Committed	ODA	Grant	Adaptation	General Environment Protection	To develop new, more demand responsive evidence, innovation and capacity to enable developing country governments and communities to better address climate change challenges and opportunities and develop more effective disaster risk management and recovery. The programme will support research to improve our understanding of weather and climate systems across African and the likely impacts of future change. It will also support research and innovation focused on low-carbon and climate resilient technology as well as help strengthen local capacity to do and use cutting edge climate research and evidence for development.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300126	300126 CLARE - CLimate And REsilience Framework Programme Geography over programme lifetime: Developing countries unspecified	0.44	0.56	Committed	ODA	Grant	Mitigation	General Environment Protection	To develop new, more demand responsive evidence, innovation and capacity to enable developing country governments and communities to better address climate change challenges and opportunities and develop more effective disaster risk management and recovery. The programme will support research to improve our understanding of weather and climate systems across African and the likely impacts of future change. It will also support research and innovation focused on low-carbon and climate resilient technology as well as help strengthen local capacity to do and use cutting edge climate research and evidence for development.
300137	300137 Regional Economic Development for Investment and Trade (REDIT) Programme Geography over programme lifetime: Kenya	1.11	1.42	Committed	ODA	Grant	Adaptation	Trade Policies & Regulations	The programme aims to increase sustainable and shared prosperity in Kenya by increasing Kenya's trade with the region and the rest of the world. Specifically, the programme will (i) invest in improving the efficiency and capacity of transport, logistics and trade infrastructure at Mombasa Port and key border points; (ii) invest in systems to improve trading standards, reduce non-tariff barriers and enhance transparency in trade processes; (iii) improve the regulatory and policy environment for trade; and (iv) support private sector advocacy for trade competitiveness, the export capacity of Kenyan businesses and the greater participation of women and small and growing businesses in trade. ICF component is supporting Kenya Ports Authority to develop and implement a Green Port Policy to help the port adapt and become resilient to climate change. Key objectives include introducing new climate friendly technologies into the port's operations.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300137	300137 Regional Economic Development for Investment and Trade (REDIT) Programme Geography over programme lifetime: Kenya	1.11	1.42	Committed	ODA	Grant	Mitigation	Trade Policies & Regulations	The programme aims to increase sustainable and shared prosperity in Kenya by increasing Kenya's trade with the region and the rest of the world. Specifically, the programme will (i) invest in improving the efficiency and capacity of transport, logistics and trade infrastructure at Mombasa Port and key border points; (ii) invest in systems to improve trading standards, reduce non-tariff barriers and enhance transparency in trade processes; (iii) improve the regulatory and policy environment for trade; and (iv) support private sector advocacy for trade competitiveness, the export capacity of Kenyan businesses and the greater participation of women and small and growing businesses in trade. ICF component is supporting Kenya Ports Authority to develop and implement a Green Port Policy to help the port adapt and become resilient to climate change. Key objectives include introducing new climate friendly technologies into the port's operations.
204437	204437 Deepening Democracy Programme Geography over programme lifetime: Kenya	0.78	1.00	Committed	ODA	Grant	Adaptation	Government & Civil Society	To improve the Kenyan Government's accountability to its citizens by delivering peaceful, transparent, inclusive elections and providing support to non-governmental organisations, oversight bodies and independent commissions that can influence and deliver reforms thereby supporting the goal of making Kenya a more stable democracy. The project aims to improve county government planning, budgeting, human resource management, results, performance management and citizen engagement. In each of these areas, UK support will focus on governance, health, climate change and local economic development.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204437	204437 Deepening Democracy Programme Geography over programme lifetime: Kenya	0.34	0.44	Committed	ODA	Grant	Mitigation	Government & Civil Society	To improve the Kenyan Government's accountability to its citizens by delivering peaceful, transparent, inclusive elections and providing support to non-governmental organisations, oversight bodies and independent commissions that can influence and deliver reforms thereby supporting the goal of making Kenya a more stable democracy. The project aims to improve county government planning, budgeting, human resource management, results, performance management and citizen engagement. In each of these areas, UK support will focus on governance, health, climate change and local economic development.
205045	205045 Zimbabwe Resilience Building Fund Programme(ZRBF) Geography over programme lifetime: Zimbabwe	0.6	0.77	Committed	ODA	Grant	Adaptation	General Environment Protection	To improve the resilience capacity of households affected by climatic shocks and trends through inclusive economic development. The programme will have a risk financing mechanism to make timely, appropriate and predictable funding available for communities that experience large scale humanitarian shocks. The program will also build evidence to improve the policy environment and stimulate service provision to enhance household and community resilience.
205045	205045 Zimbabwe Resilience Building Fund Programme(ZRBF) Geography over programme lifetime: Zimbabwe	0.15	0.19	Committed	ODA	Grant	Mitigation	General Environment Protection	To improve the resilience capacity of households affected by climatic shocks and trends through inclusive economic development. The programme will have a risk financing mechanism to make timely, appropriate and predictable funding available for communities that experience large scale humanitarian shocks. The program will also build evidence to improve the policy environment and stimulate service provision to enhance household and community resilience.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203835	203835 FCFA - Future Climate For Africa Geography over programme lifetime: Multiple countries	1	1.28	Committed	ODA	Grant	Adaptation	General Environment Protection	The Future Climate for Africa programme supports world-leading science and technology to enhance understanding and prediction of sub-Saharan African climate and, through working closely with African stakeholders, bring this knowledge into use in informing major decisions, such as infrastructure investments, urban planning and national policy. The programme has three main objectives: firstly, to produce world-leading science to advance knowledge of African climate variability and change and enhance prediction of future African climate; secondly, to drive improved knowledge, methods and tools on how climate information and services can be better designed for, delivered and integrated into major decisions today and thirdly, to support international collaboration and the development of scientific capacity in Africa.
203835	203835 FCFA - Future Climate For Africa Geography over programme lifetime: Multiple countries	0.43	0.55	Committed	ODA	Grant	Mitigation	General Environment Protection	The Future Climate for Africa programme supports world-leading science and technology to enhance understanding and prediction of sub-Saharan African climate and, through working closely with African stakeholders, bring this knowledge into use in informing major decisions, such as infrastructure investments, urban planning and national policy. The programme has three main objectives: firstly, to produce world-leading science to advance knowledge of African climate variability and change and enhance prediction of future African climate; secondly, to drive improved knowledge, methods and tools on how climate information and services can be better designed for, delivered and integrated into major decisions today and thirdly, to support international collaboration and the development of scientific capacity in Africa.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
205268	205268 Strengthening humanitarian preparedness and response in Bangladesh Geography over programme lifetime: Bangladesh	3.18	4.08	Committed	ODA	Grant	Adaptation	Emergency Response	This programme will deliver improvement in disaster preparedness and response for large-scale catastrophic emergencies (e.g. earthquakes and cyclones) and recurrent, predictable events such as flooding as well as providing predictable support to Rohingya refugees and vulnerable refugee hosting communities.
300161	300161 Zambia Social Protection Expansion Programme Phase II Geography over programme lifetime: Zambia	1.94	2.49	Committed	ODA	Grant	Adaptation	Emergency Response	To provide small grants to vulnerable households especially those with disabled and elderly persons in order for them to have regular monthly income to take care of their basic needs and build resilience to the effects of droughts and floods.
204059	204059 Supporting Structural Reform in the Indian Power Sector Geography over programme lifetime: India	1.95	2.50	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	In line with the UK government's aid policy and new development partnership with India, the 'Supporting Structural Reform in the Indian Power Sector' programme will improve the efficiency, reliability and sustainability of electricity supply in India through technical expertise, not through traditional grant support. It will provide world class expertise to support the market reforms and scale up of renewable energy supply that the Indian power sector needs to support growth and create jobs. It will work at the Central level and in upto three States which may include FCDO focus states such as Odisha, Andhra Pradesh and Madhya Pradesh.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202328	202328 Khyber Pukhtunkhwa Education Sector Programme Geography over programme lifetime: Pakistan	0.65	0.83	Committed	ODA	Grant	Mitigation	Basic Education	To improve primary and secondary education in Khyber Pakhtunkhwa by providing up to £283.2million in technical assistance, financial aid and infrastructure which aims to benefit all primary and lower secondary children in the province by 2020. Infrastructure will aim to have a lower carbon footprint, be sited away from flood prone areas and be provided with solar power. This programme targets primary enrolment specifically girl child enrolment and female literacy which contributes towards Millennium Development Goals 2 and 3.
204956	204956 CONGO - Improving Livelihoods and Land Use in Congo Basin Forests Geography over programme lifetime: Cameroon, Rep. of Congo, Dem. Rep. of Congo, Central African Republic, Gabon	0.16	0.21	Committed	ODA	Grant	Adaptation	Forestry	To improve the the livelihoods of forest dependent communities and reduce deforestation in the Congo Basin by providing support to forest zoning, independent forest monitoring, civil society advocacy and the strengthening of legal frameworks for community forestry, as well as direct investments in community forest enterprises. The programme is expected to benefit 2.4million beneficiaries (direct and indirect). The programme will also have a demonstration effect, building a body of evidence on Community Forestry in the Congo Basin.
204956	204956 CONGO - Improving Livelihoods and Land Use in Congo Basin Forests Geography over programme lifetime: Cameroon, Rep. of Congo, Dem. Rep. of Congo, Central African Republic, Gabon	0.16	0.21	Committed	ODA	Grant	Mitigation	Forestry	To improve the the livelihoods of forest dependent communities and reduce deforestation in the Congo Basin by providing support to forest zoning, independent forest monitoring, civil society advocacy and the strengthening of legal frameworks for community forestry, as well as direct investments in community forest enterprises. The programme is expected to benefit 2.4million beneficiaries (direct and indirect). The programme will also have a demonstration effect, building a body of evidence on Community Forestry in the Congo Basin.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
205027	205027 Delivering climate resilient Water, Sanitation and Hygiene in Africa and Asia Geography over programme lifetime: Ethiopia, Bangladesh, Nepal, Malawi, Mozambique	2.11	2.71	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	This programme will improve the resilience of water and sanitation services supports development of health surveillance systems to identify and respond to climate-related changes in the incidence of water and sanitation related diseases.
204656	204656 Building Urban Resilience to Climate Change in Tanzania Geography over programme lifetime: Tanzania	2.2	2.82	Committed	ODA	Grant	Adaptation	Urban development and management	To build urban resilience to current climate variability and future climate change in Tanzania's cities and towns through improved data and evidence, urban planning, and infrastructure provision for sustainable economic growth and development.
300185	300185 Supporting a Sustainable Future for Papua's Forests Geography over programme lifetime: Indonesia	0.2	0.26	Committed	ODA	Grant	Adaptation	Forestry	To catalyse a number of urgent climate initiatives that will accelerate the transition to a low carbon economy and prevent planned deforestation in the Indonesian provinces of Papua.
300185	300185 Supporting a Sustainable Future for Papua's Forests Geography over programme lifetime: Indonesia	0.82	1.05	Committed	ODA	Grant	Mitigation	Forestry	To catalyse a number of urgent climate initiatives that will accelerate the transition to a low carbon economy and prevent planned deforestation in the Indonesian provinces of Papua.
205222	205222 Cities and Infrastructure for Growth (CIG) Geography over programme lifetime: Myanmar, Uganda, Zambia, Ethiopia	6.17	7.91	Committed	ODA	Grant	Mitigation	Energy Policy	The programme will provide technical support on city and regional interventions resulting in increased inclusive economic growth and job creation. The interventions will help city economies to become more productive, deliver access to reliable, affordable, renewable power for businesses and households, and strengthen investment into infrastructure services, including from the UK.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300705	300705 Delivering ambition of the United Nations Secretary General's Climate Summit 2019 to build resilience to climate change Geography over programme lifetime: Developing countries unspecified	3.47	4.45	Committed	ODA	Grant	Adaptation	General Environment Protection	Delivering ambition of the United Nations Secretary General's Climate Summit 2019 to build resilience to climate change
204988	204988 African Agriculture Technology Foundation (AATF) Phase III (2015-2020) Geography over programme lifetime: Africa	0.75	0.96	Committed	ODA	Grant	Adaptation	Agriculture	The expected impact of support to the proposed intervention is increased productivity of small-holder farmers in Sub-Saharan Africa, including scaling up of crops resilient to climate shocks such as drought. This impact will be achieved through two outcomes a. Increased access/availability of appropriate agricultural technologies for small-holder farmers in targeted countries in Sub-Saharan Africa. b. A financially sustainable organisation/mechanism that is responsive to the needs of small-holder farmers in ensuring that market failures in the development and adoption of appropriate agricultural technologies continue to be addressed.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300237	300237 Strengthening Climate Resilient Systems for Water, Sanitation and Hygiene Services in Ethiopia (SCRS - WASH) Geography over programme lifetime: Ethiopia	4.05	5.19	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	Improve access to climate-resilient water and improved sanitation services and good hygiene practices for 1.2m people in the prioritised drought-affected and drought-prone areas of Ethiopia. The proposed Strengthening Climate Resilient Systems for Water, Sanitation and Hygiene Services in Ethiopia (SCRS-WaSH) programme will contribute to the Government of Ethiopia's Climate Resilient WaSH provision to drought-prone areas. the programme aims to realise this through a combination of targeted Financial Aid and Technical Assistance support. The FA will focus primarily on improving climate-resilient WaSH facilities which ensure year-round access to resilient WaSH services at household, community and institution levels in the targeted intervention areas. This will be complemented with TA support that focuses on strengthening the WaSH delivery systems.
300489	300489 Africa Food Trade and Resilience programme Geography over programme lifetime: Africa Regional	2.77	3.55	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	The programme will stimulate an increase in regional food trade in sub Saharan Africa (SSA), contributing to satisfying a growing food demand and to addressing food shortages through regional food production, processing and trade, and generating more rural jobs, climate resilience and income for farmers. The programme will: (i) work with companies that source, process, and trade food in the region, to maximise investment, coordination and benefits to smallholder farmers and (ii) contribute to improve the transparency and predictability of government policies to unlock regional food trade. By 2023, we expect the programme will increase income for 1.8 million farming families. UK funding will de-risk and stimulate over £100 million in private sector investment aimed at enhancing smallholder farmers' productivity and resilience.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204338	204338 Sustainable Urban Economic Development Programme (SUED) Geography over programme lifetime: Kenya	1.49	1.91	Committed	ODA	Grant	Adaptation	Urban development and management	FCDO is supporting emerging urban centres in Kenya to put in place sustainable urban economic plans; improve the investment climate and draw in investment for key climate-resilient infrastructure and value chain projects. This will include integrating digital technologies to build 'smart' towns/cities that improve the quality and performance of urban services and enable a better quality of life.
204338	204338 Sustainable Urban Economic Development Programme (SUED) Geography over programme lifetime: Kenya	0.99	1.27	Committed	ODA	Grant	Mitigation	Urban development and management	FCDO is supporting emerging urban centres in Kenya to put in place sustainable urban economic plans; improve the investment climate and draw in investment for key climate-resilient infrastructure and value chain projects. This will include integrating digital technologies to build 'smart' towns/cities that improve the quality and performance of urban services and enable a better quality of life.
300166	300166 Khyber Pakhtunkhwa Merged Districts (KPMD) Support Programme Geography over programme lifetime: Pakistan	2.57	3.29	Committed	ODA	Grant	Adaptation	Conflict, Peace & Security	The programme will work on the Basic Heath, Education, Rule of law, Civilian Peace-Building, Conflict Prevention and Resolution, Public Sector Financial Management, Climate Change and Economic and Development Policy/Planning for the Tribal Districts of Khyber Pakhtunkhwa (previously called the Federally Administered Tribal Areas) in Pakistan.

Project ID	Recipient country/region/project/ programme	Total amount: Climate-specific: Domestic currency (£m)	Total amount: Climate-specific: USD ($m)	Status: Provided, Committed, Pledged	Funding source: ODA, OOF, Other	Financial instrument: Grant, Concessional loan, Non-concessional loan, Equity, Other	Type of support: Mitigation, Adaptation, Cross-cutting, Other	Sector: Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	Additional Information
205231	205231 Centre for Disaster Protection (CDP) Geography over programme lifetime: Belize, Sierra Leone, Grenada, Jamaica, St Lucia, Pakistan, Indonesia, Philippines, Sri Lanka, Myanmar, Kenya, Nigeria, Ghana, Zambia, Mozambique, Malawi, Bangladesh, Montserrat, St Vincent & The Grenadines, Laos, Ethiopia, Somalia, Takjikistan, Nepal, Ivory Coast	4.61	5.91	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To protect poor and vulnerable people, save lives and help developing countries to get back on their feet more quickly after a disaster by working with governments to strengthen planning, embed early action, and use “risk financing” tools like insurance and contingent credit to finance more cost-effective, rapid and reliable response to emergencies. It aims to empower governments to build resilience to natural disasters and climate change, and take ownership of their risks, with more assistance delivered through pre-financed government-led systems. Funded by the UK Government Prosperity Fund.
205115	205115 Adapt Environmental and Climate Resilience in Sudan Geography over programme lifetime: Sudan	0.71	0.91	Committed	ODA	Grant	Adaptation	General Environment Protection	To increase understanding and integration of climate resilience and environmental management into delivery, plans and policy in Sudan.
205258	205258 Green Economic Growth for Papua Geography over programme lifetime: Indonesia	1.38	1.77	Committed	ODA	Grant	Mitigation	Forestry	The programme aims to promote green growth in Papua. It will contribute to the government of Papua’s vision and spatial plan that intends to preserve 90 per cent forest cover in the province. In doing so the programme will support the provinces transition away from a high carbon business as usual growth trajectory onto a low carbon development pathway. The programme is designed to address the key barriers to private sector development in Papua that will enable firms to pursue low carbon business opportunities. It will work directly with firms, the financial sector, and the public sector to improve the commercial and environmental sustainability of small and medium sized enterprises. In addition, the programme will generate knowledge on how green growth can be implemented in Indonesia and globally.

Project ID	Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
205071	205071 Central Asia South Asia (CASA 1000) Electricity Transmission Project Geography over programme lifetime: Asia Regional	3	3.85	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	Increased energy trade between Central Asia (initially Tajikistan and Kyrgyz Republic) and South Asia (initially Afghanistan and Pakistan) for improved energy services leads to improved productivity, private investment, regional trade, and pro-poor growth through access to jobs and services.
203871	203871 Energy Security and Resource Efficiency in Somaliland Geography over programme lifetime: Somalia	4.26	5.46	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To support Somaliland in diversifying its energy mix, enhancing resilience and facilitating an enabling institutional and regulatory environment for the expansion of access to electricity.
203871	203871 Energy Security and Resource Efficiency in Somaliland Geography over programme lifetime: Somalia	1.07	1.37	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To support Somaliland in diversifying its energy mix, enhancing resilience and facilitating an enabling institutional and regulatory environment for the expansion of access to electricity.
300067	300067 Water, Environmental Sanitation and Hygiene Programme Geography over programme lifetime: Sierra Leone	3.06	3.92	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To provide sanitation and hygiene services in Freetown. Establishing and expanding sustainable waste management services in three large towns and improving water, sanitation and hygiene services in rural areas and in two small towns. Includes increasing water security and building resilience to future water scarcity as a result of climate change.
300187	300187 Strengthening Palm Oil Sustainability in Indonesia Geography over programme lifetime: Indonesia	1	1.28	Committed	ODA	Grant	Mitigation	Forestry	The programme will support the government of Indonesia to strengthen sustainability in the palm oil sector, and in doing so aim to reduce the risk of further palm-oil driven deforestation. To achieve this the programme will address concerns that undermine sustainability, such as illegality and unsustainable practices, and implement measures that aim to encourage greater market acceptance for sustainably produced palm oil. The programme will focus largely on independent smallholder producers, with the aim of improving their prosperity.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300003	300003 Strengthening disaster resilience in Nepal Geography over programme lifetime: Nepal	2.69	3.45	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	This project will strengthen disaster resilience in Nepal by working with urban centres to build and plan more safely; supporting the strengthening of critical public infrastructure to earthquakes; working to strengthen national capacity to respond to crises and ensure that the international community is prepared; and ensuring that the UK is able to support a humanitarian response should a crises hit.
204495	204495 Support to Trademark East Africa Rwanda (TMEA) Rwanda Country Programme - Strategy II Geography over programme lifetime: Rwanda	0.14	0.18	Committed	ODA	Grant	Adaptation	Trade Policies & Regulations	TMEA will strengthen climate resilience by supporting climate-smart infrastructure development and export diversification. Examples include supporting the government and private sector to develop more efficient – and climate resilient – port infrastructure that saves energy and reduces emissions, at the same time as increasing trade flows; creation of logistics hubs in secondary cities, reducing inefficient empty backhaul truck journeys, so reducing average emissions per tonne-km transported; and supporting better data on trade-related carbon emissions gathered through our ICT4 trade programme.
204495	204495 Support to Trademark East Africa Rwanda (TMEA) Rwanda Country Programme - Strategy II Geography over programme lifetime: Rwanda	0.22	0.28	Committed	ODA	Grant	Mitigation	Trade Policies & Regulations	TMEA will strengthen climate resilience by supporting climate-smart infrastructure development and export diversification. Examples include supporting the government and private sector to develop more efficient – and climate resilient – port infrastructure that saves energy and reduces emissions, at the same time as increasing trade flows; creation of logistics hubs in secondary cities, reducing inefficient empty backhaul truck journeys, so reducing average emissions per tonne-km transported; and supporting better data on trade-related carbon emissions gathered through our ICT4 trade programme.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203674	203674 Solar Nigeria Programme Geography over programme lifetime: Nigeria	0.04	0.05	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To improve the welfare outcomes of the currently underserved communities in Lagos state and Northern Nigeria by making a significant financial contribution towards the solar power electrification of public institutions, such as schools and hospitals. The intervention is expected to, by year 2020, ensure improved welfare outcomes for more than 2.8 million people using domestic solar photovoltaic (PV) systems, with 190,000 school pupils and 4.7 million clinic patients benefiting from public institutions with PV systems, create more than 3000 jobs and ensure greater effectiveness of FCDO's other health and educational sector intervention in Nigeria.
203674	203674 Solar Nigeria Programme Geography over programme lifetime: Nigeria	0.25	0.32	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To improve the welfare outcomes of the currently underserved communities in Lagos state and Northern Nigeria by making a significant financial contribution towards the solar power electrification of public institutions, such as schools and hospitals. The intervention is expected to, by year 2020, ensure improved welfare outcomes for more than 2.8 million people using domestic solar photovoltaic (PV) systems, with 190,000 school pupils and 4.7 million clinic patients benefiting from public institutions with PV systems, create more than 3000 jobs and ensure greater effectiveness of FCDO's other health and educational sector intervention in Nigeria.
203488	203488 Transparency and Right to Information Geography over programme lifetime: Bangladesh	0.82	1.05	Committed	ODA	Grant	Adaptation	Government & Civil Society	To increase transparency and accountability in Bangladesh by improving systems for management and proactive publication of official information that is relevant and accessible, timely and accurate, and by enabling state reformers, businesses and social activists to hold officials and decision makers answerable for their actions across a range of services including health, education, local government, climate finance and land administration

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203427	203427 Accelerating Investment and Infrastructure in Nepal Geography over programme lifetime: Nepal	0.94	1.21	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To accelerate private investment and economic growth in Nepal by providing technical expertise to help Nepalese institutions develop major infrastructure (including renewable energy); improve the business climate for domestic and foreign investors; improve the implementation of economic policy and test new approaches for local economic development. This will result in at least £600 million of private investment into growth-boosting sectors and a reduction by at least 10% in time or cost for at least five regulatory processes perceived as burdensome by the private sector.
203516	203516 Monitoring , Evaluation and Learning from the International Climate Fund Geography over programme lifetime: Developing countries unspecified	0.26	0.33	Committed	ODA	Grant	Adaptation	General Environment Protection	The purpose of the programme is to provide the evidence and learning to increase the effectiveness and measure the impact of the UK's international climate funding.
203516	203516 Monitoring , Evaluation and Learning from the International Climate Fund Geography over programme lifetime: Developing countries unspecified	0.26	0.33	Committed	ODA	Grant	Mitigation	General Environment Protection	The purpose of the programme is to provide the evidence and learning to increase the effectiveness and measure the impact of the UK's international climate funding.
203998	203998 Green Mini-Grids Kenya Geography over programme lifetime: Kenya	0.5	0.64	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	Support for project preparation and leveraging of private investment in Green Mini-Grids (GMGs) in Kenya

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204773	204773 Applied Research on Energy and Growth Geography over programme lifetime: Developing countries unspecified	0.24	0.31	Committed	ODA	Grant	Adaptation	Energy Policy	Assisting policy makers in Low Income Countries to make better decisions about when, and how, to prioritise investment in high cost energy infrastructure. Through improved research and evidence on how to maximise the economic benefits of large scale energy projects, and a better understanding of how to bring the benefits of modern energy services to poorer people in those countries.
204773	204773 Applied Research on Energy and Growth Geography over programme lifetime: Developing countries unspecified	0.94	1.21	Committed	ODA	Grant	Mitigation	Energy Policy	Assisting policy makers in Low Income Countries to make better decisions about when, and how, to prioritise investment in high cost energy infrastructure. Through improved research and evidence on how to maximise the economic benefits of large scale energy projects, and a better understanding of how to bring the benefits of modern energy services to poorer people in those countries.
300245	300245 Regional Vulnerability Assessment and Analysis Programme Geography over programme lifetime: Angola, Botswana, Dem. Rep. of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe	0.3	0.38	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	Supporting countries in the Southern Africa Development Community to measure vulnerability to climate change and use this to inform and strengthen emergency and development responses.
201857	201857 Market Development in Northern Ghana Geography over programme lifetime: Ghana	0.5	0.64	Committed	ODA	Grant	Adaptation	Agriculture	To improve incomes and increase resilience of poor farmers and small-scale rural entrepreneurs in Northern Ghana

