

CLIMATE PROGRAMME 2020



Climate Programme 2020

Denmark's Mid-century, Long-term Low Greenhouse Gas Emission Development Strategy

– submitted under the Paris Agreement

December 2020

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¹ Translation of the Danish Government's "Klimaprogram 2020" of 29 September 2020. Information on recent developments since September is included on page 4-6.

Denmark's long-term strategy

The national Climate Act adopted by the Danish parliament defines legally binding targets and has laid down a solid foundation for continued and ambitious climate action. Not just for the next ten years, but towards 2050.

The Danish Climate Act sets a near-term target of reducing Denmark's total greenhouse gas emissions by 70% by 2030 compared to the 1990 level and sets a long-term target of achieving climate neutrality by 2050 at the latest.

We are proud to present Denmark's long-term strategy. I sincerely hope that Denmark's climate targets and efforts will inspire other countries in their efforts to solve the climate crisis. On behalf of the Danish government, we are looking forward to working with partners across the world to secure a green and prosperous future.

The list of climate-related initiatives spurred by the Government is growing long. We will establish two so-called energy hubs by 2030 with a total capacity of 5 GW and with interconnections to other European countries in the Baltic Sea and the North Sea. The immediate emission effects of these decisions are not huge. However, it is our hope that by investing now, we can lay the foundations for the development of a cost competitive Power-to-X production that can help us bridge the gap to a fossil free society towards 2050.

In addition, Denmark has recently made a historic decision on the future of fossil extraction in the North Sea. A broad majority in the Parliament has agreed on a final phase-out date of fossil extraction in the North Sea by 2050. We consider it an important step for our joint, global effort to curb demand of fossil fuels, and we are now calling on friends and allies around the world to do the same.

The path to achieving the 70% target is not only a question of the efforts made by the Danish Government and Parliament. It is a common task of Danish society with active roles for individuals, municipalities, trade unions, civil society and the business community. It requires us to rethink the way we formulate and integrate climate measures across policy areas. To this end, the Government established thirteen Climate Partnerships with Danish private sector organizations. They have presented more than 400 recommendations for the green transition. In addition, we have established a Climate Assembly and invited 99 randomly selected Danish citizens to recommend specific climate policy changes.

We have given climate policy a significantly higher priority in the Government's other areas of work, and integrated green considerations across all policy areas. This includes a Government committee for green transition, initiating efforts to come up with green financial models and drawing up guidelines for calculating the emission-related consequences of all relevant bills.

2020 has been a special year that will be remembered for the human and financial costs of the COVID-19 pandemic crisis. We face a giant task of recovering the global economy. However, it also provides us a unique opportunity to find a greener

way out of the crisis. This requires us to make the green transition the driving force in the economic recovery. It requires action, also outside of Denmark. In the spring of 2020, the Government together with the International Energy Agency (IEA) hosted a series of ministerial roundtables that emphasized the importance of a green recovery in the re-start of the world's economies.

In the EU, we continue to promote an ambitious climate law, higher climate targets and a ban on petrol and diesel vehicles. With the unanimous decision of the European Council in December 2020 to enhance the 2030 climate target from at least 40 pct. to at least 55 pct., the EU will update the EU's nationally determined contribution and lend credence to efforts to persuade other major emitters to follow suit.

Hopefully, the ambitious targets and efforts in Denmark and in the EU can inspire other countries and regions to raise the ambitions in the updating of their nationally determined contributions. Only with strengthened joint efforts can we achieve the goals of the Paris Agreement.

Copenhagen, December 2020

A handwritten signature in blue ink, appearing to read 'Dan Jørgensen', with a long horizontal stroke extending to the right.

Dan Jørgensen
Minister for Climate, Energy and Utilities

Update by December 2020

In June 2020, the Danish parliament adopted the new legal framework for Denmark's climate policy proposed by the Danish government. Long-term strategies play a key role in reaching the goals of the Paris Agreement. The objective is to bridge the policies of today with future climate action in line with Denmark's commitments under the Paris Agreement.

Denmark's long-term target is clear: Denmark must reach climate neutrality by 2050 at the latest. The pathway to a climate-neutral society entails that Denmark must reduce its greenhouse gas emissions by 70% by 2030 (compared to 1990 levels). These targets are legally binding targets adopted in Parliament.

However, Denmark's greenhouse gas emissions amount to only 0.1% of global emissions. Even if Denmark could achieve climate neutrality here and now, it would not affect the global climate significantly. Therefore, the objective of the government is to inspire others by example.

The government want to show how high climate ambitions can be translated into specific and concrete actions. How a green transition is carried through in a way that supports growth, welfare, just transition and development of green technological solutions that the world needs.

The ambitions as laid out in the climate act are high: Over the next 10 years, Denmark's emissions in 2030 are to be reduced by as much as Denmark has managed to cut emissions over the past 30 years.

In total, under the current government, Denmark has made decisions by December 2020 that reduce annual greenhouse gas emissions by approximately 7 million tonnes of CO_{2e} by 2030. This corresponds approximately to one third of what must be achieved by 2030 to fulfil the Danish climate act.

Moreover, a broad majority of the Danish Parliament has reached an agreement on the future of fossil extraction in the North Sea, leading to the cancellation of the ongoing eighth licensing round and all future rounds to extract oil and gas. The agreement also establishes a final phase-out date of fossil extraction by 2050 and lays out plans for a just transition for impacted workers.

Overall, and in line with the Danish Council on Climate Change, the Government believes that the path to the 70% target follows two tracks: an implementation track and a development track.

The *implementation track* focuses on well-known measures that are necessary to ensure early emission reductions. This track requires Denmark to make smart investments in solutions that will reduce emissions in the short term. In this regard, Denmark is already under way. For instance, measures have been adopted that will replace gas-fired and oil-fired boilers, convert arable land on organic soils, improve the energy efficiency in buildings, phase out coal and recycle waste.

Parliament has also agreed on a measure of initiatives regarding the transport sector. This includes a blend in requirement for the use of renewable energy fuels in 2021, future taxation of passenger cars and vans, and a displacement requirement concerning renewable energy fuels in the transport sector. With the changes in taxation in the transport sector, the increase in incentives for buying and using zero or low-emission vehicles is expected to lead to 775.000 zero or low -emission passenger cars and vans in the Danish vehicles fleet by 2030. Furthermore, it has been decided to implement a distance-based toll for heavy-duty vehicles from 2025 that is expected to be based on a differentiation according to CO₂e-emissions. In conjunction with the displacement requirement of 7 % in 2030, the agreement is expected to reduce CO₂e-emissions by 2.1 million tonnes by 2030.

With Denmark's 2021 Finance Act and its focus on a green recovery from the COVID-19 crisis, a number of green initiatives will be launched across sectors with an effect of 0.2 million tonnes of CO₂e in 2025 and 2030. It will support the green transition in Denmark and contribute to the development of new green technologies.

Agreement on a green tax reform was also reached in December 2020. The reform ensures a CO₂e reduction of approximately 0.5 million tonnes fully phased in by 2025. The reform is to ensure that the tax system supports the green transition and largely reflects the costs that emissions from business and households impose on society. In this connection, an expert group is established to prepare proposals for the design of a uniform CO₂e regulation for the next phase of the tax reform.

All measures in the implementation track will provide a reduction effect in the short term.

The *development track* requires the Danish Government to make early decisions now that will lead to reductions in the longer term. Therefore, the Government has decided to invest significantly in carbon capture, energy hubs and Power-to-X in accordance with the sector strategies for waste, energy and industry.

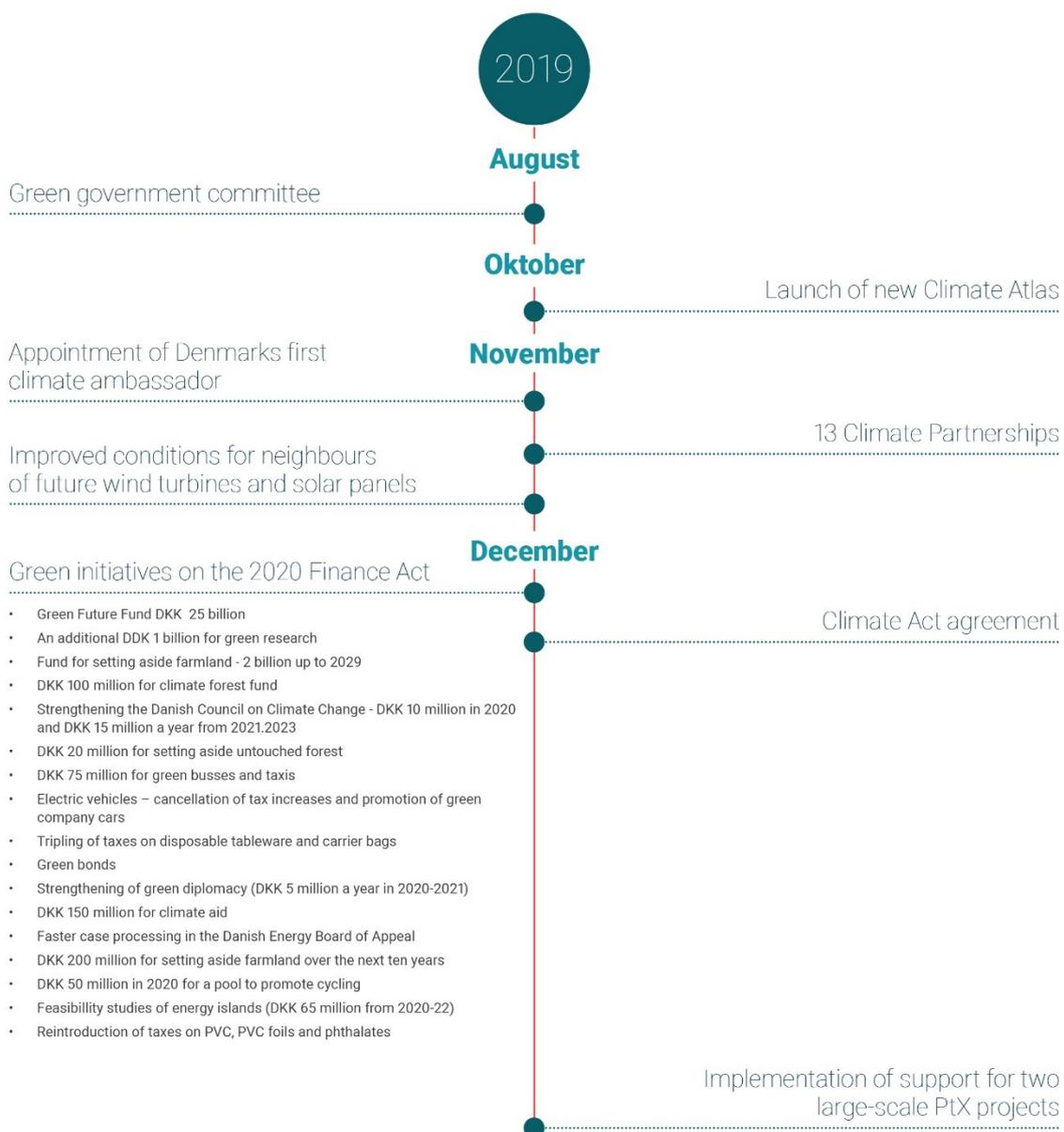
These decisions do not deliver an immediate reduction effect. But the decisions are necessary for ensuring the maturation of the technologies and delivering the reductions that will achieve the targets in the long term. To support the development track, the Government has launched a green research strategy focussing on the research efforts in the areas with the greatest potential for green technological development. In October 2020, the Government reached an agreement Parliament to increase the level of the state's investments in green research and innovation in 2021.

In the present document (published in Danish in September), you will find information on a long range of climate-related issues: The Danish Climate Act, the latest climate-science developments in a Danish perspective, and a status report on the fulfilment of Denmark's national climate targets and international commitments to name a few.

Furthermore, you will find information on the principles of the green transition, the Government's climate-policy working method, cross-cutting climate efforts such as green taxes, research activities and efforts to support climate-friendly behaviour and the governments sector strategies within the energy and industry sector, the waste sector, the transport sector, and the agricultural and forestry sector. As well as information on the Danish Government's long-term strategy for global climate action adopted in October and information regarding the recommendations of Danish Council on Climate Change and the Government's position.

Green milestones since the change of government

Decisions have been made over the past year in Denmark that will reduce emissions by 5 million tonnes of CO₂e by 2030.



2020

Denmark gathers 12 countries behind a letter to the European Commission urging higher climate targets

March

Denmark gathers 20 EU Member states in a request for green energy

April

Agreement on implementation of green transport pool in 2020 (DKK 75 million)

IEA and Denmark initiates a global discussion of green recovery

May

Agreement on climate change adaptation

Green housing agreement on renovation of social housing for DKK 30 billion

Announcement of discontinuation of coal firing at Fynsværket

June

Climate plan for a green waste sector of and circular economy

- Increased and streamlined waste separation
- Increased recycling of plastic waste
- Strong recycling sector
- Less incineration and less import of waste for incineration
- Mindre affald og mere cirkulær økonomi
- Energy and climate-neutral water sector
- Additional initiatives for a climate-neutral waste management sector

Adoption of Climate Act

PtX agreement with the Netherlands

Climate agreement for energy and industry

- Establishment of the world's first energy islands
- Transition to market-driven expansion of solar panels and onshore wind power
- Future green technologies – Power-to-X and carbon capture
- Green transition of the industry
- Support for biogas and other green gases
- Energy-efficiency improvements
- Green transition of heating taxes
- Promotion of utilisation of excess heat
- Phasing out of individual oil and gas-fired boilers
- Green district heating
- Sustainability demands on biomass for energy
- Green transport pool
- Transport negotiations
- Development of agricultural farm accounts
- Negotiations on a green tax reform

Cooperation agreement with municipalities on green public transport

Establishment of Citizens' Assembly

September

Guidance on assessing the impact on climate, environment and nature

Cooperation agreement with Aalborg Portland

Announcement of new cross-cutting collaboration with climate partnerships

Climate proposal for road transport

- Implementation of climate initiatives from *Climate agreement for energy and industry, etc., 2020*
- Common method for measuring greenhouse gas emissions
- More climate-friendly diet
- Development of green skills in the labour force

Green research strategy

Long-term strategy for global climate action

1. Summary and assessment

The Danish Climate Act defines a target of reducing greenhouse gas emissions by 70% in Denmark by 2030 compared to 1990 levels. In the long term, Denmark must be a climate-neutral society by no later than 2050. The Climate Act also establishes that the climate effort must adhere to a number of guiding principles, *see box 1 and chapter 2*).

Box 1

Guiding principles for the climate effort, see agreement on a Climate Act of 6 December 2019

"The climate effort must adhere to a number of guiding principles:

- 1) *The climate challenges are a global problem. Therefore, Denmark must be a leading nation in the international climate effort, a nation that can inspire and influence the rest of the world. Furthermore, Denmark has both a historical and a moral responsibility to take the lead.*
- 2) *The realisation of Denmark's climate targets must be as cost effective as possible, taking into account the long-term green transition, sustainable business development and Danish competitiveness, sound public finances and employment, and that Danish business must be developed rather than diminished.*
- 3) *Denmark must show that a green transition is possible while maintaining a strong welfare society, where cohesion and social balance are secured.*
- 4) *The initiatives to be taken to reduce greenhouse gas emissions must result in real domestic reductions, but it must also be ensured that Danish measures do not simply relocate all of the greenhouse gas emissions out-side of Denmark's borders."*

Every year, the Minister for Climate, Energy and Utilities must prepare a climate programme for the Danish Parliament, the Folketing. The *Climate Programme 2020* is the first since the act was passed in June 2020, and thus the first overall programme to describe how the Minister for Climate, Energy and Utilities will substantiate the probability of achieving Climate Act targets.

The Climate Act sets out a number of requirements for the contents of the programme (see box 2).

Box 2

The Climate Act's requirements for the content of the climate programme

Section 7(2) The climate programme must include the following:

- 1) A status report on fulfilment of the national climate targets; chapter 4
- 2) The planned climate initiatives and measures, including the short-term and long-term effects and the projected future effect thereof; chapters 6 and 7
- 3) A report on the Danish Council on Climate Change's recommendations and the position of the Minister for Climate, Energy and Utilities on these recommendations: chapter 9
- 4) A status report on research and development of new climate initiatives: chapters 6 and 7
- 5) A status report on developments in climate science, including the latest reports from the IPCC: chapter 3
- 6) A description and status report on fulfilment of international climate targets: chapter 4
- 7) A global climate strategy: chapter 8

The assessment of whether it appears probable the national climate targets in the Climate Act will be reached is based on an overall assessment of the effects of initiatives in the short and long term. For some initiatives, it will be possible to estimate a tangible reduction effect, whereas for others, this will require an assessment of the expectations of the reduction effect based on technical assumptions.

The Climate Act defines that the climate effort must adhere to the guiding principles outlined in the Act. Accordingly, the consideration of these principles underlies the Minister's assessment. The substantiation also includes that the Government – as set out below – will present new initiatives to help achieve the Climate Act targets later in 2020 and subsequently.

Status report on the fulfilment of climate targets

Denmark has reduced greenhouse gas emissions through many years. In 2018, Denmark emitted 54.8 million tonnes of CO₂e². Thus, total greenhouse gas emissions were reduced by 29% in 2018 compared to 1990 (UN base year). The reduction is mainly driven by developments in the energy sector where emissions declined by 65% from 1990 to 2018.

However, the target of a 70% reduction by 2030 presupposes significantly higher reductions of emissions towards 2030. Achieving the target requires securing the same reduction volumes over the next ten years as have been achieved over the past thirty years with the energy sector transition. With the 2020 Finance Act, agreements on sector strategies for energy, industry and waste, the green housing agreement, the cooperation agreement with Aalborg Portland and the Fynsværket power station's decision to discontinue coal firing, Danish greenhouse gas emissions will be reduced by around 5 million tonnes of CO₂e by 2030. This means that we are currently 16.1 million tonnes of CO₂e short of achieving the 70% reduction target. In other words, the Government and broad parliamentary majorities, together with the business community and stakeholders, have achieved reductions corresponding to almost a quarter of the goal to be reached by 2030 in one year. The Government's climate initiative for road transport is expected to deliver an additional one million tonnes of CO₂e by 2030 and the Government will present additional proposals for agriculture, a green tax reform, etc., in 2020

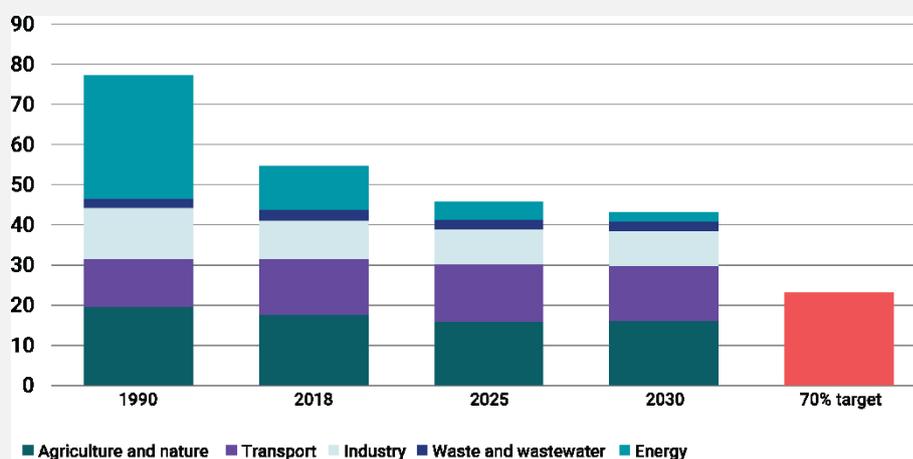
The Government will follow developments closely and will regularly consider new initiatives as technology and society develops.

The climate programme outlines how the Government will substantiate the realisation of the remaining reductions towards 2030 and beyond.

² 2018 is the most recent year for which final energy statistics have been published.

Figure 1

Total emissions by sector, 1990–2030, million tonnes of CO₂e



The Government's approach

The green transition is not only beneficial for the climate and the environment but it can also contribute to sustainable growth and new, green jobs. A smart and ambitious green transition, ensuring real greenhouse gas reductions without compromising on our welfare society and business sector competitiveness, will also make Denmark a leading nation. A leading nation that can show the way for other countries, both technologically and as a society. If others follow our lead, it can multiply the effects of actions taken to counteract global emissions. For this reason, the guiding principles of the Climate Act that define the framework for a green transition in Denmark that is financially responsible and socially balanced are key to the Danish Government's approach to the green transition.

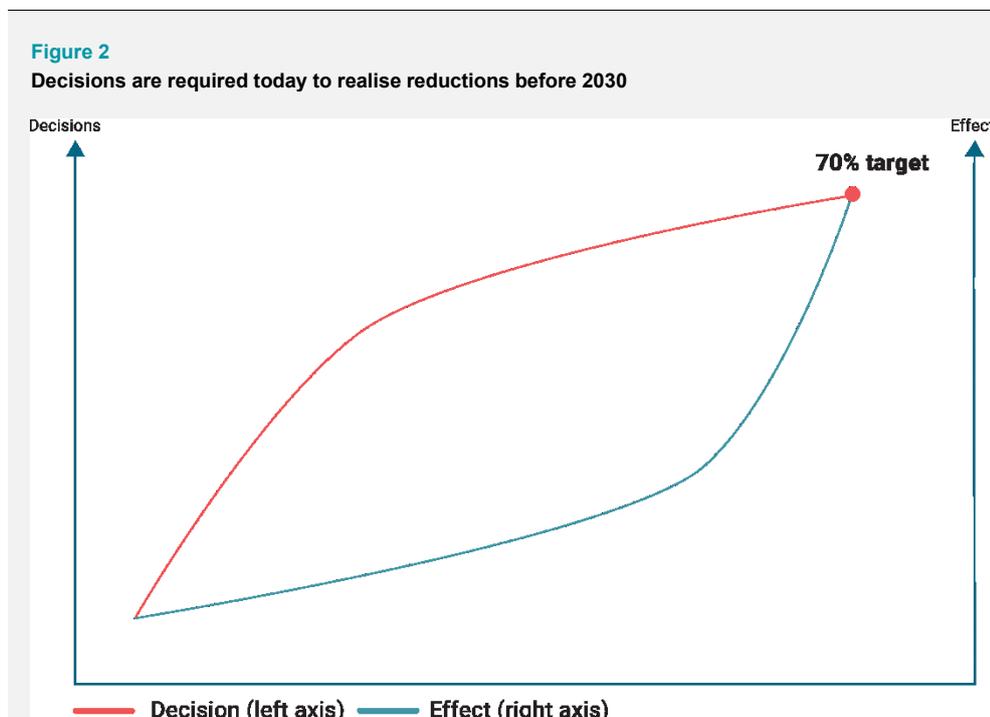
The Government's climate effort is based on acting now by investing in specific measures and development initiatives, which, in addition to general technological developments, will reduce the transition costs and ensure specific reductions towards 2030 and beyond. We must implement all initiatives that make sense to implement right now and that reduce greenhouse gas emissions. But the specific measures whose implementation and reduction effects are known cannot stand alone. We lack cost-effective and scalable measures to take us all the way to the goal. The new solutions will not come about on their own but require investments in technological development and regulation today. We must build on the successes of recent decades of reducing greenhouse gas emissions while maintaining economic growth (see chapter 5). Specific measures and development initiatives together constitute an investment path that will ensure fulfilment of the Climate Act targets combined with a wealthy and equal society in Denmark.

The Government therefore views the climate effort as continuous where many decisions are made early in the period but where development initiatives must be followed up with the implementation of specific measures later.

Decisions and effect are not necessarily simultaneous. Firstly, measures implemented now have a phasing-in period. By way of example, the *Danish Climate Agreement for Energy and Industry, etc.*, results in a reduction of 2.7 million tonnes by 2030, while the effect is 1.3 million in 2025. Secondly, development initiatives launched today and followed up regularly by political decisions will not have a reduction effect until in the longer term. The Government is also working on strengthening the framework for a smart green transition of Denmark through enhanced global and European climate regulation and partnerships with the business sector, municipalities, regions and the civil society. Overall, this will result in a reduction curve where reduction measures are implemented regularly, but where the specific reduction effect occurs later in the commitment period, as illustrated in figure 2. However, the decision curve will be steep in the first years towards 2030, as illustrated by the Government's adopted and planned policies.

The combined effect of the Government's climate action plan for 2020 will therefore only materialise over a range of years. This means that the Government will meet the Climate Act targets by making ambitious decisions already in 2020 with specific, measurable results in the short term while concurrently starting a number of development initiatives that will ensure further reductions towards 2030 and beyond.

This approach, supported by the Climate Act, ensures regular follow-up on the Government's climate effort several times a year so that Danish climate policy remains directed at fulfilling the national climate targets.



Costs will decline over time

Society in general will benefit from the positive climate effects of a reduction effort but there will be costs associated with the implementation of measures that can reduce greenhouse gas emissions and contribute to achieving the 70% reduction target by 2030.

The Danish Council on Climate Change and CEPOS have previously estimated the reduction costs for the national economy of achieving the 70% reduction target to be DKK 15–20 billion by 2030 and DKK 26 billion by 2030, respectively. The calculations were based on the then reduction deficit and a shadow price of DKK 800 and DKK 1,370, respectively, per tonne of CO₂ reduced.

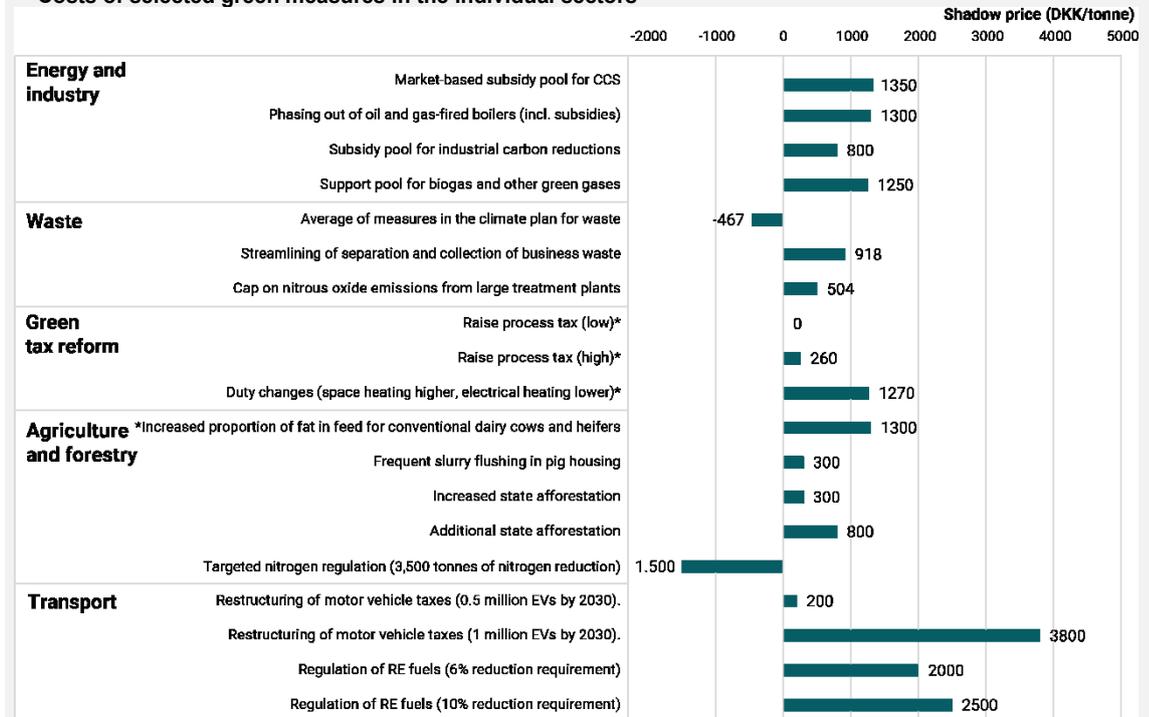
Based on the current reduction deficit of 16.1 million tonnes by 2030, a realisation with an average shadow price of DKK 1,000–1,500 per tonne will amount to DKK 16–24 billion, thus constituting a reduction cost for society of 0.7–0.1% of the current GDP per year. This should be seen in the context of estimated average annual growth rates for the Danish economy of 1.4% towards 2030. The Government also takes the approach that the green transition must be achieved without making Denmark poorer. The green transition must support sustainable growth and new, green jobs.

Estimates of reduction costs to society are subject to great uncertainty due to the currently available technologies and regulatory mechanisms. However, the above figures illustrate that it will be very costly to implement specific measures for realising the entire deficit early in the commitment period. The costs will be shouldered by businesses, households and/or the Government, depending on the measures selected. For instance, duties and technology-specific requirements impose costs on the business sector and consumers. Subsidies may compensate for such costs but leave a bill to be footed by the state, which will ultimately be financed, by consumers and businesses.

The costs vary greatly across areas, depending on issues such as the maturity of green technologies, see figure 3. The figure compares the total cost to society of a given measure that reduces one tonne of CO₂e (the so-called shadow price). By way of example, facilities that absorb carbon from large point sources carry an approximate reduction cost of DKK 1,350 per tonne of CO₂ reduced, while the costs of reducing emissions from passenger vehicle transport – depending on the number of EVs – are DKK 200–3,800/tonne.

Figure 3

Costs of selected green measures in the individual sectors



Note: Shadow prices for restructuring of vehicle registration duties are stated for the 2030 new registration year. The shadow price is higher for the 2021 new registration year, for instance. * The shadow prices for increasing process energy tax indicate marginal shadow prices.

Source: The Danish Ministry of Taxation, the Danish Ministry of Climate Energy and Utilities and the Danish Ministry of Environment and Food.

Figure 3 shows that the shadow prices of the green transition are generally highest in the transport sector and lower for agriculture and industry, for instance. In addition, there are considerable differences in the abilities of individual business sectors to reduce emissions. The shadow prices are lower for the agricultural sector than for the transport sector, but accelerating the green transition by imposing of high requirements and duties in this area will also entail a great risk of the greenhouse gas emissions being shifted abroad. This consequence will benefit neither Denmark nor the climate. Furthermore, we still do not know all the specific measures for meeting the 70% objective, but the Government's development efforts chart the path.

However, costs are generally expected to decline over time as the technologies develop and become globally available in the same way as the prices of solar cells, offshore wind and batteries have declined drastically in recent years (see chapter 5.1). We can therefore expect that measures, which are currently available but cost-intensive, become more cost-effective later in the commitment period due to developments.

The Government's climate policy

In keeping with the assessment of the Danish Council on Climate Change, the Government's climate policy is based on two tracks: implementation and development.

The implementation track involves decisions on efforts that generate specific greenhouse gas reductions in the short and long term for all sectors, see next section.

The development track comprises several concurrent efforts. Firstly, the Government already this year launches a number of development initiatives that support the development of green technologies and enable reductions towards 2030 and beyond. We currently have a vast number of green technologies but many need to become significantly cheaper before being commercialised. Some sectors are not yet aware of measures that can reduce emissions strikingly while observing the guiding principles of the Climate Act.

The Government's development initiatives therefore aim to contribute to developing and scaling up green technologies in the same way as Denmark has succeeded in developing and scaling up offshore wind technology to a competitive and eventually unsubsidised technology of a global scale.

The development track is supported by the Government's green research strategy, which ensures a targeted, strengthened Danish research effort in the green area, see chapter 6.3. Among the instruments in the strategy are new research missions in which accelerated research can contribute to promoting solutions that can reduce greenhouse gas emissions, thus contributing to fulfilling the Climate Act targets.

Another important element in the development track is the Government's international climate policy. Higher ambitions on a global scale and in the EU can contribute to the green transition in Denmark and the rest of the EU, see chapter 6.2. The effort to secure ambitious, cost-effective climate regulation in the EU and globally thus contributes to both reducing global greenhouse gas emissions and achieving the national targets set out in the Climate Act, among other things because common EU regulation ensures equal competitive conditions for Danish and other European companies and safeguards long-term framework conditions. At the same time, Denmark is advocating a high level of ambition in international climate regulation, which will minimise the risk of Danish companies and jobs relocating to countries with lower climate ambitions, see chapter 8.

At the same time, the Government launches a number of initiatives to support a nation-wide contribution to the green transition. Among other things, the Government enhances green transition partnerships with businesses, civil society and private individuals, which is also conducive to achieving the goal. By way of example, the Danish business community has set ambitious visions for the green transition through the Government's 13 Climate partnerships and is committed to implementing a number of reduction measures independently of governmental initiatives. These will be realised in the form of sector roadmaps later in the year, see chapter 6.1. The Government has also presented a range of initiatives to help inspire more climate-friendly behaviour among citizens and enterprises, see chapter 7.5.

The Government's overall approach to the green transition is illustrated in figure 4.

Figure 4
The Government's approach to the green transition



Effects and potentials in the Government's climate policy

The Government has initiated – and agreed with a broad majority of the parties of the Danish Parliament – a number of initiatives in the implementation and development tracks, which will contribute to achieving the ambitious climate targets.

Firstly, the Government has implemented a series of measures to contribute to changing the way of developing and implementing climate policy in Denmark – such as by setting up a new green Government committee. At the same time, the Government has launched a series of crosscutting efforts, several of which have been agreed by a majority of Parliament. The efforts include the Government's approach to central EU initiatives, research, launching Denmark's Green Future Fund and the Government's Climate partnerships and the Citizens' Assembly, see the box above.

In addition, the Government and a parliamentary majority have launched many initiatives for the individual sectors which will have an effect over a number years, such as agreements relating to the *2020 Finance Act*, *Climate Agreement for Energy and Industry, etc.*, and *Climate Plan for a Green Waste Sector and Circular Economy*. The sectors will also see the launch of a number of development initiatives that are expected to contribute further reductions towards 2030 as the technologies mature, see table 1.

Table 1 shows the effects of all the decisions made during this Government's term of office, which have significantly lowered the reduction deficit towards 2030. The decisions made in this term of office have brought about a significant decline of the

reduction deficit towards 2030 of approximately 5 million tonnes of CO₂e by 2030. The initiatives have reduced the deficit to approximately 16 million tonnes. The Government's climate initiative for road transport is expected to reduce emissions by an additional one million tonnes of CO₂e by 2030.

The Government has also recently presented a climate initiative for road transport; a long-term global strategy (*A green and sustainable world*)³ and a green research strategy⁴. By the end of the year, an agricultural sector strategy will follow⁵, together with strategies for green public procurement⁶ and sustainable construction⁷.

The Government will also propose a green tax reform that will further contribute to the reduction of greenhouse gas emissions in all parts of Danish society⁸. Altogether, the sector strategies make up the 2020 climate action plan, which charts the course for the green transition of individual sectors on the path towards achieving the 70% reduction target.

This means that more reductions will follow as the rest of the 2020 climate action plan is rolled out. With reduction efforts so far of 5 million tonnes CO₂e, the Government's transport initiative of one million tonnes and coming initiatives in 2020, the Government is thus well underway already in the first year of the Climate Act.

Table 1
Reduction decisions in the current government period

	Effect in 2025 (CO ₂ e)	Effect in 2030 (CO ₂ e)
2020 Finance Act	-	0.5*
Decision to discontinue coal firing at Fynsværket by 2022		0.5*
Sector strategy for waste	0.1	0.7
Sector strategy for energy and industry	1.3	2.7
Green housing agreement	-	0.05
Cooperation agreement with Aalborg Portland	0.25	0.5
Climate initiative for road transport	-	1**
<i>Coming climate initiatives in 2020</i>		
Sector strategy for agriculture and forestry		
Green tax reform		
Strategy for sustainable construction		
Strategy for green public procurement		

Notes: *Included in Baseline Projection 20. **See the footnote on the transport agreement.

It has not been possible to close the gap using known measures, which is why the Government has – with broad majorities in the Danish Parliament and through the Government's green research strategy – launched a number of development

³ Agreement on green road transport was reached on 4 December 2020.

⁴ Presented by the Government on 28 September 2020.

⁵ Will follow in 2021.

⁶ Presented by the Government on 29 October 2020.

⁷ Presented by the Government on 9 December 2020.

⁸ Agreement on a green tax reform was reached on 8 December 2020.

initiatives that are presented in the Climate Programme 2020. The development initiatives hold major potential that can be realised through development and scaling up in the years towards 2030 and beyond, see table 2.

By way of example, the climate agreement for energy and industry, etc., earmarks DKK 2.5 billion up to 2030 for targeted conversions from fossil energy and subsidies for energy-efficiency improvements. Investments are also made in the development of carbon capture and storage solutions. A technology that has the potential to reduce greenhouse gas emissions by 4–9 million tonnes by 2030.

Transport emissions can be reduced both through a greener selection of fuels, changed transportation habits and vehicle replacement, supported by specific initiatives such as lower EV taxes, CO₂ displacement⁹ requirements for fuels and a pool to promote the proliferation of green buses. The Government has also charted a specific course for Denmark, by significantly expanding offshore wind power, to support the development of Power-to-X (PtX), which has the potential to reduce emissions from the transport sector by 0.5–3.5 million tonnes of CO₂e by 2030 through the production of sustainable fuels. There is also a similar potential for biofuels, which are being promoted through measures such as the Government's proposed CO₂ displacement requirements for fuels and strategy for renewable energy and biofuels¹⁰.

In the agricultural sector, it is also deemed possible to reduce greenhouse gas emissions by developing new technologies and solutions capable of reducing climate and environmental impact of food production and farming. A number of new technologies and solutions are being developed, with selected research projects having great technical reduction potential, including in particular feed additives, slurry additives and biorefining. Agriculture is a focal point of the Government's green research strategy. The Government will also focus on development initiatives in its coming sector strategy for agriculture.

In addition, the Government is working for higher EU climate ambitions, which are expected to support greenhouse gas reductions in Denmark. The European Commission proposes to increase EU's climate target to at least 55% greenhouse gas emissions reductions by 2030 compared to 1990¹¹, implemented by means of a strengthened and possibly expanded emission trading system (ETS) and by supportive sector legislations such as increased CO₂ standards for light and heavy vehicles. Depending on how a possibly higher target will be implemented, this could lead to reductions in Denmark through for instance higher emission allowances prices and more energy-efficient vehicles.

⁹ "CO₂ displacement" in relation to transport means well-to-wheel greenhouse gas reduction.

¹⁰ The transport agreement of 4 December 2020 replaces the current fuel requirements for biofuels blend in with a CO₂ displacement requirement. The latter is a long-term, technology-neutral regulation that promotes the use of fuels with a high displacement of CO₂. This includes i.a. more advanced biofuels and new fuels such as Power-to-X. The estimated effect of the agreement is a reduction of 2.1 million tonnes of CO₂e by 2030.

¹¹ On 11 December 2020, the 27 European leaders met and made a specific, clear and ambitious commitment - the ambition to reduce EU emissions by at least 55% by 2030 from 1990.

The great potential associated with the Government's development track, together with the implementation track, helps demonstrate the probability of achieving the climate targets.

The Danish Council on Climate Change assesses that the implementation track can provide a reduction of 10.9 million tonnes, equating to approximately 60%, using known measures, while the development track must account for the remaining 10 percentage points. The climate programme shows that the Government has taken significant steps along the implementation track during the first year of the Government's existence. At the same time, the programme shows that there will be significant technical and economic barriers to implementing measures to eliminate most of the deficit in the initial years.

For this reason, the Government will regularly return to the sectors and the specific development initiatives launched towards 2030, with a view to specific decisions being made on further reductions towards 2030 and beyond.

Table 2	
Technical reduction potential towards 2030 (million tonnes of CO₂e)	
	Potential by 2030
Carbon capture, utilisation or storage	4-9
Green fuels	0.6- 5.1*
- Power-to-X	0.5-3.5 (and 1.5-7.5 in a long-term perspective) **
- Biofuels	0.5-3.5 (and 1.5-7.5 in a long-term perspective) **
- Biogas	0.6
Electrification and energy efficient in the industrial sector	2
Examples of development projects in the agricultural and forestry sector	4
- Feed additives	1
- Slurry additives	1
- Carbon binding in soil with biochar	2
Recycling and reduction of plastic waste	0.15
Cooperation agreements with businesses	0.2-0.4
Total (adjusted for overlaps)	9-16½

Note: As the potentials overlap, summing them up does not yield the total. The total takes account of these overlaps. * An expected overlap with the transport initiative of 0.8 million tonnes has been deducted from 'Green fuels' but not from the sub-categories as the distribution is uncertain. ** Including 1-4 million tonnes in international shipping and aviation which are not included in the 70% reduction target.

Source: Danish Ministry of Climate, Energy and Utilities (KEFM) and Ministry of Environment and Food of Denmark (MFVM)

The estimated technical reduction potentials are subject to considerable uncertainty, in terms of both size and overlaps between potentials. The estimated potentials do not take account of the costs of the technologies but are focused on technical feasibility and the theoretically assessed realisable scope by 2030. This means that the reduction potentials only give a picture of technical and theoretical possibilities for the technologies and solutions to reduce greenhouse gas emissions in the segments for which the technologies are deemed most relevant. Major technological advances, etc., can also result in significant reductions in other areas.

The Government's substantiation

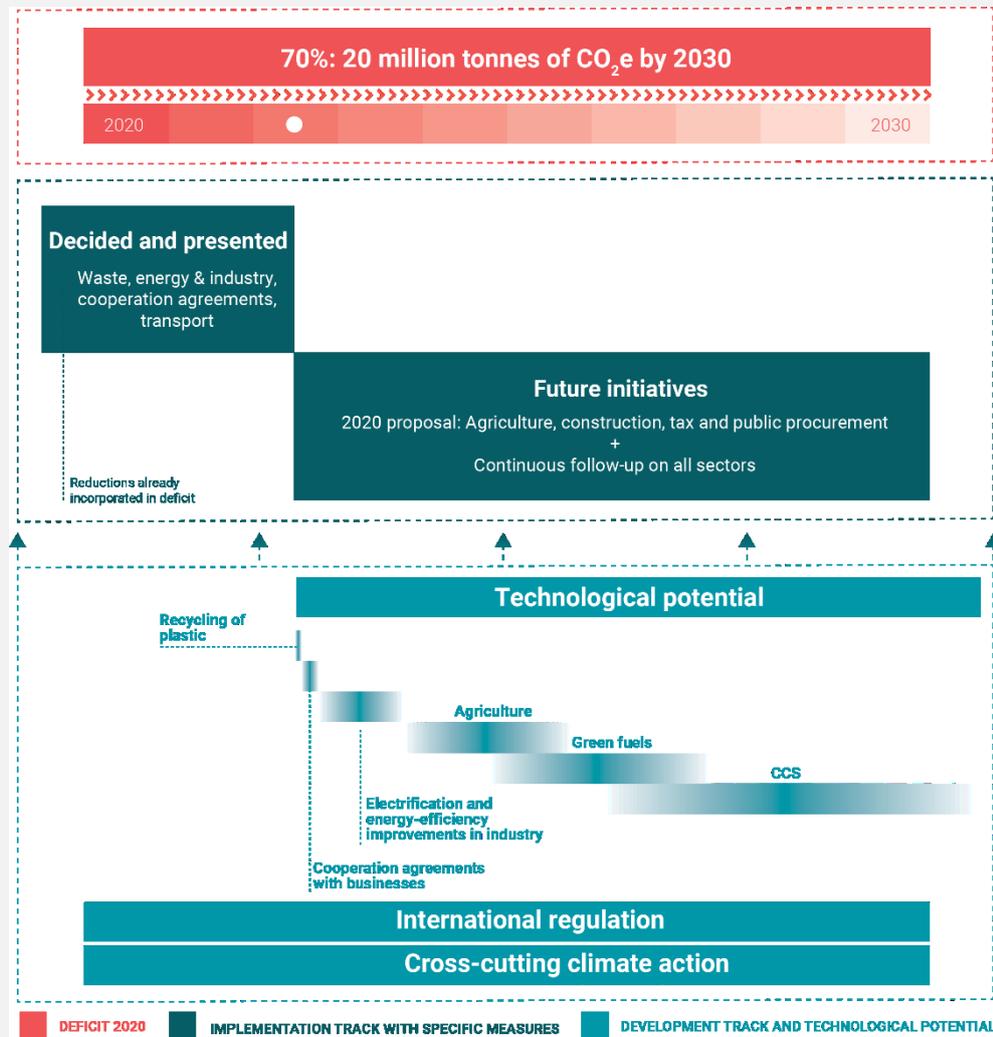
As mentioned, the Climate Act requires the Minister for Climate, Energy and Utilities to provide an assessment, in the climate programme, of whether it can be rendered probable that the national climate targets – a 70% reduction of Danish greenhouse gas emissions by 2030 compared to 1990 and climate neutrality by 2050 at the latest – are achievable.

Since the change of government in June 2019, initiatives have been adopted to reduce the deficit by approximately 5 million tonnes of CO₂e. Today, the deficit amounts to approximately 16.1 million tonnes of CO₂e. The Government has also put forward a transport initiative providing an additional one million tonnes of reductions, and the Government will put forward additional initiatives during 2020 that will involve decisions on additional reductions in the implementation track.

In addition, the Government has invested in a number of development initiatives with significant potential, which are eventually expected to be scaled up and converted into additional specific reductions.

Thus, it is the overall assessment of the Government that – with a climate effort based on specific measures here and now, combined with targeted investments in a multitude of development initiatives that can translate into specific reductions later in the commitment period, if followed up with policy decisions – it can be rendered probable that the Climate Act targets are achievable, see figure 5.

Figure 5
The Government's assessment



Overview of climate initiatives adopted since the Government took office

Box 3

Cross-cutting initiatives

The Government's climate policy working method

- Government-internal processes
 - *Green Committee*. This Government committee aims to ensure that climate, environment and nature considerations are strengthened and integrated into Governmental policies.
 - *Legislative programme*. The Government screens its annual legislative programme for green effects as a regular procedure.
 - *Guidance on assessment of impact on climate, environment and nature*. Determines guidelines for impact assessments on climate, environment and nature and for when initiatives must be presented to the Green Committee.
 - *Green economic models*. A new economic model (Green REFORM) is being prepared to assess the impact of economic activity on the environment, nature and climate and the economic impact of environmental, nature and climate policy initiatives.
- Government cooperation forums
 - 13 Climate Partnerships. Cooperation with the business community focused on how businesses and the Government can join forces to address climate challenges in a manner that also supports Danish competitiveness, export, jobs, welfare and prosperity without increasing inequity. Embedded in the Green Business Forum, the partnerships will contribute to strengthening dialogue between Government, business community and trade union organisations on possibilities and barriers in the green business transition.
 - Citizens' Assembly. The Citizens' Assembly has 99 members who will discuss dilemmas and solutions associated with citizen-centric climate challenges over the next two years.
 - Youth Climate Council. The Youth climate Council aims to infuse innovative thinking into Danish climate policy with input for future climate solutions. Appointed for two-year periods, the members come from all over Denmark, have different educational backgrounds and represent different approaches to climate challenges.

Cross-cutting EU initiatives and approaches

- Denmark is working for an ambitious implementation of the European Green Deal.
- Denmark is working for an ambitious European climate law.
- Denmark is working for an increase of the EU's 2030 climate target to at least 55% and for a cost-efficient implementation.

Green research strategy

- *Carbon capture, utilisation or storage (CCUS)*
Mission: Denmark will develop cost-effective solutions for carbon capture and storage that can be used to reduce CO₂ emissions and create negative emissions from large industrial emitters, waste incineration plants, biogas plants and biomass-based CHPs. Together with hydrogen generated by renewables, captured CO₂ can provide carbon for new climate-neutral solutions. The technical reduction potential for CCUS is estimated to amount to 4-9 million tonnes of CO₂e by 2030. It should be noted that there is an overlap with the PtX potential.
- *Power-to-X – Green fuels and fuels for transport and industry*
Mission: Solutions must be developed to convert electricity from renewable sources into products that can be used to reduce emissions from those segments of the transport and industrial sector that have no cost-effective alternatives to fossil-based energy. The technical reduction potential for PtX is estimated to amount to 0.5-3.5 million tonnes of CO₂e by 2030 and in the longer term 1.5-7.5 (including 1-4 in international shipping and aviation which are not included in the 70% reduction target). It should be noted that there is an overlap with the CCUS potential.
- *Climate and eco-friendly agriculture and food production*
Mission: Research and innovation efforts must target the development of technologies and solutions that can significantly mitigate the climate and environmental impact of conventional and organic food production and farming, including emissions from farm animals, use of fertiliser and soils, and reduce derivative effects on nature. Examples include technologies and more circular and sustainable solutions for sequestration of carbon in soils and forests, bio refining, including pyrolysis, new food and feed products with a lower climate and environmental footprint, plant breeding and supporting knowledge needs related to effective regulation, including documentation of emissions. A number of new technologies and solutions are being developed, with particular potential promised by research projects within feed additives, slurry additives and bio refining.

- **Recycling and reduction of plastic waste**

Mission: Research efforts must be directed at developing new technologies and production methods to ensure waste reduction and improve sorting and recycling of plastic waste into new plastic products. Development of plastic-containing products designed for recycling or reuse, both in terms of the chemical composition of the raw plastic product and additives as well as the composition of materials in the individual product. Technologies and solutions that yield high quality products in the recycled phase and low material loss, as well as sorting, reprocessing and reuse of plastic-containing textiles are deemed capable of reducing the amount of plastic and fossil textile waste by approximately 53,000 tonnes in addition to the reduction set out in Agreement on a Green Waste Sector and Circular Economy. If additional volume is taken out of the incineration cycle, Denmark will achieve its target of eliminating 80% of plastic waste from incineration by 2030, thus removing approximately 0.15 million tonnes of CO_{2e} from the waste incineration process by 2030.

Denmark's Green Future Fund

- **Vækstfonden.** DKK 4 billion for Vækstfonden, the Danish state's investment fund, will be used to launch a broad, long-term effort to build up a market for green venture capital. It will facilitate loan raising and equity financing for green entrepreneurs and growth companies to support the companies' development and convert good, green ideas into green jobs. Vækstfonden will mainly invest in funds and directly in companies but can also provide loan financing.
-
- **EKF Denmark's Export Credit Agency.** DKK 14 billion will be earmarked for EKF Denmark's Export Credit Agency to strengthen EKF's guarantees for Danish companies' exports of green technologies and solutions to the entire world. EKF Denmark's Export Credit Agency offers export financing to Danish exporters in the form of loans and guarantees.
-
- **The Danish Green Investment Fund.** The Danish Green Investment Fund will receive DKK 6 billion to co-finance investments promoting the green transition of Danish society, including energy savings, renewable energy installations and resource efficiency. The Fund offers loans and guarantees to private companies, social housing organisations and public undertakings and institutions, etc.
-
- **Investment Fund for Developing Countries.** DKK 1 billion for the Investment Fund for Developing Countries (IFU) will be used to promote investments and loans for green solutions in developing countries, including renewable energy, energy efficiency and securing clean water. IFU offers advice and venture capital to companies that want to do business in developing countries and emerging markets.

Green tax reform

- The Government will prepare a proposal for a green tax reform and convene negotiations about this in the autumn of 2020.

Box 4

Sector initiatives

Energy sector, construction and industry

Individual heating

Measures:

- The electrical heating tax will be reduced to the EU minimum rates
- Mandatory consumer connection to the natural gas grid will be eliminated and the socio-economic requirement will be adjusted (see also the box about main initiatives for district heating)
- Subsidy pools for phasing out oil and gas-fired boilers from 2020, including a pool for disconnection from the natural gas grid and roll-out of district heating.
- Initiatives targeted at consumer safety and safe implementation
- Energy-efficiency improvements

Development initiatives:

- Study of whether a special loan scheme can be set up for citizens without access to funding
- Effort to map oil and gas-fired boilers in municipal and regional buildings
- Analysis of potential for phasing out oil and natural gas from household heating
- Among the elements of the Green Research Strategy are a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as

well as business and research strengths and potentials. The themes include energy-efficient buildings, for instance, and the funds can thus support the development of solutions to reduce energy consumption and potentially greenhouse gas emissions.

- At European level, the Government is working to strengthening and extending the EU Emission Trading System to road transport and buildings to ensure a more uniform price signal across sectors and a more cost-effective climate regulation.
- Energy efficiency is also an EU priority for the Government. The Government supports the principle of “energy efficiency first” and cost-effective energy-efficiency efforts, particularly at reducing fossil energy consumption contributing towards the EU 2030 climate target and the climate-neutrality target by 2050 at the latest. There are also a range of EU requirements for energy utilities and buildings as well as for energy-using products such as boilers, household appliances, etc., which is a smart and cost-effective way to vastly reduce energy consumption.
- In Q3 2020, the European Commission is expected to launch a strategy to trigger “Aa Renovation Wave for Europe” aiming to break down long-standing barriers to energy and resource-efficient renovation. that the Renovation Wave will contribute to at least a doubling of the renovation rate, with guidance on applying the principle of “energy efficiency first” to follow in 2021.

District heating

Measures:

- The district heating sector's production bindings will be modernised, which includes rescinding the fuel binding to natural gas and the CHP requirement. The socio-economic requirement will also be adjusted so that district heating projects can be approved without having to compare them to fossil alternatives.
- The obligation to purchase district heating will be modernised to facilitate higher utilisation of excess heat and own RE production.
- The electrical heating tax will be reduced to the EU minimum rates, which involves eliminating the tax on electricity-based excess heat.
- The excess heat tax will be eliminated if the excess heat is certified or subject to a similar agreement scheme, that ensures energy-efficiency improvements at the excess heat provider.
- The agreement on increased utilisation of excess heating of 28 March 2019 is confirmed, including the price adjustment of excess heat.

Development initiatives:

- An analysis will be launched to illustrate the consequences of a possible ban on oil and natural gas for district heat production from 2030, including for security of supply, electricity and heating prices.
- The consequences of restricting consumption of biomass for electricity and heat production must be studied.
- An annual amount of DKK 2 million will be set aside for supporting initiatives in 2021 and 2022.
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials. The themes include intelligent solutions for integrating RE into heat production.

Electricity

Measures:

- Transition to market-driven expansion of solar panels and onshore wind power. Public procedures for onshore wind power, solar power and other green technologies will continue until 2021, and the support requirement will be analysed to qualify subsidy requirements in the future.
- Support for testing and demonstration. An additional DKK 237 million will be set aside for experimental wind turbines in 2021-24, with an analysis of how to best support the future framework for testing and demonstration.
- Administrative barriers will be removed to enable enterprises to increase their solar energy investments.
- Offshore wind turbine expansion. Advancement of farm 2 from the 2018 energy agreement, which will be located at Hesselø.

Development initiatives:

- Establishment of the world's first offshore renewable energy hubs. Establishment of offshore wind farms of 3 GW and 2 GW. Green power from the hubs and other sources will be used directly but eventually also converted into sustainable fuels (Power-to-X) that can decarbonise sectors which cannot be directly electrified, e.g. aviation, heavy-duty transport, certain industrial processes, etc.
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials. The themes include cost-effective renewable energy technologies for energy production with a potential to eventually reduce emissions in the industrial and transport sectors.
- Conclusion of one or more partnerships with Denmark's neighbouring countries about international links to ensure the establishment and profitability of the energy islands.
- Denmark participates actively in the North Seas Energy Cooperation (NSEC) with eight other countries and the Commission to expand offshore wind and grid development in the North Sea. Under the Danish presidency in December 2019, a new work programme for NSEC was adopted,

and the countries agreed, at the ministerial meeting in July 2020, on a joint declaration on the importance of offshore wind power for combating climate change. In the declaration, the North Sea countries also urge the European Commission to develop a legislative framework for cost-effective promotion of wind power.

- Influence the European Commission to develop a legislative framework for cost-effective promotion of wind power.
- In early 2021, the Government will present an electrification strategy with scenarios relating to the 70% reduction target.

