Netherlands Enterprise Agency

First Biennial Transparency Report of the Netherlands under the Paris Agreement

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Executive summary

ES.1 Introduction

This report represents the First Biennial Transparency Report (BTR) from the Netherlands.

The BTR is a pivotal part of the Enhanced Transparency Framework, established by Article 13 of the Paris Agreement. The purpose of this BTR is to provide a clear understanding of climate change action in the light of the objective of the Convention and enhanced implementation thereof as set out in Article 2 of the Paris Agreement, including clarity and tracking of progress towards achieving Parties' individual nationally determined contributions (NDCs) under Article 4, support provided and received by relevant individual Parties and Parties' adaptation actions under Article 7, including good practices, priorities, needs and gaps, to inform the global stocktake under Article 14.

As reporting under the UNFCCC (Convention, Kyoto Protocol and Paris Agreement) is only required for the European part of the Kingdom of the Netherlands, the scope of this BTR is limited to the European part of the Kingdom (referred to as "the Netherlands").

The following offers a brief outline of the report:
Chapter 1 provides a brief introduction to the BTR, offering guiding principles and some context in which this reporting takes place. Chapter 2 summarizes the main trends in national greenhouse gas emissions and removals over the period 1990-2022, as described in the annual National Inventory Report of the Netherlands (submitted as a separate report). Chapter 3 first sets out the particular national circumstances and institutional arrangements of the Netherlands that are of relevance in the context of climate action, before outlining the key aspects of the joint EU NDC (indicators, definitions, methodologies). It then goes on to describe the climate policy framework of the Netherlands, highlighting policies and measures (PaMs) per sector and the impact thereof; as well as the main projections results for greenhouse gases for the period 2025 – 2040, based on the National Climate and Energy Outlook 2024 (KEV2024). Chapter 4 describes the institutional arrangements and governance of climate adaptation in the Netherlands, in which the different roles, responsibilities and policy frameworks within the government are outlined regarding adaptation. Chapter 5 details the Netherlands's support for climate action in developing countries and provides information on financial, technology development and transfer and capacity-building support provided and mobilized. Lastly, chapter 6 identifies some areas of improvement in reporting by the Netherlands compared to previously submitted national reports.

ES.2 National Inventory Report

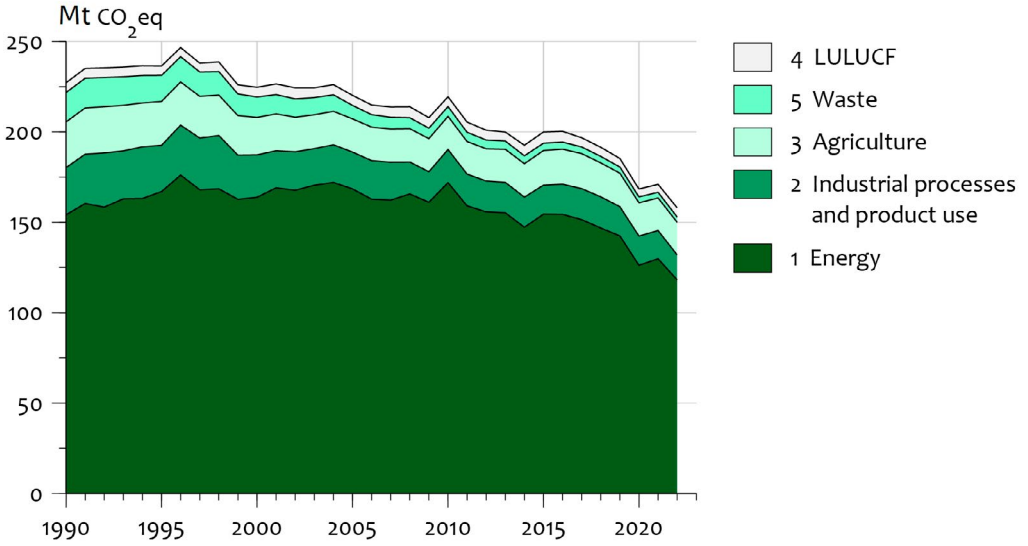
The Netherlands submitted its most recent National Inventory Report (NIR) for the 1990-2022 period to the UNFCCC in November 2024 as a separate report. The NIR consists of the National Inventory Document (NID) with accompanying methodology reports and the Common Reporting Tables (CRT), which together provide a complete overview of the Netherlands' greenhouse gas inventory in quantitative and qualitative terms.

Main trends in national greenhouse gas emissions and removals

In 2022, the total GHG emissions (including indirect CO_2 emissions and emissions from land use, land use change and forestry (LULUCF)) in the Netherlands amounted to 158.4 Megatons (Mt) CO_2 equivalents (CO_2-eq). This figure is approximately 30.5% below the total emissions in the base year of 1990 (228.1 Mt CO_2-eq). In the period 1990–2022, emissions of carbon dioxide (CO_2) decreased by 21.6% (including LULUCF). Emissions of non-CO_2 GHGs, i.e. methane (CH_4), nitrous oxide (N_2O) and F-gases (HFCs, PFCs, SF_6 and NF_3), decreased by 49.0%, 58.7% and 83.4%, respectively.

Figure ES.1 provides an overview of emission trends for each IPCC sector in Mt CO_2-eq. The Energy sector is by far the biggest contributor to the total GHG emissions in the national inventory, accounting for around 68% in the base year and 75% in 2022. Emission levels in the Energy sector decreased by approximately 23.3% in the 1990-2022 period (to 118.2 Mt CO_2-eq in 2022). The total GHG emissions in 2022 from the IPPU (14.3 Mt CO_2-eq), Agriculture (18.0 Mt CO_2-eq) and Waste (2.9 Mt CO_2-eq) sectors decreased by approximately 47%, 29% and 82% respectively, compared to 1990. The LULUCF emissions (5.1 Mt CO_2-eq in 2022) decreased by 6% in the same period. The decrease in greenhouse gas emissions occurred despite a growing population and economy: since 1990 the trends of greenhouse gas emissions per capita and the greenhouse gas emissions intensity versus GDP is a decreasing one.

Figure ES.1: Aggregated greenhouse gas emission trends and levels by sector, 1990-2022, in Mt CO_2-eq.



Since 2005 the Netherlands has a National System in place for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. The Netherlands Enterprise Agency (RVO) holds the role of 'single national entity' (NIE) within this system. The coordination of the Pollutant Release and Transfer Register (PRTR) – in which emissions of about 350 substances are annually calculated and which forms the basis of the NIR – is performed by the National Institute for Public Health and the Environment (RIVM).

ES.3 Information necessary to track progress

Climate target

The EU and its Member States, acting jointly, are committed to a legally binding target of a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 by 2030. The European Climate Law sets the goal of climate neutrality by 2050 and the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. This target for 2030 corresponds to the target of the EU NDC.

The joint EU NDC is an 'economy-wide absolute emission reduction'. The scope of the NDC covers the 27 Member States of the EU, which includes the Netherlands. The Nationally Determined Contribution (NDC) covers the emissions and removals from all sectors of the European Union (EU) GHG inventory. In addition, CO_2 emissions from specific international flights (covered by the EU Emission Trading System -ETS) and GHG emissions from maritime voyages between EU Member States are included in the scope of the NDC. The emission reductions are to be achieved within the EU, so without the use of international credits. For the LULUCF sector, net emissions are used for tracking progress towards the 2030 target of the NDC, based on all reported emissions and removals. For the tracking of progress towards implementing and achieving the NDC of the EU, the chosen indicator is the 'annual total net GHG emissions consistent with the scope of the NDC in CO_2eq'. To track progress by the Netherlands towards the national contributions for reducing emissions covered by the ESR and LULUCF, two indicators are added. Table ES.1 summarises the current status of progress.

Table ES.1: Summary of progress towards implementing and achieving the EU NDC and the contribution by the Netherlands.

	Unit	Base year value	Values in the implementation period			Target level	Target year	Progress made towards the NDC
			2021	2022	2030			
Indicator: Total net GHG emissions in the EU consistent with the scope of the EU NDC	kt CO_2 eq	4 699 405	3 272 650	3 205 223	NA	55% below base year level	2030	The most recent level of the indicator is 31.8 % below the base year level.
Annual total GHG emissions in the Netherlands covered by the EU Effort Sharing Regulation (ESR) in CO_2eq.	Mt CO_2-eq	128.1	92.9	84.8	NA	66.6 (48% below base year level)	2030	The most recent level of the indicator is 33.8 % below the base year level.
Annual total net GHG emissions in the Netherlands covered by the EU Land Use, Land Use Change and Forestry (LULUCF) Regulation in CO_2eq.	Mt CO_2-eq	5.4	4.4	5.1	NA	4.9 (0.435 Mt CO_2-eq below base year level)	2030	The most recent level of the indicator is 0.3 Mt below the base year level.

NA: Not Applicable.

Note that an annual emissions balance consistent with chapter III.B (Application of corresponding adjustment) will be provided in a subsequent BTR upon finalisation of relevant further guidance by the CMA, based on the annual information reported under Article 6.2.

Note: More detailed information can be found in CTF table 4 ('Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement'), which has been submitted electronically together with this BTR. This table is also annexed to this BTR.

Sources: The indicator values for the total GHG emissions in the EU are based on the Annual European Union GHG inventory 1990-2022. The values for total GHG emissions GHG emissions in the Netherlands are based on the Netherlands National Inventory Report 1990-2022.

Policies and Measures

To ensure that the EU and its Member States achieve their target, the 2030 EU Climate and Energy Framework was put in place. The main elements of this framework are the EU Emissions Trading System (EU ETS)[1], which caps GHG emissions in energy, industry, aviation and maritime transport; the LULUCF Regulation, which includes national net removal targets for the LULUCF sector; and the Effort Sharing Regulation (ESR), which establishes national reduction targets for GHG emissions not covered by the EU ETS or the LULUCF Regulation. The implementation of the ESR is supported by additional sectoral policies and measures, both European and national ones. The legislative acts under the 2030 Climate and Energy Framework require the European Commission and the EU Member States to set up the institutional arrangements for implementing the specific policies and measures. Progress in the implementation of these policies and measures is monitored under the Governance Regulation.

The Netherlands contributes to the achievement of EU climate targets for 2030. This target is divided into sub-targets for sectors covered by the EU ETS, sectors covered by the EU ESR and the LULUCF-sector. ESR-sectors are those not covered by the EU ETS or the LULUCF-sector. The (binding) targets on Member State-level have only been set for the ESR and LULUCF-sectors. The GHG emission reduction target for ESR-sectors in the Netherlands is a reduction of 48% in 2030 relative to 2005. The national target for the Netherlands in the LULUCF sector is a net removal of 0.435 Mt CO_2-eq in 2030 relative to the average GHG net emissions in the years 2016, 2017 and 2018.

Beside the contribution to EU-targets, the Dutch government is committed to achieve a 55% reduction of the Netherlands' GHG emissions by 2030, compared to 1990 levels, and to reach climate neutrality by 2050. These targets are enacted in the national Climate Act ("Klimaatwet") adopted on 28 May 2019, which is in line with the European Climate Law.

To achieve these ambitions, the Climate Act requires the government to adopt a national climate plan. The first plan, for the period 2021-2030, was published in 2020. At that time, the plan aimed to achieve the target of 49% reduction in 2030 compared to 1990 levels. The Climate Plan 2021-2030 is based on the National Climate Agreement, concluded in June 2019. Drafted and signed by the stakeholders from participating sectors, this agreement concerns their actions to help achieve the climate goals. The participating sectors are electricity, industry, built environment, traffic and transport, and agriculture. Additional policies and measures were announced in 2022 and 2023 to meet the 55% emission reduction target. In 2024, the new government announced several policy changes. In line with the national Climate Act, the government will publish the 2nd national Climate Plan for the period 2025-2035 in the second quarter of 2025.