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300686	300686 Support for the Climate Resilience Execution Agency of Dominica Geography over programme lifetime: Dominica	0.81	1.04	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To provide support for the operation of the Climate Resilience Execution Agency of Dominica from 2019-2023 in order to implement Dominica's climate resilience and recovery plan. The Climate Resilience Execution Agency of Dominica is expected to support delivery of key recovery and reconstruction projects, build capacity and transform systems in the public sector so that Dominica is able build back better post Hurricane Maria and quickly recover from future disasters.
300524	300524 Strengthening Disaster Recovery and Resilience in the Caribbean Geography over programme lifetime: Multiple countries	0.53	0.68	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	The programme will help protect poor and vulnerable people, ensuring action is gender responsive and inclusive, save lives and assist countries to get back on their feet more quickly after a disaster, by working with ODA-eligible Caribbean governments to strengthen preparedness and public financial investment, speed up recovery and reconstruction, as well as deliver more cost-effective, rapid and reliable response to emergencies. This programme is part of a £19m package of support to the Caribbean region following the devastating impacts of 2017 hurricane season which collectively will strengthen resilience of the region to future disaster events and climate change.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300524	300524 Strengthening Disaster Recovery and Resilience in the Caribbean Geography over programme lifetime: Multiple countries	0.35	0.45	Committed	ODA	Grant	Mitigation	Disaster Prevention & Preparedness	The programme will help protect poor and vulnerable people, ensuring action is gender responsive and inclusive, save lives and assist countries to get back on their feet more quickly after a disaster, by working with ODA-eligible Caribbean governments to strengthen preparedness and public financial investment, speed up recovery and reconstruction, as well as deliver more cost-effective, rapid and reliable response to emergencies. This programme is part of a £19m package of support to the Caribbean region following the devastating impacts of 2017 hurricane season which collectively will strengthen resilience of the region to future disaster events and climate change.
204916	204916 Strategic Partnership Arrangement II between FCDO and BRAC Geography over programme lifetime: Bangladesh	7.62	9.77	Committed	ODA	Grant	Adaptation	Basic Education	To provide support to BRAC's development programmes to improve access to quality basic services (health, education, water and sanitation), help the poorest, most marginalised people across the whole of Bangladesh graduate from extreme poverty, support inclusive growth and help build effective formal and informal institutions. Climate finance will be integrated across BRAC's programmes to strengthen the resilience of BRAC's investments and the communities they serve. UK support will include: helping over 950,000 children (600,000 girls) gain a decent education; providing additional nutritional support to 11 million people (7 million women and girls); helping 5.7 million girls and women gain access to family planning services; providing at least 75,000 people with sustainable access to clean water and sanitation; supporting over 80,000 women to better cope with the effects of climate change; and lifting 240,000 women and their families (over 960,000 people) out of extreme poverty.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300110	300110 Smart Urban Development in Indian States (SmUDI) Geography over programme lifetime: India	0.15	0.19	Committed	ODA	Grant	Adaptation	Urban development and management	Provide UK support on urban governance, planning, finance and city partnerships to deliver Government of India's urban development programmes in select UK-India partner cities. The support will bring the best expertise from the UK to help create economically vibrant, safe and climate resilient cities in India.
300110	300110 Smart Urban Development in Indian States (SmUDI) Geography over programme lifetime: India	0.23	0.29	Committed	ODA	Grant	Mitigation	Urban development and management	Provide UK support on urban governance, planning, finance and city partnerships to deliver Government of India's urban development programmes in select UK-India partner cities. The support will bring the best expertise from the UK to help create economically vibrant, safe and climate resilient cities in India.
300424	300424 Reducing Deforestation Through Improved Spatial Planning in Papua Provinces, Indonesia Geography over programme lifetime: Indonesia	1.91	2.45	Committed	ODA	Grant	Mitigation	Forestry	The objective of the programme is to support Indonesia and the provinces of Papua and West Papua to improve spatial plan processes and implementation in order to prevent deforestation and reduce greenhouse gas emissions. Technical assistance will be provided to improve the revision and implementation of Papua and West Papua provincial spatial plans; to improve transparency and build constituency in spatial planning at provincial level; and to foster national policy dialogue and engagement to support Papua's commitment to protect its forest. Support will be focused largely on two provinces – Papua and West Papua – and relevant national ministries (particularly Ministry of Home Affairs and Ministry of Agrarian and Spatial Planning), which offer the potential to realise significant reductions in emissions through improved land use planning and economic development strategies which recognise the value of forests to the provincial economies.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300186	300186 Economics of Low Carbon Development for Indonesia Geography over programme lifetime: Indonesia	1.18	1.51	Committed	ODA	Grant	Mitigation	General Environment Protection	To contribute to national debate on economic costs and benefits of unilateral and regional actions on mitigation and adaptation; to raise awareness about the urgency of climate change challenges and their potential socioeconomic impact on Indonesia, while informing other stakeholders (e.g., civil society, academia, media, nongovernment organizations, private sector, and aid agencies) of the same; and to indirectly support government and private sector actions in Indonesia to mitigate and adapt to climate change.
204837	204837 BRILHO - Energy Africa Mozambique Geography over programme lifetime: Mozambique	0.68	0.87	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To increase domestic and business energy access through private sector innovation and investment, and government support, through supply of dispersed off-grid energy solutions and improved cook stoves.
204837	204837 BRILHO - Energy Africa Mozambique Geography over programme lifetime: Mozambique	1.6	2.05	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To increase domestic and business energy access through private sector innovation and investment, and government support, through supply of dispersed off-grid energy solutions and improved cook stoves.
204020	204020 Climatescope - Clean Energy Investment Index Geography over programme lifetime: Developing countries unspecified	0.02	0.03	Committed	ODA	Grant	Mitigation	Energy Policy	To increase private investment in renewable energy projects in developing countries by providing investors with comparable and robust policy and market information in an easily accesible data tool. Renewable energy is becoming a cheaper solution than fossil fuels in many developing countries and by providing better information to potential investors, Climatescope supports increasing investment in renewable energy in developing countries. This in turn will support economic growth through greater access to sustainable energy and allow businesses to prosper.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203469	203469 African Risk Capacity (ARC) Geographic footprint over duration of programme: Gambia, Mauritania, Mali, Senegal, Burkina Faso, Kenya, Niger, Malawi	0.1	0.13	Committed	ODA	Grant	Adaptation	Banking & Financial Services	To support a parametric (index-based) weather risk insurance pool that will provide participating African countries with predictable, quick-disbursing funds with which to implement pre-defined contingency response plans in the case of a drought.
201733	201733 Climate Public Private Partnership Programme (CP3) Geography over programme lifetime: Developing countries unspecified	-20.5	- 26.28	Committed	ODA	Grant	Mitigation	Banking & Financial Services	CP3 aims to demonstrate that climate friendly investments in developing countries, including in renewable energy, water, energy efficiency and forestry are not only ethically right but also commercially viable. It aims to attract new forms of finance such as pension funds and sovereign wealth funds into these areas by creating two commercial private equity funds of funds which will invest in subfunds and projects in developing countries, creating track records of investment performance which should in turn encourage further investments and accelerate the growth of investment in climate.
204804	204804 Accountability in Tanzania Programme - Phase II Geography over programme lifetime: Tanzania	0.44	0.56	Committed	ODA	Grant	Adaptation	Government & Civil Society	To empower Tanzanian citizens and strengthen civil society by providing grants and capacity building support to selected civil society organisations, to increase the accountability and responsiveness of government and the resilience of citizens to climate change. This contributes towards the Millenium Development Goals by ensuring Tanzanians are increasingly able to exercise their rights as citizens.
204804	204804 Accountability in Tanzania Programme - Phase II Geography over programme lifetime: Tanzania	0.15	0.19	Committed	ODA	Grant	Mitigation	Government & Civil Society	To empower Tanzanian citizens and strengthen civil society by providing grants and capacity building support to selected civil society organisations, to increase the accountability and responsiveness of government and the resilience of citizens to climate change. This contributes towards the Millenium Development Goals by ensuring Tanzanians are increasingly able to exercise their rights as citizens.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204940	204940 Improving Market Systems for Agriculture in Rwanda IMSAR Geography over programme lifetime: Rwanda	4.91	6.29	Committed	ODA	Grant	Adaptation	Agriculture	IMSAR will commercialise agriculture through improving the way agricultural market systems function. It will identify market failures and provide the necessary agricultural expertise and finance required to help address them. This will benefit the poor as producers, employees and consumers, and small and medium size business, resulting in increased sales among farmers and agro-enterprises, increase in the percentage of Rwandan agricultural produce that has value-added and an increase in export diversification. Given the strong link between income, income diversity, and the ability to adapt to the effects of climate change, IMSAR will help building poor households' resilience to current and future climate threats through improving access to input and output markets, increasing opportunities to diversify their production, and increasing non-farm income sources as an alternative to agriculture. This will help decreasing their sensitivity to climate change and improving their adaptive capacity.
203186	203186 Rural Access Programme 3 Geography over programme lifetime: Nepal	0.52	0.67	Committed	ODA	Grant	Adaptation	Transport & Storage	To improve road access for 800,000 members of rural communities in the Western Region of Nepal, thereby improving economic opportunities and increasing access to markets and social services throughout the year. The project will lift 20,000 people out of poverty through access to work, skill trainings, and will promote equal opportunities for women. The project aims to contribute towards sustainable poverty reduction through investments in high value crops and will lay the foundations for private sector led development in the poorest region in the country. Climate variability and climate change are integrated in building new roads and maintaining existing roads through the programme.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204941	204941 Sustainable Inclusive Livelihoods through Tea Production in Rwanda Geography over programme lifetime: Rwanda	0.43	0.55	Committed	ODA	Grant	Adaptation	Trade Policies & Regulations	The project supports job creation and increased incomes by working with smallholder farmers to develop greenfield tea. The Wood Foundation Africa (TWFA) will set up and run two Services Companies supporting approximately 12,000 smallholder tea farmers over 7,500 hectares. Farmers will be supported to produce tea for the first time, employing best farming practices, including understanding and managing climate risk and variability.The Services Company will be co-owned by the farmers. This will lead to improved incomes and livelihoods (in particular nutrition and education) for the farmers and their families. Unilever and Luxmi will build a factory which will heavily rely on the tea supplied by the smallholder farmers with support from The Wood Foundation Africa.
201980	201980 Private Enterprise Programme in Zambia Geography over programme lifetime: Zambia	0.05	0.06	Committed	ODA	Grant	Adaptation	Industry	To create jobs and investment in Zambia by building the capacity of micro, small and medium enterprises, including for example those which use climate resilient technology or promote soil conservation. The programme will help to create over 26,500 jobs by 2019
201980	201980 Private Enterprise Programme in Zambia Geography over programme lifetime: Zambia	0.22	0.28	Committed	ODA	Grant	Mitigation	Industry	To create jobs and investment in Zambia by building the capacity of micro, small and medium enterprises, including for example those which use climate resilient technology or promote soil conservation. The programme will help to create over 26,500 jobs by 2019

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203809	203809 Disaster Risk Insurance Geography over programme lifetime: Multiple countries	0.9	1.15	Committed	ODA	Loan	Adaptation	Banking & Financial Services	To improve the resilience of the private sector in poor countries to natural disasters by improving access to insurance products. By supporting the development of a market for private sector disaster risk insurance in developing countries, the project will sustainably help strengthen resilience, mitigate the effects of climate change and supporting economic development through private sector growth.
300109	300109 Technical Assistance for Smart Cities (TASC) Geography over programme lifetime: India	0.08	0.10	Committed	ODA	Grant	Adaptation	Urban development and management	To enhance the potential of Indian cities in poorer and developing states such as Madhya Pradesh, Bihar, Andhra Pradesh, Odisha, Maharashtra to promote growth and jobs creation. UK support will achieve this by developing partnerships with UK urban planning, research and business organisations to help India cities develop investment plans, attract finance and deliver smart urban solutions that create jobs for the urban poor. Activities including climate resilient infrastructure, climate and disaster risk insurance, renewable energy and water management.
300109	300109 Technical Assistance for Smart Cities (TASC) Geography over programme lifetime: India	0.11	0.14	Committed	ODA	Grant	Mitigation	Urban development and management	To enhance the potential of Indian cities in poorer and developing states such as Madhya Pradesh, Bihar, Andhra Pradesh, Odisha, Maharashtra to promote growth and jobs creation. UK support will achieve this by developing partnerships with UK urban planning, research and business organisations to help India cities develop investment plans, attract finance and deliver smart urban solutions that create jobs for the urban poor. Activities including climate resilient infrastructure, climate and disaster risk insurance, renewable energy and water management.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202817	202817 Adaptation for Smallholder Agricultural Programme (ASAP) Geography over programme lifetime: Multiple countries	0.11	0.14	Committed	ODA	Grant	Adaptation	Agriculture	To provide knowledge and best practices to help over 6 million smallholder farmers in up to 43 countries adapt to climate change. Grants will be made to: build small scale water-harvesting, water storage and irrigation systems for farmers; provide farmers with improved seeds that are drought tolerant; help farmers access markets to sell their crops; to plant trees on farms and introduce soil and water conservation practices; and, enable farmers to access daily and seasonal weather forecasts (e.g. using text messages) so they know when best to plant and harvest crops."
202817	202817 Adaptation for Smallholder Agricultural Programme (ASAP) Geography over programme lifetime: Multiple countries	0.03	0.04	Committed	ODA	Grant	Mitigation	Agriculture	To provide knowledge and best practices to help over 6 million smallholder farmers in up to 43 countries adapt to climate change. Grants will be made to: build small scale water-harvesting, water storage and irrigation systems for farmers; provide farmers with improved seeds that are drought tolerant; help farmers access markets to sell their crops; to plant trees on farms and introduce soil and water conservation practices; and, enable farmers to access daily and seasonal weather forecasts (e.g. using text messages) so they know when best to plant and harvest crops."
205061	205061 Increasing renewable energy and energy efficiency in the Eastern Caribbean Geography over programme lifetime: Caribbean including Antigua & Barbuda, Dominica, Grenada, St Lucia, St Vincent & the Grenadines	0.08	0.10	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To increase the use of renewable energy and energy efficiency measures and to improve energy security in the Eastern Caribbean

Project ID	Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
205061	205061 Increasing renewable energy and energy efficiency in the Eastern Caribbean Geography over programme lifetime: Caribbean including Antigua & Barbuda, Dominica, Grenada, St Lucia, St Vincent & the Grenadines	0.32	0.41	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To increase the use of renewable energy and energy efficiency measures and to improve energy security in the Eastern Caribbean
204135	204135 Bihar Agriculture Growth and Reform Initiative (BAGRI) Geography over programme lifetime: india	0.13	0.17	Committed	ODA	Grant	Adaptation	Agriculture	To significantly improve the performance of the agriculture sector in Bihar by improving access to markets for identified agriculture and horticulture products, access to finance, knowledge and technology, and institutional capacity for market regulation and support farmers in building resilience to the impacts of climate change such as drought and flooding. This will reflect higher private sector investment, higher production and higher price realisation by 1,00,000 farmers.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204456	204456 Programme of Support to Agriculture in Rwanda Geography over programme lifetime: Rwanda	0.04	0.05	Committed	ODA	Grant	Adaptation	Agriculture	To sustainably increase the agricultural productivity of poor farmers by transforming Rwandan agriculture from a subsistence-based to a more commercial-based sector that accelerates agricultural growth. This will help address challenges that may limit agriculture productivity, reduce the rate at which poverty is falling, increase inequality and hamper improvements in food security and malnutrition. The programme will build resilience to climate variability and improve sustainable management of agricultural land by increasing soil erosion control, small scale irrigation and strengthening sustainability and resilience strategies. The programme will result in increased agricultural productivity, food security and incomes of poor households and contributes towards the MDG's by helping to eradicate extreme poverty and hunger and; promoting gender equality and empowering women.
204456	204456 Programme of Support to Agriculture in Rwanda Geography over programme lifetime: Rwanda	0	-	Committed	ODA	Grant	Mitigation	Agriculture	To sustainably increase the agricultural productivity of poor farmers by transforming Rwandan agriculture from a subsistence-based to a more commercial-based sector that accelerates agricultural growth. This will help address challenges that may limit agriculture productivity, reduce the rate at which poverty is falling, increase inequality and hamper improvements in food security and malnutrition. The programme will build resilience to climate variability and improve sustainable management of agricultural land by increasing soil erosion control, small scale irrigation and strengthening sustainability and resilience strategies. The programme will result in increased agricultural productivity, food security and incomes of poor households and contributes towards the MDG's by helping to eradicate extreme poverty and hunger and; promoting gender equality and empowering women.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203844	203844 Research on Growth and High Volume Transport in Low Income Countries Geography over programme lifetime: Multiple countries	0.38	0.49	Committed	ODA	Grant	Adaptation	Transport & Storage	To generate robust evidence on the role that different forms of high volume transport play in promoting growth in Low Income Countries in both a rural and urban setting. The research programme will have four themes carrying out engineering and technical research around road and rail strategic corridors, urban transport, low carbon transport and inclusive transport
203844	203844 Research on Growth and High Volume Transport in Low Income Countries Geography over programme lifetime: Multiple countries	0.57	0.73	Committed	ODA	Grant	Mitigation	Transport & Storage	To generate robust evidence on the role that different forms of high volume transport play in promoting growth in Low Income Countries in both a rural and urban setting. The research programme will have four themes carrying out engineering and technical research around road and rail strategic corridors, urban transport, low carbon transport and inclusive transport
202775	202775 South Asia Water Governance Programme (SAWGP) Geography over programme lifetime: Asia Regional	3.85	4.94	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To improve the management of water within and between South Asian countries, reducing poverty by enabling adaptation to climate change and reducing the risk of conflict over water resources. By 2018, 500 million people living in river basins will benefit from improved water management by reducing their risk of exposure to flooding and drought and enhancing regional security by improving cooperation between governments

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
205052	205052 Sustainable Development of Mining in Rwanda (SDMR) Geography over programme lifetime: Rwanda	0	-	Committed	ODA	Grant	Adaptation	Mineral Resources & Mining	SDMR aims to improve the livelihoods of over 40,000 Rwandans involved in the artisanal and small scale mining industry. Moreover, it will tackle Rwanda's growing trade deficit by increasing exports, help to attract much-needed private investment in the industry, and ultimately support Rwanda's path to economic transformation by creating more, higher paid, safer jobs for poor Rwandans. The outcome of the programme will be an economically, socially and environmentally sustainable ASM in target areas.This will contribute to the impact of an increased contribution of the mining sector to economic growth and improving livelihoods among ASM communities and improved management and operations of mines will reduce climate change related flooding and landslide risks.
205052	205052 Sustainable Development of Mining in Rwanda (SDMR) Geography over programme lifetime: Rwanda	0.03	0.04	Committed	ODA	Grant	Mitigation	Mineral Resources & Mining	SDMR aims to improve the livelihoods of over 40,000 Rwandans involved in the artisanal and small scale mining industry. Moreover, it will tackle Rwanda's growing trade deficit by increasing exports, help to attract much-needed private investment in the industry, and ultimately support Rwanda's path to economic transformation by creating more, higher paid, safer jobs for poor Rwandans. The outcome of the programme will be an economically, socially and environmentally sustainable ASM in target areas.This will contribute to the impact of an increased contribution of the mining sector to economic growth and improving livelihoods among ASM communities and improved management and operations of mines will reduce climate change related flooding and landslide risks.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202957	202957 Results Based Financing for Low Carbon Energy Access Geography over programme lifetime: Developing countries unspecified	-0.01	- 0.01	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To increase access to clean energy through the creation of an expanding market of green mini-grid installations in Africa serving rural villages unconnected to the main grid. This is expected to benefit around 1.3m people by 2018, while reducing carbon emissions by around 260,000 Tonnes of carbon dioxide, through supported private investment in the installation and operation of over 110 renewably-powered mini-grids (figures to be updated after Business Case completion). Electricity access for lighting, communications and productive uses creates jobs, enables studying at night and enhances public services (such as clinics) and public safety (eg through streetlighting). This project also addresses the post-2015 High Level Panel's recommendation on a development goal entitled Secure Sustainable Energy, which includes energy access and renewable energyThe Results-Based Financing for Low Carbon Energy Access Programme aims to accelerate access to sustainable energy services in developing countries. The funding generates and tests different forms of Results-Based Financing (RBF) mechanism, which aim to stimulate decentralised energy markets and to leverage private investment to increase access to clean energy products and services.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202957	202957 Results Based Financing for Low Carbon Energy Access Geography over programme lifetime: Developing countries unspecified	-0.04	- 0.05	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To increase access to clean energy through the creation of an expanding market of green mini-grid installations in Africa serving rural villages unconnected to the main grid. This is expected to benefit around 1.3m people by 2018, while reducing carbon emissions by around 260,000 Tonnes of carbon dioxide, through supported private investment in the installation and operation of over 110 renewably-powered mini-grids (figures to be updated after Business Case completion). Electricity access for lighting, communications and productive uses creates jobs, enables studying at night and enhances public services (such as clinics) and public safety (eg through streetlighting). This project also addresses the post-2015 High Level Panel's recommendation on a development goal entitled Secure Sustainable Energy, which includes energy access and renewable energyThe Results-Based Financing for Low Carbon Energy Access Programme aims to accelerate access to sustainable energy services in developing countries. The funding generates and tests different forms of Results-Based Financing (RBF) mechanism, which aim to stimulate decentralised energy markets and to leverage private investment to increase access to clean energy products and services.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
204784	204784 Green Mini-Grids Africa Regional Facility for Market Preparation, Evidence and Policy Development Geography over programme lifetime: Africa Regional	0	-	Committed	ODA	Grant	Adaptation	Energy Policy	The Green Mini-Grids programme aims to help transform the mini grid sector from a growing and sporadic series of pilot projects, to a thriving industry. Work includes development of small-scale electricity generation which serves a limited number of consumers via a distribution grid that can operate in isolation from national electricity transmission network. Transformation is to be achieved through the creation of a critical mass of experience and evidence of success in two countries (Kenya and Tanzania), coupled with improved policy and market conditions for investments regionally.
204784	204784 Green Mini-Grids Africa Regional Facility for Market Preparation, Evidence and Policy Development Geography over programme lifetime: Africa Regional	-0.01	- 0.01	Committed	ODA	Grant	Mitigation	Energy Policy	The Green Mini-Grids programme aims to help transform the mini grid sector from a growing and sporadic series of pilot projects, to a thriving industry. Work includes development of small-scale electricity generation which serves a limited number of consumers via a distribution grid that can operate in isolation from national electricity transmission network. Transformation is to be achieved through the creation of a critical mass of experience and evidence of success in two countries (Kenya and Tanzania), coupled with improved policy and market conditions for investments regionally.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202539	202539 Regional Transboundary Water Resources Programme - Phase 3 Geography over programme lifetime: Africa Regional	-0.02	- 0.03	Committed	ODA	Grant	Adaptation	Water Supply & Sanitation	To improve governance of shared water resources in Southern Africa, by sustainably improving local water-management capability and supporting development of key water infrastructure. This will indirectly benefit populations in the 13 shared river basins of the SADC region, in which 95 million people reside, through more equitable sharing of water resources, reduced vulnerability to flooding, improved access to drinking water, as well as reducing risk of conflict and better food security. These outcomes will contribute to MDG 1 ("Eradicate Extreme Poverty and Hunger") and MDG7 ("Ensure Environmental Sustainability").
202539	202539 Regional Transboundary Water Resources Programme - Phase 3 Geography over programme lifetime: Africa Regional	0	-	Committed	ODA	Grant	Mitigation	Water Supply & Sanitation	To improve governance of shared water resources in Southern Africa, by sustainably improving local water-management capability and supporting development of key water infrastructure. This will indirectly benefit populations in the 13 shared river basins of the SADC region, in which 95 million people reside, through more equitable sharing of water resources, reduced vulnerability to flooding, improved access to drinking water, as well as reducing risk of conflict and better food security. These outcomes will contribute to MDG 1 ("Eradicate Extreme Poverty and Hunger") and MDG7 ("Ensure Environmental Sustainability").
300141	300141 Sustainable Energy and Economic Development (SEED) Programme Geography over programme lifetime: Pakistan	0	-	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	To support provincial economic development and sustainable energy in Pakistan. The programme objective is to address two binding constraints to economic and urban development in Pakistan: weak planning; and energy. The programme aims to support Pakistan's poorest province, Khyber Pakhtunkhwa to plan and finance the infrastructure and investment it needs for growth, jobs and prosperity and to address Pakistan's energy crisis by providing innovative financial solutions to industry for the adoption of sustainable energy practices.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300141	300141 Sustainable Energy and Economic Development (SEED) Programme Geography over programme lifetime: Pakistan	0.02	0.03	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	To support provincial economic development and sustainable energy in Pakistan. The programme objective is to address two binding constraints to economic and urban development in Pakistan: weak planning; and energy. The programme aims to support Pakistan's poorest province, Khyber Pakhtunkhwa to plan and finance the infrastructure and investment it needs for growth, jobs and prosperity and to address Pakistan's energy crisis by providing innovative financial solutions to industry for the adoption of sustainable energy practices.
205142	205142 The India-UK Global Partnership Programme on Development Geography over programme lifetime: developing countries unspecified	0.17	0.22	Committed	ODA	Grant	Adaptation	Energy Policy	Strengthened UK-India global development partnership that will facilitate the sharing of development experience, expertise and policy positions including scaling up solar power and the improving the resilience of infrastructure systems to climate and disaster risks.
205142	205142 The India-UK Global Partnership Programme on Development Geography over programme lifetime: developing countries unspecified	0.2	0.26	Committed	ODA	Grant	Mitigation	Energy Policy	Strengthened UK-India global development partnership that will facilitate the sharing of development experience, expertise and policy positions including scaling up solar power and the improving the resilience of infrastructure systems to climate and disaster risks.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203582	203582 Provision of finance to the Rwanda Fund for Climate Change and Environment Geography over programme lifetime: Rwanda	0.76	0.97	Committed	ODA	Grant	Adaptation	Agriculture	To improve climate adaptation and low carbon development by providing finance to the Rwanda Fund for Climate Change and Environment from the UK International Climate Fund. This will benefit 15 000 people to cope better with climate change impacts, 2000 people gain access to clean energy especially in rural areas, protect 1200 hectares of land against soil erosion, create 2000 green jobs as well as mobilise £8 million of additional finance from the private sector by July 2015. This contributes towards the MDG on environmental sustainability and ensuring an effective response to the impacts of climate change, thus securing current and future development gains as well as protection of the livelihoods of the poorest people.
203582	203582 Provision of finance to the Rwanda Fund for Climate Change and Environment Geography over programme lifetime: Rwanda	0.25	0.32	Committed	ODA	Grant	Mitigation	Agriculture	To improve climate adaptation and low carbon development by providing finance to the Rwanda Fund for Climate Change and Environment from the UK International Climate Fund. This will benefit 15 000 people to cope better with climate change impacts, 2000 people gain access to clean energy especially in rural areas, protect 1200 hectares of land against soil erosion, create 2000 green jobs as well as mobilise £8 million of additional finance from the private sector by July 2015. This contributes towards the MDG on environmental sustainability and ensuring an effective response to the impacts of climate change, thus securing current and future development gains as well as protection of the livelihoods of the poorest people.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
201575	201575 Renewable Energy and Adaptation Climate Technologies (Africa Enterprise Challenge Fund) Geography over programme lifetime: Africa Regional	0.17	0.22	Committed	ODA	Grant	Adaptation	Energy distribution	To stimulate private sector investment in developing low cost, clean energy and climate change technologies and services, such as solar power, biomass energy, irrigation and crop insurance products for small holder farmers. Every business supported by REACT must demonstrate a positive impact on the rural poor through increased incomes, employment and productivity or by reducing costs.
201575	201575 Renewable Energy and Adaptation Climate Technologies (Africa Enterprise Challenge Fund) Geography over programme lifetime: Africa Regional	0.17	0.22	Committed	ODA	Grant	Mitigation	Energy distribution	To stimulate private sector investment in developing low cost, clean energy and climate change technologies and services, such as solar power, biomass energy, irrigation and crop insurance products for small holder farmers. Every business supported by REACT must demonstrate a positive impact on the rural poor through increased incomes, employment and productivity or by reducing costs.
204794	204794 Infrastructure for Climate Resilient Growth in India Geography over programme lifetime: India	3.39	4.35	Committed	ODA	Grant	Adaptation	Rural development	In line with the UK government's aid policy and revised development partnership with India, the Infrastructure for Climate Resilient Growth (ICRG) programme sees the UK provide world class expertise to improve the impact of the Indian Government's $5 billion per year National Rural Employment Guarantee Scheme. The scheme will help over 5 million people living in three of India's poorest states – Odisha, Chhattisgarh and Bihar – to increase their incomes and resilience to climate shocks. It guarantees 40 million households per year the opportunity to build small scale works (irrigation, flood defences, forest plantations etc.) to increase their incomes and protect themselves from extreme weather events. UK support will improve the design and quality of infrastructure built, increase the capacity of the government to deliver its own programmes and influence the policies of the largest programme of this type in the world.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203232	203232 PIDG: Core Support to Private Infrastructure Development Group Geography over programme lifetime: Multiple countries	-5.83	- 7.47	Committed	ODA	Grant	Adaptation	Energy generation, renewable sources	Increased responsible private sector participation in sustainable infrastructure including renewable energy in poorer developing countries through increased flows of private capital & expertise.This will benefit an additional 105.1 million people by the end of 2015.
203232	203232 PIDG: Core Support to Private Infrastructure Development Group Geography over programme lifetime: Multiple countries	-0.65	- 0.83	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources	Increased responsible private sector participation in sustainable infrastructure including renewable energy in poorer developing countries through increased flows of private capital & expertise.This will benefit an additional 105.1 million people by the end of 2015.
300683	300683 Strengthening Ethiopia's Adaptive Safety Net (SEASN) Geography over programme lifetime: Ethiopia	28	35.90	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	Ethiopia's rural safety net provides predictable cash and or food transfers to 8 million extremely poor people in chronically food insecure woredas (districts) in rural Ethiopia. Clients are selected for the program through a community-based targeting process. Households with able-bodied adult members are asked to work on community-planned public works in exchange for their transfers. These public works are activities like rehabilitate the natural resource base, build health posts and schoolrooms, construct and rehabilitate roads, and build other public infrastructure as prioritised by the community. Women are exempt from PW during pregnancy and 2 years postpartum. Labor-constrained households receive unconditional transfers (PDS) and are linked with complementary social services where possible. The safety net also provides livelihoods support in the form of skills training, business planning, savings promotion, credit facilitation, and, where appropriate, employment linkages.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300755	300755 Securing global wheat crops for food and nutritional security - in partnership with the Bill & Melinda Gates Foundation (BMGF) Geography over programme lifetime: Multiple countries	3.94	5.05	Committed	ODA	Grant	Adaptation	Agriculture	Working in partnership with the Bill & Melinda Gates Foundation on two major co-investments in wheat crop improvement, DFID's funding will increase the nutritional quality and disease resistance of wheat crops, building the resilience of smallholder farmers in Sub-Saharan Africa and South Asia, and contributing to global food security in the face of climate change, and emerging plant disease and pest threats. Securing global wheat crops through wheat breeding includes improving heat tolerance and increasing climate resilience in the crop varieties.
204477	204477 Exiting Poverty in Rwanda Geography over programme lifetime: Rwanda	2.06	2.64	Committed	ODA	Grant	Adaptation	Other Social Infrastructure & Services	The Exiting Poverty in Rwanda Programme will provide support to the Government of Rwanda to help create and scale up a more sustainable, self-financed and inclusive system for supporting the most vulnerable, helping the poor manage shocks and enabling more people to sustainably exit poverty. The programme will provide financial aid to the Government of Rwanda to scale up provision of Social Protection to the poorest. It will put a stronger emphasis on sustainability and on working towards a clear exit strategy from the Social Protection Sector in the future. The focus of the programme therefore is strengthening government systems to build effectiveness, government ownership and long-term sustainability of the programme. This phase of support is expected to deliver the impact of extreme poverty eradicated, and poverty levels reduced, with an outcome of the resilience of vulnerable men, women and children and of the Social Protection systems that help sustain them enhanced.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
205118	205118 Commercial Agriculture for Smallholders and Agribusiness Geography over programme lifetime: Multiple countries	1.71	2.19	Committed	ODA	Grant	Adaptation	Agriculture	To increase the opportunities and climate resilience of smallholder farmers through the adoption of sustainable agricultural practices which raise incomes and support biodiversity. The programme will also support sustainable and inclusive agribusiness models, particularly those which trade with smallholders, to access investment and improve the sustainability of their operations.
203852	203852 Pathways to Prosperity for Extremely Poor People in Bangladesh (PPEPP) Geography over programme lifetime: Bangladesh	0.8	1.03	Committed	ODA	Grant	Adaptation	Health, General	Enable 1 million people to exit extreme poverty and access a sustained pathway to prosperity, while actively promoting public and private provision of the core services required to eradicate extreme poverty.
203852	203852 Pathways to Prosperity for Extremely Poor People in Bangladesh (PPEPP) Geography over programme lifetime: Bangladesh	0.2	0.26	Committed	ODA	Grant	Mitigation	Health, General	Enable 1 million people to exit extreme poverty and access a sustained pathway to prosperity, while actively promoting public and private provision of the core services required to eradicate extreme poverty.
300147	300147 Reducing Insecurity and Violent Extremism in the Northern Territories (Re-INVENT) Geography over programme lifetime: Kenya	0.4	0.51	Committed	ODA	Grant	Adaptation	Conflict, Peace & Security	To improve safety and security institutions at national level and in 6 counties that provide more effective, accountable and responsive services to a public that is actively engaged in improving safety and security in Kenya.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
202762	202762 Supporting Indian Trade and Investment for Africa Geography over programme lifetime: Ethiopia, Kenya, Tanzania, Uganda, Rwanda	0.38	0.49	Committed	ODA	Grant	Adaptation	Trade Policies & Regulations	This project will support increased African exports to the large and growing emerging market of India. It will also help African businesses to strengthen their productive capacity and competitiveness, thereby moving away from unprocessed primary commodities, which don't earn much. The project will operate in Ethiopia, Kenya, Tanzania, Uganda and Rwanda. Together with African and Indian businesses, the implementer International Trade Centre (ITC) will carefully select a number of labour-intensive goods – for example leather, textiles, cotton, pulses – and tackle the problems that are holding back these goods from being sold in the Indian market. The project will be flexible and address the problems that are holding back exports to India: for example, it will provide market information, technical support, skills training, branding and investment. The project will tap into the large pool of Indian technical expertise and transfer some of this expertise to Africa.
203279	203279 CCMCC Promoting cooperation and avoiding conflict in managing the impacts of climate change Geography over programme lifetime: Multiple countries	0.29	0.37	Committed	ODA	Grant	Adaptation	General Environment Protection	The aim of this project is to maximise benefits to poor people from international climate change finance. It will do this by generating evidence on the links between climate change and its impacts, and the likelihood of such impacts leading to either conflict or collaboration between and within communiteis. It will help find ways for policies and programmes to foster collaborative rather than conflictual approaches to managing the impacts of climate change at local, national and global levels.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
203279	203279 CCMCC Promoting cooperation and avoiding conflict in managing the impacts of climate change Geography over programme lifetime: Multiple countries	0.07	0.09	Committed	ODA	Grant	Mitigation	General Environment Protection	The aim of this project is to maximise benefits to poor people from international climate change finance. It will do this by generating evidence on the links between climate change and its impacts, and the likelihood of such impacts leading to either conflict or collaboration between and within communiteis. It will help find ways for policies and programmes to foster collaborative rather than conflictual approaches to managing the impacts of climate change at local, national and global levels.
300991	300991 Bangladesh Climate Change and Environment Programme Geography over programme lifetime: Bangladesh	0.13	0.17	Committed	ODA	Grant	Adaptation	General Environment Protection	To address the effects of climate change and to reduce environmental degradation in Bangladesh. The aim of the programme is to systematically improve expertise, implement innovative approaches to adaptation and environmental management, and facilitate the scale-up of proven approaches. The programme will focus explicitly on building the resilience of poor and vulnerable communities and groups, including women and children. It will support political leadership by engaging youth and civil society to build the case for climate action, and by fostering future generations of Bangladeshi climate experts.
300991	300991 Bangladesh Climate Change and Environment Programme Geography over programme lifetime: Bangladesh	0.13	0.17	Committed	ODA	Grant	Mitigation	General Environment Protection	To address the effects of climate change and to reduce environmental degradation in Bangladesh. The aim of the programme is to systematically improve expertise, implement innovative approaches to adaptation and environmental management, and facilitate the scale-up of proven approaches. The programme will focus explicitly on building the resilience of poor and vulnerable communities and groups, including women and children. It will support political leadership by engaging youth and civil society to build the case for climate action, and by fostering future generations of Bangladeshi climate experts.