Industry

Measures:

- Green transition and higher energy-efficiency improvements of the fossil production in the business sector. DKK 2.5 billion has been set aside towards 2030, targeted at conversions away from fossil energy, subsidies for energy-efficiency improvements of processes, etc., that cannot currently be converted into electricity as well as electrification and energy-efficiency improvements of internal transport (forklift trucks, tractors, etc.) in manufacturing industries, agriculture, etc.
- Support for biogas and other green gases. DKK 12.8 billion has been set aside over a 20-year period for a new scheme supporting biogas and other green gases that can be used where electrification is not possible.

Development initiatives:

- Analysis of green transition options where electrification is not possible. An analysis will be conducted to identify potentials and barriers to phasing out fossil fuels in industries, including the parts of the companies' consumption of energy for processing purposes where possibilities of phasing out fossil fuel are currently limited, e.g. high-temperature processes.
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials. The themes include energy-efficient industrial production, green fuels and materials for transport and industry that can eventually advance the phasing-out of fossil fuels in industry.

Future technologies

Measures:

- Market-based technology-neutral pool of DKK 800 million a year, phased in from 2024 for carbon capture and storage. The pool will contribute to cost-effective carbon reductions by enabling capture and storage. The pool can help reduce those emissions that are otherwise difficult to reduce, and carbon capture and storage from biomass can generate negative emissions. The pool is expected to contribute reductions of 0.9 million tonnes of CO₂/year from 2030 through capture and storage.
- Denmark has entered into a partnership with the Netherlands. The partnership will generate proceeds of at least DKK 750 million. The proceeds will finance a large-scale hydrogen production (PtX) subsidy scheme that will contribute to driving down hydrogen prices and boost Denmark's areas of expertise and competitiveness within energy.

Development initiatives:

- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials. The themes include green fuels and materials for transport and industry, hydrogen production and CCS (Carbon Capture and Storage).
- Overall PtX/CCUS strategy. The strategy will support the dissemination and development of green solutions for the future. The Climate partnerships and central stakeholders in relevant sectors will be involved in the work regularly.
- Green mission: PtX – Development of green fuels for transport and industry. Develop solutions to convert power generated by renewable sources into products that can be used to reduce emissions from segments of the transport and industrial sector that have no cost-effective alternatives to fossil energy.
- Green mission: Develop cost-effective solutions for carbon capture and storage that can be applied to reducing CO₂ emissions and creating negative emissions from large industrial emitters, waste incineration plants, biogas plants and biomass-based CHPs. Together with hydrogen generated by renewables, captured CO₂ can provide carbon for new climate-neutral solutions.
- At European level, the Government is promoting a decarbonised European energy system by 2050 with particular focus on increasing the use of renewable energy and the electrification of fossil energy consumption, such as by using Power-to-X technologies for the production of green hydrogen and other hydrogen-based products (e-fuels). Power-to-X technologies enable renewable energy to be converted into hydrogen, thus helping to decarbonise sectors that are difficult to electrify, such as heavy-duty transport and industry. A European focus on green gases and their reconversion can accelerate technological development, upscaling and price reductions of green solutions for the benefit of Danish companies and the national green transition.

Measures in other agreements

- Agreement on municipal and regional economies for 2021. Earlier this year, the Government and Local Government Denmark agreed to abolish the investment ceiling for 2020 due to the COVID-19 crisis. The Government and Local Government Denmark further develop this agreement in these exceptional circumstances by raising the investment ceiling for 2021 to DKK 21.6 billion, including a DKK 1 billion allowance for green investments, enabling municipalities to make green renovations of schools, nursing homes and roads and conduct energy renovations, etc. The Government and Danish Regions have also agreed to extraordinarily raise the regions' investment ceiling for 2021 by DKK 1 billion for green investments.
- Political agreement on green renovation of social housing. The agreement earmarks DKK 30.2 billion from the National Building Foundation for social housing sector renovation in 2020-2026. The agreement secures healthy, up-to-date social housing for the benefit of tenants and the recovery of Denmark's economy. Green renovations of social housing reduce greenhouse gas emissions by approximately 47,000 tonnes of CO₂e and generate 2,200 full-time equivalents in 2020, increasing to 5,900 in 2021 and 3,500 in 2022.

Waste

Measures:

- Increased and streamlined waste sorting. The Danish populace must sort their waste in the same way at home or at work, regardless of their respective municipality. The sorting comprises ten types of waste, and both households and businesses must use the same sorting guidelines and waste pictograms.
- Increased recycling of plastic waste. A requirement will be introduced for a recycling rate of at least 60% for collected plastic waste, sector partnerships with the restaurant industry and the agriculture and construction sectors.
- Strong recycling sector. The waste flows from households and businesses are to be gathered and organised more homogeneously. The framework conditions for the waste sector must be designed to facilitate investment in recycling plants rather than incineration plants.
- Less incineration and less import of waste for incineration. The capacity of Danish incineration plants must be reduced to match Denmark's waste volumes, which are expected to decrease once Danes separate more waste for recycling.
- The impact of the public water sector must be rendered more neutral in terms of energy and climate by reducing nitrous oxide emissions from wastewater, incentivising the public water sector to optimise the use of its own resources and other measures.

Selected development initiatives:

- The launch of an analysis into how waste taxes can help support further greenhouse gas emission reductions in the waste management sector and the transition to a circular economy.
- The establishment of a partnership to support the use of new technologies and digital solutions in the waste management sector to increase waste recycling.
- The launch of efforts to look into the possibilities of increasing the percentage of recycled plastic in new products.
- The Government supports the Commission's aim to achieve a circular economy in the EU which can support the achievement of climate neutrality by 2050 and the decoupling of growth from the consumption of resources, as resource extraction and processing are major sources of EU greenhouse gas emissions and because the transition can help ensure the EU's competitiveness in the long term.
- The Government is promoting the European Commission's expected quantitative waste reduction target proposal, and Denmark will be given quantitative reduction targets when such goals are set in the EU.
- The Government backs the idea that the EU should stop exporting waste from the EU and supports an ambitious revision of the EU Transport Regulation for cross-border transfer of waste to create a real single market for trading in secondary raw materials.
- The incineration of plastic in particular should be reduced in the EU. Accordingly, Denmark supports more ambitious goals for recycling of plastic and financing of recycling capacity in Europe as well as better product designs.
- The Government supports the establishment of standardised methods for efficiently collecting and sharing data between companies throughout the supply chain with a view to supporting their data-based business development possibilities and a common single market for secondary raw materials.
- The Government supports the Commission's focus on a coherent legal framework for a sustainable product policy that will support resource efficiency, circularity, security and a reduced climate and environmental footprint. Expanding the Ecodesign Directive to include additional product groups and criteria to support the circular economy, whilst continuing to pursue progress related to energy efficiency, and build on lessons learnt from the EU Flower Ecolabel and the

Commission's new life-cycle method Product Environmental Footprint (PEF) can be instrumental in this development.

- The Government supports the Commission's ambitions to revise the urban wastewater treatment and sewage sludge directives to intensify focus on energy production and recycling of nutrients.

Transport

Measures (road transport):

- DKK 180 million to cancel tax increases on electric vehicles and reduce the process energy tax on EV electricity.
- DKK 25 million to introduce a deduction in the tax basis for green company cars to reduce the price of green driving to and from work.
- DKK 75 million to accelerate the transition to green buses.
- DKK 100 million to promote cycling and a pool of DKK 50 million from which municipalities can apply for cycling project funding in return for a 50% co-funding.
- Implementation of DKK 50 million for charging points and DKK 24 million to promote commercial carriage and DKK 1 million to analyse the potential for transitioning domestic ferries to renewable energy as part of the realisation of the green transport pool in 2020 and an analysis of the pricing structure for publicly accessible charging points.
- Advancement of the remaining implementation of the green transport pool for 2020 and 2021, as well as enlarging the pool by an additional DKK 50 million, so that total priorities amount to DKK 425 million in 2020 and 2020 for charging points, promotion of green commercial carriage and transitioning to green ferries.
- The Government's climate initiative for road transport defines the framework for the future regulation of road transport that will generate a total reduction of one million tonnes of CO_{2e} across initiatives in the area of passenger cars and heavy transport.

Development initiatives and EU regulation:

- The Government will work out a strategy for the further development of the renewable fuels market in Denmark as a transitional scheme towards 2035.
- The Government is working for a strengthened emission trading (ETS) system that will be expanded to include road transport.
- The Government has encouraged the Commission to present a strategy for how the EU can promote the green transition of the transport sector, including a clear plan for phasing out petrol and diesel cars in the EU.
- The Government is working to adjust the European rules to support phasing out of petrol and diesel cars from 2030, including more ambitious CO₂ emissions standards for light and heavy vehicles, inclusion of road transport in the ETS sector, the necessary infrastructure, promotion of alternative fuels, including Power-to-X, and an ambitious approach to batteries.
- The Government will also work to forge an alliance between like-minded EU member states that can promote the phase-out agenda in the EU.
- Among the Government's initiatives to reduce aviation emissions is a call for the Commission to submit proposals for putting a price tag on aviation emissions, possibly including duties to ensure more sustainable air transport, and for the European Commission to analyse the possibility of reducing free allocations across sectors without leading to carbon leakage.
- The Government is actively working to ensure that potential future EU initiatives in the maritime sector will benefit the climate without jeopardising the competitiveness of Europe's maritime sector.
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials. The themes include transport, etc. The Green Research Strategy also singles out a mission on e-fuels – Power-to-X – which will develop solutions to convert electricity from renewable sources to products that can be used to reduce emissions from segments of the transport and industrial sectors that have no cost-effective alternatives to fossil energy.

Agricultural and forestry sector

Measures (Finance Act 2020):

- Restoration of carbon-rich farmland. The 2020 Finance Act agreement allocates DKK 2 billion towards 2029 for restoration of carbon-rich farmland. The implementation is expected to contribute to the setting aside of roughly 15,000 ha of farmland. The expected climate impact will be 270,000 tonnes of CO_{2e} a year by 2030.
- Afforestation. The 2020 Finance Act agreement allocated DKK 100 million to establish a climate forest fund enabling companies and individuals to contribute to the reduction effort. The fund's activities are expected to realise greenhouse gas absorption of 50,000 tonnes of CO_{2e} a year by 2030. The implementation of the 2021 rural development programme also includes a decision to double the funding of the existing private afforestation aid scheme to a total of DKK 70 million. It is assessed that the implementation will result in 2,000 ha of private afforestation. Afforestation of an additional 1,000 ha is assessed to increase greenhouse gas absorption by 5,000 tonnes of CO_{2e} a year by 2030.
- Reduction of nitrogen losses. It has been decided to introduce stricter exploitation requirements on livestock manure and reduce the nitrogen standards for crops cultivated on carbon-rich soils.

In addition, a ban on spraying, fertilisation and conversion of section 3 areas has been introduced. Together, the initiatives are expected to provide an annual climate effect of 90,000 tonnes of CO₂e by 2030.

- Farm accounts. The sector strategy for energy and industry allocates DKK 5 million in 2021 to contribute to the development of climate accounts at farm level that will support a cost-effective regulation of agricultural greenhouse gas emissions, but a major research effort remains to be done to facilitate the preparation of true and fair climate accounts at farm level.
- Research. The Government has started ten research projects with a budget of DKK 90 million to help identify future solutions for agriculture-related reducing greenhouse gas emissions. The funding comes from the climate research programme and is allocated for the period 2019–2021.

Development initiatives:

- Greenhouse gas emissions in the agricultural sector are currently not regulated in the EU but have been left to the Member States with differentiated national reduction targets for the non-ETS sectors. This reduces the incentive for climate friendly activities and entails challenges of carbon leakage risks internally in the EU. At European level, the Government is therefore working for a common European reduction commitment and strengthened regulation of agriculture and its LULUCF activities. The Government is working to ensure that the reform of the EU's common agricultural policy is used to support climate measures to reduce greenhouse gas emissions in the agricultural sector.
- A mission defined in the Government's green research strategy is the development of new technologies and solutions to reduce greenhouse gas emissions from food and agricultural production. To reduce the agricultural climate impact without just reducing agricultural production, it is necessary to develop new technologies and solutions that can reduce the climate impact per unit produced.
- Current research includes biorefining whereby biomass can be converted into biochar, oil and gas through pyrolysis. The biochar is worked into the ground where the carbon bound in the biochar degrades very slowly, thereby removing it from the atmosphere for many years. Subject to considerable uncertainty, the Technical University of Denmark (DTU) assesses that carbon binding from biochar has a technical reduction potential of up to 6 million tonnes of CO₂e a year. The Danish Council on Climate Change assesses that a third of the potential can be realised by 2030 if the technology works and can be scaled up.
- Other research projects seek to reduce methane emissions from farm animals' digestion through feed additives. For instance, researchers are developing the substance "x" which initial trials have indicated can lower methane emissions from cattle by 35–40%. If the substance can reduce methane emissions from cows' digestion by 40% and is applicable to all dairy cows, it has the potential to reduce emissions by about one million tonnes of CO₂e. In September 2019, an application was lodged for EU authorisation of the feed additive Bovaer, which is expected to be fed to conventional dairy cattle to reduce methane emissions from this source. The substance can potentially reduce methane emissions by up to 30% and is expected to be marketed in 2030 after completing the EU authorisation process.
- Finally, efforts are being made to develop slurry additives that can reduce greenhouse gas emissions. A current substance researched is "NoGas" with a preliminary potential to reduce methane emissions from slurry in animal housing and storage facilities by up to 50%, corresponding to approximately one million tonnes of CO₂e if used to treat half of all slurry in Denmark.
- It should be noted that these reduction potentials are subject to very great uncertainty, both in terms of effect, including overlaps, documentation and dissemination potential.

2. The Danish Climate Act

The Government and Venstre (Liberal Party of Denmark, Dansk Folkeparti (Danish People's Party), Radikale Venstre (the Danish Social-Liberal Party) Socialistisk Folkeparti (Socialist People's Party), Det Konservative Folkeparti (Conservative People's Party) and Alternativet (the Alternative) concluded the *Agreement on a Climate Act of 6 December 2019*. The agreement is implemented in the Climate Act adopted by the Danish Parliament on 26 June 2020. The Climate Act sets a target of reducing greenhouse gas emissions in Denmark by 70% by 2030 compared to a 1990 baseline, which is one of the most ambitious climate targets in the world. At the same time, the Climate Act sets a long-term target for Denmark to be a climate-neutral society by 2050 at the latest, taking into account the Paris Agreement target of limiting the global temperature rise to 1.5 degrees Celsius. For the first time, Denmark thus has a legally binding climate target.

The Climate Act targets and guiding principles

The Climate Act mandates the setting of a new national climate target every five years, with a 10-year perspective. This means that a new legally binding climate target for 2035 must be set in 2025. At the same time, the Climate Act stipulates that a new climate target must be no less ambitious than the most recently set target. This is in alignment with the “no backsliding” principle of the Paris Agreement. The *Agreement on a Climate Act* also sets out that in connection with the 2020 climate action plan, the Government must propose an indicative target for 2025.

The green transition of society entails multiple dilemmas and considerations that must be evaluated and prioritised. The parties to the agreement behind the Climate Act agree that the climate effort must adhere to a number of guiding principles, see box 5. The climate effort must take account of the long-term green transition, cost-effectiveness, sustainable business development, Danish competitiveness, sound public finances, employment and the welfare state's cohesion and social balance. At the same time, the Climate Act emphasises that climate challenges are global and that Danish climate solutions must inspire imitation and be implemented in a manner that does not simply move Denmark's greenhouse gas emissions and jobs abroad.

The Government's climate policy efforts are based on the framework and requirements defined by the Climate Act. In other words the work – as described in this climate programme – represents an ambitious strategy for achieving the reduction targets in the Climate Act with due consideration of the principles that are also part of the act.

Box 5

Guiding principles for the climate effort, see agreement on a Climate Act of 6 December 2019

The climate effort must adhere to a number of guiding principles:

- 1) *The climate challenges are a global problem. Therefore, Denmark must be a leading nation in the international climate effort, a nation that can inspire and influence the rest of the world. Furthermore, Denmark has both a historical and a moral responsibility to take the lead.*
- 2) *The realisation of Denmark's climate targets must be as cost effective as possible, taking into account the long-term green transition, sustainable business development and Danish competitiveness, sound public finances and employment, and that Danish business must be developed rather than diminished.*
- 3) *Denmark must show that a green transition is possible while maintaining a strong welfare society, where cohesion and social balance are secured.*
- 4) *The initiatives to be taken to reduce greenhouse gas emissions must result in real domestic reductions, but it must also be ensured that Danish measures do not simply relocate all of the greenhouse gas emissions out-side of Denmark's borders.*

Climate action plans at least once every five years

The Climate Act requires the Government to present a climate action plan with a ten-year perspective, at least once every five years, and, as a minimum, in connection with setting the climate targets. This climate programme is published as the *2020 Climate action plan* is being prepared.

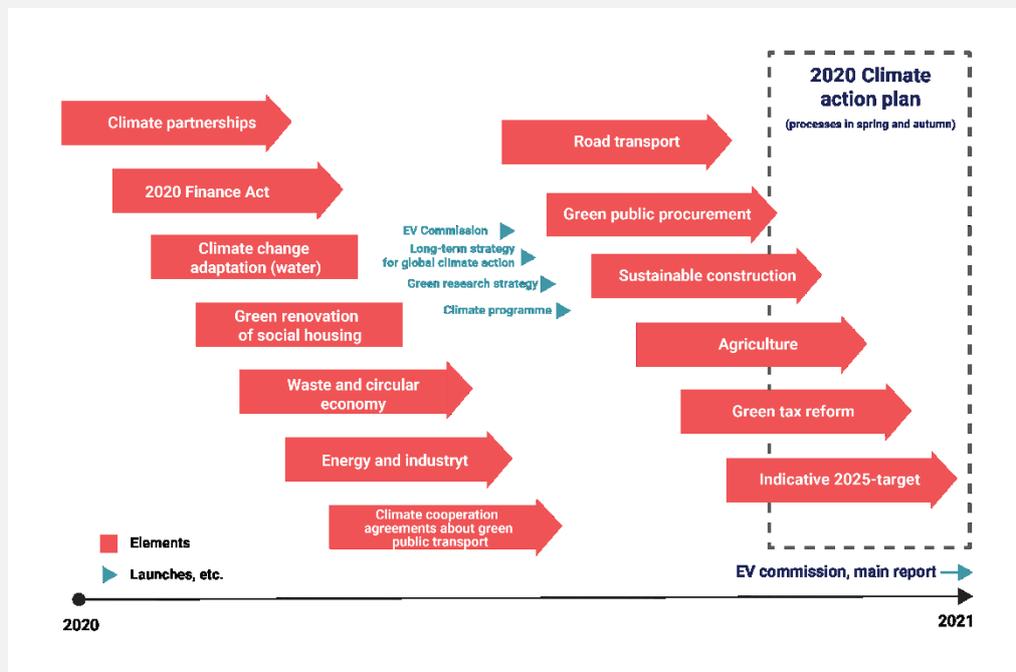
The green transition of the waste management, energy and industrial sectors has already begun. The Government and a wide swath of Denmark's political parliamentary spectrum have agreed on the *Climate plan for a green waste sector and circular economy* and *Climate agreement for energy and industry, etc., 2020*. The Government has also presented a climate initiative for road transport, a long-term global strategy *A green and sustainable world* and a strategy for green research. In addition, the Government has reached agreement on a 2020 Finance Act that gives priority to a stronger green transition, an agreement on a green renovation of social housing and cooperation agreements with the largest municipalities in Denmark on ambitious plans for the green transition of the public bus fleet.

In addition, the Government has entered into a cooperation agreement with the Aalborg Portland cement factory that secures greenhouse gas emission reductions of 0.5 million tonnes of CO₂e by 2030.

Later this year, an agricultural sector strategy will follow, together with strategies for green public procurement and sustainable construction. At the same time, the Government will present a proposed green tax reform.

Together, the sector strategies make up the 2020 climate action plan that charts the direction for the green transition in the individual sectors. Figure 6 lists the elements of the *2020 Climate Action Plan*.

Figure 6
Elements of the 2020 Climate Action Plan



The global dimension of the Climate Act

Denmark must be a leading nation in the international climate effort that can inspire and influence the rest of the world. Accordingly, the Climate Act has an international perspective as well. The act stipulates that Denmark must work actively for realisation of the Paris Agreement target of limiting the global rise in temperature to 1.5 degrees Celsius. The act also requires annual status reporting in the climate programme of Denmark's international obligations and presentation of a global climate strategy and that the annual climate status and projection must contain a separate global report on the international effects of the Danish climate effort. This includes information about reductions in international shipping and aviation and reductions from export of electricity from renewable sources. It could also include the effects of the Danish bilateral energy partnerships with large greenhouse gas emitters, and efforts are also made to illustrate the effects of Danish import and consumption. In addition, information the Danish climate finance for developing countries must be included. The purpose of the reporting is to make Denmark's global impact on the climate visible. This will include adverse and positive impacts alike, such as from consumption and specific bilateral country partnerships, respectively, where Denmark helps the countries' energy sectors, etc., in the transition process.

Climate Act year wheel

The Climate Act gives Denmark a fixed year wheel for Danish climate policy that obliges the incumbent Government at any time to work to meet the Climate Act targets. The year wheel elements are illustrated and explored in box 6. According to the year wheel, the Danish Council on Climate Change must advise the Government on the climate action. As part of the *2020 Finance Act Agreement*, The Danish Council on Climate Change has received increased funding to enhance the Council's climate-technical skills and capacity to assess socio-economic consequences of climate policy proposals.

Box 6
Climate Act year wheel



Annual recommendations from the Danish Council on Climate Change

The Council on Climate Change will advise the Government on climate efforts. The Climate Act strengthens this role by requiring the Council to annually assess the Government's climate efforts and make recommendations on the action going forward. In each year's climate programme, the Minister for Climate, Energy and Utilities must report on these recommendations and state the Minister's position on the recommendations. The Council on Climate Change must also assess whether the Government's climate efforts make it probable that the climate targets will be reached.

Climate status and projection

The Danish Energy Agency prepares each year a projection of the Danish greenhouse gas emissions. The climate status and projection will provide an overall situation report on the expected emissions after incorporating the measures decided in the past year and any new knowledge in the form of technological developments, framework conditions or new knowledge of the impact of activities on greenhouse gas emissions. The annual climate status and projection will include a separate global reporting on the international effects of the Danish climate effort.

Climate programme

The Climate Act requires the Minister for Climate, Energy and Utilities to annually present a climate programme to the Danish Parliament, see below on the annual climate programme.

Finance Act process

The climate programme will be presented to the Danish Parliament in September to enable it to be taken into consideration during Finance Act deliberations.

Report to the Danish Parliament

After the annual Finance Act agreement, the Minister for Climate, Energy and Utilities must present a report on the effects of the Government's climate policy and, in this connection, answer questions at an interpellation debate in the Danish Parliament. This enables the Parliament to annually assess whether the Government's initiatives are sufficient for the Parliament to assess that the obligation to act is fulfilled, see below on the annual climate programme.

Climate programme and duty to take action

The Climate Act requires the Minister for Climate, Energy and Utilities to prepare a climate programme for the Danish Parliament each year. The *Climate Programme 2020* is the first since the act was adopted and was thus written before the Climate Act year wheel had turned a full year.

The act makes requirements on the content of the programme to support regular follow-up on the aggregate climate effort in the period until the next sub-target. For instance, the climate programme provides a status report on the fulfilment of Denmark's climate targets and commitments and presents the Government's planned climate initiatives. The climate programme also has a global chapter that sets out the Government's long-term strategy for global climate action with specific initiatives to be launched in the coming year. Box 7 illustrates the Climate Act requirements for the contents of the climate programme and where these elements can be found in the *Climate Programme 2020*.

Box 7

The Climate Act's requirements on the content of the climate programme

Section 7(2) The climate programme must include the following:

- 1) A status report on fulfilment of the national climate targets (chapter 4)
- 2) The planned climate initiatives and measures, including short- and long-term effect and the projected future effect thereof (chapter 7)
- 3) A report on The Council on Climate Change's recommendations and the position of the Minister for Climate, Energy and Utilities on these recommendations (chapter 9)
- 4) A status report on research and development of new climate initiatives (chapters 6 and 7)
- 5) A status report on developments in climate science, including the latest IPCC reports (chapter 3)
- 6) A description and status report on fulfilment of international climate targets (chapter 4)
- 7) A global climate strategy (chapter 8)

In addition to these requirements of the climate programme, the Minister for Climate, Energy and Utilities must, in the climate programme, provide an assessment of whether it appears probable that the national climate targets will be reached.

Box 8

The Climate Act on duty to take action

The Act features the following elements:

- In the climate programme, the Minister for Climate, Energy and Utilities must provide her/his assessment of whether it appears probable that the national climate targets mentioned in Article 1 will be reached.
- If it cannot be deemed probable that the national climate targets will be reached, in the climate programme the Minister for Climate, Energy and Utilities must present new initiatives with a reduction effect in the shorter term and initiatives with a reduction effect in the longer term, which together chart a path toward fulfilment of the national climate targets.

In accordance with the Climate Act requirements, the Government demonstrates the fulfilment of the target by means of two tracks as illustrated in chapter 1.

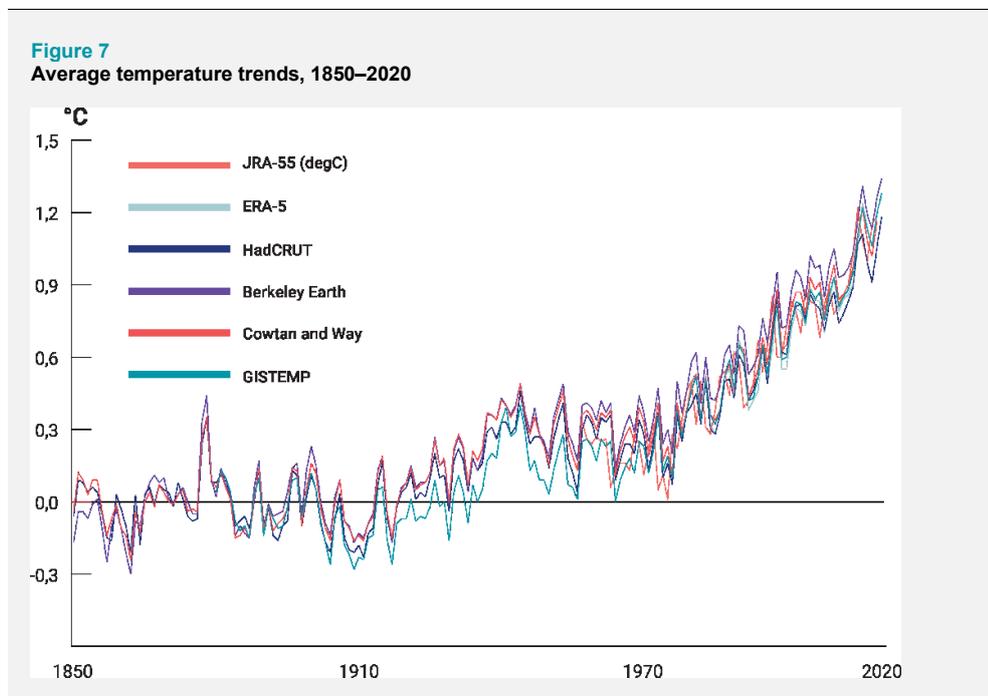
3. Latest climate-science developments

Every year, the Danish Meteorological Institute (DMI), the Government's climate science adviser, will provide a status report in the climate programme on the latest climate-science developments based on recent research and the latest conclusions from IPCC. DMI is Denmark's Focal Point of contact with the UN Intergovernmental Panel on Climate Change (IPCC), thereby ensuring visibility of Danish research internationally as well as embedment and dissemination of the latest international knowledge in a Danish context. DMI thus represents Denmark at IPCC meetings and keeps Danish scientists updated on how they can contribute to the preparation of IPCC reports. DMI also communicates knowledge from IPCC to the Danish Government and population. DMI is currently engaged in more than 70 national and international research projects, most of which are climate research activities, including research in oceanic climate conditions.

In this year's climate programme, DMI concludes, based on several IPCC reports, that the warming of the climate system is unequivocal and that the dominant cause is anthropogenic emissions of greenhouse gases. Current research also indicates that the melting of ice sheets and glaciers is causing sea levels to rise at an increasing rate with consequences for Denmark and the rest of the world.

Global temperature trends according to IPCC and the latest research

Warming of the climate system is unequivocal¹². Since the 1970s, the average global temperature has continuously increased decade by decade. The five latest years are the warmest ever recorded, and 19 out of the 20 warmest years have occurred since the year 2000, see figure 7.

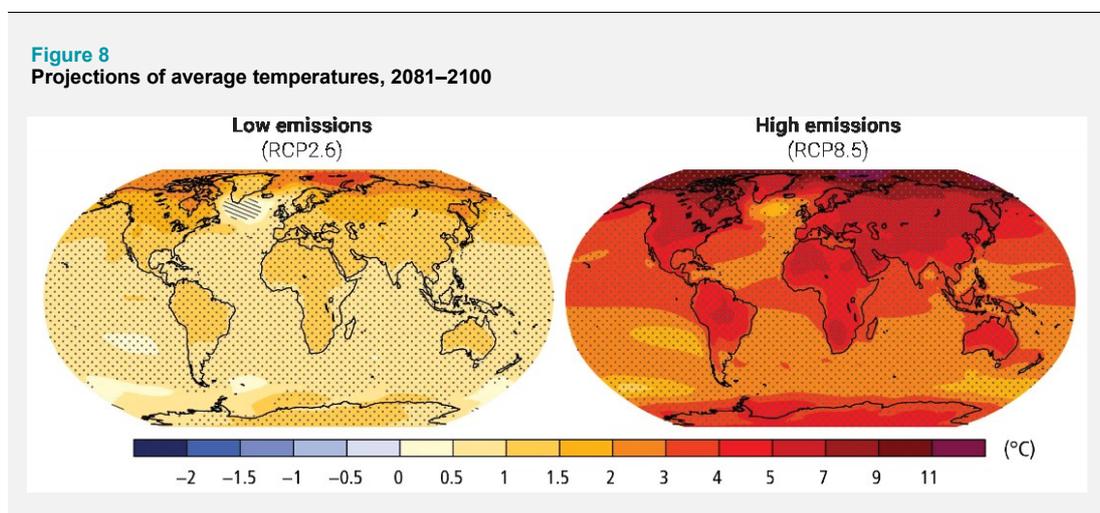


Note: Observed global mean temperature from 1850 to 2020. The graph shows temperature trends relative to the 1850-1900 reference period. Data from six different scientific sources are shown. The different data sets all show the same long-term trend and year-to-year variability.
Source: <https://www.metoffice.gov.uk/hadobs/monitoring/dashboard.html>

¹² IPCC AR5 WGI SPM 2013

Figure 7 shows clear interannual variability of the global mean temperature due to the natural variability of the climate system, such as the El Niño phenomenon in the Pacific region. However, since the middle of the last century, there has been substantial warming due to the fundamental energy imbalance in the climate: the Earth receives more energy from the sun than it emits back to space. This is due to anthropogenic enhancement of the greenhouse effect¹³.

The future trend of the global mean temperature depends on the emission of greenhouse gases. IPCC assesses¹⁴ that the global temperature increase by the end of the 21st century will be between 1.0 °C in a low emissions scenario (referred to as RCP2.6¹⁵) and 3.7 °C in a high emissions scenario (referred to as RCP8.5¹⁶) compared to the 1986–2005 reference period. Figure 8 shows the significant differences in warming around the globe. Warming is greater over land than over oceans, and the warming is more than twice the global average in the Arctic¹⁷.



Note: Annual average temperature 2081-2100 compared to 1986-2005; in low and high emission scenarios, respectively (RCP2.6 left, RCP8.5 right). The expected average global warming is 1.0°C for RCP2.6 and 3.7°C for RCP8.5. If the warming is instead viewed in relation to pre-industrial levels (1850-1900), this adds an additional warming of 0.6°C.

Source: IPCC AR5, 2013

Sea level

The sea level in general and specifically along Denmark's coastline is rising due to a warmer climate. Figure 9 shows the global average. The water column expands when ocean temperatures rise, and Greenland and Antarctic ice sheets and glaciers worldwide experience increased melt. The increasing melt of the Greenland ice sheet and minor glaciers in the Arctic has contributed roughly one-third of the global sea level rise observed in the period 1992–2017¹⁸. The IPCC assesses that anthropogenic activity is the primary cause of the rise in sea level since 1970¹⁹.

¹³ IPCC AR5 WGI Chapter 1 2013

¹⁴ IPCC AR5 WGII SPM 2013

¹⁵ RCP 2.6 is a low emissions scenario with comprehensive reduction measures, achieving global net zero emissions before the end of the century.

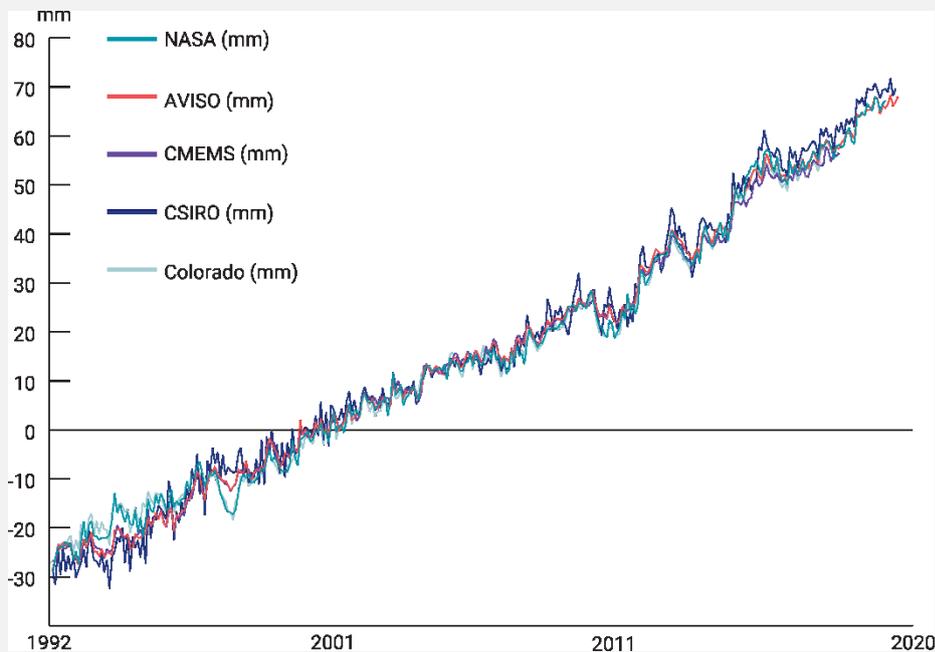
¹⁶ RCP 8.5 is a high emissions scenario without undertaking comprehensive reduction measures, in which emissions continue to increase towards the end of the century.

¹⁷ IPCC SROCC SPM 2019

¹⁸ AMAP, Climate Change Update 2019: *An Update to Key Findings of Snow, Water, Ice and Permafrost in the Arctic* (SWIPA) 2017.

¹⁹ IPCC SROCC SPM 2019

Figure 9
Sea level trend, 1993-2020



Note: Global sea level trends from 1993 to today. The mean sea level has risen by 2.5 mm on average annually throughout the period. However, the rise in the past five years has been roughly 4 mm per year. The graph shows the sea level relative to the 1993-2010 reference period, based on satellite data from five scientific sources. The different data sets all show the same long-term trend and year-to-year variability.

Source: <https://www.metoffice.gov.uk/hadobs/monitoring/dashboard.html>

The sea level is expected to rise at an increasing pace²⁰. This trend is expected to continue for several centuries to come, but the extent and rate will depend on greenhouse gas emissions. From mid-century and onwards, there will be a substantial difference in the extent and speed of the sea level rise, depending on greenhouse gas emissions, see figure 10. In the low emission scenario, the sea level is expected to rise by an additional 0.43 m towards 2100, whereas a high emission scenario will result in an expected rise of 0.84 m²¹. There is also a small, yet not insignificant, risk of considerably higher sea level rise, particularly due to potentially unstable ice masses in West Antarctica²².

In the long term (towards the year 2300), there is large uncertainty as to whether the deglaciation of Antarctica and Greenland will pass critical thresholds that initiate an irreversible loss of ice, resulting in major sea level rise. The threshold for triggering these potential tipping points could be global temperature increases of 1.5–2°C²³.

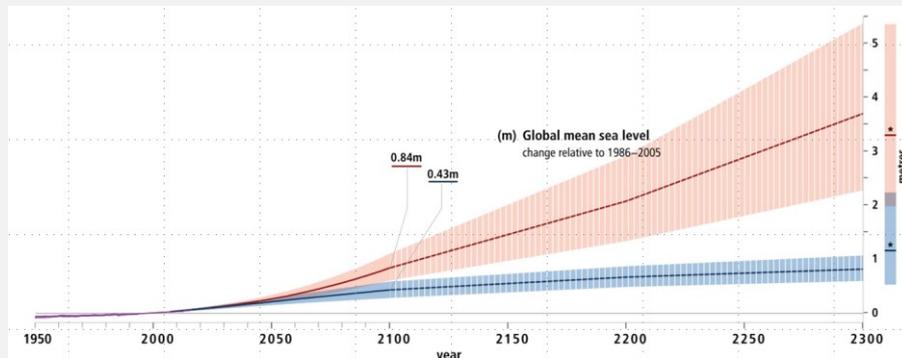
²⁰ IPCC SROCC SPM 2019

²¹ IPCC SROCC SPM 2019

²² IPCC SROCC Chapter 4 2019 and Bamber et al. "Ice Sheet Contributions to Future Sea-Level Rise from Structured Expert Judgment" Proceedings of the National Academy of Sciences 2019.

²³ IPCC SR15 SPM 2018

Figure 10
Future sea level



Note: Projections of global sea level towards the year 2300; low emission scenario RCP2.6 (blue) and high emission scenario RCP8.5 (red). The curves indicate the best estimates, and the shaded areas indicate the range of uncertainty. The two points: 0.84 m and 0.43 m indicate the expected sea level rise by 2100 for each scenario.

Source: IPCC SROCC 2019 Figure SPM.1 panel m

Other global consequences of climate change

In recent decades, global warming has already changed the climate in a way that impacts natural and human systems on all continents and oceans. A continued emission of greenhouse gases will cause further warming and permanent changes to the climate system.

As air gets warmer, it can hold more water vapour. More water vapour in the atmosphere will result in heavier and more severe rain showers and cloudbursts. This means that heavy precipitation events will generally become more extreme and frequent as global warming intensifies. The risk of flooding may increase. Due to the rising sea level throughout the 21st century and onwards, coastlines and low-lying areas will increasingly experience flooding and coastal erosion as well.

The frequency of droughts will probably increase in current dry areas. There are large regional variations in the future risk of drought. The Mediterranean, south-western USA and southern Africa are at increased risk of drought as the climate warms²⁴. As a consequence of warming and higher risk of heatwaves, droughts and less precipitation, several areas will also be at increased risk of wildfires. This risk is expected to increase with warming which is why a gradually larger proportion of the Earth's landmass will be more exposed to wildfires²⁵. In addition, climate change will significantly reduce water resources in the driest subtropical areas. The proportion of the world's population that experiences water shortages will therefore increase concurrent with global warming in the 21st century²⁶.

²⁴ IPCC AR5 WGI Chapter 12 2013

²⁵ IPCC SR15 Chapter 3 2018

²⁶ IPCC AR5 WGII and SR15 SPM

Climate change also threatens biodiversity. A large proportion of land and freshwater-dwelling species may risk extinction due to the projected climate change in this century and beyond. This is particularly the case when considering climate change together with other factors such as habitat change, over-exploitation of natural resources, pollution, invasive species and ocean acidification²⁷. The risk increases with the magnitude and rate of climate change²⁸. Tropical forests and rainforests have potential tipping points for warming beyond which a drying process begins that can cascade into abrupt, widespread forest dieback, e.g. in the Amazon²⁹.

In addition, the consequences of climate change are expected to increase the number of displaced people during the 21st century. Climate change may indirectly lead to a higher risk of violent conflicts by aggravating poverty and economic crises³⁰.

Latest special reports from the IPCC

The IPCC regularly publishes reports specifying the latest knowledge on climate change, as described in this section. Among the issues highlighted by the IPCC is that we must reach zero global greenhouse gas emissions by around year 2050 to limit global warming to 1.5 °C. In another special report, IPCC estimates that sustainable land management integrated with climate change adaptation and control can increase resilience to the consequences of climate change. The special report on the ocean and cryosphere in a changing climate highlights the rising global sea level at an ever-increasing pace. Box 9 presents the latest special reports.

Box 9

Latest special reports from the UN Intergovernmental Panel on Climate Change

IPCC special report on 1.5 °C

It matters greatly to the magnitude and consequences of climate change whether the temperature rise is limited to 1.5 °C or 2 °C. Even temporary warming above 1.5 °C may lead to long-lasting or irreversible change such as gradual, but irreversible melt of the Greenland and Antarctic ice sheets and loss of ecosystems. With the current ambitions reported by the countries of the world during the global climate negotiations, global warming will reach approximately 3 °C by the end of the century. Global carbon reductions of 45% by 2030 compared to 2010 are required to limit the warming to 1.5 °C by the end of the century, and emissions must reach zero by 2050.

IPCC special report on climate change and land

Agriculture, forestry and other land use activities represent 23% of anthropogenic emissions of greenhouse gases globally. The report establishes that climate change creates pressure on land with negative impacts on food security and biodiversity. Food production also has a significant climate impact. Sustainable land management integrated with climate change adaptation and control can increase resilience to the consequences of climate change.

IPCC special report on the ocean and cryosphere in a changing climate

Oceans warm and suffer from acidification and oxygen loss. At the same time, the sea level is rising faster than before, particularly due to the melting of glaciers and the Greenland and Antarctic ice sheets. Since 1993, ocean warming has more than doubled, and the global sea level is rising at an ever-increasing rate.

Future climate in Denmark

The average temperature in Denmark for the entire year has increased by approximately 1°C when comparing the last 30 years with the preceding 30 years (1991–

²⁷ IPCC SROCC SPM 2019

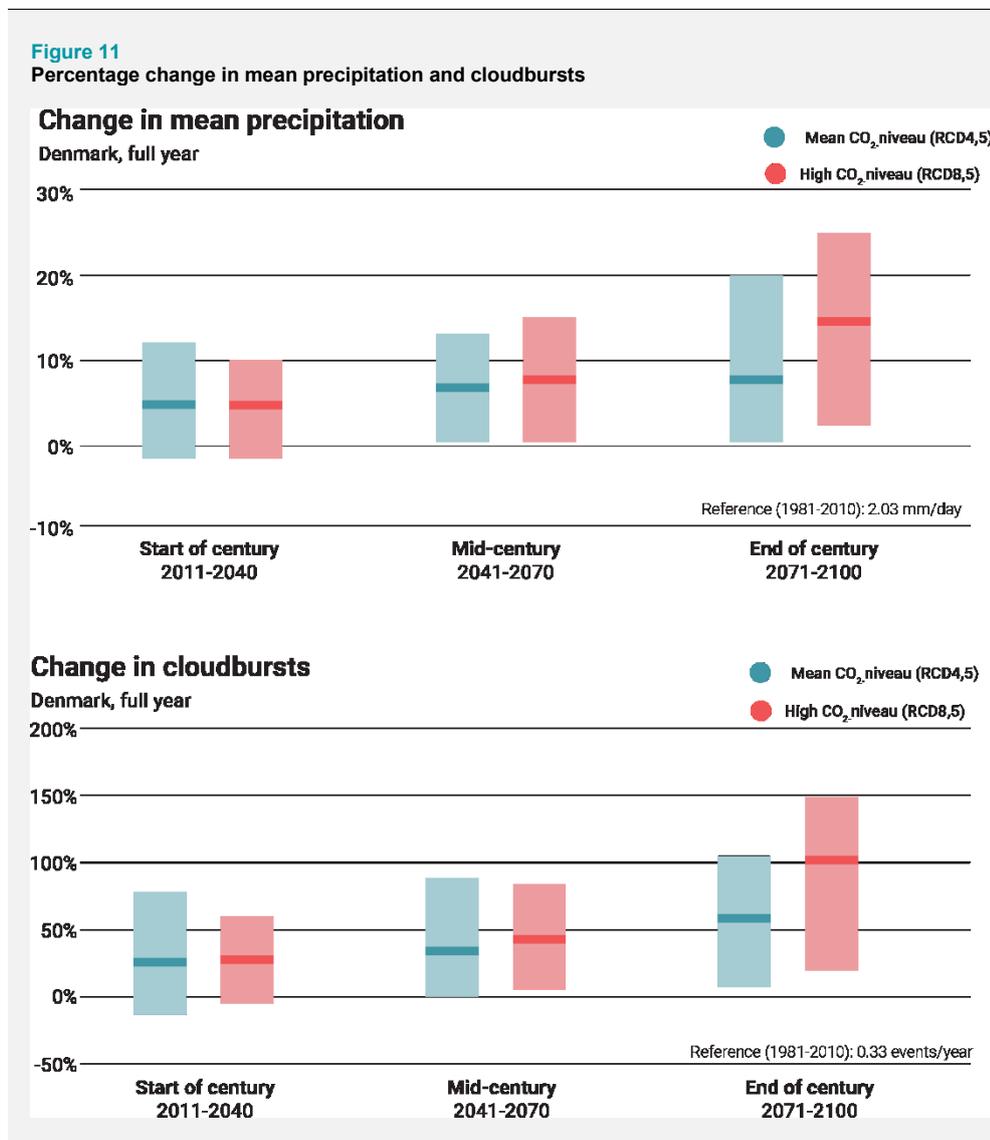
²⁸ IPCC SR15 SPM 2018

²⁹ IPCC SR15 Chapter 3 2018

³⁰ IPCC AR5 WGII SPM 2014

2020 compared to 1961–1990). Danish scientists make it clear that the temperature in Denmark will continue to rise in the future. DMI's Danish Climate Atlas³¹ shows that in a high emission scenario, the annual average temperature will increase by 3.4 °C leading up to year 2100 (compared to 1981–2010). Precipitation amounts will increase with warming, particularly in winter when precipitation is expected to rise by almost 25%, of which an increasing proportion will be rain.

Summer precipitation is expected to remain broadly unchanged, but will increasingly be in the form of heavy showers. Cloudburst events are expected to increase by 70% and the heaviest precipitation incidents will increase in intensity, see figure 11. Sea level may rise by approximately 50 cm by the end of the century and the rising sea level will increase the frequency of high water levels and storm surges. Storm surges that at present statistically occur once every twenty years could occur every one or two years.



³¹ <https://www.dmi.dk/klimaAtlas/>

Note: Percentage change in Denmark's annual precipitation between 1981-2010 and the future periods 2011-2040, 2041-2070 and 2071-2100 with a moderately low (RCP4.5, blue) and a high (RCP8.5, red) emission scenario. Average precipitation for the entire year (left), cloudburst frequency (right). The expected change by the end of the century for RCP8.5 is 14% (2-25%) for average precipitation and 70% (20-150%) for cloudbursts.

Source: DMI's Danish Climate Atlas, <https://www.dmi.dk/klimaAtlas/>

Danish climate change research at the north and south poles

The National Centre for Climate Research at DMI gathers the climate research capacities of Denmark, Greenland and the Faroe Islands and initiates research projects aiming to fill the knowledge gaps in the field of climate research, including the impact of climate change on ice loss processes in Greenland and from Arctic and Antarctic glaciers, see box 10.

Box 10

National Centre for Climate Research

The National Centre for Climate Research (NCKF) was established at DMI in 2020 with a grant from the research reserve. The centre gathers the climate research capacities of Denmark, Greenland and the Faroe Islands and initiates interdisciplinary research collaboration embracing universities, agencies, institutions and decision-makers. The NCKF research projects aim to fill the gaps in international knowledge of climate change. Among the issues requiring deeper understanding are the processes causing the melting of the Greenland Ice Sheet and Arctic and Antarctic glaciers which greatly impact global sea level changes. We also need to conduct research into the impact of climate change on the circulation of North Atlantic and Arctic Ocean currents. NCKF has initiated a number of research projects that aim to enhance the knowledge within these important fields of climate science.

Both the Arctic and Antarctic regions are undergoing striking changes due to climate change which affect the entire globe – particularly in terms of contributing to a rising sea level³². In recent years, Danish scientists have contributed to a great number of international studies on ice loss at the poles. One of these projects shows that Arctic warming over the past four decades has taken place at a rate that has only previously occurred in rare periods of sudden warming during the last ice age³³. Another detailed study of the Greenland Ice Sheet concluded that the actual ice loss up to now has followed the high emission scenario (RCP 8,5)³⁴.

Arctic temperatures are rising two or three times faster than the global average³⁵. The latest research emphasises that warming has already resulted in significant changes in the Arctic: reduced sea-ice cover, shorter snow cover season, increased melting of the ice sheet and smaller glaciers, increased water flow in Arctic rivers and wider vegetation cover in the Arctic tundra³⁶. Melting of the Greenland Ice Sheet raises the global sea level by 0.7 mm per year on average (equating 250 billion tonnes of ice)³⁶. Rising temperatures, changing snow and sea-ice cover and new weather extremes are affecting Arctic flora and fauna, both in the ocean and on land³⁷. The IPCC mentions the Arctic and the region's indigenous people as par-

³² IPCC SROCC SPM 2019 and AMAP, Climate Change Update 2019

³³ Jansen et al., "Past Perspectives on the Present Era of Abrupt Arctic Climate Change." Nature Climate Change, 2020.

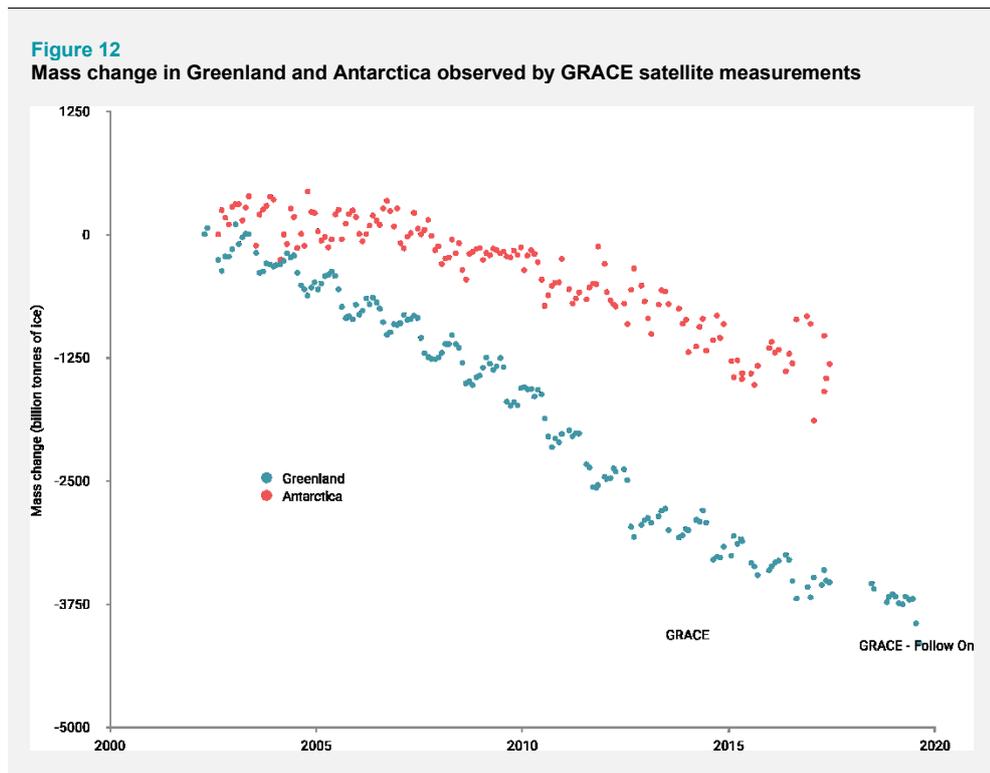
³⁴ The IMBIE Team. "Mass Balance of the Greenland Ice Sheet from 1992 to 2018." Nature, 2019.

³⁵ IPCC SR15 SPM 2018

³⁶ IPCC SROCC SPM 2019 and AMAP Climate Change Update 2019 and NOAA Arctic Report Card 2019 (<https://www.arctic.noaa.gov/Report-Card>).

³⁷ IPCC SROCC SPM 2019

ticularly endangered and unique systems which are at particularly high risk if warming continues³⁸. The latest climate models indicate that we will see the first sea-ice free summer in the Arctic by 2050 – even with a rapid, significant reduction of global greenhouse gas emissions³⁹. Figure 12 illustrates this mass loss from the ice sheets at the north and south poles.



Note: The figure shows month-by-month mass changes for the Greenland (blue) and Antarctic ice sheets (red). The changes are stated in gigatonnes (1 gigatonne = 1 billion tonnes). 100 gigatonnes equals 0.28 mm global sea level rise. Based on satellite data from GRACE until 2016 and GRACE-Follow On after 2016.

Source: DTU-Space and polarportal.dk

The estimated future sea level rise is greater than previously assumed due to a higher than expected contribution from Antarctica⁴⁰. The Antarctic ice sheet, compared to the Greenland Ice Sheet, has a larger influence on the sea level along the coasts of Denmark. Antarctic melting has increased in recent years: Since 2012, the ice sheet has lost about 200 billion tonnes of ice a year. Overall, the Antarctic ice sheet alone has caused a rise in the global sea level of approximately 7.5 mm since 1992⁴¹. Parts of the Antarctic ice sheet are in direct contact with the ocean and can therefore also be impacted by increasing ocean temperatures. In West Antarctica, this entails a risk of rapid retreat, irreversible ice loss and a significant rise in sea level. Available data and current knowledge are insufficient for a quantitative assessment, but it is highly improbable that this will lead to a complete loss of

³⁸ IPCC SR15 SPM 2018

³⁹ SIMIP Community. "Arctic Sea Ice in CMIP6" Geophysical Research Letters, 2020.

⁴⁰ IPCC SROCC SPM 2019

⁴¹ The IMBIE team. "Mass Balance of the Antarctic Ice Sheet from 1992 to 2017" Nature, 2018.

the ice sheet during this century, however⁴². The Antarctic ice sheet is the primary cause of uncertainty in the current projections of the global sea level; nevertheless, the melting from Antarctica is expected to be the biggest contributing factor to rising sea levels in the 21st century⁴³.

⁴² IPCC AR5 WGI Chapter 12 2013

⁴³ IPCC SROCC SPM 2019

4. Status report on the fulfilment of Denmark's national climate targets and international commitments

Denmark's climate commitments relate to both the national targets on the path to a climate-neutral society, defined in the Climate Act, and international commitments following from the Paris Agreement's global temperature targets and Denmark's EU commitments. There are also other international commitments that impact greenhouse gas reductions in Denmark, such as target percentages for RE and energy-efficiency improvements.

This chapter provides an overall status report of Denmark's fulfilment of its climate targets and commitments, including that the agreements on sector strategies for waste, energy and industry and the cooperation agreement with Aalborg Portland set out additional reductions of 16.1 million tonnes of CO_{2e} towards achieving the 70% reduction target by 2030. This chapter also illustrates the great uncertainty associated with making projections that extend many years into the future.