Since 1990, the Netherlands has implemented many policies and measures (PAMs) which have (had) a significant impact on greenhouse gas (GHG) emissions in the Netherlands, even if the primary objective of the policy is (or was) not directly related to climate change. The policies and measures currently implemented or planned are described by sector, in addition to cross-sectoral policies and measures.

The Climate Act also includes provisions to monitor and evaluate the progress of the climate plan. The government reports annually to the Parliament on the progress of the climate plan and will propose additional measures when needed. To inform the government and parliament on the progress, projections of greenhouse gases are reported in the annual Climate and Energy Outlook prepared by the Dutch Environmental Assessment Agency (PBL).

Projections

Based on existing policies (the "With Existing Measures" or WEM variant), projected greenhouse gas emissions fall to 114-131 Mt CO_2-eq by 2030. This is an emission reduction of 42.5-50.0% from 1990 levels. The variant with additional measures (WAM) results in only slightly lower emissions with a decrease to

[1] This refers to the ETS1, i.e. the Emission Trading System for stationary sources (Chapter III of the ETS Directive) and for aviation and maritime transport (chapter II of the ETS Directive). Note that the 'Emissions trading system for buildings, road transport and additional sectors' (ETS2), added in 2023 as Chapter IVa of the ETS Directive, forms an instrument under the Effort Sharing Regulation (ESR).

110-127 Mt CO_2-eq by 2030, a reduction of 44.4-51.8% compared to 1990. The possible reduction of emissions from scheduled policies and measures (the WSM variant) is estimated, on balance, to be relatively small with an additional reduction of 1 Mt CO_2-eq in 2030. This would result in emissions by 2030 that would be 44.7-52.1% below 1990 levels. In all variants, the national target to reduce greenhouse gas emissions with 55% by 2030 compared to 1990 levels is not achieved.

For the EU ETS, there are no targets on Member State level, but only on EU-level. Greenhouse gas emissions from companies in the Netherlands covered by the original European Emission Trading System (EU ETS1) have been declining since 2015, mostly due to increased use of renewable energy and lower electricity production from coal-fired power plants. In 2023, ETS1-emissions fell to 58.9 Mt CO_2-eq (around 40.1% of the total national GHG emissions), which represents a drop of 9.6 Mt CO_2-eq in ETS1-emissions compared to 2022. In the projections with additional measures (WAM), ETS1-emissions are expected to decrease further to 43.8 [38.4-51.8] Mt CO_2-eq by 2030, representing a drop of 45.5% [35.6-52.2%] in ETS1-emissions compared to 2005 levels. This further decrease after 2023 is largely due to the ban on the use of coal for electricity production from 2030 onwards. The possible additional reduction of ETS1-emissions by also incorporating scheduled policies and measures (the WSM variant) in the estimates, results in a slight further decrease of ETS1-emissions to 37.8-51.2 Mt CO_2-eq by 2030.

Under the European Effort Sharing Regulation (ESR), EU Member States have agreed on national targets for greenhouse gases that fall within the ESR-scope (2021-2030 period). The ESR covers most emissions from mobility, the built environment and agriculture, as well as emissions from smaller industry, including waste processing. National ESR-emissions amounted to 84.1 Mt CO_2-eq in 2023. The majority of these emissions came from mobility (36%), followed by agriculture (30%) and the built environment (20%). In the 2021-2030 period, emissions covered by ESR are expected to decrease further across all sectors. In the projections with additional measures (WAM), emissions are expected to decrease to 68.3 [63.3-73.2] Mt CO_2-eq by 2030. For the WSM variant which also includes scheduled policies and measures, ESR-emissions drop to 63.6-73.6 Mt CO_2-eq by 2030. Based on the annual emissions between 2021 and 2023 and the projected ESR-emissions between 2024 and 2030 (following the WAM variant), the cumulative emissions amount to 800 [781-819] Mt CO_2-eq for the 2021-2030 period. This would remain 30.1 [11.0-49.4] Mt CO_2-eq below the allocated emission allowance of 830 Mt CO_2-eq for the Netherlands, meaning that the Netherlands contributes more than needed to meet the EU-wide emission reduction target under the ESR.

Net emissions from LULUCF declined from 5.4 Mt CO_2-eq in 2000 to 5.1 Mt CO_2-eq in 2022. The main emission sources are grasslands (on peatland), croplands and soils in the built environment. Projected net emissions from LULUCF will decrease to nearly 4.8 [4.7-5.3] Mt CO_2-eq in 2030 in both the WEM and WAM variants, which is about 11% below 1990 levels. The binding national target under the European Land Use, Land Use Change and Forestry (LULUCF) Regulation is a reduction of 0.435 Mt CO_2-eq in 2030 compared to the average of the years 2016-2018. This translates in an (net) emission target of 4.9 Mt CO_2-eq in 2030. This target falls within the range of projected net emissions for 2030.

ES.4 Climate change impacts and adaptation

The climate in the Netherlands is expected to undergo significant changes over the coming decades. The Netherlands has become warmer since the start of the 20th century, with average temperatures in De Bilt (the central meteorological point of measurement in the Netherlands) having increased by 2.3 °C between 1901 and 2020. In all four scenarios developed by the Royal Netherlands Meteorological Institute (KNMI), the temperature is expected to increase further towards 2050 and 2100. Extreme precipitation has increased as well up to 2020 and is likely to further increase towards 2050 and 2100, including higher frequencies and intensities of extreme precipitation. The most pressing potential consequences of the changing climate in the Netherlands are increasing heat stress, increasing flood risks due to both more extreme river discharge and sea level rise, drought, more frequent failure of vital infrastructure like electricity and IT, more frequent damage to crops or production resources, an increased health burden and productivity loss, and changes in biodiversity. These conditions in a country such as the Netherlands, situated in a low-lying delta area

intersected by four large rivers and with a high population density, give rise to climate change impacts that require risk assessments, planning and timely decision-making on smart interventions.

The Netherlands has established comprehensive institutional arrangements to address climate adaptation, involving multiple government levels, specialized agencies, and collaborative frameworks. At the national level, the Ministry of Infrastructure and Water Management (IenW) is the coordinating ministry charged with national climate change adaptation. It actively coordinates with other ministries on domestic and international adaptation efforts, and formulates and oversees the implementation of the National Climate Adaptation Strategy (NAS).

The NAS is the precursor to a Climate Adaptation Implementation Programme which is currently being developed. Its goal is to mainstream climate adaptation in all policies, policy implementation and relevant activities of civil society, targeting the effects of climate change within nine sectors: water and spatial management; nature; agriculture, horticulture and fisheries; health and welfare; recreation and tourism; infrastructure; IT and telecommunications; and public safety and security. The NAS focuses on integrating climate adaptation into these sectors and prioritizes a multi-level governance approach which fosters collaboration between national, regional, and local authorities, as well as engaging stakeholders from the private sector and civil society. Key actions include improving climate data and risk assessments, enhancing adaptive capacity through innovation and knowledge dissemination, and ensuring that adaptation measures are sustainable and economically viable. Following the periodic, required comprehensive evaluation of the NAS, the National Implementation Plan Climate Adaptation ("Nationaal Uitvoeringsprogrammema Klimaatadaptatie") was adopted in 2023, which further operationalizes the NAS by detailing specific actions, timelines, and responsibilities for implementation.

Additionally, within the Dutch institutional arrangements, there is an important role for the Delta Programme, which is overseen by an independent Delta Programme Commissioner. The programme aims to protect against flooding, ensure freshwater supply, and enhance climate resilience by 2050 through cross-sector collaboration. It employs dynamic planning, a multilayered safety approach, and stakeholder collaboration, involving national, regional, and local governments, private sectors, and civil society organizations. The programme exists of three core elements, namely:

1. Flood Risk Management (enhancing and maintaining dikes, dams, and flood barriers to withstand extreme weather and sea-level rise);
2. Freshwater Supply (ensuring the availability of freshwater resources for agriculture, industry, and households through improved water management practices and infrastructure);
3. Spatial Adaptation (integrating climate adaptation measures into spatial planning to create resilient urban and rural areas). Each year a Delta Programme report is sent to the Dutch parliament containing an update on the current situation regarding climate adaptation and forecasting the programmes of measures.

To further strengthen monitoring and evaluation, the Netherlands is currently in the process of developing a comprehensive national monitoring and evaluation system. It will entail monitoring the progress of the implementation programme, monitoring the extent to which climate adaptation measures are effective in terms of risk reduction and monitoring the development of climate change risks to all sectors. This monitoring scheme will be fully operational in 2026 and will ensure structured monitoring of the progress on climate adaptation.

ES.5 Support provided and mobilized

The Netherlands' support for climate action in developing countries has been an integral part of its international cooperation. The Netherlands has been committed to contribute in the international effort to support mitigation and adaptation activities in developing countries. The Netherlands realized a year-on-year increase in its climate finance, including both public and mobilized private climate finance, since 2010. This has been achieved by an allocation of additional resources for climate-specific action, a better integration of climate objectives in development cooperation and a more effective mobilization of private finance for climate action.

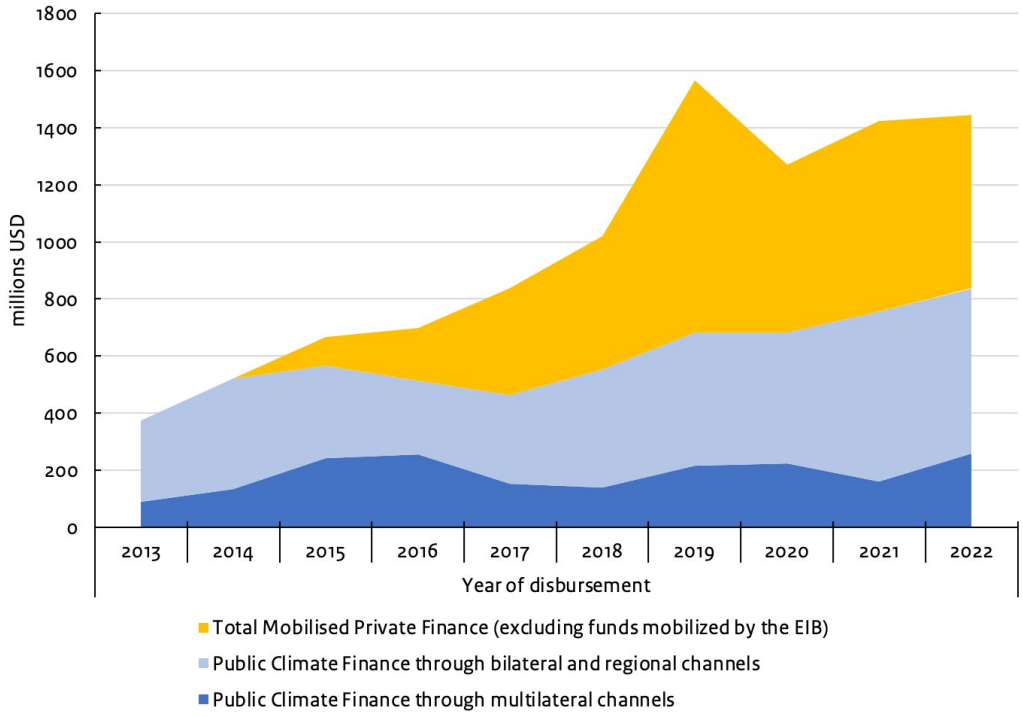
The Netherlands has aimed to provide balanced support to mitigation and adaptation. To support mitigation, the Netherlands invest in, among others, providing access to renewable energy and on halting deforestation. To support adaptation, the focus is on climate-smart agriculture, climate-resilient infrastructure, integrated water resource management, the provision of climate-resilient water, sanitation and hygiene services (WASH). The private sector is mobilized for adaptation in programmes such as the Dutch Fund on Climate and Development. A number of activities contributes to both adaptation and mitigation, as there is a growing awareness that many challenges are interlinked and are best addressed in an integrated manner (e.g., climate smart agriculture).