Project ID	Recipient country/region/project/programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300635	300635 Private Enterprise Programme Zambia Phase II Geography over programme lifetime: Zambia	0.02	0.03	Committed	ODA	Grant	Adaptation	Industry	To create investment in Zambia by building the capacity of micro, small and medium sized enterprises. The programme will aim to systematically transform the finance and investment environment for small and medium sized enterprises in Zambia, by helping companies with potential to grow and become the engine of job creation in the economy. The programme will create jobs at scale, including for women, disabled people, and rural communities with high levels of poverty. Small and medium sized enterprises supported by the programme will help to improve nutrition outcomes and improve climate resilience of smallholder farmers. It is expected that at least 5 new small and medium enterprise finance vehicles enter the Zambian market; At least 1000 small and medium sized enterprises are supported by the programme and demonstrate growth in their business; At least 50% of businesses supported should be owned or managed by women and at least 50% of the 30,000 jobs created, should be for women.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300635	300635 Private Enterprise Programme Zambia Phase II Geography over programme lifetime: Zambia	0.07	0.09	Committed	ODA	Grant	Mitigation	Industry	To create investment in Zambia by building the capacity of micro, small and medium sized enterprises. The programme will aim to systematically transform the finance and investment environment for small and medium sized enterprises in Zambia, by helping companies with potential to grow and become the engine of job creation in the economy. The programme will create jobs at scale, including for women, disabled people, and rural communities with high levels of poverty. Small and medium sized enterprises supported by the programme will help to improve nutrition outcomes and improve climate resilience of smallholder farmers. It is expected that at least 5 new small and medium enterprise finance vehicles enter the Zambian market; At least 1000 small and medium sized enterprises are supported by the programme and demonstrate growth in their business; At least 50% of businesses supported should be owned or managed by women and at least 50% of the 30,000 jobs created, should be for women.
301000	301000 Climate Action for a Resilient Asia Geography over programme lifetime: Multiple countries	0.04	0.05	Committed	ODA	Grant	Adaptation	General Environment Protection	A Technical Assistance facility will build capacity of national and subnational governments and vulnerable communities to integrate climate resilience into government-wide policy and planning and also work with the private sector, banks and financial regulators to support the integration of climate-related risks into investment decisions. A portion of the programme budget will be earmarked for coordinated policy work and regional cooperation in specific sectors or themes which require a regional approach where we have existing successful regional partnerships which can be scaled up, and or there is demand from country offices for a multi-country approach. Enable management of the programme including monitoring and evaluation, research, knowledge dissemination, communication, advisory support to country offices if required.

Project ID	Recipient country/region/project/ programme	Total amount: Climate-specific: Domestic currency (£m)	Total amount: Climate-specific: USD ($m)	Status: Provided, Committed, Pledged	Funding source: ODA, OOF, Other	Financial instrument: Grant, Concessional loan, Non-concessional loan, Equity, Other	Type of support: Mitigation, Adaptation, Cross-cutting, Other	Sector: Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	Additional Information
301000	301000 Climate Action for a Resilient Asia Geography over programme lifetime: Multiple countries	0	-	Committed	ODA	Grant	Mitigation	General Environment Protection	A Technical Assistance facility will build capacity of national and subnational governments and vulnerable communities to integrate climate resilience into government-wide policy and planning and also work with the private sector, banks and financial regulators to support the integration of climate-related risks into investment decisions. A portion of the programme budget will be earmarked for coordinated policy work and regional cooperation in specific sectors or themes which require a regional approach where we have existing successful regional partnerships which can be scaled up, and or there is demand from country offices for a multi-country approach. Enable management of the programme including monitoring and evaluation, research, knowledge dissemination, communication, advisory support to country offices if required.
300164	300164 Climate Adaptation Water and Energy Infrastructure Programme Geography over programme lifetime: Zimbabwe	0.03	0.04	Committed	ODA	Grant	Adaptation	General Environment Protection	This project will support the development of climate resilient multiple use water and renewable energy infrastructure in vulnerable rural districts of Zimbabwe. Targeted communities will have continued access to water for productive and household use, including during droughts and floods and improved access to clean and affordable energy to support economic activities. The project will also provide technical assistance to the government and other key stakeholders to support the wider use of climate science in designing and delivering resilient water and energy infrastructure. Evidence generated through this project will be used to influence climate policy reforms and support the national climate adaptation plan.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300164	300164 Climate Adaptation Water and Energy Infrastructure Programme Geography over programme lifetime: Zimbabwe	0.01	0.01	Committed	ODA	Grant	Mitigation	General Environment Protection	This project will support the development of climate resilient multiple use water and renewable energy infrastructure in vulnerable rural districts of Zimbabwe. Targeted communities will have continued access to water for productive and household use, including during droughts and floods and improved access to clean and affordable energy to support economic activities. The project will also provide technical assistance to the government and other key stakeholders to support the wider use of climate science in designing and delivering resilient water and energy infrastructure. Evidence generated through this project will be used to influence climate policy reforms and support the national climate adaptation plan.
201884	201884 SHEAR - Science for Humanitarian Emergencies and Resilience Geography over programme lifetime: Africa regional	0.12	0.15	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	SHEAR will support world-leading research and innovations in flood and drought risk monitoring and warning systems in Sub-Saharan Africa and landslip prone regions of South Asia. To enable greater and more effective investment in disaster resilience and earlier action to respond to imminent natural hazards by providing decision makers with enhanced risk mapping and analyses and more reliable warning systems

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
300414	300414 Essential Healthcare for the Disadvantaged in Bangladesh Geography over programme lifetime: Bangladesh	0.09	0.12	Committed	ODA	Grant	Adaptation	Disaster Prevention & Preparedness	To test and support effective and sustainable models for increasing access to essential health services for 2 million disadvantaged people including estimated 138,000 disabled, living on the coast, for future scale-up. The programme will use adaptive approach and will be implemented through three inter-linked components. Component I will test innovative models for providing essential healthcare, including family planning, maternal-new-born health and nutrition services. Component II will address health needs of 138,000 disabled people by creating enabling environment, ensuring access to essential healthcare and linking them with appropriate referral centres. Component III will focus on continuous evaluation, learning and adaptation of best approaches for driving effectiveness and sustainability. In addition, building capacity to tackle climate shocks will be an integral part of the programme in the two costal divisions i.e. Barisal and Khulna.
GB-GOV-13-ICF-0039-TEFOS	Territorios Forestales Sostenibles (TEFOS) – formerly ForTREES For People	43.0	55.13	Committed	ODA	Grant	Mitigation	Trade facilitation	To stabilise the deforestation frontier in the areas of Colombia most acutely threatened by deforestation and affected by conflict, by improving land systems and usage rights, building capacity to effectively tackle environmental crime, and promoting sustainable forest livelihoods and enterprises.
GB-GOV-13-ICF-0004-CIF_GRTA	MDB Green Recovery TA Programme	10.0	12.82	Committed	ODA	Grant	Mitigation	Sectors not specified	The $8 billion Climate Investment Funds (CIF) accelerates climate action by empowering transformations in clean technology, energy access, climate resilience, and sustainable forests in developing and middle income countries. The CIF's large-scale, low-cost, long-term financing lowers the risk and cost of climate financing. It tests new business models, builds track records in unproven markets, and boosts investor confidence to unlock additional sources of finance.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GB-GOV-13-ICF-0002-CEFTA	Clean Energy Fund Technical Assistance Programme (CEF TA)	0.5	0.64	Committed	ODA	Grant	Mitigation	Energy policy and administrative management	The fund supports the development of renewable energy and energy efficiency projects in developing countries in the Asia-Pacific region, in order to contribute to the mitigation of climate change impacts in those countries by reducing their carbon emissions. The fund focuses specifically on technical assistance, which involves building the knowledge and skills base of the industries and governments in the supported countries, as well as undertaking feasibility studies of potential low carbon energy projects.
GB-GOV-13-ICF-0003-CLIC	Climate Leadership In Cities (CLIC)	9.5	12.18	Committed	ODA	Grant	Mitigation	Urban development	The project aims to support cities in developing countries to plan for, and implement, ambitious climate actions. It will provide technical assistance to 15 megacities in Asia and South America to develop climate action plans consistent with the Paris Agreement, support 10 – 12 cities to develop investable business cases for climate action through the C40 Cities Finance Facility, and fund a global research and national advocacy component (in China and Mexico) to help remove barriers to city action.
GB-GOV-13-ICF-0006-CETP	Clean Energy Transitions Programme (CETP)	2.1	2.69	Committed	ODA	Grant	Mitigation	Energy research	The Clean Energy Transitions Programme (CETP) leverages the IEA's unique energy expertise across all fuels and technologies to accelerate global clean-energy transitions, particularly in major emerging economies. The Programme includes collaborative analytical work, technical cooperation, training and capacity building and strategic dialogues.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GB-GOV-13-ICF-0007-NAMA	The Nationally Appropriate Mitigation Actions (NAMA) Facility	28.8	36.92	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management	The NAMA Facility is a targeted fund set up in 2012 by Germany and the UK to help finance measures that tackle and shift challenging sectors within a country's climate mitigation action plans. Projects in these plans (their Nationally Appropriate Mitigation Actions Plans) funded by the NAMA Facility offer good potential for replication and are important building blocks towards implementing ambitious NDCs. The NAMA Facility has an open access competitive structure and projects are wide ranging in type (energy efficiency, transport, agriculture, renewables, waste) and geography (Asia, Africa and South and Central America) and noticeable for high level of country support.
GB-GOV-13-ICF-0008-NDCP	NDC Partnership (NDCP)	5.1	6.54	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management	The NDC Partnership is a international partnership aiming to help turn countries' climate targets under the Paris Agreement, known as Nationally Determined Contributions (NDCs), into specific strategies and measures. It also aims to achieve greater harmonisation among the various donor programmes supporting NDCs.
GB-GOV-13-ICF-0012-CMCI	The Global Innovation Lab (Continuation of the Capital Markets Climate Initiative)	0.4	0.51	Committed	ODA	Grant	Mitigation	Business Policy and Administration	The Global Innovation Lab (the Lab) is a public-private partnership that brings together experts from Governments, investors and civil society to discuss and help understand the barriers to investment. It works to identify, refine, and launch innovative financial instruments to attract private investment in climate change mitigation and adaptation at scale. It aims to drive billions of dollars of private investment into low-carbon, climate resilient economies.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GB-GOV-13-ICF-0015-UKCI_SouthAfrica	UK Climate Investments (UKCI) Investment	13.7	17.56	Committed	ODA	Equity	Mitigation	Energy generation, renewable sources - multiple technologies	UK Climate Investments (UKCI) invests in renewable energy and energy efficiency projects across sub-Saharan Africa and India to demonstrate that low carbon development is possible, replicable at scale, commercially viable and capable of lowering carbon emissions and supporting economic growth. The fund (£200m of UK International Climate Finance) provides late-stage minority equity investments on a commercial basis to get projects off the ground that would not otherwise reach financial close.
GB-GOV-13-ICF-0018-P4F	Partnerships for Forests (P4F)	2.9	3.72	Committed	ODA	Grant	Mitigation	Forestry policy and administrative management	The Partnerships for Forests programme (P4F) supports investment models in which the private sector, public sector and communities can achieve shared value from forests and sustainable land use. It aims to add value to standing forests by incubating new investments in agroforestry and non-timber forest products, and helping local and indigenous community enterprises, smallholder farmers and larger businesses connect to new markets and scale up production. It can also target commodities that have traditionally driven large-scale deforestation, facilitating multi-stakeholder approaches and solutions which support transitions to sustainable production models to fulfil zero-deforestation supply-chain commitments.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GB-GOV-13-ICF-0021-UKPACT	UK Partnering for Accelerated Climate Transitions (UK PACT)	7.0	8.97	Committed	ODA	Grant	Mitigation	Environmental policy and administrative management	UK Partnering for Accelerated Climate Transitions (UK PACT) is the Department for Business, Energy, and Industrial Strategy's (BEIS) flagship technical assistance programme and is funded via the UK's International Climate Finance (ICF) commitment. UK PACT operates in countries with high greenhouse gas emissions that are eligible to receive Official Development Assistance (ODA) and have potential for high emissions reduction. UK PACT supports these countries to increase and implement their ambitions for emissions reductions in line with internationally agreed commitments (NDCs). UK PACT works strategically to leverage the UK's position as a global leader in tackling climate change to provide support and share expertise, build strong relationships with other governments, and deliver transformational assistance.
GB-GOV-13-ICF-0023-FijiCOP	Fiji Support Programme	0.7	0.90	Committed	ODA	Grant	Mitigation	Public sector policy and administrative management	This programme seeks to provide £1.7M of International Climate Finance (ICF) funding for ODA-eligible activities in support of the Fijian Presidency of the UNFCCC climate negotiations in 2017-2018. The programme of activities proposed to fund will include capacity-building for the Fijian government, support to the Fijians' Pre-COP event in October, and a series of technical workshops at the Pre-COP, COP and Bonn inter-sessional events, on issues important to Fiji, SIDS and the UK.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GB-GOV-13-ICF-0025-CiDev	Carbon Initiative For Development (Ci-Dev)	1.5	1.92	Committed	ODA	Grant	Mitigation	Energy policy and administrative management	The Carbon Initiative for Development (Ci-Dev) aims to increase the flow of international carbon finance, primarily into Least Developed Countries (LDCs). It launched in 2013 and supports climate change mitigation in pursuit of the Paris Agreement's goals and facilitates access to cleaner energy and other poverty reducing technologies. It guarantees a revenue stream if projects deliver their expected benefits, builds local capacity to develop projects and monitor carbon emissions, and pilots projects that could serve as blueprints to increase LDC access to the international carbon market.
GB-GOV-13-ICF-0028-2050C	2050 Calculator	0.8	1.03	Committed	ODA	Grant	Mitigation	Energy research	The 2050 Calculator is a revolutionarily open, transparent and interactive energy model, which was originally developed by the Department of Energy and Climate Change (DECC) (now part of BEIS -the Department for Business, Energy and Industrial Strategy) to help the UK Government plan the country's low-carbon transition in an evidence-based way. The model allows users to try out different options for reducing emissions and to build a pathway that meets the UK's 2050 target using an online "webtool".
GB-GOV-13-ICF-0029-KEEP	Knowledge, Evidence and Engagement Portfolio (KEEP)	1.5	1.92	Committed	ODA	Grant	Mitigation	Environmental research	KEEP is a research and engagement facility that enables HMG climate leads to commission bespoke evidence and engagement activities to improve the delivery and increase the ambition of UK International Climate Finance activities, supporting developing countries to tackle climate change. It facilitates this by making funds available for research and engagement activities, filling evidence gaps and by ensuring efficient quality assurance and approval procedures.
GB-GOV-13-ICF-0031-PMEH	Negative ODA flow	- 10.8	- 13.85	Committed	ODA	Grant	Mitigation	Biosphere protection	A number of projects have returned ODA, until this money is respent is counts as negative ODA which we have recorded against the appropriate themes.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GB-GOV-13-ICF-0033-ESMAP	Energy Sector Management Assistance Programme (ESMAP)	10.0	12.82	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	The World Bank Energy Sector Management Assistance Programme (ESMAP) is a multi-donor trust fund that provides technical assistance to help shape global energy policies and leverage significant development financing. It primarily targets six Asian countries (China, India, Indonesia, the Philippines, Pakistan and Vietnam) where the most new, unabated coal-fired power generation is due to begin operation (from 2018 to 2020). ESMAP is influential in advising countries on the clean energy transition, with significant demand for its technical assistance.
GB-GOV-13-ICF-0034-CaBIN	Climate Ambition Support Alliance (CASA)	2.5	3.21	Committed	ODA	Grant	Mitigation	Energy policy and administrative management	The Climate Ambition Support Alliance (CASA) programme will work through secondary providers to provide training, in addition to technical, legal and logistical support for developing country negotiators, in order to build the capacity of the least developed and most climate vulnerable states to participate in the international negotiations process and be more effective in influencing its outcomes.
GB-GOV-13-ICF-0036-CFA	Climate Finance Accelerator (CFA)	0.0	0.05	Committed	ODA	Grant	Mitigation	Financial policy and administrative management	To accelerate the transformation of developing countries' Nationally Determined Contributions into a pipeline of bankable projects, which have the potential to attract investment at scale from the private sector. The CFA will achieve this by facilitating 'transaction-oriented' workshops, convening project developers, policy makers and capital market players from participant countries with UK-based green finance experts.
GB-GOV-13-ICF-0037-CEIF_IUK	Clean Energy Innovation Facility (CEIF)	14.2	18.21	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	ODA grant funding that supports clean energy research, development & demonstration (RD&D) to help improve the performance of innovative technologies, and to accelerate the clean energy transition to avoid the most severe impacts of climate change in developing countries.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GB-GOV-13-ICF-Staff	Staff costs	8.0	10.26	Committed	ODA	Grant	Mitigation	Administrative costs (non-sector allocable)	ODA eligible costs associated with the management and delivery of programmes.
GB-GOV-13-ICF-Other	Admininstrative and Due Diligence costs	0.3	0.38	Committed	ODA	Grant	Mitigation	Administrative costs (non-sector allocable)	Expenditure on external legal advice, evaluation and auditing services to support ODA spend.
GB-GOV-13-UNFCCC_MS	Mandatory Subscription to the UNFCCC	0.8	1.03	Committed	ODA	Grant	Mitigation	Other	Mandatory Subscription to the United Nations Framework Convention on Climate Change - ODA eligible proportion.
GB-GOV-13-UNFCCC_VC	Voluntary Contribution to the UNFCCC	0.7	0.90	Committed	ODA	Grant	Mitigation	Other	Voluntary Contribution to the United Nations Framework Convention on Climate Change - ODA eligible proportion.
GB-GOV-13-IPCC_TF	Intergovernmental Panel on Climate Change - Trust Fund Contribution	0.1	0.13	Committed	ODA	Grant	Mitigation	Environmental research	Supporting attendance by developing countries at Plenary meetings, scoping meetings and author meetings.
GB-GOV-13-IPCC_TSU	Intergovernmental Panel on Climate Change Working Group III (Mitigation) Technical Support Unit	0.2	0.26	Committed	ODA	Grant	Mitigation	Environmental research	The Working Group III assesses the options for mitigating climate change. ODA funds are used to support TSU staff in India and to support other developing country participation.

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		Domestic currency (£m)	USD ($m)						
GB-GOV-13-ICF-CBFF	Congo Basin Forest Fund (CBFF)	- 0.8	- 1.03	Committed	ODA	Grant	Mitigation	Forestry	Programme aims to improve the the livelihoods of forest dependent communities and reduce deforestation in the Congo Basin by providing support to forest zoning, independent forest monitoring, civil society advocacy and the strengthening of legal frameworks for community forestry, as well as direct investments in community forest enterprises. The programme is expected to benefit 2.4million beneficiaries (direct and indirect). The programme will also have a demonstration effect, building a body of evidence on Community Forestry in the Congo Basin. Geography over programme lifetime : Cameroon, Rep. of Congo, Dem. Rep. of Congo, Central African Republic, Gabon
GCRF_ESRC_BRA_ES/T005130/1	Transforming Universities for a Changing Climate	0.62	0.79	Committed	ODA	Grant	Adaptation	Research/ scientific institutions	This project aims to strengthen the contribution of universities to addressing the causes and impacts of climate change in lower-income countries. This project addresses these questions in the context of the higher education systems of Brazil, Fiji, Kenya and Mozambique.
GCRF_ESRC_ETH_ES/T006358/1	Community energy and sustainable energy transitions in Ethiopia, Malawi, Mozambique (CESET)	0.11	0.14	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	Research Grant - CESET is an interdisciplinary research programme for the development of Community Energy Systems (CESs) to facilitate a just sustainable energy transition that will bridge the energy access gap in East Africa.

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GCRF_ESRC_ZMB_ES/T006285/1	Energy Democracy and the Politics of Energy Transition in African Countries	0.11	0.14	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	This project aims to provide a “pro-poor”/”pro-marginalised” integrated approach that links stakeholders of the energy sector at all levels (local, national and non-states actors) in three Southern African countries (Zambia, Lesotho, Zimbabwe) and in Nigeria. For this it will generate robust data on the relations between different actors from the energy sector in these countries faced with the challenge of energy transition; it will then help to implement effective policies and regulations to accelerate energy transition by promoting energy democracy.
GCRF_IUK_NS_ Innovation & Commercialisation - Energy Catalyst	Energy Catalyst Programme	8.62	11.05	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	Innovate UK’s Energy Catalyst programme aims to support businesses to develop highly innovative, sustainable energy technologies and business models, which are accelerating the clean energy transition in Sub-Saharan Africa and South/South East Asia. The Catalyst provides support for early, mid and late stage innovations through grants and an accelerator programme.
GCRF_NERC_IND_NE/S01344X/1	Low-cost printed flexible solar cells as substitute for current (1st and 2nd generation) photovoltaics for building integrated applications in India	0.09	0.12	Committed	ODA	Grant	Mitigation	Environmental research	Funding to develop a solar energy product that is low-cost to manufacture in terms of set up costs, materials and energy consumption. Benefitting the Indian Government’s target to generate 57% of India’s energy from renewables by 2027.