International climate targets

The United Nations Framework Convention on Climate Change (UNFCCC) from 1992 and the Paris Agreement adopted at COP21 in 2015 define the future framework for global climate action. The overarching target of the Paris Agreement is to keep the global temperature rise well below 2 degrees C and strive to limit it to 1.5 degrees C, become more resilient to the consequences of climate change, redirect financing flows towards low-carbon societies and achieve climate neutrality in the last half of this century. The Paris Agreement commits the parties to present Nationally Determined Contributions (NDC), which will contribute to the overall reduction of greenhouse gas emissions. Denmark negotiates through the EU in the climate negotiations. This means that the EU has presented a single combined climate contribution on behalf of Denmark and the other member states: reduce greenhouse gas emissions by at least 40% by 2030 compared to the 1990 baseline. Denmark is working to get the EU to boost its 2030 climate contribution to at least 55% and to achieve climate neutrality in both the EU and its member states by 2050 at the latest.

In addition to the EU's NDC, many European countries have set national sub-targets and long-term reduction targets, see table 3. The targets do not compare directly, as they may include different emissions, for instance, but the box shows that Denmark is not alone in its ambitious green-transition targets. By leading the way with an ambitious, socially balanced and cost-effective green transition, Denmark and other EU member states can inspire others to raise their ambitions, too.

Table 3
National climate targets in other EU member states

Country	Long-term target*	Sub-target
Finland	80% greenhouse gas reductions by 2050	Climate neutrality by 2035
France	Climate neutrality by 2050 with a reduction of greenhouse gas emissions of at least 83.3%	
Republic of Ireland	Climate neutrality by 2050	51% by 2030
Netherlands	95% reduction of greenhouse gas emissions by 2050	49% by 2030
Portugal	Climate neutrality by 2050	-
Spain	Climate neutrality by 2050 (including at least a 90% reduction of greenhouse gas emissions)	23% by 2030
Sweden	Climate neutrality by 2045	63% by 2030 75% by 2040
Germany	Climate neutrality by 2050	55% by 2030
Hungary	Climate neutrality by 2050 at the latest	40% by 2030
Austria	Climate neutrality by 2040	

Note: *: Targets stated relative to the 1990 level. Not all targets are comparable due to differences in scope and methodology.

Source: Danish Ministry of Climate, Energy and Utilities.

Denmark's national climate targets and international climate commitments

In an effort to drive the national and international climate agendas, Denmark has committed to a number of national and international climate objectives. Table 4 gives an overall view of the targets.

Table 4
Denmark's climate policy commitments

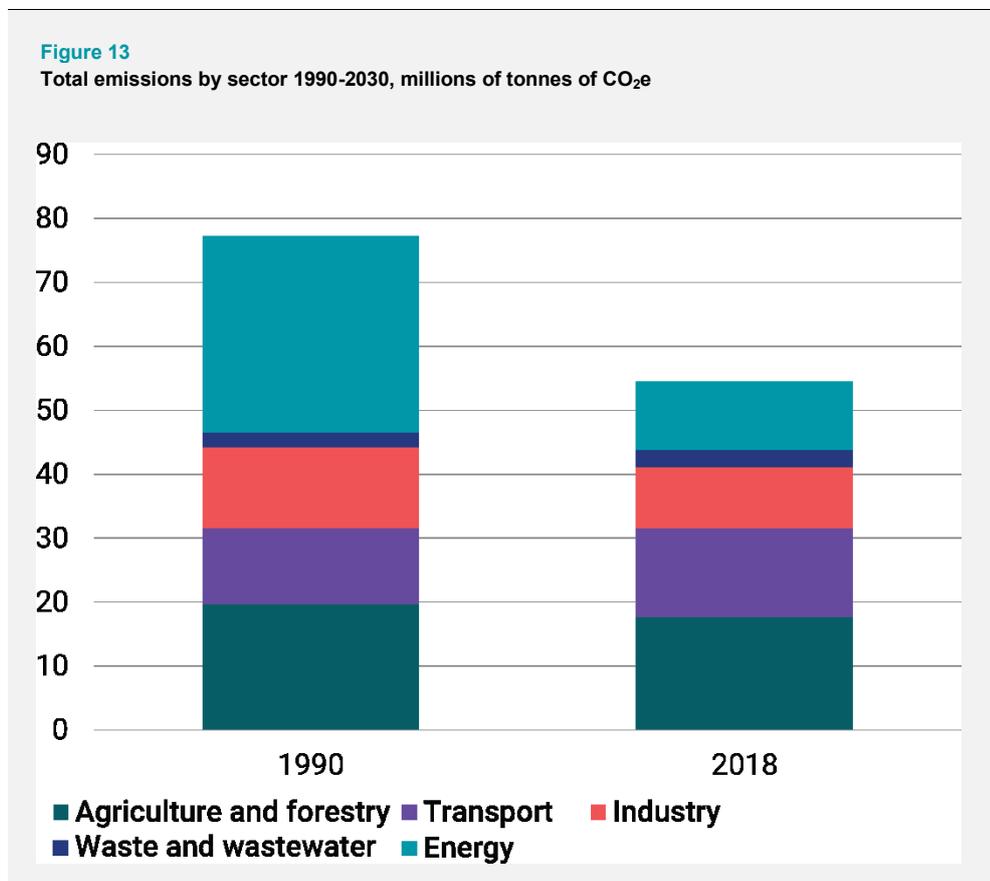
	Keep the average global temperature rise well below 2 °C compared to pre-industrial levels with the intent to limit the temperature rise to 1.5 °C.
Long-term framework commitments	The EU reduction target for 2030: at least a 40% reduction of greenhouse gas emissions relative to a 1990 baseline.
	2030 target
EU commitments	39% reduction of greenhouse gas emissions relative to 2005 in the non-ETS sectors.
Danish commitments	70% reduction of greenhouse gas emissions relative to 1990.
	2050 target
EU commitments	The EU has set a target for the EU as a whole to be climate-neutral by 2050.
Danish commitments	The Climate Act's long-term objective of climate neutrality by 2050 at the latest.

Denmark has also set a number of targets for energy and transport, including the phasing out of coal for power generation towards 2030, which the Danish Energy

Agency assesses to be achieved without new initiatives in its latest Baseline Projection.

Denmark’s greenhouse gas emissions – historical perspective

Denmark emitted 54.8 million tonnes of CO₂e in 2018⁴⁴, see figure 13. This represented a reduction of Denmark’s total greenhouse gas emissions in 2018 by 29% compared to 1990 (Denmark’s UNFCCC baseline year). This reduction is mainly driven by developments in the energy sector whose emissions are down by 65% from 1990 to 2018, corresponding to a decrease in emissions from this sector of some 20 million tonnes of CO₂e over the period.



Status report on the achievement of the Climate Act targets

The latest projection of Denmark’s greenhouse gas emissions indicates that without new measures, the emissions will amount to 43.1 million tonnes of CO₂e by 2030⁴⁵, see figure 14. This corresponds to a 44% reduction of Danish greenhouse gas emissions by 2030 compared to 1990, of which the measures in the 2020 Finance Act and the Fynsværket power station’s decision to discontinue coal firing by 2022

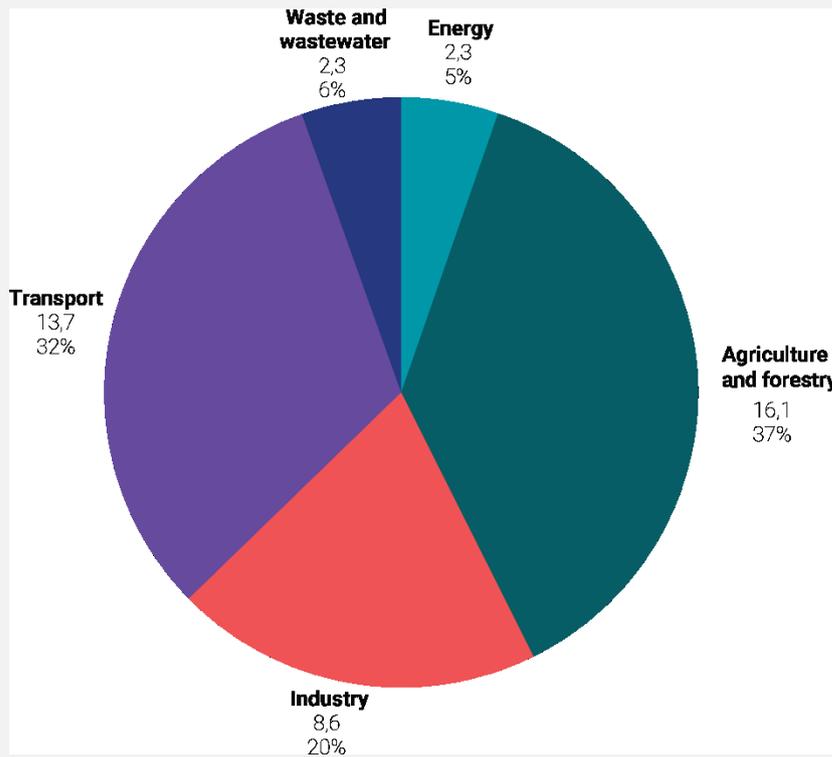
⁴⁴ 2018 is the most recent year for which final energy statistics have been published. The figure covers total emissions, including LULUCF

⁴⁵This figure does not include sectoral strategies for waste and energy.

contribute a reduction of Danish greenhouse gas emissions of some one million tonnes of CO₂e.

Figure 14

Total expected emissions in 2030 by sector, millions of tonnes of CO₂e



The sector strategies for waste and energy from June 2020 are estimated to help reduce Danish greenhouse gas emissions by an additional 3.4 million tonnes of CO₂e by 2030, see table 5. On top of this are the agreement on green renovation of social housing made by the Government in May 2020, which provide reductions of about 0.05 million tonnes of CO₂e by 2030, and the cooperation agreement with Aalborg Portland that reduces 2030 emissions by 0.5 million tonnes of CO₂e. This brings the 2030 greenhouse gas emissions down to 39.2 million tonnes of CO₂e. Including these agreements, emissions will consequently have been reduced by about 49% in 2030 compared to 1990.

Table 5
Agreements with a climate effect over the last year

Agreement	Effect in 2025 (million tonnes CO ₂ e)	Effect in 2030 (million tonnes CO ₂ e)
2020 Finance Act	-	0.5*
Sector strategy for waste	0.1	0.7
Sector strategy for energy and industry	1.3	2.7
Green housing agreement	-	0.05
Cooperation agreement with Aalborg Portland	0.2	0.5

Note: *Included in Baseline Projection 20.

A situational snapshot of the reduction deficit for achieving the Climate Act targets of a 70% reduction by 2030 compared to 1990 shows that greenhouse gas emissions will be reduced by an additional 16.1 million tonnes of CO₂e by 2030 after incorporating the sector strategy for waste and energy and industry and the cooperation agreement with Aalborg Portland, see table 5⁴⁶.

Indicative sub-target for 2025

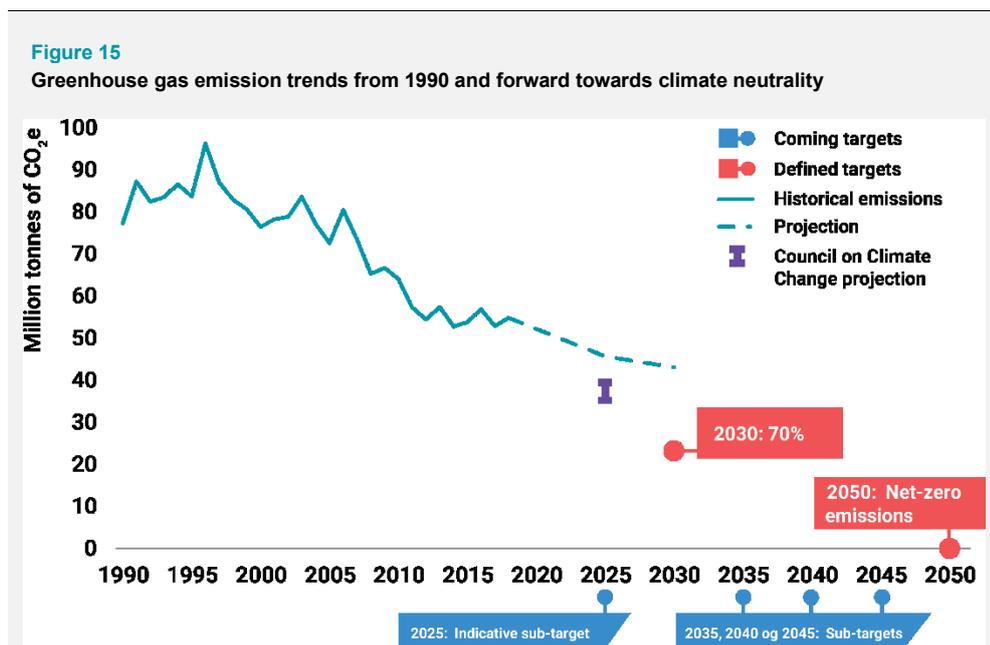
To ensure climate action in the short term as required by the *Agreement on a Climate Act*, the Government must propose an indicative sub-target for 2025 following the recommendation of the Danish Council on Climate Change in connection with the 2020 climate action plan. New legally binding climate targets with a ten-year perspective must subsequently be set every five years.

The Council on Climate Change recommends that the indicative sub-target for 2025 be set at a 50-54% reduction by 2025 compared to 1990. The Council identifies known transition elements of approximately 5.4 million tonnes of CO₂e, corresponding to a reduction of some 50% by 2025 compared to 1990. In the view of the Council, it is difficult to make do with less than a 50% reduction by 2025 if Denmark is to stay the cost-effective course to the 70% reduction target. A reduction of 54% by 2025 will follow a linear reduction path from 2020 towards the 70% reduction target in 2030. The Council on Climate Change estimates that achieving a 54% reduction by 2025 will require either lower industrial or agricultural production or restrictions on vehicular traffic and that this will entail major socio-economic costs, contrary to the Climate Act principles. The costs to the state, businesses, households, etc., of a 50–54% reduction by 2025 have not been assessed.

With the Government's actions so far, emissions are expected to be at 44.1 million tonnes CO₂e by 2025, corresponding to a reduction of 43% by 2025 compared to

⁴⁶ After publication of Denmark's Climate Programme 2020 in September 2020, additional policies and measures have been adopted as mentioned in the preface. These additional policies and measures are estimated to deliver around additional 2 million tonnes of CO₂e reduction in annual greenhouse gas emissions by 2030.

1990. In addition, there are the future initiatives towards 2025. To achieve reductions matching the Council on Climate Change’s recommended range of 50-54%, we will need to find an additional 5.5-8.6 million tonnes CO₂e by 2025. However, the Government’s efforts do not necessarily follow a linear reduction path as the Government’s climate efforts are continuous and the Government will revert to and address greenhouse gas emissions in individual sectors regularly concurrent with technological developments or as other conditions change. The aim is to ensure a reduction growth in accordance with the Climate Act principles.



Note: The figure does not include the effects of the sector strategy for waste and energy and industry as well as the cooperation agreement with Aalborg Portland.
Source: Danish Ministry of Climate, Energy and Utilities

Status report on the fulfilment of Denmark’s EU commitments

In addition to the national 70% reduction target set out in the Climate Act, Denmark has a commitment under the Effort Sharing Regulation (ESR) to deliver a 39% reduction of greenhouse gas emissions by 2030 relative to 2005 in the non-ETS sectors.

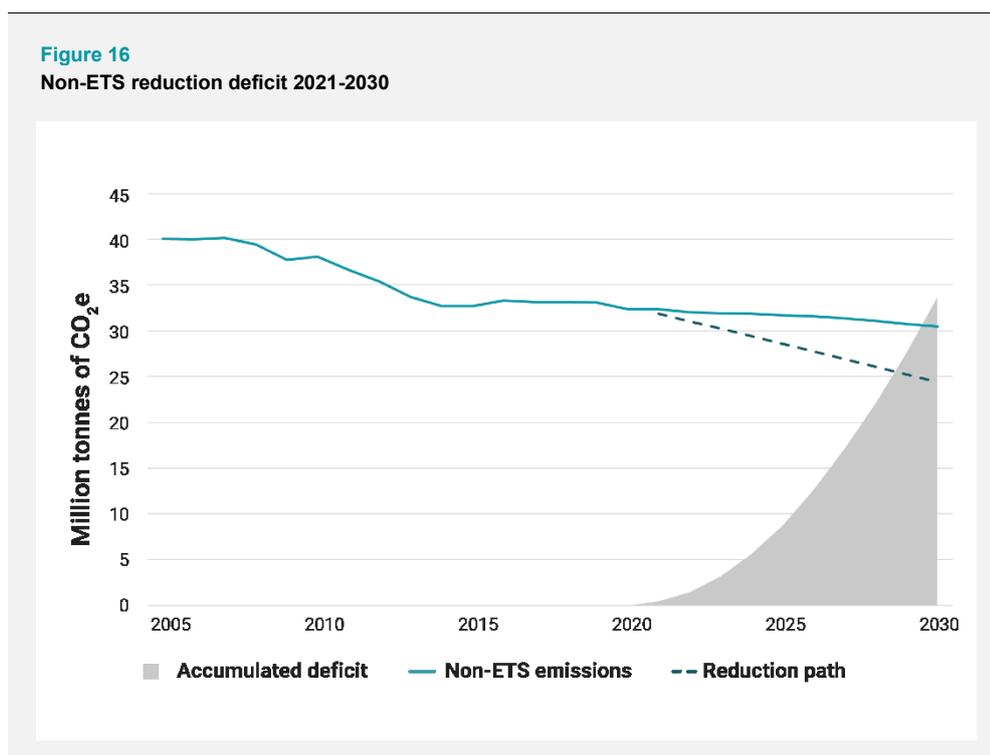
Where the national 70% reduction target is set as a point target for 2030, the non-ETS target is set as a total reduction commitment for the years 2021-2030.

All EU Member States have a reduction path defined for the years 2021-2030 in the non-ETS sector, and Denmark’s reduction deficit will be stated as the difference between the defined reduction path and expected emissions in the years 2021-2030. The shaded area in figure 16 shows the accumulated deficit towards 2030, showing that Denmark must reduce non-ETS emissions by a total of 34 million tonnes of CO₂e in the years 2021-2030. The reduction effects of the sector strategies for waste, energy and industry have not yet been taken into account. Nor has the effects of Denmark’s access to the ESR flexibility mechanisms under which Denmark

can use LULUCF credits and cancellation of ETS emission allowances to fulfil its EU ESR commitments. This indicates that a decision to exercise the two flexibility mechanisms will be able to reduce the deficit in 2021-2030 to 11 million tonnes of CO₂e.

The Climate Act states that the parties to the agreement do not wish to use reduction mechanisms to achieve the 70% reduction target. The parties to the agreement agree that if it turns out, in the last years leading up to 2030, that we cannot achieve the 70% reduction target while observing the principles set out in the Climate Act, the parties must convene to discuss whether they can agree to use flexible mechanisms and other measures.

As a result of the differences between the national target for 2030 and the non-ETS commitments 2021-2030, the national reduction deficit does not compare directly with the non-ETS deficit.



In mid-September, the European Commission presented a plan for raising the EU's 2030 climate target to at least 55% in relation to 1990 levels. The Danish Government has taken the lead with other climate-ambitious countries in a focused effort to ensure an increase of the EU 2030 target to at least 55%.

Major uncertainties in the projection

It is always important to take into consideration the uncertainties that are associated with projections of future trends. Denmark's greenhouse gas emissions are

projected annually to enable tracking of future developments. The Energy Agency's 2020 Baseline Projection presents developments under a so-called frozen policy scenario up to 2030 (the so-called With Existing Measures scenario). This only includes measures that have already been politically decided until May 2020. The projection therefore becomes a qualified estimate of future developments in climate and energy-related factors in the absence of new policy measures. Predicting the future will always be subject to great uncertainty, particularly in a time in which the technology and the awareness of reducing greenhouse gas emissions have never been greater. The potential outcome can vary in either direction by several million tonnes CO_{2e} a year in both 2025 and 2030.

The Baseline Projection assumes a certain level of technology costs, but the projection cannot foresee actual technological game changers. We could see a technological development that suddenly accelerates much faster than assumed, an entirely new solution or behavioural changes. By way of example, we have seen the cost of wind power and batteries drop dramatically which has been crucial for the green transition. Most recently, the lockdown in spring showed how an extraordinary, significant behavioural change caused by COVID-19 reduced Danish energy consumption by 10% in the first half of 2020 compared to the previous year. The decline was driven by large reductions in the use of jet fuel and petrol because transport consumption dropped sharply during the lockdown.

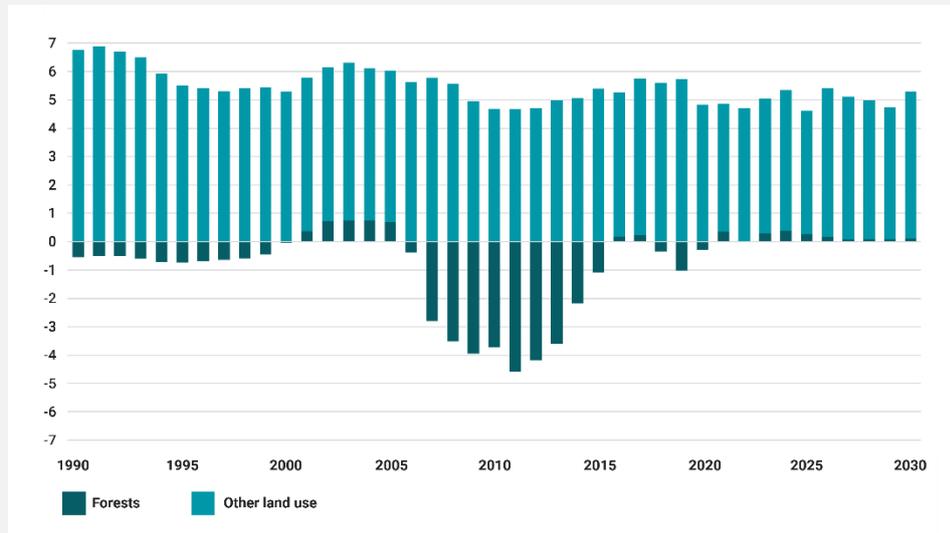
The uncertainty of the projection is due to various aspects. Work is being done to continuously improve the underlying data and projections based on improving methodologies, technological developments differing from today's best practice or changes to other framework conditions. The methodological uncertainty is currently assessed to be greatest for the projection of emissions in the agricultural and LU-LUCF sectors, where the projection is based on relatively complex computation methods related to different activities in the sector. The variations in the statements of emissions and sequestration from soils and forests underpin the uncertainty, see the illustration in figure 17. In addition to the methodological uncertainty, emissions will vary considerably depending on the weather in a given year and changed behavioural patterns.

The agricultural sector's emissions are also sensitive to agricultural production changes. For instance, the Baseline Projection for 2020 indicates that a 15% change in the number of dairy cows by 2030 will increase or reduce annual greenhouse gas emissions from agriculture by at least 0.5 million tonnes of CO_{2e}.

There is a similar, great uncertainty in the transport sector about technological developments and thus the specific projection for the trend in expected sales of electric vehicles up to 2030. The Baseline Projection basic development predicts an EV share of new car sales of 36% by 2030. However, the outcome will range between 18% and 65% in case of variations in technological developments and consumer preferences, see figure 18.

Figure 17

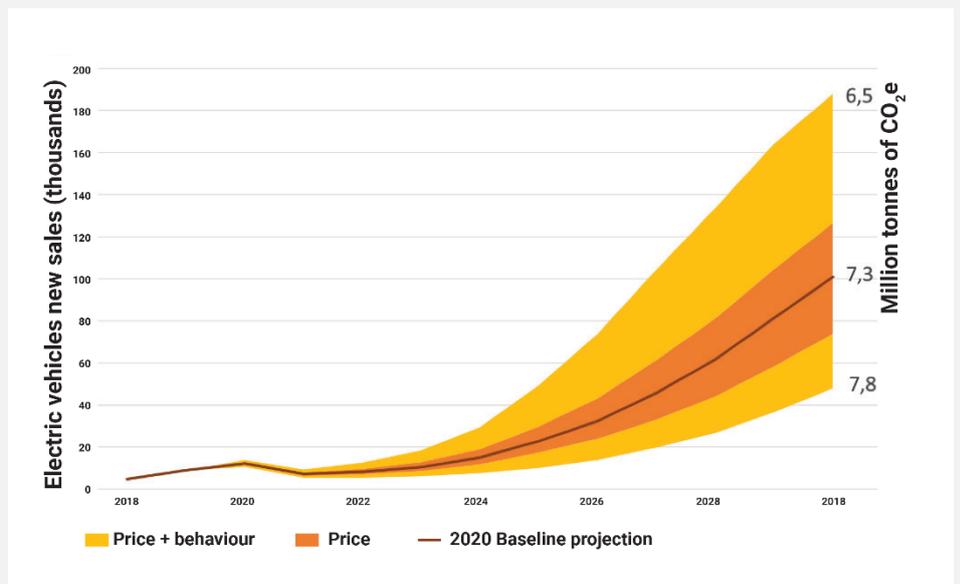
Emissions and sequestration from forests and other areas 1990-2030, millions of tonnes of CO₂e.



Note: Positive figures are emissions, negative figures are sequestration.

Figure 18

Uncertainty of determining the EV share



External framework conditions also impact the individual assessments made in the project, particularly in relation to energy prices, CO₂ prices and economic growth. This year's projection is subject to unique uncertainty arising from the COVID-19 pandemic which was not possible to take into consideration in the projection up to 2030. The Danish Economic Survey from August 2020 also points out that it can be difficult to predict how and when certain impacts on the economy, such as the COVID-19 crisis, will be corrected. For this reason, it also remains uncertain how the COVID-19 pandemic will potentially affect greenhouse gas emissions from businesses and industry in particular up to 2030.

New climate projection

As illustrated in chapter 2, the Climate Act establishes a year wheel according to which the annual climate status report and projection will be published in April. The climate status report and projection replace the current Baseline Projection. Each year, the climate status report and projection will provide an overall situational report on the expected emissions after incorporating the measures decided in the past year and new knowledge in terms of technological developments, framework conditions or the impact of activities on greenhouse gas emissions, see the section above on projection uncertainty.

In addition to providing an updated trend picture for emissions up to 2030, the new climate projection is envisaged to be elaborated with more detailed descriptions of the remaining emissions as time goes by. A more detailed understanding of the remaining emissions will be an essential tool for supporting ongoing launches of new initiatives towards target achievement in 2030.

Separate global reporting

Together with the new climate status report and projection in April, separate annual public reporting will be made of Denmark's climate efforts in relation to global emissions. This includes information about reductions in international shipping and aviation and reductions from export of electricity from renewable sources. It could also include the effects of the Danish bilateral energy partnerships with large CO₂ emitters and efforts are also made to illustrate the effects of Danish import and consumption. In addition, information the Danish climate finance for developing countries must be included.

The purpose of the reporting is to make Denmark's global impact on the climate visible. There will be negative impacts, for instance in relation to consumption, but also positive impacts, for instance in relation to specific bilateral country partnerships where Denmark contributes with transitioning the countries' energy sectors, etc.

5. Principles of green transition

A smart green transition is not only beneficial for the climate and the environment but can also increase green exports and contribute new, green jobs. Denmark becomes a leading nation by implementing a smart and ambitious green transition that does not relocate jobs and emissions abroad, thus straining the social balance. Towards this end, the Climate Act principles (see chapter 2) set out a central framework for the Government's green transition approach.

The Climate Act requires the green transition in Denmark to be implemented so that the measures for achieving the 70% reduction target generally secure a socially balanced, cost-effective transition in accordance with the Climate Act principles. The effort must also be guided by the long-term target of climate neutrality.

The climate efforts is therefore based on specific measures and development initiatives which, in addition to general technological developments, will reduce transition costs and ensure specific reductions towards 2030 and beyond. Many of the measures will also increase their effect and only reach their full impact after some time. This means that the green transition will follow a curve with investments now and on an ongoing basis whereas most of the reductions will occur later in the commitment period.

The 2020 climate action plan consequently helps lay the framework that will ensure further reductions later in the commitment period to reach the overall objective by 2030.

5.1 Smart and effective climate action

Reducing greenhouse gas emissions usually requires changes to consumption or production. Reduction efforts will therefore impose costs on businesses, households and/or the Government, depending on the measures selected.

For instance, duties and technology-specific requirements impose costs on the business sector and consumers. Financial support may compensate for such costs but leaves a bill to be footed by the state, which will ultimately be financed by instruments such as higher taxes or lower public spending. This is why an attempt is made to structure the reduction effort as cost-effectively as possible with a view to social balance and corporate competitiveness in keeping with the Climate Act principles.

Cost-effective measures

The cost-effectiveness associated with achieving the climate policy objectives increases when the reductions are obtained at the least cost to society. This means impacting the public sector, private individuals and businesses as little as possible in light of the desired target.

In socio-economic terms, it would be most expedient to advance the green transition by means of international objectives and international regulation so as to avoid carbon leakage. Danish companies compete with foreign enterprises and measures in Denmark, which is why there is risk of moving emissions abroad if they entail disproportionately high costs for the sector. This will also lead to job losses in the affected sectors in Denmark.

However, if Denmark's national targets and climate regulation are more ambitious than can be agreed globally, the green transition cannot be driven by international regulation alone. This means that the target of 70% greenhouse gas reduction by 2030 relative to 1990 and climate neutrality by no later than 2050 cannot be achieved by international regulation alone.

To identify which measures are more cost-effective than others, the models use CO₂e shadow prices (or just shadow prices). The shadow price indicates the socio-economic cost of the measure per tonne of greenhouse gas reduced. The lower the shadow price, the cheaper (more cost-effective) the measure.

The shadow prices represent a snapshot in the sense that they reflect the costs under current technologies and their associated expenses. The shadow prices will change if technological developments increase the efficiency or reduce the price of current measures, for instance. Technological developments may also bring about new measures that are more competitive (have lower shadow prices).

The costs vary greatly across areas, depending on issues such as the maturity of green technologies, see figure 19. By way of example, facilities that absorb carbon from large point sources carry an approximate reduction cost of DKK 1,350 per tonne of CO₂ reduced, while the costs of reducing emissions from passenger car transport – depending on the number of EVs – are DKK 200–3,800 a tonne in 2030.

It can also be seen that the shadow prices of the green transition are generally highest in the transport sector and lower for agriculture and industry, for instance. To this should be added that there are also considerable variations in the possibilities of the individual business structures to actually change behaviour using current technologies.

Figure 19
Costs of selected green measures



Note: Shadow prices for restructuring of vehicle registration duties are stated for the 2030 new registration year. The shadow price is higher for the 2021 new registration year, for instance. * The shadow prices for increasing process energy tax indicate marginal shadow prices.
Source: Ministry of Taxation, Ministry of Climate, Energy and Utilities and Ministry of the Environment and Food.

The costs are expected to decrease as the technologies develop and become globally available in the same way as the price of solar cells, offshore wind and batteries has sharply dropped in recent years, see figure 20. This means that we can expect the development of currently available, but cost-intensive measures, to become more cost-effective later in the commitment period. Offhand, the Climate Act's principle of cost-effectiveness would mean that investments in the green transition are organised to take account of technological developments and maturing of technologies.

Society will benefit from the positive climate effects of a reduction effort but there will be costs associated with the implementation of measures that can reduce greenhouse gas emissions and contribute to achieving the 70% reduction target by 2030. The Danish Council on Climate Change and CEPOS have previously estimated the reduction costs for society from the achievement of the 70% reduction target to be DKK 15–20 billion by 2030 and DKK 26 billion by 2030, respectively. The calculations were based on the then reduction deficit and a shadow price of DKK 800 and DKK 1,370, respectively, per tonne of reduced CO₂e. Based on the current reduction deficit of 16.1 million tonnes of CO₂e by 2030, a realisation with an average shadow price of between DKK 1,000 and 1,500 per tonne will amount to DKK 16-24 billion, thus constituting a cost for society of 0.7-0.1% of the current

GDP per year. This should be seen in the context of estimated average annual growth rates for the Danish economy of 1.4% towards 2030.

Figure 20
Historical technology cost trends

Figure 20.a: Offshore wind price

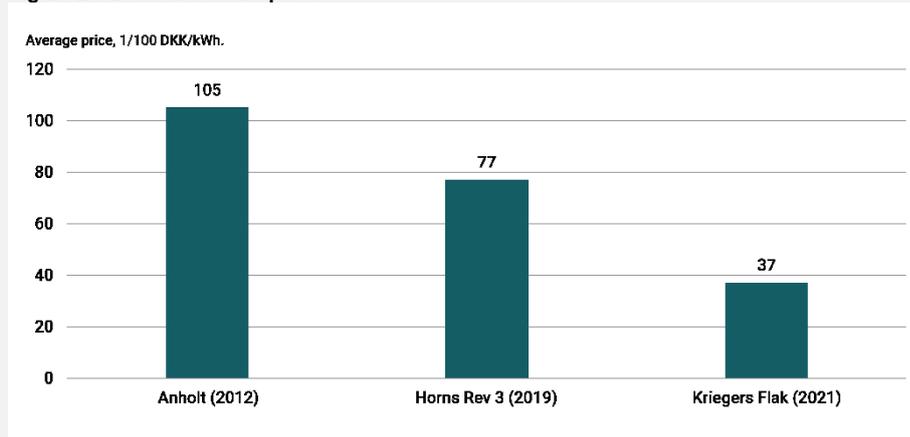
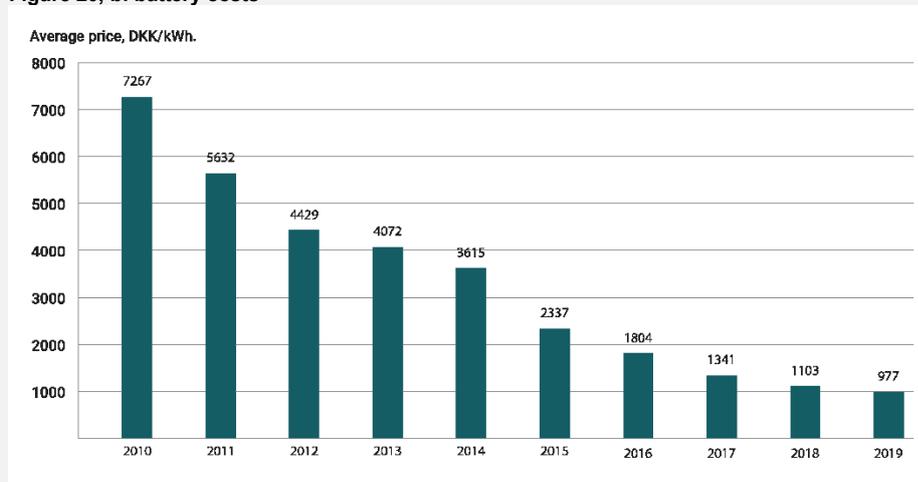


Figure 20, b: battery costs



Source: Danish Energy Agency and DTU

The cost-efficiency also increases if the conversion to green technologies takes place when existing technologies are due to be replaced. By way of example, the socio-economic costs of converting from a natural gas boiler to heat pumps will be significantly higher if it entails the decommissioning of existing, yet well-functioning gas boilers. However, this still may be necessary to achieve the 70% reduction target as a number of technologies and assets have service lives that extend beyond 2030, see table 6.

This means that we must take decisions now and invest in long-term frameworks for the green transition that will have an impact later on in terms of incentivising

conversion as and when companies and consumers need to reinvest in new forms of heating, modes of transport, process technologies, etc.

Table 6
Examples of technical life

Facility/vehicle	Service life (years)
Ferries	30
Passenger cars	15
Heavy duty vehicles	10
Animal housing	25
Gas-fired boilers	20
Combined heat and power plants	25
Forklift trucks	20

Source: Examples of assumptions applied based on technical estimates from the Ministry of Climate, Energy and Utilities, DCE (2017) and the Ministry of Transport and Housing

Shadow prices are essential to facilitate comparisons between the cost-effectiveness of various measures. Conversely, shadow prices do not provide information about the distribution consequences or carbon leakage, for instance.

The climate challenge is global, and decisions to reduce greenhouse gas emissions in Denmark may therefore result in carbon leakage or higher emissions in other countries. This happens when a measure imposes higher costs on companies and they choose to move their production abroad. The risk of this depends on the trading and emission-intensity of a business sector. The higher the competition with other countries and the higher the cost of reducing greenhouse gas emissions, the greater the risk of losing market shares when implementing emission-reducing initiatives.

Common EU rules also create a level playing field and reduce the risk of companies, jobs and, thus, greenhouse gas emissions moving out of the country. The joint EU efforts and an ambitious green EU policy are consequently important preconditions for Denmark's ability to realise the green ambitions and for them to be cost-effective with due consideration of growth and workplaces in accordance with the Climate Act principles. In addition, the EU represents around 10% of global emissions, which is why ambitious climate efforts in the EU has the potential to significantly reduce global emissions.

The climate transition may impact differently across income groups, rural and urban settings, etc. Climate action that does not consider the social balance in keeping with Climate Act principles may lead to some groups shouldering a significantly higher burden than others, which could affect social cohesion.

The Climate Act also stipulates that the structuring of the climate effort must accommodate sound public finances. It must be ensured that we can still afford funding Denmark's welfare system, for instance. Finally, the Climate Target both defines a reduction target for 2030 and a target of climate neutrality by 2050 at the latest. This means that the climate effort must also take into account the long-term green transition, whereby some initiatives will have different perspectives and costs in the long term than in the short term.

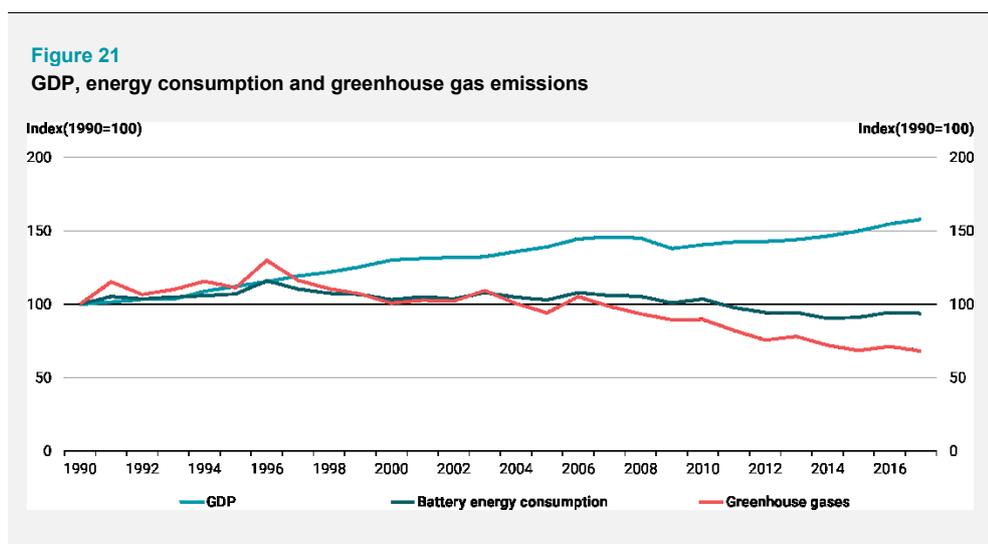
Summary

The Climate Act's targets, its principles and the costs incidental to the green transition require an overall, balanced, gradual national and international approach that involves short-term decisions to ensure a level playing field in Denmark and the EU and provides specific reductions.

At the same time, it involves decisions supporting technological developments that reduce costs and bring technologies closer to market terms so that they can eventually provide specific reductions to achieve the reduction targets in the Climate Act. Overall, this approach will enable us to build on the successes of recent decades of decoupling greenhouse gas emissions from economic growth, which has made Denmark a pioneering country for the rest of world in the past.

5.2 Decoupling growth and greenhouse gas emissions

Denmark has historically been a green leader. Economic activity has been decoupled from the scope of greenhouse gas emissions over the past decades which is the prerequisite for achieving the 70% reduction target by 2030 while observing the principles in the Climate Act. Denmark's economy has thus increased approximately 60% from 1990 to 2017 while greenhouse gas emissions have been reduced by 32% in the same period, see figure 21.



Note: Greenhouse gas emissions follows the UNFCCC inventory, excluding land use and forestry (LULUCF).

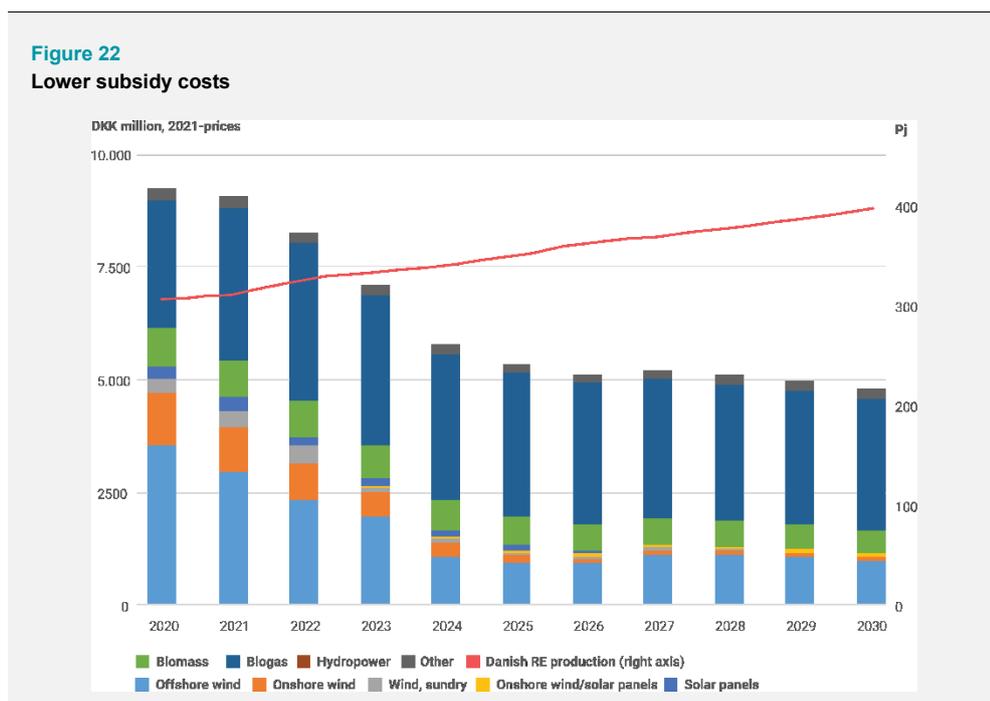
Source: Statistics Denmark and own calculations.

The decoupling of economic growth from greenhouse gas emissions reflects both that the economy has grown without increased energy consumption and that the generation of energy now has fewer emissions. Thus, it is the energy sector that has achieved a reduction of greenhouse gas emissions in the past.

Economic growth is fundamentally borne out of increases in productivity that can originate from various sources and are often not contingent on higher energy use. This could be higher levels of education, technological advances through research and development, strengthened framework conditions, trading gains and keener competition. These circumstances and many more can contribute to economic growth without a corresponding increase in energy consumption.

Energy-efficiency improvements have also played a significant role. The utilities sector of today can generate energy with far lower emissions, and companies and households have improved their energy-utilisation efficiency, thus saving energy. Finally, the business structure has shifted towards less energy-intensive industries, such as various service sectors. This all contributes to facilitating higher economic activity without a corresponding greenhouse gas emissions footprint.

The ongoing developments in the costs of biomass, wind power and other renewable sources have been crucial for the decoupling growth from greenhouse gas emissions. Renewable energy sources (RES) are expected to become increasingly competitive with other technologies, and there are also examples of non-subsidised public tender procedures for onshore wind and solar power projects. Consequently, RES subsidies, particularly for wind turbines and solar panels, are expected to decrease significantly towards 2030, see figure 22.



Note: 2021 figures. Impact of climate agreement for energy and industry, etc., incorporated.
Source: The Danish Energy Agency

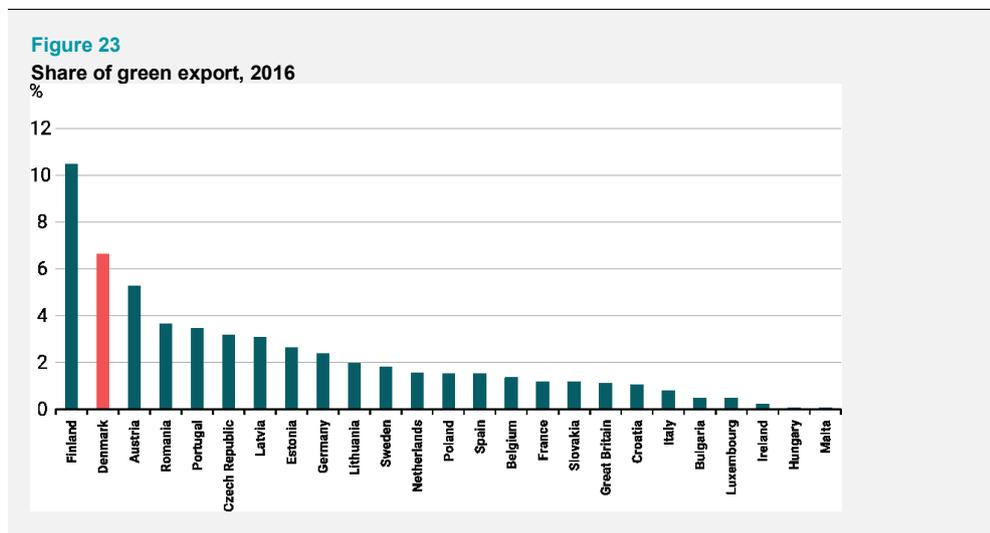
The decoupling of growth from greenhouse gas emissions will therefore be able to continue in the years ahead, among other things because GDP will continue to be driven by factors that do not require higher energy consumption. The continued expansion of renewable energy and technological developments will also be able to further reduce the costs of the emission reductions.

It is therefore a key element for target achievement in consideration of the Climate Act principles to invest in the development of technologies that will eventually reduce the cost of producing green technologies, thus potentially enhancing their competitiveness in relation to fossil and greenhouse gas-emitting technologies, see chapter 6. It may also pave the way for exports of new, green solutions.

5.3 Future export potential

The Danish wind turbine industry is a good example of how the green transition can provide scope for new business opportunities in which companies become increasingly experienced in utilising and commercialising green technologies. Wind power for electricity generation has become a Danish position of strength supported by public investments in research and development, creating green jobs and export.

These initiatives have contributed to Denmark's current leading role in the wind industry, employing around 33,000 in all of Denmark with exports totalling DKK 54 billion in 2018, according to Wind Denmark's industry statistics.



Note: The statement is based on the definitions to be used in green national accounts and follows the same principles across countries.
Source: Eurostat and own calculations.

Denmark is well positioned to benefit from the green transition, and Danish companies are leading the way in the green field. Danish exports of green commodities and services make up 6.5% of total exports according to the green national accounts, which is a proportionately large share compared to other EU member states, see figure 23.

Exports from Denmark particularly concern the environmental objective of renewable energy production (especially wind turbines) that comprised most of the exports in 2018 in the amount of DKK 50 billion. Commodities and consultancy with reduced energy and heat consumption as the objective (e.g. insulation and energy-efficient technologies) was the runner up with exports totalling DKK 11 billion. Exports related to waste management and recovery amounted to DKK 5 billion.

Denmark has a strong point of departure as an energy-technology pioneer with a comparatively large production and exports of green goods and services. This can provide new opportunities for growth and export and attract foreign investment in accordance with the Climate Act principles.

This should be considered in the context of global investments in RES and energy efficiency being expected to double in the future if global temperature rises are to be kept below 2 degrees (following from the Paris Agreement). Global investments in RES and energy efficiency currently total DKK 4,300 billion, which is expected to rise to DKK 9,500 billion annually by 2030 to fulfil the Paris Agreement.

However, it is not necessarily essential for new technologies to be developed in Denmark. New technologies developed abroad are also needed to reduce emissions. However, the commitment to help develop the green solutions of the future serves to achieve reduction targets pursuant to the Climate Act principles if implemented smartly.

Maintaining the green positions of strength requires the Danish labour force and business structure to remain adaptable so that resources do not become deadlocked in outdated technologies. A good regulatory framework for private-sector development and innovation will also facilitate green investments in Denmark, benefiting growth and the green transition.

6. Cross-cutting climate efforts

The Government has launched a number of initiatives that will contribute to achieving the ambitious greenhouse gas emission reduction targets while also taking account of the principles in the Climate Act. Firstly, the Government has implemented a number of measures to contribute to changing the way of developing and implementing climate policy in Denmark. The Government has also initiated a range of crosscutting efforts, such as the Government's approach to central EU initiatives, the approach to research, the activation of Denmark's Green Future Fund and the Government's Climate partnerships. It also includes a green tax reform, which is presented in this chapter.

6.1. The Government's climate-policy working method

The Government's initiatives aim to support a strong, continuous climate effort by helping change the way we develop and implement climate policy in Denmark. Box 11 shows the elements of the Government's climate policy working method.

Box 11

The Government's climate policy working method

Government-internal processes

- *Green Committee* This government committee aims to ensure that climate, environment and nature considerations are strengthened and integrated into the Government's policies.
- *Legislative programme*. The Government screens its annual legislative programme for climate, environment and nature effects as a regular procedure.
- *Guidance on assessment of impact on climate, environment and nature*. Determines guidelines for impact assessments on climate, environment and nature. The guidance also describes when measures must be submitted to the *Green Committee*.
- *Green economic models*. A new economic model (Green REFORM) will be able to assess impacts on the environment, nature and climate of economic activity and assess the economic impact on environment, nature and climate policy initiatives.

Government cooperation forums

- *13 Climate Partnerships* Cooperation with the business community focused on how businesses and the Government can join forces to address climate challenges in a manner that also supports Danish competitiveness, export, jobs, welfare and prosperity without increasing inequity.
- *Citizens' Assembly*. The Citizens' Assembly has 99 members who will discuss dilemmas and solutions associated with citizen-centric climate challenges over the next two years.
- *Youth Climate Council*. The Youth Climate Council aims to infuse innovative thinking into Danish climate policy with input for future climate solutions. Appointed for two-year terms, the members come from all over Denmark, have different educational backgrounds and represent different approaches to climate challenges.

Climate policy in the central government administration

The Government has established a *Green Committee* tasked with ensuring that climate, environment and nature considerations are strengthened and integrated into the Government's policies. The committee will support a targeted, comprehensive and coordinated effort to ensure a socially balanced approach to the challenges and create the basis for green growth and new Danish position of strength in a rapidly growing global green technology market. The committee's permanent members are the Minister for Climate, Energy and Utilities (chair), the Minister for the Environment, the Minister for Taxation, the Minister for Transport, the Minister for Higher Education and Science and the Minister for Business.

The *Green Committee* prepares issues such as the Government's proposals relating to climate, environment and nature, and the committee supports the implementation of the governmental policies and that due consideration is given to climate, environment and nature impacts in other relevant policy agreements in the area.

Calculations and impact assessments

The *Green Committee's* contribution to ensuring green considerations across the Government policies is also supported by a screening of the Government's annual legislative programme for green effects and by a number of specific tools, including *Guidance on assessment of impact on climate, environment and nature* and development of a new green economic model (Green REFORM). These tools aim to integrate the green focus in the daily work of Government and the civil service system.

Guidance on assessing the impact on climate, environment and nature thus lays down guidelines as to when and how political measures must be reviewed in order to identify their impact on climate, environment and nature. The guidance also describes when measures must be submitted to the *Green Committee*.

Joint cross-cutting climate efforts – Climate partnerships, Green Business Forum, Citizens' Assembly and Youth Climate Council

In addition to the embedment of green considerations in internal governmental processes, the Government takes part in external cooperation forums with the business community, civil society and private individuals.

Achieving the Government's ambitious reduction targets requires the provision of new green solutions and implementing them. It is necessary to cooperate on common solutions to the green transition challenges faced by society and businesses. To this end, the Government has entered into 13 Climate partnerships with all segments of the Danish business community. The purpose is to ensure that the business community will contribute to reducing greenhouse gases in Denmark using methods that take into account Danish competitiveness, exports, jobs and welfare, see figure 24.

Embedded in the Green Business Forum, the Government's Climate partnerships will contribute to strengthening dialogue between Government, the business community and trade unions on opportunities and obstacles in the green business transition. The forum will follow the work of the 13 Climate partnerships in the various business sectors, focusing on progress in the sector roadmaps and synergies, and beneficial cooperation between the different Climate partnerships on issues such as technological developments and research. The forum will discuss specific paths to achieving greenhouse gas emission reductions through business-community initiatives and policy action and discuss the business potential for Danish green-sector companies. Green Business Forum meets semi-annually and its members include a wide range of directors and chairpersons from leading Danish companies and professional bodies and a wide selection of Government representatives.

Figure 24
The Government's 13 Climate partnerships



Note: Permanent ministers in the Green Business Forum include the Minister for Business, the Minister for Climate, Energy and Utilities, the Minister for Foreign Affairs, the Minister for Taxation, The Minister for Food, Fisheries and Equal Opportunities⁴⁷, the Minister for Health and Elderly, Minister for Transport, Minister for Higher Education and Science, the Minister for Housing and the Minister for the Environment. In addition, the directors of the Confederation of Danish Industry, the Danish Chamber of Commerce, Danish Energy, the Danish Agriculture & Food Council and the chairpersons of FH - Danish Trade Union Confederation, the Danish Metalworkers Union, 3F, Concito, the Council on Climate Change and the chairpersons of the (13) Climate partnerships set up by the Government.

Source: Danish Ministry of Climate, Energy and Utilities (KEFM)

The partnerships have submitted more than 400 recommendations to the Government. Several of the recommendations are already reflected in the sector strategies for waste and energy and industry. The other recommendations will be included in the Government's work on future proposed climate action.

The Climate partnerships are also tasked with providing emission reduction recommendations to be realised by the individual sectors. In this connection, several companies have launched initiatives to reduce their greenhouse gas emissions and invest massively in the green transition, see box 12.

This includes Aalborg Portland, which recently became the first of a number of companies to enter into a cooperation agreement with the Government on significantly reducing its emissions. A milestone for the Government's new approach to stronger climate cooperation with Danish business, the agreement will contribute significantly to the green transition. The Government intends for the cooperation agreement with Aalborg Portland to serve as a template for future cooperation

⁴⁷ As of 19 November 2020: The Minister for Food, Agriculture and Fisheries

agreements with other large Danish emitters. Such agreements are assessed to entail a reduction potential of 0.2–0.4 million tonnes of CO₂e that can help achieve the climate targets set out in the Climate Act in consideration of the principles outlined in the act.

Box 12

Examples of independent business sector initiatives

- The Government has made an agreement with Aalborg Portland for the company to reduce its emissions by 660,000 tonnes of CO₂e up to 2030. The agreement will reduce the annual emission in 2030 by 0.5 million tonnes of CO₂e.
- The Danish pensions industry has announced that it will invest DKK 350 billion in the green transition up to 2030. This figure equates to more than 10% of the total Danish GDP.
- Finance Denmark implements an initiative to better equip financial advisers to inform Danish homeowners of the financial savings available by making climate-friendly choices and making their homes more energy efficient.
- WWF and the VELUX group have launched the Lifetime Carbon Neutral initiative to ensure that VELUX covers all its historical and future greenhouse gas emissions through forest projects. This equates a total of 5.6 million tonnes of CO₂ in forest projects to be developed and operated by WWF.
- Ørsted, Mærsk, Haldor Topsøe, DSV, SAS, Copenhagen Airports and DFDS have teamed up to establish a historical large-scale hydrogen plant with a capacity of up to 1.3 GW. It is set to generate sustainable hydrogen for aircraft, vessels, lorries and buses using Danish wind power. The parties behind the plant expect its production to reduce CO₂ emissions by 850,000 tonnes a year by 2030.
- Some 20% of Danes' climate footprint comes from the food we eat. As the first retail group in Denmark, Coop now enables their customers to track their own climate footprint from the products they buy.

The Government and the Climate partnerships continue their future collaboration along the three tracks, see box 13.