Gender equality and intersectionality are important crosscutting issues, as climate action is most effective when it builds on the capacities and addresses the aspirations, needs as well as the vulnerabilities of marginalized peoples.
In line with the above policies, the Netherlands has focused its bilateral aid relationships on countries in West-Africa/Sahel, Northern-Africa, Middle East and the Horn of Africa. However, given the global challenge that climate change presents, there has been flexibility to provide support to programmes and initiatives that target climate change at a global level beyond the regions listed.

The Netherlands works with a wide range of global, regional, national and local partners including governmental structures, multilateral organisations, funds, private sector organisations, knowledge institutes and non-governmental organisations (NGOs) & civil society organisations (CSO's), to support climate action in developing countries.

Committed to scaling up its support for mitigation and adaptation activities in developing countries, the Netherlands has realised a year-on-year increase in climate finance (see Figure ES.2).

Figure ES.2: Public and Mobilised Private Climate Finance provided by the Netherlands from 2013–2022 (rounded figures in millions USD).



Over the period 2021–2022, total adaptation expenditures amounted to a little over 49% of Dutch public climate finance (€ 705 million out of € 1.433 million) and mitigation expenditures to more than 28% (€ 404 million). Much of public climate finance also supported cross-cutting activities (€ 324 million or close to 23%), mainly due to substantial contributions through multilateral organisations, in particular multilateral

development banks. The Netherlands started to track private climate finance mobilised by public finance in 2015 only, in accordance with the 'Joint Statement on Tracking Progress Towards the USD 100 Billion Goal'. As data and methodological limitations are still a serious constraint, the reported amounts should be considered as best estimates currently available.

Multilateral climate change funds to which the Netherlands contributed core funding include the Green Climate Fund (GCF), the Global Environment Facility (GEF), the Least Developed Countries Fund (LDCF) and the Climate Investment Funds (CIFs). The Netherlands is also a major donor of core funding to multilateral development banks (MDB's) such as the World Bank (IDA, IFC and IBRD), the Asian and African Development Banks, International Fund for Agricultural Development (IFAD) and the United Nations' agencies and funds that provide significant support to climate action in developing countries.

The Netherlands focuses on the mobilisation of blended and/or innovative finance through its private sector development portfolio, its cooperation with MDBs and FMO and through the development of specific funds tailored to public-private cooperation. In line with its foreign trade and development cooperation strategy and the Global Climate Strategy, the Netherlands strives to further increase the mobilised private finance for climate action.

The Netherlands is at the forefront of developing innovative, resilient and sustainable techniques in many of the relevant sectors and regards technology development and transfer as an important element of its actions to promote climate adaptation and mitigation worldwide. The government is keen to mobilize Dutch knowledge and expertise to support local actors' self-development in the Global South. Good examples of support for the development and enhancement of capacities and technologies include a range of programmes implemented by the Netherlands Enterprise Agency (RVO) such as the Energising Development Partnership Programme (EnDev) and the Climate and Energy Response Facility (CERF).

Capacity development of local partners in developing countries forms an integral part of many activities that support climate change mitigation or adaptation. The Dutch strategy takes a positive approach by assessing the capacities already there, identifying the aspiration and facilitating the further self-development of capacities whereby outsiders' support can be instrumental. Another feature of this strategy is that mobilization and development of capacity of local partners in developing countries is an integral part of many activities that support climate change mitigation or adaptation. Good examples of programmes where south-south learning and sharing is actively supported and promoted are the NDC Partnership and the Climate & Development Knowledge Network (CDKN).

1 Introduction

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This BTR follows the requirements according to decision 18/CMA.1.[2] The guiding principles of the therein mentioned these modalities, procedures and guidelines (MPGs) are:

- Building on and enhancing the transparency arrangements under the Convention, recognizing the special circumstances of the least developed countries (LDCs) and small island developing States (SIDS), and implementing the transparency framework in a facilitative, non-intrusive, non-punitive manner, respecting national sovereignty and avoiding placing undue burden on Parties;
- The importance of facilitating improved reporting and transparency over time;
- Providing flexibility to those developing country Parties that need it in the light of their capacities;
- Promoting transparency, accuracy, completeness, consistency and comparability;
- Avoiding duplication of work and undue burden on Parties and the secretariat;
- Ensuring that Parties maintain at least the frequency and quality of reporting in accordance with their respective obligations under the Convention;
- Ensuring that double counting is avoided;
- Ensuring environmental integrity.

As reporting under the UNFCCC (Convention, Kyoto Protocol and Paris Agreement) is only required for the European part of the Kingdom, this BTR reports only on that part of the Kingdom (referred to as "the Netherlands"). The National Inventory Report (1990-2022) is submitted as a separate report. A summary of the NIR has been provided in chapter two of this BTR. Information necessary to track progress, including information on policies and measures and projections, is provided in chapter three. Climate change impacts and adaptation is described in chapter four. Support provided and mobilized by the Netherlands is provided in chapter five. Although this is the first BTR of the Netherlands, it builds on many reports that have been submitted previously under the Convention and the Kyoto Protocol. Therefore, an overview of major changes and/or improvements is provided in chapter six. The Common Tabular Format (CTF) tables as required by decision 5/CMA.3, which are submitted by the Netherlands using the UN Reporting Tool[3], should be considered to be an integral part of this BTR. Also, several annexes are included.

The BTR was first published in November 2024. This version includes editorial improvements and minor corrections (most notably some figures in Table 3.11 and 3.12). Also, Annex 6 has been included in this version.

[2] Decision 18/CMA.1 (para 1 – 145): *https://unfccc.int/resource/tet/o/oompg.pdf*

[3] https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review/transparency-data-and-tools/etf-reporting-tools?gad_source=1&gclid=EAIaIQobChMIsIWml7CSiQMVw7CDBxoqzR5IEAAYASAAEgLQoPD_BwE

2 National Inventory Report

2.1 Introduction

The Netherlands submitted its most recent National Inventory Report (1990-2022 period) to the UNFCCC in November 2024 as a separate report. The NIR consists of the National Inventory Document (NID) with accompanying methodology reports and the Common Reporting Tables (CRT), which together provide a complete overview of the Netherlands' greenhouse gas inventory in quantitative and qualitative terms. The following section provides a summary of the main trends in national greenhouse gas emissions and removals as described in the NIR 2024, with summary tables to be found in CTF table 6. Throughout this summary, it should be noted that more detailed explanations are provided in the Netherlands' NIR 2024 (Emissieregistratie, 2024a). Figures and graphs in this chapter are taken from the NIR 2024, unless otherwise mentioned.

Disclaimer
The year 2024 represents a transitional year with the start of reporting under the Paris Agreement through the Enhanced Transparency Framework (ETF). As part of this transition, new ETF reporting tools have been made available by the secretariat (July 2024), including for the Common Reporting Tables (CRT). The NIR compilation in the Netherlands has become a regular process over the years, which for a long time has followed an annually repeated cycle aimed at delivery of the final NIR submission to the UNFCCC by the 15th of April (and a matching EU internal deadline to submit the final version by the 15th of March to facilitate the compilation of the EU NIR). Although the UNFCCC deadline for reporting in 2024 was set later in the year to help accommodate the delivery of – and familiarization with – the new reporting tools, the regular national inventory cycle had to be maintained as the EU internal deadline still needed to be met (as well as the regular national cycle in releasing emission figures). As such, the NIR 2024 was finalized by March 2024 as usual, using the existing CRF reporter to deliver the necessary tables. The emission figures as contained in the CRF are based on our national database; and for the subsequent compilation of the CRT, the same national database was used after linking the various unique identifiers in a similar manner as had previously been done for the CRF reporter.

Despite encountering some technical issues in correctly linking the national database with all (sub) categories in the new reporting tools, the yearly national totals in the CRT for the period 1990-2022 all correspond – with one exception – within 1-5 kt CO_2eq of the previously reported national totals in the CRF as finalized in March 2024, on which basis the NID was drafted. The most significant remaining issue for the Netherlands is a discrepancy for CH4 in 3.B.4.h 'Other' in the summation of the emission from country specific child nodes, which appears to be the result of a technical issue in the CRT tool; this is clearly seen in 1990 figures for the Netherlands, where it results in a discrepancy for CH4 of around ˜56 kt CO_2eq. This issue was reported but was unresolved at the time of drafting. As the remaining differences are relatively small and well within the threshold of significance (with the remaining margin of 1-5 kt CO_2eq largely relating to summing/rounding errors), and work on the NIR 2025 submission has already started (which as usual will incorporate improvements across all sectors encompassing such deviations), it seemed better to focus efforts and limited resources on the 2025 submission rather than manually revising the NID 2024 to account for any minor fluctuations within this 1-5 kt CO_2eq margin (which will otherwise already be automatically addressed in the NIR 2025 compilation process).

Therefore, to reiterate, it should be noted that:

1. The GHG inventory data in this report was compiled using the September 2024 release of the 'CRT reporting tool' provided by the UNFCCC Secretariat. Data provided by this tool may differ from the actual inventory data in some cases due to any remaining technical issues and errors caused by the CRT electronic tool affecting the quality of the GHG inventory.
2. There is a discrepancy in the CRT for CH4 in 3.B.4.h 'Other' in 1990 of around ~56 kt CO_2eq (this is incorrectly reflected in the 1990 total in the CRT, while the NID reflects the correct value). This will be addressed in the next NIR submission.
3. There are slight fluctuations in the CRT figures compared to the figures referenced in the NID, which fall within a 1-5 kt CO_2eq margin and are largely the result of summing/rounding errors. This will be addressed in the next NIR submission.
4. References to CRF categories throughout the NID should be read as CRT categories. This will be addressed in the next NIR submission.
5. The Netherlands does not accept responsibility and should not be held liable for any remaining technical issues and errors caused by the CRT electronic tool affecting the quality of its GHG inventory during the technical expert review.

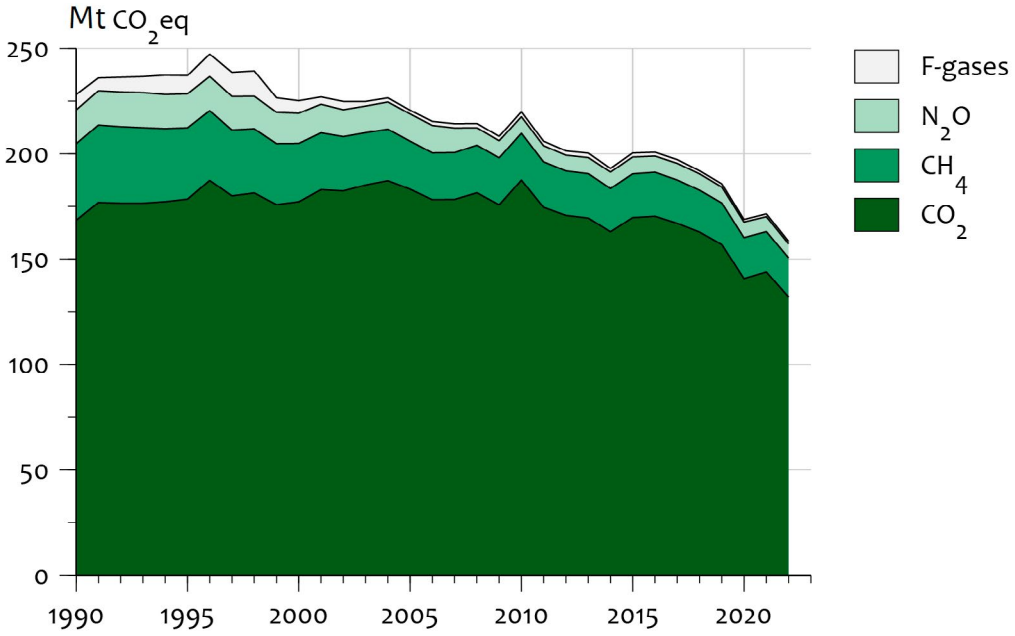
2.2 Descriptive summary

Trends in aggregated greenhouse gas emissions

In 2022, the total GHG emissions (including indirect CO_2 emissions and emissions from land use, land use change and forestry (LULUCF)) in the Netherlands amounted to 158.4 Mt CO_2 equivalents (CO_2-eq). This figure is approximately 30.5% below the total emissions in the base year of 1990 (228.1 Mt CO_2-eq).