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GCRF_NERC_JOR_NE/S01358X/1	A user-friendly tool for effective monitoring and management of forest conservation set-asides in oil palm landscapes	0.08	0.11	Committed	ODA	Grant	Mitigation	Environmental research	We have developed and field-tested a simple, paper-based survey tool to monitor forest quality in SE Asia. The survey is a robust proxy for measuring forest quality against a range of independently sampled scientific metrics. To increase the uptake of the survey tool, we propose to develop a smartphone application. This will simplify and speed up data collection, enhance in-field training support, improve the consistency of survey responses, and streamline data aggregation and analysis. Translating monitoring data into meaningful management actions is also crucial to the implementation of successful forest conservation and we will also develop a supporting web-based dashboard for analysis and decisionmaking.
GCRF_NERC_SLE_NE/S014063/1 (S013636/1 & S013644/1	Raising the value of biodiversity-friendly cocoa and carbon storage: ensuring sustainable incomes around Gola Rainforest National Park	0.09	0.12	Committed	ODA	Grant	Mitigation	Environmental research	We propose to produce a methodologically transparent and continuously updated decision-support tool to support the notfor-profit company, Gola Rainforest Conservation Limited Group (GRC-LG) in Sierra Leone, which has identified a need to be able to audit and externally verify the effectiveness of REDD+ carbon-credit payments and premium-pricing for Rainforest-Friendly cocoa. These payment streams will thus be safeguarded, allowing sustained support of the livelihoods of 22,000 people living in and around the Gola Rainforest National Park.
GCRF_EPSRC_AA_EP/R030243/1	Creating Resilient Sustainable Microgrids through Hybrid Renewable Energy Systems	0.19	0.24	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	Creating Resilient Sustainable Microgrids through Hybrid Renewable Energy Systems to enable the development of sustainable and resilient energy distribution grids in rural communities of the low- and middle-income countries (LMICs) Tanzania, Uganda and Republic of the Congo.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GCRF_EPSRC_AA_EP/R030243/1	Creating Resilient Sustainable Microgrids through Hybrid Renewable Energy Systems	0.19	0.24	Committed	ODA	Grant	Adaptation	Research/ scientific institutions	Creating Resilient Sustainable Microgrids through Hybrid Renewable Energy Systems to enable the development of sustainable and resilient energy distribution grids in rural communities of the low- and middle-income countries (LMICs) Tanzania, Uganda and Republic of the Congo.
GCRF_RS_NS_Dorothy Hodgkin Fellowships DH160111	The role of wetland trees in atmospheric methane emissions	0.10	0.13	Committed	ODA	Grant	Mitigation	Environmental research	Fellowship award researching the role of wetland trees in atmospheric change, particularly methane emissions and carbon sequestration. Fieldwork in Mexico, Brazil and China will feed into policies on reforestation, conservation and management of wetland.
GCRF_RS_ETH_FLAIR Collaboration Grants FCG\R1\201002	Biosynthesised Cost effective N2O3 solar absorber coating to heat water in low income rural areas	0.03	0.04	Committed	ODA	Grant	Adaptation	Solar energy	Collaboration between UK and a FLAIR Fellow based in Ethiopia. Synthesis of a cost-effective solar absorber surface for heating and purifying water in rural areas, to decrease waterborne diseases.
GCRF_RS_SEN_FLAIR Collaboration Grants FCG\R1\201030	Sustainable Electrocatalysts based on abundant and non-critical materials for Oxygen Reduction, Oxygen Evolution and Hydrogen Evolution Reactions for Decentralised Energy	0.03	0.04	Committed	ODA	Grant	Mitigation	Energy research	Collaboration between UK and a FLAIR Fellow based in Senegal. Developing high-stability electrocatalysts from local resources to build future decentralised energy vectors for Senegal at different scales.
GCRF_RS_SEN_FLAIR Fellowships FLR\R1\190281	Innovative Electrode Materials for Energy Storage Applications as Supercapacitors	0.15	0.19	Committed	ODA	Grant	Mitigation	Energy research	Fellowship award based in Senegal. Combining battery and supercapacitor technology to design a large-scale energy storage system to support the transition from fossil fuels to renewable energy in Senegal.
GCRF_RS_KEN_FLAIR Fellowships FLR\R1\191733	Tackling household air pollution in rural Kenya	0.11	0.14	Committed	ODA	Grant	Adaptation	Biosphere protection	Fellowship award based in Kenya. Research into cooking fuels used in rural communities. Kenyan homes typically use wood for fuel, with negative impacts on health (particularly of women) and the environment. This project compares emission profiles of fuels and assesses drivers/barriers to uptake of cleaner ethanol cookstoves.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GCRF_RS_AA_FLAIR Fellowships FLR\R1\201528	Upgrading of raw biogas into biomethane using low-cost adsorbents produced from a holistic strategy that utilises three waste streams	0.12	0.16	Committed	ODA	Grant	Adaptation	Modern biofuels manufacturing	Fellowship award based in South Africa. Developing alternative low-cost materials for cleaning biogas, which is used as a substitute for traditional cooking fuels in developing countries but has greater economic potential if cleaned.
GCRF_RS_GHA_ FLAIR Fellowships FLR\R1\201640	Building resilience using climate smart agricultural interventions in northern Ghana	0.11	0.15	Committed	ODA	Grant	Adaptation	Agricultural research	Fellowship award based in Ghana. Investigating ways Climate Smart Agriculture technologies can be used to equip smallholder farmers in Ghana and Africa dryland farming systems with information to improve land management decision-making.
GCRF_RS_VNM_ International Collaboration Awards ICA\R1\180130	Improving food security and adaptation to climate change in Northern Vietnam by developing rapid-maturation rice varieties	0.07	0.09	Committed	ODA	Grant	Adaptation	Agricultural research	Research Grant Collaboration between UK and Vietnam. Using genomic studies to crossbreed rice varieties, producing highyielding shortlifecycle crops suitable for the growing in North Vietnam, where climate change is currently impacting negatively on agricultural production.
GCRF_RS_IDN_ International Collaboration Awards ICA\R1\180276	Mitigation of CH4 and N2O emissions from tropical peatland plantations under a changing water table regime - MitiMeN	0.07	0.09	Committed	ODA	Grant	Mitigation	Environmental research	Research Grant - Collaboration between UK and Indonesia. The Indonesian government has recently made it a legal requirement to raise the water table in drained peatlands. This project will develop strategies to mitigate the potential climate impact of this policy whilst maintaining the livelihoods of fibreindustry workers.
GCRF_RS_COL_ International Collaboration Awards ICA\R1\191201	Enabling Harvesting of Solar Energy for Remote Applications in the Andes Region (LA-SOLAR ENHANCE)	0.08	0.10	Committed	ODA	Grant	Mitigation	Solar energy - thermal applications	Research Grant - Collaboration between UK and Colombia. Developing a mobile, re-chargeable, low-maintenance Solar Thermal Storage System to provide heat to homes and businesses in the Andes Region where conventional heating is cost prohibitive.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GCRF_RS_MEX_ International Collaboration Awards ICA\R1\191321	Textiles to Terawatts: exploring the global opportunity for screen printed photovoltaics	0.08	0.10	Committed	ODA	Grant	Mitigation	Solar energy for centralised grids	Research Grant - Collaboration between UK and Mexico. Transferring manufacture of low-cost screen-printed perovskite solar cell technology to the Mexican screen-printing industry, typically used for production of T-shirts and other textiles.
GCRF_RS_NS_ University Research Fellowships UF150526	Quantifying the joint impacts of land use and climate on ecological assemblages	0.11	0.14	Committed	ODA	Grant	Adaptation	Agricultural land resources	Fellowship award modelling how climate change interacts with land use to drive biodiversity change, and the effects on ecosystems vital to sustainable intensification of food production. This research will benefit LMICs where future expansion of agriculture will occur, enabling better planning for land use and climate adaptation.
GCRF_UKSA_CIV_ UKSA-047	Deforestation prevention with land-use monitoring and valuation in Cote d'Ivoire	0.11	0.13	Committed	ODA	Grant	Mitigation	Rural land policy and management	Using publicly available Earth Observation imagery, Vivid aim to create land-use tracking and deforestation warning systems for the Ivory Coast. This will improve monitoring to help and inform enforcement efforts, better target support to local economic development and sustainable supply chains through payment for ecosystem services (PES) schemes. Overall this will prevent forest loss and prioritise afforestation.
GCRF_UKSA_ COL_UKSA- Call 2 Agricompas	EcoProMIS 2.0	0.97	1.24	Committed	ODA	Grant	Adaptation	Rural land policy and management	EcoProMIS is focussed on Colombian rice and oil palm farmers and their need to improve productivity and stabilise incomes to allow them to compete globally whilst responding to climate change and producing responsibly. The project uses satellite earth observation combined with environmental and crop data to research the impact of crop and ecosystem management on biodiversity, greenhouse gas (GHG) emissions, social-economic indicators and productivity.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GCRF_UKSA_PER_ UKSA-048	21 Vivid Peru - Call 1	0.05	0.06	Committed	ODA	Grant	Mitigation	Forestry policy and administrative management	Using a range of publicly available satellite imagery, Vivid will develop economic valuation and small-plot mapping tools for the Peruvian region of San Martin. The project will use high resolution Earth Observation images and digital elevation mapping in deforestation-prone areas to enable the implementation and certification of sustainable agricultural production and to reduce barriers to small-scale irrigation systems.
UKSA_C3_07_ gEOtherm	gEOthermalKenya: Earth Observation Insights for Sustainable Growth of the Kenyan Geothermal Sector	0.07	0.09	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	This proposal presents a timely and innovative plan for the characterisation and monitoring of land-use around geothermal sites, to support social, environmental and economically sustainable growth of the Kenyan geothermal sector.
UKSA_C3_07_ gEOtherm	gEOthermalKenya: Earth Observation Insights for Sustainable Growth of the Kenyan Geothermal Sector	0.07	0.09	Committed	ODA	Grant	Adaptation	Research/ scientific institutions	This proposal presents a timely and innovative plan for the characterisation and monitoring of land-use around geothermal sites, to support social, environmental and economically sustainable growth of the Kenyan geothermal sector.
GCRF_BBSRC_COF_ ES/P011306/1_ES_ GROW	GCRF: Social and Environmental Trade-offs in African Agriculture	1.42	1.82	Committed	ODA	Grant	Adaptation	Research/ scientific institutions	SENITAL is a collaboration of research organisations from the UK, Ethiopia, Ghana, Uganda and Zambia that is working to enhance knowledge about impacts, risks & trade-offs among social, economic & environmental dimensions of different agricultural development pathways through high quality research. SENITAL will also work to build linkages and research capacity across all partner countries.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
UKRI_NS_EP/ T029145/1_DIDA	Integrated digital monitoring and management of air pollution in African cities	0.99	1.27	Committed	ODA	Grant	Mitigation	Health policy and administrative management	Improving population health and wellbeing in SSA's cities, through evidence-based policies and social programmes that reduce air pollution. We will realise our aim through co-development and co-design (current proposal) and implementation, testing, documentation and promotion of an integrated digital urban air pollution monitoring system, which is suitable for the local infrastructure and social context.
UKRI_NS_EP/ T030100/1_DIDA	East African Digital Solutions to Air Quality Network	0.99	1.27	Committed	ODA	Grant	Mitigation	Administrative costs (non-sector allocable)	This project forms a new network to co-create strategy and protocols to bring together data that relate to air pollution in East African Urban areas. It targets the capitals of Ethiopia (Addis Ababa), Kenya (Nairobi) and Uganda (Kampala). New data science techniques will be developed to synthesize disparate data streams into spatially and temporally coherent outputs, which can be used to understand historic, contemporary and future air quality. The project will provide a road map to harness the power of new data analytics and big data technologies.
GCRF_BA_VNM_ YF190165	Youth-led adaptation for climate change challenges in Vietnam: social action, inter-generational and inter-cultural learning	0.22	0.28	Committed	ODA	Grant	Adaptation	Environmental policy and administrative management	Research grant - this project develops creative, youth-led perspectives and action on climate challenges facing one of the most populous, economically important and ethnically diverse areas in Vietnam. Benefitting young people and those living in the Red River Basin in Vietnam who are affected by climate challenges.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GCRF_ESRC_NS_ES/P011373/1	GCRF: DAMS 2.0: Design and assessment of resilient and sustainable interventions in water-energy-food-environment Mega-Systems	1.98	2.54	Committed	ODA	Grant	Adaptation	Research/ scientific institutions	The DAMS 2.0 project is building links between UK research bodies and institutes in Ethiopia, Ghana, India, Jordan and Myanmar, as well as influential international environmental organisations and is working to provide transformative research and knowledge on how to design and plan the complex water-energy systems that minimises impact on poor people, avoids environmental degradation and provides water and energy security for all.
GCRF_IUK_NS_ Innovation & Commercialisation - Demonstrate Impact	Demonstrate Impact in meeting the Sustainable Development Goals	0.72	0.92	Committed	ODA	Grant	Mitigation	Technological research and development	Demonstrate Impact supports businesses to use human centred design to develop appropriate innovations that tackle SDGs in developing countries. It is a two phase programme to support market feasibility studies and prototyping. 10 SDGs and 140 LMICs are in scope.
GCRF_IUK_NS_ Innovation & Commercialisation - Demonstrate Impact	Demonstrate Impact in meeting the Sustainable Development Goals	0.72	0.92	Committed	ODA	Grant	Adaptation	Technological research and development	Demonstrate Impact supports businesses to use human centred design to develop appropriate innovations that tackle SDGs in developing countries. It is a two phase programme to support market feasibility studies and prototyping. 10 SDGs and 140 LMICs are in scope.
GCRF_NERC_NS_ NOC_NE/R000123/1	National Capability ODA Programme. NOC Foundation & Full award. Addressing Challenges of Coastal Communities through Ocean Research for Developing Economies (ACCORD).	1.09	1.39	Committed	ODA	Grant	Adaptation	Environmental research	Research Grant – supporting the sustainable growth of, and resilience to change for, Blue Economies in East Africa and South East Asia, through sustainable use of natural resources and improved coastal hazard warning and coastal management. Benefitting policy makers, resource managers and coastal managers of coastal states.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GCRF_EPSRC_NS_EP/P032591/1_GROW	Strategic University Network to Revolutionise Indian Solar Energy (SUNRISE)	1.66	2.12	Committed	ODA	Grant	Mitigation	Education policy and administrative management	Combining the best of British and Indian solar expertise from leading institutions in both countries, the project will develop printed photovoltaic (PV) cells and innovative manufacturing processes. This will allow local production, at scale, of affordable solar energy products, which will be integrated into buildings in five large, off-grid villages.
GCRF_UKSA_NS_UKSA-035	Forest 2020	1.58	2.03	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	This project is using EO imagery from satellites to improve forest monitoring across six partner countries (Brazil, Colombia, Mexico, Ghana, Kenya, and Indonesia). It works with leading experts from the National Centre for Earth Observation (NCEO) in leading universities in the UK and with international partners to test new forestry monitoring methods . These new methods will enable our partner countries to use more frequent, better quality data, quicker, improving the national forest monitoring systems.
GCRF_UKSA_NS_UKSA-042	Drought and Flood Mitigation Service (DFMS)	0.75	0.97	Committed	ODA	Grant	Adaptation	Research/ scientific institutions	This project aims to provide accurate flood and drought predictions to farmers in Uganda and Kenya so that they are able to use that information to adjust their farming and livestock activities, with the ultimate impact of reducing the losses they would otherwise suffer from flood and drought impacts. The system is enabled through use of data with improved quality, detail and frequency from the Sentinel 1, 2 and 3 satellites (to ensure low cost) combined with SMOS/ SMAP and climate modelling/meteorological data.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
GCRF_UKSA_SLB_ UKSA-063	CommonSensing	4.68	6.00	Committed	ODA	Grant	Adaptation	Research/ scientific institutions	The overall aim of CommonSensing is to improve resilience towards climate change, including disaster risk reduction, and contribute to sustainable development in three selected Commonwealth Small Island Developing States (SIDS): Fiji, the Solomon Islands and Vanuatu. The project will combine earth observation data to provide stakeholders with access to important information regarding disaster risks (including disaster risk planning, food security, climate risk and other environmental concerns). This information will be accessible to beneficiaries through a web portal and mobile applications.
GCRF_UKSA_SC_ UKSA-046b	Renewable Energy Space Analytics Tool (RE-SAT)	1.28	1.64	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	The project aims to assess the feasibility (using EO data) of small island developing states to move away from fossil fuel and onto renewable energy as their primary power source. The project will use historic Earth Observation data combined with ground observations and weather models to develop a proof-of-concept energy planning tool – RE-SAT.
NF_IUK_MYS_15040	Strengthening UK-Malaysian business-research partnership	0.25	0.33	Committed	ODA	Grant	Mitigation	Small and medium-sized enterprises (SME) development	Grants to industry-research institutions collaborators in Malaysia and UK, partnering on translational research activities related to climate change and its impact on urbanisation.
NF_MO_BRA_491 & NF_MO_BRA_512	Climate Science for Service Partnership (CSSP - Brazil) Calls Year 1+	1.29	1.65	Committed	ODA	Grant	Mitigation	Environmental research	Collaborative climate science research programme between Brazilian and UK to improve understanding of recent climate changes and Brazil's role in mitigation activities to inform international negotiations; to enhance projections of future weather and climate extremes and impacts to inform decision making and contribute to disaster risk reduction in Brazil.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
NF_MO_BRA_491 & NF_MO_BRA_512	Climate Science for Service Partnership (CSSP - Brazil) Calls Year 1+	1.29	1.65	Committed	ODA	Grant	Adaptation	Environmental research	Collaborative climate science research programme between Brazilian and UK to improve understanding of recent climate changes and Brazil's role in mitigation activities to inform international negotiations; to enhance projections of future weather and climate extremes and impacts to inform decision making and contribute to disaster risk reduction in Brazil.
NF_MO_CHN_473 & 475	China - Climate Science for Service Partnership (CSSP) - Work Package 1	1.54	1.97	Committed	ODA	Grant	Adaptation	Environmental research	Collaborative climate science research between Chinese and UK researchers to help better understand the likely causes of climate-related extreme events and long-term climate trends in China and East Asia region. Increased scientific understanding will help to better mitigate the risks arising from climate variability and change.
NF_MO_CHN_476 & 478	China - Climate Science for Service Partnership (CSSP) - Work Package 2	1.48	1.89	Committed	ODA	Grant	Adaptation	Environmental research	Collaborative climate science research programme between China and UK focused on the evaluation of UK and Chinese climate model variability to further our collective understanding of the underpinning science of climate dynamics. Contribution to improvement in climate predictions of extreme events in the East Asia region for climate mitigation/adaptation decisions.
NF_MO_CHN_479 & 481	China - Climate Science for Service Partnership (CSSP) - Work Package 3	0.62	0.79	Committed	ODA	Grant	Adaptation	Environmental research	Climate change research focused on impacts on regional water cycle and climate extremes within East Asia. Collaboration between scientists in UK and China to strengthen research capacity and increase understanding of drivers of regional drought and flooding, thus contributing to developing the capability of early warning methodology.

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
NF_MO_CHN_482 & 484	China - Climate Science for Service Partnership (CSSP) - Work Package 4	1.92	2.46	Committed	ODA	Grant	Adaptation	Environmental research	Collaborative climate science research programme between China and UK focused on climate model development and climate prediction systems. Research into near term climate projections in China and projections of 21st century hydrological change in China aims to enable better business planning and help inform climate adaptation choices.
NF_MO_CHN_485 & 488	China - Climate Science for Service Partnership (CSSP) - Work Package 5	1.65	2.12	Committed	ODA	Grant	Adaptation	Environmental research	Collaborative work with Chinese stakeholders to strengthen capacity in climate services, bridging the gap between information developed by scientists and service providers and the practical needs of climate-sensitive decision-makers. Development of translational science with Chinese collaborators to produce useable and useful climate science knowledge and applications.
NF_STFC_IDN_142	Train Indonesian scientists on the design & analysis of experiments to explore novel catalytic processes of biofuel production from palm oil waste	0.14	0.18	Committed	ODA	Grant	Mitigation	Advanced technical and managerial training	Training activities for studying novel catalytic processes of biofuel production. This will help Indonesian scientists to use UK facility to design, run and analyse experiments to turn palm oil waste into biofuels.
NF_EPSRC_IND_67	Joint Virtual Clean Energy Centre	0.49	0.63	Committed	ODA	Grant	Mitigation	Energy generation, renewable sources - multiple technologies	A joint renewable energy centre to research challenges in grid-isolated communities in India. This centre will study solar energy, smart grids, and energy storage as a complete programme of effort.
NF_EPSRC_IND_75	End-use energy demand in the built environment	0.40	0.51	Committed	ODA	Grant	Mitigation	Research/ scientific institutions	Collaborative research programme on the challenges related to reducing energy demand in the built environment in India. Reducing energy demand is a crucial requirement for sustainable economic growth in India while reducing carbon emissions and increasing energy security, also leading to improved health/ wellbeing and lower energy costs for building users.

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
NF_ESRC_MEX_3	Joint collaboration between Economic and Social Research Council and Consejo Nacional de Ciencia y Tecnología on Smart Cities in Mexico.	0.28	0.36	Committed	ODA	Grant	Mitigation	Educational research	Joint collaboration between Economic and Social Research Council and Consejo Nacional de Ciencia y Tecnología on Smart Cities in Mexico. These projects will look at the changes in politics, quality of life and mobility. They will also explore the changes to cities that result from the interactions between smart city technologies and urban economies, redistribution of resources, climate change, disaster risk reduction, resilience and public policies.
NF_ESRC_MEX_3	Joint collaboration between Economic and Social Research Council and Consejo Nacional de Ciencia y Tecnología on Smart Cities in Mexico.	0.28	0.36	Committed	ODA	Grant	Adaptation	Educational research	Joint collaboration between Economic and Social Research Council and Consejo Nacional de Ciencia y Tecnología on Smart Cities in Mexico. These projects will look at the changes in politics, quality of life and mobility. They will also explore the changes to cities that result from the interactions between smart city technologies and urban economies, redistribution of resources, climate change, disaster risk reduction, resilience and public policies.
NF_IUK_ZAF_ESC SA	Prosumer business case for transition to solar	0.10	0.13	Committed	ODA	Grant	Mitigation	Solar energy for centralised grids	The project's aims are to provide South African municipalities and electricity distributors with an understanding of the prosumer2 business case for rooftop PV deployment, and to assess the impact of these installations on South African distribution networks
NF_NERC_BRA_ Brazilian biomes	Understanding & Sustaining Brazilian Biome Resources	0.05	0.07	Committed	ODA	Grant	Mitigation	Environmental research	Funding to support collaborative research between UK and Brazilian academics to understand how environmental stressors e.g. climate change, deforestation affect the ability of Brazilian ecosystems to deliver societal benefits. Outputs will inform ecosystem management & policy in Brazil

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		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
NF_NERC_BRA_ Brazilian biomes	Understanding & Sustaining Brazilian Biome Resources	0.05	0.07	Committed	ODA	Grant	Adaptation	Environmental research	Funding to support collaborative research between UK and Brazilian academics to understand how environmental stressors e.g. climate change, deforestation affect the ability of Brazilian ecosystems to deliver societal benefits. Outputs will inform ecosystem management & policy in Brazil
NF_NERC_IDN_ Wallacea	Wallacea Region - Understanding biodiversity & evolutionary responses to environmental change	0.86	1.11	Committed	ODA	Grant	Adaptation	Environmental research	The prorgamme aims to explore biodiversity of the Wallacea region, and through this understand tensions in land use and the adaptation of biodiversity in response to environmental change. The programme will provide solutions to support effective management, restoration, rehabilitation and exploitation of the region and its biodiversity.
Blue Forests Initiative (PO001)	Blue Forests	0.74	0.95	Committed	ODA	Grant	Mitigation	Forestry	The project aims to design a holistic model for mangrove forest conservation and sustainable development. Operating in Madagascar and Indonesia, the project seeks to reduce the deforestation of mangrove habitat, create new sustainable livelihoods, support community health and women's empowerment and increase climate resilience in coastal communities. https://devtracker.fcdo.gov.uk/projects/GB-GOV-7-ICF-P0001-BV
Blue Forests Initiative (PO001)	Blue Forests	0.74	0.95	Committed	ODA	Grant	Adaptation	Forestry	The project aims to design a holistic model for mangrove forest conservation and sustainable development. Operating in Madagascar and Indonesia, the project seeks to reduce the deforestation of mangrove habitat, create new sustainable livelihoods, support community health and women's empowerment and increase climate resilience in coastal communities. https://devtracker.fcdo.gov.uk/projects/GB-GOV-7-ICF-P0001-BV

Project ID	Recipient country/region/project/ programme	Total amount		Status	Funding source	Financial instrument	Type of support	Sector	Additional Information
		Climate-specific		Provided, Committed, Pledged	ODA, OOF, Other	Grant, Concessional loan, Non-concessional loan, Equity, Other	Mitigation, Adaptation, Cross-cutting, Other	Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other, Not applicable	
		Domestic currency (£m)	USD ($m)						
FR-R&D	Forest Research ICF R&D	0.04	0.05	Committed	ODA	Grant	Mitigation	Forestry	This project aimed to provide Defra with initial evidence that can inform future international programming (e.g. International Climate Finance) and international policy with regards to forest restoration and tree planting in the tropics.
DASGUPTA	Support for the development of the Dasgupta Review	0.32	0.41	Committed	ODA	Grant	Mitigation	Other	The project builds our understanding of interventions that are effective in protecting and enhancing biodiversity, and improve our understanding of extreme situations such as ecosystems tipping into new regimes.
Kew-ITT	Kew Illegal Timber Trade	0.19	0.24	Committed	ODA	Grant	Mitigation	Other	Funding to support RGB Kew to build a reference library of timber samples to support enforcement, policy intervention and the trade in legal timber.
Climate Change Research and Development (PO011)	Nature based solutions - R&D	0.22	0.28	Committed	ODA	Grant	Mitigation	Forestry	The research project comprises two distinct work packages on: i) the development of relevant biodiversity indicators; and ii) identifying 'best buy' options for nature-related climate finance programming.
MP-UNEP	Africa Centre of Excellence for Rural Cooling (ACES) and Sustainable Public Procurement for cooling	0.4	0.51	Committed	ODA	Grant	Mitigation	Other	1. UNEP – ACES | A programme to deliver the first Africa Centre of Excellence for Rural Cooling and Cold-chain. ACES is being established by the Governments of Rwanda and the UK, the United Nations Environment Programme's United for Efficiency (UNEP U4E) initiative, the Centre for Sustainable Cooling, and a range of academic institutions.

Table 8
Provision of support for technology development and transfer

Many programmes funded by the UK actively support some form of technology development or transfer in developing countries. The list below provides some key examples.