Box 13

Examples of independent climate partnership initiatives

- *Input for future sector strategies:* The Government will assess and make policy decisions on the climate partnership recommendations in connection with the autumn's sector strategies. This includes computing all material recommendations using the ministries' usual economic calculation principles. The Climate partnerships continue working on their own schedules and initiatives.
- *Implementation:* The Government will work with the Climate partnerships to implement recommendations from existing and future climate agreements. At first, this concerns specific initiatives from the climate agreement for energy and industry.
- **Four new cross-cutting collaborations, see below (box 14)**

The Green Business Forum has also decided to set up four new cross-cutting collaborations tasked with creating coherence and synergies between climate efforts of relevance to several organisations and Climate Partnerships, see box 14.

Box 14

Four new cross-cutting business collaborations

- *Collaboration on implementation of climate initiatives from the climate agreement on energy and industry, etc.* includes a partnership on developing the strategy for the further development of PtX and CCS in Denmark as well as a partnership on the efficient utilisation of subsidies of DKK 2.5 billion in 2020–2030 allocated for the green transition of industry.

- *Collaboration on a common method for specifying greenhouse gas emissions* based on a voluntary, quantitative model for the financial sector can compute the climate impact of the activities it finances in Danish companies, etc. This work is headed by the financial sector climate partnership with Finance Denmark at the helm and is being developed in close cooperation with the business community and relevant authorities. The model will reflect future regulatory information requirements of businesses' carbon footprint that the financial sector will demand from its customers.
- *Collaboration on the development of a more climate-friendly diet* includes strengthening existing partnerships on more climate-friendly diets and food waste as one of its elements, ensuring that the green transition reaches all the way to Danish plates – by focusing on production, consumption and export.
- *Collaboration on green skills* concerns job creation and skills upgrades to ensure the availability of the skills required for implementing the many green initiatives. The green transition will also result in new skill-sets and various types of jobs that cannot be predicted as yet.

The Government also wishes to activate the Danish population – young and old alike. To achieve this, the Government has set up a Citizens' Assembly, and there is already a Youth Climate Council in the area of climate, energy and utilities.

The Citizens' Assembly consists of 99 citizens with different backgrounds in terms of age, gender, geography, education and income. Their task is to discuss citizen-centric dilemmas associated with the green transition and to provide input and recommendations for the green agenda. Thus, the Citizens' Assembly will provide an additional opportunity for private individuals to be heard in the organisation of the climate policy. The first meeting of the assembly has been cancelled due to the COVID-19 pandemic. It is not yet known when it will be safe to hold meetings of the Citizens' Assembly. At the meetings of the Citizens' Assembly, relevant experts will present insights to citizens, who will discuss inputs and recommendations with a view to presenting them to the Minister for Climate, Energy and Utilities and the Danish Parliament's Climate, Energy and Utilities Committee.

The Youth Climate Council is tasked with contributing to the green agenda by collecting input and ideas on Danish climate action, disseminating youth requests for specific policy proposals and raising awareness of the green agenda among young and older people alike. Since taking office, the Government has strengthened the Youth Climate Council by adding members, and the Council has submitted their recommendations on the structure of Danish climate policy with particular focus on food, climate taxes, the North Sea and green recovery to the Minister for Climate, Energy and Utilities.

Thus, the Government is contributing to providing greater scope for public debate on the structure of Danish climate policy with perspectives for individuals, the business community and civil society alike.

6.2 Cross-cutting EU initiatives and approaches

Realising the European Green Deal and ensure ambitious and cost-effective climate efforts in the EU can drive the green transition in Denmark and the EU, while also leveraging global action by inspiring countries to increase their contribution to the Paris Agreement. At the same time, common EU regulation ensures a level

playing field and reduces the risk of companies and jobs moving abroad and thus moving emissions from one country to another.

Box 15

EU climate regulation

The EU's current greenhouse gas emissions reduction target is at least 40% by 2030, compared to 1990. The EU target is divided into:

- A common European reduction target for the ETS sector (emissions from energy use for electricity generation, district heating, large industrial installations, oil and gas production and air transport).
- National burden-sharing targets for the non-ETS sector (emissions from road transport, households with individual heating, waste and agriculture). This means that each country has its own reduction target.

The countries also have commitments in the form of sector targets for renewable energy, energy-efficiency improvements and transport. The sectors are regulated by substantial EU legislation that will contribute to advancing the green transition, for instance by promoting energy saving efforts and a green transport sector through emissions standards for new vehicles.

The Danish Government has pushed for climate policy to become a key priority for the current European Commission that took office in December 2019. Among its first actions in December 2019, the Commission presented the European Green Deal, which sets out a detailed roadmap of ambitious climate targets and green initiatives in all sectors up to 2030 to set the EU on track towards climate neutrality in the EU by 2050 at the latest. A new European climate law and an increase of the EU's 2030 climate target are among the central elements of the plan that will provide the overall EU framework for realising the climate effort in the years to come.

The Commission has tabled the first specific proposal under the European Green Deal and more will follow over the next years. Negotiating EU proposals in the Council and the European Parliament often takes a few years, followed by Member States implementation. This means that new EU measures cannot be expected to take effect before in a few years leading towards 2030. However, the European Green Deal offers significant potential to contribute to a significantly reduction effort in Denmark up to 2030 and thus contribute to achieving the 70% reduction target, see chapter 1.

Ambitious implementation of the European Green Deal

The Government takes the lead in the EU and works with like-minded countries to secure the most ambitious implementation of the European Green Deal. COVID-19 has dealt a severe blow to the EU and thrown the member state economies into a tangible crisis. It is important for the Government that the recovery of the EU economy strengthens, rather than delays climate actions. This is why the Government took the initiative in the spring of 2020 to gather 19 member states in sending a shared message to the European Commission, encouraging a high level of momentum in the EU climate ambitions, not least by raising the EU 2030 climate target before the end of 2020. This helped ensure that the European Green Deal remains pivotal for a green recovery of the EU economy that promotes the green transition and creates sustainable growth and green jobs.

In this summer's negotiations on the EU budget for 2021-2027 and the EU recovery package, Denmark has also helped ensure that at least 30% of the total EU funds in the coming period will be applied to measures that benefit the climate. In this context, the Government will work to achieve the greatest possible climate return on the funds as the multiannual EU budget is deployed.

The European Climate Law

In the spring of 2020, the European Commission presented its proposal for the first European Climate Law. Denmark's Climate Act provides a good starting point for impacting the European Climate Law in the right direction. The Government is working to ensure that a European Climate Law will be as ambitious as possible, helps the EU achieve its target of climate neutrality by 2050 and meets its commitments under the Paris Agreement.

This is why the Government is working to ensure that the law establishes a proper framework within which the EU and Member States can achieve the goal of climate neutrality and ensure that a process is in place for setting the intermediate targets on the road to climate neutrality. The law will also ensure that the climate-neutrality target applies to all EU member states and it should signal that the EU must aim for net-negative emissions after achieving climate neutrality by 2050. In addition, it is important for the Government that a clear framework will be created for how carbon capture and storage can be integrated into the EU climate effort.

Increasing the EU 2030 climate target to at least 55%

In mid-September 2020, the European Commission presented an ambitious plan for raising the EU's 2030 climate target to at least 55% compared to the 1990 level. The Government has taken the lead with other climate-ambitious countries in a focused effort to ensure an ambitious increase of the EU 2030 target to at least 55%.

An EU target of at least 55% will reduce EU greenhouse gas emissions by the equivalent of approximately 20 times Denmark's total emissions in 2018. This shows that Denmark can make a difference when everyone pulls in the same direction. The Danish Government will work to ensure that the EU adopts the new 2030 target in time to submit an updated Nationally Determined Contribution to the Paris Agreement by the end of the year. The EU must lead the way for other major emitters if we are to fulfil the global climate ambitions of the Paris Agreement.

At the same time, the Government is working for a cost-effective and modernised climate regulation to deliver on the target. The Commission's plan is to a large extent aligned with the Danish Government's priorities, see box 16. The Government is now continuing its work to ensure that the Commission's plan is translated into a concrete and ambitious EU regulation that correspond with the Danish priorities.

Box 16

Central elements of the European Commission's 2030 plan

The Commission has proposed to increase the EU's 2030 climate target to at least 55% and charted the course for a fundamental modernisation of European climate and energy regulation. The Commission envisages a larger role for common European instruments and market-based regulation in all sectors up to 2030 and 2050 to promote a more cost-effective green transition.

The plan also includes different scenarios for the implementation, including focusing on the following areas:

- strengthening the EU's Emission Trading System
- possibly extending emissions trading to more sectors, such as road transport and buildings
- increased energy efficiency
- higher ambitions for renewable energy
- reduction of transport emissions, including stricter CO₂ emission standards for new cars
- integrated approach to climate regulation of agricultural emissions and sequestration in soils and forests (LULUCF)
- adjustment of national effort sharing targets in the non-ETS sector

The Government's efforts to secure an ambitious, cost-effective implementation of the European Green Deal for the individual sectors are outlined in chapter 7 on energy and industry, transport and agriculture, respectively. The Government's approach to an ambitious realisation of Green Deal is summed up in box 17.

Box 17

The Government's approach to an ambitious realisation of Green Deal

The Commission's 2030 Climate Target Plan is a cornerstone of the realisation of the European Green Deal. As part of the implementation of a higher 2030 climate target, the Government is advocating for a change of EU climate regulation with a significant strengthening and extension of the EU ETS to include road transport and heating of buildings. Concurrently, a separate pillar for agricultural emissions and its LULUCF activities must be set up to significantly boost incentives for climate-friendly agricultural production. This will strengthen the incentive for reducing greenhouse gas emissions in the areas that offer most potential across countries and sectors.

In the European Green Deal and the practical application of a higher 2030 climate target, the Government will also continue working for an ambitious sector regulation of road transport and heating of buildings. By way of example, the Government has long encouraged the phasing out of petrol and diesel cars in the EU. It is positive that the Commission has been responsive in its presentation of the 2030 plan and will now consider an end date for the phase-out.

The following priorities in the Green Deal deserve mention:

- more sustainable energy in the EU, e.g. in the form of wind islands in the North Sea.
- a green, integrated energy system across borders and sectors.
- higher CO₂ requirements on light and heavy vehicles.
- reduction of aviation emissions.
- future EU initiatives in the maritime area that will support a global solution under the auspices of IMO, will benefit the climate and will not jeopardise the competitiveness of the European maritime sector.
- introduction of climate regulation of agriculture and its LULUCF activities in the EU.
- strengthened energy-efficiency efforts, e.g. by means of product requirements.

6.3. Green research strategy

With the strategy *Future green solutions – Strategy for investments in green research, technology and innovation*, the Government sets a long-term direction for green research, development and demonstration in Denmark. The strategy will in-

form clear policy priorities for efforts going forward, thereby supporting the development of technologies that will eventually help achieve the Climate Act targets and realise its principles.

The strategy identifies research needs and potentials with the most perspective for the green transition in different sectors and areas – such as in the form of developing existing green technologies and more innovative research.

A mission-driven effort will accelerate the development of new solutions

To support a focused development of future technologies, the Government sets up four specific *green missions*, see box 19. The Government will apply a mission-driven effort to accelerate the development of technologies that must be deployed to propel us towards the Climate Act targets while observing the principles of the act. The strategy identifies challenges (“pick the challenge”) to be overcome with a strategic and coherent green research effort ranging from basic research and all the way to commercialisation of new solutions across public and private stakeholders, keeping the business sector’s research and innovation needs and strengths in mind, see box 18.

Box 18

Criteria for green missions

Green potential

Target specific challenges in sectors that have the greatest need for new solutions and potential for achieving green objectives in Denmark and globally.

Business strengths and potentials

Target challenges where the Danish business community has strong prerequisites for developing green solutions and gaining a clear competitive edge. A growing global market for green solutions, products and services gives Danish scientists, businesses and entrepreneurs an opportunity to turn challenges into new business potential and disseminate global solutions around the world.

Scientific strengths

Target challenges where Danish scientific players have strengths and prerequisites for entering into collaboration and partnerships with scientists and knowledge institutions globally, obtain knowledge and attract research funding, particularly from EU research programmes.

Partnership potential

The missions must be able to form the basis for green research and innovation partnerships that support cooperation between universities, businesses, Authorised Technological Service Institutes, authorities, etc. They must specify and target the research and innovation effort to accelerate the rate at which concrete outcomes are realised for the green transition.

The Government aims to prioritise significant funding for the four missions with the highest assessed need for new solutions and the greatest potential for reducing greenhouse gas emissions in Denmark and globally. This focuses the missions on the effort to achieve the Climate Act targets. At the same time, these are areas with an assessed potential for creating new jobs and exports of green solutions that will contribute to reducing greenhouse gas emissions globally, see box 19. Additional missions may be identified over the coming years.

Box 19

The four missions of the green research strategy

Carbon capture, utilisation or storage

Mission: Denmark will develop cost-effective solutions for carbon capture and storage that can be applied towards reducing carbon emissions and creating negative emissions from large industrial emitters, waste incineration plants, biogas plants and biomass-based CHPs. Together with hydrogen generated by renewables, captured CO₂ can provide carbon for new climate-neutral solutions. The technical reduction potential for CC(U)S is estimated to amount to 4–9 million tonnes of CO₂e by 2030. It should be noted that this overlaps the PtX potential.

Power-to-X – Green fuels and fuels for transport and industry

Mission: Solutions must be developed to convert power from renewable sources to products that can be used to reduce emissions from transport and industrial segments with no cost effective alternatives to fossil energy. The technical reduction potential for PtX is estimated at 0.5-3.5 million tonnes of CO₂e by 2030 and in the longer term 1.5–7.5 million tonnes of CO₂e (including 1-4 million tonnes in international shipping and aviation which are not included in the pursuit of Denmark's national 70% reduction target). It should be noted that this overlaps with the CC(U)S potential.

Climate and eco-friendly agriculture and food production

Mission: The research and innovation effort must target the development of technologies and solutions that can significantly mitigate the climate and environmental impact of conventional and organic food production and farming, including emissions from livestock, application of fertiliser and land, and reduce derived effects on nature. This could be through technologies and more circular and sustainable solutions for capturing carbon in soils and forests, biorefining, including pyrolysis, new food and feed products with a lower climate and environmental footprint, plant breeding and support of knowledge requirements in relation to effective regulation, including documentation of emissions. A number of new technologies and solutions are being developed, with particular potential promised by research projects within feed additives, slurry additives and biorefining.

Recycling and reduction of plastic waste*

Mission: Research efforts must target new technologies and production methods to ensure waste reduction and improve the sorting and recycling of plastic waste into new plastic products. Development of plastic-containing products that are designed for recycling or reuse, both in terms of the chemical composition of the raw plastic product and additives as well as the composition of materials in the individual product. Technologies and solutions that heighten the quality of reuse and lessen material loss, as well as sorting, reprocessing and reuse of plastic-containing textiles are assessed as being able to reduce the volume of plastic and fossil textile waste by approximately 53,000 tonnes in addition to the reduction set out in the Agreement on a Green Waste Sector and Circular Economy. By removing this additional quantity from incineration, Denmark will achieve its target of removing 80% of plastic waste from incineration by 2030, which will result in a reduction of approximately 0.15 million tonnes of CO₂e from waste incineration by 2030.

* Note: In connection with the negotiations on the distribution of the research reserve in 2021, the parties in the agreement agreed that the fourth mission from the government's green research strategy on recycling and reduction of plastic waste be extended to include circular economy, including with special focus on plastics and textiles: *The mission will help promote circular economy through the development of solutions to improve resource productivity, reduce the amount of waste, increase the amount and quality of recycling, and reduce environmental and climate impact from products. There will be a special focus on plastics and textiles. Solutions may include e.g. changed design and production methods as well as changed forms of consumption. Other solutions include developing technologies that can improve the traceability of materials through the value chain and sorting e.g. plastic waste for high quality recycling. It also includes the development of new solutions for more sustainable design of e.g. textiles that minimize the consumption of natural resources and ensure longer life of textiles, as well as technologies that can increase the recycling of e.g. textile waste. At the same time, there will be a focus on increased use of renewable and recycled raw materials instead of newly extracted fossil raw materials.*

General note: A memorandum on methods is available at the Ministry's website.

In concrete terms, the green missions will be carried out by green research and innovation partnerships. This is a new research and innovation measure introduced by the Green Research Strategy. The green research and innovation partnerships will gather knowledge institutions, businesses, public parties and innovation actors around a common research and innovation effort targeting the accomplishment of a specific mission. This means that the green transition goes hand in hand with the effort to create Danish jobs and strengthen the competitiveness in accordance with the Climate Act's consideration of sustainable business development.

To accelerate and support the successful maturation of promising green research and technologies in Denmark, the partnerships must, to the greatest extent possible, forge a strong bond between partnership activities, public subsidy schemes such as the demonstration programmes and the Innovation Fund and Denmark's Green Future Fund and private investor environments. The goal is to develop promising green research and development projects under the partnerships wherever possible so they can nourish new green growth successes which are upscalable in Denmark with funding from Denmark's Green Future Fund and private investors or a combination.

In coordination and dialogue with the other relevant stakeholders, including Denmark's Green Future Fund, Innovation Fund Denmark will head the practical deployment of the mission-driven green research and innovation partnerships. The funds are subject to a public tender procedure. In the years ahead, the *Green Research Strategy*, including the research needs and potentials mapped by the strategy, will form the basis for the green research effort in the Government's annual proposal for research funding priorities as part of the agreement on the distribution of the research reserve, etc.

6.4. Denmark's Green Future Fund

The parties behind the 2020 Finance Act have allocated DKK 25 billion to Denmark's Green Future Fund which will contribute to a national and global green transition, including developing and spreading new technologies, converting energy systems into renewable energy, storing and efficiently using energy, etc., and promoting global exports of green technologies, such as wind power and energy-efficiency improvement solutions.

Through its four underlying institutions (Vaekstfonden, EKF Denmark's Export Credit Agency, the Danish Green Investment Fund and the Investment Fund for Developing Countries), the fund will also contribute to fulfilling the Paris Agreement temperature target and achieving national climate targets and will thus actively finance and invest in measures to reduce the impact on climate, nature and environment, including measures directed at water scarcity, food deprivation and sustainable food production, see box 20.

Box 20

Four underlying institutions in Denmark's Green Future Fund

Vækstfonden

DKK 4 billion for Vaekstfonden, the Danish state's investment fund, must be used to launch a broad, long-term effort to build up a market for green venture capital. This will facilitate loan-raising and equity financing for green entrepreneurs and growth companies to support the companies' development and convert good, green ideas into green jobs. Vaekstfonden will mainly invest in funds and directly in companies but can also provide loan financing.

EKF – Denmark’s Export Credit Agency

DKK 14 billion for EKF must be used to strengthen EKF’s scope for guaranteeing of Danish companies’ exports of green technologies and solutions all over the world. EKF provides export financing to Danish exporters in the form of loans and guarantees.

The Danish Green Investment Fund

DKK 6 billion for the Danish Green Investment Fund to co-finance investments promoting the green transition of Danish society, including energy efficiency measures, renewable energy systems and installations and resource efficiency. The Fund provides loans and guarantees to private-sector companies, social housing organisations and public-sector undertakings and institutions, etc.

Investment Fund for Developing Countries

DKK 1 billion for the Investment Fund for Developing Countries (IFU) must be used to promote investments and loans for green solutions in developing countries, including renewable energy, energy efficiency, food production and safeguarding clean water. IFU provides advice and venture capital to companies seeking to do business in developing countries and emerging markets.

As a rule, Denmark’s Green Future Fund will always seek co-financing with private-sector operators, such as pension companies, venture capital funds or business angels. This means that the Future Fund will also mobilise significant private capital funding, resulting in an overall boost for the green capital ecosystem and making it easier for green companies and projects to obtain funding.

6.5. Green tax reform

With the *Climate Agreement for Energy and Industry 2020*, a broad parliamentary majority has agreed that the Government is to prepare a proposal for a green tax reform, including short-term adjustments to the energy taxation aimed at a homogeneous CO_{2e} tax in the long term.

Taxes and duties are generally an effective tool for obtaining the reductions at the lowest socio-economic cost. With correct taxation, the price of CO_{2e} emissions reflects the costs incurred on society by households and businesses. This provides an economic incentive for reducing CO_{2e} emissions to save on tax.

Taxation can also target CO_{2e} emissions, which is difficult to achieve with subsidies, for instance, as this requires knowing which technologies yield the most cost-effective reductions and should thus be supported.

However, it is still important for a green conversion of the tax and duty system to balance the considerations that apply to the green transition of society in general in accordance with *the Climate Act principles*.

Current tax system

Current CO_{2e} taxes include energy taxes on fossil fuels, a CO₂ tax, primarily in the non-EU ETS sector, and a CO₂ quota price in the sectors regulated under the EU emission trading system. In addition, there are taxes on air pollution from fuels

(NO_x and sulphur), and the vehicle registration taxes differentiate according to vehicles' CO₂ emissions. Energy taxes make up the largest proportion with revenues of some 4.5% of the total tax and duty revenues of about DKK 1,000 billion.

The tax system structure is designed to take account of a number of different concerns, including carbon emissions, but also issues such as industries' competitive situation. CO_{2e} emissions are exempt from all taxation in a number of areas.

This means that CO_{2e} emissions in the current system are regulated with highly incongruous pricing across sectors and uses. The taxation of land transport and households as well as industrial space heating (comfort heating and cooling, etc.) is relatively high. Conversely, the taxation on production is comparatively low and differentiated further, with some areas being exempt from taxation. In addition, non-energy-related emissions from e.g. agriculture (methane and nitrous oxide) are not subject to tax or other direct regulation. In specific terms, the effective rate of taxation varies between 0 and 2,000 (measured in DKK per tonne of CO_{2e} emitted).

This results in great variation in shadow prices, i.e. the socio-economic cost per tonne of CO_{2e} reduced as illustrated in table 7. The shadow price will go up with the rate of taxation.

Table 7	
Marginal shadow prices for possible measures	
Initiative, energy	Shadow price (DKK/t CO_{2e})
Space heating tax	1,270
Process energy tax	0-260

Note: The total tax and allowance costs related to carbon emissions are shown for a tax increase of DKK 1 per tonne of carbon. For space heating and process energy, the basis applied is natural gas, including agreed increases in the Climate Agreement for Energy and Industry.

Consequences of a green tax reform

There are many opportunities for converting taxes in connection with a green tax reform, which will result in very different consequences for citizens and businesses depending on the specific model, including whether CO₂ taxes are homogenised across sectors, whether the existing differentiations are maintained or whether certain sectors are exempt.

Regardless of the model for a green tax reform, tax on business sectors will impact their competitiveness, see the example in table 8.

Table 8
Immediate consequences for selected industries of an increase of total CO₂e taxes by DKK 100/tonne of CO₂e

Selected industries	Current rules	Increase
	<i>DKK per employee/year</i>	<i>DKK per employee/year</i>
Agriculture, horticulture, forestry	475	2,350
Food, beverage and tobacco industry	1,575	3,675
Chemical industry	775	1,800
Plastic, glass and concrete industry	0	4,375

Note: Increasing total CO₂ taxes from approximately DKK 250/tonne of CO₂ to approximately DKK 350/tonne of CO₂ (when increasing the energy tax on process energy in the industry sector) involves considerable increases for the production sectors. The consequences are shown in DKK per employee. It is estimated that such an increase will reduce CO₂ emissions by 0.5 million tonnes.
Source: Ministry of Taxation calculations.

All else being equal, higher CO₂e taxation will result in generally lower production and job rates and affect sectors selling products in foreign competition.

In the longer term, the competitiveness of the Danish business community is expected to be restored and employment rates will mostly return to the same level. In this process, the business structure will be adjusted so that highly taxed sectors exposed to competition will be reduced for the benefit of other sectors where jobs will be created. This is because higher taxes will carry over and ultimately lead to lower wages (and possibly lower land prices).

For the segments of domestic production that are not exposed to foreign competition, tax increases could be passed on to higher consumer prices. However, the taxes will also lead to potentially considerable displacements between industries so that activities and employment in emission-intensive trades (such as certain manufacturing industries, horticulture and agriculture) will decline, while emission-light trades (services, etc.) will increase their levels of activity and employment.

It will ultimately be households that bear the costs of achieving the goal in the form of lower real income. The share of the burden that is passed down through wages can be expected to be fairly broadly dispersed while the distribution of the share that is passed on to prices will depend on who purchases the goods in question.

There will be adjustment costs in the period until the new equilibrium sets in. All other factors being equal, they will be higher in times of recession than in boom times.

Implementation of a green tax reform

Denmark has a long tradition of using taxes to curb pollution and reduce emissions of greenhouse gases, etc., under the 'polluter pays' principle.

However, a green tax reform that aims to be a main driver in the reduction of CO₂e emissions throughout Danish society through the general pricing of greenhouse gas emissions will have considerable consequences for private individuals and businesses. Companies with limited alternatives will primarily reduce their production, for instance, meaning that jobs and emissions will move abroad. There will also be major displacements in the current business structure as well as impacts on distribution and revenue.

At the same time, there are considerable challenges of introducing a broad-based CO₂e tax which requires substantial development efforts, particularly in sectors where it is not yet possible to document the basis for the level of CO₂e taxation. This is exemplified by agriculture's non-energy-related emissions.

This makes it essential to introduce the green transition gradually so private individuals and companies can adapt to the new initiatives, such as a restructuring of the tax system. A gradual transition also ensures that new taxes can be implemented and managed.

The Government is therefore laying the groundwork for a green tax reform that moves in the direction of higher and more uniform taxation of CO₂e emissions.

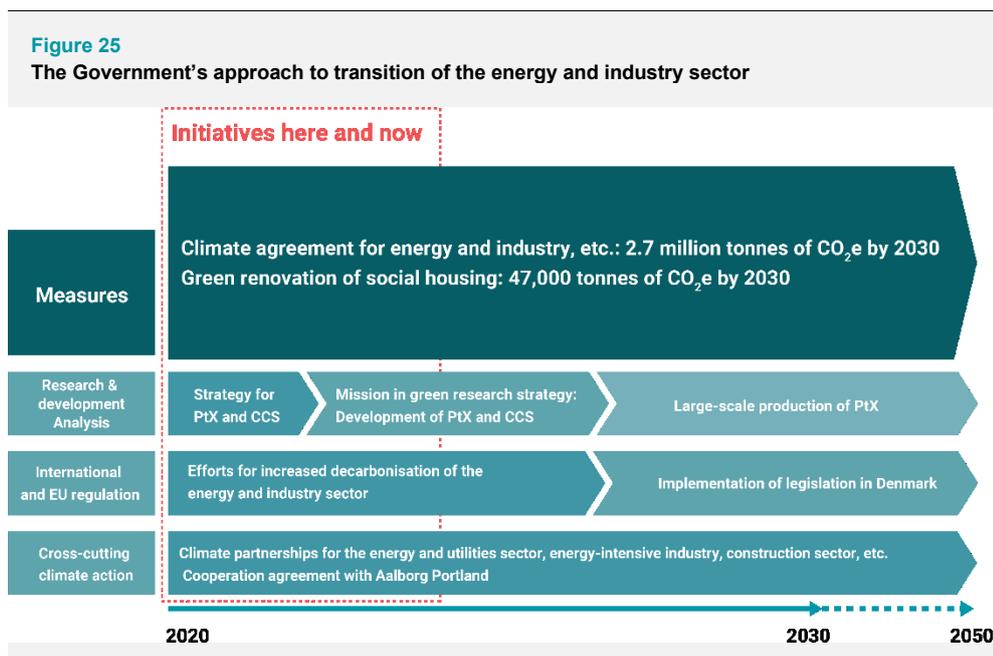
This must be seen in the context of the agreed increase on the tax on fossil space heating to promote greener forms of heating in the *Climate Agreement for Energy and Industry 2020*. It was also agreed in effect to abolish the electric heat tax, making it easier to use green wind power for heating, for instance.

7. A wise green transition

The green transition offers opportunities and challenges in all sectors, but their nature varies greatly. In particular, the cost levels of the available technologies differ immensely. The costs incidental to the transition therefore vary considerably among the different sectors, and there are different technical barriers obstructing the implementation of such measures. In accordance with the *Agreement on a Climate Act*, the Government pursues a sector by sector approach to transitioning to a climate-neutral Denmark. Sector action plans will be prepared in 2020-2021 for all major sectors, including agriculture, transport, energy, construction, waste and industry. This approach aims to accommodate the special circumstances of the individual sectors.

7.1 Energy and industry sector

There is an outstanding reduction challenge in the industrial sector and for parts of heating production. Developing the future energy sector can also support the green transition in other sectors. The Government therefore agreed a sector strategy for energy and industry in June 2020 with a broad parliamentary majority. The plan includes specific initiatives that will result in reductions by 2030. At the same time, the agreement contains a significant development track for developing and maturing CCS and PtX technologies, which is backed by the Government's green research strategy. This will lead to further reductions as the technologies mature. In early 2021, the Government will also present an electrification strategy with scenarios relating to the 70% reduction target. Finally, the Government will strengthen the efforts for a common European energy market while ensuring continued close dialogue with the Climate partnerships for energy and industry to conclude cooperation agreements with the Climate partnerships on future reduction efforts. Figure 25 illustrates the Government's plan for the green transition in the sector.



The sector's greenhouse gas emissions

In 2030, energy and industry sector emissions are expected to be mainly attributable to fossil fuels for heating and industrial processes. Figure 26 shows the expected distribution of energy and industry emissions in 2030 before agreeing the sector strategy for energy and industry on 22 June. Greenhouse gas emissions in the energy sector will be reduced significantly up to 2030. The sector's emissions are expected to decline by 9.5 million tonnes of CO₂e without incorporating reductions that follow from the conclusion of the sector strategy for energy and industry of 22 June.

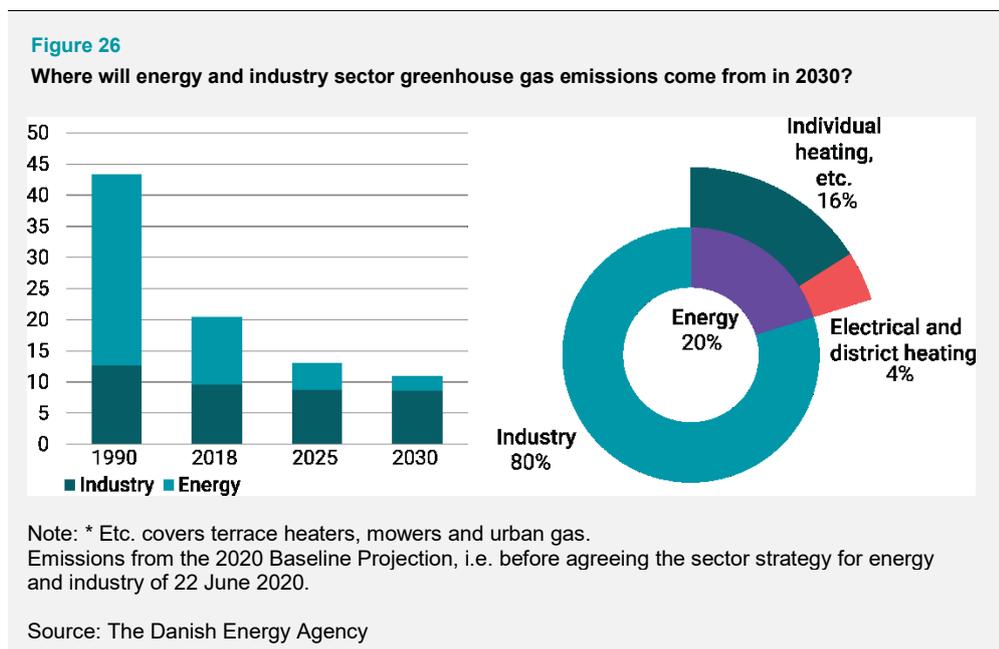
The remaining energy sector emissions by 2030 are expected to almost exclusively come from heating production. After entering into the sector strategy on 22 June, individual oil and gas-fired boilers are expected to still emit one million tonnes of CO₂e by 2030. Emissions from individual oil and gas-fired boilers in 2030 should be seen in the light of the Government's sector strategy for energy and industry already securing greenhouse gas reductions of 0.7 million tonnes of CO₂e. Including expected developments, 180,000–240,000 oil and gas boilers are expected to have been phased out by 2030.

Some oil and gas boilers are expected to remain in 2030, however, for many reasons. Many owners of gas boilers will still have a relatively new, well-functioning boiler and the natural time to replace them has yet to come. For some, the financial incentive to replace even a worn-out gas boiler with district heating or a heat pump will be limited. A few oil-fired boilers are expected to remain in 2030 that are difficult to phase out. This could be due to considerable difficulty and costs of replacing these oil boilers with a heat pump or district heating for the individual homeowner despite the high average personal financial gain of converting to a heat pump, for instance.

District heat production emissions are expected to decline by 0.05 million tonnes of CO₂e in 2020 and 0.02 million tonnes of CO₂e by 2030 due to the sector strategy. The remaining greenhouse gas emissions in the district heating sector, at an expected 0.50 million tonnes of CO₂e by 2030, are mainly attributable to firing of natural gas and oil for peak and reserve-load production of heat and combined heat and power. Though technically possible, the costs of an accelerated transition of the last emissions can be relatively high. This is because peak and reserve-load facilities operate for very few hours and therefore are plants with low investments and slightly higher marginal operating costs. This means that, e.g., natural gas-fired plants will remain attractive, also because it is technically feasible to start up and shut them down quickly. Electrical heat pumps require large investments and are therefore unsuitable for peak and reserve loads. Biomass plants can be used, but also come at relatively high investment costs. Initiatives affecting CHPs can also affect the security of electricity supply due to the close integration of the Danish power and heating systems.

Investments in renewable energy (RE) in Denmark have steadily lowered greenhouse gas emissions. This particularly applies to power production where the share

of RE is expected to exceed power consumption by 2030. However, it is assessed that there will still be a need to expand RE capacity in addition to already agreed initiatives, as society's demand for electricity is expected to increase considerably due to increased electrification, conversion to green alternative fuels and increased prevalence of major power consumers (e.g. data centres). This means that the future energy sector could support green transitions in other sectors, particularly industry and transport, by generating and distributing green electricity and green fuels.



Greenhouse gas emissions from industrial and business sectors mainly derive from the concrete industry, the petrochemical sector and manufacturing industries. There are also industrial emissions from the construction industry which uses fossil fuels for internal transport and from energy used by agriculture and horticulture which involves fossil fuels for internal transport and heating of animal housing, etc. The industrial sector is expected to emit 8.6 million tonnes of CO₂ by 2030, though this level is expected to be reduced by several of the initiatives from the sector strategy for energy and industry of 22 June. This will be achieved through support for increased biogas production, increased electrification and energy-efficiency improvements of industrial processes, etc. The funds for increased biogas production and for electrification and energy-efficiency improvements of industrial processes are expected to reduce emissions by an additional 0.9 million tonnes of CO₂e, primarily from industrial emissions. In addition to the initiatives from the sector strategy for energy and industry of 22 June, the cooperation agreement between the Government and Aalborg Portland is also expected to contribute a separate reduction of industrial emissions up to 2030 of 0.5 million tonnes of CO₂.

Some of the remaining industrial emissions will be possible to reduce by means of additional electrification and changing over from fossil fuels and gas to biogas in the long term. However, there are major technological barriers to obtaining significant reductions of industrial greenhouse gas emissions as it is currently not possible to use heat pumps for high-temperature processes, for instance. In addition, some process emissions, such as from the production of concrete, cannot be reduced by electrification or replacing fossil fuels. Instead, these emissions must be addressed by means of new green technologies that capture carbon and subsequently store it or use for generating green fuels, or by developing more sustainable products with lower process emissions.

The expectations of the use of biogas, costs of subsidy expenses and climate effect are being consolidated. The energy agreement from 2018 put a halt to admission of new subsidy recipients in the existing biogas schemes. All existing and future biogas projects had to apply before 1 July 2020 to receive a commitment with a determination of the terms of subsidy. The Danish Energy Agency is currently processing the cases.

Individual heating – green heating

There are currently some 80,000 oil boilers and 380,000 gas boilers in Denmark. Emissions from individual heating are estimated to be 2.6 million tonnes of CO₂e in 2018, declining to 1.7 million tonnes of CO₂e by 2030 without additional initiatives (i.e. exclusive of the sector strategy of 22 June). In 2030, emissions from oil and gas boilers will comprise most of the heating sector emissions.

In most instances, oil and gas boilers can be replaced by green district heating or electric heat pumps. A barrier to the transition is that a heat pump requires an average initial investment of almost DKK 90,000, which can be economically challenging for homeowners. Before the sector strategy for energy and industry, gas boiler owners did not have clear financial incentives for replacing their boilers, and consumer binding to the gas system also meant that some gas customers were obliged to either use gas or contribute to the gas system. The socio-economic requirement also constituted a barrier to conversion of gas areas to district heating.

With the sector strategy for energy and industry, the parties to the agreement have therefore agreed to make the green choice more financially palatable by introducing taxes that increase the price of fossil fuel heating and reduce the price of electrical heating, and allocate a total of DKK 4.1 billion (including derived lost taxes) up to 2030 in the form of subsidies for phasing out oil and gas boilers. The parties to the agreement will repeal the consumer binding to natural gas and also adjust the socio-economic requirement so that district heating projects can be approved without having to submit a comparison with fossil alternatives, and natural gas areas can be converted to district heating. The total effort to phase out oil and gas boilers in the sector strategy for energy and industry is expected to result in reductions of 0.7 million tonnes of CO₂e by 2030.

Oil and gas boilers are expected to continue emitting one million tonnes of CO₂e in 2030, for many reasons. Many gas boilers will still function in 2030, meaning that the natural time of replacement has yet to come. It should be noted that the age profile for gas boilers indicates that many boilers will have to be replaced in the period 2030–2035. With the sector strategy for industry and energy of 22 June 2020, it is expected that more gas boiler owners will find a financial incentive to switch to district heating or a heat pump when the gas boiler breaks, but this is not expected to apply to everyone. There will be a few oil boilers remaining by 2030 that can be difficult to phase out. The reasons can include that it is very difficult and costly for the relevant oil boiler owners to change their heating system despite the high average personal financial gains of replacing the oil-fired boiler.

A possible measure for phasing out the last remaining boilers is various forms of bans or requirements. However, Denmark is bound by EU law in this area, and it is not deemed possible to ban the actual boiler under current EU regulation. In addition, a ban on or requirement to refrain from using oil and gas boilers will entail large costs for some of the homeowners who still own such a boiler. There are also other avenues than bans, and the sector strategy is expected to increase the profitability of replacing a worn-out gas boiler. The parties behind the sector strategy have agreed to carry out an analysis of the potential for phasing out oil and natural gas from household heating.

It should also be added that in relation to phasing out of gas boilers, the time frame for the phase-out will have a profound impact on the remaining gas customers (mainly manufacturing companies). This is because the gas system operations are funded by consumer tariffs and a rapid phase-out of natural gas for the benefit of individual heating will leave a bill that must be shared by fewer gas consumers. Without time for adjustment, this will lead to significant price increases for the remaining gas customers. The costs are assessed to be significantly larger if the phase-out takes place before 2030 instead of after 2035.

Box 21

Accelerated transition of oil and gas boilers

Emissions from oil and gas boilers are estimated to be one million tonnes of CO₂e in 2030 (according to the sector strategy for energy and industry of 22 June 2020). A complete phase-out by 2030 through bans is not deemed possible under current EU rules. The options and possible alternative initiatives will be discussed in more detail as agreed in the sector strategy. A complete phase-out of the remaining oil and gas boilers by 2030 will also incur derived tax losses on the state under current tax rules. Under the sector strategy, a CO₂ reduction of 0.7 million tonnes of CO₂ from phasing out of oil and gas boilers thus results in total tax losses of DKK 1.9 billion up to 2030. Transitioning the remaining oil and gas boilers to other heating forms by 2030 as well as using requirements, bans or the like will lead to higher tax losses, possibly prompting a need to allocate additional subsidies.

Green EU energy policy

A significant step has been taken towards a common energy policy in the EU with the EU Energy Union. Additional initiatives follow from the European Green Deal, both in terms of renewable energy, energy efficiency and new green technologies such as PtX, hydrogen and CCS/CCU. Our international links and electricity grid connect Denmark closely to our neighbouring countries, and the steadily increasing

RE availability in both Denmark and the EU engenders a requirement for common European solutions to safeguard a cost-effective green transition of our energy system.

The energy renovation wave and the “Energy efficiency first principle” in the EU
The Government supports the Green Deal’s “energy efficiency first principle”, which makes energy efficiency key for cost-effective energy policy-making in the EU, and the European Commission’s proposed energy renovation wave and the Commission’s emphasis on energy-efficiency standards as a crucial element. This entails enormous potential exports for Danish companies. The Government is working for stricter EU requirements for the energy efficiency of products and for targeting energy-efficiency efforts particularly at reducing fossil energy.

Box 22 summarises the individual heating initiatives taken so far.

Box 22

Overview of main individual heating initiatives

Measures:

- The electric heat tax will be reduced to minimum EU rates
- Mandatory consumer connection to the natural gas grid will be eliminated and the socio-economic requirement will be adjusted (see also box about main initiatives for district heating)
- Subsidy pools for phasing out oil and gas-fired boilers from 2020, including a pool for disconnection from the natural gas grid and roll-out of district heating.
- Initiatives targeted at consumer safety and safe implementation
- Energy-efficiency improvements
-

Development initiatives:

- Study of whether a special loan scheme can be set up for individuals without access to funding
- Effort to map oil and gas boilers in municipal and regional buildings
- Analysis of potential for phasing out oil and natural gas from household heating
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials. The themes include energy-efficient buildings, for instance, and the funds can thus support the development of solutions to reduce energy consumption and potentially CO₂e emissions.
- At European level, the Government is working to strengthen and broaden the EU emission trading system to include areas such as road transport and buildings to improve the consistency of CO₂e price signals across sectors and ensure more cost-effective climate regulation.
- Energy efficiency is also an EU priority for the Government. The Government is working to aim energy-efficiency efforts particularly at reducing fossil energy consumption so that the effort contributes to the EU 2030 climate target and the net zero emissions target by 2050 at the latest. There are also a range of EU requirements on energy utilities and buildings as well as on energy-using products such as boilers, household appliances, etc., which is a smart and cost-effective path to widespread energy efficiency.
- In Q3 2020, the European Commission is expected to launch a renovation wave initiative that will contribute to at least doubling the rate of renovation with guidance on the application of the energy efficiency first principle to follow in 2021.

Electric and district heating – excess heat, green district heating and phasing out coal

In 2018, the district heating sector (including CHPs producing electricity and heat) emitted 8.5 million tonnes of CO₂e (not including emissions from waste incineration). The emissions are expected to be reduced to 0.5 million tonnes of CO₂e by 2030 if no additional initiatives are implemented. The remaining emissions are

mainly attributable to the firing of natural gas and oil for peak and reserve-load production of heat and combined heat and power.

Though technically possible, the costs of an accelerated transition of the last emissions can be relatively high. Initiatives affecting CHPs can also affect the reliability of electricity supply due to the close integration of the Danish power and heating systems.

It is challenging that the sector is characterised by limited competition and outdated regulation.

It is important that the framework conditions for the district heating sector support giving households and the business community access to green district heating at consumer-friendly prices. This is one of the reasons why the sector strategy for energy and industry initiates a modernisation of the sector's production commitments, which will give district heating producers a greater say over their own investments. This includes phasing out the combined heat and power requirement and the fuel commitment to natural gas. An analysis will also be launched to illustrate the consequences of a possible ban on oil and natural gas for district heat production from 2030, including possible consequences for reliability of supply, electricity and heating prices.

A large number of the major coal-fired CHPs have already been converted to or replaced by biomass-fired blocks. This development is promoted through financial incentives, including subsidies for biomass-generated power ("15 øre" (DKK 0.15)), and the option for the heating and power sectors to agree on cost allocation. Investment decisions and plans are also in place for the remaining plants that use coal as their primary fuel, involving the expected phasing out of coal from electricity and heat production by the end of 2028. It is expected that coal will be phased out at the Fynsværket power station and Ørsted's power stations in 2022 and 2023, respectively, whereas the Nordjyllandsværket CHP plans to phase out the use of coal in 2028. It is generally the case that an accelerated phase-out is deemed to entail relatively high costs that can increase heating costs for consumers, and there may be technical challenges of meeting large-scale heating requirements without the use of fossil fuels.

Biomass represents most of the RE solutions (primarily in the form of straw, wood pellets and wood chips). The Climate partnerships have recommended a statutory framework for sustainable biomass to ensure, among other things, that biomass genuinely contributes to CO₂ reduction and complies with the biodiversity requirements. The parties to the sector strategy for energy and industry agree to make statutory requirements for the sustainability of wood biomass for energy and documentation and verification requirements to maximise the sustainability of electricity and heat production with due regard to reliability of supply.

Box 23

Accelerated transition of district heat production

The Nordjyllandsværket CHP uses coal to generate power and district heating in Aalborg. There are plans to shut down the plant by the end of 2028, and advancing the closure to 2025 will result in additional costs. Firstly, the plant has debts that will not be written off by 2025. Secondly, moving investments forward in the district heat production plants that will replace heat production from Nordjyllandsværket will result in added costs. Aalborg Municipality estimates the total costs of moving investments forward to be DKK 500 million. This cost must be shouldered by heating consumers in Aalborg, unless the state subsidises the conversion, which will entail a significant cost for the state. On top of this, the tax loss to the state is estimated to be DKK 100–150 million.

In the specific case, the utilisation of excess heat can be an effective and inexpensive way to displace fossil fuels in the district heating sector. With the sector strategy for energy and industry, the parties agree to lower the electrical heating tax to the EU minimum rates thereby eliminating the tax on electricity-based excess heat. The excess heat tax will also be eliminated if the excess heat is certified or subject to a similar agreement scheme that ensures energy-efficiency improvements at the excess heat provider. The parties also confirm the agreement on excess heat of 28 March 2019, including the price adjustment of excess heat.

Box 24 summarises the initiatives taken in the area of district heating so far.

Box 24

Overview of main initiatives in the area of district heating

Measures:

- The district heating sector production bindings will be modernised, including removing the fuel binding to natural gas and the CHP requirement. The socio-economic requirement will also be adjusted so that district heating projects can be approved without having to provide comparisons with fossil alternatives.
- The obligation to purchase district heating will be modernised to facilitate higher utilisation of excess heat and own RE production.
- The electrical heating tax will be reduced to the EU minimum rates, which involves eliminating the tax on electricity-based excess heat. The excess heat tax will be eliminated if the excess heat is certified or subject to a similar agreement scheme that ensures energy-efficiency improvements at the excess heat provider.
- The agreement on increased utilisation of excess heat of 28 March 2019 is confirmed, including a price adjustment of excess heat.

Development initiatives:

- An analysis will be launched to illustrate the consequences of a possible ban against oil and natural gas for district heat production from 2030, including for security of supply, electricity and heating prices.
- A study will be made of consequences of restricting consumption of biomass for electricity and heat production.
- An annual amount of DKK 2 million will be allocated for supporting initiatives in 2021 and 2022.
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials and include, for instance, intelligent solutions for integrating RE in heating production.

Electricity and district heating – green power

The power sector's role in the green transition is to generate sufficient RE-based electricity to also enable other sectors to phase out the use of fossil energy sources. The power sector has already been very successful at achieving the green transition as Denmark's electricity consumption is expected to be made up of 100% green power by 2027. The power sector emissions are thereby extremely limited,

mainly deriving from peak loads (a total of 0.5 million tonnes of CO₂e from electrical and district heating by 2030). An additional expansion of RE power production compared to what is already expected to be constructed up to 2030 will therefore not in itself lead to additional greenhouse gas reductions in the power sector but may contribute to reducing emissions in other sectors by means of conversion.

The many peak-load units (e.g. gas turbines, diesel-powered generators, etc.) in the electricity area are only rarely in operation but play a major role in the reliability of power supply when consumption exceeds production, e.g. at times when the wind is not blowing and the sun is not shining. This means that it may be necessary to maintain peak-load units in the power system during a transitional period to safeguard the power supply until we have suitable technologies and storage solutions and until the consumption of power is made more flexible. Emissions may be mitigated, if necessary, by the use of non-fossil fuels such as bio-oil and green gas, but at a significantly higher cost than current fossil fuels. An analysis on the effects on security of power supply from the initiatives in the sector strategy for energy and industry of 22 June will examine these matters more closely.

The scope for further expansion of onshore wind power and solar power is mainly limited by geography, including considerations for citizens and the possibilities for getting approval for locations. At the end of 2019, the Government and a broad parliamentary majority agreed to improve conditions for neighbours of future RE installations to increase local support for a continued expansion of onshore RE. It was decided in the climate agreement for energy and industry to increase two of the RE schemes (Green Pool and RE bonus). The grid may eventually become a limiting factor for the expansion of onshore RE.

A prerequisite for increasing power consumption is that the electrical grid must be able to convey sufficient power to sustain traditional power consumption as well as new types of consumption (such as heating and transport) and maintain comparatively high security of supply in spite of changed consumption patterns and production forms. This not only requires reinforcements of the existing grid, but also improved grid utilisation with focus on flexibility of consumption and production.

As the first country in the world, Denmark will embark on a new era of offshore wind expansion with a paradigm shift from individual offshore wind farms to energy islands by 2030 in order to create the energy sector of the future. This will secure more efficient utilisation of non-coastal offshore wind resources and a relatively smaller need for new land-based power pylons. It can support an electrification of Denmark and contribute to Europe's green transition by means of Danish export and pan-European integration of electricity markets.

The sector strategy for energy and industry provides for the establishment of two energy islands by 2030. One island will be established in the North Sea with 3 GW of offshore wind power connected and space for at least 10 GW in the long term, while Bornholm will be made a Baltic Sea energy island by connecting up to 2 GW

of offshore wind power. An already adopted 1 GW offshore wind farm at Hesselø will also be moved forward and is scheduled for grid connection in 2027 instead of 2028. The total expansion of 6 GW is three times larger than Denmark's current offshore wind capacity. The expansion of onshore renewable energy will also be continued, with decisions already in place for significant additional green power expansion in Denmark. It is essential that we can also utilise all this green power. The power grid must be able to keep up with the increasing supply of green power and the higher demand, and the Government will therefore present initiatives to continue the grid expansion.

A tightly meshed energy market with a cost-effective renewable energy expansion

The Government is working for the EU to maintain and further develop the European electricity market, thus ensuring cross-border energy supplies. The integration of our energy markets can increase the volume of renewable energy while maintaining high security of supply. This will require intensified cooperation across borders, both onshore and offshore.

The EU has identified a need for offshore wind power of up to 450 GW by 2050 in order to keep climate-changed induced temperature rises below 1.5 °C. This is a twentyfold increase of the current capacity. Denmark is working with the other EU countries to define a framework for offshore wind expansion in the North Sea and the Baltic Sea in order to exploit this potential. In this context, the future Danish energy islands are aimed at increasing the share of renewable energy in Europe while also tying the member states even closer together.

The EU's coming strategy for offshore wind power is also important for Denmark due to our unique positions of strength in this field and our ambitious offshore wind expansion plans in the coming years. The future revision of the TEN-E Regulation will also help improve European power and gas energy infrastructures to facilitate easier transport of renewable energy from the north, such as North Sea and Baltic Sea wind power, across the borders to areas in Europe with a high demand for energy and a challenging security of supply.

Box 25 summarises the initiatives taken so far for electrical power.

Box 25

Overview of the main initiatives in the area of electricity

Measures:

- Transition to market-driven expansion of solar cells and onshore wind power. Public tender procedures for onshore wind power, solar power and other green technologies will continue until 2021, and the support requirement will be analysed to qualify subsidy requirements in the future.
- Support for testing and demonstration. An additional DKK 237 million will be set aside for experimental turbines in 2021-2024, with an analysis of how to best support frameworks for testing and demonstration in the future.
- Administrative barriers will be removed to enable enterprises to increase their solar energy investments.
- Offshore wind turbine expansion. Speeding up farm 2, from the 2018 energy agreement, to be located at Hesselø.

Development initiatives:

- Establishment of the world's first energy islands. Establishment of offshore 3 GW and 2 GW wind farms. Green power from energy islands and other sources will be used directly but eventually also converted into sustainable fuels (Power-to-X) that can decarbonise sectors which are unable to use the power directly, e.g. aviation, most heavy-duty transport, certain industrial processes, etc.
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials. The themes include cost-effective renewable energy technologies for energy production with a potential to eventually reduce emissions in the industrial and transport sectors.
- Entering into one or more partnerships with Denmark's neighbouring countries about international links to ensure the establishment and profitability of the energy islands.
- Denmark participates actively in the North Seas Energy Cooperation (NSEC) with eight other countries and the Commission to expand offshore wind and grid development in the North Sea. Under the Danish presidency in December 2019, a new work programme for NSEC was adopted, and, at the ministerial meeting in July 2020, the countries agreed on a joint declaration on the importance of offshore wind power for combating climate change. In the declaration, the North Sea countries also encourage the European Commission to develop a legislative framework for cost-effective promotion of wind power.
- Influence the European Commission to develop a legislative framework for cost-effective promotion of wind power.

Industry

The possibilities of reducing industrial greenhouse gas emissions depend greatly on the possibilities of converting from fossil fuels to electricity or other forms of renewable energy, as well as the scope for energy-efficiency improvements. The sector strategy for energy and industry therefore allocates DKK 2.5 billion (including derived tax losses) for 2020–2030 for a subsidy pool for electrification and energy-efficiency improvements to reduce greenhouse gas emissions from the Danish business sector.

The greatest potential for electrification is related to production of medium and low-temperature heat of up to 150 degrees Celsius in manufacturing sectors, agriculture, horticulture, etc. Internal industry transport at the companies also offers electrification opportunities. However, it is a challenge that conversions may represent major investment decisions and that the market price of fossil fuels is relatively low. This means that there is often limited economic incentive to reduce greenhouse gas emissions in manufacturing sectors and agriculture.

Other industrial areas currently have limited technological possibilities of using power. An example is high-temperature processes as electricity (heat pumps) cannot easily heat to temperatures above 150 degrees Celsius (e.g. production of concrete, metal processes, etc.). The electrification of these industrial processing elements' energy consumption will require continued technological developments in the use of industrial heat pumps. In addition, certain production processes require direct firing with a fuel, which would exclude the use of electricity. The biggest potential reductions for these production processes is currently within energy-efficiency improvements and the possible increased use of green gases, which is why the sector strategy allocates a total of DKK 12.8 billion over a twenty-year period for a new subsidy scheme for biogas and other green gases that can be used where electrification is not an option. The climate partnership for energy and utilities and the climate partnership for energy-intensive industry point to enlarging the production of biogas as a necessary tool for reaching the 70% reduction target.

Box 26

Accelerated transition of industrial activities

There is currently only a limited number of manufacturing companies (10-15) that still use coal in their production. In 2018, they used a total of 5.2 PJ of coal, equating to 6% of the total energy used in manufacturing sectors. A small number of farms and horticultural businesses also used coal, totalling 0.4 PJ of coal in 2018. Together, emissions from burning coal make up 1.1 million tonnes of CO₂ for manufacturing companies and 0.04 million tons of CO₂ for agriculture.

Many of the companies using coal require high-temperature heat, so conversion to power through heat pumps is not an alternative. Conversion to power, biogas, waste or, initially, natural gas is a possible alternative to coal. However, the import price of coal is comparatively low compared to alternative fuels. Conversion to gas also requires it to be available to the company, and the company's location must therefore facilitate connection to the gas grid. A ban on the use of coal in industry and businesses in 2025 will therefore entail business-economic consequences that can undermine competitiveness due to higher fuel prices. This can slow down production and result in possible shutdowns as well as carbon leakage effects with production and thus emissions shifting to other countries that possibly have lower standards for climate-friendly production.