Figure 2.1 shows the trends and contributions of the different gases in relation to the aggregated national emissions of greenhouse gases. In the period 1990–2022, emissions of carbon dioxide (CO_2) decreased by 21.6% (including LULUCF). Emissions of non-CO_2 GHGs, i.e. methane (CH_4), nitrous oxide (N_2O) and F-gases (HFCs, PFCs, SF_6 and NF_3), decreased by 49.0%, 58.7% and 83.4%, respectively.

Figure 2.1: Greenhouse gas trends and emission levels, 1990–2022, in Mt CO_2-eq (NIR 2024).

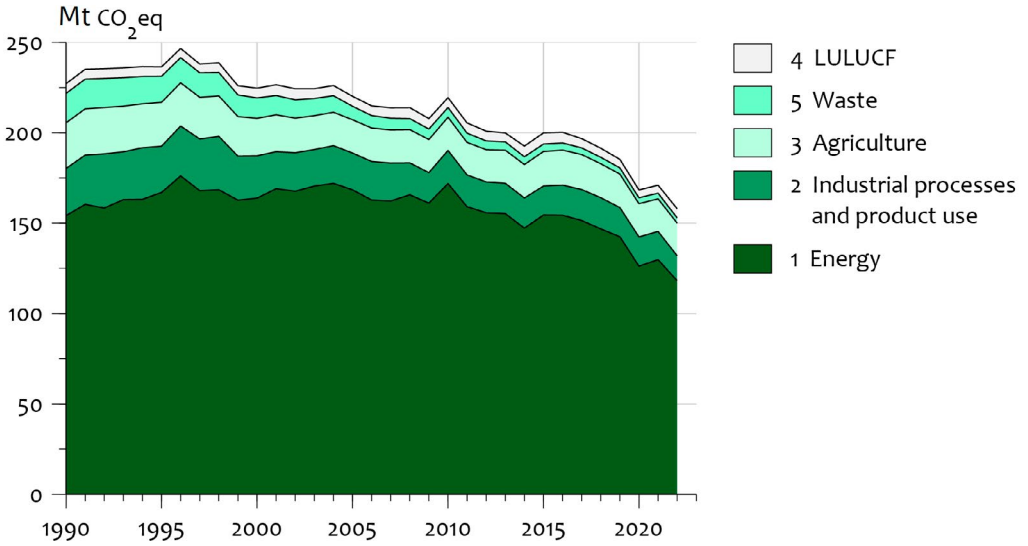


Emission trends specified by source category

Figure 2.2 provides an overview of emission trends for each IPCC sector in Mt CO_2-eq. The Energy sector is by far the biggest contributor to the total GHG emissions in the national inventory (accounting for around 68% in the base year and 75% in 2022). Emission levels in the Energy sector decreased by approximately 23.3% in the 1990-2022 period (to 118.2 Mt CO_2-eq in 2022).

The total GHG emissions in 2022 from the IPPU (14.3 Mt CO_2-eq), Agriculture (18.0 Mt CO_2-eq) and Waste (2.9 Mt CO_2-eq) sectors decreased by approximately 47%, 29% and 82% respectively, compared with the base year. The LULUCF emissions (5.1 Mt CO_2-eq in 2022) decreased by 6% in the same period.

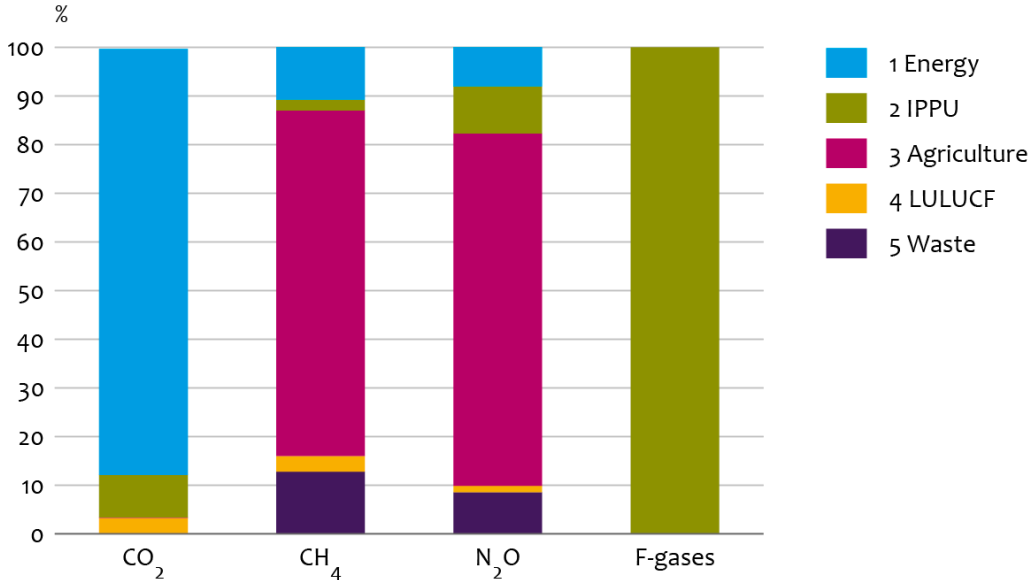
Figure 2.2: Aggregated greenhouse gas emission trends and levels by sector, 1990-2022, in Mt CO_2-eq (NIR 2024).



Emission trends by gas

In figure 2.3 the contributions of the individual sectors (including LULUCF) to the total emissions of the different GHGs are shown. The dominance of the Energy sector regarding CO_2 emissions is clearly visible. Likewise, the agricultural sector is the main contributor of CH_4 and N_2O emissions. All F-gases originate from the IPPU sector.

Figure 2.3: Relative contributions of the individual sectors (including LULUCF) to GHG emissions in 2022 (NIR 2024).

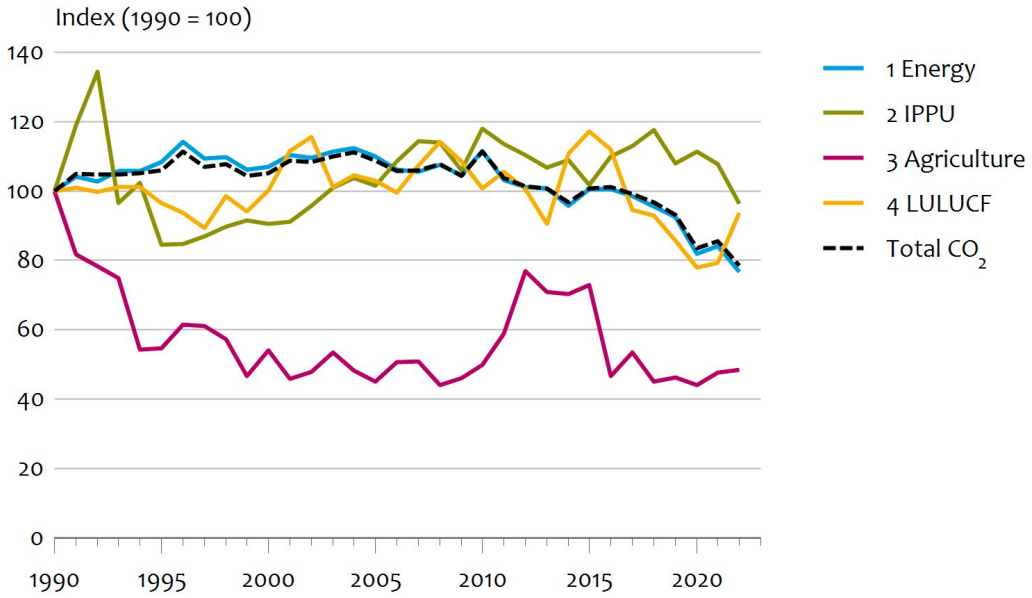


Carbon dioxide

Figure 2.4 shows the CO_2 emission trends of the individual sectors. The base year 1990 is set at 100.

In the 1990-2022 period, national CO_2 emissions (including indirect CO_2 emissions from LULUCF) decreased by 21.6% (from 168.4 to 132.1 Mt). The energy sector was by far the largest contributor to CO_2 emissions in the Netherlands in 2022 (88%). In the period 1990-2022, CO_2 emission from the Energy sector decreased by 23.2%. Note that in figure 2.4 the CO_2 emission trend of the Energy sector almost completely overlaps with that of total CO_2 emissions.

Figure 2.4: Relative emission trend of CO_2 in the Netherlands, 1990-2022. The base year 1990 is set at 100 (NIR 2024).



Within the Energy sector, an increasing trend in electric power production until 2005 corresponded to a substantial increase in CO_2 emissions from fossil fuel combustion by power plants. Also, the diesel fuel consumption increased by 60% between 1990 and 2008, which led to increased emissions in this sector. The decreasing trend of CO_2 from 2016 onwards is the result of a decline in coal combustion caused by the closure of coal fired power plants, and an increase in renewable energy. Besides these overall trends, some substantial interannual fluctuations are visible which are mostly due to weather conditions. More gas is used during cold winters (e.g. 1996 and 2010) and less in warm winters (e.g. 2014 and 2020). The large decrease in CO_2 emissions in 2022 compared to 2021 is mainly caused by a decrease in gaseous fuel consumption due to high prices of natural gas in 2022 following the war in Ukraine.

Compared with the Energy sector, other sectors contribute much less to overall CO_2 emissions (figure 2.3). The IPPU sector is responsible for 8.7% of the total CO_2 emissions in the Netherlands). CO_2 emissions from the sectors Agriculture and LULUCF amount to 0.1% and 3.3% of total CO_2 emission in 2022. The fluctuating trend of CO_2 emissions from Agriculture is explained by fluctuations in the application of liming products and urea.

Indirect CO_2 emissions are calculated from the process emissions of NMVOC (mainly from product use) and form only a minor source of emissions in the Netherlands (0.5 Mt in 2022).

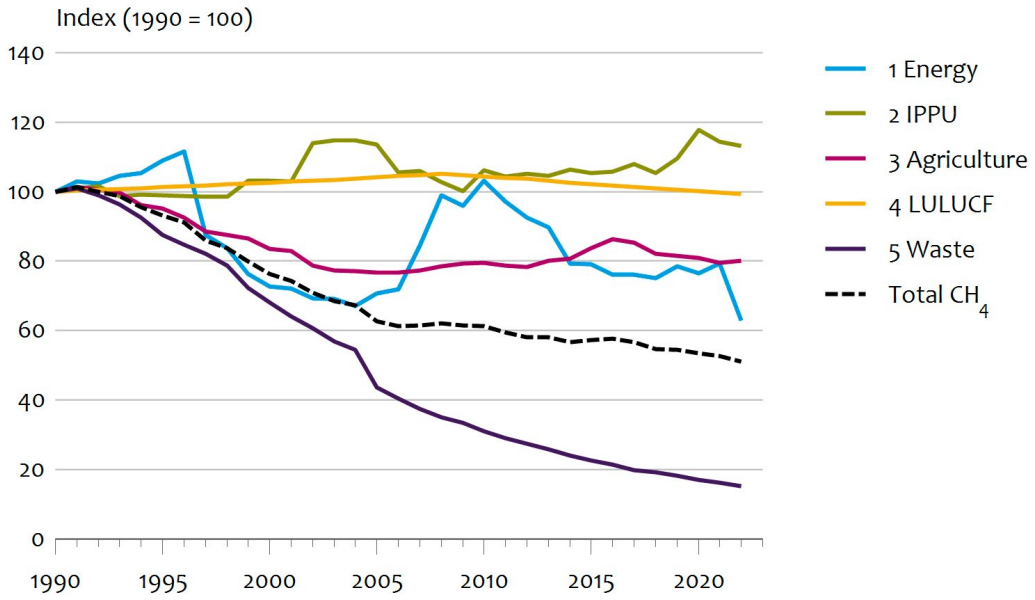
Methane

Figure 2.5 shows the CH_4 emission trends of all individual sectors over time. National CH_4 emissions decreased by 49%, from 36.3 Mt CO_2-eq in 1990 to 18.5 Mt CO_2-eq in 2022. The Agriculture and Waste sectors (71.0% and 12.8%, respectively) were the largest contributors in 2022.