Recipient country and/or region	*Targeted area*	*Measures and activities related to technology transfer*	*Sector*	*Source of funding for technology transfer*	*Activities undertaken by*	*Status*	*Additional information*
Sub Saharan Africa, South Asia	Mitigation	The programme will include: i) partnership with Shell Foundation, enabling support to another 30+ early stage private sector innovations. ii) Innovate UK's Energy Catalyst to stimulate technology innovation by UK enterprises; iii) build other strategic clean energy innovation partnerships (e.g. testing a new 'P2P Solar' crowdfunding platform; and scoping a potential new partnership with Gates Foundation on Mission Innovation); iv) skills and expertise development. To support early stage testing and scale up of innovative technologies and business models that will accelerate access to affordable, clean energy services for poor households and enterprises, especially in Africa.	Energy Policy	Private and public	Private and public	Implemented	204867 TEA - Transforming Energy Access
East Asia	Adaptation	Improve the observational basis for understanding East Asian climate variability and change by including early years' data through digitisation, and by developing techniques, software and tools to improve gridded datasets, including at higher temporal and spatial resolution and to assess their uncertainties.	Environmental research	Public	Private and public	Implemented	(MO_CHN_475) Improve the observational basis for understanding East Asian climate variability and change

Recipient country and/or region	*Targeted area*	*Measures and activities related to technology transfer*	*Sector*	*Source of funding for technology transfer*	*Activities undertaken by*	*Status*	*Additional information*
Seychelles	Mitigation	The project aims to assess the feasibility (using EO data) of small island developing states to move away from fossil fuel and onto renewable energy as their primary power source. The project will use historic Earth Observation data combined with ground observations and weather models to develop a proof-of-concept energy planning tool – RE-SAT.	Energy generation, renewable sources - multiple technologies	Private and public	Private and public	Implemented	(UKSA_SC_UKSA-046) - Renewable Energy Space Analytics Tool (RESAT)
Kenya, Uganda	Adaptation	This project aims to provide accurate flood and drought predictions to farmers in Uganda and Kenya so that they are able to use that information to adjust their farming and livestock activities, with the ultimate impact of reducing the losses they would otherwise suffer from flood and drought impacts. The system is enabled through use of data with improved quality, detail and frequency from the Sentinel 1, 2 and 3 satellites (to ensure low cost) combined with SMOS/SMAP and climate modelling/meteorological data.	Research/ scientific institutions	Private and public	Private and public	Implemented	(UKSA_NS_UKSA-042) Drought and Flood Mitigation Service
India	Mitigation	Funding to develop a solar energy product that is low-cost to manufacture in terms of set up costs, materials and energy consumption.	Environmental research	Private and public	Private and public	Implemented	(GCRF_NERC_IND_NE/S01344X/1) Low-cost printed flexible solar cells as substitute for current (1st and 2nd generation) photovoltaics for building integrated applications in India
Tanzania, Uganda and Republic of the Congo.	Mitigation and adaptation	Creating Resilient Sustainable Microgrids through Hybrid Renewable Energy Systems to enable the development of sustainable and resilient energy distribution grids in rural communities	Research/ scientific institutions	Private and public	Private and public	Implemented	(GCRF_EPSRC_AA_EP/R030243/1) Creating Resilient Sustainable Microgrids through Hybrid Renewable Energy Systems
Ethiopia	Adaptation	Synthesis of a cost-effective solar absorber surface for heating and purifying water in rural areas, to decrease waterborne diseases.	Solar energy	Private and public	Private and public	Implemented	(GCRF_RS_ETH_FLAIR Collaboration Grants FCG\R1\201002) Biosynthesised Cost effective N2O3 solar absorber coating to heat water in low income rural areas

Recipient country and/or region	*Targeted area*	*Measures and activities related to technology transfer*	*Sector*	*Source of funding for technology transfer*	*Activities undertaken by*	*Status*	*Additional information*
Senegal	Mitigation	Developing high-stability electrocatalysts from local resources to build future decentralised energy vectors for Senegal at different scales.	Energy research	Private and public	Private and public	Implemented	(GCRF_RS_SEN_FLAIR Collaboration Grants FCG\R1\201030) Sustainable Electrocatalysts based on abundant and non-critical materials for Oxygen Reduction, Oxygen Evolution and Hydrogen Evolution Reactions for Decentralised Energy
Senegal	Mitigation	Combining battery and supercapacitor technology to design a large-scale energy storage system to support the transition from fossil fuels to renewable energy	Energy research	Private and public	Private and public	Implemented	(GCRF_RS_SEN_FLAIR Fellowships FLR\R1\190281) Innovative Electrode Materials for Energy Storage Applications as Supercapacitors
Latin America	Mitigation	Developing a mobile, re-chargeable, low-maintenance Solar Thermal Storage System to provide heat to homes and businesses	Solar energy - thermal applications	Private and public	Private and public	Implemented	(GCRF_RS_COL_International Collaboration Awards ICA\R1\191201) Enabling Harvesting of Solar Energy for Remote Applications in the Andes Region (LA- SOLAR ENHANCE)
Mexico	Mitigation	Transferring manufacture of low-cost screen-printed perovskite solar cell technology to the Mexican screen-printing industry, typically used for production of T-shirts and other textiles.	Solar energy for centralised grids	Private and public	Private and public	Implemented	(GCRF_RS_MEX_International Collaboration Awards ICA\R1\191321) Textiles to Terawatts: exploring the global opportunity for screen printed photovoltaics

Table 9

Provision of Capacity-building support

Many programmes funded by the UK actively support some form of support for capacity building in developing countries. The list below provides some key examples:

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Global	Mitigation	UK Partnering for Accelerating Climate Transitions (UK PACT) - GB-GOV-13-ICF-0021-UKPACT	UK PACT will support a programme of activities which will provide low-carbon related technical assistance to a number of strategically important developing countries. Our goal is to improve the effectiveness of key institutions (public, private, civil society) in these countries so that they can deliver accelerated emission reductions. We will seek to do this in part by leveraging the skills and expertise developed in the UK over decades of experience with our own transition to a lower-carbon economy.
Global	Mitigation	2050 Calculator - GB-GOV-13-ICF-0028-2050C	Working directly with 10 developing country governments to help them build their own version of the UK's 2050 calculator. The calculator will also be developed to explore global scenarios, illustrating the impacts of these scenarios on climate change.
Global	Mitigation	Climate Ambition Support Alliance (CASA) GB-GOV-13-ICF-0034-CaBIN	The Climate Ambition Support Alliance (CASA) programme will work through secondary providers to provide training, in addition to technical, legal and logistical support for developing country negotiators, in order to build the capacity of the least developed and most climate vulnerable states to participate in the international negotiations process and be more effective in influencing its outcomes.
Global	Mitigation	Clean Energy Transition Programme (CETP) - GB-GOV-13-ICF-0006-CETP	The Clean Energy Transitions Programme (CETP) leverages the IEA's unique energy expertise across all fuels and technologies to accelerate global clean-energy transitions, particularly in major emerging economies. The Programme includes collaborative analytical work, technical cooperation, training and capacity building and strategic dialogues.
Asia	Mitigation	Clean Energy Fund Technical Assistance (CEF TA) Programme - GB-GOV-13-ICF-0002-CEFTA	This fund supports the development of renewable energy and energy efficiency projects in developing countries in the Asia-Pacific region, in order to contribute to the mitigation of climate change impacts in those countries by reducing their carbon emissions. The fund focuses specifically on technical assistance, which involves building the knowledge and skills base of the industries and governments in the supported countries, as well as undertaking feasibility studies of potential low carbon energy projects.
Global	Mitigation	Energy Sector Management Assistance Programme (ESMAP) - GB-GOV-13-ICF-0033-ESMAP	The World Bank's Energy Sector Management Assistance Programme (ESMAP) has developed an Energy Transitions programme that targets six Asian countries (China, India, Indonesia, the Philippines, Pakistan and Vietnam) where the most new, unabated coal-fired power generation is due to begin operation (from 2018 to 2020). ESMAP is influential in advising countries on the clean energy transition, with significant demand for its technical assistance.
Ethiopia	Adaptation	300363 Building Resilience in Ethiopia (BRE)	To build Ethiopia's resilience to climate and humanitarian shocks by seeking to support the Government of Ethiopia to lead an effective and accountable humanitarian response system. It will have four key strands: Providing technical assistance to the Government of Ethiopia to lead and deliver an effective and accountable humanitarian response, delivering food and cash to people in humanitarian need in the most effective way, respond to emergency humanitarian needs in the most effective way and monitoring, evaluation and learning to strengthen humanitarian delivery in Ethiopia. Geography over programme lifetime: Ethiopia
Asia	Adaptation	203842 Managing Climate Risks for Urban Poor	This programme will help cities plan for and invest in reducing the impacts of weather-related changes and extreme events, through a partnership with the Rockefeller foundation and the Asian Development Bank, on 2 million urban poor and vulnerable people in 25 medium-sized cities in 6 Asian countries (initially Pakistan, Bangladesh, India, Vietnam, Indonesia) by improving planning processes so that they consider climate change risks, for developing and funding new investment and infrastructure opportunities, and for knowledge and lesson sharing by 2018. Geography over programme lifetime: Asia Regional including Pakistan, Bangladesh, India, Vietnam, Indonesia
Malawi	Adaptation	300113 Building Resilience and adapting to climate change in Malawi	This programme aims to strengthen the resilience of poor households in Malawi to withstand current and projected weather and climate-related shocks and stresses. This will in turn halt the annual cycle of humanitarian crises that blights people's lives, harms poverty reduction efforts and swallows up resources. The UK will invest up to £70 million over five years (2018-2023) to provide direct benefits to 1.7 million poor and vulnerable people in Malawi (approximately 300,000 households). Geography over programme lifetime: Malawi

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Global	Mitigation and adaptation	202745 Investments in Forests and Sustainable Land Use	To support public-private partnerships that demonstrate how companies, communities, smallholders and governments can work collaboratively to reduce deforestation and benefit forest dependent communities. Geography over programme lifetime: Multiple countries including Dem. Rep. of Congo, Rep. of Congo, Cote d'Ivoire, Cameroon, Ethiopia, Gabon, Ghana, Indonesia, Kenya, Liberia, Mozambique, Tanzania, Sierra Leone, Central African Republic
Global	Adaptation	202571 Support to the Global Agriculture and Food Security Programme (GAFSP)	To improve agricultural productivity in developing countries and to increase farmers' access to markets whilst increasing the economic resilience of poor peopleglobally. Geography over programme lifetime: Multiple countries
Palestine/Israel	Mitigation and adaptation	300667 Supporting Economic Empowerment and Development in the Occupied Palestinian Territories (SEED OPTs)	This programme will focus FCDO economic development assistance in the areas of sustainable supply of water and electricity, access & movement and trade, and fiscal losses and customs. Programme activities will support institutional capacity building and infrastructure development, working closely with the Palestinian Authority and Government of Israel. The overarching goal is to support economic growth and job creation in the OPTs. Geography over programme lifetime : Occupied Palestinian Territories
Global	Adaptation	202921 Building Resilience and Adaptation to Climate Extremes and Disasters	To help up to 10 million people, especially women and children, in developing countries cope with extreme climate and weather events such as droughts, cyclones and floods (climate extremes). This will be achieved by doing three things. By making grants to civil society organisations to scale up proven technologies and practices in the Sahel, sub-Saharan Africa and South Asia that help people withstand, and more quickly recover, from climate extremes. By identifying the best ways of doing this, and share this knowledge globally to increase the programme's overall impact. By supporting national governments to strengthen their policies and actions to respond to climate extremes. These will all contribute to the Millennium Development Goals on the eradication poverty and hunger, and environmental sustainability, and also respond to the Humanitarian and Emergency Response Review recommendation that FCDO should integrate the threat from climate change into a Disaster Risk Reduction.
sub-Saharan Africa	Mitigation	204637 Africa Clean Energy Programme (ACE)	The programme will catalyse a market based approach for private sector delivery of solar home system (SHS) products and services. This will lead to improved energy access for people in sub-Saharan Africa currently who are currently without modern energy. The programme will support: 1) Technical assistance to improve the enabling environment for a market based approach for private sector delivery of solar home system (SHS) products and services (Policy and Regulatory Reform, investment readiness, learning and Coordination) 2) Finance for businesses wanting to enter new and emerging SHS markets in sub-Saharan Africa for their start up and early commercialisation of ideas 3) Test innovative approaches to stimulating private sector investment and a market development. Geography over programme lifetime: Africa Regional including Mozambique, Malawi, Zambia, Zimbabwe, Tanzania, Rwanda, Uganda, Kenya, Ethiopia, Somalia, Nigeria, Ghana, Sierra Leonne, Senegal
South Sudan	Adaptation	204019 Humanitarian Assistance and Resilience in South Sudan (HARISS) 2015 - 2021	To help approximately three million South Sudanese by providing critical life-saving support and helping people to better cope with shocks from conflict, drought and flooding. This programme aims to save the lives of an estimated two million people who will receive at least one form of humanitarian assistance; and build the capacity of an estimated one million people to recover and cope better with shocks. Over five years this programme will provide food, shelter and access to water and health services to millions of vulnerable people, including women and children. Geography over programme lifetime: South Sudan
Africa	Adaptation	204624 WISER - Weather and climate Information and SERvices for Africa	WISER will help at least 24 million people across Africa (focusing initially on East Africa) to be more resilient to natural disasters and climate change by 2030 by improving early warning systems (giving more time to prepare for heavy rains for example) as well as helping them make better decisions by knowing what the weather and climate is likely to be (enabling them to make better crop choices or alter planting times in farming, for example). We estimate that this will save over £190 million in terms of avoided damage to health,homes, livelihoods and infrastructure between now and 2030.The WISER programme will initially benefit the East African fishing and farming communities, as well as a wide range of African people, including young, old, men and boys and women and girls. Geography over programme lifetime: Africa Regional including Ethiopia, Kenya, Tanzania, Uganda, Rwanda, Burundi

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Uganda	Adaptation	204012 Northern Uganda: Transforming the Economy through Climate Smart Agribusiness (NU-TEC)	To increase the resilience to climate change of poor farmers in Northern Uganda, and to increase their incomes. This will be achieved by working with agricultural businesses to supply farmers with cheaper, better and more varied agricultural inputs and services, and to create stronger markets for farmer produce. This will benefit 250,000 households in Northern Uganda, who will adopt new practices, products and markets that will make them more resilient to climate change, while 150,000 households will see measurable increases to income. This will contribute to the MDGs (and their successor targets) by reducing poverty in Uganda. Geography over programme lifetime: Uganda
Africa	Adaptation	300230 Transboundary Water Management in Southern Africa	The project will support countries in Southern Africa to manage their shared water resources, thereby helping 2-3 million poor people to better cope with the impacts of existing climate variability and climate change (especially floods and drought). It will do this by improving assessment and planning concerning these resources, anddesigning and building water infrastructure such as irrigation schemes, water supply or hydropower schemes. This will help poor and vulnerable people gain access to clean and safe water, produce a predictable agricultural yield and store water for when it is needed during the dry months of the year. The programme will also help countries to communicate hydrological data between themselves – thus providing downstream countries with advance notice of floods and enabling countries to optimise how much water is stored in each country to ensure each has enough to meet their basic requirements. Geography over programme lifetime: Angola, Botswana, Dem. Rep of Congo, Tanzania, Swaziland, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe
Bangladesh	Adaptation	203491 Support to Bangladesh's National Urban Poverty Reduction Programme (NUPRP)	Improvement in the integration of poor communities into municipal planning, budgeting and management, with a particular focus on women and girls and climate resilience; piloting of options for scale up and lesson learning at national level to inform overall urban policy and poverty reduction. Geography over programme lifetime: Bangladesh
Zambia	Mitigation and adaptation	204842 Promoting Conservation Agriculture in Zambia	To raise agricultural productivity in Zambia, particularly small scale farmers, using climate smart agriculture techniques and facilitating commercial relationships with agriculture companies. Geography over programme lifetime: Zambia
Indonesia	Mitigation	204623 Forestry, Land-use and Governance in Indonesia	To reduce greenhouse gas emissions and deforestation in Indonesia as part of the UK's efforts to avoid catastrophic climate change that would hit the very poorest first and set back global efforts at poverty reduction. Geography over programme lifetime: Indonesia
Nepal	Adaptation	205138 Post-Earthquake Reconstruction in Nepal - Building Back Better	Establish partnerships with local & central government, communities and businesses to support the (I) districts effected by the Earthquake to "build back better" including leading to more resilient (including climate resilient) infrastructure and institutions; (ii) the most vulnerable recover their livelihoods and assets; and (iii) the Government of Nepal to plan for and manage the response to the earthquake. Geography over programme lifetime: Nepal
Kenya	Mitigation and adaptation	300137 Regional Economic Development for Investment and Trade (REDIT) Programme	The programme aims to increase sustainable and shared prosperity in Kenya by increasing Kenya's trade with the region and the rest of the world. Specifically, the programme will (I) invest in improving the efficiency and capacity of transport, logistics and trade infrastructure at Mombasa Port and key border points; (ii)invest in systems to improve trading standards, reduce non-tariff barriers and enhance transparency in trade processes; (iii) improve the regulatory and policy environment for trade; and (iv) support private sector advocacy for trade competitiveness, the export capacity of Kenyan businesses and the greater participation of women and small and growing businesses in trade. ICF component is supporting Kenya Ports Authority to develop and implement a Green Port Policy to help the port adapt and become resilient to climate change. Key objectives include introducing new climate friendly technologies into the port's operations. Geography over programme lifetime: Kenya
Kenya	Mitigation and adaptation	204437 Deepening Democracy Programme	To improve the Kenyan Government's accountability to its citizens by delivering peaceful, transparent, inclusive elections and providing support to non-governmental organisations, oversight bodies and independent commissions that can influence and deliver reforms thereby supporting the goal of making Kenya a more stable democracy. The project aims to improve county government planning, budgeting, human resource management, results, performance management and citizen engagement. In each of these areas, UK support will focus on governance, health, climate change and local economic development. Geography over programme lifetime: Kenya

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Africa	Mitigation and adaptation	203835 FCFA - Future Climate For Africa	The Future Climate for Africa programme supports world-leading science and technology to enhance understanding and prediction of sub-Saharan African climate and, through working closely with African stakeholders, bring this knowledge into use in informing major decisions, such as infrastructure investments, urban planning and national policy.The programme has three main objectives: firstly, to produce world-leading science to advance knowledge of African climate variability and change and enhance prediction of future African climate; secondly, to drive improved knowledge, methods and tools on how climate information and services can be better designed for, delivered and integrated into major decisions today and thirdly, to support international collaboration and the development of scientific capacity in Africa. Geography over programme lifetime: Multiple countries
Bangladesh	Adaptation	205268 Strengthening humanitarian preparedness and response in Bangladesh	This programme will deliver improvement in disaster preparedness and response for large-scale catastrophic emergencies (e.g. earthquakes and cyclones) and recurrent, predictable events such as flooding as well as providing predictable support to Rohingya refugees and vulnerable refugee hosting communities. Geography over programme lifetime: Bangladesh
India	Mitigation	204059 Supporting Structural Reform in the Indian Power Sector	In line with the UK government's aid policy and new development partnership with India, the 'Supporting Structural Reform in the Indian Power Sector' programme will improve the efficiency, reliability and sustainability of electricity supply in India through technical expertise, not through traditional grant support. It will provide world class expertise to support the market reforms and scale up of renewable energy supply that the Indian power sector needs to support growth and create jobs. It will work at the Central level and in up to three States which may include FCDO focus states such as Odisha, Andhra Pradesh and Madhya Pradesh. Geography over programme lifetime: India
Africa	Mitigation and adaptation	204956 CONGO - Improving Livelihoods and Land Use in Congo Basin Forests	To improve thelivelihoods of forest dependent communities and reduce deforestation in the Congo Basin by providing support to forest zoning, independent forest monitoring, civil society advocacy and the strengthening of legal frameworks for community forestry, as well as direct investments in community forest enterprises. The programme is expected to benefit 2.4million beneficiaries (direct and indirect). The programme will also have a demonstration effect, building a body of evidence on Community Forestry in the Congo Basin. Geography over programme lifetime: Cameroon, Rep. of Congo, Dem. Rep. of Congo, Central African Republic, Gabon
Tanzania	Adaptation	204656 Building Urban Resilience to Climate Change in Tanzania	To build urban resilience to current climate variability and future climate change in Tanzania's cities and towns through improved data and evidence, urban planning, and infrastructure provision for sustainable economic growth and development. Geography over programme lifetime: Tanzania
Kenya	Adaptation	204788 Kenya Devolution Support Programme	The Kenyan Constitution, adopted by referendum in 2010, introduced far reaching devolution to 47 newly-established counties. Hopes are high that devolution will improve accountability and service delivery and contribute to poverty reduction. The purpose of this programme is to build and improve public services for Kenyan citizens, particularly focusing at the county level where poverty exists and where public service delivery is poor. The programme will improve the ability of county governments to better plan, deliver and monitor the delivery of public services. This includes working with county governments to strengthen public financial management systems(e.g. improving accounting, audit and procurement systems) to ensure that public money is effectively spent and can be accounted for. It also includes a focus on critical services for example health and natural resource management (such as water scarcity due to climate change). The programme will help county governments to improve planning and allocation of budgets. Geography over programme lifetime: Kenya
Myanmar, Uganda, Zambia, Ethiopia	Mitigation	205222 Cities and Infrastructure for Growth (CIG)	The programme will provide technical support on city and regional interventions resulting in increased inclusive economic growth and job creation. The interventions will help city economies to become more productive, deliver access to reliable, affordable, renewable power for businesses and households, and strengthen investment into infrastructure services, including from the UK. Geography over programme lifetime: Myanmar, Uganda, Zambia, Ethiopia

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Ethiopia	Adaptation	300237 Strengthening Climate Resilient Systems for Water, Sanitation and Hygiene Services in Ethiopia (SCRS - WASH)	Improve access to climate-resilient water and improved sanitation services and good hygiene practices for 1.2m people in the prioritised drought-affected and drought-prone areas of Ethiopia. The proposed Strengthening Climate Resilient Systems for Water, Sanitation and Hygiene Services in Ethiopia (SCRS-WaSH) programme will contribute to the Government of Ethiopia's Climate Resilient WaSH provision to drought-prone areas. the programme aims to realise this through a combination of targeted Financial Aid and Technical Assistance support. The FA will focus primarily on improving climate-resilient WaSH facilities which ensure year-round access to resilient WaSH services at household, community and institution levels in the targeted intervention areas. This will be complemented with TA support that focuses on strengthening the WaSH delivery systems. Geography over programme lifetime: Ethiopia
Pakistan	Adaptation	300166 Khyber Pakhtunkhwa Merged Districts (KPMD) Support Programme	The programme will work on the Basic Heath, Education, Rule of law, Civilian Peace-Building, Conflict Prevention and Resolution, Public Sector Financial Management, Climate Change and Economic and Development Policy/Planning for the Tribal Districts of Khyber Pakhtunkhwa (previously called the Federally Administered Tribal Areas) in Pakistan. Geography over programme lifetime: Pakistan
Global	Adaptation	205231 Centre for Disaster Protection (CDP)	To protect poor and vulnerable people, save lives and help developing countries to get back on their feet more quickly after a disaster by working with governments to strengthen planning, embed early action, and use "risk financing" tools like insurance and contingent credit to finance more cost-effective, rapid and reliable response to emergencies. It aims to empower governments to build resilience to natural disasters and climate change, and take ownership of their risks, with more assistance delivered through pre-financed government-led systems. Funded by the UK Government Prosperity Fund. Geography over programme lifetime: Belize, Sierra Leone, Grenada, Jamaica, St Lucia, Pakistan, Indonesia, Philippines, Sri Lanka, Myanmar, Kenya, Nigeria, Ghana, Zambia, Mozambique, Malawi, Bangladesh, Montserrat, St Vincent & The Grenadines, Laos, Ethiopia, Somalia, Tajikistan, Nepal, Ivory Coast
Sudan	Adaptation	205115 Adapt Environmental and Climate Resilience in Sudan	To increase understanding and integration of climate resilience and environmental managementinto delivery, plans and policy in Sudan. Geography over programme lifetime: Sudan
Indonesia	Mitigation	205258 Green Economic Growth for Papua	The programme aims to promote green growth in Papua.It will contribute to the government of Papua's vision and spatial plan that intends to preserve 90 per cent forest cover in the province.In doing so the programme will support the provinces transition away from a high carbon business as usual growth trajectory onto a low carbon development pathway. The programme is designed to address the key barriers to private sector development in Papua that will enable firms to pursue low carbon business opportunities. It will work directly with firms, the financial sector, and the public sector to improve the commercial and environmental sustainability of small and medium sized enterprises.In addition, the programme will generate knowledge on how green growth can be implemented in Indonesia and globally. Geography over programme lifetime: Indonesia
Asia		203180 Climate Proofing Growth and Development in South Asia	Integrate climate change into development planning, budgeting and delivery in national and sub-national governments. This will done by strengthening planning, budgeting, delivery mechanisms, building awareness and capacity of stakeholders through technical and some implementation support. It will help to mobilise domestic and International finance. Sharing lessons and knowledge in South Asia is a key element of the project. Geography over programme lifetime: Afghanistan, India, Nepal, Pakistan
Nepal	Adaptation	300003 Strengthening disaster resilience in Nepal	This project will strengthen disaster resilience in Nepal by working with urban centres to build and plan more safely; supporting the strengthening of critical public infrastructure to earthquakes; working to strengthen national capacity to respond to crises and ensure that the international community is prepared; and ensuring that the UK is able to support a humanitarian response should a crisis hit. Geography over programme lifetime: Nepal
Afghanistan	Adaptation	203904 Multi-Year Humanitarian Support to Afghanistan	To provide support to the most vulnerable groups in Afghanistan to have access to timely, appropriate and cost-effective humanitarian aid, have fewer life-critical needs, build the capacity of communities to mitigate the risk of natural disasters, including climate risk mitigation, and to better respond to these events when they occur. Geography over programme lifetime: Afghanistan

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Nepal	Mitigation	203427 Accelerating Investment and Infrastructure in Nepal	To accelerate private investment and economic growth in Nepal by providing technical expertise to help Nepalese institutions develop major infrastructure (including renewable energy); improve the business climate for domestic and foreign investors; improve the implementation of economic policy and test new approaches for local economic development. This will result in at least £600 million of private investment into growth-boosting sectors and a reduction by at least 10% in time or cost for at least five regulatory processes perceived as burdensome by the private sector. Geography over programme lifetime: Nepal
Global	Mitigation and adaptation	204773 Applied Research on Energy and Growth	Assisting policy makers in Low Income Countries to make better decisions about when, and how, to prioritise investment in high cost energy infrastructure.Through improved research and evidence on how to maximise the economic benefits of large scale energy projects, and a better understanding of how to bring the benefits of modern energy services to poorer people in those countries. Geography over programme lifetime: Developing countries unspecified
Africa	Adaptation	300245 Regional Vulnerability Assessment and Analysis Programme	Supporting countries in the Southern Africa Development Community to measure vulnerability to climate change and use this to inform and strengthen emergency and development responses. Geography over programme lifetime: Angola, Botswana, Dem. Rep. of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe
Dominica	Adaptation	300686 Support for the Climate Resilience Execution Agency of Dominica	To provide support for the operation of the Climate Resilience Execution Agency of Dominica from 2019-2023in order to implement Dominica's climate resilience and recovery plan. The Climate Resilience Execution Agency of Dominica is expected to support delivery of key recovery and reconstruction projects, build capacity and transform systems in the public sector so that Dominica is able build back better post Hurricane Maria and quickly recover from future disasters. Geography over programme lifetime: Dominica
India	Mitigation and adaptation	300110 Smart Urban Development in Indian States (SmUDI)	Provide UK support on urban governance, planning, finance and city partnerships to deliver Government of India's urban development programmes in select UK-India partner cities. The support will bring the best expertise from the UK to help create economically vibrant, safe and climate resilient cities in India. Geography over programme lifetime: India
Indonesia	Mitigation	300424 Reducing Deforestation Through Improved Spatial Planning in Papua Provinces, Indonesia	The objective of the programme is to support Indonesia and the provinces of Papua and West Papua to improve spatial plan processes and implementation in order to prevent deforestation and reduce greenhouse gas emissions.Technical assistance will be provided to improve the revision and implementation of Papua and West Papua provincial spatial plans; to improve transparency and build constituency in spatial planning at provincial level; and to foster national policy dialogue and engagement to support Papua's commitment to protect its forest. Support will be focused largely on two provinces – Papua and West Papua – and relevant national ministries (particularly Ministry of Home Affairs and Ministry of Agrarian and Spatial Planning), which offer the potential to realise significant reductions in emissions through improved land use planning and economic development strategies which recognise the value of forests to the provincial economies. Geography over programme lifetime: Indonesia
Indonesia	Mitigation	300186 Economics of Low Carbon Development for Indonesia	To contribute to national debate on economic costs and benefits of unilateral and regional actions on mitigation and adaptation; to raise awareness about the urgency of climate change challenges and their potential socioeconomic impact on Indonesia, while informing other stakeholders (e.g., civil society, academia, media, nongovernment organizations, private sector, and aid agencies) of the same; and to indirectly support government and private sector actions in Indonesia to mitigate and adapt to climate change. Geography over programme lifetime: Indonesia
Africa	Adaptation	203469 African Risk Capacity (ARC)	To support a parametric (index-based) weather risk insurance pool that will provide participating African countries with predictable, quick-disbursing funds with which to implement pre-defined contingency response plans in the case of a drought. Geographic footprint over duration of programme: Gambia, Mauritania, Mali, Senegal, Burkina Faso, Kenya, Niger, Malawi

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Global	Adaptation	203506 CARIAA - Collaborative Adaptation Research Initiative in Africa and Asia	Research to identify what works and what doesn't in terms of cost-effective and sustainable ways to improve the resilience and capacity to adapt to climate change of the poorest and most vulnerable people and communities in three climate change 'hot spots' – semi-arid regions of Africa and Central and South Asia; low-lying heavily populated deltas of Africa and South Asia and; densely populated river basins dependent on snow-pack or glaciers. Geography over programme lifetime: Multiple countries
Tanzania	Mitigation and adaptation	204804 Accountability in Tanzania Programme - Phase II	To empower Tanzanian citizens and strengthen civil society by providing grants and capacity building support to selected civil society organisations, to increase the accountability and responsiveness of government and the resilience of citizens to climate change. This contributes towards the Millennium Development Goals by ensuring Tanzanians are increasingly able to exercise their rights as citizens. Geography over programme lifetime: Tanzania
Rwanda	Adaptation	204940 Improving Market Systems for Agriculture in Rwanda IMSAR	IMSAR will commercialise agriculture through improving the way agricultural market systems function. It will identify market failures and provide the necessary agricultural expertise and finance required to help address them. This will benefit the poor as producers,employees and consumers, and small and medium size business, resulting in increased sales among farmers and agro-enterprises, increase in the percentage of Rwandan agricultural produce that has value-added and an increase in export diversification. Given the strong link between income, income diversity, and the ability to adapt to the effects of climate change, IMSAR will help building poor households' resilience to current and future climate threats through improving access to input and output markets, increasing opportunities to diversify their production, and increasing non-farm income sources as an alternative to agriculture. This will help decreasing their sensitivity to climate change and improving their adaptive capacity. Geography over programme lifetime: Rwanda
Global	Adaptation	204250 Infrastructure and Cities for Economic Development (ICED)	To improve the enabling environment for sustainable, inclusive growth-enhancing infrastructure service delivery in focus countries; and, Harness the benefits of cities for sustainable economic growth and poverty reduction in focus countries. The ICED programme can help deliver low carbon growth and resilient economic growth which sustainably manage our natural resources. Geography over programme lifetime: Developing countries unspecified
Rwanda	Adaptation	204941 Sustainable Inclusive Livelihoods through Tea Production in Rwanda	The project supports job creation and increased incomes by working with smallholder farmers to develop greenfield tea. The Wood Foundation Africa (TWFA) will set up and run two Services Companies supporting approximately 12,000 smallholder tea farmers over 7,500 hectares. Farmers will be supported to produce tea for the first time, employing best farming practices, including understanding and managing climate risk and variability. The Services Company will be co-owned by the farmers. This will lead to improved incomes and livelihoods (in particular nutrition and education) for the farmers and their families. Unilever and Luxmi will build a factory which will heavily rely on the tea supplied by the smallholder farmers with support from The Wood Foundation Africa. Geography over programme lifetime: Rwanda
India	Mitigation and adaptation	300109 Technical Assistance for Smart Cities (TASC)	To enhance the potential of Indian cities in poorer and developing states such as Madhya Pradesh, Bihar, Andhra Pradesh, Odisha, Maharashtra to promote growth and jobs creation. UK support will achieve this by developingpartnerships with UK urban planning, research and business organisations to help India cities develop investment plans, attract finance and deliver smart urban solutions that create jobs for the urban poor. Activities including climate resilient infrastructure, climate and disaster risk insurance, renewable energy and water management. Geography over programme lifetime: India
Global	Adaptation	202817 Adaptation for Smallholder Agricultural Programme (ASAP)	To provide knowledge and best practices to help over 6 million smallholder farmers in up to 43 countries adapt to climate change. Grants will be made to: build small scale water-harvesting, water storage and irrigation systems for farmers; provide farmers with improved seeds that are drought tolerant; help farmers access markets to sell their crops; to plant trees on farms and introduce soil and water conservation practices; and, enable farmers to access daily and seasonal weather forecasts (e.g. using text messages) so they know when best to plant and harvest crops." Geography over programme lifetime: Multiple countries