The guiding principles of the Climate Act require the 70% reduction target to be achieved while taking into consideration issues such as cost-effectiveness, sustainable business development, Danish competitiveness and jobs. Reduction initiatives for industrial greenhouse gas emissions must also ensure real domestic reductions and not just cause greenhouse gas emission to move out of Denmark. Ensuring a level playing field for companies across borders is thus key for promoting ambitious international regulations in the climate area.

Box 27 summarises the initiatives taken in the area of industrial activities so far.

Box 27

Overview of main initiatives in the area of industrial activities

Measures:

- Green transition and higher energy-efficiency improvements of the fossil production in the business sector
DKK 2.5 billion has been set aside towards 2030, targeted at conversions away from fossil energy, subsidies for energy-efficiency improvements of processes, etc., that cannot currently be converted into electrical power, as well as electrification and energy-efficiency improvements of internal transport (forklift trucks, tractors, etc.) in manufacturing industries, agriculture, etc.
- Support for biogas and other green gases
DKK 12.8 billion has been set aside over a 20-year period for a new support scheme for biogas and other green gases that can be used where electrification is not possible.

Development initiatives:

- Analysis of green transition options where electrification is not possible.
An analysis will be conducted to identify potentials and barriers to phasing out fossil fuels in industries, including the segments of companies' that use energy for processing purposes where the possibilities of phasing out fossil fuel is currently limited, e.g. high-temperature processes
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials. The themes include energy-efficient industrial production, green fuels and materials for transport and industry that can eventually advance the phasing-out of fossil fuels in industry.

The North Sea

Exploration and production of oil and gas in the Danish sector of the North Sea lead to emissions that are considered part of business-sector emissions. It is relevant to distinguish between emissions from the actual production process – relating to internal consumption and flaring – and emissions associated with the consumption of the oil and gas produced. The first are included in the national emissions, whereas the latter are not, as the oil and gas are sold on a global market. Internal consumption is energy consumed by the production process whereas flaring covers the direct burning of natural gas, etc., for various reasons. Emissions amounted to 2.5 million tonnes of CO_{2e}⁴⁸ in 2018. Based on the forecast for the continued production from 2019, emissions are expected to be 2.2 million tonnes of CO_{2e} by 2030. There is a technical potential for reducing emissions from internal consumption by electrifying the production process and through increased efficiency. However, electrifying the production process entails large costs for both the state and the companies. The possible costs to the state are associated with connection to either the land power grid, a future energy island or an independent offshore wind farm. The companies will incur costs for technical modifications at their facilities. Neither the size of the potential nor the exact cost level is known. It is expected that it will not be possible to electrify the entire production process.

The latest forecast for the future production of oil and gas from September 2020 indicates that Denmark will still be a net oil importer but that we will be net exporters of gas until after 2035, except for 2020 and 2021.

Future technologies in the energy and industry sector

CC (Carbon Capture) is a common name for a range of technologies that capture carbon directly from the source of emission, for instance in industrial sector and waste incineration plants. Carbon Capture and Storage (CCS) enables emission reductions that are otherwise difficult to achieve, as well as negative emissions. The latter is obtained by capturing and storing carbon from sustainable carbon sources or directly from the atmosphere. It is also possible to use the captured carbon for various purposes (Carbon Capture and Utilisation – CCU). This could be the production of green fuels in which CO₂ is coupled with hydrogen produced from renewable energy (PtX).

We have not yet gained experience with CCS in Denmark, but the technology is being used in other countries, such as Norway. The potential for carbon capture from large Danish point sources is extensive but depends on the specific development of the individual sources. It is assessed that the Danish subsoil can potentially accommodate up to 500 times the current total annual Danish CO₂ emissions. The potential for carbon capture in 2030-2040 is difficult to determine precisely and depends on factors such as the development in the sectors for which the technology can be relevant. The potential for using the technology as a tool to achieve Denmark's climate targets is assessed to be able to provide reductions of 4-9 million tonnes of CO₂ by 2030 (in addition to the expected reduction from the CCS pool in the sector

⁴⁸ Source: 2020 Baseline Projection.

strategy for energy and industry) in the industrial, energy and waste sectors and by carbon capture from biogas plants. The assessment is based on the expected developments in the individual sectors and will be determined more accurately during the continued efforts in the coming CC(U)S strategy work.

Carbon capture and storage or use is an efficient societal tool for achieving Denmark's climate objectives, but the companies that may be able to use the technology lack a personal finance incentive to do so. Thus, the financial incentive is currently not big enough to achieve the full reduction potentials of the technologies without subsidy.

The sector strategy for energy and industry therefore allocates a market-based funding pool corresponding to DKK 800 million a year, phased in from 2024, for reducing CO₂ emissions through capture and storage or capture and use. The funding pool will run for 20 years and is expected to result in annual CO₂ reductions of 0.9 million tonnes by 2030.

It is not always possible to use electricity directly, such as in high-temperature processes in parts of the industry and long-distance flights and shipping routes. This leaves a need to convert power into another end product in order to accelerate the transition of parts of the transport sector, such as aviation, shipping and segments of heavy-duty road transport. Higher electrification towards 2030 can also happen indirectly, i.e. by converting power to green fuels using different technologies, collectively referred to as PtX, which can also constitute an important element in the vision for hybrid projects such as energy islands. Electrolysis (hydrogen production) is technologically mature for market roll-out, but the demand and regulatory setting for green hydrogen are still not sufficient for large-scale expansion. One of the reasons for the low demand is that fossil fuels remain more competitive than green hydrogen and other green gases. Several PtX technologies for converting hydrogen into other types of fuel are transitioning from research to development and demonstration level whereas others are at a higher stage of technological development.

Subject to considerable uncertainty, it is assessed that PtX has a technical potential to contribute with a reduction of 0.5–3.5 million tonnes of CO₂ by 2030 and in the longer term 1.5-7.5 million tonnes of CO₂ (including 1-4 million tonnes of CO₂ in international shipping and aviation which are not included in the 70% reduction target). A technical potential means that, CO₂ reduction potential is estimated on the basis of technical feasibility. Research and development, up-scaling of the more market-mature technologies and higher demand for e-fuels are needed to realise this potential.

In addition, it has been agreed under the sector strategy for energy and industry that Denmark must have an overall strategy for PtX and CC(U)S and that at least DKK 750 million must be allocated to a subsidy scheme through public tendering of PtX-projects.

Green research missions for both CC(U)S and PtX

With the Green Research Strategy, the Government will initiate a mission-based research and development effort for both CC(U)S and PtX. The objective of the CC(U)S mission is for scientists, companies, authorities and other parties to join forces in developing cost-effective solutions for carbon capture and storage that can potentially provide reductions, negative emissions and carbon for new climate-neutral materials such as textiles and aviation fuels. The objective of the PtX mission is to boost the development of green fuels for transport and industry, see chapter 6.

A decarbonised European energy system by means of sector coupling and PtX

In order to optimise utilisation of renewable energy and CO₂ displacement from the European energy system, the Government has worked to place focus on sector coupling and promotion of renewable PtX/hydrogen in the EU. The European Commission has responded to this by presenting strategies for hydrogen and energy system integration. The Government will work to maintain focus on technologies and solutions that can contribute to up-scaling and lowering prices of, e.g., production and continued conversion of renewable hydrogen using Power-to-X technologies. This has the potential to support achieving the 70% reduction target for sectors that are difficult to electrify, e.g. heavy transport such as heavy-duty vehicles, planes and vessels as well as energy-intensive industry.

Box 28 summarises the initiatives taken so far for future technologies.

Box 28

Overview of main initiatives for future technologies

Measures:

- Market-based technology-neutral pool of DKK 800 million a year, phased in from 2024 for carbon capture and storage. The pool will contribute to cost-effective CO₂ reductions by enabling capture and storage. The pool can help reduce those emissions that are otherwise difficult to reduce, and carbon capture and storage from biomass can generate negative emissions. The pool is expected to contribute reductions of 0.9 million tonnes of CO₂ per year from 2030 through capture and storage.
- Denmark has entered into a partnership with the Netherlands. The partnership will generate revenues for at least DKK 750 million. The revenues will finance a large-scale hydrogen production (PtX) subsidy scheme that will contribute to driving down hydrogen prices and boost Denmark's expertise and competitiveness within the energy sector.

Development initiatives:

- Overall PtX/CC(U)S strategy. The strategy will support the dissemination and development of green solutions for the future. The Climate partnerships and central stakeholders in relevant sectors will be involved in the work regularly.
- Green mission: PtX – Development of green fuels for transport and industry. Develop solutions to convert power from renewable energy sources into products that can be used to reduce emissions from segments of the transport and industrial sector with no cost-effective alternatives to fossil energy.
- Green mission: Develop cost-effective solutions for carbon capture and storage that can be applied to reducing CO₂ emissions and creating negative emissions from large industrial emitters, waste incineration plants, biogas plants and biomass-based CHPs. Together with hydrogen generated by renewables, captured CO₂ can provide carbon for new climate-neutral solutions.
- The Green Research Strategy lists a number of themes for green research and innovation. The selection of themes is guided by green research requirements and potentials as well as business and research strengths and potentials and include green fuels and materials for transport and industry, hydrogen production and CCS – Carbon Capture and Storage.
- At European level, the Government is promoting a decarbonised European energy system by 2050 with particular focus on increased use of renewable energy and the electrification of fossil

energy consumption, such as by using Power-to-X technologies for the production of green hydrogen and other hydrogen-based products (e-fuels). Power-to-X technologies enable renewable energy to be reconverted into hydrogen, thus helping to decarbonise sectors that are difficult to electrify, such as heavy-duty transport and industry. A European focus on green gases and their reconversion can accelerate technological developments, up-scaling and price reductions of green solutions to the benefit of Danish companies and support the national green transition.

Additional initiatives

The sector strategy for energy and industry includes a range of initiatives that together ensure more efficient energy use up to 2030, including subsidies for phasing out oil and gas boilers and transitioning the industry. The agreement also allocates almost DKK 0.5 billion in the period 2021–2030 for targeted energy-efficiency improvement efforts. The efforts will include energy-saving standards for central government buildings and contribute to taking the energy-efficiency measures into the digital age. The Government has also made a number of agreements over the past year that will improve the energy efficiency of buildings, see box 29.

Box 29

Measures in other agreements

- Agreement on municipal and regional economies for 2021. Earlier this year, the Government and Local Government Denmark agreed to abolish the investment ceiling for 2020 due to the COVID-19 crisis. The Government and Local Government Denmark further develop this agreement by extraordinarily raising the investment ceiling for 2021 to DKK 21.6 billion, including a DKK 1 billion allowance for green investments, enabling municipalities to make green renovations of schools, nursing homes, roads and conduct energy renovations, etc. The Government and Danish Regions have also agreed to extraordinarily raise the regions' investment ceiling for 2021 by DKK 1 billion for green investments.
- Political agreement on green renovation of social housing. In May, the Government made an agreement on green renovation of social housing. The agreement earmarks DKK 30.2 billion from the National Building Foundation for social housing sector renovation in 2020–2026 and secures healthy, up-to-date social housing for the benefit of tenants and the recovery of Denmark's economy. Green renovations of social housing reduce greenhouse gas emissions by approximately 47,000 tonnes of CO₂e and generate 2,200 full-time equivalents in 2020, increasing to 5,900 in 2021 and 3,500 in 2022.

In the autumn, the Government will present a strategy for sustainable construction that will help ensure more sustainable and high-quality construction that is also financially responsible.

Table 9 illustrates the varying costs of implementing measures in the energy and industry sector.

Electrification and energy-efficiency improvements are often the least expensive path to greenhouse gas reductions in the industry and energy sector, as many of the technologies are tried and tested. Less mature technologies such as CC(U)S and PtX are more cost-intensive. The reduction potential for CCS is deemed great as it is a well-known technology, and the allocated funds for capture and storage or use are expected to help achieve annual greenhouse gas reductions of 0.9 million tonnes of CO₂ from 2030. Tapping the potential requires storage options in or close to Denmark, which are expected to be ready around 2024.

Table 9

Overview of key measures in the Climate Plan for energy and industry: CO₂e effect and financial consequences

Measures	Carbon reduction Million tonnes of CO ₂ e/year	Costs (DKK millions)			Shadow price	
		State	Households	Businesses	DKK per tonne of CO ₂ displaced	
	2030	2030	2030	2030	(with side-effects)	(without side-effects)
Measures						
Market-based subsidy pool for CCS	0.9	815	0	-800	n.c.	1,350
Tax changes (space heating higher, electrical heating lower)	0.35*	830	-85	-95	n.c.	1,270**
Phasing out of oil and gas boilers (subsidy, repeal of consumer binding to the natural gas grid, modernisation of the socio-economic requirement and supporting initiatives)	0.35	307	0	0	1,300	1,300
Subsidy pool for industrial CO ₂ reductions	0.2	40	0	0	n.c.	800
Support pool for biogas and other green gases	0.7	678	0	-678	1,200	1,250

Note: Costs for businesses and households are stated as the support funding with respect to subsidy pools. *Compared to current emissions, the fully phased-in partial effect of tax changes is calculated to be 0.6 million tonnes of CO₂, subject to great uncertainty. The uncertainty concerns issues such as the projection of the expected use of fossil fuels in heat production. Based on the Baseline Projection and coherence with other initiatives, the tax changes are assessed, subject to great uncertainty, to result in emission reductions of 0.35 million tonnes of CO₂ by 2030. It is emphasised that the initiative should be seen in a context of the combined package of initiatives in the area of heating and the isolated effect stated is therefore a technical calculation only. The aggregate effects of a heating area package will not necessarily be the sum of the individual initiatives. **Marginal shadow price for space heating. The shadow price is negative for electrical heating.

Joint climate action

The business community also contributes to the green transition of energy use and industry. Danish companies are leaders in energy technology and show their deep commitment to cooperating on the continued green transition of business and industry. The climate partnership for energy-intensive industry has reported a potential for reducing emissions of 30%, for instance. This can be done by switching to green gas, the production of and demand for sustainable solutions, carbon capture from the largest point-source emitters and increased utilisation of excess heat. The climate partnership for energy and utilities also points to a great potential for reductions with a 95% reduction from 1990 to 2030 in the energy and utilities sector, by means of substantial electrification and expansion with renewable energy, etc. Box 30 emphasises other reported business sector reduction initiatives.

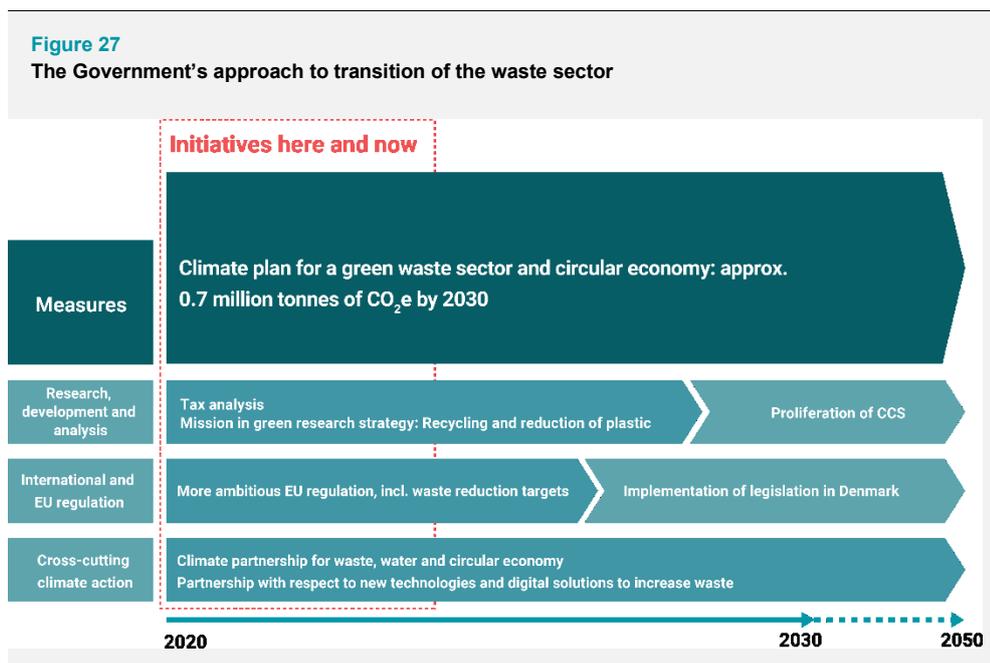
Box 30**Energy-sector efforts**

- Aalborg Portland has entered into an agreement with the Government under which Aalborg Portland undertakes to reduce CO₂ emissions by 0.5 million tonnes and to cooperate on further reductions.
- Fynsværket has decided to stop using coal from 2022, providing reductions of upwards of 0.5 million tonnes of CO₂e by 2030.
- Ørsted has decided to phase out coal at all plants by 2023.
- Ørsted has entered into a partnership with other relevant actors and the City of Copenhagen to develop a large-scale plant (1.2 GW electrolysis capacity by 2030) in Greater Copenhagen aimed at generating hydrogen and e-fuels.
- Shell and Everfuel are behind the HySynergy project on a large-scale PtX plant at Fredericia refinery (up to 1 GW electrolysis capacity).

7.2 Waste sector

In the absence of new initiatives, the waste sector will account for 5.4% of total emissions in Denmark by 2030. The Government's plan for the green transition of the sector follows four tracks. Firstly, the Government and a wide circle of parties in the Danish Parliament have reached an agreement on a sector strategy for waste - *The Climate Plan for a green waste sector and circular economy*, which reduces annual sector emissions by 0.7 million tonnes of CO₂e by 2030 and sets out a vision for a climate-neutral waste sector in 2030. The strategy also contains a number of initiatives in the development track. Secondly, the Government's green research strategy identifies recycling and reduction of plastic as one of four research missions, and thirdly, Denmark is working for increased recycling in the EU as well. Finally, at the same time, the industry is also making an effort to drive the green transition of the sector. The Climate partnership for waste, water and circular economy has a vision for Denmark to be the world's leading circular economy by 2030 that blazes the trail for climate neutrality by 2050.

Figure 27 illustrates the Government's plan for the green transition in the sector.



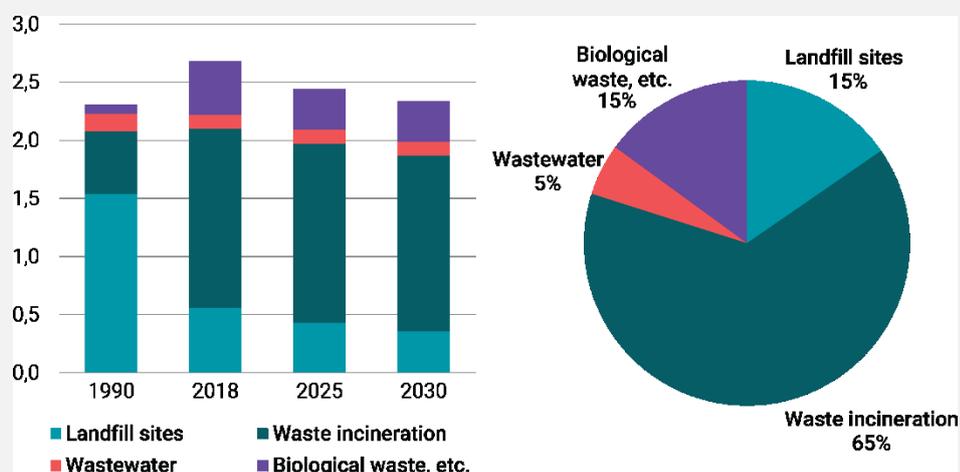
The sector's greenhouse gas emissions

In the absence of new initiatives, the waste sector is expected to emit 2.3 million tonnes of CO₂e in 2030, corresponding to 5.4% of national CO₂e emissions. The emissions will come from waste incineration (1.5 million tonnes of CO₂e), landfill (0.4 million tonnes of CO₂e), biological waste treatment (0.35 million tonnes of CO₂e) and the wastewater sector (0.12 million tonnes of CO₂e).

Figure 28 shows the sources of waste sector emissions.

Figure 28

What will be the source of waste sector greenhouse gas emissions in 2030?



Note: *The sub-components stated with one decimal place sum up to 2.3 million tonnes of CO₂e and not the total emissions of 2.4 million tonnes of CO₂e. This is due to rounding.

Source: The Danish Energy Agency

Most waste sector emissions come from the incineration of waste, in other words. There are two main barriers to reducing greenhouse gas emissions from waste incineration today: 1) The existing framework conditions in the sector have resulted in significant excess capacity for waste incineration and hampered investments in recycling plants; and 2) not enough waste is sorted out for recycling, and too much is sent for incineration, partly because the municipalities currently have different collection schemes, which result in small and varied waste flows for recycling. It is necessary to address both challenges simultaneously to achieve reductions in the incineration sector.

Based on this, the Government and the following parties in the Danish Parliament: Venstre (The Liberal Party of Denmark), Radikale Venstre (The Danish Social-Liberal Party), Socialistisk Folkeparti (The Socialist People's Party), Enhedslisten (The Red-Green Alliance), Det Konservative Folkeparti (The Conservative People's Party) Liberal Alliance (The Liberal Alliance) and Alternativet (The Alternative) in June 2020 reached an agreement on a sector strategy for waste – *The Climate plan for a green waste sector and circular economy*.

The strategy sets out a vision for a climate-neutral waste sector by 2030 and for 80% of Danish plastic waste to avoid incineration by 2030 and for turning the waste curve in the direction of less waste, less wastage and more recycling. There are also a number of initiatives for increased and streamlined waste sorting, increased recycling and adjustment of incineration capacity, see box 31.

Box 31

Overview of the key elements in *Climate plan for a green waste sector and circular economy*

- **Increased and streamlined waste sorting**
The Danes must sort their waste in the same way at home or at work, regardless of where they live. The sorting comprises ten types of waste, and both households and businesses must use the same sorting guidelines and waste pictograms.
- **Increased recycling of plastic waste**
A requirement will be introduced for at least a 60% recycling rate for collected plastic waste, and sector partnerships with the restaurant industry and the agriculture and construction sectors will be initiated.
- **A strong recycling sector**
The waste flows from households and businesses are collected and organised more uniformly. The framework conditions for the waste sector must be set up to encourage investment in recycling facilities rather than incineration plants.
- **Less incineration and less import of waste for incineration**
The capacity of Danish incineration plants must be reduced to match Denmark's volume of waste which is expected to decrease as the Danes begin sorting more waste for recycling.

Selected development initiatives:

- **Analysis of waste taxes**
An analysis will be launched into how taxes on waste can support additional CO₂e-reductions in the waste sector and the transition to a circular economy.
- **Partnership**
A partnership will be established to support the use of new technologies and digital solutions in the waste sector that can increase waste recycling.
- **Increasing the share of recycled plastic**
Work will be initiated to look at possibilities of increasing the share of recycled plastic in new products.

Furthermore, the strategy is expected to result in approximately 65% less plastic waste in incineration plants by 2030 compared to 2020. The strategy accommodates a number of the recommendations made by the Climate partnership for waste, water and circular economy, including streamlined waste sorting, mandatory waste collection and market access to recyclable waste.

Waste incineration

Fossil CO₂ emissions from waste incineration mainly come from incineration of Danish plastic waste and imported plastic waste. For that reason, the emissions can be reduced, partly by adjusting the capacity at the waste incineration plants to the volume of national waste, and partly by reducing the amount of waste, and sorting more waste, including plastic, in order to increase recycling.

The specific measures in the sector strategy for waste are associated with varying levels of additional costs compared to waste incineration, see table 10. The shadow prices for the individual measures vary, as can be seen in table 10, and the shadow prices are negative for several measures due to the strategy removing a number of

barriers to efficient operation and use of resources, which helps reduce the costs of the green transition.

Table 10

Overview of central measures in the sector strategy for waste: CO₂e reduction effect and financial consequences

	CO ₂ e reduction Million tonnes of CO ₂ e/year by 2030	Costs (DKK millions) – 2030			Shadow price DKK per displaced tonne of CO ₂ (with side-effects)
		State	Municipal costs*	Businesses**	
Measures					
1. New organisation of the waste sector	0.14	-17.5	-167	-167	-13,815
2. Streamlining of sorting and collection of the industry's household-like waste	0.071	11.3	0	>75	918
3. Streamlining and mandatory collection schemes for household waste - including synergy effects with existing schemes and efficiency gains (2% efficiency gain – behaviour)	0.008 0.050	1.6 9.3	>157 80	- -	24,562 525
4. Streamlining with mandatory collection scheme for household's textile waste***	0.018	3.2	>/<0	-	-
5. Waste sorting in public spaces	0.000	0.0	-	20	559,895
6. Removing bulk waste from the incineration plant	0.004	0.8	16	-	3,169
7. More direct reuse and clear rules for municipal second-hand shops	0.001	0.2	-6	-	-12,591
8. Requirement of lower loss rates for recycling of plastic	0.007	1.1	1	-	134
9. 50% reduction target for certain plastic take-away food packaging by 2026	0.004	0.7	-3	>0	-950
10. National implementation of extended producer responsibility for packaging	0.121	20.2	-1,500	>1,500	-
11. Increased recycling of plastic from the agricultural sector	0.02	3.6	-	>0	-
12. Increased recycling of plastic in the construction sector	0.034	5.6	-	>0	-
13. New model for waste supervisory authority to ensure increased recycling	0.059	9.3	-	62	986
14. Productivity gain from increased recycling of plastic from the synergy effects of getting clear rules for the sector, allowing market access to both household and business waste and increasing and streamlining waste flows.	0.153	23.3	6.	6.	-359
15. Voluntary return schemes for companies that want to take back their own products	-	-	-	<10	-
16. Standardised demolition plans for construction	-	-	-	<10	-
17. Cap on nitrous oxide emissions from large treatment plants***	0.016	0.5	1.2	-	504
Subtotal including redistribution for producer responsibility	0.71	73.2****	-1,415	1,516	
Total excluding redistribution for producer responsibility		53.0	85	16	-467

Note: Minus indicates a gain, plus indicates a cost. The consequences are stated for 2025 and 2030, 2020 prices.

*Municipal costs comprise both costs to waste actors and municipalities passed on to citizens in the form of charges.

**The costs for the business sector are partially passed on to consumers through pricing.

*** The shadow price is not included in the total shadow price

**** As there have only been minor pilot tests of collecting textile waste from citizens, the underlying data are not good enough for computing the economic consequences of the initiative.

It is currently difficult to remove all waste sector emissions of greenhouse gases, because even with increased recycling, there will still be residual waste containing fossil carbon that has to be incinerated. It is expected that there will still be recyclable waste in residual waste from households and business, and there are currently products containing plastics that are difficult to separate from other materials (e.g. disposable diapers or combined packaging). Ideally, the Danish waste for incineration will eventually mainly contain waste with environmentally problematic substances, clinical risk waste and other waste that is not suitable for recycling and cannot be deposited in landfills.

It may therefore be necessary to capture and either store or use (CCS and CCU) greenhouse gas emissions from waste incineration in order for the sector to move towards climate neutrality. In addition, the development of product design and treatment technologies can lead to improved sorting and more recycling of plastic waste. If improved sorting and recycling technologies are developed, it will help to achieve climate neutrality in the sector. Recycling of plastics is a mission in the Government's green research strategy, see the below section on future green solutions in the waste area.

Landfill

Landfill facilities are expected to emit approximately 0.4 million tonnes of CO₂e in 2030. Around 3% of total waste generated in Denmark is deposited in landfills, corresponding to about 416,000 tonnes of waste in 2018. Today, landfill sites are only used if the waste cannot be prepared for reuse, recycling or incineration. Examples include asbestos from roofs and ceilings, soft PVC plastics and contaminated soil.

Prior to 1997, it was allowed to deposit combustible waste in Denmark, including organic waste that generates methane in oxygen-free conditions. It is assessed that there will be a CO₂e reduction of 76% in 2030 compared to 1990 without additional policy action. The reduction is mainly due to the 1997 ban, which means that old waste disposal sites are slowly degassing, thereby emitting gradually less CO₂ and methane.

The Danish Environmental Protection Agency has a current bio-cover scheme aimed at reducing emissions from Danish landfill sites. However, the potential for establishing bio-covers is far lower than originally expected as the methane emissions have proved to be lower than expected at several of the sites examined. Investigations have also been made of various models for imposing specific reduction requirements on the landfill sites. The models examined were expected to provide reductions of about 0.011 and 0.045 million tonnes of CO₂e and result in additional

costs of DKK 67-362 million in the period 2024-2027. Considering the downward trend in emissions already seen, it is expected to be cost-intensive to make specific reduction requirements of the smaller landfill sites in particular, and the real effect will also be subject to widespread uncertainty.

The sector strategy for waste therefore launches alternative initiatives that are expected to result in local socio-economic reduction initiatives at landfills and waste treatment facilities. The initiatives involve dialogue with municipalities and sites about implementation of CO₂e reduction initiatives, clarification of the possibility of implementing and incorporating these initiatives in the charges and guidance material to support the effort.

Biological waste management

Biological treatment of waste will lead to emissions of 0.35 million tonnes of CO₂e by 2030 in the form of methane, CO₂ and nitrous oxide. Approximately 0.2 million tonnes of CO₂e come from composting. Composting of garden and park waste makes up more than 80% of the emissions from composting.

The possibility of imposing requirements on incineration of garden and park waste has been examined, as incineration of organic matter is considered as carbon-neutral. Incineration of certain types of garden and park waste is in contravention of the Waste Directive and may potentially have adverse environmental consequences and make it difficult to meet the EU recycling targets. The possibility of bio-gasification of garden and park waste has also been examined, but not all garden and park waste is suitable for decomposition in biogas plants. Instead, the sector strategy for waste sets in motion a detailed analysis of the area in order to identify initiatives that can ensure greenhouse gas emission reductions from garden and park waste of at least 20%.

The remaining 0.1 million tonnes of CO₂e emissions from biological treatment of waste come from leakage from biogas plants⁴⁹. Biogas Denmark established a voluntary measurement programme for methane leakage from biogas plants in 2016 under which the plants use measurements and systematic self-monitoring to identify and reduce their methane leakage. The programme aims to achieve a level of total leakage below 1% of the biogas production by 2020. In extension of this, the Danish Energy Agency has started a comprehensive measurement programme to determine the loss to qualify an assessment of whether statutory requirements are needed. In this connection, it is assessed how and when demands can be made to minimise methane leakage.

⁴⁹It is noted that the Baseline Projection for emissions of leakage from biogas plants in 2030 of 0.1 million tonnes CO₂e already takes into account the effect of the Energy Agency's measurement programme and a possible future statutory requirement of minimising leakage from biogas plants.

Wastewater

Treatment of wastewater will lead to emissions of 0.12 million tonnes of CO_{2e} in 2030 in the form of methane and nitrous oxide at the current values⁵⁰. Nitrous oxide emissions from treatment plant processes are by far the largest contributor of CO_{2e} emissions from the water sector. Studies show that there are relatively low costs associated with improving process management and reducing nitrous oxide losses at treatment plants.

The sector strategy for waste therefore introduces threshold values for emissions of nitrous oxide from plants that treat wastewater corresponding to the discharge of waste from at least 30,000 people (PE). The threshold values comprise some 65% of the wastewater volumes and 75% of nitrous gas emissions from the process. Discussions will be held by no later than 2025 with the parties to the agreement about possibly reducing the threshold from 30,000 person equivalents (PE) to a lower level, based on the lessons learned. The initiative is expected to bring about reductions of 0.02 million tonnes of CO_{2e} by 2030 at a shadow price of DKK 504 per displaced CO_{2e}, see the above table 10. Greenhouse gas emissions from wastewater overflows will also be analysed. Potential measures for treatment of the methane loss from septic tanks have also been examined. However, the figure for methane loss from septic tanks is very uncertain, and the initiatives are expected to have little effect, be cost-intensive and have a socially imbalanced impact. A rural smallholding will typically have to invest DKK 60–80,000 in improved waste water treatment. The use of septic tanks will also be reduced due to sewage installations under the river basin management plans – over the last 15 years, 15-20% of septic tanks have been removed due to installation of sewerage, etc., and this trend is expected to continue in the years ahead.

The sector strategy for waste also includes a number of initiatives to support the goal of an energy- and climate-neutral water sector. That includes the implementation of a “Paris Model” for an energy- and climate-neutral water sector and an examination of whether the economic regulation can be designed to give drinking-water and wastewater companies stronger incentives to utilise their own resources effectively for the benefit of consumers, for instance in relation to degasification.

Future green solutions in the waste sector

To reduce the climate impact from incineration of waste and contamination of our nature, we must reduce the quantities of plastic waste and reuse and recycle more plastic. Recycling and reduction of plastic waste thus comprise one of the four missions in the Government’s green research strategy. Research efforts must be directed towards new technologies and production methods to ensure waste reduction and improve sorting and recycling of plastic waste into new plastic products. Plastic-containing products that are designed for recycling or reuse must be devel-

⁵⁰Preliminary figures from the Nitrous Oxide Pool at the Danish Environmental Protection Agency indicate that the actual emission of nitrous oxide from wastewater treatment processes is underestimated. The real figure for nitrous oxide emissions from processes is three times larger than stated, according to provisional figures.

oped, both in terms of the chemical composition of the raw plastic product and additives, as well as the composition of materials in the individual product. The mission will thus support the sector strategy vision for 80% of plastic waste to be removed from incineration processes by 2030.

Technologies and solutions are expected to hold significant potential for reducing the amount of waste comprising plastic and textiles made from fossil fuels. These include designing and producing plastic packaging and products for reuse and recycling; tracking and recognition technologies for labelling plastic products and packaging; sorting and reprocessing technologies that provide high-quality recycling and low material loss; and sorting, reprocessing and recycling of plastic-containing textiles. These technologies and solutions must be complementary to ensure a high level of recycling of plastic materials with plastic repeatedly re-entering the cycle. Achieving the technical reduction potential of 53,000 tonnes of plastic requires both research efforts and the necessary investments in and implementation of solutions, as well as cooperation between value-chain actors. Realising the technical reduction potential will reduce CO₂e from waste incineration by 0.15 million tonnes of CO₂e by 2030. Reducing the amount of combustible waste in Denmark may well have, all other things being equal, secondary effects in relation to imported waste that are not included in this calculation.

Common European framework for the waste sector and circular economy

A common European framework may reduce the costs of the Danish effort. The Government is therefore working actively to also set more ambitious targets at EU level for reducing waste volumes, increasing recycling and restricting imports of plastic for incineration.

The Government consequently finds it positive that the Commission's Circular Economy Action Plan focuses on strengthening efforts to reduce waste, increase recycling and increase and improve re-utilisation, including in particular for plastics and textiles. The Government supports quantitative waste reduction targets, including for selected types of waste such as household-like waste, increased harmonisation across the EU and improved terms for use of recycled materials.

The Government remains open to investigating the possibility of making demands on the content of recycled plastic in products such as packaging, building materials and cars. The Government also finds it positive that the Commission wants to support the development of solutions for high-quality sorting facilities. Both of these elements can support a market for recycled plastic and increase the attractiveness of establishing sorting facilities for different plastic types in the EU member states.

Circularity is an important component of the industry's contribution to climate neutrality and its continued competitiveness, and it supports the Commission's intention of promoting the use of digital technologies to track, trace and map resource flows and qualities in value chains.

Ecodesign and energy labelling are estimated to have accounted for 50% of the EU's 2020 energy saving target. Expanding the scope of Ecodesign could consequently bring about major energy and environmental savings and disseminate the approach to a circular economy. A coherent legal framework for sustainable products should therefore comprise the many other product regulations that already exist. This will ensure consistency in climate impact requirements across product areas throughout the life cycle and promote the use of renewable resources and the protection of health and environment for all products made in the EU. This is the only way to create sustainable material cycles. Longer product life, optimisation of resources and increased recyclability of products, increased use of secondary raw materials and substitution of harmful chemicals must be central elements in the coherent legal framework.

Box 32 summarises the Government's EU efforts.

Box 32

More ambitious EU regulation of the waste area and circular economy

- The Government supports the Commission's ambition to achieve a circular economy in the EU which can support realising climate neutrality by 2050 and the decoupling of growth from resource consumption, as resource extraction and processing are major sources of EU greenhouse gas emissions and because the green transition can help secure the EU's long-term competitiveness.
- The Government backs the idea that the EU should stop exporting waste from the EU and supports an ambitious revision of the EU Transport Regulation for cross-border transfer of waste to create a genuine internal market for trading in secondary raw materials.
- The incineration of plastic in particular should be reduced within the EU. Therefore, Denmark supports more ambitious goals for the recycling of plastic and the financing of recycling capacity in Europe, as well as better product designs.
- The Government backs quantitative waste-reduction targets, including for household-like waste.
- The Government supports the establishment of standardised methods for efficient collection and sharing of data between companies throughout the supply chain with a view to supporting their data-based business development possibilities and supporting a common single market for secondary raw materials.
- The Government supports the Commission's focus on a coherent legal framework for a sustainable product policy that will support resource efficiency, circularity, security and a reduced climate and environmental footprint. Expanding the Ecodesign Directive to include additional product groups and criteria to support the circular economy and build on lessons learnt from the EU Flower Ecolabel and the Commission's new life-cycle method Product Environmental Footprint (PEF) can be instrumental in this development.
- The Government supports the Commission's ambitions to revise the urban wastewater treatment and sewage sludge directives to intensify focus on energy production and recycling of nutrients.

Joint climate action

The industry also assists in the transitioning of the waste sector. The climate partnership for waste, water and circular economy is working to make Denmark's circular economy world-leading by 2030, blazing the trail for climate neutrality by 2050. The partnership leads the way with specific recommendations on how the sector can drive developments across action areas such as longer product service life and

circular business models. Box 33 highlights different examples of recommendations for waste sector effort.

Box 33**Examples of recommendations for the waste sector's own efforts**

- Design of circular products and implementation of business models based on recycling and repair to extend product life.
- Management of recyclable waste by means of producer responsibility obligations and focus on improved sorting of waste from service, industry and construction sites to maximise recycling of all materials.
- Utilisation of excess heat and expansion of biogas production at treatment plants.

7.3 Transport sector

The green transition of passenger cars, vans and heavy duty vehicles is the primary challenge for the transport sector in relation to national greenhouse gas emissions. Other modes of transport only represent a minor share of transport sector emissions with limited reduction potentials in Denmark.

At present, there are major challenges in the green transition of the transport sector up to 2030 and beyond. The green transition of transport is characterised by a broad range of challenges across areas. One example is the low rate of transition for passenger cars (the average useful life for passenger cars is 15 years), and another that electric vehicles, the current alternative, are not competitively priced compared to conventional cars. It is also a challenge for the transition of conventional heavy duty vehicles, ferries and aircraft that the green technologies are not mature at present.

Thus, the potential for reducing emissions is, on the one hand, to work to minimise emissions from conventional vehicles, etc., until they are replaced, which could be affected by blending in biofuels, for instance. On the other hand, the potential is a long term transition from fossil fuelled vehicles to zero and low-emission vehicles and the development of technologies that can compete with current fossil fuel sources in shipping and aviation. The current regulatory framework is expected to facilitate the phasing in of about 400,000 zero or low emission passenger cars up to 2030⁵¹. The total vehicle fleet in Denmark is expected to grow from 2.7 million passenger cars today to about 3.3 million by 2030. The market-based phase-in of zero or low emission vehicles, for instance, is expected to be very limited for heavy duty vehicles and vans.

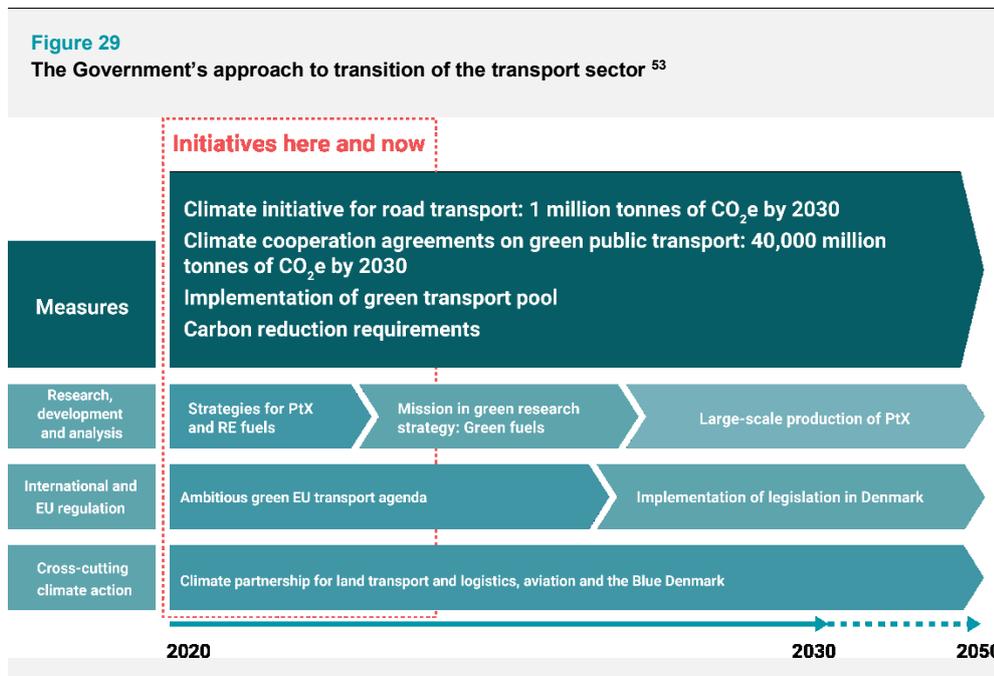
In the short term, transport sector emissions can be reduced through increased energy efficiency (e.g. EU emission standards for new vehicles) and the use of greener fuels in the existing vehicle fleet. The potential for reducing emissions by reducing the demand for transport or transfer to more climate-friendly modes of transport such as trains and buses is expected to be limited.

With the 2020 Finance Act, the Government has clarified the situation for vehicle registration taxes for green cars in 2020⁵². The Government's climate initiative for road transport provides long-term framework conditions for the automotive industry and car owners in the green transition of passenger cars based on the recommendations by the Commission for a transition to green passenger cars (the EV Commission). In addition, there are real reductions in emissions from existing road transport by means of a more long-term and future-proof regulation of RE fuels and conversion of lorry traffic taxes in order for the taxes to increasingly reflect the socio-economic costs of heavy transport, including by means of differentiated taxation based on vehicular energy efficiency.

⁵¹ According to the Transport Agreement of 4 December 2020 the new regulatory framework is expected to facilitate the phasing in of about 775,000 zero or low emission passenger cars up to 2030.

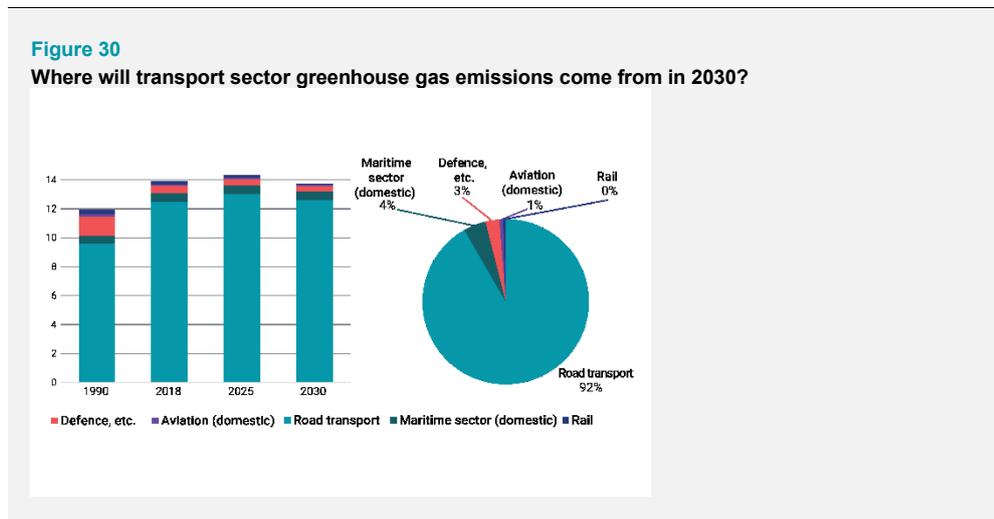
⁵² According to the Transport Agreement of 4 December 2020, the situation has been clarified until 2030.

Based on this, figure 29 illustrates the Government’s plan for the green transition in the sector⁵³.



The sector’s greenhouse gas emissions

The transport sector is estimated to account for about one-third of Denmark’s greenhouse gas emissions by 2030, in the absence of new initiatives. Road transport comprises 92% of total domestic emissions from the transport sector.



⁵³ As of 29 September 2020. The plan shown has been superseded by the Transport Agreement of 4 December 2020.

Greenhouse gas emissions in the transport sector primarily come from the use of fossil fuels, with 92% of the transport sector's energy use being based on fossil fuels.

Road transport

Road transport currently emits 12.5 million tonnes of CO_{2e} a year, corresponding to 92% of total transport sector greenhouse gas emissions. By 2030, road transport is expected to emit 12.6 million tonnes of CO_{2e}, i.e. also in 2030 corresponding to 92% of total transport sector emissions in 2030, see figure 30.

A significant challenge to road transport is that a large proportion of the vehicle fleet in 2030 (passenger cars, vans and heavy-duty vehicles) is still expected to comprise conventional cars. The purchase price of both passenger cars, vans and heavy-duty vehicles (less vehicle registration tax) running on alternative fuels is also expected to be significantly higher than corresponding petrol and diesel vehicles in 2030.

The Government's climate initiative for road transport defines the framework for the future regulation of road transport that will generate total reductions of one million tonnes of CO_{2e} across initiatives for passenger cars and heavy transport by road. Tax adjustments address the fact that the production costs of EVs remain considerably higher than for conventional costs. The Government also proposes incentives for the use of greener fuels in the conventional car fleet. In addition, the Government proposes preparing the establishment of mileage-based road taxes for heavy duty vehicles from 2025 so that heavy-duty vehicles become increasingly taxed on the socio-economic costs of lorry traffic with a more targeted focus. It is also proposed to differentiate the tax according to the CO₂ emission of the individual vehicle along with a geographical differentiation of rates. Finally, the Government proposes that a strategy be prepared for the further development of the RE fuel market in Denmark⁵³.

The Government is working to for more ambitious EU regulation of the transport sector, see box 34. Within the EU, the Government will also work to strengthen the emission trading system so that it will deliver a greater share of the EU's total reduction effort and so that the emission trading system will be expanded to include road transport.

Box 34

More ambitious EU regulation of the transport sector

The Government is working to ensure that the Commission presents a strategy for how the EU can promote the green transition of the transport sector, including a clear plan for phasing out petrol and diesel cars in the EU.

The Government is working to strengthen the emission trading system so that it will be expanded to include road transport.

The Government is working to adjust the European rules to support the phase-out of petrol and diesel cars from 2030, including stricter CO₂ standards for light and heavy vehicles, the necessary infrastructure, promotion of alternative fuels, including Power-to-X and an ambitious approach to the development of batteries.

The Government will work to set up an alliance between like-minded EU member states that can apply pressure to promote the phasing-out agenda in the EU.

Among the Government's initiatives to reduce aviation emissions is a call for the Commission to propose pricing of aviation emissions, possibly including taxes to ensure more sustainable air transport, and for the Commission to analyse the possibility of reducing free allocations across sectors without leading to carbon leakage.

The Government is actively working to ensure that potential future EU initiatives in the maritime area will support a global solution under the auspices of IMO, benefit the climate and not jeopardise the competitiveness of the European maritime sector.

Passenger cars

Passenger cars are expected to account for 7.3 million tonnes of CO₂e emissions by 2030, equating to 53% of the transport sector's emissions. The transition to more climate-friendly alternatives is directly and technically feasible for passenger car transport, whereas battery-operated electric vehicles are expected to be the most competitive alternatives to conventional cars up to 2030. In the longer term, technologies such as hydrogen are expected to play a greater role for passenger cars. However, the purchase price for most electric vehicles remains higher than for corresponding conventional cars despite existing tax relief measures.

Nevertheless, differences remain between conventional cars and EVs, other than the financial reasons for choosing an EV. For instance, electric vehicles have a shorter range than conventional cars and charging an electric vehicle takes considerably longer than filling petrol and gas cars. Also, the reliability of supply is lower, which contributes to uncertainty in terms of using electric vehicles. Due to these differences, electric vehicles are still not a real alternative for all user groups. This means that the practical restrictions in relation to traditional driving patterns remain challenging and are not solely a matter of the costs. However, there is growing appreciation of EVs' amenities concurrent with an increasing number of these types of cars on the roads. Production limitations are still a barrier to increasing the number of electric vehicles.

Many operators also point to the roll-out of a charging infrastructure as a challenge to the spread of electric vehicles. Several studies show that the amount of publicly accessible charging options is a key parameter for the decision to buy electric vehicles. It is therefore necessary to sufficiently develop a publicly accessible charging infrastructure to support an increase in the demand for EVs. This particularly applies to consumers without access to home charging or those who need to charge on longer trips. By the turn of the year 2020/2021, the EV Commission will submit its second and final interim report with the charging infrastructure as one of its focus points.

The parties behind the 2018 energy agreement have decided to expend almost DKK 50 million from the green transport pool on charging stations. In the 2020 *Climate agreement for energy and industry, etc.*, the parties also agreed that the remaining funds in the green transport pool should target the charging infrastructure, heavy transport and ferries. With the *Climate agreement for energy and industry, etc.*, the parties have agreed to move forward the realisation of the remaining funds in the green transport pool to 2020 and 2021 and increase the funding by DKK 50 million with specific priorities of DKK 100 million in 2020 and DKK 375 million in 2021.

Vehicle registration taxes and the choice of passenger car

One way to induce more people to choose an electric vehicle over a petrol or diesel car is therefore to reduce the cost of EVs compared to petrol and diesel cars and make the purchase and use of petrol and diesel cars more expensive to offset some of the other differences through economic incentives.

In addition to the purchase price, the purchase decision should include considerations of the cost of ownership and consumption, where zero and low-emission cars have significantly lower fuel and maintenance costs.

Table 11
Comparison of prices before tax in 2019

Car segment	Micro	Small	Medium	Large	Premium
<i>Conventional cars</i>	<i>VW Up!</i>	<i>Hyundai Kona</i>	<i>Nissan Qashqai</i>	<i>Audi A5</i>	<i>Audi A7</i>
Price before registration tax (DKK)	76,500	120,300	159,300	248,400	471,400
Purchase price including registration tax (DKK)	115,900	211,500	283,300	499,800	1,063,00
<i>Electric vehicles</i>	<i>VW e-Up!</i>	<i>Hyundai Kona</i>	<i>Nissan Leaf</i>	<i>Tesla 3</i>	<i>Tesla S</i>
Price before registration tax (DKK)	200,500	311,700	281,600	468,500	708,600
Purchase price including registration tax (DKK)	200,500	311,700	281,600	484,300	803,600

Note: Based on average of car models sold in Denmark in 2019.

Source: Commission for a Transition to Green Passenger Cars (the EV Commission).

Sales of zero and low-emission vehicles in Denmark reached 9,400 in 2019. By mid-September 2020, 16,000 zero and low-emission vehicles had been sold. Sales of EVs and low-emission vehicles are estimated to increase significantly up to 2030 as the prices fall, the range of models grows and knowledge of the new technologies improves, etc. It is therefore expected that there will be about 400,000 zero and low-emission cars in Denmark by 2030 under the current rules, and, subject to great uncertainty, more than 1 million zero and low-emission cars by 2035.

A fundamental challenge of a green transition of passenger cars is that consumers must replace a high-tax product (conventional cars) with a more expensive, but lower-tax, product (zero and low-emission cars). A major shift from conventional cars to electric vehicles involves costs for both the state and for the consumers in the purchase situation. At the same time, the technical service life of vehicles means that the individual will suffer a loss if the car fleet replacement is advanced in relation to the life of the vehicles. Furthermore, the international EV market remains limited. Forcing the development will therefore be associated with significant costs for the state and households alike.

A greater proliferation of zero and low-emission cars requires a wider and more competitive selection of zero and low-emission cars, particularly in the small-car segments as about half of all new cars bought by Danes in 2019 cost less than DKK 250,000, including VAT and vehicle registration tax. About 300 different models of conventional cars were marketed in Denmark in 2019 and about 45 different models of zero and low-emission cars.

Generally, an advancement will also entail distribution consequences for households, as most sales of zero and low-emission cars are in the more expensive car segments that are typically purchased by high-income groups. It is also in these segments that tax relief will have the greatest effect as the tax component of smaller, conventional cars is relatively low. It will therefore have distribution consequences if taxes on conventional cars are increased to promote zero and low-emission cars in small-car segments in which zero and low-emission cars are less prevalent.

Promoting zero and low-emission cars by making these cars less expensive without raising the tax on conventional cars will significantly lower the tax revenue for the state (taxpayers) which must, all other factors being equal, be financed by lower public spending or by raising other taxes or duties.

The state will experience lower revenue of DKK 115,000–125,000 per EV sold, even with a fully phased-in registration tax for EVs, because the EV, due to high energy efficiency, qualifies for a big deduction in the registration tax and a low motor vehicle tax.

The EV Commission report also shows that it is difficult to obtain a significant contribution from passenger cars in 2030 without CO₂ reductions being associated with significant socio-economic costs per tonne of CO₂ reduced. For instance, the EV Commission estimates a marginal shadow price of DKK 3,800 per tonne of CO₂ by 2030 with one million zero and low-emission cars in 2030, see table 12. It should be added that this involves an annual tax increase of DKK 5,900 for an average conventional car, most of which will be vehicle registration tax, see table 12.

Table 12

The EV Commission's models

Measures	Model 1	Model 2	Model 3	Model 4
Stock of zero and low-emission cars in 2030	500,000	600,000	750,000	1,000,000
Change in zero and low-emission cars in 2030 compared to baseline trend	100,000 200,000 350,000 600,000			
Zero and low-emission car percentage of new sales in 2030	39	41	50	62
CO ₂ reduction in 2030 (million tonnes)	0.2	0.3	0.9	1.5
Revenue change in 2030 (DKK billion)	-0.3	-0.7	-0.1	1.0
Socio-economic impact less CO ₂ (DKK billion) in 2030	-0.0	-0.3	-2.4	-5.7
Socio-economic impact including CO ₂ (DKK billion) in 2030*	0.0	-0.3	-2.2	-5.2
Shadow price (DKK per tonne of CO ₂) in 2030	200	2,000	3,400	3,800
Tax change for conventional cars (annual)				
Average conventional car	440	440	2,200	5,900
Average electric vehicle	-2,000	-2,300	-1,900	-1,500

Note: The changes are specified relative to baseline trend. *The Commission for a Transition to Green Passenger Cars uses a CO₂ price of DKK 363 per tonne of CO₂ in 2030, see *the Ministry of Finance key figure catalogue*. Economic impact and shadow prices are stated for the useful life of the 2030 new registration year.

Despite a greater phasing-in of zero and low-emission cars, it is expected that a substantial fleet of conventional cars will remain in 2030. Consequently, the Government will work to reduce emissions from passenger cars by means of sustainable fuels such as biofuels and RE fuels.

Heavy road haulage

Heavy duty vehicles and vans are expected to account for 2.6 and 2.1 million tonnes of CO₂ respectively in 2030. Transitioning heavy road haulage is technically more difficult than passenger transport due to the limited number of real alternatives to fossil-fuelled heavy duty vehicles in existence today, and the fuel infrastructure can also be an obstacle. The electro technology is not sufficiently mature to meet heavy road haulage transport requirements, and at present there is no competitive green solution for the transition of heavy road haulage.