Methane emissions from Agriculture declined by 20% between 1990 and 2022. The trend in methane emission from the sector Agriculture is mainly explained by changes in the number of mature dairy cattle and pigs. The number of dairy cattle decreased since the 1990s due to higher production rates per animal and production quotas. Between 2012 and 2016, the number of cattle increased as dairy farmers anticipated the abolition of milk production quotas. The Dutch government implemented new policies in accordance with the phosphate production ceiling, which resulted in a decrease of cattle of cattle numbers between 2017 and 2022.

In the period 1990-2022, methane emission from the Waste sector decreased by 85%, mainly due to a strong reduction in methane emissions from landfill. The Energy sector contributed 10.7% to total CH_4 emissions in the Netherlands in 2022. In the period 1990-2022, CH_4 emissions from Energy declined by 37%, mainly in the category Fugitive emissions (1B).

Figure 2.5: Relative emission trend of CH_4 in the Netherlands, 1990-2022. The base year 1990 is set at 100 (NIR 2024).



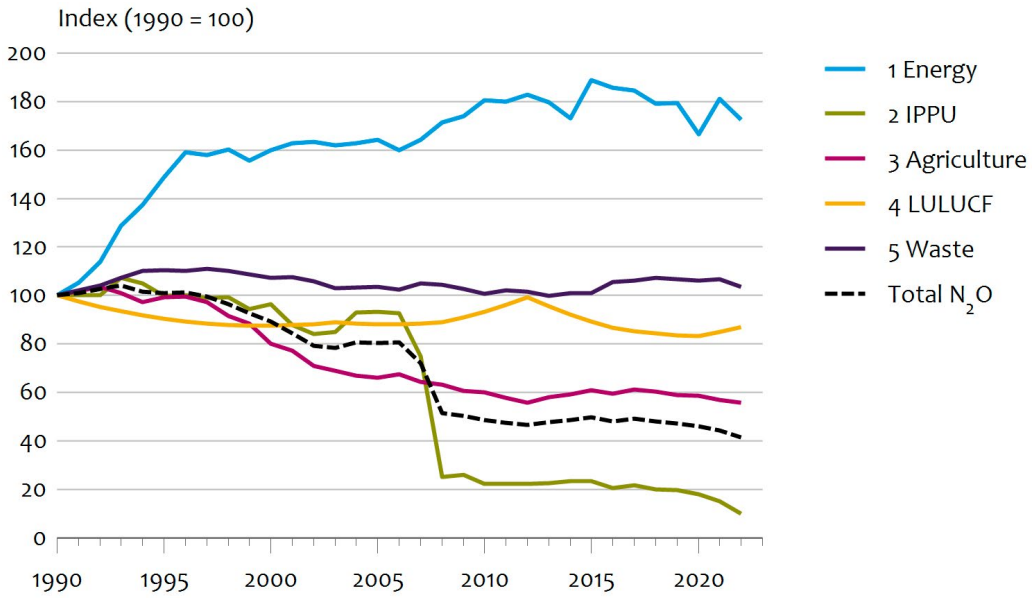
Nitrous oxide

Figure 2.6 shows the N_2O emission trends of all individual sectors over time. In total, the national inventory of N_2O emissions decreased by 58.7%, from 16.1 Mt CO_2-eq in 1990 to 6.6 Mt CO_2-eq in 2022.

The Agriculture sector was the largest contributor to the total nitrous oxide emissions in 2022 (72.4%). N_2O emissions from Agriculture declined by 44% between 1990 and 2022. The decreasing trend of N_2O emission in the agricultural sector is a result of a decrease in organic and inorganic N fertilizer application, a decrease in animal numbers and a decrease in grazing in the agricultural sector from 1990 to 2012.

The sectors IPPU, Waste and Energy contributed 9.6%, 8.6% and 8.0%, respectively, to total N_2O emissions in the Netherlands in 2022 (figure 2.3). In the period 1990-2022, emissions from the IPPU sector decreased by 90%. The sharp decrease in N_2O emissions within the IPPU after 2006 is the result of a change in the process of nitric acid production (2B2) under EU-ETS regulation. Emissions from Waste and Energy increased by 4% and 72%, respectively, in the period 1990-2022. In the Energy sector the increase in N_2O emissions took place mainly in the category Fuel combustion (1A).

Figure 2.6: Relative emission trend of N_2O in the Netherlands, 1990-2022. The base year is set 100 (NIR 2024).



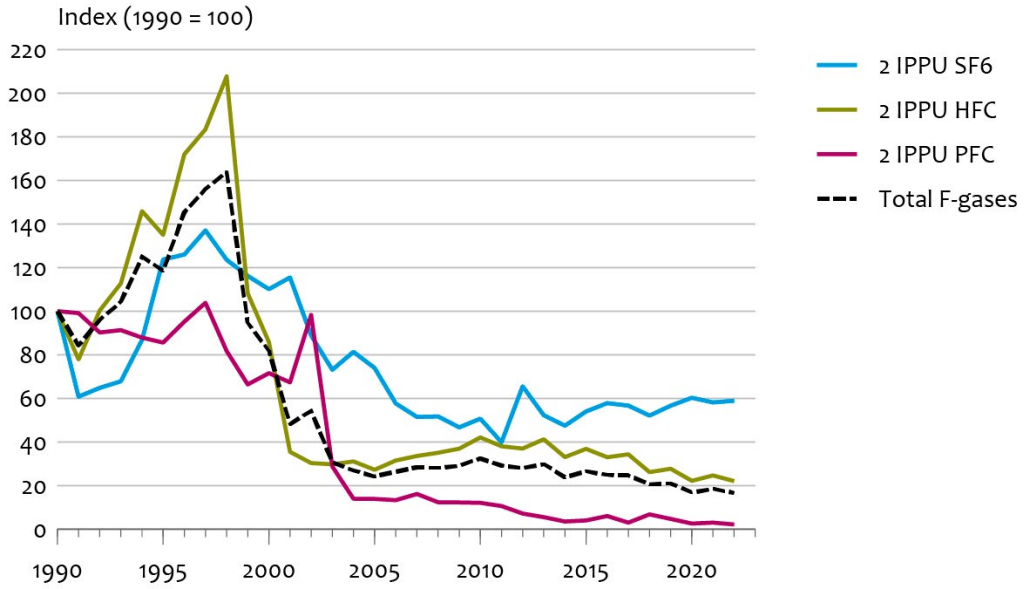
Fluorinated gases

Fluorinated gases are only emitted in the IPPU sector. Within the IPPU sector, there are several F-gas emissions. Figure 2.7 shows the trend in F-gas emissions over the period 1990-2022.

Total emissions of F-gases have decreased by 83.4%, from 7.3 Mt CO_2eq in 1990 to 1.2 Mt CO_2eq in 2022. The decrease in emission of F-gases is mainly the result of the EU and Netherlands' programme for reducing emissions of non-CO_2 greenhouse gases (e.g. through the F-gas Regulation and consistent improvement thereof). Within the fluorinated gases, emissions of hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) decreased by 77.9% and 97.8% respectively during the period 1990-2022, while sulphur hexafluoride (SF6) emissions decreased by 41.1%. It should be noted that, since there is no separate registration of NF_3 in the Netherlands, the emissions of NF_3 cannot be reported separately and are included in the PFC emissions.

The increase in emissions between 1995 and 1998 is mainly due to increased HFC-23 emissions because of increased production of HCFC-22. The subsequent sharp decrease in emissions in the period 1998–2000 is the result of a 69% decrease of HFC-23 emissions following the installation of a thermal converter (TC) at the plant in question. Since 1990, there has been an increase in HFC use as a substitute for (H)CFC use (category 2F). In 2022, this category accounts for 86.1% of the remaining national HFC emissions (0.89 Mt CO_2 eq.).

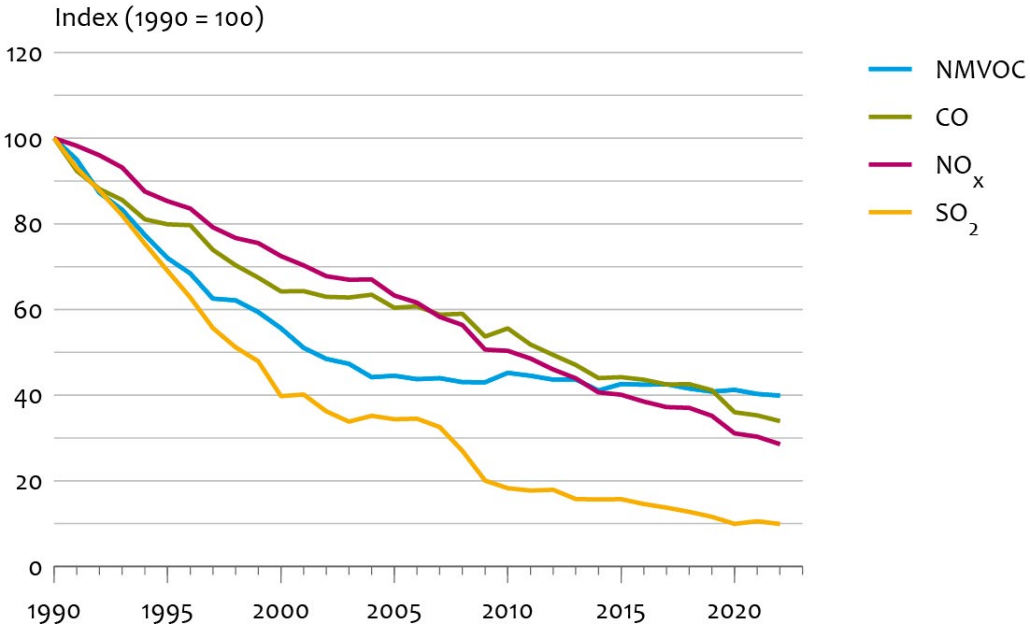
Figure 2.7: Relative emission trends of fluorinated gases in the Netherlands, 1990-2022. The base year 1990 is set at 100 (NIR 2024).



Indirect greenhouse gases and SO_2 emission trends

Figure 2.8 shows the relative emission trends of carbon monoxide (CO), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC) and sulphur dioxide (SO_2).
Compared with 1990, CO and NMVOC emissions were reduced in 2022 by 66.0% and 60.1%, respectively. For SO_2, the reduction was 90.1%; for NO_x, the 2022 emissions were 71.4% lower than the 1990 level. Except for NMVOC, most of the emissions stem from fuel combustion.

Figure 2.8: Relative emission trends of NO_x, CO, NMVOC and SO_2 in the Netherlands, 1990-2022. The base year 1990 is set at 100 (NIR 2024).



2.3 Description of the national inventory arrangements

2.3.1 Background

As a Party to the United Nations Framework Convention on Climate Change (UNFCCC), the Netherlands has national arrangements in place for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not regulated under the Montreal Protocol. In 2005, the Convention's Kyoto Protocol (KP) came into force. Rules for Monitoring, Reporting and Verification (MRV), initially agreed under the Convention itself, were further extended in the KP under Articles 5, 7 and 8, and implemented successively. The National System for the Netherlands under Article 5.1 of the KP, established in 2005, was reviewed (Article 8 of the KP) and found to comply with all the necessary requirements. Since then, the system has remained largely unchanged; relevant changes for the period from 2010 to 2022 are described in chapter 3 of the Netherlands' Eighth National Communication.[4] The UNFCCC review of the inventory in October 2022 confirmed that the Netherlands' inventory and inventory process remain in line with the requirements for National Systems.