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Rwanda	Adaptation	203927 Rwanda Multi-Donor Civil Society Support Programme (2015-2021)	Strengthened civil society engagement on critical social cohesion, reconciliation and governance issues in Rwanda, prioritising four policy areas: (I) access to services amongst people with disabilities; (ii) sustainable agriculture; (iii) coordination of responses to gender-based violence (GBV); and (iv) promoting reconciliation in relation to the 1994 Genocide.UK will provide funding and technical support to Rwandan civil society organisations to support the design and implementation of governance and reconciliation focused initiatives, and to support more effective engagement (influencing) with government on these issues. Geography over programme lifetime: Rwanda
India	Adaptation	204135 Bihar Agriculture Growth and Reform Initiative (BAGRI)	To significantly improve the performance of the agriculture sector in Bihar by improving access to markets for identified agriculture and horticulture products, access to finance, knowledge and technology, and institutional capacity for market regulation and support farmers in building resilience to the impacts of climate change such as drought and flooding. This will reflect higher private sector investment, higher production and higher price realisation by 1,00,000 farmers. Geography over programme lifetime: India
Rwanda	Mitigation and adaptation	204456 Programme of Support to Agriculture in Rwanda	To sustainably increase the agricultural productivity of poor farmers by transforming Rwandan agriculture from a subsistence-based to a more commercial-based sector that accelerates agricultural growth. This will help address challenges that may limit agriculture productivity, reduce the rate at which poverty is falling, increase inequality and hamper improvements in food security and malnutrition. The programme will build resilience to climate variability and improve sustainable management of agricultural land by increasing soil erosion control, small scale irrigation and strengthening sustainability and resilience strategies. The programme will result in increased agricultural productivity, food security and incomes of poor households and contributes towards the MDG's by helping to eradicate extreme poverty and hunger and; promoting gender equality and empowering women. Geography over programme lifetime: Rwanda
Bangladesh	Adaptation	204468 Strengthening Economic Systems in Bangladesh	To increase the dialogue on economic reforms, and support the Government of Bangladesh to make more pro-poor economic policies, including building evidence on the macro-economic impact of climate change and the economic impact of climate-induced migration. Geography over programme lifetime: Bangladesh
Caribbean	Adaptation	300674 Building the capacity of the Caribbean Disaster Emergency Management Agency (CDEMA)	To provide operational support to the CDEMA coordinating unit and national disaster offices for strengthening procurement, contract and logistics management during emergencies. Geography over programme lifetime: Caribbean
Global	Mitigation and adaptation	205142 The India-UK Global Partnership Programme on Development	Strengthened UK-India global development partnership that will facilitate the sharing of development experience, expertise and policy positions including scaling up solar power and the improving the resilience of infrastructure systems to climate and disaster risks. Geography over programme lifetime: developing countries unspecified
Tanzania	Mitigation	204365 Improving Energy Access in Tanzania through Green Mini-Grids	To improve access to clean, safe and reliable energy for Tanzanians, particularly the rural poor. This includes support for green mini-grids and technical assistance for energy access companies and project developers. Geography over programme lifetime: Tanzania
China	Adaptation	(MO_CHN_478 & 476) Assess model simulations of European and Chinese regional climate	Collaborative climate science research programme between Chinese and UK to develop an enhanced understanding of underpinning climate dynamics and use of this to critically examine the performance of China and UK climate models and predictions.These models underpin climate services needed to support economic development and welfare.
China	Adaptation	(MO_CHN_484) Accelerated improvements to climate models through collaborative climate science research between China and UK researchers.	Grants to develop methods to derive robust information on uncertainties in future climate variability and change in East Asia during the 21st century to help inform decision making and impacts analysis.
China	Adaptation	(MO_CHN_488 & 485) Integration of all activities across Climate Science for Service Partnership-China	China and UK collaborative development of translational science - a multi-disciplinary approach to bridge the gap between climate science and society to produce useable knowledge and applications. Development of case studies to demonstrate the value of climate science for services by translating climate information into beneficial decisions.

Recipient country/region	*Targeted area*	*Programme or project title*	*Description of programme or project*
Asia	Adaptation	(MO_CHN_479 & 481) Increase the understanding of East Asian climate variability and assessment of its predictability for improving climate prediction skills over East Asia on seasonal to decadal timescales.	Climate change research focused on impacts on regional water cycle and climate extremes within East Asia.Collaboration between scientists in UK and China to strengthen research capacity and increase understanding of drivers of regional drought and flooding, thus contributing to developing the capability of early warning methodology.
Brazil	Mitigation and adaptation	(MO_BRA_512) Climate Science for Service Partnership (CSSP - Brazil)	Collaborative climate science research programme between Brazilian and UK to improve understanding of recent climate changes and Brazil's role in mitigation activities to inform international negotiations; to enhance projections of future weather and climate extremes and impacts to inform decision making and contribute to disaster risk reduction in Brazil.
Brazil	Mitigation and adaptation	(MO_BRA_491) Climate Science for Service Partnership (CSSP - Brazil)	To strengthen the climate science and research relationship between Brazil and the UK.To work in partnership with Brazilian research institutes with the aim of improving climate and carbon cycle modelling to help inform future policy and climate service.
Guatemala	Mitigation	(UKSA_GT_UKSA-045) Astrostat Forest Management and Protection (FMAP) System	The key aims of this project are to provide Guatemala with a centralised Forestry Management support tool that allows them to; monitor changes in the forestry canopy to look for deforestation or logging activities, identify illegal logging sites to facilitate intervention and prosecution provide information for evidence in legal proceedings. This will support Guatemala in their abilities to manage forests through knowledge exchange, capacity building and training. It will also establish a certified product for sustainable forestry management in the Central American region enabling wider roll out of the system to neighbouring countries.
Indonesia	Mitigation	(NF_STFC_IDN_142) Train Indonesian scientists on the design & analysis of experiments to explore novel catalytic processes of biofuel production from palm oil waste	Training activities for studying novel catalytic processes of biofuel production. This will help Indonesian scientists to use UK facility to design, run and analyse experiments to turn palm oil waste into biofuels.
Global	Mitigation	UK Blue Carbon Fund	The Fund will promote the sustainable management, conservation and restoration of mangrove habitats by developing and embedding operational blue carbon markets across the Caribbean and Latin America that provide local communities with a sustainable income and assist in moving low-income countries towards low-emission, climate-resilient development. Includes capacity building. https://devtracker.fcdo.gov.uk/projects/GB-GOV-7-ICF-PO008-UKBLUECARBONFUND

Table 10(i)

Description of selected projects or programmes that promote practicable steps to facilitate and/or finance the transfer of, or access to, environmentally sound technologies

The UK publishes details of it's climate finance programmes on https://devtracker.fcdo.gov.uk/

Project/programme title

Transforming Energy Access (TEA)

Purpose

Accelerate innovation and scale-up of clean energy technologies and business models, contributing to an inclusive clean energy transition in developing countries

Recipient country:	*Sector:*	*Total funding:*	*Years in operation:*
Global	Energy Innovation	£225m (over 10 years, 2016-2026)	6 years (2016-2022)

Description:

Transforming Energy Access is the flagship FCDO research and innovation programme, supporting early-stage testing and scale-up of innovative technologies and business models that accelerate access to affordable, clean energy for poor households, enterprises, and social institutions in developing countries in Sub-Saharan Africa, South Asia, and the Indo-Pacific region. This includes energy generation technologies, as well as efficient appliances, smart energy systems, and energy storage.

Between 2016/17 and 2021/22, the programme has already improved clean energy access for 16 million people in developing countries; leveraged £890 million of additional investment into clean energy technology research, innovation and scale-up from both private and public sources; created 96,000 sustainable long-term jobs; stimulated UK-led research and development of nearly 500 new clean energy technologies and business models; supported 1,100 African graduates and trainees with placements in clean energy access businesses; and led to the avoidance of 1.3 million tonnes of carbon dioxide emissions (equivalent to the annual carbon footprint of an estimated quarter of a million people in the UK).

Factors that led to project/programme's success:

Experienced and knowledgeable Tier 1 implementing partners with well defined mandates and roles within the programme

Strong network of like-minded public and philanthropic co-funders leveraging up TEA funds and also results

Large and diverse downstream network of innovators, entrepreneurs, researchers and non-profits, including local organisations with knowledge of the local context

Clear theory of change for the programme, aligning with key UK and global climate and development objectives, iterated for phase 2 based on phase 1 learnings.

Line of sight to commercial viability, and strong market interest in broader energy transition technologies, leading to substantial private sector investment leverage

Clear and well-structured management and reporting systems managing flow of funds down, and results and learnings up, through delivery Tiers.

Technology transferred:

Wide range of individual and integrated technologies supported across the clean energy access sector, both on and off-grid, clean energy supply, efficient appliances and smart delivery systems including energy storage, smart grid etc.

Impact on greenhouse gas emissions/removals:

The UK publishes annual fund level results including on greenhouse gas emission reductions at https://www.gov.uk/government/publications/uk-climate-finance-results-2021.

Table 10(ii)

Description of selected projects or programmes that promote practicable steps to facilitate and/or finance the transfer of, or access to, environmentally sound technologies

The UK publishes details of it's climate finance programmes on https://devtracker.fcdo.gov.uk/

Project/programme title

Creating Resilient Sustainable Microgrids through Hybrid Renewable Energy Systems (GCRF)

Purpose

This project was funded under EPSRC's GCRF Resilient and sustainable energy networks for developing countries call. The project goal is to enable the development of sustainable and resilient energy distribution grids in rural communities of the low- and middle-income countries Tanzania, Uganda and Republic of the Congo, where currently at most 10% of the rural population has access to electricity. This will be achieved by designing a scalable low-cost microgrid infrastructure based on a novel planning methodology that incorporates real-time operational strategies and sustainable generation flexibility at the system design stage to reduce the investment requirements and increase sustainability.

Recipient country:	*Sector:*	*Total funding:*	*Years in operation:*
Congo, Indonesia, Tanzania and Uganda	Energy research	Project budget is £1,259,750	2018-2022

Description:

This project focuses on energy distribution in off-grid communities with a population of around 4000 inhabitants, a size that has been recommended by our African project partners as being the practical optimum for implementation. The research has an integrated approach to ensure that the design of the system is maintainable, has good longevity with low cost, meets diverse community energy needs and is resilient to natural hazards. A sustainable electricity network can be created by using different types of renewable energy sources (RES) (e.g., wind energy, solar energy, tidal energy). However, the optimal design for a sustainable electricity network is a function of different inputs, such as weather conditions, which significantly affect RES power generation at various locations. In this research project, the open-source Python-based Energy Planning (PyEPLAN) tool, which is developed at University of Leeds, is used to obtain the optimal topology for a sustainable electricity network for the partner country case studies.

Factors that led to project/programme's success:

Technology transferred:

The micro-grid design tool, PyePlan, has been developed to be an open access resource available to anyone with an interest in designing a micro-grid. It integrates outputs from all three work packages in the project: electrical engineering, generation and socio-economic. The project team is the process of creating a user-friendly web interface with instruction manuals and tutorials.

Impact on greenhouse gas emissions/removals:

The UK publishes annual fund level results including on greenhouse gas emission reductions at https://www.gov.uk/government/publications/uk-climate-finance-results-2021

Annex 4: UK GHG Inventory tables

Summary Table for National Greenhouse Gas Inventories – 1990
(Summary1.As1 to Summary1.As3 from CRF tables)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		Net CO_2 emissions/ removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs [1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
		(kt)			(kt CO_2 equivalent)			(kt)					
Total national emissions and removals		608,632.73	5,382.72	166.94	14,400.73	1,648.64	NO,NE	0.05	0.00	2,923.28	7,622.07	2,786.71	3,586.95
1. Energy		556,856.29	1,496.20	12.40						2,827.10	6,748.47	1,715.16	3,492.00
A. Fuel combustion	Reference approach[2]	546,361.55											
	Sectoral approach[2]	550,069.21	129.44	12.25						2,822.93	6,692.43	1,061.80	3,470.84
1. Energy industries		238,058.47	9.33	4.82						819.95	140.85	9.66	2,686.40
2. Manufacturing industries and construction		77,047.10	4.59	1.06						367.10	394.45	29.26	401.76
3. Transport		119,750.59	50.68	4.84						1,345.59	5,051.02	928.16	156.36
4. Other sectors		109,919.62	64.70	1.34						251.33	1,094.48	92.60	215.23
5. Other		5,293.44	0.14	0.19						38.96	11.63	2.11	11.09
B. Fugitive emissions from fuels		6,787.08	1,366.76	0.15						4.17	56.03	653.37	21.16
1. Solid fuels		1,698.56	873.07	0.00						0.53	39.06	223.62	20.68
2. Oil and natural gas and other emissions from energy production		5,088.52	493.68	0.15						3.64	16.97	429.75	0.49
C. CO_2 Transport and storage		NO											

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/ removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs [1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)			(kt)					
2. Industrial processes and product use	43,090.96	11.68	81.93	14,400.73	1,648.64	NO,NE	0.05	0.00	44.18	625.82	933.58	87.17
A. Mineral industry	10,133.32								NO	5.30	4.74	14.10
B. Chemical industry	6,975.59	8.87	79.86	14,386.73	17.55	NO	NO	NO	18.36	90.25	164.69	40.12
C. Metal industry	25,429.25	1.57	0.07	NO	1,553.11		0.02		24.28	516.92	4.45	28.41
D. Non-energy products from fuels and solvent use	552.81	NO,IE	NO,NE,IE						NO,IE	NO,IE	669.89	1.87
E. Electronic industry				5.55	NO,NE,IE	NO,NE	NO,NE,IE	0.00				
F. Product uses as substitutes for ODS				8.45	NO							
G. Other product manufacture and use	NE	NO	2.00		77.98		0.04		0.20	6.00	0.53	NO
H. Other[3]	IE,NE,NO	1.24	NO						1.34	7.35	89.29	2.67
3. Agriculture	1,344.46	1,171.99	61.15						44.39	191.24	118.95	NO
A. Enteric fermentation		987.32										
B. Manure management		166.35	11.52								72.49	
C. Rice cultivation		NO									NO	
D. Agricultural soils		NE	48.83						35.94	NE	42.83	
E. Prescribed burning of savannas		NO	NO						NO	NO	NO	
F. Field burning of agricultural residues		7.46	0.19						6.44	190.77	3.63	
G. Liming	1,014.03											
H. Urea application	326.88											
I. Other carbon-contining fertilizers	NO											
J. Other	3.55	10.85	0.60						2.01	0.47	0.01	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/ removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs [1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)					(kt)			
4. Land use, land-use change and forestry [4]	5,980.65	189.73	8.25						0.85	18.72	NO	NO
A. Forest land [4]	-13,992.50	3.50	2.53						0.09	3.47	NO	
B. Cropland [4]	15,947.46	11.68	2.47						0.00	0.13	NO	
C. Grassland [4]	114.65	95.43	0.09						0.66	11.78	NO	
D. Wetlands [4]	571.12	78.47	0.07						NO	NO	NO	
E. Settlements [4]	5,427.63	0.15	1.48						0.09	3.33	NO	
F. Other land [4]	NO	NO	NO						NO	NO	NO	
G. Harvested wood products [4]	-2,087.72											
H. Other [4]	NO,IE	0.51	0.59						NO	NO	NO	NO
5. Waste	1,360.37	2,513.13	3.21						6.76	37.83	19.01	7.78
A. Solid waste disposal [5]	NO,NE	2,415.58							NO,NE	NO,NE	8.97	
B. Biological treatment of solid waste [5]		0.73	0.04						NE	NE	NE	
C. Incineration and open burning of waste [5]	1,360.37	5.45	0.17						6.76	37.83	9.68	7.78
D. Wastewater treatment and discharge [5]		91.37	3.00						NO,NE	NO,NE	0.35	
E. Other [5]	NO	NO	NO						NO	NO	NO	NO
6. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo items:[6]												
International bunkers	24,271.88	0.44	0.91						286.88	28.68	13.15	143.20
Aviation	15,390.62	0.31	0.49						68.55	19.98	6.48	2.94
Navigation	8,881.27	0.13	0.42						218.33	8.70	6.67	140.26
Multilateral operations	NE	NE	NE						NE	NE	NE	NE
CO_2 emissions from biomass	3,849.14											
CO_2 captured	NO											
Long-term storage of C in waste disposal sites	NE											

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/ removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs [1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)			(kt)					
Indirect N_2O			14.11									
Indirect CO_2	NO,NE											

(1) The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs and other fluorinated gases are expressed as carbon dioxide (CO_2) equivalent emissions.

(2) For verification purposes, Parties to the UNFCCC are requested to report the results of their calculations using the Reference approach. For estimating national total emissions, the results from the Sectoral approach should be used.

(3) 2.H. Other includes pulp and paper and the food and beverages industry.

(4) For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(5) CO_2 from categories solid waste disposal on land and waste incineration are only included if it stems from non-biogenic or inorganic waste streams. Only emissions from waste incineration without energy recovery are to be reported in the waste sector, whereas emissions from incineration with energy recovery are to be reported in the energy sector.

(6) Parties to the UNFCCC are asked to report emissions from international aviation and international navigation and multilateral operations, as well as CO_2 emissions from biomass and CO_2 captured, under Memo Items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO_2 emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO_2 emissions are accounted for as a loss of biomass stocks in the Land Use, Land-use Change and Forestry sector.

Summary Table for National Greenhouse Gas Inventories – 2020 (Summary1.As1 to Summary1.As3 from CRF tables)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/ removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)					(kt)			
Total national emissions and removals	324,026.26	2,065.49	70.75	12,208.81	159.79	NO	0.02	0.00	712.37	1,308.98	787.16	138.48
1. Energy	304,262.12	235.56	7.23						666.88	1,015.13	189.66	120.45
A. Fuel combustion Reference approach[2]	299,720.18											
Sectoral approach[2]	300,819.52	48.22	7.12						664.47	999.02	83.64	111.18
1. Energy industries	76,089.41	15.28	2.35						144.89	71.93	3.03	32.72
2. Manufacturing industries and construction	38,946.24	5.37	0.84						133.26	342.76	18.21	26.96
3. Transport	96,405.28	3.07	3.26						288.50	197.08	31.58	6.13
4. Other sectors	87,974.70	24.46	0.62						86.78	384.20	30.26	44.36
5. Other	1,403.89	0.04	0.05						11.02	3.06	0.55	1.00
B. Fugitive emissions from fuels	3,442.60	187.34	0.10						2.41	16.11	106.02	9.27
1. Solid fuels	197.11	18.99	0.00						0.08	7.61	1.04	9.01
2. Oil and natural gas and other emissions from energy production	3,245.49	168.35	0.10						2.33	8.50	104.98	0.26
C. CO_2 Transport and storage	NO											
2. Industrial processes and product use	21,225.07	3.23	2.72	12,208.81	159.79	NO	0.02	0.00	14.34	215.47	456.59	17.50
A. Mineral industry	5,659.21								NO	0.78	0.73	3.16
B. Chemical industry	4,513.43	2.69	0.17	NO	76.13	NO	NO	NO	4.60	29.83	12.80	0.73
C. Metal industry	10,672.94	0.44	0.02	1.48	4.28		0.00		8.49	176.44	1.77	10.14
D. Non-energy products from fuels and solvent use	379.49	NO,IE	NO,NE,IE						NO,IE	NO,IE	323.57	1.08
E. Electronic industry				24.42	NO,NE,IE	NO	NO,IE	0.00				
F. Product uses as substitutes for ODS				12,182.92	NO							
G. Other product manufacture and use	NE	NO	2.53		79.38		0.02		0.06	1.85	0.16	NO
H. Other[3]	NO,NE,IE	0.10	NO						1.19	6.57	117.57	2.39

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/ removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)					(kt)			
3. Agriculture	1,184.56	997.71	48.91						27.43	NO,NE,NA	131.84	NO
A. Enteric fermentation		837.50										
B. Manure management		152.48	9.44								76.20	
C. Rice cultivation		NO									NO	
D. Agricultural soils		NE	39.09						25.70	NE	55.64	
E. Prescribed burning of savannas		NO	NO						NO	NO	NO	
F. Field burning of agricultural residues		NO	NO						NO	NO	NO	
G. Liming	947.83											
H. Urea application	233.59											
I. Other carbon-contining fertilizers	NO											
J. Other	3.14	7.73	0.38						1.73	NO,NE,NA	NO,NE,NA	NO
4. Land use, land-use change and forestry [4]	-2,894.43	195.09	5.99						1.72	52.70	NO	NO
A. Forest land [4]	-17,933.72	4.13	2.39						0.33	11.92	NO	
B. Cropland [4]	14,403.93	11.17	1.34						0.00	0.05	NO	
C. Grassland [4]	-1,873.95	96.84	0.11						0.80	20.09	NO	
D. Wetlands [4]	605.99	81.74	0.08						0.18	6.28	NO	
E. Settlements [4]	4,032.04	0.63	0.98						0.40	14.36	NO	
F. Other land [4]	NO	NO	NO						NO	NO	NO	
G. Harvested wood products	-2,128.72											
H. Other [4]	NO,IE	0.58	0.51						NO	NO	NO	NO
5. Waste	248.95	633.90	5.90						2.00	25.67	9.07	0.53
A. Solid waste disposal [5]	NO,NE	516.49							NO,NE	NO,NE	2.07	
B. Biological treatment of solid waste [5]		48.67	2.40						NE	NE	NE	
C. Incineration and open burning of waste [5]	248.95	0.30	0.09						2.00	25.67	6.55	0.53
D. Wastewater treatment and discharge [5]		68.45	3.41						NO,NE	NO,NE	0.45	
E. Other [5]	NO	NO	NO						NO	NO	NO	NO

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/ removals	CH_4	N_2O	HFCs[1]	PFCs[1]	Unspecified mix of HFCs and PFCs[1]	SF_6	NF_3	NO_x	CO	NMVOC	SO_2
	(kt)			(kt CO_2 equivalent)			(kt)					
6. Other *(please specify)*	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo items:[6]												
International bunkers	22,817.39	0.17	0.85						268.27	17.40	7.25	25.93
Aviation	14,340.69	0.05	0.46						77.07	9.11	1.24	7.28
Navigation	8,476.70	0.12	0.39						191.20	8.28	6.01	18.66
Multilateral operations	NE	NE	NE						NE	NE	NE	NE
CO_2 emissions from biomass	47,197.54											
CO^2 captured	NO											
Long-term storage of C in waste disposal sites	NE											
Indirect N_2O			3.70									
Indirect CO_2	NO,NE											

(1) The emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), unspecified mix of HFCs and PFCs and other fluorinated gases are expressed as carbon dioxide (CO_2) equivalent emissions.

(2) For verification purposes, Parties to the UNFCCC are requested to report the results of their calculations using the Reference approach. For estimating national total emissions, the results from the Sectoral approach should be used.

(3) 2.H. Other includes pulp and paper and the food and beverages industry.

(4) For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

(5) CO_2 from categories solid waste disposal on land and waste incineration are only included if it stems from non-biogenic or inorganic waste streams. Only emissions from waste incineration without energy recovery are to be reported in the waste sector, whereas emissions from incineration with energy recovery are to be reported in the energy sector.

(6) Parties to the UNFCCC are asked to report emissions from international aviation and international navigation and multilateral operations, as well as CO_2 emissions from biomass and CO_2 captured, under Memo Items. These emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO_2 emissions are not included in the national total as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO_2 emissions are accounted for as a loss of biomass stocks in the Land Use, Land-use Change and Forestry sector.

Summary Report for CO_2 equivalent – 1990 (Summary2 from CRF tables)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions) [(1)]	608,632.73	134,568.06	49,746.71	14,400.73	1,648.64	1,200.60	NO,NE	0.12	810,197.59
1. Energy	556,856.29	37,404.96	3,695.15						597,956.40
A. Fuel combustion (sectoral approach)	550,069.21	3,235.99	3,650.37						556,955.57
1. Energy industries	238,058.47	233.19	1,436.84						239,728.50
2. Manufacturing industries and construction	77,047.10	114.73	315.38						77,477.21
3. Transport	119,750.59	1,267.03	1,442.35						122,459.97
4. Other sectors	109,919.62	1,617.48	399.67						111,936.78
5. Other	5,293.44	3.56	56.12						5,353.12
B. Fugitive emissions from fuels	6,787.08	34,168.97	44.78						41,000.83
1. Solid fuels	1,698.56	21,826.86	0.09						23,525.51
2. Oil and natural gas	5,088.52	12,342.11	44.69						17,475.32
C. CO_2 transport and storage	NO								NO
2. Industrial processes and product use	43,090.96	291.95	24,414.03	14,400.73	1,648.64	1,200.60	NO,NE	0.12	85,047.03
A. Mineral industry	10,133.32								10,133.32
B. Chemical industry	6,975.59	221.63	23,797.38	14,386.73	17.55	NO	NO	NO	45,398.88
C. Metal industry	25,429.25	39.22	20.73	NO	1,553.11	387.17			27,429.48
D. Non-energy products from fuels and solvent use	552.81	NO,IE	NO,NE,IE						552.81
E. Electronic Industry				5.55	NO,NE,IE	NO,NE,IE	NO,NE	0.12	5.67
F. Product uses as ODS substitutes				8.45	NO				8.45
G. Other product manufacture and use	NE	NO	595.92		77.98	813.43			1,487.33
H. Other	IE,NE,NO	31.11	NO						31.11

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
3. Agriculture	1,344.46	29,299.66	18,222.59						48,866.71
A. Enteric fermentation		24,683.01							24,683.01
B. Manure management		4,158.78	3,433.79						7,592.57
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	14,552.30						14,552.30
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		186.57	57.66						244.23
G. Liming	1,014.03								1,014.03
H. Urea application	326.88								326.88
I. Other carbon-containing fertilizers	NO								NO
J. Other	3.55	271.30	178.84						453.68
4. Land use, land-use change and forestry [1]	5,980.65	4,743.36	2,457.81						13,181.82
A. Forest land	-13,992.50	87.54	752.90						-13,152.05
B. Cropland	15,947.46	291.94	734.60						16,974.00
C. Grassland	114.65	2,385.87	25.82						2,526.34
D. Wetlands	571.12	1,961.70	21.29						2,554.12
E. Settlements	5,427.63	3.66	440.67						5,871.96
F. Other land	NO	NO	NO						NO
G. Harvested wood products	-2,087.72								-2,087.72
H. Other	NO,IE	12.65	177.05						189.69

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
5. Waste	1,360.37	62,828.14	957.12						65,145.63
A. Solid waste disposal	NO,NE	60,389.54							60,389.54
B. Biological treatment of solid waste		18.13	12.97						31.10
C. Incineration and open burning of waste	1,360.37	136.32	50.93						1,547.61
D. Waste water treatment and discharge		2,284.15	893.23						3,177.38
E. Other	NO	NO	NO						NO
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo items:[2]									
International bunkers	24,271.88	11.07	270.70						24,553.65
Aviation	15,390.62	7.75	145.62						15,543.98
Navigation	8,881.27	3.32	125.08						9,009.67
Multilateral operations	NE	NE	NE						NE
CO_2 emissions from biomass	3,849.14								3,849.14
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	NE								NE
Indirect N_2O			4,206.08						
Indirect CO_2	NO,NE								
Total CO_2 equivalent emissions without land use, land-use change and forestry									797,015.77
Total CO_2 equivalent emissions with land use, land-use change and forestry									810,197.59
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA

[1] For carbon dioxide ($CO^{2)}$ from land use, land-use change and forestry net emissions/removals are reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 6 to table 'Summary Table for National Greenhouse Gas Inventories – 1990'.