However, a transition to more sustainable fuels could be a significant element of the solution, concurrent with the development and testing of future green solutions, as also indicated by the climate partnership for land transport. The Government's focus on development of green fuels for the future, including both biogas and PtX, can support the transition of particularly the heavy segment of the transport sector for which the technology is not yet mature to facilitate electrification for longer distances.

This means that research into green fuels and Power-to-X is a prioritised mission in the Government's green research strategy. Green fuels can eventually help replace fossil fuels. Denmark can build on a research tradition in the area of hydrogen and electrolysis in particular to tap into a possibly large potential for a commercial position strength within PtX.

With its climate initiative for road transport, the Government will initiate work on establishing mileage-based CO₂-emission-differentiated road taxes for heavy duty vehicles from 2025 so that heavy duty vehicles are increasingly, and with more focus, taxed in relation to the cost of the damage they inflict on society, climate and environment, and eventually drive the transition to carbon-neutral heavy duty vehicles. In December, the Council is expected to adopt the directive amendment that will make differentiation mandatory in all EU road tax schemes with subsequent negotiations with the European Parliament. Thus, it is too soon to estimate the possible effects on a future Danish mileage-based road tax. The CO₂ effect incorporated in the initiative is based on changed demand, with the road tax resulting in lower demand for road freight transport. A differentiation in which green vehicles pay relatively less than fossil vehicles will give hauliers an incentive to invest in green heavy duty vehicles, including heavy-duty vehicles fuelled by electricity, hydrogen or gas. The effect of increasing the number of green vehicles in the total fleet is not included in the determination of the CO₂e effect of the initiative. These effects will be assessed in more detail when the directive amendment is known and specific models have been prepared for the tax structure and rates in a mileage-based road tax for heavy duty vehicles on the Danish road network.

Box 35 summarises the Government's initiatives for addressing road transport emissions so far⁵³.

Box 35

Overview of main initiatives for road transport

Measures:

- DKK 180 million for cancelling tax increases on electric vehicles and reducing the process energy tax on power for EVs.
- DKK 25 million for introducing a deduction in the tax basis for green company cars to reduce the price of green driving on the job.
- DKK 75 million for accelerating the transition to green buses.
- DKK 100 million for promoting cycling and a pool of DKK 50 million from which municipalities can apply for bicycle project funding in return for 50% co-funding.
- Realisation of DKK 50 million for charging stations and DKK 24 million for promoting green heavy commercial transport and DKK 1 million for analysing the potential for transitioning domestic ferries to renewable energy as part of the realisation of the green transport pool in 2020 and an analysis of the pricing structure for publicly accessible charging points.
- Moving forward the remaining realisation of the green transport pool to 2020 and 2021 and an increase of the pool by DKK 50 million, resulting in total priorities of DKK 425 million in 2020 and 2020 for charging stations, promotion of green commercial carriage and transitioning to green ferries.
- The Government's climate initiative for road transport defines the framework for the future regulation of road transport that will generate total reductions of one million tonnes of CO₂e across initiatives for passenger cars and heavy transport.

Green fuels

Biofuels

With its climate initiative for road transport, the Government proposes a long-term, technologically neutral regulation of the use of RE fuels in the transport sector with focus on CO₂ displacement. Depending on the approach, the regulation of biofuels and RE fuels can contribute to achieving the national 70% reduction target and the target for global CO₂ emissions, including sustainability, food considerations, alternative uses of production soils, social considerations, etc., and promoting the domestic production of new green fuels.

The Government proposes replacing the current blend in requirement with a CO₂e displacement requirement that will commit fuel suppliers to a percentage reduction of greenhouse gas per energy unit compared to the 2010-level. This will incentivise the sector to a technologically neutral use of the most sustainable fuels with a high global reduction effect. This means that sustainable fuels also include considerations outside the national emissions. A displacement requirement will also make it possible to include competing types of CO₂e-reducing fuel measures, thereby taking account of future developments of new fuels based on Power-to-X, etc.

It is estimated that a national CO₂ displacement requirement of 4.6% in 2022 for diesel, petrol and gas will cause fuel suppliers to apply the highest possible standards for petrol and diesel (corresponding to an actual blending percentage of 6.6) and the RE requirement for use of advanced biofuels is estimated to be met until 2024. Higher requirements based on current prices and technologies are estimated to result in blending of HVO biodiesel which can replace diesel without restrictions due to its technical characteristics.

Table 13 presents a number of examples of displacement requirements. It is noted that a considerable market development is assessed to be required to make it possible for fuel suppliers to purchase the amount of diesel required to satisfy a CO₂e displacement requirement of 30%, for instance.

It is noted that estimates of the precise fuel composition are subject to considerable uncertainty as it is only possible to estimate the composition based on the current pricing and the current supply of fuels. The actual fuel composition will consequently depend on issues such as technological developments, which may impact the additional costs for the sector, CO₂ reduction, etc.

The Government's measures to support further technological developments include the preparation of a strategy for further developing the market for RE fuels in Denmark that can provide a transitional solution up to the phase-out of fossil fuel cars.

Today, it is technically feasible to substitute all petrochemical diesel with HVO biodiesel. However, this is not considered practical at the moment, due to a limited market supply, among other factors.

Table 13**Estimation of consequences at various levels of CO₂ displacement requirements****Cost of different CO₂ displacement requirements in 2030**

CO ₂ displacement requirement, percent	4.6	6	7	8	9	10	15	30
Total CO ₂ effect, including behavioural effect, millions tonnes of CO ₂ ¹	0.3	0.8	1.1	1.5	1.8	2.2	3.6	6.2
<i>Direct CO₂ effect, million tonnes of CO₂</i>	0.2	0.5	0.7	0.9	1.1	1.3	2.3	5.3
Additional cost to the sector, DKK billion	0.2	0.8	1.3	1.8	2.3	2.8	5.3	12.8
Revenue reduction, DKK billion	0.2	0.7	1.0	1.3	1.7	2.1	4.0	9.8
Shadow price, DKK/tonnes of CO ₂	1,400	2,000	2,300	2,400	2,500	2,500	2,900	4,100
Increased price of diesel, DKK .00/litre incl. VAT ²	10	30	50	70	90	110	200	490
Increased price of petrol, DKK/litre incl. VAT	0	0	0	0	0	0	0	0

Note: The HVO biodiesel used in the computation example is based on rapeseed, a first-generation biofuel. 1: Behavioural effects are only incorporated in the form of less driving and cross-border trade. The cross-border trading effects are subject to great uncertainty, particularly in case of steep diesel price increases. The calculations do not take into account that a considerable unilateral price increase of diesel compared to petrol will, in isolation, increase the consumption of petrol and lower that of diesel due to a gradual shift from diesel cars to petrol cars. This effect is expected to result in even more biofuel having to be blended in diesel to achieve a given CO₂ displacement requirement. 2: The figures are rounded to the nearest DKK 0.10 per litre. Subject to great uncertainty, it is estimated that a CO₂ displacement requirement may cause the price of petrol to decline slightly.

Box 36**Requirement of 100% biodiesel – example**

HVO is a special biodiesel that offers the same characteristics as fossil diesel. HVO is as sustainable as other bio-diesels as it can be produced using the same raw materials and can therefore be both first and second generation or advanced HVO biodiesel.

It is technically feasible for diesel cars to run on 100% biodiesel.

Today, 7% conventional biodiesel can be blended in, and it is thus possible, in theory, to blend an additional 93% HVO biodiesel into petrochemical diesel. This is roughly estimated to reduce greenhouse gas emissions by 7 million tonnes of CO₂e in 2030, corresponding to the entire expected emissions from diesel in road transport.

However, a requirement of 100% biodiesel is expected to cost the sector an additional DKK 16.5 billion a year. Based on the assumption that the additional costs follow the fuel, passing on the additional costs will result in substantial price increases for diesel vehicle owners in the form of a price increase of around DKK 6 per litre of diesel. The average annual diesel costs for a passenger car will thus increase by about DKK 7,000.

In addition, there is a revenue loss of about DKK 1.5 billion for the state from the CO₂ tax. This is another-factor-being-equal consideration without considering behavioural effects, increased cross-border trading, tax system changes (e.g. lapse of the countervailing charge), lower demand for diesel vehicles, etc. It is also assessed that it will be practically impossible for fuel suppliers to purchase such quantities of HVO.

Power-to-X

It is not considered possible to phase out all fossil energy consumption in all sectors in coming decades. A promising perspective is, however, to convert green power from the coming energy islands to green fuels that can be used in those sectors, where the direct use of green power is not a fully viable solution. An example is heavy road haulage, shipping and aviation, where the direct use of electricity today can only satisfy a small portion of the transport energy demand. The processes in which power from wind turbines and solar cells is converted into green fuels are collectively referred to as “PtX”.

Both direct electrification and bio-based fuels have different limitations, notably in relation to battery capacity and sustainability. In this respect, Power-to-X stands out for being scalable without significant technical restrictions other than having sufficient access to RE-based power. However, to realize some of these potentials will require the use of carbon (CCU), which depends on the available carbon sources, see the section on CCS. It is therefore necessary to develop cost-effective solutions for converting power from renewable energy sources into products that can be used to reduce emissions from segments of the transport and industrial sector where there are no broadly scalable alternatives to fossil energy.

For transport alone, it is assessed that the CO₂ displacement potential from the use of green fuels generated through Power-to-X will eventually be in the magnitude 0.5–3.5 million tonnes of CO₂ by 2030 and, eventually, 1.5–7.5 million tonnes of CO₂ (including 1–4 million tonnes of CO₂ in international shipping and aviation which are not included in the 70% reduction target). Such potential is subject to uncertainty and should be assessed in more detail. The estimated potential includes both domestic and international transport, meaning that the potential cannot be directly compared to the basis for the 70% reduction target for 2030.

This potentials assessment assumes a comparatively large share of PtX-fuels in the transport segments that are difficult to electrify directly (shipping, aviation and parts of heavy road haulage).

Box 37

Wind and solar power must be converted into green fuels

Shell and Everfuel are behind a large-scale PtX installation project at Fredericia refinery. Ørsted has entered into a partnership with other relevant actors and the City of Copenhagen to develop a large-scale PtX plant in Greater Copenhagen for generating sustainable fuels.

Denmark and the Netherlands have also entered into bilateral cooperation on the sale of Danish RE-shares (at least DKK 750 million and up to DKK 1.5 billion) to finance a subsidy scheme for PtX plants in Denmark.

Public transportation

Buses

Public buses (approx. 3,300) are currently estimated to emit 190,000 tonnes of CO₂ a year while private sector buses (6,235) have estimated emissions of 320,000 tonnes of CO₂ a year. All public buses are anticipated to have been transitioned to clean fuels between 2035 and 2040 without additional initiatives. The green transition of the private bus market is extremely sluggish, however, and CO₂ emissions are currently expected to remain largely unchanged by 2030 compared to today. One possible reason is that green buses are more expensive than conventional buses. In addition to the comparatively long private coach journeys for which transitioning to electricity is a particular challenge, private bus transport exhibits a different and less predictable driving pattern compared to public buses.

On 22 April 2020, the parties behind the 2020 Finance Act entered into an agreement on *Climate cooperation agreements for green public transport*. The agreement mandated the Minister for Transport to negotiate climate cooperation agreements with Denmark's biggest municipalities which other municipalities and regions can join later on. The climate cooperation agreements were entered into on 25 June 2020 with six of Denmark's biggest municipalities and mainly contribute by setting out an ambitious plan for the green transition of public bus transport, but they also contain commitments for the transition of the municipal vehicle fleet. Once all six municipalities have transitioned their buses in accordance with these climate cooperation agreements, the total annual CO₂ reduction is estimated to be almost 40,000 tonnes compared to the current annual level. Another two municipalities have subsequently joined the agreements and talks are ongoing with several other municipalities. In the autumn of 2020, the Minister for Transport will also negotiate climate cooperation agreements with the regions.

The parties behind the 2020 Finance Act also entered into an agreement on a *Green bus pool for regional buses and islands*. To distribute the bus pool funds of DKK 75 million appropriated in the 2020 Finance Act, an application pool has been set up to subsidise green regional bus lines and green buses on islands. Green buses comprise CO₂ emission reducing technologies such as biogas, biodiesels, electricity or hydrogen.

Taxis

With the liberalisation of the taxi market, it is estimated that there will be around 6,000 taxis with expected annual emissions of 80,000 tonnes of CO₂. By 2030, taxi emissions are expected to be reduced to 70,000 tonnes of CO₂ a year. Energy requirements of taxis are currently regulated in Executive Order 1018 of 29 June 2020 which stipulates that taxis registered for the first time after 1 January 2021 must be class A++, which leaves a limited number of car makes suitable for taxi operation in the current car market, as it must at least be a simple hybrid car.

Rail transport

Rail transport currently emits 0.2 million tonnes of CO₂ a year, corresponding to 2% of total transport sector emissions. This includes CO₂ emissions from both diesel

and electric trains. CO₂ emissions from train operation are estimated to make up 1% of the transport sector's CO₂ emissions by 2030. This is mainly due to already decided and financed electrification initiatives.

With the already decided and financed initiatives to electrify the main rail network, DSB's entire railway operations will be based on electricity by 2030. The remaining diesel rail traffic on the state railways after 2030 will be regional traffic on branch lines in Central and West Jutland and on the Svendborgbanen line which is now or from late 2020 will be operated by Arriva. This part makes up 8% of the railway sector's CO₂ emissions. All of these diesel trains are expected to be replaced by CO₂-neutral trains up to 2035.

Box 38

Replacement of regional diesel trains in state rail traffic – example

It is deemed possible to expedite the replacement of diesel trains in state rail traffic in Central and West Jutland and on the Svendborgbanen line to a CO₂-neutral solution, e.g. battery or hydrogen-operated trains by 2030 at the latest, which provides total CO₂ reductions of about 0.05 million tonnes by 2030. However, advancing the shift to carbon-neutrality is estimated to entail additional cost as the trains must be replaced before it is economically ideal to do so, i.e. before the end of the service lives of the trains.

Domestic ferries

Danish domestic ferries annually emit 249,000 tonnes of CO_{2e}, 72,000 tonnes of which is attributable to public domestic ferries that do not serve the Faroe Islands. Emissions from public-transport ferries have declined by 85% compared to 1990. This is mainly due to discontinued ferry connections, including two routes across the Great Belt.

Danish domestic ferry lines are dissimilar in terms of size, age of the tonnage, range and organisation. We have no specific data about costs or technological opportunities for the green transition of Danish ferry connections.

We do not yet have an overview of the economy and the fuels that will be most beneficial for the individual ferry routes in transition to a more climate-friendly ferry operation. We lack specific calculations for the transition of ferries that take account both of investments in the actual ferries and surrounding changes such as shore-power facilities and possible fuel savings. We also lack specific suggestions on how to best support the green transition of ferries. There are only a limited number of development projects in Denmark that convert ferries into climate-friendlier operation (such as the Ellen electrical ferry on the Ærø line and a coming hybrid ferry on the Fanø line).

The *Agreement on the realisation of the green transport pool* in April 2020 provided for an analysis to examine which ferry connections are most suitable for transitioning to renewable energy and how to best support the transition of ferries with fund-

ing from the green transport pool. The possibility of making requirements of the individual ferry routes will also be identified. The analysis is expected completed by the end of 2020.

Aviation

Aviation (emissions from air travel departing from Denmark) is overall expected to emit 3.1 million tonnes of CO₂e by 2030, of which domestic aviation, which is included in the 70% reduction target, is expected to emit 0.1 million tonnes of CO₂e by 2030, which will be a reduction of some 60% compared to 1990. This is due to reasons that include the establishment of the Great Belt Link which prompted passengers to switch from air travel to cars, buses and train travel. Thus, domestic air traffic thus amounts to about 1% of the transport sector's emissions.

A major challenge for the green transition of aviation is that the production of competitive sustainable fuels is currently insufficient to allow it to be blended in aviation fuel. The increased use of CO₂-neutral fuels in the aviation sector will therefore require higher production in Denmark or increased import and that the fuel can be produced at prices that can compete with fossil aviation fuel. Sustainable aviation fuels are expected to be 2 to 5 times more expensive than fossil aviation fuel. The technology is not yet mature for aircraft to fly on 100% green energy such as electricity.

Another challenge is that air transport is also exempt from energy tax and VAT. This means that air transport is subject to a more favourable taxation compared to other consumption in general and particularly compared to private cars and public transport such as buses and trains.

The COVID-19 crisis impacts the aviation sector in particular, with air traffic being reduced to a few percentage points of its usual level in the spring of 2020 and still only around 20% of its usual level of activity in August 2020. The time by when the activity will have returned to its usual level is subject to great uncertainty.

Overall, the Government and the parties of the parliament ensure the launch of a number of measures for the green transition of the transport sector with the climate initiative for road transport⁵⁴ and the 2020 Finance Act and the *Climate Agreement for Energy and Industry*, see box 35.

Joint climate action

The transport-policy industrial associations support the Climate Act targets. Both under the auspices of the Climate partnerships and as separate organisations, the sector has recommended targets and measures that could help achieve the climate targets. The Climate partnerships have outlined visions for the green transition of the transport sector which also contribute to reaching the target. Box 39 presents examples of the transport sector's contribution to the green transition of the transport sector.

⁵⁴ Replaced by the Transport agreement of 4 December 2020.

Box 39

The transport sector's initiatives and cooperation with the municipalities

- The aviation sector invests in new fleet of aircraft and operational efficiency measures that can reduce fuel consumption, and the sector proposes production facilities for green fuels in combination with other business sectors and research in technologies for electrical and hydrogen aircraft.
- On 25 June, the Minister for Transport entered into climate cooperation agreements on green public bus transport. Under the agreements, Denmark's largest municipalities commit (at varying rates) to an ambitious transition of public bus transport. The cooperation with municipalities will reduce greenhouse gas emissions in 2030 by 40,000 tonnes of CO₂e – and this reduction will increase as other municipalities and regions join.
- Danish Ports has launched new, ambitious objectives for CO₂-neutral ports that enable green connection of ships by 2030 at the latest.
- The partnership for aviation works to increase the production and use of sustainable aviation fuels. The partnership for land transport works to optimise logistics and will focus more intensely on the sector's fuel consumption to generate efficiency improvements that can drive down greenhouse gas emissions.
- The Blue Denmark partnership aims to secure Denmark's position as an international leading nation for climate-friendly shipping.

With the sector strategy for energy and industry, the Government has concurrently pushed the development of the future green solutions that also play a major role in the green transition of the transport sector, see box 40.

Achieving the green transition of the transport sector requires development initiatives, including the prioritisation of green fuels and Power-to-X in the green research strategy, as well as the EU efforts in the long term that will support the green transition of transport, see box 40.

Box 40

EU and international action for a green transition of the transport sector

Strengthened pan-European regulation can contribute to a more cost-effective achievement of the Danish 70% reduction target, for instance by means of a plan for phasing out petrol and diesel cars and imposing CO₂ demands on light and heavy vehicles that can drive the technological development of zero-emission cars.

· *Road transport*

There is a need to significantly strengthen the green transition of the transport sector in the EU. The Government is working to ensure that the Commission presents an ambitious, broad-based strategy for how the EU can promote the green transition of the transport sector and the sector's contribution to the climate-neutrality target by 2050 at the latest, including a clear plan for phasing out petrol and diesel cars. In the autumn of 2020, the Commission will present a strategy for sustainable and smart mobility which the Government is working to influence in an ambitious direction in a range of areas.

The Government is advocating an adjustment of the European rules to support phasing out the sale of new petrol and diesel cars from 2030, including stricter CO₂ requirements for both light and heavy vehicles. The Government will also work to set up an alliance between like-minded

EU member states that can apply pressure to promote the phase-out agenda in the EU. In addition, the Government is working to ensure the necessary infrastructure at European level, for instance by a broad roll-out of charging points and filling stations for alternative fuels, promotion of alternative fuels, including Power-to-X, and maintaining the level of ambition in the strategic action plan for batteries.

In addition, the Government works to strengthen and enlarge the EU ETS to also cover road transport emissions.

Aviation

The Government is also making an effort to reduce aviation sector emissions through European action. One of the challenges to the green transition of the aviation sector is to ensure that ambitious Danish requirements will not only result in the emissions being moved to other EU countries or to prevent ambitious European regulation from causing emissions to be moved non-EU countries.

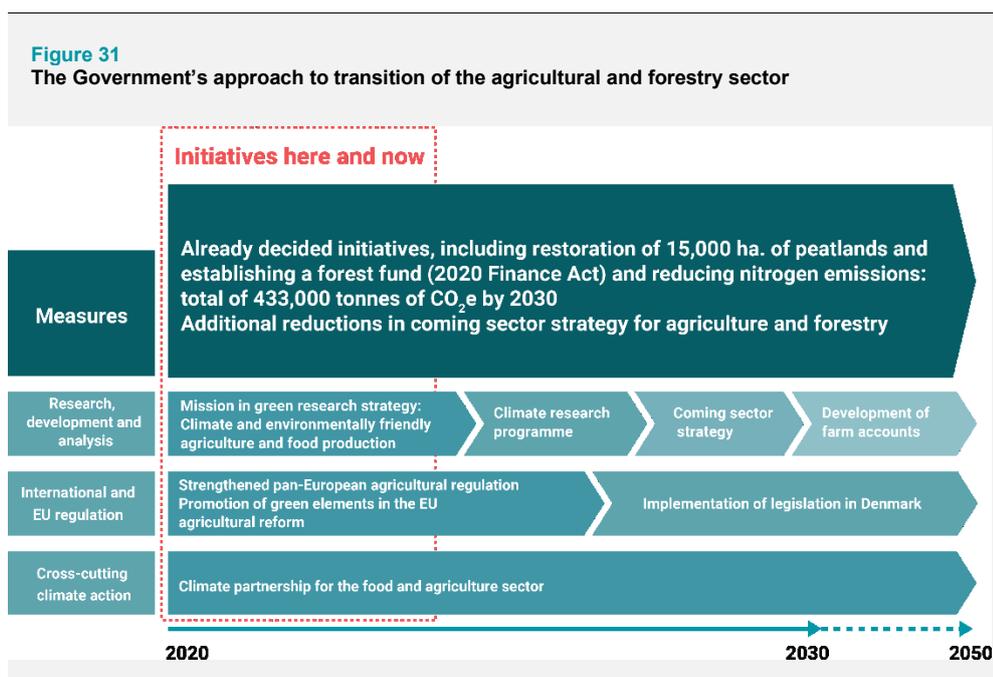
Parts of aviation are already subject to international regulation. This includes the EU emission trading system and the greenhouse gas emission regulation mechanism CORSIA (from 2021) whereas EU and ICAO rules define the framework for additional regulation of greenhouse gas emissions from aviation. The Government is advocating an ambitious and cost-effective regulation of this field. Among the Government's initiatives are encouraging the European Commission to propose pricing of aviation emissions, including possible taxes to ensure more sustainable air transport, and to analyse the possibility of reducing free allowance allocation across sectors with a view to promoting the green transition of the sector without leading to carbon leakage.

Maritime transport

Shipping emissions represent around 2–3% of greenhouse gas emissions. This means that there is a large potential for greenhouse gas reductions. The shipping sector is characterised by its global nature where shipping companies can freely choose the flag of registration for their vessels and change routes and ports of call on grounds of competition, which requires international regulation. The Government is working for the UN International Maritime Organisation (IMO) to adopt global, flag-neutral and ambitious initiatives. The Government also works to ensure that future maritime initiatives at EU level support a global solution under the auspices of the IMO, safeguard the European maritime sector's competitiveness and create real reductions.

7.4 Agricultural and forestry sector

Reducing greenhouse gas emissions in agriculture will entail significant costs for the sector and/or the state, based on current knowledge. This means that the reduction effort must be organised in a cost-effective manner, expediently balancing development initiatives and decisions on short-term initiatives. The Government therefore pursues a multi-pronged approach to the efforts in the agricultural and forestry sector. On the one hand, specific short-term initiatives must be initiated. On the other, sufficient resources must be allocated to investments in ambitious research and development that focuses on new technologies in the agricultural and forestry sector with potential to generate greater, more cost-effective reductions in the longer term. The green transition must also be supported by common climate regulation of agriculture in the EU that defines equal competitive framework conditions for achieving additional reductions in agriculture. Finally, the industry's contributions, including the Climate Partnership for Food and Agriculture, can qualify the green transition in the sector towards lower production emissions. The approach is illustrated in figure 31.



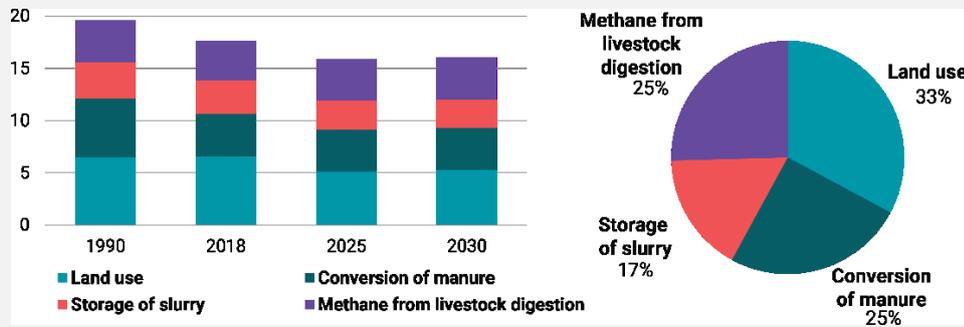
The sector's greenhouse gas emissions

In the absence of new initiatives, emissions from the agricultural and forestry sector are expected to amount to 16 million tonnes of CO₂e by 2030, equivalent to more than one third of Denmark's total greenhouse gas emissions, see figure 32.

Figure 32 shows the source of the agricultural and forestry sector emissions.

Figure 32

Where will agricultural and forestry sector greenhouse gas emissions come from in 2030?



The agricultural industry has moved in a direction towards fewer greenhouse gas emissions over time, see figure 32. Since 1990, there has been a decoupling of production size from the scope of greenhouse gas emissions. From 1990 to 2017, production increased 35% while greenhouse gas emissions declined by 16%. There is a considerable overlap between agricultural activities that result in nitrogen discharge to the aquatic environment and greenhouse gases. The reduction in agricultural greenhouse gas emissions of 18% (2.3 million tonnes of CO₂e) from 1990 to 2010 is thus primarily attributable to a decline in nitrous oxide emissions from cultivating the land as a consequence of nitrogen regulation. The primary reduction in emissions took place in the period from 1990 to 2002, following which emissions from fertiliser on the fields have remained fairly unchanged. The reduction is due to a 50% decline in the use of chemical fertilisers, a number of environmental measures to reduce nitrogen leaching and developments in types of animal housing, manure management and environmental technology. The design of the climate initiative therefore offers obvious synergies between greenhouse gas reductions and satisfaction of environmental directive obligations. Correspondingly, a reduction of greenhouse gases will reduce negative impacts on nature with potential synergy effects in relation to the nature area when the climate action involves setting aside intensively cultivated agricultural land.

However, there are also a number of challenges for the green transition in the agricultural and forestry sector. Some degree of emission reduction in agriculture can be facilitated by introducing known technologies in the production, extraction of lowland soils, afforestation, etc. However, the current production methods and technologies will also involve nitrous oxide losses in connection with fertilisation of crops and losses of methane from livestock production. The sector's emissions of greenhouse gases have not been directly regulated, neither nationally or by the EU.

A number of existing measures can be used in the short term. However, we are not familiar with all the technological solutions that are capable of removing the sector's emissions in terms of existing production systems. Agricultural production facilities have lengthy depreciation periods, meaning that it takes time to replace livestock

housing systems and technologies. Therefore, a cost-effective reduction effort must be designed with a suitable balance between development initiatives and short term initiatives with documented effects in order to avoid imposing unnecessarily high costs on the sector or the state.

However, there is a crucial need to develop and test new measures that are required in order to reduce agricultural emissions while considering agriculture's competitiveness at the same time. Furthermore, it is necessary to document the effect of existing climate measures so they can be included in the national emission inventory, but also to ensure a cost-effective green transition. Finally, basic knowledge of agricultural emissions must be improved and knowledge of the sector's activity data needs to be widened.

Initiatives in the agricultural sector should be seen in context of how the industry is being exposed to competition with a struggling operating economy. The food cluster in Denmark exports collectively for total DKK 150 billion and the cluster employs 110,000 people, particularly in rural districts. The agriculture sector's economy is currently vulnerable to fluctuating prices and interest rates, due to factors such as a large debt burden totalling DKK 350 billion, most of which is floating-rate debt. Many farms also operate with low earnings.

Some climate initiatives, such as efficiency improvements and improved utilisation of feed, fertilisers and other resources, can both benefit agriculture's economy and reduce its climate impact. In addition, pan-EU regulation in the area can help reduce transition costs for the industry and lower the risk of greenhouse gas emission leakage, see box 41.

Box 41

Greenhouse gas leakage in agriculture

Reducing the production of food and/or wood will, *ceteris paribus*, lead to displacement of production/land use/logging, thereby increasing emissions abroad (carbon leakage/indirect land-use change) and lessen the actual climate impact globally in relation to the apparent, nominal reduction of emissions in Denmark. Subject to great uncertainty, the actual global reduction is deemed to amount to only 25–73% of the national reduction, see the Danish Environmental Economic Council, equivalent to a leakage rate of 25–75%. Common EU regulation can level the playing field and reduce the risk of carbon leakage from Danish initiatives. At the same time, early Danish action will demonstrate the reduction potentials and possibly lead to the development of new technologies, production forms and exports with derivative effects on the global reduction.

Source: The Danish Economic Councils Economy and Environment 2019, Chapter II Leakage of greenhouse gas emissions and Danish climate policy

Greenhouse gas reductions in the agricultural and forestry sector

Livestock production (manure management and methane from livestock digestion)

In the absence of new initiatives, livestock production is expected to constitute 6.8 million tonnes of CO₂e by 2030, equivalent to almost 42% of agricultural and forestry sector emissions. The emissions primarily derive from methane generated by livestock digestive processes and the management of manure in livestock housing and

storage. Currently available technologies could reduce the greenhouse gas emissions. For instance, slurry can be flushed from livestock housing faster, used in biogas plants for energy production, or it is possible to increase the fat content in feed rations for dairy cows and heifers, which would reduce emissions. In addition, several measures are currently used to reduce ammonia, which can have a climate effect. Significant reductions of livestock production emissions will require lower production activity, conversion to other production forms or the development of new technologies. This requires massive investments in the development and testing of new measures that can help reduce emissions from livestock production.

Conversion of fertiliser and manure in the fields

When applying nitrogen to fields in the form of chemical fertiliser or livestock manure to nourish crops, some of the nitrogen converts into nitrous oxide, for instance. In the absence of new initiatives, conversion of chemical fertiliser and manure in the fields is expected to constitute 2.7 million tonnes of CO₂e by 2030, equivalent to 25% of total agricultural and forestry sector emissions. This means that it is possible to optimise the spreading of fertiliser, but this must be done without jeopardising a continued effective and competitive production, which depends on the application of nitrogen under current production methods.

In spring 2020, it was decided to introduce stricter exploitation requirements on manure and reduce the nitrogen standards for crops cultivated on carbon-rich soils, see box 42 below.

Nitrogen use is currently subject to targeted regulation and the river basin management plans that implement EU environmental standards. Climate effects and synergies will be considered in the implementation of the new river basin management plans.

This includes considering whether to increase the proliferation of climate-friendly crops, such as grasses, and enhance subsidised measures, such as biomass refinery plants. Also, efforts can be made to develop new mechanisms for reducing emissions related to fertiliser spreading.

Land use

Cultivation and management of soils and forests generate greenhouse gas emissions when the carbon balance in soils and biomass is altered. Conversely, the sector can contribute to carbon sequestration when carbon is stored in soils and plants. Net emissions from forests and other land use are expected to amount to 5.3 million tonnes of CO₂e by 2030, equivalent to 33% of total agricultural and forestry sector emissions.

With the 2020 Finance Act, the Government has taken targeted action with a DKK 2 billion pool for restoration of peatlands that can reduce emissions by 270,000 tonnes of CO₂e by 2030, see box 42 below. At the same time, the Government has allocated funding to establish a forest fund to secure increased afforestation in Denmark. In

addition, funding for private afforestation under the rural development programme has doubled.

Compared with other measures, restoration of carbon-rich peatlands is a cost-efficient measure for achieving greenhouse gas reductions in the agricultural sector. There is an estimated current technical potential for setting aside 50,000 hectares of agricultural soils. The pool appropriated in the 2020 Finance Act enables the setting aside of the first 15,000 hectares. This leaves a technical potential for setting aside 35,000 additional hectares. It is estimated that the already initiated initiatives are exhaustive for the set-aside potential under the current incentive structures. The reason is that after setting aside the first 15,000 hectares, there is probably no potential for purchasing additional land at the technically determined average market price of DKK 133,000/hectare (including land consolidation, compensation, feasibility studies, administration and capital expenditure).

A voluntary pool only allows for paying the market price, which means that increasing the compensation to ensure more set-asides is not compatible with state aid rules. Therefore, setting aside the remaining technical potential would probably require other mechanisms to increase the incentive to sell.

This means that setting aside the remaining 35,000 hectares would result in a total one-off cost of at least DKK 4.5 billion in basic compensation.

A set-aside of this magnitude is estimated to contribute 0.5 million tonnes of CO₂e a year to greenhouse gas emission reductions. This could indicate that, compared to other agricultural initiatives, restoration of peatlands can still contribute cost-effective reductions towards the 70% reduction target and a number of other environmental objectives. However, the final assessment of further restoration of peatlands requires specific models for how to strengthen the incentive.

Organic production

The Government aims to double organic production levels and nurtures great ambitions for organic production. New data from Aarhus University have led to an appreciation of the climate effect of organic production per hectare from 0.6 tonnes of CO₂e per hectare to 2 tonnes of CO₂e per hectare. The reasons include more climate-friendly crops and less livestock per hectare. When consumers buy more organic products, they help pay some of the price of the agricultural green transition. At the same time, it is evident that while organic production has been subsidised over the years, the development of organic production must be market-driven. The production of organic food must meet the demand for organic products by Danish and global consumers. Increasing the amount of organic farmland will contribute to reducing greenhouse gas emissions.

Box 42

Measures in the 2020 Finance Act and other adopted and initiated actions

The action adopted for the agricultural area in the current government period contributes a total reduction effect of 433,000 tonnes of CO₂e a year by 2030.

- **Restoration of carbon-rich agricultural soils**
The 2020 Finance Act agreement allocates DKK 2 billion towards 2029 for restoration of carbon-rich agricultural soils. The implementation is expected to contribute to the setting aside of 15,000 ha of agricultural land. The expected climate effect is 270,000 tonnes of CO₂e a year by 2030.
- **Afforestation**
The 2020 Finance Act agreement allocates DKK 100 million to establish a climate forest fund enabling companies and individuals to contribute to the reduction effort. The fund's activities are expected to realise greenhouse gas capture of 50,000 tonnes of CO₂e a year by 2030. The implementation of the 2021 rural development programme also includes a decision to double the funding of the existing private afforestation aid scheme to a total of DKK 70 million. It is assessed that the implementation will result in some 2,000 ha of private afforestation. Afforestation of an additional approximately 1,000 ha is assessed to increase greenhouse gas absorption by 5,000 tonnes of CO₂e a year by 2030.
- **Reduction of nitrogen losses**
It has been decided to introduce stricter exploitation requirements on manure and reduce the nitrogen standards for crops cultivated on carbon-rich soils. In addition, a ban is introduced on spraying, fertilisation and conversion of section 3 areas. Together, the initiatives are expected to provide an annual climate effect of 90,000 tonnes of CO₂e by 2030.
- **Farm accounts**
The sector strategy for energy and industry allocates DKK 5 million in 2021 to contribute to the development of climate accounts at farm level that will support a cost-effective regulation of agricultural greenhouse gas emissions, but a major research effort remains to be done to facilitate the preparation of true and fair climate accounts at farm level.
- **Research**
The Government has started ten research projects with a budget of DKK 90 million to help identify future solutions for reducing agriculture-related greenhouse gas emissions. The funding comes from the climate research programme and is allocated for the period 2019-21. The Government's Green Development and Demonstration Programme (GUDP) also allocates DKK 23 million in 2020 to support three major new projects on creating plant-based protein products from Danish raw materials for future climate-friendly diets. The development of new technologies to reduce greenhouse gas emissions from food and agricultural production is also a mission in the Government's green research strategy.

Table 14 below presents the estimated effects and costs of a number of known climate measures in the agricultural and forestry sector. In addition, there are initiatives related to the restoration of peatland and initiatives for promoting organic production. It is noted that the initiatives are scalable and that the reduction effect depends on funding, among other issues. Thus, the initiatives in the table are examples only. All figures are subject to uncertainty.

Table 14

Economy and effect of possible measures

	Reduction		Costs	Shadow price	Shadow price
	million tonnes CO ₂ e/year		DKK million	DKK per tonne	DKK per tonne
	2025	2030	Annual average up to 2030	(with side-effects)	(without side-effects)
Increased proportion of fat in feed for conventional dairy cows and heifers	0.15	0.15	156	1,300	1,300
Frequent slurry flushing from pig housing	0.14	0.17	34	300	300
Increased state afforestation ¹	0.002	0.01	25	300	800
Additional state ² afforestation	0.01	0.06	196	800	1,300
Current effort in targeted nitrogen regulation (3,500 tonnes of nitrogen reduction) ³	0.29	0.29	200	-1,500	900
Collective nitrogen measures ⁴ (1,500 tonnes of nitrogen reduction)	0.02	0.10	450	From -5,300 to -240	From 250 to 1,700

¹ The effort cannot be scaled beyond the eight-year profile with 200 ha/year as it is not deemed possible to obtain co-financing for this from municipalities and waterworks beyond the profile.
² The effort can be adjusted with additional hectares. However, the phasing-in profile remains fixed.
³ The effort can be increased. For instance, an additional effort corresponding to 1,000 tonnes of nitrogen reduction will ensure side-effects equivalent to almost 0.1 tonnes of CO₂e. Increasing efforts will result in increasing shadow prices. It should be noted that the long-term effort of catch crops has not been taken into consideration. In a perspective of several decades, the accumulated climate impact (LULUCF) of catch crops will converge towards zero. The shadow price calculation only includes the positive initial effect of the measure and not the subsequent adverse effects. This means that the shadow price is underestimated.
⁴ It is assumed that only a very limited number of projects will be realised by 2025. The phasing-in corresponds to the expected phasing-in obtained in the second river-basin management plan period. The initiative covers several measures such as peatland, wetlands and private afforestation. The shadow price interval covers different measures as well as different time horizons for carbon sequestration (2050/2080). Reductions due to private afforestation are included in the 2020 Baseline Projection and are not included.

Development and research efforts with reduction potential in a long-term perspective

The achievement of significant, long-term reductions in the agricultural and forestry sector requires targeted research and development actions that can reduce the climate and environmental impact from both conventional and organic food production and farming and reduce derivative effects on nature. This can be affected by means of technologies and more circular and sustainable solutions for sequestration of carbon in soils and forests, biorefining and pyrolysis, new food and feed products with lower climate and environmental footprints, plant breeding and support of knowledge required with respect to effective regulation, including the documentation of emissions.

In its green research strategy, the Government consequently proposes prioritising a mission on a climate and environmentally friendly agriculture and food production in 2021 that will be carried out by means of green research and innovation partnerships. A mission-driven research effort that can substantially support the development of new technologies and solutions that are expected to help reduce agriculture’s climate

and environmental impact. This includes emissions from livestock, fertiliser application and soils as well as the development of alternative sources of protein and new food products with lower climate and environmental footprints.

Current research includes biorefining whereby biomass can be converted into biochar, oil and gas through pyrolysis. The biochar is worked into the ground where the carbon sequestered in the biochar degrades very slowly, thus removing it from the atmosphere for many years. Subject to considerable uncertainty, DTU assesses that carbon sequestration from biochar has a technical reduction potential of up to 6 million tonnes of CO₂e per year. The Danish Council on Climate Change assesses that a third of the potential can be realised by 2030 if the technology can be brought into play and scaled up. The Climate Partnership for the Food and Agricultural Sector recommends developing biochar and emphasises the current SkyClean pyrolysis project which aims to upgrade gas for aviation fuel by adding hydrogen to the gas. The project is in the testing phase.

To reduce methane emissions from farm animals' digestive processes, research in development of feed additives is also being conducted. For instance, researchers have developed the substance "x". The first trials of the substance indicate that methane emissions from cattle can be lowered by 35-40%. In September 2019, an application was also lodged for EU authorisation of the feed additive Bovaer, which is expected to be fed to conventional dairy cattle to reduce their methane emissions. The substance can potentially reduce methane emissions by up to 30% and is expected to be marketed in 2030 after completing the EU authorisation process.

Researchers also study meat and milk produced in a laboratory from individual animal cells with significantly lower greenhouse gas emissions than conventional meat and dairy production. By way of example, the Government's climate research programme is behind the project "CleanMeat and CleanMilk" which examines and tests muscle cells and udder cells from livestock and sustainable protein sources for culturing the cells. The project is expected to be completed in the summer of 2022. It has been estimated that meat without livestock can reduce the requirement for agricultural land and water usage by up to 90% while energy consumption can be reduced by up to 60%. The climate effect of meat produced without livestock depends on the final mode of action and efficiency, however. Another research area is biorefining of grass into grass protein that can potentially replace imported protein feed for animals or protein in foodstuffs. The Government's Green Development and Demonstration Programme (GUDP) also allocates DKK 23 million in 2020 to support three new projects involving the creation of plant-based protein products from Danish produce.

A project under the Government's climate research programme is also working to develop a slurry additive ('NoGas') to reduce emissions from livestock manure. It is assumed that the substance will be able to reduce methane emissions from livestock housing and stores by up to 50%. Researchers are also currently studying a range

of livestock housing technologies with ammonia-reducing effects to establish their effectiveness in reducing greenhouse gases.

Aarhus University is also conducting a research project to study the climate effect and environmental consequences of using so-called nitrification inhibitors, which is expected to be completed by the end of 2021. Nitrification inhibitors are a range of synthetic slurry additives that can potentially reduce greenhouse gas emissions from slurry by up to 50%.

However, we must expect an overlap between the different feed additives and the various slurry and manure additives as well as several of the animal housing technologies.

Introduction of climate regulation of agriculture in the EU

The agricultural sector is subject to strong international competition. This means that the best framework conditions can be obtained through common European legislation. Accordingly, the Government is actively promoting that the EU's climate policy must support the transition to more climate-friendly and competitive agricultural production through ambitious reduction commitments and a regulation that incentivises climate-improving activities for Member States and the individual farmer. The reform of the EU's common agricultural policy is a central tool in supporting the Government's high ambitions for the green transition.

At present, the EU does not directly regulate greenhouse gas emissions in the agricultural sector. This significantly limits incentives to implement climate-improving activities in agriculture and is challenging in terms of distortion of competition and risk of carbon leakage. For these reasons, the Government is working for a common land sector pillar that can promote the agricultural green transition together with national climate initiatives. In this light, the Government sees potential in the European Commission's idea of eventually establishing an AFULO sector that includes agriculture and emissions and removals from forests and soil. The Government is also working to ensure that the reform of the EU's common agricultural policy will increasingly be used to support common climate initiatives. For instance, it must become significantly easier to convert agricultural areas into nature areas, which would reduce greenhouse gas emissions. In addition, Denmark will promote the widening of the Industrial Emissions Directive to include greenhouse gas emissions from certain livestock productions.

In May 2020, the European Commission launched the 'Farm to Fork' Strategy to ensure a comprehensive approach to a sustainable food system in Europe. Based on this strategy, the Government will work for regulation that encourages climate-improving activities. The Government will specifically work to establish mandatory fertilisation accounts across the EU based on a Danish model. New green business models are another focus area for the Farm to Fork Strategy where the Danish experience of climate accounting at farmer level can help the EU move forward. The Government is also working for the introduction of EU-wide methane emission standards.

Box 43

More ambitious EU regulation of agriculture

At present, the EU does not directly regulate greenhouse gas emissions in the agricultural sector as the area is managed by the member states with differentiated reduction targets for the non-ETS sector. This reduces the incentive for climate-improvement activities and is challenging in terms of risks of carbon leakage internally in the EU. At European level, the Government is therefore promoting a pan-European reduction commitment and strengthened agricultural regulation. The Government is working to ensure that the EU agricultural reform is used to support common climate action to reduce greenhouse gas emissions in the agricultural sector.

Future sector strategy for the agricultural and forestry sector

Later in the year, the Government will present a sector strategy for the agricultural and forestry sector. The structure of the content of the sector strategy will be based on challenges and opportunities in the respective areas (land use, fertilisation, live-stock production, see above). The framework for the coming strategy is set out in box 44 below.

Box 44

Framework for coming sector strategy for the agricultural and forestry sector

We must prevent Danish agriculture from being undermined so that food-production emissions are merely moved to other countries. Instead, we must develop Danish agriculture, and we need a strategy for the agricultural and forestry sector that unifies and boosts the achievement of ambitious climate and environmental objectives while ensuring the continued competitiveness of Danish agriculture.

In consideration of the principles in the Climate Act, the actions should initially be based on known mechanisms with documented effects. At the same time, the actions must focus on research as well as technological development and maturation. The effort must also take account of economic and structural circumstances that can create barriers to an efficient and successful green transition.

This includes focusing on transitioning Danish agriculture by means of an ongoing process so that the climate footprint of the existing production is reduced and developed as and when new production methods with a lower climate impact gain ground. The sector strategy will thus aim for a continuous climate effort in the agricultural and forestry sector that will contribute long-term framework conditions and support the implementation of climate actions in consideration of the latest technological developments and the Climate Act principles. This is expected to increase the reduction level up to 2030, which will be supported by the Government's development efforts, expected increased climate regulation at EU level, etc.

Joint climate action

The Climate Partnership for the Food and Agricultural Sector emphasises that they consider the green transition as a future competition parameter and that the entire sector will promote the transition and contribute to achieving Denmark's objectives.

To achieve the 70% reduction target, the partnership recommends initiatives such as restoration of carbon-rich peatland and increased afforestation. The partnership also recommends increasing the use of climate and eco-friendly livestock housing technologies to reduce emissions from handling livestock manure in livestock housing. The recommendations also include preparing climate checks and action plans on the farms with clear rules and specification methods for greenhouse gas emissions. Finally, the partnership considers it essential to allocate sufficient resources for re-

search in extraction of grass protein, biochar (SkyClean), biofilters and the feed additive X. The recommendations are part of the work on the coming sector strategy for the agricultural and forestry sector.

Box 45

The food and agricultural sector's climate ambitions

The Climate Partnership for the Food and Agricultural Sector has made 24 recommendations that apply throughout the sector: from agriculture over aquaculture and forestry to processing, society and research. The partnership focuses particularly on restoration of peatlands and on R&D.

The Danish food and agriculture sector has set a target of climate-neutrality by 2050. According to this vision, the Danish food industry must not emit more climate gases than it absorbs by 2050, and it must contribute green, sustainable energy. At the same time, the industry has a vision of continuing to produce at least the same amount of food or more than today, also in the future.

7.5 Climate-friendly behaviour

Reducing Denmark's greenhouse gas emissions mainly involves investments in new technologies and transitions in Denmark's transport, food and energy systems. A great part of the effort consequently focuses on production in Denmark. However, climate-friendly behaviour can also contribute to the green transition and support real reductions, such as by maturing the market for green solutions and increasing the demand for goods and services with lower climate footprints.

This requires that consumers be willing and able to make climate-friendly choices. Consumers do not always have the prerequisites for choosing climate-friendly products due to a lack of standardisation of information about what is climate friendly. Our consumption is also guided by habit. Greater awareness of the impact of our consumption can help change these habits. Therefore, the Government wishes to support climate-friendly behaviour and actively involve the general public in the green transition.

Initiatives for making policy with private individuals

The Government will ensure a broad embedment of the climate efforts. Accordingly, the Government has decided to continue the Youth Climate Council and has set up a national citizens' assembly in the climate area together with the parties behind the Climate Act agreement.

The Citizens' Assembly consists of 99 private individuals with different backgrounds in terms of age, gender, geography, education and income. The Citizens' Assembly is tasked with discussing citizen-centric dilemmas associated with the green transition and providing input and recommendations to the Government and the Parliament's Climate, Energy and Utilities Committee on the climate action plans and the green agenda in general. The first meeting of the assembly was cancelled due to the COVID-19 pandemic. It is not yet known when it will be safe to hold the meetings of the Citizens' Assembly. At the meetings of the Citizens' Assembly, relevant experts will present insights to citizens, who will discuss inputs and recommendations with a view to presenting them to the Minister for Climate, Energy and Utilities and the Parliament's Climate, Energy and Utilities Committee in November 2020.

Initiatives to boost climate-friendly behaviour through diet

About 60% of Danes want to follow a more climate-friendly diet but are unsure of how to do this. Towards this end, the Government has launched a number of projects that focus on climate-friendly food.

A campaign for climate-friendly diets

In August 2020, the Government launched a Campaign called "Food-loving Climate Tips" with specific and easy tips for how to make one's diet more climate-friendly. The campaign offers 22 specific climate tips that help individuals lead more climate-friendly lives. DTU, Technical University of Denmark has assessed a considerable potential for reducing the climate footprint of Danish diets by composing meals of more climate-friendly alternatives from a food category. This could be choosing chicken instead of beef and potatoes instead of rice. The campaign will therefore support individuals' possibilities of choosing more climate-friendly foods.

Dietary recommendations with a climate perspective

The current official dietary recommendations from the Danish Veterinary and Food Administration provide guidance on how to compose the diet from a health and food culture perspective. It has been decided that the new official dietary recommendations should also provide advice on consuming food with a lower climate footprint. To realise this, the Government has started the preparation of new dietary recommendations that can also guide on the composition of climate-friendly meals. The Government is launching new dietary recommendations in November 2020 and initiating a campaign to heighten awareness of the dietary recommendations in early 2021.

Government-municipal partnership on climate-friendly meals

The Ministry of Climate, Energy and Utilities and the Ministry of Environment and Food have partnered with the City of Copenhagen and the City of Aarhus on climate-friendly meals.

The work focuses on:

- Methods for determining the climate footprint of meals and food waste in professional kitchens.
- Using procurement agreements as a tool to ensure more climate-friendly meals.
- Communication about climate-friendly and organic meals, including climate and organic product targets, to individuals and employees.

Large kitchens and municipalities are expected to be motivated to raise their ambitions for serving climate-friendly meals when they have the methods to measure and thus render their effort visible. The methods and solutions can subsequently be dispersed throughout Denmark.

Guide to canteens that want to become more climate-friendly

The Danish Ministry of Climate, Energy and Utilities works with the Ministry of Environment and Food and the Danish Competition and Consumer Agency on preparing a guide for canteens about behavioural initiatives that support more climate-friendly consumption. The guide will offer advice on behavioural initiatives that can make canteen users choose healthier, more climate-friendly meals.

National stop food waste day

Denmark generates 700,000 tonnes of food waste every year. In March 2020, the Government presented an annual national stop food waste day to be held on 29 September. The date coincides with the UN's International Day of Awareness of Food Loss and Waste. The aim is to engage Danes in the fight against food waste. A series of stakeholders help to highlight the day and focus on how both children and adults, consumers and professionals can help reduce food waste.

Initiatives to boost climate-friendly behaviour in companies

Several Climate partnerships indicated that companies' climate-friendly behaviour must be strengthened, and transparency about this can also influence consumer behaviour positively. The Government will ensure good framework conditions that

support companies' transition to a green, circular economy and support the companies' utilisation of the commercial potential – nationally, in the EU and globally –by developing new products, services and business models, for instance. Together with the Danish Energy Agency, the Business Houses and Danish Standards, the Danish Business Authority is developing a new theme titled 'Green and sustainable business' for the Business Guide, which is a common public platform. The theme is a digital guidance universe that compiles information about the green transition targeted at companies. The theme aims to promote the green transition in companies throughout Denmark by motivating SMEs in particular to integrate green and circular climate-oriented initiatives in all parts of their business. The theme 'Green and sustainable business' presents clear and relevant information on how businesses can embark on the green transition, such as guidance with easy steps to become more climate-friendly, case scenarios from other companies that have introduced climate-oriented initiatives and circular business models, and specific examples of how the company can improve the efficiency of its energy consumption or reduce material waste.

The Government also focuses on reducing food waste in the retail sector with the 'Food waste hunters' project that offers retailers assistance to reduce their food waste and by starting the development of an internationally accepted standard for determination of food loss and food waste. The initiatives are part of the Government's growth plan for improving conditions for growth in the commerce and logistics industries throughout Denmark from January 2020.

Initiatives to strengthen behavioural research

The Government's Green Research Strategy furthermore addresses the need to enhance knowledge of sustainable behaviour, including what it takes for individuals, companies, institutions, etc., to change their behaviour in a greener direction and what the scope of behavioural change gains would be. This could be in relation to, e.g., the products and services we consume within food, transport, energy and textiles.

Coming Strategy for Green Public Procurement

It is important that the Danes have the proper tools for making more climate-friendly choices, such as when cooking or shopping. The public sector must take the lead in this field and ensure that green public procurement contributes to increasing the supply of green solutions. Efficient procurement has been an area of focus for the public sector for many years. It still is, but the Government wants the public sector to help shift the market in a greener direction by means of procurement at the same time. Each year, the public sector in Denmark purchases goods and services for almost DKK 200 billion, of which state purchases make up DKK 50 billion. The state and its large procurement capacity can contribute to driving the market in a greener direction by demanding green and climate-friendly products. This can eventually ensure new green and competitive products and services.

Therefore, the Government will launch Strategy for Green Public Procurement later this year. One focus area of the Government's strategy is to further develop guidelines and tools for green procurement.

8. Global strategy

Climate change does not stop at the border. Neither does Danish climate efforts. The challenge is to bring the global society together in realising the Paris Agreement targets. This will require global ambition, action and financing. Denmark must be the small green cog that makes the large ones turn in the right solidary and green direction. This means that the Danish climate efforts must be ambitious and take on new, innovative solutions. Focus must be on the opportunities rather than problems. Denmark can make the greatest difference when our effort can inspire others. This is the guiding principle of the Government's effort. From major global climate negotiations to the decisive common European measures, the Government is helping to push ambitions in the right direction. There is a straight line from the areas that the Government is working on at a national level to the ambitions that Denmark helps push forward in Europe and globally.

The Government's long-term strategy for global climate action *A green and sustainable world* sets the course for the efforts across sectors and stakeholders. This is the first overarching strategy for Denmark's global climate efforts. The Government will activate all relevant areas of international policy and coordinate Denmark's global efforts in an ambitious, persistent, multifaceted and integrated global effort. The Government will focus Denmark's international climate effort on the Paris Agreement's three overall targets:

- pursuing efforts to limit the global temperature increase to 1.5 degrees
- increase the adaptability and foster resilience to the impacts of climate change, affecting the poorest most severely
- shift finance flows to support the transition to low emissions and resilience to climate change

The global chapter in the Government's climate programme materialises the Government's long-term strategy for global climate action into specific initiatives to be launched over the coming year in accordance with international milestones for the year. The chapter describes how Denmark will play a part as a global driver of international climate policy. An ambitious and cost-effective climate effort in the EU is also a central part of the Government's long-term strategy, and is described in chapter 6 of the climate programme.