With the transition from the Kyoto Protocol to the Paris Agreement, the national arrangements for the preparation of the inventory (including quality assurance and control procedures) must nonetheless still be implemented and maintained, similar to the previous requirements. The greenhouse gas inventory therefore continues to be prepared annually under these national arrangements. This chapter details the system as it operates on 1 November 2024, describing how the national inventory arrangements are performed in the Netherlands. More detailed information on the inventory process, such as relevant data arrangements, quality checks and methodologies, can be found in the NIR 2024 (Emissieregistratie, 2024a).

Objectives of the national arrangements

The national arrangements include all institutional, legal and procedural arrangements made within the Netherlands for estimating anthropogenic emissions by sources and removals by sinks of all greenhouse gases not regulated by the Montreal Protocol, as well as for reporting and archiving inventory information. The overall objectives of the Dutch national system are as follows:

- to enable the estimation and reporting of anthropogenic GHG emissions by sources and removals by sinks[5];
- to facilitate the review of the information submitted;
- to ensure and improve the quality of the inventory.

2.3.2 Institutional, legal and organisational aspects

The following section describes the roles and responsibilities of various agencies and entities in relation to the inventory development process, as well as the institutional, legal and procedural arrangements made to prepare the inventory. It distinguishes between arrangements for data collection, data processing and reporting.

Since 2017, the Ministry of Economic Affairs and Climate Policy (EZK) has been the coordinating Ministry in the Netherlands for climate change policy. In 2024 this ministry was divided into the Ministry of Economic Affairs (EZ) and the Ministry of Climate Policy and Green Growth (KGG), with responsibility for climate policy falling under the latter, including the preparation of the national GHG emissions inventory. The Minister of Economic Affairs and Climate Policy (EZK) appointed the Netherlands Enterprise Agency (RVO) by law as the exclusive national entity (NIE) as originally required under the Kyoto Protocol, with overall responsibility for the national inventory (Government Gazette (*Staatscourant*), 2005). With the transition from the Kyoto Protocol to the Paris Agreement, it is required that national arrangements for the preparation of the inventory are maintained, similar to the previous requirements.

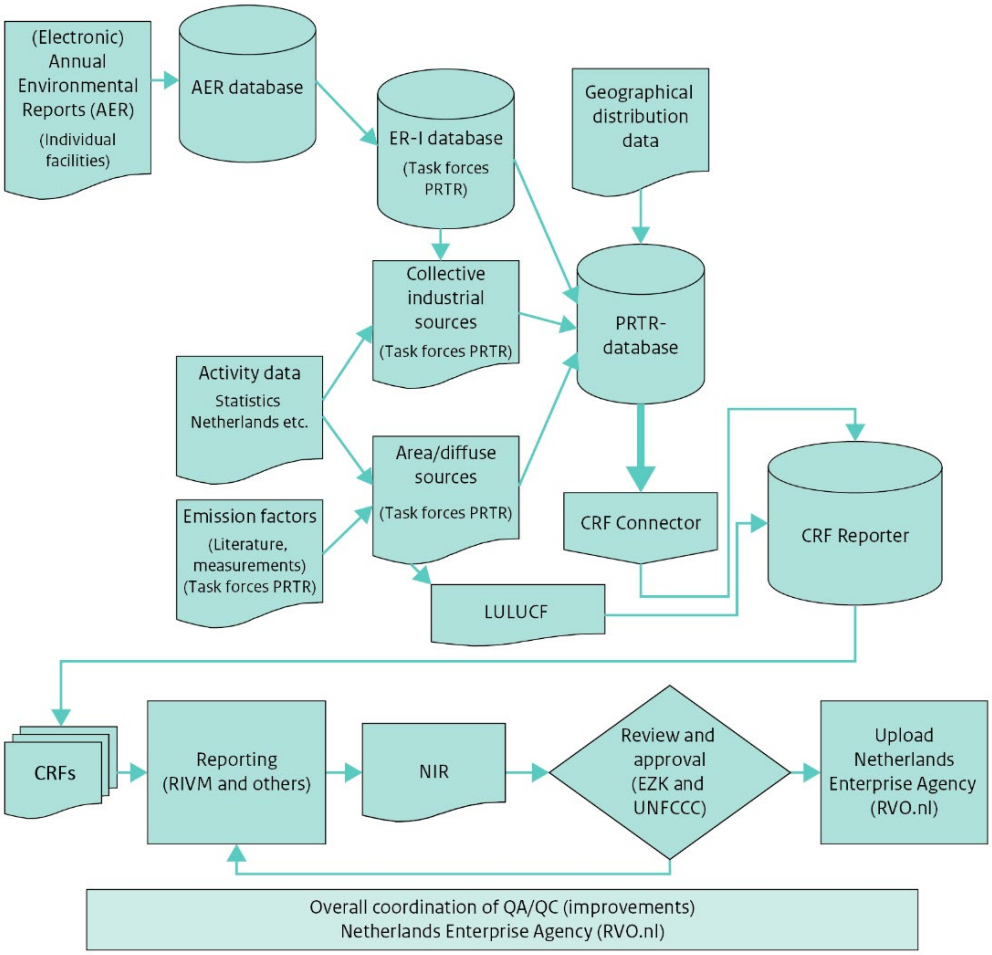
[4] https://unfccc.int/documents/624552

[5] In accordance with the reporting guidelines and other relevant decisions of the Conference of the Parties (COP) and/or Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA).

Contact information of the National Entity:
Netherlands Enterprise Agency (RVO), PO Box 8242, 3503 RE Utrecht, the Netherlands.
Designated representative with overall responsibility for the inventory:
Jorieke Rienstra: jorieke.rienstra@rvo.nl, telephone: +31(0)6 46181287

RVO is responsible – among other things – for compiling and issuing the annual reports to the UNFCCC, coordinating the QA/QC process and operating as focal point for the UNFCCC in relation to the report, which includes supporting the UN review process. Parts of the annual report are provided by other organisations. The coordination of the Pollutant Release and Transfer Register (PRTR) – in which emissions of about 350 substances are annually calculated – is performed by the National Institute for Public Health and the Environment (RIVM). Major decisions on the tasks and priorities of the PRTR are taken by the Steering Committee ER (SCER) by approving the Annual Work Plan (see Textbox 2.1 below).

Figure 2.9: Schematic overview of main steps in the primary process; in practice, various feedback loops exist (NIR 2024).



The inventory and reporting process is illustrated in Figure 2.9 and briefly described below in three parts:
- arrangements for data collection;
- arrangements for data processing;
- arrangements for reporting.

Arrangements for data collection
The emissions data are taken from the Pollutant Release and Transfer Register project (PRTR). A series of bodies and ministries in the Netherlands are involved in this collaborative project (which started in 1974). The objective of the project is to agree on one national data set for emissions inventories, covering some 350 pollutants in the air, water and soil. This data set is used for a variety of international and national applications. The RIVM, an agency under the Ministry of Health, Welfare and Sport (Ministry of VWS), is charged with its coordination.

Textbox 2.1: Responsibilities for coordination of the Pollutant Release and Transfer Register (PRTR) project
Major decisions regarding tasks and priorities are taken by the Steering Committee ER (SCER) by approving the Annual Work Plan. This committee consists of representatives of the commissioning ministries, regional governments, the RIVM, Statistics Netherlands (CBS) and the Netherlands Environmental Assessment Agency (PBL).

Since September 2020, the SCER has been split into a Strategic Board consisting of representatives of the commissioning ministries (Ministry of Infrastructure and Water Management, Ministry of Climate Policy and Green Growth, Ministry of Agriculture, Nature and Food Security) and a Tactical Board consisting of representatives of the various external agencies and the RIVM (see Figure 2.10). The Strategic Board formally approves the Annual Work Plan.

The PRTR project leader at the RIVM acts as Head of the PRTR and is responsible for the PRTR process; the outcomes of that process are the responsibility of the bodies involved. The collaboration of the various bodies is ensured by means of contracts, covenants or other agreements.

Task Forces
Various emissions experts from the participating organisations take part in the task forces that calculate the national emissions from 650 emission sources. A formal agreement is drawn up by all the participating organisations. After being thoroughly checked, the national emissions are accepted by the project leader of the PRTR project and the data set is saved in the Central Database.

The 650 emission sources are divided in a logical manner into 55 work packages. An emissions expert is responsible for one or more work packages, the collection of the data and the calculation of the emissions. The experts are also closely involved in developing the methodologies to calculate the emissions. Work packages are assigned to the six task forces as described below.

Task Force on Energy, Industry and Waste Management (ENINA):
Charged with calculating the emissions released into the air by the Industry, Energy Production, Refineries and Waste Management sectors. Emissions experts from the RIVM, TNO, Statistics Netherlands (CBS) and Rijkswaterstaat Environment (Waste Management Department) are involved in ENINA.

Task Force on Transportation
Charged with calculating the emissions released into the soil and air by the Transportation sector (aviation, shipping, rail and road transport). The following organisations are represented: the Netherlands Environmental Assessment Agency (PBL), Statistics Netherlands (CBS), the RIVM, Directorate-General for Public Works and Water Management and TNO.

Task Force on Agriculture
Charged with calculating the emissions released into the soil and air from agriculture. Participating organisations include the RIVM, the Netherlands Environmental Assessment Agency (PBL), Wageningen Environmental Research (WenR), Wageningen University Research (WUR) and Statistics Netherlands (CBS).

Task Force on Water - MEWAT
Charged with calculating the emissions released into the water by all sectors. Experts from the Directorate-General for Public Works and Water Management, Deltares, the RIVM, Statistics Netherlands (CBS) and TNO are involved in MEWAT.

Task Force on Consumers and other sources of emissions – WESP
Charged with calculating the emissions produced by consumers, trade and services. The members are emissions experts from the RIVM and TNO.

Task Force on Land Use, Land Use Change and Forestry (LULUCF)
Charged with calculating sources and sinks from land use, land use change and forestry. Emissions experts from Wageningen University Research (WUR), PBL and the RIVM are involved in LULUCF.

The data sources, methods and processes used for elaborating the greenhouse gas emission estimates are described in the National System documentation, mostly in the form of methodology reports. These reports are drafted by the PRTR Task Forces, checked by the National Inventory Entity and approved by the chair-person of the PRTR Task Force concerned. The Netherlands has included the methodology reports in its annual inventory submission since 2018 as an integral part of the NIR. As part of the national arrangements, all the methodology reports are made available on the NIE website[6].

The PRTR project uses primary data from various data suppliers, as described below.

Statistical data
Statistical data are provided under various obligations and legal arrangements (not specifically related to greenhouse gases). These include national statistics from Statistics Netherlands (CBS) and a number of other sources of data on sinks, water and waste. The provision of the relevant data on greenhouse gases is guaranteed through covenants and an Order in Decree prepared by the Ministry of Economic Affairs and Climate Policy. Regarding greenhouse gases, the relevant agreements have been reached with Statistics Netherlands, and with Rijkswaterstaat Environment with respect to waste management. An agreement was established with the Ministry of Agriculture, Nature and Food Quality (LNV) and the related institutions in 2005.

Data from individual companies
Data from individual companies are provided in the form of electronic annual environmental reports (e-AERs). A large number of companies have a legal obligation to submit an e-AER which includes, in addition to other environmental information, emissions data that has been validated by the competent authorities (usually regional implementing agencies and occasionally local authorities), which also issue environmental permits to these companies. Some companies provide data voluntarily within the framework of environmental covenants. Large companies are also obliged to participate in the EU Emissions Trading System (EU ETS). These companies must report their CO_2 emissions in specific annual ETS emission reports.