Summary Report for CO_2 equivalent – 2020 (Summary2 from CRF tables)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions) [1]	324,026.26	51,637.16	21,084.28	12,208.81	159.79	406.94	NO	0.36	409,523.61
1. Energy	304,262.12	5,888.92	2,153.93						312,304.97
A. Fuel combustion (sectoral approach)	300,819.52	1,205.46	2,123.02						304,148.00
1. Energy industries	76,089.41	382.05	701.08						77,172.54
2. Manufacturing industries and construction	38,946.24	134.17	250.62						39,331.03
3. Transport	96,405.28	76.72	971.46						97,453.45
4. Other sectors	87,974.70	611.59	185.06						88,771.36
5. Other	1,403.89	0.93	14.79						1,419.61
B. Fugitive emissions from fuels	3,442.60	4,683.46	30.91						8,156.97
1. Solid fuels	197.11	474.70	0.02						671.83
2. Oil and natural gas	3,245.49	4,208.76	30.89						7,485.14
C. CO_2 transport and storage	NO								NO
2. Industrial processes and product use	21,225.07	80.76	810.85	12,208.81	159.79	406.94	NO	0.36	34,892.59
A. Mineral industry	5,659.21								5,659.21
B. Chemical industry	4,513.43	67.21	51.08	NO	76.13	NO	NO	NO	4,707.85
C. Metal industry	10,672.94	10.93	7.12	1.48	4.28	27.44			10,724.19
D. Non-energy products from fuels and solvent use	379.49	NO,IE	NO,NE,IE						379.49
E. Electronic Industry				24.42	NO,NE,IE	NO,IE	NO	0.36	24.78
F. Product uses as ODS substitutes				12,182.92	NO				12,182.92
G. Other product manufacture and use	NE	NO	752.65		79.38	379.50			1,211.53
H. Other	NO,NE,IE	2.62	NO						2.62

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
3. Agriculture	1,184.56	24,942.83	14,575.36						40,702.74
A. Enteric fermentation		20,937.60							20,937.60
B. Manure management		3,812.01	2,813.54						6,625.55
C. Rice cultivation		NO							NO
D. Agricultural soils		NE	11,648.42						11,648.42
E. Prescribed burning of savannas		NO	NO						NO
F. Field burning of agricultural residues		NO	NO						NO
G. Liming	947.83								947.83
H. Urea application	233.59								233.59
I. Other carbon-containing fertilizers	NO								NO
J. Other	3.14	193.22	113.40						309.75
4. Land use, land-use change and forestry [1]	-2,894.43	4,877.17	1,785.99						3,768.72
A. Forest land	-17,933.72	103.13	712.25						-17,118.34
B. Cropland	14,403.93	279.33	398.47						15,081.74
C. Grassland	-1,873.95	2,420.90	33.88						580.83
D. Wetlands	605.99	2,043.62	24.81						2,674.42
E. Settlements	4,032.04	15.77	293.43						4,341.24
F. Other land	NO	NO	NO						NO
G. Harvested wood products	-2,128.72								-2,128.72
H. Other	NO,IE	14.42	151.37						165.79

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
5. Waste	248.95	15,847.49	1,758.15						17,854.58
A. Solid waste disposal	NO,NE	12,912.14							12,912.14
B. Biological treatment of solid waste		1,216.79	715.01						1,931.80
C. Incineration and open burning of waste	248.95	7.39	26.37						282.71
D. Waste water treatment and discharge		1,711.17	1,016.77						2,727.94
E. Other	NO	NO	NO						NO
6. Other *(as specified in summary 1.A)*	NO	NO	NO	NO	NO	NO	NO	NO	NO
Memo items:[2]									
International bunkers	22,817.39	4.16	252.55						23,074.09
Aviation	14,340.69	1.17	135.68						14,477.54
Navigation	8,476.70	2.99	116.87						8,596.55
Multilateral operations	NE	NE	NE						NE
CO_2 emissions from biomass	47,197.54								47,197.54
CO_2 captured	NO								NO
Long-term storage of C in waste disposal sites	NE								NE
Indirect N_2O			1,102.18						
Indirect CO_2	NO,NE								
Total CO_2 equivalent emissions without land use, land-use change and forestry									405,754.88
Total CO_2 equivalent emissions with land use, land-use change and forestry									409,523.61
Total CO_2 equivalent emissions, including indirect CO_2, without land use, land-use change and forestry									NA
Total CO_2 equivalent emissions, including indirect CO_2, with land use, land-use change and forestry									NA

[1] For carbon dioxide ($CO^{2)}$ from land use, land-use change and forestry net emissions/removals are reported. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] See footnote 6 to table 'Summary Table for National Greenhouse Gas Inventories – 1990'.

Emissions trends by gas
(Table 10s6 from CRF tables)

GREENHOUSE GAS EMISSIONS	Base year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	CO_2 equivalent (kt)																															
CO2 emissions without net CO2 from LULUCF	602,652.08	602,652.08	610,098.95	594,499.06	580,276.82	574,683.24	566,852.20	587,450.91	563,386.58	569,237.78	562,344.30	569,744.21	578,698.60	561,014.63	572,373.66	574,200.86	571,126.89	568,698.07	560,512.74	545,791.87	494,923.49	512,736.34	470,509.12	488,176.36	478,311.00	439,505.39	423,162.94	400,145.84	388,085.92	380,444.86	365,468.41	326,920.69
CO2 emissions with net CO2 from LULUCF	608,632.73	608,632.73	615,584.72	599,170.53	584,382.35	578,386.13	570,571.95	590,194.69	565,587.65	570,682.39	563,951.86	571,096.00	579,445.43	560,965.55	572,150.41	573,201.81	569,771.16	566,978.93	558,452.81	542,939.28	492,025.18	509,773.26	466,939.37	484,837.39	474,918.56	435,779.91	419,723.00	396,812.05	384,567.42	377,533.41	362,878.95	324,026.26
CH4 emissions without CH4 from LULUCF	129,824.71	129,824.71	130,586.88	130,467.64	129,018.34	122,160.74	123,790.66	123,024.70	120,599.98	117,203.37	111,684.53	106,417.60	101,650.85	99,232.32	94,320.12	89,824.53	85,387.72	81,117.92	77,308.44	71,521.20	67,166.47	62,459.40	59,789.10	58,172.73	54,001.01	52,032.40	51,023.50	49,257.55	49,656.35	49,131.55	48,833.32	46,759.99
CH4 emissions with CH4 from LULUCF	134,568.06	134,568.06	135,326.32	135,197.06	133,744.83	126,880.80	128,521.05	127,742.38	125,317.52	121,911.40	116,384.24	111,136.32	106,374.07	103,960.24	99,078.65	94,560.96	90,136.50	85,865.98	82,072.27	76,280.08	71,925.93	67,241.92	64,587.71	62,960.36	58,801.15	56,814.86	55,835.20	54,074.14	54,471.66	53,995.92	53,736.08	51,637.16
N2O emissions without N2O from LULUCF	47,288.89	47,288.89	47,521.11	42,585.56	38,345.68	38,990.76	37,650.46	37,731.24	38,090.24	38,117.56	28,599.35	27,969.48	26,564.33	24,864.62	24,400.75	25,015.25	24,128.27	22,984.83	23,028.50	22,217.43	20,764.72	21,195.38	20,290.46	20,042.92	20,144.73	20,692.18	20,351.08	20,048.49	20,533.62	20,374.23	20,367.79	19,298.29
N_2O emissions with N2O from LULUCF	49,746.71	49,746.71	49,965.22	45,008.12	40,748.45	41,375.25	40,022.57	40,069.08	40,417.97	40,409.15	30,853.44	30,194.40	28,747.18	27,013.05	26,548.94	27,105.40	26,190.63	25,010.92	25,036.63	24,188.68	22,699.96	23,114.71	22,208.25	21,926.99	22,013.07	22,524.39	22,173.13	21,860.68	22,328.02	22,179.23	22,182.71	21,084.28
HFCs	14,400.73	14,400.73	15,010.26	15,628.26	16,403.61	17,307.95	18,569.54	19,484.30	21,712.13	18,053.95	9,765.32	7,796.64	8,464.52	8,785.48	9,575.81	8,412.49	9,194.99	10,058.10	10,492.48	10,924.15	11,464.91	12,072.04	12,722.60	13,381.30	13,835.38	14,029.25	14,056.39	14,081.18	13,998.89	13,676.46	13,034.55	12,208.81
PFCs	1,648.64	1,648.64	1,381.02	685.58	597.19	604.96	589.45	587.65	492.97	478.55	454.33	571.94	471.97	397.67	348.48	439.76	391.97	390.02	286.57	262.15	191.14	280.02	405.80	233.57	286.12	233.58	269.32	279.52	400.70	144.56	210.72	159.79
Unspecified mix of HFCs and PFCs	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO	NO	NO	NO	NO	NO	NO
SF_6	1,200.60	1,200.60	1,258.84	1,322.72	1,156.10	1,200.36	1,245.33	1,290.95	1,265.39	1,313.19	1,481.38	1,800.45	1,426.29	1,462.77	1,285.78	1,078.95	1,017.80	844.18	802.38	647.56	554.53	655.06	545.95	520.79	460.14	421.62	402.54	432.01	437.36	535.19	474.50	406.94
NF_3	0.12	0.12	0.14	0.16	0.20	0.23	0.27	0.32	0.38	0.44	0.51	0.58	0.36	0.36	0.33	0.31	0.35	0.38	0.39	0.39	0.38	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Total (without LULUCF)	**797,015.77**	**797,015.77**	**805,857.21**	**785,188.99**	**765,797.93**	**754,948.24**	**748,697.91**	**769,570.07**	**745,547.68**	**744,404.84**	**714,329.71**	**714,300.90**	**717,276.92**	**695,757.85**	**702,304.93**	**698,972.15**	**691,247.99**	**684,093.49**	**672,431.51**	**651,364.74**	**595,065.65**	**609,398.60**	**564,263.40**	**580,528.03**	**567,038.74**	**526,914.79**	**509,266.13**	**484,244.95**	**473,113.19**	**464,307.21**	**448,389.64**	**405,754.88**
Total (with LULUCF)	**810,197.59**	**810,197.59**	**818,526.53**	**797,012.44**	**777,032.72**	**765,755.67**	**759,520.17**	**779,369.38**	**754,794.03**	**752,849.08**	**722,891.08**	**722,596.33**	**724,929.81**	**702,585.11**	**708,988.40**	**704,799.69**	**696,703.41**	**689,148.50**	**677,143.54**	**655,242.28**	**598,862.04**	**613,137.37**	**567,410.04**	**583,860.76**	**570,314.78**	**529,803.96**	**512,459.94**	**487,539.94**	**476,204.41**	**468,065.12**	**452,517.86**	**409,523.61**
Total (without LULUCF, with indirect)	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total (with LULUCF, with indirect)	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Emissions trends by sector
(Table 10s6 from CRF tables)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	CO_2 equivalent (kt)																															
1. Energy	597,956.40	597,956.40	608,347.24	593,152.22	577,825.72	562,394.87	554,936.12	572,108.91	548,181.54	553,647.00	542,930.15	551,550.51	562,385.37	546,529.71	552,428.24	552,193.49	548,268.73	544,731.23	534,494.52	521,981.65	479,449.51	497,066.39	456,195.43	472,663.74	457,593.64	418,091.56	403,570.12	384,690.25	372,553.38	366,186.48	350,548.93	312,304.97
2. Industrial processes and product use	85,047.03	85,047.03	83,186.41	77,999.35	74,326.25	77,471.32	77,825.23	80,371.11	81,348.34	75,558.51	58,933.78	54,817.68	51,384.05	47,109.03	50,488.69	51,560.51	50,593.87	51,082.52	53,171.66	50,291.44	40,701.09	41,725.20	39,564.97	41,280.91	45,907.60	45,890.98	43,884.26	38,682.21	38,751.87	36,892.23	36,466.63	34,892.59
3. Agriculture	48,866.71	48,866.71	48,572.93	48,065.36	47,153.14	48,263.67	48,094.85	48,970.35	48,329.41	48,557.01	48,585.65	46,470.13	44,181.49	43,886.46	44,732.55	44,879.32	44,663.38	43,550.11	43,043.70	41,897.48	41,587.22	41,875.97	41,842.89	41,389.58	41,208.01	42,731.34	42,261.27	42,017.15	42,525.16	41,997.59	42,263.15	40,702.74
4. Land use, land-use change and forestry[1]	13,181.82	13,181.82	12,669.32	11,823.45	11,234.79	10,807.43	10,822.26	9,799.31	9,246.35	8,444.24	8,561.36	8,295.43	7,652.89	6,827.26	6,683.47	5,827.54	5,455.41	5,055.01	4,712.04	3,877.54	3,796.39	3,738.77	3,146.64	3,332.73	3,276.04	2,889.17	3,193.81	3,294.99	3,091.22	3,757.91	4,128.22	3,768.72
5. Waste	65,145.63	65,145.63	65,750.63	65,972.06	66,492.81	66,818.38	67,841.70	68,119.71	67,688.39	66,642.33	63,880.14	61,462.58	59,326.00	58,232.65	54,655.44	50,338.83	47,722.01	44,729.63	41,721.62	37,194.17	33,327.83	28,731.04	26,660.10	25,193.80	22,329.48	20,200.90	19,550.48	18,855.35	19,282.78	19,230.91	19,110.93	17,854.58
6. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Total (including LULUCF)[1]	**810,197.59**	**810,197.59**	**818,526.53**	**797,012.44**	**777,032.72**	**765,755.67**	**759,520.17**	**779,369.38**	**754,794.03**	**752,849.08**	**722,891.08**	**722,596.33**	**724,929.81**	**702,585.11**	**708,988.40**	**704,799.69**	**696,703.41**	**689,148.50**	**677,143.54**	**655,242.28**	**598,862.04**	**613,137.37**	**567,410.04**	**583,860.76**	**570,314.78**	**529,803.96**	**512,459.94**	**487,539.94**	**476,204.41**	**468,065.12**	**452,517.86**	**409,523.61**

[1] Includes net CO2, CH4 and N2O from LULUCF.

Annex 5: Sectoral definitions

Sector[1]	IPCC Category[2]	Source name
Agriculture	**1A4ci**	Agriculture - stationary combustion
	1A4cii	Agriculture - mobile machinery
	2D1	Agricultural engines
	3A1a	Enteric
	3A1b	Enteric
	3A2	Enteric
	3A3	Enteric
	3A4	Enteric
	3B11a	Digestate
		Excreta
		Managed Manure
	3B11b	Digestate
		Excreta
		Managed Manure
	3B12	Excreta
		Managed Manure
	3B13	Digestate
		Excreta
		Managed Manure
	3B14	Digestate
		Excreta
		Managed Manure
	3B21a	Dairy - Dairy Cows - Direct
	3B21b	Other cattle - Beef females for slaughter - Direct
		Other cattle - Bulls for breeding - Direct
		Other cattle - Cereal fed bull - Direct
		Other cattle - Cows - Direct
		Other cattle - Dairy Calves Female - Direct
		Other cattle - Dairy In Calf Heifers - Direct
		Other cattle - Dairy Replacements Female - Direct

Sector[1]	IPCC Category[2]	Source name
		Other cattle - Heifers for breeding - Direct
		Other cattle - Steers - Direct
	3B22	Sheep - Ewe - Direct
		Sheep - Lamb - Direct
		Sheep - Ram - Direct
	3B23	Pig - Boar - Direct
		Pig - Fattening Pig < 20 kg - Direct
		Pig - Fattening Pig > 80 kg - Direct
		Pig - Fattening Pig 20 to 80 kg - Direct
		Pig - Gilt - Direct
		Pig - Sow - Direct
	3B24	Agricultural Horses - Direct
		Deer - Direct
		Domestic Horses - Direct
		Goats - Direct
		Poultry - Breeding Flock - Direct
		Poultry - Broilers - Direct
		Poultry - Ducks - Direct
		Poultry - Geese - Direct
		Poultry - Growing Pullets - Direct
		Poultry - Laying Hens - Direct
		Poultry - Other - Direct
		Poultry - Turkeys - Direct
		Professional Horses - Direct
	3B25	Agricultural Horses - Indirect Deposition
		Agricultural Horses - Indirect Leach
		Dairy - Dairy Cows - Digestate Indirect Deposition
		Dairy - Dairy Cows - Indirect Deposition
		Dairy - Dairy Cows - Indirect Leach
		Deer - Indirect Deposition
		Deer - Indirect Leach
		Domestic Horses - Indirect Deposition
		Domestic Horses - Indirect Leach
		Goats - Indirect Deposition
		Goats - Indirect Leach
		Other cattle - Beef females for slaughter - Digestate Indirect Deposition
		Other cattle - Beef females for slaughter - Indirect Deposition
		Other cattle - Beef females for slaughter - Indirect Leach
		Other cattle - Bulls for breeding - Digestate Indirect Deposition
		Other cattle - Bulls for breeding - Indirect Deposition
		Other cattle - Bulls for breeding - Indirect Leach
		Other cattle - Cereal fed bull - Digestate Indirect Deposition

Sector[1]	IPCC Category[2]	Source name
		Other cattle - Cereal fed bull - Indirect Deposition
		Other cattle - Cereal fed bull - Indirect Leach
		Other cattle - Cows - Digestate Indirect Deposition
		Other cattle - Cows - Indirect Deposition
		Other cattle - Cows - Indirect Leach
		Other cattle - Dairy Calves Female - Digestate Indirect Deposition
		Other cattle - Dairy Calves Female - Indirect Deposition
		Other cattle - Dairy Calves Female - Indirect Leach
		Other cattle - Dairy In Calf Heifers - Digestate Indirect Deposition
		Other cattle - Dairy In Calf Heifers - Indirect Deposition
		Other cattle - Dairy In Calf Heifers - Indirect Leach
		Other cattle - Dairy Replacements Female - Digestate Indirect Deposition
		Other cattle - Dairy Replacements Female - Indirect Deposition
		Other cattle - Dairy Replacements Female - Indirect Leach
		Other cattle - Heifers for breeding - Digestate Indirect Deposition
		Other cattle - Heifers for breeding - Indirect Deposition
		Other cattle - Heifers for breeding - Indirect Leach
		Other cattle - Steers - Digestate Indirect Deposition
		Other cattle - Steers - Indirect Deposition
		Other cattle - Steers - Indirect Leach
		Pig - Boar - Digestate Indirect Deposition
		Pig - Boar - Indirect Deposition
		Pig - Boar - Indirect Leach
		Pig - Fattening Pig < 20 kg - Digestate Indirect Deposition
		Pig - Fattening Pig < 20 kg - Indirect Deposition
		Pig - Fattening Pig < 20 kg - Indirect Leach
		Pig - Fattening Pig > 80 kg - Digestate Indirect Deposition
		Pig - Fattening Pig > 80 kg - Indirect Deposition
		Pig - Fattening Pig > 80 kg - Indirect Leach
		Pig - Fattening Pig 20 to 80 kg - Digestate Indirect Deposition
		Pig - Fattening Pig 20 to 80 kg - Indirect Deposition
		Pig - Fattening Pig 20 to 80 kg - Indirect Leach
		Pig - Gilt - Digestate Indirect Deposition
		Pig - Gilt - Indirect Deposition
		Pig - Gilt - Indirect Leach
		Pig - Sow - Digestate Indirect Deposition
		Pig - Sow - Indirect Deposition
		Pig - Sow - Indirect Leach
		Poultry - Breeding Flock - Digestate Indirect Deposition
		Poultry - Breeding Flock - Indirect Deposition

Sector[1]	IPCC Category[2]	Source name
		Poultry - Breeding Flock - Indirect Leach
		Poultry - Broilers - Digestate Indirect Deposition
		Poultry - Broilers - Indirect Deposition
		Poultry - Broilers - Indirect Leach
		Poultry - Ducks - Digestate Indirect Deposition
		Poultry - Ducks - Indirect Deposition
		Poultry - Ducks - Indirect Leach
		Poultry - Geese - Digestate Indirect Deposition
		Poultry - Geese - Indirect Deposition
		Poultry - Geese - Indirect Leach
		Poultry - Growing Pullets - Digestate Indirect Deposition
		Poultry - Growing Pullets - Indirect Deposition
		Poultry - Growing Pullets - Indirect Leach
		Poultry - Laying Hens - Digestate Indirect Deposition
		Poultry - Laying Hens - Indirect Deposition
		Poultry - Laying Hens - Indirect Leach
		Poultry - Other - Digestate Indirect Deposition
		Poultry - Other - Indirect Deposition
		Poultry - Other - Indirect Leach
		Poultry - Turkeys - Digestate Indirect Deposition
		Poultry - Turkeys - Indirect Deposition
		Poultry - Turkeys - Indirect Leach
		Professional Horses - Indirect Deposition
		Professional Horses - Indirect Leach
		Sheep - Ewe - Indirect Deposition
		Sheep - Ewe - Indirect Leach
		Sheep - Lamb - Indirect Deposition
		Sheep - Lamb - Indirect Leach
		Sheep - Ram - Indirect Deposition
		Sheep - Ram - Indirect Leach
	3D11	Arable - Direct
		Grass - Direct
	3D12a	Agricultural Horses - Direct
		Dairy - Dairy Cows - Direct
		Deer - Direct
		Domestic Horses - Direct
		Goats - Direct
		Other cattle - Beef females for slaughter - Direct
		Other cattle - Bulls for breeding - Direct
		Other cattle - Cereal fed bull - Direct
		Other cattle - Cows - Direct
		Other cattle - Dairy Calves Female - Direct
		Other cattle - Dairy In Calf Heifers - Direct

Sector[1]	IPCC Category[2]	Source name
		Other cattle - Dairy Replacements Female - Direct
		Other cattle - Heifers for breeding - Direct
		Other cattle - Steers - Direct
		Pig - Boar - Direct
		Pig - Fattening Pig < 20 kg - Direct
		Pig - Fattening Pig > 80 kg - Direct
		Pig - Fattening Pig 20 to 80 kg - Direct
		Pig - Gilt - Direct
		Pig - Sow - Direct
		Poultry - Breeding Flock - Direct
		Poultry - Broilers - Direct
		Poultry - Ducks - Direct
		Poultry - Geese - Direct
		Poultry - Growing Pullets - Direct
		Poultry - Laying Hens - Direct
		Poultry - Other - Direct
		Poultry - Turkeys - Direct
		Professional Horses - Direct
		Sheep - Ewe - Direct
		Sheep - Lamb - Direct
		Sheep - Ram - Direct
	3D12b	Sewage Sludge Cake - Direct
		Sewage Sludge Liquid - Direct
	3D12c	Beef females for slaughter - Digestate Direct
		Boar - Digestate Direct
		Broilers - Digestate Direct
		Bulls for breeding - Digestate Direct
		Cereal fed bull - Digestate Direct
		Cows - Digestate Direct
		Crop Digestates - Direct
		Dairy Calves Female - Digestate Direct
		Dairy Cows - Digestate Direct
		Dairy In Calf Heifers - Digestate Direct
		Dairy Replacements Female - Digestate Direct
		Fattening Pig < 20 kg - Digestate Direct
		Fattening Pig > 80 kg - Digestate Direct
		Fattening Pig 20 to 80 kg - Digestate Direct
		Food Digestates - Direct
		Gilt - Digestate Direct
		Heifers for breeding - Digestate Direct
		Laying Hens - Digestate Direct
		Other organic residue Digestates - Direct
		Poultry - Breeding Flock - Digestate Direct

Sector[1]	IPCC Category[2]	Source name
		Poultry - Ducks - Digestate Direct
		Poultry - Geese - Digestate Direct
		Poultry - Growing Pullets - Digestate Direct
		Poultry - Other - Digestate Direct
		Sow - Digestate Direct
		Steers - Digestate Direct
		Turkeys - Digestate Direct
	3D13	Agricultural Horses - Direct
		Dairy - Dairy Cows - Direct
		Deer - Direct
		Domestic Horses - Direct
		Goats - Direct
		Other cattle - Beef females for slaughter - Direct
		Other cattle - Bulls for breeding - Direct
		Other cattle - Cereal fed bull - Direct
		Other cattle - Cows - Direct
		Other cattle - Dairy Calves Female - Direct
		Other cattle - Dairy In Calf Heifers - Direct
		Other cattle - Dairy Replacements Female - Direct
		Other cattle - Heifers for breeding - Direct
		Other cattle - Steers - Direct
		Pig - Boar - Direct
		Pig - Fattening Pig < 20 kg - Direct
		Pig - Fattening Pig > 80 kg - Direct
		Pig - Fattening Pig 20 to 80 kg - Direct
		Pig - Gilt - Direct
		Pig - Sow - Direct
		Poultry - Breeding Flock - Direct
		Poultry - Broilers - Direct
		Poultry - Ducks - Direct
		Poultry - Geese - Direct
		Poultry - Growing Pullets - Direct
		Poultry - Laying Hens - Direct
		Poultry - Other - Direct
		Poultry - Turkeys - Direct
		Professional Horses - Direct
		Sheep - Ewe - Direct
		Sheep - Lamb - Direct
		Sheep - Ram - Direct
	3D14	Arable - Direct
		Grass - Direct
	3D15	Cropland management
	3D16	Managed Histosols

Sector[1]	IPCC Category[2]	Source name
	3D21	Agricultural Horses - Indirect Deposition
		Arable - Indirect Deposition
		Crop Digestates - Indirect Deposition
		Dairy - Dairy Cows - Digestate Indirect Deposition
		Dairy - Dairy Cows - Indirect Deposition
		Deer - Indirect Deposition
		Domestic Horses - Indirect Deposition
		Food Digestates - Indirect Deposition
		Goats - Indirect Deposition
		Grass - Indirect Deposition
		Other cattle - Beef females for slaughter - Digestate Indirect Deposition
		Other cattle - Beef females for slaughter - Indirect Deposition
		Other cattle - Bulls for breeding - Digestate Indirect Deposition
		Other cattle - Bulls for breeding - Indirect Deposition
		Other cattle - Cereal fed bull - Digestate Indirect Deposition
		Other cattle - Cereal fed bull - Indirect Deposition
		Other cattle - Cows - Digestate Indirect Deposition
		Other cattle - Cows - Indirect Deposition
		Other cattle - Dairy Calves Female - Digestate Indirect Deposition
		Other cattle - Dairy Calves Female - Indirect Deposition
		Other cattle - Dairy In Calf Heifers - Digestate Indirect Deposition
		Other cattle - Dairy In Calf Heifers - Indirect Deposition
		Other cattle - Dairy Replacements Female - Digestate Indirect Deposition
		Other cattle - Dairy Replacements Female - Indirect Deposition
		Other cattle - Heifers for breeding - Digestate Indirect Deposition
		Other cattle - Heifers for breeding - Indirect Deposition
		Other cattle - Steers - Digestate Indirect Deposition
		Other cattle - Steers - Indirect Deposition
		Other organic residue Digestates - Indirect Deposition
		Pig - Boar - Digestate Indirect Deposition
		Pig - Boar - Indirect Deposition
		Pig - Fattening Pig < 20 kg - Digestate Indirect Deposition
		Pig - Fattening Pig < 20 kg - Indirect Deposition
		Pig - Fattening Pig > 80 kg - Digestate Indirect Deposition
		Pig - Fattening Pig > 80 kg - Indirect Deposition
		Pig - Fattening Pig 20 to 80 kg - Digestate Indirect Deposition
		Pig - Fattening Pig 20 to 80 kg - Indirect Deposition
		Pig - Gilt - Digestate Indirect Deposition
		Pig - Gilt - Indirect Deposition