It is key for the Government to take leadership in the international climate efforts in a manner that is solidary, cooperative and with an eye for the special challenges faced by poorest and most fragile countries and populations. The Government is therefore setting a new ambitious green direction for development cooperation by proposing to set aside a total of approx. 2.9 billion on the 2021 Finance Bill proposal for climate and environment initiatives in developing countries in 2021. In this connection, the Government will launch pioneer projects in Africa aimed at ensuring that far more Africans get access to clean water and clean energy while creating green jobs and apprenticeships – particularly for the many young people in Africa. The Government will set up green strategic partnerships and strengthen strategic sector cooperation and green export promotion. Finally, the Government has taken the initiative for a new foreign and security policy strategy that will also focus on

global climate action. The current development policy strategy and the settlement behind it expire in 2021, and the Government will therefore also initiate, over the coming year, a new development policy strategy together with the parties in the Danish Parliament, where increased aid to support climate and environmental purposes will be central.

The global emissions that are attributable to Danish imports and consumption are not part of the current climate programme but will be described in more detail in the global reporting in April 2021 in connection with the annual climate status report and projection. The global reporting in April 2021 will illustrate the international effects of the Danish climate efforts, including reductions in international shipping and aviation and reductions from exports of electricity from renewable energy sources. In addition, it can include the effects of the Danish bilateral energy partnerships with major CO₂ emitters together with an investigation into the effects of Danish import and consumption. Danish aid in the climate area will also be reported on.

Political milestones in the coming year

2020 is and has been an unusual year – also for the global climate cooperation. 2020 should have been the year in which the world, for the first time since the adoption of the Paris Agreement should have discussed increased ambitions level at the UN Climate Change Conference, COP26. Instead, COVID-19 and the economic crisis have dominated the picture. In the coming year, the recovery of the Danish, European and global economies will be central. Green transition and support of green workplaces are among the main priorities for the Government. The Government will lead the way by integrating the green transition into the recovery after COVID-19, both globally and through the EU – we must *Build Back Better and Greener*. By leading the way with innovation, pioneering efforts and the power of example, Denmark can inspire the big ones to follow a green path of solidarity. Green Business Forum (Grønt Erhvervsforum), the Climate partnerships and restart teams will also continue to be important platforms for dialogue. Furthermore, the Government has taken the initiative to promote a green recovery of the economy globally, based on massive green investment in the green transition in Denmark. This has happened, among other things, through ministerial meetings in the International Energy Agency – which Denmark co-initiated – and in the EU, including through a letter to the European Commission signed by 20 countries requesting that the EU Green Pact must play a key role in the recovery of the EU.

To strengthen Danish green exports, the Government's Export and Job Creation Task Force will employ more green sector advisers, identify new green market opportunities and create more green business promotions, based on recommendations from the Danish business community, former growth teams and the Climate partnerships.

The Government's global climate efforts focuses on the following milestones in the coming year:

- COP26, which has been postponed until November 2021. The time must be used to create momentum in the negotiations, and the Government will,

among other things, focus on finalising the Paris Agreement rules, increased mobilisation of climate financing and raising global climate ambitions working together with other countries, including the UK as the COP presidency, and other stakeholders.

- *The P4G summit in Seoul in 2021*, which is a key stepping stone towards COP26 where the private sector and other actors must be mobilised to demonstrate green solutions. An important Danish message will be the need for increased public-private partnerships inspired by the Climate partnerships.
- *The UN Secretary-General's SDG7 summit*, which is held in connection with the General Assembly in 2021. By taking leadership on Sustainable Development Goal 7 on sustainable energy for all, Denmark will contribute actively to the summit.
- *The 15th UN Conference of the Parties to the Convention on Biological Diversity (UNCBD), tentatively September/October 2021*, at which new global nature goals are to be adopted. The goals also contribute to mitigating climate change from natural disasters and improving nature-based climate change adaptation and thereby meeting the Paris Agreement. Denmark will work for a strengthened use of nature-based solutions and for new global nature goals to ensure that the oceans are resilient and robust to climate change.

The Government's efforts in the coming year

The Government is working for an ambitious international climate effort along five tracks that will structure the efforts in the coming year:

- raise global climate ambitions.
- reduce global greenhouse gas emissions by leading the way in the green transition.
- drive adaptation and resilience initiatives in the fight against climate change.
- shift global finance flows in a green direction.
- collaborate with the business community on green solutions that make a difference.

Raise global climate ambitions

Through negotiations in the UN and a strengthened climate diplomatic effort, the Government will work to influence countries and non-state actors to commit themselves to ambitious goals that contribute to limiting the global temperature rise. We will work to ensure an ambitious effort for climate adaptation and resilience, as well as for sustainable development. This must be done via the EU and in alliance and collaboration with countries and non-state actors. Therefore, in the coming year, Denmark will, among other things, advance the elements mentioned in Box 46.

Box 46:

Raise global climate ambitions

Enter into green strategic partnerships with selected countries

Denmark's partnerships with other countries will support meeting the UN Sustainable Development Goals with particular focus on the green transition and sustainable economic growth in the partner country while

supporting the market positions of Danish companies and specific export opportunities. The Government will work on new green strategic partnerships with India and South Africa as well as new green action plans for existing strategic partnerships with China, Japan, South Korea, Indonesia and Mexico.

Increase the number of Green Frontline Missions by adding five more embassies

Denmark's reinforced climate diplomacy will be expanded with additional Green Frontline Missions in Brazil, Egypt, Ethiopia, Italy and the UK to raise their climate ambitions and spread Danish green solutions to the climate challenge.

Promote more ambitious climate and environmental goals for the trade policy in the EU and WTO

The Government will work to promote a green focus in all phases of the EU's trade agreements as well as liberalisation of trade in green goods and services, phasing out subsidies for fossil fuels and increasing the use of green standards and labelling schemes.

Reinforcement of strategic partnerships and ambition coalitions

The Government will strengthen international partnerships with, among others, the C40 Cities Climate Leadership Group, Global Green Growth Institute (GGGI), the Getting to Zero coalition and Partnering for Green Growth and the Global Goals (P4G) with a view to raise climate ambitions and promote a green and fair recovery in high-income countries, developing countries and emerging countries in Africa and Asia, etc.

- The Government has already contributed DKK 67 million to cooperation with the C40 Cities in 2020.
- In addition, contributions in 2020 are expected to amount to:
 - DKK 30 million for the Global Green Growth Institute (GGGI)
 - DKK 15 million for the New Climate Economy
 - DKK 35 million for the NDC Partnership

In the 2021 Finance Bill Proposal, the Government proposes allocating an additional DKK 50 million for the Global Green Growth Institute (GGGI).

Strengthened green public diplomacy in countries where Denmark is represented

Denmark strengthens the effort for dialogue and debate on a green transition and marketing of sustainable Danish green solutions and know-how in close collaboration with Danish authorities, civil society and the private sector.

Promote international regulation of aviation

From 2021, Denmark will participate in the voluntary phase of the international Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

Promote greener land-based transport globally

Denmark will focus on the green transition across modes of transport in International Transport Forums (ITF) at the ministerial summit in 2021 and on knowledge-sharing and social and green requirements in connection with allocation of transport authorisations.

Work for a global chemicals strategy that supports climate initiatives

The UN oversees negotiations on a global chemicals strategy for the safe management of chemicals and waste (SAICM beyond 2020) in which Denmark will work to link chemicals and climate initiatives to support the climate objective.

Drive a European and global collaboration on plastic

Together with the other Nordic countries, Denmark has taken leadership in the preparations towards a global agreement on plastics and marine waste at UNEA 5 in 2021.

Take leadership in global sustainable food systems

Denmark is working to take on a leading role in reducing food waste, which is a significant source of greenhouse gas emissions. Denmark organises World Food Summit 2021 as a stepping-stone to the UN Food Systems Summit 2021 (FSS).

Reduce global greenhouse gas emissions by leading the way in the green transition

Denmark will work to put the green transition into practice with focus on ensuring that the world's largest emitters reduce their emissions and on sustainable development in developing countries. Denmark's priorities in the coming year therefore include, among other things, the elements mentioned in Box 47.

Box 47:**Reduce global greenhouse gas emissions by leading the way in the green transition****Significantly strengthen energy collaboration with major greenhouse gas emitters**

The Government proposes allocating

- DKK 310 million through the Climate Pool in the 2020 Finance Act and the 2021 Finance Bill Proposal for expanding energy cooperation with Indonesia, China, Mexico, South Africa and Vietnam, focusing on issues such as energy planning and improved framework conditions for renewable energy and energy efficiency.
- Concurrently initiates energy cooperation with Japan on offshore wind and coal phase out.
- In addition, the Government proposes allocating, in the 2021 Finance Bill Proposal, DKK 50 million for continued energy collaboration with Ethiopia and DKK 10 million towards initiating strategic sector cooperation in Africa with a view to improving access to clean energy.

Strengthen the environmental cooperation's focus on climate action

The existing bilateral government cooperation within environment focus on intensifying environmental synergies with the climate effort. This work will include energy-efficiency improvements in water supply, reduction of greenhouse gases from water treatment, circularity in resource and waste flows and initiatives with concurrent reduction of air pollution and greenhouse gases.

Promote resource-efficient food production

In the food area, Denmark will enter into bilateral government cooperation with China, Kenya, Vietnam, Mexico, Colombia, Indonesia and Nigeria to contribute to developing a global, sustainable food system focused on reducing the impact of food production on climate and environment. This will be put into effect by assisting in improving framework conditions for resource-efficient food production, among other things.

Launch global catalyst contribution for energy in developing countries

The Government proposes allocating DKK 15 million to the Climate Pool in the 2021 Finance Bill Proposal for a new, flexible contribution to supplement long-term collaboration projects with short-term and clearly defined actions in developing countries in need of specific, technical assistance that Denmark can provide.

Promote green and sustainable international value chains

The Government launches actions to power the transition to green and sustainable value chains with particular focus on emerging and developing economies. The Government proposes allocating DKK 20 million in the 2021 Finance Bill Proposal to promote green and more sustainable supply chains and decarbonisation of sectors.

Increase support for multilateral cooperation on energy

The Government proposes allocating additional funding in the 2021 Finance Bill Proposal for multilateral energy initiatives, including

- DKK 50 million for the work of the International Energy Agency (IEA) on energy efficiency and sustainable energy in emerging economies such as India, Indonesia and China.
- DKK 90 million for the World Bank Energy Sector Management Assistance Program (ESMAP).
- DKK 100 million for the Sustainable Energy Fund under the African Development Bank (SEFA).

In addition, Denmark has a strategic partnership with IRENA.

Strengthen the international cooperation on coal phase out towards COP26.

Through collaborative initiatives such as the Powering Past Coal Alliance, Denmark will influence other countries, particularly in Asia, to phase out coal production.

Halt support for export of coal technology

The Government will work to promote the phasing out of coal globally and a halt to public export financing of coal-fired power plants, thermal coal extraction and thermal coal logistics. In international negotiations, the Government will also intensify climate diplomatic pressure for a global phasing out of coal.

Launch an action plan against deforestation

Denmark will fight global deforestation and will in the autumn of 2020 launch an action plan with existing and new initiatives against deforestation.

Drive adaptation and resilience initiatives in the fight against climate change

The Government wants to use its position as a green pioneer country to inspire internationally, and drive adaptation and resilience initiatives in the climate fight, both through development cooperation and export promotion efforts. The Government wants Danish development cooperation to embrace far higher climate ambitions, with a stronger focus on adaptation and sustainable development in the poorest and most fragile developing countries, where more people must have access to clean energy and clean water and where more green jobs and apprenticeships

must be created. Through its export promotion efforts, the Government will advocate the global spread of Danish solutions for prevention and climate adaptation. Denmark's priorities in the coming year therefore include the elements mentioned in Box 48.

Box 48

Drive adaptation and resilience initiatives in the fight against climate change

Allocating a total of DKK 2.9 billion in the 2021 Finance Bill Proposal for climate and environmental efforts in developing countries in 2021

In total, in the 2021 Finance Bill Proposal, the Government proposes adding an additional DKK 450 million in 2021 to climate and the green agenda, including maintaining the record level of the Climate Pool in 2021. The increased support will, among other things, go to climate change adaptation, green transition and access to clean energy and clean water in the least developed countries as well as actions targeting emissions reductions in emerging economies.

New development policy strategy

The Government will prepare a new development policy strategy together with the political parties in parliament in which climate and environmental support will be central. The strategy will come after the current strategy and the underlying settlement agreement which expire at the end of 2021. The Government wishes to contribute to developing countries' sustainable development and socially just green recovery after the COVID-19 crisis. In specific terms, the Government will give priority to the green transition and promotion of resilience, particularly in Africa. The Government will, among other things, contribute to access to clean energy and clean water focusing on creating green skilled jobs and apprenticeships.

Strengthen efforts to secure access to clean water and clean energy, green jobs and apprenticeships and to promote biodiversity

As part of the Government's 2021 Finance Bill Proposal, it is proposed to allocate:

- DKK 149.5 million for the African Water Facility under the African Development Bank.
- DKK 130 million for UNICEF's water programme in Ethiopia.
- DKK 80 million to promote decentralised solar power in Africa (NEFCO).
- DKK 40 million for the International Union for Conservation of Nature (IUCN).

Explore the options for determining the new global climate financing goal that applies after 2025 to enhance support for climate action in the least affluent countries.

A new target of increased mobilisation of public and private climate financing for the developing countries' climate action is crucial for all parties' ability to deliver on the Paris Agreement. Progress in this area can lay the foundation for an improved negotiation climate and support an ambitious implementation of the Paris Agreement.

Initiate a green initiative in local areas on climate change, conflict, displacement and irregular migration with focus on Sahel and the horn of Africa.

The Government is planning to launch a multiannual regional programme to reduce vulnerability and fragility and promote sustainable development focused on the Sahel and the Horn of Africa. The Government proposes setting aside DKK 200 million in the 2021 Finance Bill Proposal for this purpose as part of a multiannual effort.

Establish new collaboration on climate change adaptation with African environmental authorities

The Government proposes allocating DKK 10 million in the 2021 Finance Bill Proposal to establish one or two new strategic sector cooperation initiatives to bring strong Danish experiences of climate change adaptation into play and contribute to strengthening resilience against climate change and access to clean water in partner countries.

Strengthen cooperation with Danish civil society on climate and environment

The Government will engage in dialogue with the civil society to help identify solutions for how to jointly boost Denmark's international climate action, and enter into agreements on reduction targets for civil society work that can serve as global inspiration.

Strengthen cooperation with the business community on climate and environment in development work

The Government proposes allocating DKK 50 million in the 2021 Finance Bill Proposal to establish climate development partnerships with the business community that can cooperate with other actors to contribute to increase access to, among other things, clean water and energy in developing countries.

Shift global finance flows in a green direction

Massive investment is needed to speed up the green transition. The Government will work to accelerate a shift to green, climate-friendly investments at all levels and

country groups. The framework conditions for the financial markets and, for example, the energy market must be designed to support green investments from private and institutional investors and funds. There is also a need to strengthen the mobilisation of climate financing for the poorest and most fragile countries. The Government will take the lead in efforts to incorporate the green transition in recovery packages after COVID-19, both globally and through the EU. Denmark's priorities in the coming year therefore include, among other things, the elements mentioned in Box 49.

Box 49

Shift global finance flows in a green direction

Organise an investment conference in Copenhagen

As part of the partnership *Climate Investment Coalition* between the Government, Insurance & Pension Denmark, Institutional Investors Group on Climate Change and World Climate Foundation, an investment conference will be organized in Copenhagen to disseminate Danish and international experiences with financing models in green energy infrastructure and structuring of political framework conditions that promote the green transition and private investors' access to green investments.

Mobilise increased climate financing as a board member of the Green Climate Fund

With the Government's ambition to double the contribution to the Green Climate Fund to a total of DKK 800 million for the period 2020–2023, Denmark will, as a board member of the fund, promote increased climate financing for reduction and adaptation initiatives in developing countries and ensure systematic performance measurement of project efforts. Denmark has also contributed to increasing mobilisation of climate financing with contributions of DKK 210 million in 2020 to the Least Developed Countries Fund (LDCF).

Support the recommendations from the Task Force on Climate-Related Financial Disclosures

The recommendations aim to increase companies' focus on how climate-related risks and opportunities can affect their business and thereby strengthen the incentive for a green transition and the related communication to investors and the surrounding world.

Launch concrete green ambitions in the multilateral development banks

Through its board duties in multilateral development banks, the Government will advocate the phasing out of investments in and subsidies for fossil fuels, strengthening investments in renewable energy, annual growth rates of at least 10% in climate investments in the World Bank and the regional development banks in Africa, Latin America and Asia (measured in terms of their overall operations) and push for a common approach to how activities contribute to meeting the Paris Agreement targets. In addition, the Government will initiate Nordic cooperation on strategies for energy investments and green action in the multilateral development banks.

Create a distinctive green profile in IFU

Through active ownership of the Investment Fund for Developing Countries (IFU), the Government will ensure more sustainable and responsible investments in developing countries, particularly in Africa and in the climate area. IFU must contribute to mobilising more private investors by leading the way with new investments in the poorest countries as well.

Promote green investments in developing countries through strategic sector cooperation

The Government will launch three pilot projects in selected developing countries for the period 2020–2022 that will improve framework conditions for green investments and contribute to identifying specific new investments. The pilot projects build on lessons learnt from existing strategic sector cooperation within energy, water, urban development and food.

Collaborate with the business community on green solutions that make a difference

In Denmark, we benefit from strong cooperation between public authorities and businesses. This is a position of strength that we should uphold. A successful global climate effort must include Denmark's business community and ensure that Danish solutions deliver for the Danish population as well as around the world. Denmark's priorities in the coming year therefore include, among other things, the elements mentioned in Box 50.

Box 50**Collaborate with the business community on green solutions that make a difference****Strengthen regulatory efforts for exports in the EU**

The Export Package allocates DKK 15 million a year in 2020 and 2021 to the Export and Job Creation Task Force, whose duties, among other things, include to ensure strengthened government effort aimed at securing Danish companies' participation in the EU recovery plans, including in a green direction, and removing barriers in the EU's single market.

Strengthen green economic diplomacy and promote exports for both greenhouse gas reductions and climate adaptation

Danish solutions for both greenhouse gas reductions and climate change adaptation must be brought even more into play globally. The Government will strengthen green economic diplomacy as well as investment and export promotion with a broad range of measures, including the Government's Export and Job Creation Task Force, the export and investment package, restart teams, employment of green sector advisers and green export promotion, initiatives for small and medium-sized enterprises, strengthened cooperation with utilities in the export and sector cooperation and by using a new tool to promote green investments.

Influence the European Clean Hydrogen Alliance in a green direction

The Government will actively participate in the European Clean Hydrogen Alliance in order to shape the alliance in a green direction and pave the way for Danish businesses to be part of the green European value chains of the future.

Establish Denmark's Green Future Fund

With a total budget of DKK 25 billion, Denmark's Green Future Fund will contribute to developing and spread of new technologies that contribute to the reduction of greenhouse gas emissions, as well as climate change adaptation and promotion of global exports of green technologies. This involves conversion of energy systems to renewable energy, storage and efficient use of energy, etc., and promoting global exports of green technologies, particularly within wind.

Strengthen the effort for research and development and for obtaining knowledge in the climate area

The Government wishes to enter into cooperative agreements on research with the USA and South Korea on energy and climate, and will organize high-level meetings with South Africa, China and India to strengthen the green direction of the cooperation.

9. The Danish Council on Climate Change’s recommendations and the Government’s position

After presenting the Government’s climate policy, this chapter will explain the annual recommendations by the Danish Council on Climate Change on future climate efforts and summarise the Minister for Climate, Energy and Utilities’ position on the recommendations in accordance with the Climate Act. The chapter is based on the recommendations by the Danish Council on Climate Change as summarised in box 1.1 in the Council’s report *Known paths and new tracks to 70% reduction. Direction and measures for the next 10 years’ climate action in Denmark* from March 2020. The presentation shows that the agreement on a sector strategy for energy and industry implements some of the recommendations by the Council on Climate Change and that the remaining part of the 2020 Climate Action Plan will make further decisions on the Council recommendations.

The Government’s working method

Table 15

Recommendations by the Danish Council on Climate Change: The government’s working method

Recommendation	The Minister’s position on the recommendations
Climate effect impact analyses should be made on all relevant bills, but also major public capital investments and other infrastructure decisions.	The Government has implemented a screening for green effects of the annual legislative programme, which subjects all relevant bills to an analysis of its climate impact.
Socio-economic calculations supporting decisions on public-sector projects should apply a price to greenhouse gases that is consistent with the 70% target. The Council on Climate Change assesses that the price should be approximately DKK 1,500/tonne. This corresponds to the estimated marginal costs of the transition elements required to reach the 70% target.	<p>The CO₂ price used for socio-economic calculations is based on technical considerations of the socio-economic costs of emitting greenhouse gases. The difference between the calculation price set today and the costs of decided reduction measures can be understood as the best available proxy for the political willingness to pay for reducing CO₂. The Ministry of Finance finds it important to maintain this target for willingness to pay in relation to the 70% target. This means that there are no plans to change the determination method for the price of greenhouse gases currently in effect.</p> <p>However, it is deemed important to be able to evaluate initiatives in relation to the 70% target in all contexts, even when initiatives are not initially conceived as part of a climate action plan. To support this consideration, the Ministry of Finance guidelines for socio-economic impact assessments introduce a requirement for reporting shadow prices in all socio-economic analyses and for presenting sensitivity calculations for the socio-economic result using other carbon prices than those recommended by the Ministry of Finance. This will facilitate an assessment for all initiatives of whether they are a good investment relative to the 70% target.</p>

Research

Table 16

Recommendations by the Danish Council on Climate Change: Research

Recommendation	The Minister's position on the recommendations
<p>We should focus on massive and strategic action in research and development as well as demonstration and market maturation of new technologies that can take us the rest of the way to the 2030 target, particularly: carbon capture and storage in the agricultural and food sector, heavy road transport, ships, aircraft and industry.</p>	<p>The <i>Climate Agreement for Energy and Industry</i> of 22 June 2020 proposes the strengthening of green technologies.</p> <p>The agreement allocates technology-neutral market-based funding of DKK 815 million a year for CCS and CCU projects that can further the technologies and ensure greenhouse gas reductions. The funding pool will be phased in from 2024 and is expected to result in estimated annual CO₂ reductions of 0.9 million tonnes from 2030.</p> <p>In relation to PtX, the climate agreement parties also agree that the proceeds of an RE agreement with the Netherlands (at least DKK 750 million) will fund a subsidy scheme for PtX projects.</p> <p>No later than by 2030, two energy islands must be established with a total capacity of 5 GW, allowing for subsequent expansion. Renewable energy from the islands is intended to eventually also be used for hydrogen production and other PtX.</p> <p>The Government will also present an overall strategy for carbon capture, utilisation and storage (CC(U)S) and PtX in Denmark.</p> <p>Finally, the Government has presented a green research strategy that charts the strategic course for green research, innovation, development and demonstration. The strategy will ensure that the efforts best support the green transition in Denmark and around the world and that they help achieve Denmark's climate targets.</p> <p>The strategy includes among other things a <i>mission-oriented</i> approach, which will support a targeted, accelerated development of new solutions for the green transition of selected sectors for which specific challenges have been identified that cannot be efficiently managed with current technologies.</p>

Greenhouse gas tax

Table 17

Recommendations by the Danish Council on Climate Change: Greenhouse gas tax

Recommendation	The Minister's position on the recommendations
<p>The climate and energy tax system should be reformed to redirect focus on greenhouse gases so that a future, uniform greenhouse gas tax will be significantly higher than the sum of the current energy and CO₂ tax. The tax rate should be announced now and phased in gradually over a number of years to enable businesses and private individuals to adapt to the higher taxes early on.</p>	<p>The Government shares the ambition for uniform taxation of CO₂e emissions. It will require considerable development efforts to tax emissions that are currently not taxed, including tax-exempt emissions such as oil production and refining as well as agricultural non-energy related emissions.</p> <p>Against this background, the Government proposes that a green tax reform be divided into phases, where the first phase can be based on a higher and more uniform taxation of CO₂e-emissions in the existing tax system, while subsequent phases may include extensions of the tax base to areas that are relatively well defined as well as areas that are not taxed today. Thus, companies and citizens will have the opportunity early on to adapt to the higher taxes.</p>

Companies in industries exposed to tough international competition should have a basic deduction to limit carbon leakage. In some sectors, the basic deduction could benefit by being made production-dependent so that reducing production reduces the deduction.

The deduction for these sectors should be counterbalanced by a corresponding tax on the consumption of the industry's products, regardless of whether they are made in Denmark or abroad.

This can be particularly relevant for products such as beef and cement that are traded internationally and leave a big climate footprint.

The Government will examine which initiatives might mitigate the consequences for companies in industries with tough international competition.

Taxes and deductions must also apply to the agricultural sector when reasonably true and fair accounts have been prepared for the individual farm's emissions.

In the short term, the agricultural sector must be encouraged to more climate-friendly production by means of a simpler tax model or a broad range of measures such as requirements for specific green technologies and financial support for their implementation.

In presenting its annual climate programme, the Government should also estimate the required increase in the greenhouse gas tax if the development track initiatives do not appear to provide the expected effect.

Such a tax rate can illustrate what is required to reach the 70% target and instil credibility about the target, also if it requires tougher measures.

Emission data from agriculture must be expanded and improved. Together with the parties to the agreement on the sector strategy for energy and industry, the Government has allocated DKK 5 million to contribute to the development of climate accounts at farm level and to support a cost-effective regulation of agricultural greenhouse gas emissions.

There are many considerations to be made on the path to meeting the 70% target. Other tools than taxes must also be considered. Additionally, it will require major development efforts to tax emissions that are currently not taxed. A given tax rate is therefore not a goal in itself, and the Government will thus not provide ongoing assessments of the tax level.

Energy, construction and industry

Table 18

Recommendations by the Danish Council on Climate Change: Energy, construction and industry sector

Theme	Recommendation	The Minister's position on the recommendations
Phasing out coal	We should decide to stop burning coal for power and district heating production as soon as possible and by 2025, given the requirement for fast reductions and the comparatively low price of phasing out coal. This stop can be put into effect by means of an outright ban or other framework conditions that either make it impossible to continue using coal or make coal distinctly less attractive than the alternatives.	The Energy Agreement from 2018 sets a target of phasing out coal from power production before 2030, which is expected to be met. After Ørsted's decision to phase out coal from their CHPs in 2030 and Fjernvarme Fyn's decision to phase out coal in 2022, only Nordjyllandsværket is left, which has a plan to phase out coal by 2028. An accelerated phase-out is assessed to entail relatively high costs and technical challenges.
Green power	The public tender procedures for and commissioning of offshore wind farms adopted in pursuance of the 2018 energy agreement should be moved forward, and additional tender procedures for initially 3 GW of offshore wind farms should be set in motion for commissioning as soon as possible. At the same time, additional tender procedures should be prepared to meet the increased consumption of power.	The sector strategy for energy and industry has accommodated the recommendations on the moving forward (of wind farm 2 from the 2018 energy agreement) and establishment of offshore wind power, and it also provides more resources for processing complaints about the establishment of renewable energy systems. The strategy also continues the technology-neutral tender procedures and an

	<p>The current tender procedures for projects involving onshore wind, coastal wind and solar power should continue in auctioning processes as long as significant capacity of each of the technologies is not being established on market terms.</p> <p>Sufficient funding should be provided for the processing of complaints to prevent the process of expanding renewable energy projects from being delayed by case processing.</p> <p>The Government should prepare a strategy for expanding energy storage and flexible power consumption that can safeguard the balance in the power supply, contribute to safeguarding supplies in periods without sun and wind and support a reduction of fuel-fired installations.</p> <p>The Government should prepare a new compensation model for transmission projects that can ensure popular acceptance locally for the establishment of additional high-voltage overhead power lines.</p>	<p>analysis of the need for continued subsidies.</p> <p>Finally, the sector strategy commits the Government to present initiatives that support the continued development of the power infrastructure.</p>
<p>Green heating</p>	<p>The tax on electricity used for heating should be lowered to DKK 0.10/kWh in 2022 and further to DKK 0.05/kWh in 2023 as a consequence of lower support for power production based on renewable energy.</p> <p>The power grid should have flexible tariffs with temporal and regional differentiation to reflect the actual costs of using both the transmission and the distribution grid.</p> <p>Following the two first items, the Council on Climate Change also recommends phasing out the CHP requirement and the fuel requirements in the district heating area.</p> <p>The tax on certified excess heat should be abolished.</p> <p>The CO₂ price in the socio-economic calculation prerequisites applied in the approval of district heating projects must reflect the costs of achieving the 70% target.</p> <p>The rules binding certain heating customers to natural gas should be eliminated as soon as possible.</p> <p>The Government should look into the rules for disconnection from the natural gas grid to reduce the cost to private individuals of phasing out their natural gas boilers.</p>	<p>The sector strategy for energy and industry accommodates several of the Council on Climate Change recommendations, including phasing out of the CHP requirement and the fuel binding to natural gas and abolishment of the tax on certified excess heat. The consumer binding to natural gas will also be removed, and it is made less costly for private individuals to phase out their natural gas boilers. The agreement reduces the electrical heating tax to the EU's minimum rates (DKK 0.08/kWh for households and DKK 0.04/kWh for businesses) already in 2021 to realise carbon reductions and socio-economic gains. The sector strategy adjusts the socio-economic requirement so that district heating projects can be approved without having to compare them to fossil-fuelled alternatives.</p>
<p>Energy efficiency improvements</p>	<p>The industry's energy-saving scheme, the so-called agreement scheme, should be reinstated with particular focus on CO₂ emission savings.</p> <p>The building regulation requirements of energy-efficiency improvements in reconstruction and renovation should be enforced by sample checks combined with fines or orders in the event of non-compliance with the regulations.</p> <p>Assistance should be provided for optimising technical installations in buildings, for instance by means of improved information about energy-savings potentials and offers on free energy checks.</p> <p>Financing solutions through Energy Service Companies (ESCO) should be pro-</p>	<p>The sector strategy for energy and industry allocates DKK 2.5 billion from 2020-2030 targeted at CO₂ reductions in businesses and the industry, focusing on issues such as energy-efficiency improvements of production processes that cannot be readily electrified.</p> <p>With respect to the recommendation for compliance with the building regulations, a new analysis has been launched to map compliance before making a decision on the results.</p> <p>A targeted energy-efficiency improvement effort will also be made to contribute to taking the measures into the digital age</p>

	<p>moted, for instance by additional guidance about the scheme using examples from specific Danish cases.</p> <p>Requirements should be imposed on energy renovation of municipal and regional buildings. At the same time, it should be examined whether investments in energy-efficiency improvements and improved interior climate can be exempted from the construction ceiling if the investments are repaid within a given period.</p>	<p>and support smart management of technical installations in buildings.</p> <p>The Danish Energy Agency has already prepared an ESCO guidance that is available at SparEnergi.dk.</p> <p>The Government expects to begin talks with municipalities and regions on energy-renovation efforts and has cancelled the construction ceiling in 2020 and raised it extraordinarily in 2021.</p>
Biogas	<p>One or more biogas production tenders should be invited so that the total production increases to around 35 PJ by 2025.</p> <p>The subsidy scheme for power production generated by biogas should be changed to provide the proper socio-economic incentives to only use biogas for power production when the wind is not blowing or the sun is not shining. This could be in the form of reduced subsidies added to the market price of power corresponding to the support for other, new renewable energy sources such as offshore wind power.</p> <p>Requirements should be introduced to minimise emission losses from biogas plants as soon as possible, and only biogas plants meeting the requirements should qualify for support.</p> <p>Precise measurements of emission losses from the biogas plants must be performed so that Denmark can change the leakage rate stated in the official emission inventories for the EU and UN based on this specific documentation.</p>	<p>The sector strategy for energy and industry allocates DKK 12.8 billion over a 20-year period for tenders for biogas support. The tender procedures will contribute to increased competition, lower costs and thus a reduced support level. It is assessed that this can increase utilisation of biogas with 10 PJ by 2030. The termination of the existing biogas support schemes, under which existing installations had to apply for acceptance before 1 July 2020, enables a mapping of the total expected production of biogas.</p> <p>With regard to the recommended requirement of reducing emission losses from biogas plants, the statutory basis has been provided for making such requirements, and work is currently in process on measurement programmes to help define these requirements.</p>

Waste sector

Table 19

Recommendations by the Danish Council on Climate Change: Waste sector

Recommendation	The Minister's position on the recommendations
<p>Companies should be required to either separate or manage their own waste or opt in to municipal waste schemes, supported by the relevant statutory framework.</p>	<p>The sector strategy on waste streamlines and increases the collection of public and private companies' waste by introducing a cost-effective reporting scheme for companies' waste arrangements and requirements for companies to separate household-like waste according to the same separation criteria as households and comply with the environmental requirements in force at any time. The scheme will take effect before the end of 2022. A new model must be set up for waste supervision to ensure that the sector complies with existing requirements of source separation of recyclable waste. Small companies that generate waste whose composition and volume correspond to households will be allowed to opt for municipal collection schemes for recyclable waste.</p>
<p>New regulations should be put in place to ensure that plastic packaging is in fact recyclable.</p>	<p>The sector strategy on waste collects and organises waste flows from households and businesses more uniformly. The framework conditions for the waste sector must be designed to facilitate investments in recycling plants rather than incineration plants in the future. The Executive Order on Waste will stipulate that by no later than 1 January 2022, municipalities must require in tender procedures for waste management that at least 60% of collected plastic waste is actually recycled.</p>

	<p>A decision must be made in 2021 on the organisational model for the national implementation of the extended producer responsibility for packaging and determination of the modular fees that will give producers the financial incentive to design packaging for recycling.</p>
<p>Consideration should be given to whether the non-recyclable proportion of separated plastic can be stored in Denmark until the proper management of the plastic is ensured.</p>	<p>The recommendation is not deemed an appropriate measure as it risks sending a message to the industry and waste sector that could cause developments in the field to stagnate. The Government's initiatives in the area aim to promote increased recycling of plastic, for instance through circular design, including in particular phasing out plastic packaging that cannot be readily recycled. The Government is also working to ensure that plastic waste must be managed within Europe.</p>

Transport sector

Table 20

Recommendations by the Danish Council on Climate Change: Transport sector

Recommendation	The Minister's position on the recommendations
<p>Announcement of initiatives to stop the sale of passenger cars that are fully or partially fuelled by petrol or diesel.</p>	<p>The Government is working to discontinue sales of petrol and diesel car from 2030. However, implementing a complete ban on marketing, import or registration of new petrol and diesel cars in a member state is not compatible with the applicable EU type-approval legislation. Therefore, the Government is working to ensure that the Commission presents an ambitious, broad-spectrum strategy for how the EU can promote the green transition of the transport sector, including a clear plan for phasing out petrol and diesel cars in the EU. The Government is also working to obtain stricter CO₂ standards for light and heavy vehicles, inclusion of road transport in the ETS sector, promotion of the necessary infrastructure and alternative fuels, including Power-to-X, and an ambitious approach to batteries. The Government will also work to set up an alliance between like-minded EU member states that can apply pressure to promote the phase-out agenda in the EU.</p>
<p>In the short term, EVs and other zero-emission vehicles should be given a financial boost. The current EV battery deduction in the vehicle registration tax should be made permanent and scaled down as the prices of batteries decline. The purchase of an electric vehicle should trigger a fixed subsidy, regardless of car size.</p>	<p>The Government wants to secure good, stable framework conditions for motor vehicle taxes to enable as many Danes as possible to join the green transition while we preserve security for car owners and mobility within society. It is important for the Government that the green transition is financially responsible and provides the greatest CO₂ reduction return on investment.</p> <p>The recommendations by the Council on Climate Change for changing car taxes and cash subsidies for purchases of EVs and PHEVs are deemed to involve significantly less state revenue and will be associated with significant costs per tonne of CO₂ reduced by 2030. In addition, cash subsidies for EV purchases can result in a significant risk that vehicles will be exported after the buyer has received the subsidy.</p> <p>Based on the EV Commission's recommendations on taxes, the Government will work to set up a broadly based agreement that secure long-term framework conditions for the automotive industry and car owners as well as clarification of motor vehicle taxes in the green transition of passenger cars.</p>
<p>A package of initiatives should be put in place to ensure more transparency and competitiveness in the EV charging market. The package should address equal terms for electricity taxes for all EV owners and improved options and framework conditions for the installation of charging stations. It should also ensure a sufficient charging infrastructure in all cities and on the motorway network. This can be put into effect by means of a tender procedure</p>	<p>The parties behind the 2018 energy agreement have decided to expend DKK 50 million from the green transport pool on charging stations. The parties behind the agreement on the sector strategy for energy and industry decided to increase this pool by DKK 50 million in 2020. At the same time, the payment of the remaining funds in the pool will be advanced to 2020 and 2021. The EV Commission is also expected to provide recommendations for the charging infrastructure in their next report later in the year, after which the Government expects to discuss initiatives in the area together with the political parties in the Danish Parliament.</p>

for fast and rapid chargers at specific locations, resulting in either a fee to the state or support to the operator.

Implementing environmental zones in urban areas to promote sales of CO₂-neutral heavy-duty vehicles should be considered.

Stricter environmental zones have been implemented for heavy-duty vehicles. Most vehicle owners comply with the rules by purchasing new vehicles, which means that environmental zones indirectly help renew the vehicle fleet with potentials for CO₂ reductions. Together with the Ministry of Environment and Food and the City of Copenhagen, the Ministry of Transport and Housing have entered into a climate partnership to examine how to set up trial zero-emission zones.

Agricultural and forestry sector

Table 21

Recommendations by the Danish Council on Climate Change: Agricultural and forestry sector

Recommendation	The Minister's position on the recommendations
<p>The current restoration scheme for carbon-rich peatlands must play a more significant role in the future. However, the scheme must be improved on an ongoing basis in order to make a serious impact.</p> <p>We must improve our knowledge of emissions factors and actual land-use conditions as soon as possible.</p> <p>However, the setting aside of peatlands should not be suspended until this knowledge has been obtained.</p> <p>The restoration scheme should be organised with sufficient flexibility to manage new knowledge of emissions factors in various types of soil as and as and when it is obtained.</p>	<p>Restoration of carbon-rich peatlands is a significant measure for reducing agricultural emissions. The potential and the model for additional set-asides and restoration will be examined and qualified in connection with the coming sector strategy for agriculture.</p>
<p>Taxes and deductions must also apply to agriculture when reasonably true and fair accounts have been prepared for the individual farm's emissions. In the short term, agriculture must be incentivised towards more climate-friendly production processes by means of a simpler tax model or a broad range of measures such as requirements for specific green technologies and financial support for their implementation.</p>	<p>Emission data from agriculture must be expanded and improved. Together with the parties to the agreement on the sector strategy for energy and industry, the Government has allocated DKK 5 million to contribute to the development of climate accounts at farm level and support a cost-effective regulation of agricultural greenhouse gas emissions.</p>

Behaviour

Table 22

Recommendations by the Danish Council on Climate Change: Climate-friendly behaviour

Recommendation	The Minister's position on the recommendations
<p>All Danish municipalities and regions should prepare climate strategies with clear guidelines for climate-friendly choices in cafeterias, transport, construction, procurement, etc. The strategies should be followed up by monitoring to make it clear whether the strategies are being followed and the targets achieved.</p>	<p>The Government notes positively that all municipalities will potentially prepare a climate strategy and that this work is coordinated across municipalities, e.g. under the auspices of Local Government Denmark.</p>

<p>The state should further develop guidelines and tools for green procurement for municipalities and regions to use. An example is a tool for calculating the municipal climate footprint, both in and outside the municipality's territory.</p>	<p>With the Strategy for Green Public Procurement, the state shows the way in the form of strategies and initiatives for green procurement and tools for tracking developments in the green transition. The Government invites municipalities and regions to follow suit in the green direction. The strategy provides for the development of a calculation model for determining greenhouse gas emissions from public sector procurement, and it is an ambition for municipalities and regions to eventually be able to use the calculation model to determine the greenhouse gas emissions from their purchasing.</p>
<p>Taxes on food with climate impacts</p>	<p>Later in the year, the Government will propose a sector strategy for agriculture.</p>
<p>Incentives for increased carpooling</p>	<p>The Ministry of Transport regularly supports pilot schemes with funding from special state allocations. Frederikshavn, Hjørring and Aalborg have started cooperation projects with the GoMore share-riding service to encourage more people to combine public transport and carpooling, for instance. Special allocation funds have also been granted for pilot testing in North Jutland involving an expansion of Journey Planner to also include private transport such as carpooling services.</p>

Annexes

Annex 1: The Danish Climate Act, June 2020

Annex 2: A Green and Sustainable World: The Danish Government's long-term strategy for global climate action, October 2020

Annex 1

The Danish Climate Act

JUNE 2020

Climate Act

This is an unofficial translation of the Climate Act. Only Danish laws published in the Danish Law Gazette (Lovtidende) have legal validity

Chapter 1

Purpose

1. The purpose of this Act is for Denmark to reduce greenhouse gas emissions in 2030 by 70% compared to the level of emissions in 1990, and for Denmark to achieve a climate-neutral society by 2050 at the latest, taking into account the Paris Agreement target of limiting the global temperature rise to 1.5 degrees Celsius.

(2). Denmark must actively work for realisation of the Paris Agreement target of limiting the global temperature rise to 1.5 degrees Celsius.

(3). The climate effort must adhere to a number of guiding principles:

- 1) The climate challenges are a global problem. Therefore, Denmark must be a leading nation in the international climate effort, a nation that can inspire and influence the rest of the world. Furthermore, Denmark has both a historical and a moral responsibility to take the lead.
- 2) The realisation of Denmark's climate targets must be as cost effective as possible, taking into account the long-term green transition, sustainable business development and Danish competitiveness, sound public finances and employment, and that Danish business must be developed rather than diminished.
- 3) Denmark must show that a green transition is possible while maintaining a strong welfare society, where cohesion and social balance are secured.
- 4) The initiatives to be taken to reduce greenhouse gas emissions must result in real domestic reductions, but it must also be ensured that Danish measures do not simply relocate all of the greenhouse gas emissions outside of Denmark's borders.

2. At least once every five years, the Minister for Climate, Energy and Utilities must set a national climate target with a 10-year perspective. A new climate target must not be less ambitious than the most recently set target.

(2). At least once every five years, and as a minimum in connection with the setting of the climate targets, as referred to in paragraph 1, the Minister for Climate, Energy and Utilities must publish a climate action plan with a 10-year perspective.

Chapter 2

The Danish Council on Climate Change

3. To promote impartial advice on the climate effort, the Minister for Climate, Energy and Utilities will be assisted by the The Danish Council on Climate Change.

(2). The Danish Council on Climate Change assists the Minister for Climate, Energy and Utilities in setting national climate targets, as referred to in Article 2(1).

4. The Danish Council on Climate Change must annually make recommendations to the Minister for Climate, Energy and Utilities on the climate effort. In the recommendations, The Danish Council on Climate Change must observe the principles stated in Article 1(3).

(2). In the recommendations, The Danish Council on Climate Change must also assess whether the government's climate efforts make it probable that the climate targets, as referred to in Articles 1(1) and 2(1), will be reached.

(3). In connection with the recommendations, The Danish Council on Climate Change must provide a status update on Denmark's international targets.

5. The Danish Council on Climate Change must comment on the annual climate status and projection, as referred to in Article 6, and the Minister of Climate, Energy and Utilities' annual climate programme, as referred to in Articles 7(1) and 7(2).

(2). The Danish Council on Climate Change must prepare a catalogue of potential measures.

(3). The Danish Council on Climate Change must contribute to the public debate.

(4). The Danish Council on Climate Change may prepare analyses of, and recommendations on, the climate effort, etc.

Chapter 3

Climate status and projection

6. The Minister for Climate, Energy and Utilities must annually prepare a climate status and projection, which must at least contain the following:

- 1) Historic greenhouse gas emissions, overall and by sector.
- 2) Projections of greenhouse gas emissions, overall and by sector.
- 3) Global report on the international effects of the Danish climate effort.

Chapter 4

Climate programme, report to the Danish Parliament and obligation to act

7. The Minister for Climate, Energy and Utilities must annually present a climate programme for the Danish Parliament.

(2). The climate programme must include the following:

- 1) A status report on fulfilment of the national climate targets, as referred to in Articles 1(1) and 2(1).
- 2) The planned climate initiatives and measures, including short- and long-term effect and the projected future effect thereof.
- 3) A report on The Danish Council on Climate Change's recommendations, as referred to in Article 4, and the position of the Minister for Climate, Energy and Utilities on these recommendations.
- 4) A status report on research and development of new climate initiatives.
- 5) A status report on developments in climate science, including the latest reports from the UN Climate Panel.
- 6) A description and status report on fulfilment of international climate targets.
- 7) A global climate strategy.

(3). In the climate programme, the Minister for Climate, Energy and Utilities must provide an assessment of whether it appears probable that the national climate targets mentioned in Articles 1(1) and 2(1) will be reached.

(4). If it cannot be deemed probable that the national climate targets will be reached, the Minister for Climate, Energy and Utilities must in the climate programme present new initiatives with a reduction effect in the shorter term and initiatives with a reduction effect in the longer term, which together chart a path toward fulfilment of the national climate targets.

8. The Minister for Climate, Energy and Utilities must prepare an annual report to the Danish Parliament on the effects of the overall climate policy after the publication of the climate programme.

9. The Danish Meteorological Institute is the government's adviser on developments in climate science.

Chapter 5

Organisation of The Danish Council on Climate Change

10. The Danish Council on Climate Change is an independent advisory body of experts.

(2). The Danish Council on Climate Change consists of 1 chair and 8 other members. The Danish Council on Climate Change elects 1 candidate for each vacant post, who is subsequently appointed by the Minister for Climate, Energy and Utilities.

(3). The Danish Council on Climate Change is composed of experts with broad expertise and high level of climate-relevant academic knowledge relating to energy, buildings, transport, agriculture, environment, nature, economics, climate science research, and behavioural research of relevance to the climate field.

(4). Two of the Climate Council's other members will be appointed as deputy chairs.

(5). The chair and the deputy chairs speak on behalf of the Climate Council.

(6). The members of The Danish Council on Climate Change are appointed for a four-year term. Members may be reappointed once. If the chair or one of the other members resigns from the Council before the expiry of the term, a new member may be appointed for less than four years in accordance with the procedure outlined in paragraph 2.

(7). The Danish Council on Climate Change determines its rules of procedure.

11. The Danish Council on Climate Change is assisted by a secretariat.

(2). The secretariat is headed by a head of secretariat, who is appointed by the chair of The Danish Council on Climate Change.

12. The Danish Council on Climate Change must establish a climate dialogue forum, which is tasked with assisting The Danish Council on Climate Change in its work.

(2). The members of the Climate Council's climate dialogue forum will be appointed by The Danish Council on Climate Change for a term of up to three years at a time.

(3). The Danish Council on Climate Change and the climate dialogue forum must convene at least once annually prior to the submission of the Climate Council's annual report with recommendations, as referred to in Article 4(1), and prior to other significant publications by the Climate Council. The discussions will be led by the chair.

(4). The annual report with recommendations, as referred to in Article 4(1), and other significant publications from the Danish Council on Climate Change will be accompanied by a summary of views expressed in connection with the discussions referred to in paragraph 3.

(5). The Minister for Climate, Energy and Utilities must set detailed rules on which organisations and institutions nominate members of the climate dialogue forum.

Chapter 6

Entry into force etc.

13. This Act will enter into force on the day after it is published in the Danish Law Gazette (Lovtidende).

(2). The current chair and members of The Danish Council on Climate Change will continue in their posts until the expiry of the term for which they are appointed, and after the expiry of their first term they may be reappointed once for an additional four-year term. The chair of The Danish Council on Climate Change may decide that two of the members of The Danish Council on Climate Change upon the entry into force of this Act may, upon the expiry of their second term, be appointed for an additional two-year term.

(3). Act no. 716 of 25 June 2014 on Climate Council, climate policy report and setting of national climate targets is hereby abolished.

14. This Act is not applicable in the Faeroe Islands and Greenland.

Annex 2

A Green and Sustainable World: The Danish Government's long-term strategy for global climate action

OCTOBER 2020

A Green and Sustainable World

**The Danish Government's long-term
strategy for global climate action**

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Preface

The climate challenge is one of the greatest global challenges of our times. With the Paris Agreement and the UN Sustainable Development Goals (SDGs) from 2015, we have reached a global consensus on the need for a change of course to avoid a major rise in global temperatures and the irreparable damage such an increase would cause. Yet efforts to translate these goals into action have been insufficient.

Significantly higher ambitions and action are needed if the world is to reach the 1.5 degree goal of the Paris Agreement. Action must be taken within the coming decade to ensure a sustainable planet for future generations. We must break the curve of global greenhouse gas emissions. Even if the world achieves the goals, we must intensify our efforts to prevent and adapt to the impacts of climate change. By doing so, we can avoid and minimise the damage from climate change as far as possible and prevent climate change from causing increased global inequality. Climate changes are inevitable – and in many regions, such as Africa, they will be severe. We are already seeing the impacts today.

Denmark is leading the way with the Danish Climate Act and unprecedented ambitious climate goals. But Denmark only accounts for 0.1% of global emissions, so it is essential that the rest of the world moves in the same direction. The COVID-19 pandemic has merely intensified the need for drastic measures in support of sustainable development and green transition as a means of creating a real and lasting economic recovery. We must use the Danish example to rebuild better and greener societies – Build Back Better and Greener. We must also use the green transition and efforts to ensure access to clean water and clean energy to create jobs and apprenticeships, particularly in developing countries.

The Government wants Denmark, as a green pioneer, to lead the global climate effort and a fair global transition to sustainable societies for the benefit of the world's peoples – just as we have ensured a smooth transition to a green economy in Denmark over the past 50 years.

We have a historic and moral responsibility to take the lead. We have the experience and we have the green solutions. We have shown that economic growth and green transition can go hand in hand. We now have a unique opportunity to contribute solutions to the global climate challenges. Through bilateral and multilateral collaborations, as well as efforts via the EU, Denmark will be a global driving force in the international effort for a green and sustainable transition. Through stronger collaboration, dialogue and alliances with countries and non-state actors, we will inspire and influence others to raise ambitions in order to meet the goals of the Paris Agreement and ensure sustainable development in line with the SDGs. We will work for a socially just green transition that creates growth and opportunities for all, and which fights inequality.

With the Government's long-term strategy for global climate action, *A Green and Sustainable World*, a course is charted for Denmark's international climate efforts spanning foreign, development, trade and sector policy, as well as export and investment promotion. Success in our efforts for a green and sustainable transition globally will require political support at the highest level in all countries and comprehensive solutions involving all sectors and stakeholders. The Government will therefore activate all relevant areas of international policy and coordinate the Danish approach to ensure an ambitious, persistent, multifaceted and integrated

global climate effort. The climate agenda must be pursued by all areas of the Government, from the technical to the highest political level – and it must be pursued consistently and without hesitation. The Government has therefore taken the initiative to establish the first ever comprehensive strategy for Denmark's global climate efforts.

We will work to raise global climate ambitions, reduce global greenhouse gas emissions, intensify the focus on climate adaptation and sustainable development, and increase the mobilisation of financing for climate efforts. The Government wants to ensure that efforts to fight climate change and support sustainable development go hand in hand. Meeting the goals of the Paris Agreement and the SDGs serve as the framework for the Danish effort.

When we strengthen our global efforts for green transition, it benefits Denmark beyond the mere fact that we are contributing to a greener, more sustainable and equal world. The spread of Danish green solutions also contributes to green exports, growth and employment in Denmark. Our commitment to global climate action can also contribute to the acquisition of knowledge, innovative technology, solutions and investments, thus benefitting Denmark's own green transition, future-proofing our positions of strength in business, and helping to meet our ambitious climate goals.

It is also about solidarity. The Government wants to help the poorest countries, which are hardest hit by climate change. We will take the lead in support of a just green transition that creates skilled jobs – particularly in developing countries – and does not increase inequality.

The framework for global climate action is constantly evolving. The Government's international climate action will therefore expand as new challenges, opportunities and alliances arise. In the global chapter of our annual climate programme, we will outline the Government's initiatives in Denmark's global climate action, aligned with the aims of the Government's five-year strategy for global climate action.

The Government is setting a course for Denmark's global climate action with this strategy – and we are ready to take responsibility for realising these ambitions. Therefore, as we agreed in the Agreement on the Climate Act, we will prepare separate global reports on the international impacts of the Danish climate effort and the status of Denmark's international obligations as part of the annual climate status and forecast in April. Among other things, the report will present the current status of reductions in international shipping and aviation, as well as reductions from exports of electricity from renewable energy sources. The effects of Danish bilateral energy collaborations with major carbon emitters can also be included, and the effects of Danish imports and consumption will be explored. Additionally, the report will provide a review of Danish development assistance relating to climate action.

The Strategy was developed by the Danish Ministry of Foreign Affairs, Ministry of Climate, Energy and Utilities, Ministry of Finance, Ministry of Industry, Business and Financial Affairs, Ministry of Environment and Food, Ministry of Higher Education and Science, and Ministry of Transport and Housing.

We will make Denmark a global green driving force

Denmark will be a green pioneer in the global climate effort so that we can inspire and influence the rest of the world. Denmark will once again take leadership in the green transition, contribute to significantly raising global ambitions for the climate, environment and nature, and actively advance the Paris Agreement and sustainable development in line with the SDGs.

The global climate challenges must be addressed now

The world and Denmark are in a climate crisis. We consume more of the Earth's resources and emit more than the planet can withstand. These actions have consequences. The last four years are the warmest ever recorded on Earth. The planet's oceans are rising at a record pace and we have set a new low for how little sea ice is left in the Arctic.

The global green transition is one of the most important but also most difficult tasks the world is facing. If the whole world is to achieve the dream of enjoying the same standard of living as us, we must produce and consume in a different way. The green transition of society is a broad and deep process of change, often associated with social and economic changes that demand great political courage, collaboration and governmental capacity. To be a leading country, Denmark must show the way to a socially just and cost-effective transition that does not result in job losses, unequal redistribution and increased inequality, but rather in new green jobs and opportunities for more people. A concerted effort to train skilled workers with green competencies will be needed to ensure that job creation and the green transition go hand in hand in developing countries.

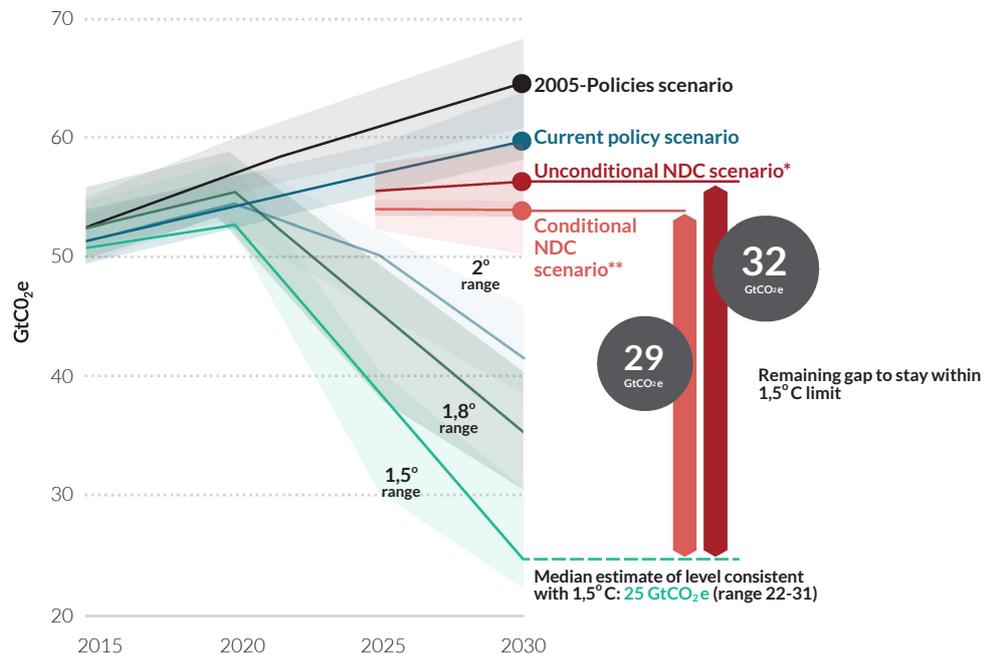
Immediate action is needed. Despite consensus on the Paris Agreement among the vast majority of the world's nations, we are not yet on track to limit temperature increases to below 2 degrees or striving for 1.5 degrees. We must break the curve of global greenhouse gas emissions. In order to limit global warming to 1.5 degrees, the UN Climate Panel finds that global CO₂ emissions must be 45% lower in 2030 than in 2010, combined with a significant reduction in other greenhouse gases. Man-made CO₂ emissions must reach net zero by 2050 at the latest. By meeting the already adopted climate contributions, however, global temperatures will still rise by more than 3 degrees by the end of this century. In other words, significantly higher ambitions are needed.