The data contained in the AERs and EU ETS reports are used to verify the CO_2 emissions figures derived from energy statistics for the industry, the energy sector and refineries. Whenever reports from major industries contain plant-specific activity data in addition to EFs of sufficient quality and transparency, these reports are used in the calculation of CO_2 emissions estimates for specific sectors. Plant-specific data is mainly used for the calculation of CO_2 emissions from derived gases (chemical waste gas, blast furnace gas, coke oven gas). Since derived gases can have a highly variable emission factor, the use of plant-specific data will improve the CO_2 calculations. The AERs from individual companies also provide essential information for calculating the emissions of substances other than CO_2. Calculations of industrial process emissions of non-CO_2 GHGs (e.g. N_2O, HFC-23 and PFCs released as by-products) are mainly based on information from these AERs, as are emissions figures for precursor gases (CO, NO_x, NMVOC and SO_2). Only those AERs with high-quality and transparent data are used as a basis for calculating the total source emissions in the Netherlands.

[6] http://english.rvo.nl/nie

Additional data related to greenhouse gases

Additional data related to greenhouse gases are provided by other institutes and consultants specifically contracted to supply information on sectors not sufficiently covered by the aforementioned data sources. For example, the RIVM concludes contracts and financial arrangements with various agricultural institutes and the Netherlands Organisation for Applied Scientific Research (TNO). In 2004, the Ministry of Agriculture, Nature and Food Quality (LNV) issued contracts to a number of agricultural institutes; in particular, these contracts related to the development of a monitoring system and provided a methodological description for the LULUCF data set. Based on a written agreement between the Ministry of Agriculture, Nature and Food Quality (LNV) and RIVM, these activities are also part of the PRTR.

Arrangements for data processing

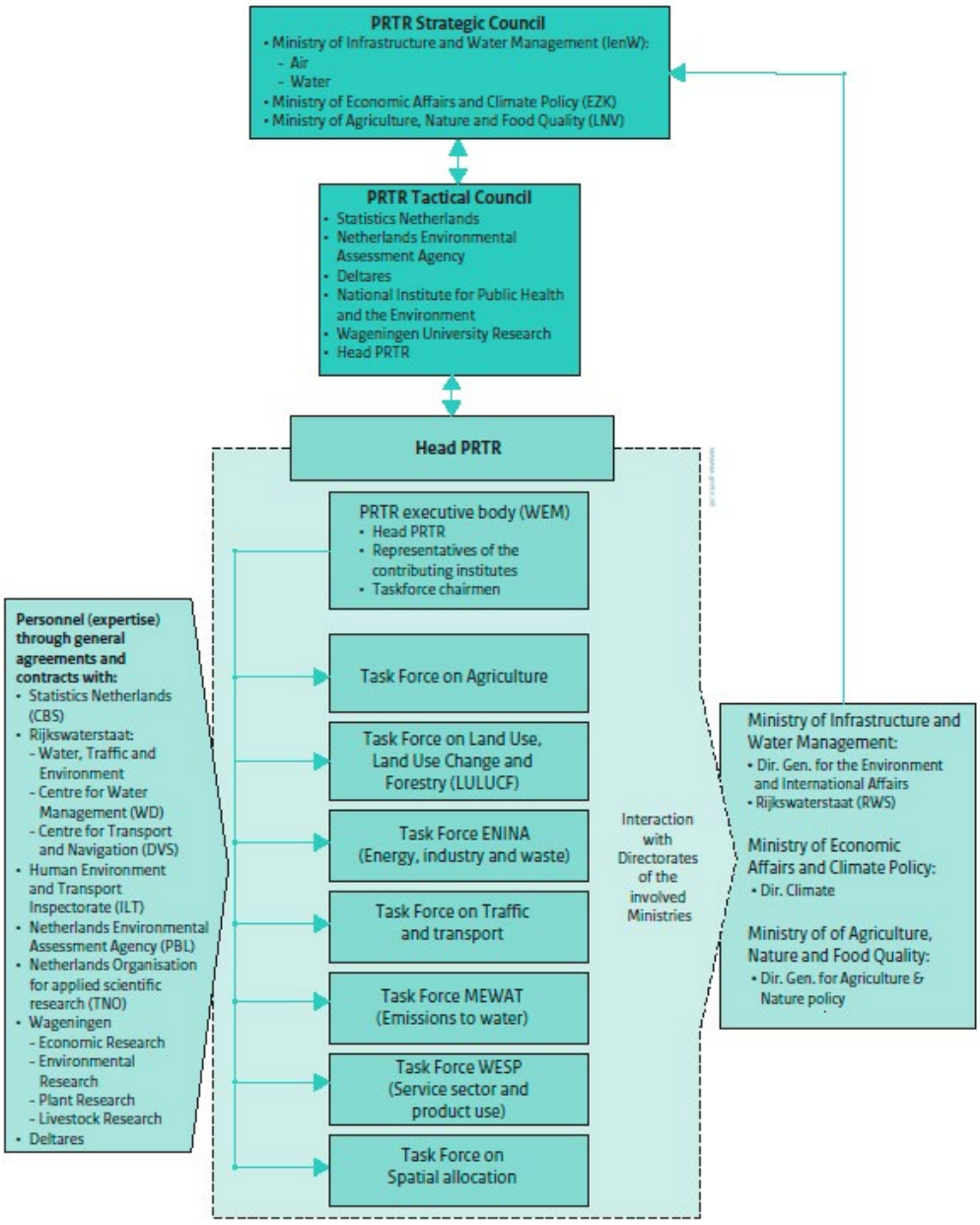
The calculation of greenhouse gas emissions and sinks is the responsibility of the PRTR project. Data are collected and processed by Task Forces (see Box 2.1) according to predetermined methods described in the methodology reports.

Arrangements for reporting, QA/QC coordination and review

Data processing and storage are coordinated by the RIVM. These processes mostly involve the elaboration of emissions estimates and data preparation in the PRTR database. The emissions data are stored in a central database thereby efficiently and effectively satisfying national and international criteria for emissions reporting. Using a custom-made programme, all relevant emissions and activity data are extracted from the PRTR database and included in the CRT reporting tool, thus ensuring the highest level of consistency. Data from the CRT reporting tool are used in the compilation of the NIR.

The overall annual report for the UNFCCC is drafted under the responsibility of the RIVM and coordinated by RVO/NIE. To ensure the involvement of the relevant experts from the various bodies (CBS, TNO, PBL, RIVM, WUR, and so on) that supply the relevant emission estimates, this procedure is implemented as an annual project in which each section of the NIR is assigned to one lead author. This lead author usually involves other experts, while a co-author is assigned for mutual checks. RVO/NIE is closely involved, but the coordination and fine-tuning of the contents of the NIR is delegated to the RIVM to ensure consistency with the PRTR data. Overall coordination is carried out by RVO/NIE. RVO/NIE submits the annual report to the UNFCCC after approval has been obtained from the Ministry of Climate Policy and Green Growth (KGG). It is also charged with the overall QA/QC coordination of the inventory, its process and the national system, facilitation of UNFCCC reviews and coordination of requests for clarification.

Figure 2.10: Organisational arrangements for the PRTR project (NIR 2024).

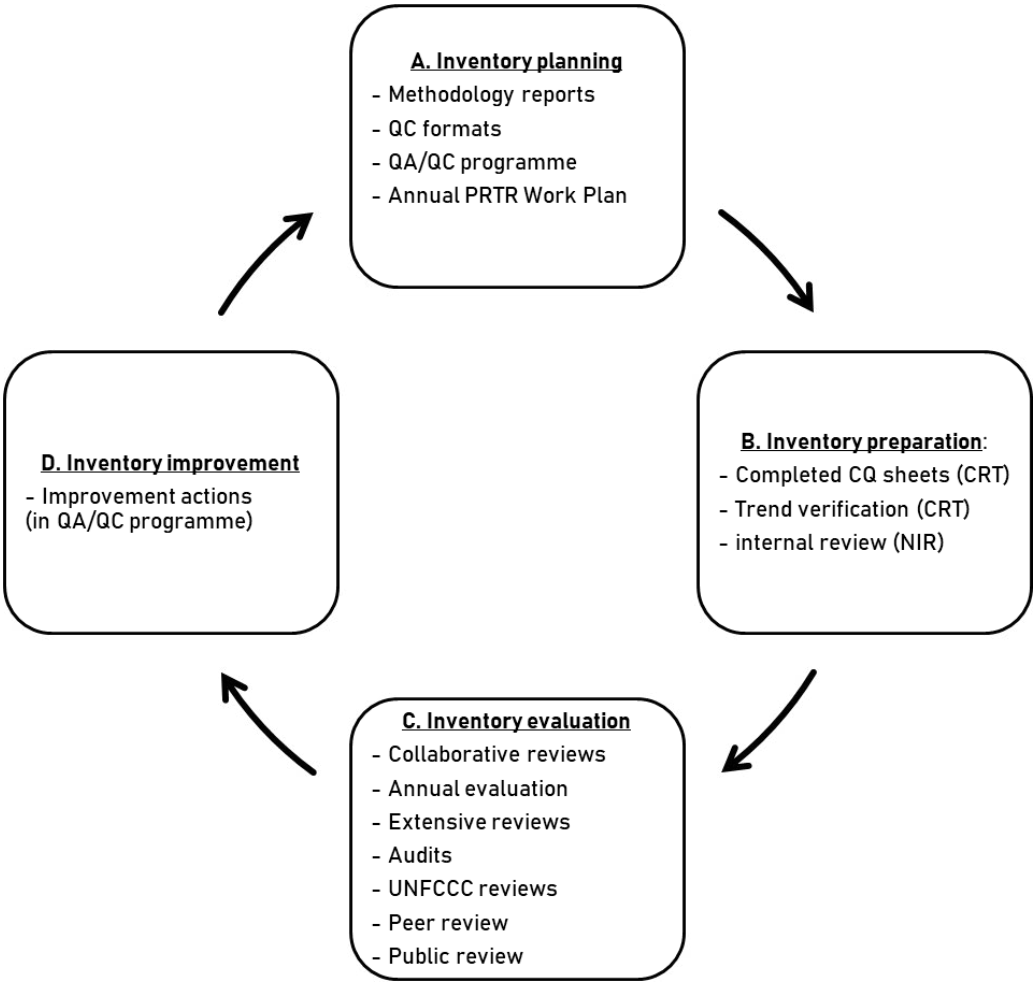


2.3.3 Methodology and quality management aspects

The annual cycle is a key quality management tool (based on the Deming cycle of plan-do-check-act) and encompasses:

- inventory planning:
  - inventory preparation;
  - inventory evaluation;
  - inventory improvement.

Figure 2.11: Annual inventory cycle (RVO, 2023).



To ensure high quality and continuous improvement, the annual inventory process is implemented as a cyclical project. As part of its National System, the Netherlands has developed and implemented a QA/QC programme (RVO, 2023), which is assessed annually and updated as necessary. Figure 2.11 illustrates the steps, and the QA/QC tools used in each step; the key elements of the current programme (RVO, 2023) are summarised in chapter 1.2.2 of the NIR 2024. For more detailed information, please refer to the QA/QC programme on the NIE website.[7]

During the initial establishment of the national system, an improvement programme was implemented together with the relevant bodies and experts assessed all relevant data, emission factors and methods. More information on this programme, the resulting monitoring protocols and methodology reports, as well as other relevant review and QA/QC activities for the period up to 2022, can be found in chapter 3 of the Eighth National Communication.[8]

[7] https://english.rvo.nl/topics/energy-agreement/energy-and-climate-reports/qaqc
[8] https://unfccc.int/documents/624552

3 Information necessary to track progress

3.1 National circumstances and institutional arrangements

The following section first describes the national circumstances of the Netherlands (3.1.1) relevant to progress made in implementing and achieving the Nationally Determined Contribution (NDC), before continuing with the institutional arrangements – both at the national and EU level – in place to track progress made in implementing and achieving the NDC (3.1.2), in line with the relevant MPGs (decision 18/CMA.1, para. 59 - 63).[9]

3.1.1 National circumstances

3.1.1.1 *Governmental structure*

The Kingdom of the Netherlands compromises four countries (see Figure 3.1): the Netherlands, Aruba, Curaçao, and Saint Maarten. Since 10 October 2010 the islands of Bonaire, Saba and Saint Eustatius have been special municipalities of the Netherlands. They are called the Caribbean Netherlands. Together with the countries Aruba, Curacao, and Saint Maarten they form the Caribbean part of the Kingdom. Under the UNFCCC (Convention, KP and Paris Agreement), reporting is required only for the European part of the Kingdom, hereinafter referred to as the Netherlands.