Sector[1]	IPCC Category[2]	Source name
		Pig - Sow - Digestate Indirect Deposition
		Pig - Sow - Indirect Deposition
		Poultry - Breeding Flock - Digestate Indirect Deposition
		Poultry - Breeding Flock - Indirect Deposition
		Poultry - Broilers - Digestate Indirect Deposition
		Poultry - Broilers - Indirect Deposition
		Poultry - Ducks - Digestate Indirect Deposition
		Poultry - Ducks - Indirect Deposition
		Poultry - Geese - Digestate Indirect Deposition
		Poultry - Geese - Indirect Deposition
		Poultry - Growing Pullets - Digestate Indirect Deposition
		Poultry - Growing Pullets - Indirect Deposition
		Poultry - Laying Hens - Digestate Indirect Deposition
		Poultry - Laying Hens - Indirect Deposition
		Poultry - Other - Digestate Indirect Deposition
		Poultry - Other - Indirect Deposition
		Poultry - Turkeys - Digestate Indirect Deposition
		Poultry - Turkeys - Indirect Deposition
		Professional Horses - Indirect Deposition
		Sewage Sludge Cake - Indirect Deposition
		Sewage Sludge Liquid - Indirect Deposition
		Sheep - Ewe - Indirect Deposition
		Sheep - Lamb - Indirect Deposition
		Sheep - Ram - Indirect Deposition
	3D22	Agricultural Horses - Indirect Leach
		Arable - Indirect Leach
		Arable - Residue Indirect Leach
		Crop Digestates - Indirect Leach
		Cropland management
		Dairy - Dairy Cows - Digestate Indirect Leach
		Dairy - Dairy Cows - Indirect Leach
		Deer - Indirect Leach
		Domestic Horses - Indirect Leach
		Food Digestates - Indirect Leach
		Goats - Indirect Leach
		Grass - Indirect Leach
		Grass - Residue Indirect Leach
		Other cattle - Beef females for slaughter - Digestate Indirect Leach
		Other cattle - Beef females for slaughter - Indirect Leach
		Other cattle - Bulls for breeding - Digestate Indirect Leach
		Other cattle - Bulls for breeding - Indirect Leach
		Other cattle - Cereal fed bull - Digestate Indirect Leach

Sector[1]	IPCC Category[2]	Source name
		Other cattle - Cereal fed bull - Indirect Leach
		Other cattle - Cows - Digestate Indirect Leach
		Other cattle - Cows - Indirect Leach
		Other cattle - Dairy Calves Female - Digestate Indirect Leach
		Other cattle - Dairy Calves Female - Indirect Leach
		Other cattle - Dairy In Calf Heifers - Digestate Indirect Leach
		Other cattle - Dairy In Calf Heifers - Indirect Leach
		Other cattle - Dairy Replacements Female - Digestate Indirect Leach
		Other cattle - Dairy Replacements Female - Indirect Leach
		Other cattle - Heifers for breeding - Digestate Indirect Leach
		Other cattle - Heifers for breeding - Indirect Leach
		Other cattle - Steers - Digestate Indirect Leach
		Other cattle - Steers - Indirect Leach
		Other organic residue Digestates - Indirect Leach
		Pig - Boar - Digestate Indirect Leach
		Pig - Boar - Indirect Leach
		Pig - Fattening Pig < 20 kg - Digestate Indirect Leach
		Pig - Fattening Pig < 20 kg - Indirect Leach
		Pig - Fattening Pig > 80 kg - Digestate Indirect Leach
		Pig - Fattening Pig > 80 kg - Indirect Leach
		Pig - Fattening Pig 20 to 80 kg - Digestate Indirect Leach
		Pig - Fattening Pig 20 to 80 kg - Indirect Leach
		Pig - Gilt - Digestate Indirect Leach
		Pig - Gilt - Indirect Leach
		Pig - Sow - Digestate Indirect Leach
		Pig - Sow - Indirect Leach
		Poultry - Breeding Flock - Digestate Indirect Leach
		Poultry - Breeding Flock - Indirect Leach
		Poultry - Broilers - Digestate Indirect Leach
		Poultry - Broilers - Indirect Leach
		Poultry - Ducks - Digestate Indirect Leach
		Poultry - Ducks - Indirect Leach
		Poultry - Geese - Digestate Indirect Leach
		Poultry - Geese - Indirect Leach
		Poultry - Growing Pullets - Digestate Indirect Leach
		Poultry - Growing Pullets - Indirect Leach
		Poultry - Laying Hens - Digestate Indirect Leach
		Poultry - Laying Hens - Indirect Leach
		Poultry - Other - Digestate Indirect Leach
		Poultry - Other - Indirect Leach
		Poultry - Turkeys - Digestate Indirect Leach
		Poultry - Turkeys - Indirect Leach

Sector[1]	IPCC Category[2]	Source name
		Professional Horses - Indirect Leach
		Sewage Sludge Cake - Indirect Leach
		Sewage Sludge Liquid - Indirect Leach
		Sheep - Ewe - Indirect Leach
		Sheep - Lamb - Indirect Leach
		Sheep - Ram - Indirect Leach
	3F11	Field burning
	3F12	Field burning
	3F14	Field burning
	3F5	Field burning
	3G1	Liming
	3G2	Liming
	3H	Fertiliser Application
Business	**1A2a**	Iron and steel - combustion plant
	1A2b	Autogeneration - exported to grid
		Autogenerators
		Non-Ferrous Metal (combustion)
	1A2c	Chemicals (combustion)
	1A2d	Pulp, Paper and Print (combustion)
	1A2e	Food & drink, tobacco (combustion)
	1A2f	Cement production - combustion
		Lime production - non decarbonising
		Other industrial combustion
	1A2gvii	Industrial off-road mobile machinery
	1A2gviii	Autogeneration - exported to grid
		Autogenerators
		Other industrial combustion
	1A4ai	Miscellaneous industrial/commercial combustion
	2B1	Ammonia production - combustion
	2B8a	Methanol production – combustion
	2B8g	Chemicals (combustion)
	2C1b	Blast furnaces
		Iron and steel - combustion plant
	2D1	Industrial engines
	2D3	Non Energy Use: petroleum coke
	2E1	Electronics - HFC
		Electronics - NF3
	2F1a	Commercial Refrigeration: Commercial central systems, chill
		Commercial Refrigeration: Commercial central systems, frozen
		Commercial Refrigeration: Commercial condensing units, chill
		Commercial Refrigeration: Commercial condensing units, frozen
		Commercial Refrigeration: Commercial integral systems, chill

Sector[1]	IPCC Category[2]	Source name
		Commercial Refrigeration: Commercial integral systems, frozen
	2F1b	Domestic Refrigeration: Domestic freezers
		Domestic Refrigeration: Domestic refrigerators and freezers
	2F1c	Industrial Refrigeration: Industrial chillers, large
		Industrial Refrigeration: Industrial chillers, mid-size
		Industrial Refrigeration: Industrial DX systems, large, chill
		Industrial Refrigeration: Industrial DX systems, large, frozen
		Industrial Refrigeration: Industrial DX systems, mid-size, chill
		Industrial Refrigeration: Industrial DX systems, mid-size, frozen
		Industrial Refrigeration: Industrial DX systems, small, chill
		Industrial Refrigeration: Industrial DX systems, small, frozen
		Industrial Refrigeration: Industrial flooded systems, large, chill
	2F1d	Transport Refrigeration: Systems for large trucks, iso-containers
		Transport Refrigeration: Systems for marine vessels
		Transport Refrigeration: Systems for vans, light trucks
	2F1e	Mobile Air-Conditioning: MAC systems - buses, trains
		Mobile Air-Conditioning: MAC systems - cars, vans, cabs
	2F1f	Stationary Air-Conditioning: AC chillers, large
		Stationary Air-Conditioning: AC chillers, mid-size
		Stationary Air-Conditioning: AC chillers, small
		Stationary Air-Conditioning: AC integral systems (e.g. window units)
		Stationary Air-Conditioning: AC roof-top units, large
		Stationary Air-Conditioning: AC roof-top units, small
		Stationary Air-Conditioning: AC split systems, large
		Stationary Air-Conditioning: AC split systems, mid-size
		Stationary Air-Conditioning: AC split systems, small
		Stationary Air-Conditioning: AC VRF systems, small
		Stationary Air-Conditioning: Heat pumps, large
		Stationary Air-Conditioning: Heat pumps, mid-size
		Stationary Air-Conditioning: Heat pumps, small
		Stationary Air-Conditioning: Heat pumps, very small (domestic)
	2F2a	Closed foams
	2F2b	One Component Foams
	2F3	Firefighting
	2F5	Precision cleaning
	2F6b	F-gas handling
		Transport and distribution of refrigerants
	2G1	Electrical insulation
	2G2a	Airborne Warning And Control Systems
	2G2b	Particle accelerators
	2G2e	Electronics and shoes

Sector[1]	IPCC Category[2]	Source name
		Tracer gas
	2G3a	N2O use as an anaesthetic
	5C2.2b	Accidental fires - other buildings
Energy Supply	1A1ai	Miscellaneous industrial/commercial combustion
		Power stations
	1A1aiii	Heat supply
	1A1b	Refineries - combustion
	1A1ci	Coke production
		Solid smokeless fuel production
	1A1cii	Gas terminal: fuel combustion
		Oil terminal: fuel combustion
		Upstream Gas Production - fuel combustion
		Upstream Oil Production - fuel combustion
	1A1ciii	Collieries - combustion
		Gas production
		Nuclear fuel production
	1A2gviii	Autogenerators
	1B1a1i	Deep-mined coal
	1B1a1ii	Coal storage and transport
	1B1a1iii	Closed Coal Mines
	1B1a2i	Open-cast coal
	1B1b	Charcoal production
		Coke production
		Iron and steel - flaring
		Solid smokeless fuel production
	1B2a1	Onshore oil well exploration (conventional)
		Upstream Oil Production - Offshore Well Testing
	1B2a2	Oil Terminal: Direct Process
		Oil Terminal: Other Fugitives
		Onshore oil production (conventional)
		Petroleum processes
		Upstream Oil Production - fugitive emissions
		Upstream Oil Production: direct process emissions
	1B2a3	Oil transport fugitives: pipelines (onshore)
		Oil transport fugitives: road tankers
		Upstream Oil Production - Offshore Oil Loading
		Upstream Oil Production - Onshore Oil Loading
	1B2a4	Upstream Oil Production - Oil terminal storage
	1B2a6	Abandoned oil wells (offshore)
		Abandoned oil wells (onshore)
	1B2b1	Upstream Gas Production - Offshore Well Testing
		Well exploration (unconventional gas): all sources
	1B2b2	Onshore natural gas gathering

Sector[1]	IPCC Category[2]	Source name
		Onshore natural gas production (conventional)
	1B2b3	Gas Terminal: Direct Process
		Gas Terminal: Other Fugitives
		Upstream Gas Production - fugitive emissions
		Upstream Gas Production: direct process emissions
	1B2b4	Gas leakage
		Upstream Gas Production - Gas terminal storage
	1B2b5	Gas leakage
	1B2c1i	Oil Terminal: Venting
		Upstream Oil Production - venting
	1B2c1ii	Gas Terminal: Venting
		Upstream Gas Production - venting
	1B2c2i	Oil Terminal: Gas Flaring
		Onshore oil production: gas flaring
		Upstream Oil Production - flaring
	1B2c2ii	Gas Terminal: Gas Flaring
		Upstream Gas Production - flaring
	2A4d	Power stations - FGD
Industrial processes	1B2d	Flue Gas Treatment (neutralisation)
	2A1	Cement - decarbonising
	2A2	Lime production - decarbonising
	2A3	Glass - general
	2A4a	Brick manufacture - all types
		Brick manufacture - Fletton
		Other ceramics
	2A4b	Non Energy Use: chemical feedstock
		Other emissive applications of Soda Ash
	2A4d	Bread baking
		Other emissive applications of Sodium Bicarbonate
		Unknown applications of Sodium Bicarbonate
	2B1	Ammonia production - feedstock use of gas
	2B10	Chemical industry - general
	2B2	Nitric acid production
	2B3	Adipic acid production
	2B6	Chemical industry - titanium dioxide
	2B7	Chemical industry - soda ash
	2B8a	Chemical industry - methanol
	2B8b	Chemical industry - ethylene
	2B8c	Chemical Industry - ethylene dichloride
	2B8d	Chemical industry - ethylene oxide
	2B8e	Chemical industry - acrylonitrile
	2B8f	Chemical industry - carbon black
	2B9a1	Halocarbons production - by-product

Sector[1]	IPCC Category[2]	Source name
	2B9b3	Halocarbons production - fugitive
	2C1a	Basic oxygen furnaces
		Electric arc furnaces
		Ladle arc furnaces
	2C1b	Iron and steel - flaring
	2C1d	Sinter production
	2C3a	Primary aluminium production - general
	2C3b	Primary aluminium production - PFC emissions
	2C4	Magnesium cover gas
	2C6	Non-ferrous metal processes
	2G3b	Other food - cream consumption
	2G4	Chemical Industry – other process sources
International aviation bunkers	International bunkers CRF memo item	International aviation bunkers
International shipping bunkers	International bunkers CRF memo item	International shipping bunkers
Land use, land use change and forestry	4	LULUCF Indirect N2O - Atmospheric Deposition
		LULUCF Indirect N2O - Nitrogen Leaching and Run-off
	4A	Forest Land - Drainage and rewetting and other management of organic and mineral soils
	4A1	Forest Land remaining Forest Land - Biomass Burning - Wildfires
		Forest Land remaining Forest Land - Carbon stock change
	4A2	Cropland converted to Forest Land - Carbon stock change
		Cropland converted to Forest Land - Direct N2O emissions from N Mineralization/Immobilization
		Direct N2O emission from N fertilisation of forest land
		Grassland converted to Forest Land - Carbon stock change
		Grassland converted to Forest Land - Direct N2O emissions from N Mineralization/Immobilization
		Settlements converted to Forest Land - Carbon stock change
		Settlements converted to Forest Land - Direct N2O emissions from N Mineralization/Immobilization
	4B1	Cropland remaining Cropland - Biomass Burning - Wildfires
		Cropland remaining Cropland - Living biomass carbon stock change
		Cropland remaining Cropland - Soils carbon stock change
	4B2	Forest Land converted to Cropland - Biomass Burning - Controlled Burning
		Forest Land converted to Cropland - Carbon stock change
		Forest Land converted to Cropland - Direct N2O emissions from N Mineralization/Immobilization
		Grassland converted to Cropland - Carbon stock change
		Grassland converted to Cropland - Direct N2O emissions from N Mineralization/Immobilization
		Settlements converted to Cropland - Carbon stock change
	4C	Grassland - Drainage and rewetting and other management of organic and mineral soils
	4C1	Grassland remaining Grassland - Biomass Burning - Wildfires

Sector[1]	IPCC Category[2]	Source name
		Grassland remaining Grassland - Carbon stock change
		Grassland remaining Grassland - Direct N2O emissions from N Mineralization/Immobilization
	4C2	Cropland converted to Grassland - Carbon stock change
		Forest Land converted to Grassland - Biomass Burning - Controlled Burning
		Forest Land converted to Grassland - Carbon stock change
		Forest Land converted to Grassland - Direct N2O emissions from N Mineralization/Immobilization
		Settlements converted to Grassland - Carbon stock change
	4D	Wetlands - Drainage and rewetting and other management of organic and mineral soils
	4D1	Other Wetlands Remaining Other Wetlands - Carbon stock change
		Peat Extraction Remaining Peat Extraction - Carbon stock change
	4D2	Cropland converted to Other Wetlands - Carbon stock change
		Forest Land converted to Other Wetlands - Biomass Burning - Controlled Burning
		Forest Land converted to Other Wetlands - Carbon stock change
		Grassland converted to flooded land - Carbon stock change
		Land converted for Peat Extraction - Carbon stock change
	4E	Settlements - Drainage and rewetting and other management of organic and mineral soils
	4E1	Settlements remaining Settlements - Carbon stock change
		Settlements remaining Settlements - Direct N2O emissions from N Mineralization/Immobilization
	4E2	Cropland converted to Settlements - Carbon stock change
		Cropland converted to Settlements - Direct N2O emissions from N Mineralization/Immobilization
		Forest Land converted to Settlements - Biomass Burning - Controlled Burning
		Forest Land converted to Settlements - Carbon stock change
		Forest Land converted to Settlements - Direct N2O emissions from N Mineralization/Immobilization
		Grassland converted to Settlements - Carbon stock change
		Grassland converted to Settlements - Direct N2O emissions from N Mineralization/Immobilization
	4G	HWP Produced and Consumed Domestically - Carbon stock change
		HWP Produced and Exported - Carbon stock change
Public	1A4ai	Public sector combustion
Residential	1A4bi	Domestic combustion
	1A4bii	House and garden machinery
	2D2	Non-aerosol products - household products
	2F4a	Metered dose inhalers
	2F4b	Aerosols other than metered dose inhalers
	2G3b	Recreational use of N2O
	5B1a	Composting (at household)
	5C2.2b	Accidental fires - dwellings

Sector[1]	IPCC Category[2]	Source name
		Accidental fires - vehicles
Transport	**1A3a**	Aircraft - domestic cruise
		Aircraft - domestic take off and landing
	1A3bi	Road transport - cars - cold start
		Road transport - cars - motorway driving
		Road transport - cars - rural driving
		Road transport - cars - urban driving
	1A3bii	Road transport - LGVs - cold start
		Road transport - LGVs - motorway driving
		Road transport - LGVs - rural driving
		Road transport - LGVs - urban driving
	1A3biii	Road transport - buses and coaches - motorway driving
		Road transport - buses and coaches - rural driving
		Road transport - buses and coaches - urban driving
		Road transport - general
		Road transport - HGV articulated - motorway driving
		Road transport - HGV articulated - rural driving
		Road transport - HGV articulated - urban driving
		Road transport - HGV rigid - motorway driving
		Road transport - HGV rigid - rural driving
		Road transport - HGV rigid - urban driving
	1A3biv	Road transport - mopeds (<50cc 2st) - urban driving
		Road transport - motorcycle (>50cc 2st) - urban driving
		Road transport - motorcycle (>50cc 4st) - motorway driving
		Road transport - motorcycle (>50cc 4st) - rural driving
		Road transport - motorcycle (>50cc 4st) - urban driving
	1A3bv	Road transport - all vehicles biofuels use
		Road transport - all vehicles LPG use
	1A3c	Rail - coal
		Railways - freight
		Railways - intercity
		Railways - regional
	1A3d	Inland goods-carrying vessels
		Motorboats / workboats (e.g. canal boats, dredgers, service boats, tourist boats, river boats)
		Personal watercraft e.g. jet ski
		Sailing boats with auxiliary engines
		Shipping - coastal
	1A3eii	Aircraft - support vehicles
	1A4ai	Railways - stationary combustion
	1A4ciii	Fishing vessels
	1A5b	Aircraft - military
		Shipping - naval

Sector[1]	IPCC Category[2]	Source name
	2D1	Marine engines
		Road vehicle engines
	2D3	Road transport - urea
Waste Management	**5A1a**	Landfill
	5B1a	Mechanical Biological Treatment - Composting
		Total composting (non-household)
	5B2a	Anaerobic Digestion (other)
		Mechanical Biological Treatment - Anaerobic Digestion
	5C1.1b	Incineration - sewage sludge
	5C1.2a	Incineration
	5C1.2b	Incineration - chemical waste
		Incineration - clinical waste
	5D1	Sewage sludge decomposition
		Sewage sludge decomposition in private systems
	5D2	Industrial Waste Water Treatment

[1] 'National Communication' sectors, used for reporting emissions projections (Chapter 4 of the UK's 8th National Communication, Chapter 5 of the UK's 5th Biennial Report, and accompanying CTF Table 6a-b). Note that where projections are presented, historic figures up to 2020 are based on the UK's 1990-2020 greenhouse gas inventory, while projections from 2021 are based on the UK's 1990-2018 greenhouse gas inventory. The sector mapping here aligns with the most recent greenhouse gas inventory (1990-2020).

[2] Broad IPCC sectors (1. Energy (excluding 1.A.3 transport), 1.A.3 Transport, 2. Industrial Processes and Product Use, 3. Agriculture, 4. Land Use, Land Use Change and Forestry, and 5. Waste) are used for reporting inventory information in Chapter 2 of the UK's 8th National Communication, Chapter 1 of the UK's 5th Biennial Report, and accompanying CTF table 1.

Annex 6: List of Global Warming Potentials of greenhouse gases used in UK emissions

Greenhouse gas	Lifetime (years)	100 years GWP (AR4[1])
Carbon dioxide	50-200	1
Methane	12	25
Nitrous oxide	114	298
HFC-23	270	14,800
HFC-32	4.9	675
HFC-41	2.4	92
HFC-43-10mee	15.9	1,640
HFC-125	29	3,500
HFC-134	9.6	1,100
HFC-134a	14	1,430
HFC-143	3.5	353
HFC-143a	52	4,470
HFC-152	0.6	53
HFC-152a	1.4	124
HFC-161	0.3	12
HFC-227ea	34.2	3,220
HFC-236cb	13.6	1,340
HFC-236ea	10.7	1,370
HFC-236fa	240	9,810
HFC-245ca	6.2	693
HFC-245fa	7.6	1,030
HFC-365mfc	8.6	794
Perfluoromethane	50,000	7,390
Perfluoroethane	10,000	12,200
Perfluoropropane	2,600	8,830
Perfluorobutane	2,600	8,860
Perfluorocyclobutane	3,200	10,300
Perfluoropentane	4,100	9,160
Perfluorohexane	3,200	9,300
Perfluorodecalin	>1,000	>7,500

Greenhouse gas	Lifetime (years)	100 years GWP (AR4[1])
Perfluoropropene	>1,000	>17,340
Sulphur hexafluoride	3,200	22,800
Nitrogen trifluoride	740	17,200

[1] GWPs listed are from Working Group 1 of the IPCC Fourth Assessment Report: Climate Change 2007.

Annex 7:
Reporting under Article 7, Paragaph 2

National Systems in accordance with Article 5, paragraph 1	
30. Each Party included in Annex I shall provide a description of how it is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1. The description shall contain the following elements:	
(a) The name and contact information for the national entity and its designated representative with overall responsibility for the national inventory of the Party	NC8 Chapter 2 Section 1.2 and National Inventory Report (NIR)
(b) The roles and responsibilities of various agencies and entities in relation to the inventory development process, as well as the institutional, legal and procedural arrangements made to prepare the inventory	NC8 Chapter 2 Section 1.2 and NIR
(c) A description of the process for collecting activity data, for selecting emission factors and methods, and for the development of emission estimates	NC8 Chapter 2 Section 1.2 and NIR
(d) A description of the process and the results of key source identification and, where relevant, archiving of test data	NC8 Chapter 2 Section 1.2 and NIR
(e) A description of the process for the recalculation of previously submitted inventory data	NC8 Chapter 2 Section 1.2 and NIR
(f) A description of the quality assurance and quality control plan, its implementation and the quality objectives established, and information on internal and external evaluation and review processes and their results in accordance with the guidelines for national systems	NC8 Chapter 2 Section 1.2 and NIR
(g) A description of the procedures for the official consideration and approval of the inventory.	NC8 Chapter 2 Section 1.2 and NIR
31. Where the Party included in Annex I has not performed all functions, the Party shall provide an explanation of which functions were not performed or were only partially performed and information on the action planned or taken to perform these functions in the future.	NC8 Chapter 2 Section 1.2 and NIR

National Registries	
32. Each Party included in Annex I shall provide a description of how its national registry performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1,11 and complies with the requirements of the technical standards for data exchange between registry systems as adopted by the COP/MOP. The description shall include the following information:	
(a) The name and contact information of the registry administrator designated by the Party to maintain the national registry	NC8 Chapter 2 and Standard Independent Assessment Report (SIAR)
(b) The names of the other Parties with which the Party cooperates by maintaining their national registries in a consolidated system	NC8 Chapter 2 and SIAR
(c) A description of the database structure and capacity of the national registry	NC8 Chapter 2 and SIAR
(d) A description of how the national registry conforms to the technical standards for data exchange between registry systems for the purpose of ensuring the accurate, transparent and efficient exchange of data between national registries, the clean development mechanism registry and the transaction log (decision 19/CP.7, paragraph 1)	NC8 Chapter 2 and SIAR
(e) A description of the procedures employed in the national registry to minimize discrepancies in the issuance, transfer, acquisition, cancellation and retirement of ERUs, CERs, tCERs, lCERs, AAUs and/or RMUs, and replacement of tCERS and lCERs, and of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transactions	NC8 Chapter 2 and SIAR
(f) An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error and of how these measures are kept up to date	NC8 Chapter 2 and SIAR
(g) A list of the information publicly accessible by means of the user interface to the national registry	NC8 Chapter 2 and SIAR
(h) The Internet address of the interface to its national registry	NC8 Chapter 2 and SIAR
(i) A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster.	NC8 Chapter 2 and SIAR
(j) The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems.	NC8 Chapter 2 and SIAR

Supplementarily relating to the mechanisms pursuant to Articles 6, 12 and 17	
33. Each Party included in Annex I shall provide information on how its use of the mechanisms is supplemental to domestic action, and how its domestic action thus constitutes a significant element of the effort made to meet its quantified limitation and reduction commitments under Article 3, paragraph 1, in accordance with the provisions of decision 5/CP.6.	NC8 Chapter 3

Policies and measures in accordance with Article 2	
34. In providing information under part II, section V, of the guidelines for the preparation of national communications by Parties included in Annex I to the Convention (FCCC/CP/1999/7), each Party included in Annex I shall specifically address policies and measures implemented and/or further elaborated as well as cooperation with other such Parties in achieving its quantified emission limitation and reduction commitment under Article 3, in order to promote sustainable development. Such reporting shall take into account any relevant decision by the COP and the COP/MOP resulting from the process for further consideration of the issue of policies and measures (decision 13/CP.7).	NC8 Chapter 4 and 6
35. With respect to aviation and marine bunker fuels, each Party included in Annex I shall, in pursuit of Article 2, paragraph 2, of the Kyoto Protocol, identify the steps it has taken to promote and/or implement any decisions by the International Civil Aviation Organization and the International Maritime Organization in order to limit or reduce emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels.	NC8 Chapter 3
36. Each Party included in Annex I shall also provide information not reported elsewhere under these guidelines on how it strives to implement policies and measures under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change, effects on international trade, and social, environmental and economic impacts on other Parties, especially developing country Parties and in particular those identified in Article 4, paragraphs 8 and 9 of the Convention, taking into account Article 3 of the Convention.	NC8 Chapter 3

Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	
37. Each Party included in Annex I shall report any relevant information on its domestic and regional legislative arrangements and enforcement and administrative procedures, established pursuant to the implementation of the Kyoto Protocol, according to its national circumstances.	NC8 Chapter 1 and 3
(a) A description of any domestic and regional legislative arrangements and enforcement and administrative procedures the Party has in place to meet its commitments under the Kyoto Protocol, including the legal authority for such programmes, how they are implemented, and procedures for addressing cases of non-compliance under domestic law.	NC8 Chapter 3
(b) A description of any provisions to make information on these legislative arrangements and enforcement and administrative procedures (e.g. rules on enforcement and administrative procedures, action taken) publicly accessible	NC8 Chapter 3
(c) A description of any institutional arrangements and decision-making procedures that it has in place to coordinate activities relating to participation in the mechanisms under Articles 6, 12 and 17, including the participation of legal entities.	NC8 Chapter 3
38. Each Party included in Annex I shall provide a description of any national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and any elected activities under Article 3, paragraph 4, also contribute to the conservation of biodiversity and sustainable use of natural resources.	NC8 Chapter 3

Information under Article 10	
39. Each Party included in Annex I shall report its activities, actions and programmes undertaken in fulfilment of its commitments under Article 10.	NC8 Chapter 6
40. Each Party included in Annex I shall report on the steps it has taken to promote, facilitate and finance the transfer of technology to developing countries and to build their capacity, taking into account Article 4, paragraphs 3, 5 and 7, of the Convention, in order to facilitate the implementation of Article 10 of the Kyoto Protocol.	NC8 Chapter 6

Financial resources	
41. Each Party included in Annex II shall provide information on the implementation of Article 11 of the Kyoto Protocol, in particular information on what new and additional financial resources have been provided, in what way these resources are new and additional, and how that Party has taken into account the need for adequacy and predictability in the flow of these resources.	NC8 Chapter 5
42. Each Party included in Annex II shall provide information on its contribution to the entity or entities entrusted with the operation of the financial mechanism.	NC8 Chapter 5
43. Any Party included in Annex I that has provided funding for the adaptation fund established in accordance with decision 10/CP.7 shall report on its financial contributions to this fund. In doing so, the Party shall take into account the information reported in accordance with paragraph 6 of decision 10/CP.7.	NC8 Chapter 5