The majority of global emissions stem from a small group of major emitters, with China, the US and the EU in the top 3. This is where serious action must be taken so that the largest emitters commit to deliver more ambitious climate contributions. It is also important to maintain a focus on developing countries, and particularly emerging economies, which are already responsible for the majority of global emissions, and whose energy and resource needs will continue to grow, thus amplifying the trend of increased greenhouse gas emissions.



Graphic

Scenarios for future global CO₂ emissions



* Unconditional Nationally Determined Contributions which countries will deliver without conditions attached

** Conditional Nationally Determined Contributions which countries will deliver contingent on support or if other conditions are met

The graph shows different scenarios for future global CO₂ emissions based on different policies. Significantly higher global ambitions are needed if the world is to successfully limit the global temperature increase to 1.5 degrees. Depending on the political scenario (conditional or unconditional Nationally Determined Contributions), we still need to reduce global emissions by, respectively, 32 and 29 gigaton CO₂. That is more than half of the current combined global emissions or about three times China's annual emissions (2020 figures).

Source: UNEP emission Gap rapport 2019. Adjusted by the Danish Ministry of Climate, Energy and Utilities.

In 2040, more than half of the increase in emissions will come from India and China. Meanwhile, approximately 550 million residents of sub-Saharan Africa still lacked access to electricity in 2018. When they gain access, the rising energy needs must be met by green rather than polluting sources of energy.

In addition to the energy sector, sectors such as agriculture, transport and industrial manufacturing play a key role in the climate fight, as they account for a large and growing share of resource consumption and global greenhouse gas emissions. Green technologies, energy efficiency, effective use and reuse of resources, new methods of cultivation and production in agriculture, reduced deforestation, innovation and new technologies are all necessary to counteract and adapt to climate change. Establishing a circular economy is thus also a core element of the green transition.

Danish consumption and activity impact greenhouse gas emissions beyond Denmark's borders.

Danes consume goods produced in other countries. The average climate footprint of Danes is therefore larger than what is produced nationally. Therefore, efforts by Danish companies to integrate sustainability into their value chains and to export green solutions are important elements of Denmark's overall global action. The Government is also working for a reduction of global emissions through bilateral Strategic Sector Cooperation, including with a number of emerging economies.

The reduction effort cannot stand alone. Even if the goals of the Paris Agreement are met, global warming will still have major consequences. All countries will face challenges in adapting to climate change and preventing its consequences. Global demand for methods and technologies for climate protection and adaptation is expected to rise as the impacts of climate change become increasingly evident. The strong competencies in these fields held by Danish public authorities and companies must be extended to the rest of the world and further developed.

The least developed countries and small island states will be hardest hit by climate change, and also have the fewest resources to manage the challenge. Here, climate change has the potential to roll back decades of development progress and intensify problems relating to poverty, inequality, migration and displacement, conflict, security and instability, and shortages of, for example, water. The Government wants to strengthen efforts to ensure that developing countries have opportunities to meet the goals of the Paris Agreement and achieve sustainable development in line with the SDGs.

Establishing a sufficient level of ambition in the reduction and adaptation efforts will depend on shifting global finance flows from investments in fossil fuels to green solutions and adaptation measures. Green investments must be the answer for rebuilding the local and global economy, and for promoting economic growth and jobs.

Denmark as a green superpower

Danish efforts are to a great extent carried out through the EU, multilateral and bilateral collaborations, and alliances with countries and non-state actors. With its high national ambitions and decades of experience in green transition and climate adaptation, Denmark is a leading country with a unique platform for inspiring the rest of the world to adopt high ambitions and take action now. Danish climate diplomacy efforts must focus on the largest emitters, as well as other emerging economies and developing countries, which will be the source of increased greenhouse gas emissions in the future, and which have the fewest resources to meet the challenges of climate change. We can help to inspire other countries and play a constructive role as bridge builders in international climate negotiations. We can demonstrate that green transition, growth, welfare, job creation and education go hand in hand.

The Government will focus Denmark's international climate effort on the three main goals of the Paris Agreement:

- Pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.
- Increasing the ability to adapt to the adverse impacts of climate change affecting the poorest most severely and foster climate resilience.
- Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

Immediate action is needed to ensure sustainable global development. The Paris Agreement and the SDGs reflect that the challenges and the solutions must cut across all three dimensions of sustainable development: social, environmental and economic. To reach the goal of limiting the temperature rise, the global community must invest massively in the green transition. The global market for green transition will only continue to grow. This is a unique opportunity for Danish businesses that must be seized. Denmark must be known as a green entrepreneurial nation with strong knowledge institutions, and exports of green technology, solutions and consulting must be increased.

A stronger effort will also contribute to attracting knowledge, investment and collaborations in research and innovation to advance the development of tomorrow's green positions of strength and support Denmark's position as a green superpower.

We cannot take action to achieve these goals alone. The Government's climate diplomacy efforts must be conducted with the global community through alliances via the EU, with other countries and non-state actors. Non-state actors play a crucial role, as their ambitions and development of green solutions increase the pressure on countries to commit to higher climate ambitions, while also demonstrating the availability of green solutions.

Reading guide

The following chapters present the strategic framework for Denmark's climate diplomacy efforts, divided into the following aims:

- We will raise the global climate ambitions.
- We will reduce global greenhouse gas emissions by leading the way in the green transition.
- We will drive adaptation and resilience initiatives in the fight against climate change.
- We will shift global finance flows in a green direction.
- We will collaborate with the business community on green solutions that make a difference.

We will raise the global climate ambitions

Through negotiations in the UN and stronger climate diplomacy efforts, the Government will work to influence countries and non-state actors to commit to ambitious goals that contribute to limiting the global temperature rise. We will work to ensure an ambitious effort for climate adaptation and resilience, as well as for sustainable development. This will be done via the EU and in alliance and collaboration with countries and non-state actors.

We will ensure a robust framework in the negotiations

The climate challenge can only be solved with common global solutions. The UN Climate Convention and the Paris Agreement comprise the common international framework for the global climate effort. The current level of ambition is far from sufficient. Implementation of the Paris Agreement is too slow. The polarisation in recent years between different groups of countries, and particularly the impending US withdrawal from the Paris Agreement, weakens the overall framework for higher ambitions to reach the common goals of limiting the global temperature rise, ensuring ambitious efforts in climate adaptation and sustainable development, and mobilising financing for both purposes.

The Government wants to strengthen the UN Climate Convention, maintain the Paris Agreement as a global framework, and finalise negotiations on the provisions of the agreement to ensure the most ambitious framework possible. Trust in the negotiations must be restored. Denmark is working to make the Paris Agreement a well-functioning and credible framework

that ensures continuous intensification of the global climate effort. This will send a clear signal about the will to take action, and it will support the green transition of businesses.

Denmark must be a driving force in climate diplomacy

The Government wants a new and strengthened Danish climate diplomacy effort to influence other countries to commit to ambitious goals and take action to meet these goals. We have much to offer, for example in the areas of nationally determined contributions, strategies for climate adaptation, national political and economic decisions. Denmark will work for comprehensive solutions and increased influence by all means available to the Government, including bilateral and multilateral efforts, and through the EU in coordinated efforts. We will work to ensure that international policy areas systematically support efforts to meet the goals of the Paris Agreement and the SDGs. Across the Government, we will raise the climate agenda in the dialogue with international partners, working closely with our Green Frontline Missions and the climate ambassador.



Graphic

Denmark's Green Frontline Missions



The climate diplomacy effort must be rooted in the Danish positions of strength and competencies, and we will connect the political dialogue with technical capacity building and the dissemination of green Danish solutions. The strong Danish competencies in energy transition are key to achieving green and sustainable development. Denmark's global leadership for SDG 7 on sustainable energy is thus a priority in the bilateral and multilateral climate diplomacy effort, with a focus on promoting renewable energy, energy efficiency and access to

clean energy for all. We will also draw on Danish competencies to strengthen the climate effort in the areas of environment, waste, water, agriculture and food – also in relation to other greenhouse gases than CO₂, particularly methane and nitrous oxide, both of which have a high greenhouse effect.

The climate diplomacy effort focuses on countries where Denmark has special opportunities for influence, and will vary according to the challenges and opportunities of the given country. The main



Text box

Green strategic partnerships

The green agenda is a main focus of Denmark's strategic partnerships with China, South Korea, Japan, Mexico and Indonesia. The Government is working on new green strategic partnerships with India and South Africa. Many of these countries play key roles in meeting the aims of the SDGs and the Paris Agreement. The strategic partnerships are important levers for accelerating the partner country's green transition, strengthening alliances in international negotiations on green agendas, while also creating new opportunities for the export of Danish green solutions.

challenge in countries with high emissions, OECD countries and emerging economies is to raise the level of ambition towards climate neutrality via sustainable transition in all sectors. The challenge among the least developed and most vulnerable countries and small island states is to ensure sustainable low-emission development and adaptation to climate change. Green strategic partnerships with selected third countries is a key instrument in the Danish climate diplomacy effort. This is a coordinated approach that offers broad-spectrum collaboration with Danish authorities based on green Danish experiences and solutions, and which builds political relations, opens doors for Danish businesses, and invites alliances in international negotiations on common green agendas.

The EU must lead by the power of the green example

We will increase Denmark's climate diplomacy influence by working harder through the EU. The EU must lead by the power of the green example. Denmark is working for a more ambitious EU climate target of at least 55% by 2030, a cost-effective implementation, and an ambitious European climate law with goals of climate neutrality by 2050 for the EU and all member countries, which can put pressure on and inspire other countries and actors to raise their ambitions. The EU must lead the way globally and set an example that shows it is possible to create a successful democratic society with a well-designed green transition that is supported by citizens and civil society, and in partnership with businesses, investors, educational institutions and the research community. This will put the EU in a strong position to advocate for higher ambitions in the rest of the world – and Denmark will make a strong contribution to this effort.

The Government will work to activate all instruments linked to the EU's external diplomacy to promote green transition and an increase in EU alliances with non-state actors. EU development assistance must be a platform for promoting climate ambitions and supporting climate adaptation. This

increases opportunities for alliance formation with the poorest developing countries and small island states, which can help put pressure on large emerging economies to raise their ambitions. Meanwhile, EU trade policy must focus more on climate and environmental considerations, as well as commitments to implement the Paris Agreement. Trade in sustainable solutions must be promoted. Being green must provide competitive advantages. Denmark will therefore work – nationally and through the EU – to promote beneficial regulatory and competitive conditions for business that lead the way in the green transition. Denmark will also work to ensure that EU research and innovation policy contributes to reaching the goal of climate neutrality.

We make advances through alliances and collaboration with countries and non-state actors

Denmark will strengthen alliances, coalitions and partnerships with countries and non-state actors to raise global ambitions. International organisations, businesses, investors, knowledge institutions, civil society, labour and employer organisations, municipalities and other non-state actors – not least those in Denmark – often lead the way with high climate ambitions and by demonstrating the global potential of putting green solutions into practice. They thereby help to inspire and put pressure on countries and other non-state actors to commit to higher climate ambitions.

The Government will promote international cooperation with and between these actors, including in sectors where the green transition is particularly challenging. The Government will support the business community's own innovative partnerships and green goals internationally, including as a lever for green jobs. The climate partnerships will play a key role in this respect. The Government will strengthen its climate agenda collaborations with civil society organisations, whose broad knowledge, global networks and partners in the Global South can play an important role as a mobilising force of



Text box

Prioritised green EU areas

- More ambitious EU climate targets: Climate neutrality in the EU by 2050 for all member states and a 2030 climate goal of at least 55%
- Reform of the Emissions Trading Scheme (ETS)
- More renewable energy in the EU and wind islands in the North Sea
- Phasing out of petrol and diesel cars in the EU
- Green reform of EU agricultural policy
- 8th Environment Action Programme, including biodiversity strategy and circular economy
- Global action, including green trade policy



Text box

Green policy for, with and by young people

Young people are hard hit by climate change. At the same time, young people have an important voice in the climate debate – a voice that embraces new thinking. Denmark is leading the way in engaging and involving young people, both in Denmark and beyond. The Government is actively working in the global arena to ensure that young people participate in decision-making processes, and has, among other things, appointed two youth delegations to the UN that represent the views of young people in the realm of international climate and environment policy.

global ambition rooted in popular movements, as a green watchdog for socially just green transition, as a partner in the development of sustainable green solutions, and as a facilitator of information and debate on opportunities in green transition in partner countries. Denmark's climate diplomacy effort will also build on our role as a champion of democracy and human rights, where indigenous peoples in particular are affected by climate change. We will also promote civil engagement and democratic responsibility as driving forces of climate action, particularly among young people.

It is a priority of the Government that all of society contributes to the climate effort. This includes the sectors and activities that are not part of the Paris Agreement, e.g. international aviation and shipping, which account for 4-5% of global greenhouse gas emissions at present – a figure that is expected to rise going forward. The Government wants to raise climate ambitions globally in international shipping, aviation and land transport via relevant international agreements and global collaborations. In 2018, the UN International Maritime Organization (IMO) adopted a climate strategy in line with the goals of the Paris Agreement. We have seen great willingness from the Danish maritime sector to contribute to the global climate effort, and combined with the EU goal of climate neutrality by 2050, there is a strong foundation for working with the rest of the EU to raise the ambitions of the IMO. Increased climate diplomacy in the maritime sector can help strengthen efforts to raise and implement climate goals for international shipping under the auspices of the IMO. As part of efforts to raise global ambitions in the transport sector, the Government will work to promote knowledge about urban mobility internationally, including cycling and studies of determining factors that drive citizen to choose cycling as a means of transport in larger cities.

Finally, the Government will work to raise ambitions and accelerate action via international cooperation, agreements and measures to achieve synergies across efforts involving agriculture, deforestation, water and air quality, land use, biodiversity, sustainable production and consumption, circular economy, nature-based solutions and marine environments.

Strategic initiatives and efforts

- **The Government will** work to ensure that the UN Climate Convention and the Paris Agreement serve as an effective and credible framework for the global climate effort that contributes to raising global ambitions. In UN climate negotiations, the Government will seek to build alliances with all relevant groups, among others, the poorest and most vulnerable developing countries and small island states, with a focus on their special needs for securing access to climate financing and climate adaptation.
- **The Government will** work for an increase of the EU's 2030 goal to at least 55%, a cost-effective implementation, an ambitious European climate law with a goal of climate neutrality by 2050 at the latest for the EU and member states, and a well-designed EU green transition.
- **The Government will**, as part of an intensified climate diplomacy effort, work to ensure that foreign, development, trade and relevant sector policies, as well as export and investment promotion efforts, systematically support the Paris Agreement and the SDGs, and are part of a coordinated effort bilaterally, multilaterally and via the EU. The Government will work to strengthen the EU's climate diplomacy.
- **The Government will** work for an economic recovery after the COVID-19 crisis that is in accordance with the Paris Agreement and the SDGs – we must Build Back Better and Greener.
- **The Government will** work to ensure that EU trade policy has a greater focus on climate and environmental considerations, and to promote trade in sustainable solutions.
- **The Government will** utilise Denmark's leadership for SDG 7 on sustainable energy with a focus on renewable energy, energy efficiency and access to energy to raise the level of global ambitions. In connection with these efforts, we will also work to ensure training of skilled workers with the right competencies in these areas.
- **The Government will** work to raise climate ambitions and increase green transition efforts via green strategic partnerships and collaborations with selected third countries, and via dialogue with priority countries for development cooperation.
- **The Government will** work to raise climate ambitions and promote action through collaboration with non-state actors, including municipalities, businesses, international organisations and civil society.
- **The Government will** work for a socially just global green transition in which civil societies – particularly vulnerable groups and young people – are involved in shaping the green future.
- **The Government will** strengthen synergy with the climate agenda in global cooperation to promote sustainable consumption and production, global recycling of plastic, and safe management of chemicals and waste.
- **The Government will** work for ambitious new global nature goals under the UN Biodiversity Convention, including efforts to stop the loss of natural areas and promote the use of nature-based solutions, and will work for relevant international agreements to ensure the marine ecosystems are resilient to and robust in the face of climate change.
- **The Government will** work with other countries and non-state actors to make global food systems more sustainable, for example through participation in coalitions and multilateral forums, and through the spread of sustainable solutions, among others, in nitrogen use, food waste and food loss.
- **The Government will** adopt high ambitions in the regulation of international shipping and aviation through the UN International Maritime Organization (IMO) and the UN International Civil Aviation Organization (ICAO), and will work for the effective implementation of these ambitions.
- **The Government will** work to raise ambitions and support the phasing out of petrol and diesel cars, both in its efforts via the EU and through relevant global collaborations in the area of land transport, including International Transport Forum (ITF).

We will reduce global greenhouse gas emissions by leading the way in the green transition

Denmark will work to put the green transition into practice, with a focus on ensuring the world's largest emitters reduce their emissions and on sustainable development in developing countries.

Denmark must take green leadership in the EU

Denmark's influence on the EU's climate goals and regulations is a key means of reducing greenhouse gas emissions globally. The EU accounts for approximately 10% of global emissions, and robust EU regulations are helping to reduce that share, which can serve as inspiration for other countries. Ambitious and cost-effective regulation in the EU can also contribute to Denmark's green transition. Under the current European Commission in 2020-2024, legislation will be considered on how the EU will increase and meet

a higher greenhouse gas reduction goal by 2030 and transition to a climate-neutral society with a resource-efficient and competitive economy.

Denmark will take proactive green leadership in the EU and work for an ambitious implementation of the European Green Deal with cost-effective climate regulation that contributes to a higher EU climate goal for 2030 of at least 55% and climate neutrality in the EU and in all member states by 2050 at the latest. The Danish effort in the EU is crucial because it helps to advance the green transition at the national level, reduces the risk



Text box

Elements of the European Green Deal

- Climate neutrality in the EU by 2050 at the latest
- Increasing the EU 2030 climate goal to at least 50% and up to 55%
- Delivery of clean, affordable and safe energy
- Mobilisation of the industry with a view to a clean and circular economy
- Construction and renovation of buildings in an energy- and resource-efficient way
- Ambition of zero pollution for a non-toxic environment
- Preservation and restoration of ecosystems and biodiversity
- From farm to table: A just, healthy and environmentally-friendly food system
- Accelerating the transition to sustainable and intelligent mobility
- Financing of the transition
- No one is left behind (a just transition)

of job relocation, strengthens the competitiveness of green Danish businesses and exports, and pushes for strong European climate regulation that can inspire globally.

We contribute to global reductions

Denmark’s combined experience and competencies in green transition give us a unique opportunity to help reduce global greenhouse gas emissions in the rest of the world.

Danish public authorities have many decades of experience in creating the framework for a successful green transition, and Danish businesses and other actors, such as knowledge institutions, are leaders in developing and implementing green solutions in areas such as renewable energy, district heating, energy efficiency improvements, clean drinking water, wastewater, efficient agricultural and food production, and biofuels. Bilateral Strategic Sector Cooperation with public authorities in other countries and export promotion initiatives allow for significant upscaling and gearing of Danish experiences and solutions. These activities

contribute to reducing emissions outside of Denmark’s borders.

In the Strategic Sector Cooperation with other countries, Danish experts and the Danish embassies engage in direct and extended cooperation with the partner country’s public authorities. For example, Danish and Chinese technical experts worked together to show how China’s future energy system can be designed so that China reduces its CO₂ emissions by more than 7 billion tonnes of CO₂ annually by 2050 – without increased energy costs. Through this unique Danish approach, we provide advice on downscaling high-emission activities while upscaling green solutions.

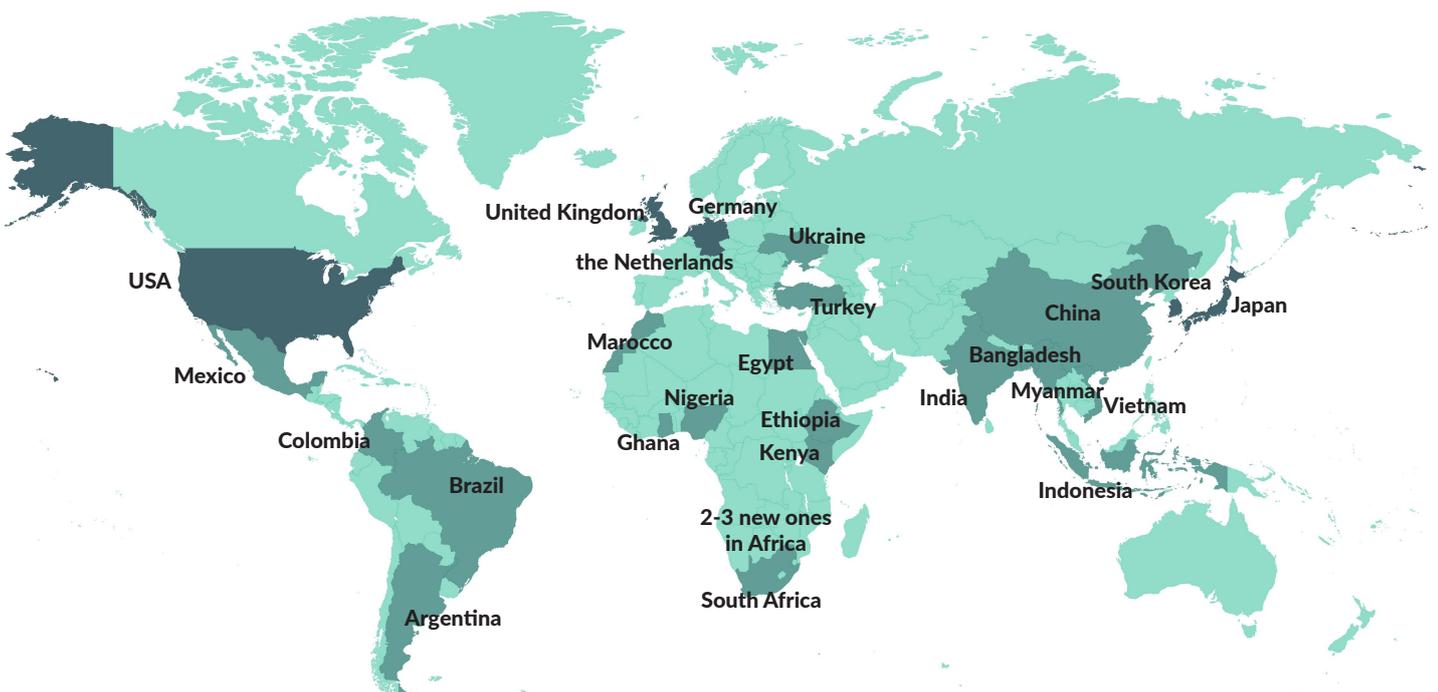
The combination of solution-oriented Strategic Sector Collaboration with public authorities, commercial export advisory services, and strong Danish climate diplomacy represents a coordinated and multifaceted approach that strengthens the foundation for political and technical decisions in support of green and sustainable transitions in our partner countries and green solutions from Danish businesses. In a world where many countries are



Graphic

Strategic Sector Cooperation

- Strategic Sector Cooperation as part of development assistance
- Strategic Sector Cooperation as part of the Energy Governance Partnerships





Text box

Strategic Sector Cooperation in Vietnam

With annual CO₂ emissions of 75 million tonnes, the Vietnamese industrial sector is among the sectors in Vietnam with the highest energy consumption. As part of the Danish-Vietnamese Strategic Sector Cooperation in the area of energy, Danish experiences are being shared with Vietnamese industry to help achieve major energy savings in Vietnam. The climate effect of this increased energy efficiency is expected to be annual CO₂ emissions reductions of three million tonnes over the next five years. This corresponds to 37% of the annual emissions from Danish energy consumption (2018 figures).

The Danish-Vietnamese dialogue is being conducted by the Danish Energy Agency and the Vietnamese Ministry of Industry and Trade, and is supported by the Danish Embassy in Vietnam. Denmark has contributed to the preparation of guidelines and a data-driven tool where Vietnamese provinces can enter their energy data and obtain an overview of attractive energy-saving measures, proposed local action plans, and reduction goals. The tool is part of the national action plan that has a goal of 5-7% increased energy efficiency in the period 2019-2025.

raising their green ambitions, there is increased demand for Danish expertise and advice. The Government will strengthen Danish advisory services through long-term and in-depth cooperation, while also opening up for short-term collaborations with a narrower focus in countries with specific needs that Denmark can help to meet.

The world is facing major investments in infrastructure in the coming decades as a result of higher climate ambitions and rising energy and resource needs. Denmark must work for green infrastructure that improves the possibility of reaching the goals of the Paris Agreement. This offers great opportunities for Danish companies – big and small – with established positions of strength in green technologies, including energy, water, environmental, and agricultural technologies, as well as in maritime businesses. These opportunities must be seized for the benefit of the global green transition, job creation and education, green exports and the future prosperity of Denmark. Via international agreements, partnerships and development cooperation, we will also contribute to reducing the global climate footprint of Danish and global businesses relating to imports and consumption.

The Government's efforts for an upscaling of green solutions around the world must go hand in hand with a downscaling of high emission sectors and energy sources. Phasing out coal and subsidies for fossil fuels globally are the most pressing global challenges to reach the temperature goal of the Paris Agreement. In the EU, the phasing out of coal is being managed through the European Green Deal and the goal of a climate-neutral EU by 2050 at the latest. The Government wants to strengthen efforts

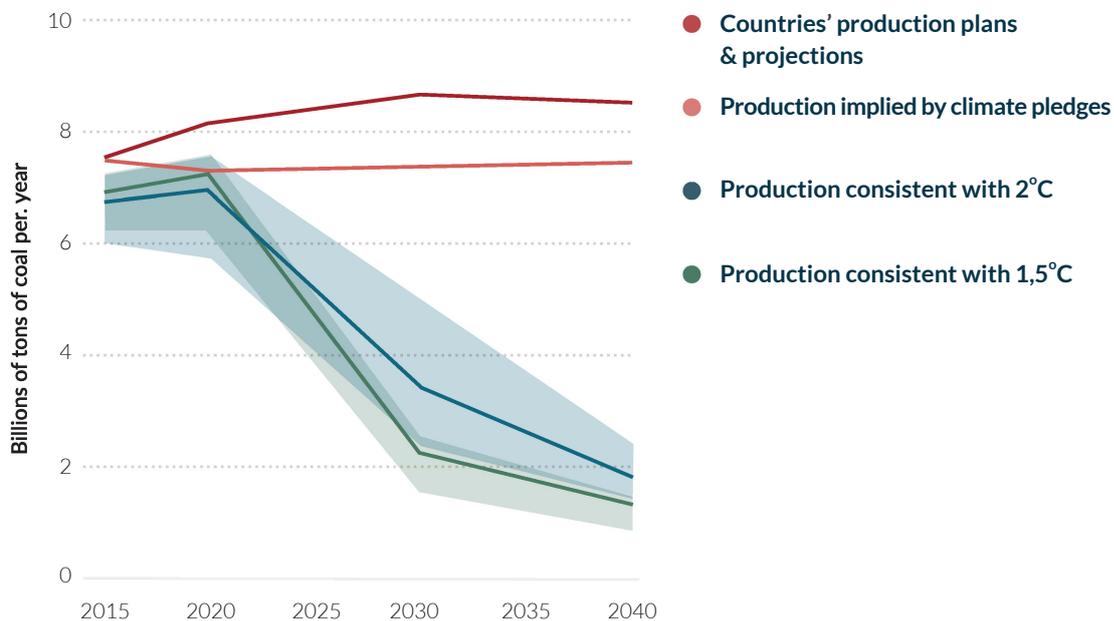
to phase out coal, particularly in Asia and Africa, where the sharply increasing energy demand should be met with renewable energy or limited through energy-efficient measures. We will also work to ensure that the green transition is socially just, and that new green opportunities are created in areas where fossil fuel industry jobs disappear. The green transition must serve as a tool for creating the jobs of tomorrow and a better society. Relevant education and training is critically important in this respect. Therefore, we will contribute to training more skilled workers in green sectors, with a particular focus on developing countries.

A strong link between bilateral collaborations and efforts in multilateral forums can increase the impact of the overall Danish climate effort. Through strong Danish climate diplomacy efforts in the EU and UN, as well as participation in international organisations, the Danish bilateral effort must be supported by the collective political pressure of larger groups of countries and the exchange of experiences.



Graphic

Projection of global coal production



The graphic shows projections of the global coal production according to different scenarios: continued current development (red), production implied by climate pledges (light red) and coal production consistent with, respectively, 2 and 1.5 degrees global temperature increases (blue and green).

Source: UNEP (2019): Production Gap Report 2019.

Strategic initiatives and efforts

- **The Government will** work for ambitious and cost-effective climate and environmental regulation in the EU that can ensure a green transition towards an increased climate goal in 2030 of at least 55%, and towards a climate-neutral EU by 2050 at the latest.
- **The Government will** strengthen bilateral Strategic Sector Cooperation with public authorities in other countries, as well as commercial export promotion efforts in the EU and globally, in order to reduce global greenhouse gas emissions.
- **The Government will** strengthen Danish support for the multilateral efforts in support of a global green transition.
- **The Government will** work to promote the phasing out of coal globally and a halt to public export financing of coal-fired power plants, thermal coal extraction and thermal coal logistics. In international negotiations, the Government will also intensify its climate diplomacy efforts for a global phasing out of coal.
- **The Government will** work to support a reduction of the global climate footprint of Danish and foreign businesses, with a focus on the value chain.
- **The Government will** strengthen responsible and deforestation-free value chains for agricultural goods in order to benefit the climate, biodiversity and social conditions in producer countries, and to reduce the Danish climate and environmental footprint.

We will drive adaptation and resilience initiatives in the fight against climate change

The Government wants to use its position as a green pioneer country internationally to inspire and drive adaptation and resilience initiatives in the climate fight, both through development cooperation and export promotion efforts. The Government wants Danish development cooperation to embrace far higher climate ambitions, with a stronger focus on adaptation and sustainable development in the poorest and most fragile developing countries, where more people must have access to clean energy and clean water. Through its export promotion efforts, the Government will advocate the global spread of Danish solutions for climate adaptation and resilience.

Climate changes are being felt across the globe

Extreme weather events such as heat waves, droughts and floods have become the norm in many parts of the world. These developments require extensive investments. Most of the world's large cities are located along coastlines or rivers and are threatened by rising water levels and floods, while global agricultural production is challenged by extreme weather phenomena. It is particularly concerning that climate change risks undermining the progress of recent decades in many developing countries, thus making it impossible to meet the UN Sustainable Development Goals. All countries must improve their resilience to climate changes. This is particularly true in the poorest and most fragile countries. Climate changes are severely impacting agriculture, and thus the livelihoods of the large share of the world's population that depends on it. We must increase resilience in agriculture and ensure adaptation through alternative sources of income so that these groups are less vulnerable.

We must contribute to preventing and reducing the risk of losses and damage as a result of climate change, and help with rebuilding efforts in the wake of climate disasters. We will thereby help to save human lives, reduce inequality, prevent conflict and displacement, and support positive economic development in the years to come. The foreign and security policy aspects of the climate challenge will be further elucidated in the Government's foreign and security policy strategy.

Denmark has experience, know-how and solutions in prevention, resilience, climate adaptation and sustainable development, all of which must be put into play

globally. Therefore, Danish authorities, utility companies, businesses, civil society organisations and knowledge institutions must strengthen their international engagement and cooperation. This will be to the benefit of our partner countries, Danish exports and employment, and further development of Danish positions of strength.

We will ensure green development cooperation rooted in solidarity

Climate changes are global, yet the impacts are skewed. The world's poorest people and countries are the hardest hit. They also have the fewest resources for adapting to a warmer climate with changing precipitation patterns, elevated water levels and more frequent natural disasters. Without massive and rapid action, the climate crisis will undermine the possibility of reaching the SDGs, especially in Africa, while also putting past advances at risk. The climate crisis may also exacerbate existing poverty, fragility, inequality and conflicts – and lead to increased displacement and irregular migration. Denmark will therefore focus on prevention of, and adaptation to, the impacts of climate change, and the development of resilience in all efforts relating to the other SDGs. When we fight climate change, we must also fight inequality.

The Government wants to increase the share of development assistance that supports climate-related activities. Development cooperation relating to climate activities must also target the diverse needs of developing countries and be rooted in local priorities and challenges.

Reduction efforts in large emerging economies have the greatest impact on global emissions in the short

term. The poorest and most fragile countries have the greatest need for support in dealing with the consequences of climate change. There are also great opportunities for positive synergy between a green transition, climate adaptation and achieving the other SDGs, such as SDG 5 on gender equality. Investments in women's and girls' education and sexual and reproductive health and rights contribute to improving the inclusion of women in political and economic life and help to break the population curve. This also applies to SDG 8 on decent jobs and economic growth, where the green transition can be a tool for creating new green jobs, including by investing in more skilled workers with green skills.

Developing countries are facing enormous challenges in creating jobs for millions of young people. At the same time, huge sums must be invested in new infrastructure, urban development, industry, sustainable agricultural production and water and energy supply. In sub-Saharan Africa, a large share of the population lacks access to clean energy and clean water. Access

to water and better water resource management are requirements for stable food production. Access to water can also reduce tensions in regions where resources are scarce. Massive investments in new infrastructure will be required to achieve the SDGs. In this respect, the poorest countries have the opportunity to skip the fossil fuel-powered polluting phase and go directly to green solutions. New investments must be based on future climate scenarios, and thus adapted for a warmer world with increased risk of drought, flooding and heat waves. It is necessary to set a green agenda that adds a new dynamic to efforts to reach the SDGs, and which creates growth, education and green jobs and apprenticeships with green skills, particularly for the many young people in Africa. The green transition must not increase inequality. This will also prevent climate-driven displacement and irregular migration. Therefore, Denmark's development cooperation will have a special focus on ensuring access to clean energy and clean water for millions in Africa. And, lastly, Denmark will work to promote initiatives combining climate, environment and biodiversity considerations.



Text box

We must ensure global access to clean water and clean energy

Access to water and energy is the basis for life and sustainable development. But many millions of people, particularly in Africa, lack access. Therefore, the Government is working to ensure access to clean water and clean energy, particularly in Africa.

- 844 million people worldwide lack access to water. The problem is particularly severe in sub-Saharan Africa, where approximately 40% of the population lacks access to water.
- 789 million people worldwide lack access to energy. Most of these people – 70% – live in sub-Saharan Africa.

Danish competencies and solutions must be applied

The strong Danish competencies and solutions in climate adaptation and sustainable development must be actively applied in the rest of the world.

Denmark's Strategic Sector Cooperation with public authorities will contribute to supporting partner countries in preparing and implementing ambitious climate adaptation plans. These plans must be integrated in relevant national and local development plans and contribute to strengthening the resilience of these countries, and they must be coordinated with other Danish climate efforts, including in the area of financing. Strategic Sector Cooperation will also help to lay the groundwork for private investments in climate adaptation projects. This can create concrete opportunities for Danish businesses to export green technology solutions, project consulting and technical collaborations with other actors. By the power of example, these solutions can show what is possible and help to inspire green growth and ambitious adaptation plans, and to mobilise capital from private investors.

The close links between technical cooperation, development assistance, climate diplomacy and export promotion can form the basis for a more rapid green transition and adaptation in the rest of the world. This can be achieved through targeted energy, climate, food and environment collaborations in existing partner countries and in new countries, and strengthened green export promotion.

Danish businesses already export climate adaptation solutions designed to prevent and mitigate the consequences of climate change to countries around the world. In the coming years, demand is expected to further increase as the impacts of climate change begin to accelerate and demand for sustainable solutions increases. This challenge will require innovative new solutions and further development of Danish positions of strength in green solutions for climate adaptation. The Government will support this development by intensifying the focus of export promotion efforts on sustainability and climate. The Government will also support the development of a local green private sector in partner countries through development cooperation, which can also serve as a means of creating more green jobs.

Strategic initiatives and efforts

- **The Government will** ensure that Denmark once again becomes a leading green country when it comes to development assistance with a pioneer approach that inspires and creates tangible change for the world's poorest.
- **The Government will** prepare a new development policy strategy in which climate and environmental support are central and closely tied to efforts to fulfil the SDGs.
- **The Government will** prioritise the integration of climate considerations into all relevant country strategies, organisation strategies and agreements with civil society, which comprise the strategic frameworks for Denmark's development engagement with countries, organisations and partners.
- **The Government will** ensure that development cooperation activities advance efforts to meet the SDGs and the goals of the Paris Agreement, and that no Danish efforts counteract the ambitions of the Paris Agreement.
- **The Government will** give special priority to green transition and promotion of resilience in Africa by ensuring access to clean energy and clean water, and by supporting sustainable food systems. In these efforts, we will also focus on creating green jobs and training skilled workers with green competencies, and on ensuring that the green transition does not increase inequality.
- **The Government will** work to ensure that the UN is better at preventing conflicts and maintaining peace by addressing the security-related consequences of climate change, including in connection with the work of the UN Security Council.
- **The Government will** work for initiatives that promote and coordinate climate, environment and biodiversity considerations.
- **The Government will** strengthen Strategic Sector Cooperation in the area of climate adaptation in developing countries, with a focus on Africa.
- **The Government will** intensify export promotion efforts in relation to green prevention and climate adaptation solutions.
- **The Government will** expand the use of water alliances with utility companies, businesses, knowledge institutions and international partners to more countries.

We will shift global finance flows in a green direction

Massive investment is needed to speed up the green transition. The Government will work to accelerate a shift to green, climate-friendly investments at all levels and country groups. The framework conditions for the financial markets and, for example, the energy market must be designed to support green investment by private and institutional investors and funds. There is also a need to strengthen the mobilisation of climate financing for the poorest and most fragile countries. The Government will take the lead in efforts to incorporate the green transition in recovery packages after COVID-19, both globally and through the EU.

Financial actors must contribute to the green transition

Public and private investors have a responsibility to accelerate the green transition by investing in green solutions. Denmark can build on past successes with the mobilisation of investors in the green transition by intensifying efforts to pull the EU and multilateral development banks in a greener direction. The Government therefore intends to work for the development of international frameworks for businesses and the financial sector that promote green and sustainable investments. This will also support green investments in Denmark.

The EU regulation on a classification system for sustainable economic activities is a step in the right direction, and the Government wants to make a positive contribution towards additional EU initiatives in the financial sector. The Government will be a constructive partner in efforts to promote greater transparency in the financial sector in relation to climate risks. Denmark will therefore contribute to advancing common definitions and transparency that can give investors and consumers the opportunity to “vote with their pocketbooks” by choosing sustainable alternatives. Denmark also supports the Task Force on Climate-related Financial Disclosures (TCFD) initiative. The recommendations of TCFD are helping to create a common global frame of reference for

climate reporting and increasing the incentive for businesses to embrace the green transition. TCFD is thus contributing to shifting finance flows in accordance with the goals of the Paris Agreement.

Public-private partnerships are an important tool for increasing private investments. For example, the Government and a group of private actors have established the Climate Investment Coalition, a public-private partnership with an aim of mobilising institutional investors internationally to increase their investments in the green transition between now and 2030. This sends a clear signal that investors are prepared to make investments if the countries raise their political ambitions and create the right framework conditions for green energy. Going forward, we will collaborate with investors and investor coalitions and other financial actors that are driving the green transition.

Investments must be channelled into the green transition and climate adaptation

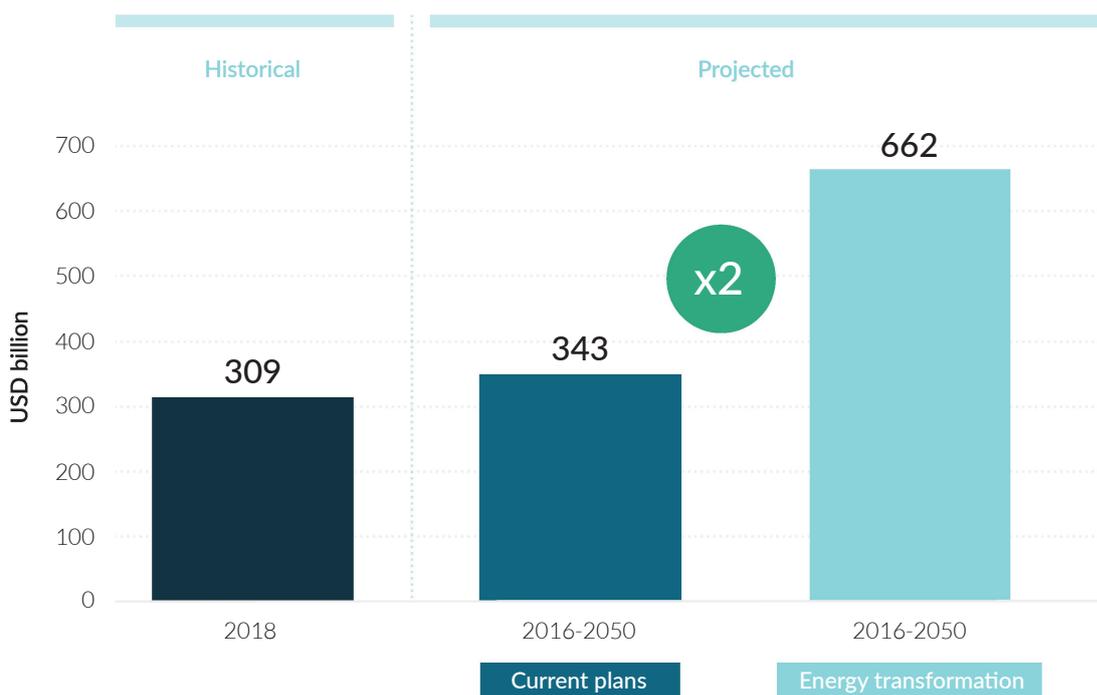
Massive investments in the green transition are needed. Annual investments in renewable energy alone must be nearly doubled, from approximately 350 billion to approximately 650 billion USD annually, by 2050 if the global temperature rise is to be limited to 1.5 degrees¹. In the short run, the economic crisis in the wake of COVID-19 is putting green investments under pressure. Despite the existence of developed green technologies that are

¹ IRENA (2019): Holding the Line on Rising Global Temperatures



Graphic

Massive need for investments in renewable energy to reach the 1.5 degree goal



The graph shows the need for average global annual investments in renewable energy capacity (electricity production) to reach the 1.5 degree goal. Annual investments in renewable energy need to be almost doubled from approximately 350 to approximately 650 billion USD annually until 2050 compared to current plans.

Source: IRENA, 2019: Holding the Line on Rising Global Temperatures. Adjusted by the Danish Ministry of Energy, Climate and Utilities.

competitive with fossil technologies, investments in renewable energy and other green technologies are often seen as more financially risky, particularly in emerging economies and developing countries. This represents a challenge to efforts to advance the green transition. Therefore, Denmark is actively engaging in efforts to improve the framework conditions for investments in the green transition, particularly in renewable energy, through the sharing of our own experiences. This is being done bilaterally through capacity building in Denmark's partner countries, and multilaterally through international organisations such as the OECD, the World Bank and the UN. The Government wants to ensure continued strong focus on the development of framework conditions as a prerequisite

for accelerating global investments in the green transition.

Investment partnerships between public and private actors, also called blended finance, can help improve opportunities to attract private investors and realise projects in emerging economies and developing countries – projects that would otherwise lack financing because large investments in unfamiliar markets are often considered high risk. Denmark is leading the way in the mobilisation of financing from institutional investors for developing countries. For example, the Investment Fund for Developing Countries (IFU) manages an investment fund to promote fulfilment of the SDGs, where private investors – primarily Danish pension funds



Text box

Climate Investment Coalition

The Climate Investment Coalition is working internationally to mobilise pension funds and private investors to increase their investments in green energy and climate solutions. The initiative stems from the 2019 UN Climate Summit, where Danish pension funds announced plans to make new green investments amounting to 350 billion DKK by 2030. The coalition is a collaboration between the Danish Government, Insurance & Pension Denmark, Institutional Investors Group on Climate Change (IIGCC) and World Climate Foundation.

– have pledged to contribute 60% of the fund's total capital of nearly 5 billion DKK. The fund can serve as inspiration for other areas and other countries.

It is particularly challenging to mobilise financing for the least developed and most vulnerable countries. This applies to investments for reducing greenhouse gas emissions and for climate adaptation. According to the UN, there is a need for 150-300 billion USD annually until 2050 for climate adaptation in developing countries. The Government wants to support private investment in the poorest developing countries and emerging economies. This requires new thinking in terms of alternative investments and new instruments that can supplement traditional development assistance.

Another obstacle to green investments in developing countries is a lack of projects that are ready for investment. Therefore, Denmark has taken the lead to establish Climate Investment Platform in collaboration with other multilateral actors. This initiative aims to connect investors with public authorities in developing countries to develop and expand climate projects to help make them ready for investment.

The multilateral development banks, which are a cornerstone in the mobilisation of investment and financing, account for about half of all climate financing for emerging economies and the least developed countries. Thus it is crucial to fully integrate the climate agenda with the traditional and important development focus of these development banks. The Government will work to promote and concretise the green ambitions in the development banks' strategies and across projects, with a focus on increasing investments in renewable energy, upscaling of energy efficiency and access to energy, phasing out investments and subsidies for fossil fuels, strengthening environmental focus – including circular economy, water and biodiversity – and climate financing for the poorest and most vulnerable countries. We will work to bring the development banks' ambitions and financing to the levels

of the European Investment Bank, which decided in 2019 to phase out fossil energy investments from the end of 2021.

The Government will also strengthen its efforts in the multilateral climate and environmental funds, with a particular focus on those established as part of the Climate Convention. The Government will actively engage in strategy development and the awarding of funds from the Green Climate Fund and the Global Environment Facility. Over the next four years (2020-2023) Denmark has the opportunity to directly influence the board of the world's largest climate fund, Green Climate Fund, to drive the global green transition forward with a focus on reduction and adaptation initiatives targeting the least developed countries and small island states.

The Government will ensure that Denmark contributes to the agreement to mobilise at least 100 billion USD annually in the period 2020-2025 from various sources, and we will work to ensure that the EU and the other developed nations do the same. It is especially important that the least developed countries receive a share of these funds. This will contribute to the vital aid to these countries, which are hardest hit by climate change, while also helping developing countries reduce their greenhouse gas emissions. Climate assistance to developing countries is a key element of the green transition in the poorest developing countries and meeting the goals of the Paris Agreement.

The Government will work to strengthen the efforts and commitment of ministries of finance to the green transition through the *Coalition of Finance Ministers for Climate Action*. This coalition brings together more than 50 ministers of finance from around the world and serves as a forum for sharing experience and tools for integrating climate considerations in economic and fiscal policy. Denmark will be particularly involved in sharing Danish experiences with integrating climate and green transition into the Ministry of Finance's economic models.

Strategic initiatives and efforts

- **The Government will** work to ensure that the European Commission makes ambitious proposals that support development, standardisation and acceleration of the markets for sustainable financing.
- **The Government will** support recommendations on how businesses and the financial sector can work with climate-related risks and opportunities through the Task Force for Climate-related Financial Disclosures.
- **The Government will** work to improve framework conditions for the green transition through bilateral and multilateral efforts.
- **The Government will** mobilise more private capital for sustainable investments through innovative financing instruments and public-private partnerships.
- **The Government will**, through active ownership of the Investment Fund for Developing Countries (IFU), create a clear green profile in IFU's investments.
- **The Government will** work to promote and concretise the green ambitions in the multilateral development banks' strategies and across projects.
- **The Government will** strengthen its engagement in the Green Climate Fund and the Global Environment Facility to increase climate financing and investments in sustainability for developing countries, including the most vulnerable countries.
- **The Government will** work for a greater international focus on ensuring adequate climate financing for climate adaptation in the poorest and most vulnerable countries, where market financing is difficult to obtain.
- **The Government will** work to strengthen the role and capacity of ministries of finance in relation to climate action through the Coalition of Finance Ministers for Climate Action, with a particular emphasis on sharing Danish experiences with integrating climate and the green transition into macroeconomic models.

We collaborate with the business community on green solutions that make a difference

In Denmark, we benefit from strong cooperation between public authorities and businesses. This is a great strength that we must value and uphold. A successful global climate effort must include businesses and ensure that Danish solutions deliver for Danes and people around the world.

Danish businesses have a deep-seated commitment to creating solutions that make a difference in the world. The COVID-19 crisis has shown how quickly we as a society and our businesses can mobilise and adapt, and that the private sector can play an important role in solving key societal challenges. The Danish economy and welfare both depend on exporting solutions to neighbouring markets, the EU and globally. We must maintain and expand the green positions of strength held by Danish businesses and increase exports for the benefit of the global green transition, and for the creation of green growth and green jobs in Denmark.

The public and private sectors must collaborate on concrete solutions

All areas of society must contribute in order to meet the global climate challenges. This includes collaborations between public authorities and private sector businesses. Therefore, in collaboration with Danish businesses, the Government has established 13 climate partnerships in different sectors that cover most of the Danish business community. The climate partnerships focus on how businesses and the Government can work together to solve climate

challenges in a way that also supports Danish competitiveness, exports, jobs, welfare and prosperity – without increasing inequality. Danish businesses hold great potential for contributing through their own green transitions, as well as through green imports and exports, and by inspiring others with their ambitions. It is therefore positive that the climate partnerships also have a significant international outlook and point to initiatives that will also have reduction effects outside Denmark's borders. It is a priority of the Government that Danish businesses translate this potential into action so that they can contribute to meeting the ambitions of the Paris Agreement.

We must export green solutions

Denmark is an export-oriented economy where GDP growth is largely driven by exports. We have the opportunity to make a difference globally if businesses change the way they engage in trade in the global market.

The green sector represents a position of strength for Danish businesses. With approximately 71,000 full-time workers and exports amounting to approximately



Text box

Climate partnerships with an international outlook

The climate partnerships have a significant international outlook and point to initiatives that will have reduction effects outside Denmark's borders. For example, the Climate Partnership for Trade points to the potential for global reductions by recycling textiles, greener diets and reducing food waste. The Climate Partnership for "The Blue Denmark" (maritime sector) points to the potential of upscaling big data and eliminating waiting times in ports around the world to reduce the energy consumption of existing ships and lower greenhouse gas emissions by approximately 48 million tonnes of CO₂.

65 billion DKK², this sector provides a basis for increased green growth in Denmark and contributions to the global green transition. Therefore, Danish businesses need favourable conditions for developing and exporting new green products and solutions, including access to export promotion initiatives and financing, as well as new incentives for research and development. The Government will work to ensure the spread of Danish businesses' green solutions through a focused export promotion initiative and by further strengthening green economic diplomacy.

Competition in the export markets is increasing as the market becomes more lucrative. Denmark remains the EU country with the highest export share of green goods. However, it is not a given that Denmark will maintain its leading position as a supplier of green solutions. Therefore, it is important that Danish

businesses follow and contribute to global technological developments so that Danish green solutions remain relevant in the global market. We must also address the barriers experienced by businesses when they export green goods and services, and improve the conditions under which businesses can carry out the necessary green transition. For example, by limiting tariffs on green goods and services, promoting green standards and relevant labelling schemes, ensuring better access to data for green transition, and creating opportunities for large-scale testing and demonstration of innovative solutions.

The positions of strength held by Danish businesses can help push for changes to global regulations and spread solutions globally. It is essential that we expand and maintain Danish positions of strength to reduce emissions from global industries.



Text box

We must take full advantage of our green positions of strength

With the world's fifth largest merchant fleet measured by operated tonnage and as the world's seventh largest exporter of green maritime technologies, Denmark has a unique opportunity to influence the global rules for shipping. It is important to expand and maintain Danish positions of strength in energy efficiency and green fuels for maritime shipping, thus reducing emissions from a sector where a large share of Danish emissions occur outside of Denmark's borders.

We must adapt and develop new green solutions

The Government's ambitions must motivate businesses to work for a more climate-friendly world.

The Government wants to promote the establishment of new green growth businesses and Denmark as a workshop for the development of new green technologies. With the 2020 climate agreement on energy and industry, there is broad political support for Denmark taking the global lead in renewable energy and ensuring an ambitious green transition of industry.³ Denmark is facing an ambitious expansion of green energy and a significant investment in green technologies of the future, including carbon capture and Power-to-X. Denmark has entered into a partnership with the Netherlands, which will finance a subsidy scheme for Power-to-X plants with at least 750 million DKK. The collaboration will help to collect experiences with large-scale production of green fuels for transport and industry, and strengthen international cooperation in the Power-to-X sector. The UN's Intergovernmental Panel on Climate Change estimates that capture and storage are necessary to meet the goals of the Paris Agreement. These technologies will contribute to a reduction of greenhouse gas emissions, including in sectors where it is currently difficult or not

possible to reduce emissions. The expanded use of these technologies can also make a positive impact globally. We must seize this opportunity and engage in partnerships to spread these new technologies in the EU and globally.

We must collect knowledge and investments for Denmark's green transition

Denmark is leading the way with an ambitious national green transition, and we can make great strides with established technologies and instruments. But there is also a need to develop technologies through cooperation with other countries and the international business community to attract knowledge, innovation and investments from other countries, businesses and actors. This can contribute to our domestic efforts to reduce greenhouse gas emissions by 70% by 2030 and the goal of climate neutrality by 2050. The Government will work to attract green investments to Denmark and engage in international collaborations on innovation and research, which can strengthen the role of Danish knowledge institutions and accelerate the development of new green technologies that can contribute to maintaining Danish positions of strength. Intensified climate diplomacy efforts can also contribute to these efforts.

² Eurostat and calculations by the Ministry for Industry, Business and Financial Affairs (2017 figures).

³ 2020 Climate Agreement on Energy and Industry etc. from 22 June 2020.

(available in Danish <https://fm.dk/media/18085/klimaaf tale-for-energi-og-industri-mv-2020.pdf>)

Strategic initiatives and efforts

- **The Government will** strengthen green economic diplomacy and promote exports of green solutions.
- **The Government will** work to attract more green investments to Denmark.
- **The Government will** contribute to helping Danish businesses develop and re-establish themselves in export markets after the COVID-19 crisis, with a particular focus on sustainable and green exports.
- **The Government will**, across all public authorities and through the 13 climate partnerships, cooperate with the Danish business community to create larger and more attractive markets for Danish solutions.
- **The Government will** work to strengthen the framework conditions nationally, in and through the EU, and multilaterally to ensure that businesses can carry out the necessary green transition and spread green solutions.
- **The Government will** closely follow efforts with European industrial alliances and actively join the European Clean Hydrogen Alliance to push it in a green direction and pave the way for Danish businesses to be part of tomorrow's green European value chains.
- **The Government will** collaborate with businesses and international actors to create green ecosystems and develop new green solutions and fuels.
- **The Government will** spread Danish green solutions through Denmark's Green Future Fund and, more broadly, strengthen the development of future green positions of strength and innovation.
- **The Government will** work to increase collaboration in research and technology development and to attract knowledge, experience and solutions to Denmark, including via the Danish innovation centres and Strategic Sector Cooperation. A key aim of these efforts will be to support the Government's priorities in the Green Research Strategy.

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