Figure 3.1: Kingdom of the Netherlands.

The Netherlands is a constitutional monarchy. The legislative powers are vested in the national government and the 12 provinces and the municipalities, of which there were 342 as of 1 January 2024.[10]

[9] Decision 18/CMA.1: https://unfccc.int/resource/tet/o/oompg.pdf

[10] https://www.cbs.nl/nl-nl/onze-diensten/methoden/classificaties/overig/gemeentelijke-indelingen-per-jaar/indeling-per-jaar/gemeentelijke-indeling-op-1-januari-2024

The Dutch Parliament, officially referred to as the States General of the Netherlands, comprises the Senate (*Eerste Kamer*; 75 members, elected by the provinces) and the House of Representatives (*Tweede Kamer*; 150 members, elected directly by the citizens).

The execution of the legislative process is a joint effort by the Dutch Government and Parliament. Bills, draft Decrees and draft Orders in Council are first submitted to the Council of State. Legislation comes into force when published in the Bulletin of Acts (*Het Staatsblad*) or the Government Gazette (*Staatscourant*). Policies can also be formulated in memoranda to Parliament. Commitments in these documents are politically binding and can be elaborated in legislation, such as a Decree or Order in Council, or other binding agreements such as Long-Term Agreements. The regional governments, for example, are responsible for granting environmental licences and permits.

Since 2017, the Ministry of Economic Affairs and Climate Policy (EZK) was responsible for climate policy. In 2024 this ministry was divided into the Ministry of Economic Affairs (EZ) and the Ministry of Climate Policy and Green Growth (KGG), with responsibility for climate policy falling under the latter. Other ministries are responsible for integrating environmental policy targets and endorsing the environmental policies within their respective fields (e.g. the Ministry of Infrastructure and Water Management is responsible for climate adaptation).

Many parties are involved in the policymaking process, such as the economic sectors, consumers, advisory councils, research institutes, environmental protection organisations, and various trade unions and federations. The formulation and implementation of policy is usually carried out in collaboration or consultation with the relevant "target groups". Good communication between government and market parties is given high priority. Environmental protection organisations also play an important role in the Netherlands, for example through participation in advisory councils.

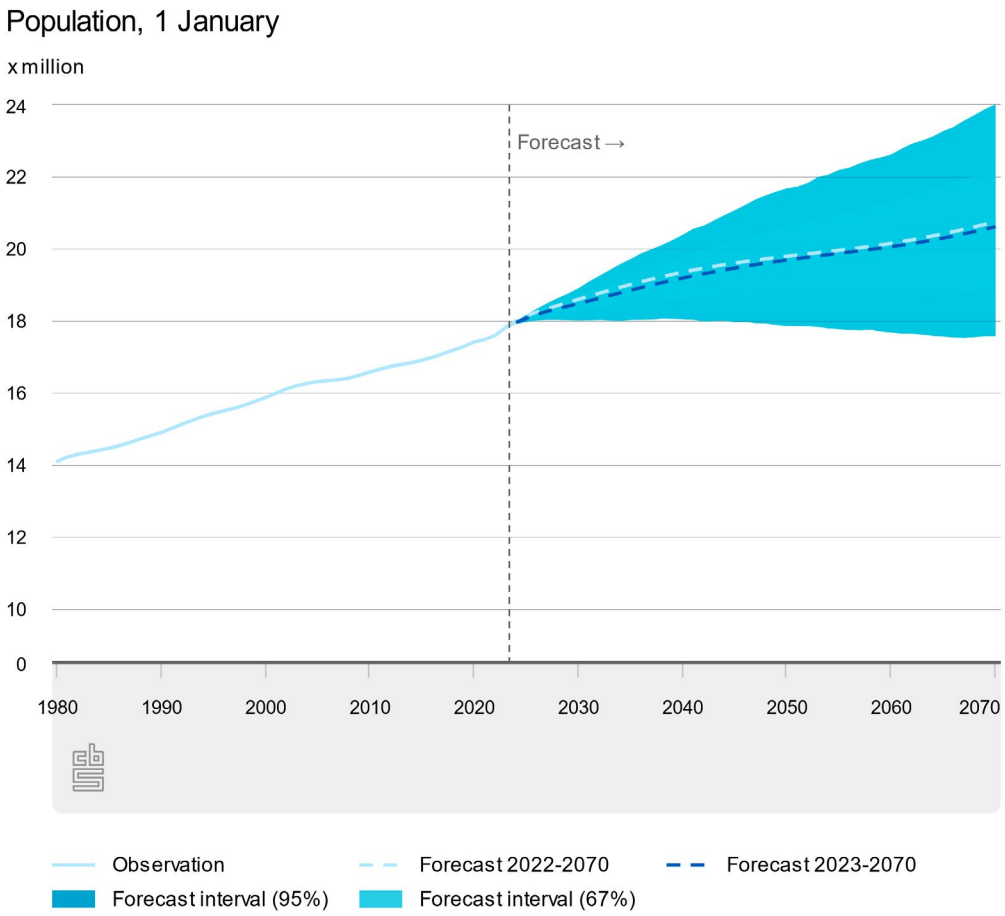
3.1.1.2 *Population profile*

The 1990–2022 period saw a population increase in the Netherlands from 14.9 million to around 17.6 million inhabitants (Table 3.1). Annual growth fluctuates, but since 2000 it has been falling: the growth rate was around 0.8% in 1980, 1990 and 2000 but, fell to 0.5% and 0.4% in 2010 and 2020 respectively. The total population is expected to reach 20.6 million in 2070, with migration playing an important role in future population growth (Figure 3.2).

Table 3.1: Key population figures (CBS, 2023a).

Year	Total population	Total private households	One-person households	Multi-person households	Average household size	Total population growth	Total population growth, rate	Population density
	number	× 1,000	× 1,000	× 1,000	number	number	o/oo	number
1950	10,026,773	2535	245	2290	3.93	173,507	17.3	309
1960	11,417,254	3171	387	2784	3.56	138,754	12.2	352
1970	12,957,621	3986	679	3307	3.21	161,809	12.5	384
1980	14,091,014	5006	1085	3921	2.78	117,572	8.3	415
1990	14,892,574	6061	1813	4249	2.42	117,871	7.9	439
2000	15,863,950	6801	2272	4529	2.30	123,125	7.8	468
2010	16,574,989	7386	2670	4717	2.22	80,810	4.9	491
2020	17,407,585	7998	3080	4918	2.14	67,830	3.9	517
2021	17,475,415	8043	3097	4946	2.14	115,257	6.6	519
2022	17,590,672	8139	3173	4966	2.13	--	--	522

Figure 3.2: Population forecast 2023-2070 (CBS, 2023b-c).



The Netherlands is a densely populated country. The population density increased between 1990 and 2022 from 439 to 522 persons per km². A further important demographic factor influencing the pressure on the environment is a decrease in the number of persons per household. This figure fell from 2.5 in 1990 to 2.3 in 2000 to 2.1 in 2022. The number of households increased from 6.1 million in 1990 to 8.1 million in 2021, while the percentage of single-person households increased from 30% to 39% (CBS, 2023a). Due to the significant increase in single-person households, there is a greater need for housing, and an increasing demand for land for the construction of new dwellings and infrastructure.

3.1.1.3 *Geographic profile*

The Netherlands is a low-lying country situated in the delta of the rivers Rhine, IJssel and Meuse (see Figure 3.3). Around 26% of the country's land is below sea level. The soils consist of fluvial and tidal deposits, partially covered by peat. After the ice age, this Holocene peat was formed behind the coastal dunes in the western part of the Netherlands, where polders have been created with controlled water levels. The eastern part of the Netherlands includes Pleistocene ice-pushed ridges that are covered with wind-borne sand deposits. The southern part consists mainly of Meuse terraces with loess deposits or wind-borne sand deposits. The highest point is 321 metres above sea level, at the border with Belgium and Germany, while the lowest point is 7 metres below sea level. The surface area of the land, plus inland and coastal waters, amounted to 41,560 km² in 2021. The land surface covers 33,320 km² in total (Kramer & Los, 2022).

Although agricultural land is decreasing, it is still the main use of land; about 66% (22300 km²) of the total land area consisted of agricultural land in 2021. Forest covered an area of approximately 3,640 km² (11% of total land area). The use of land for settlement has increased over time: in 1990 4096 km² of land were used for settlement and in 2021 this figure was 6,330 km². The population density is highest in the "Randstad" (a cluster of relatively large cities in the western part of the country comprising Amsterdam, Rotterdam,

The Hague and Utrecht, as well as the interspersed villages, towns and smaller cities). This is illustrated in Figure 3.4.

Figure 3.3: River delta: Surface waters in the Netherlands (CLO, 2021).

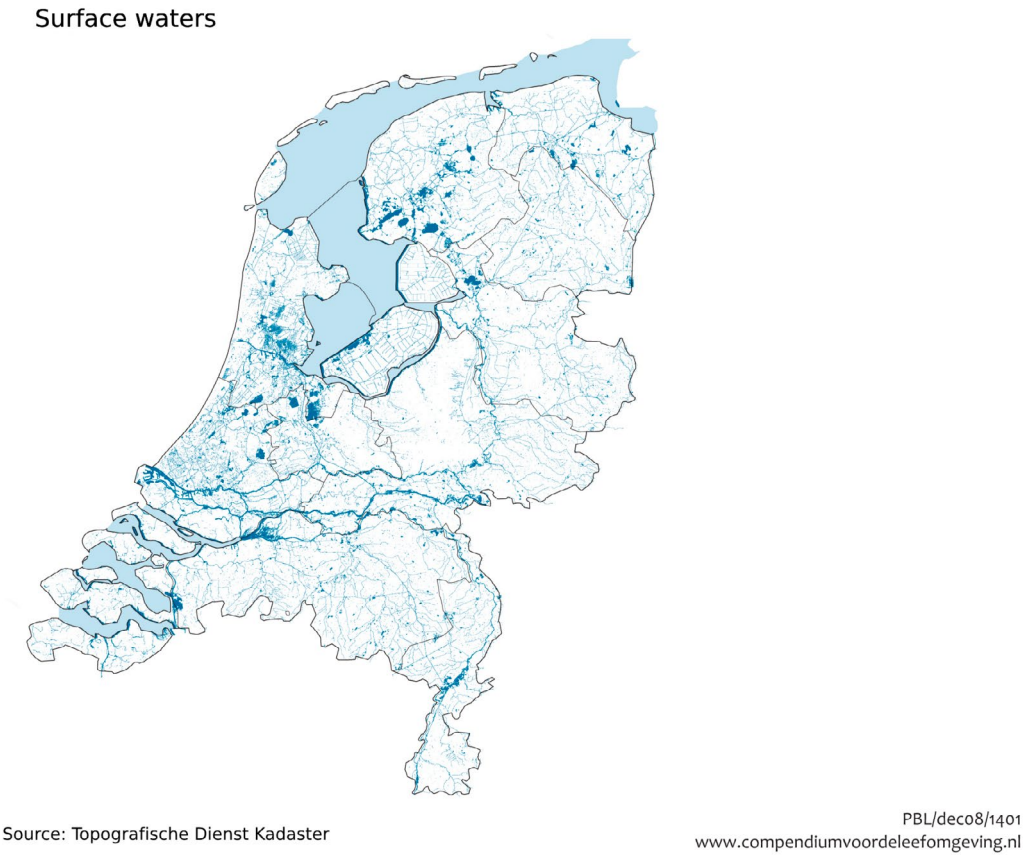
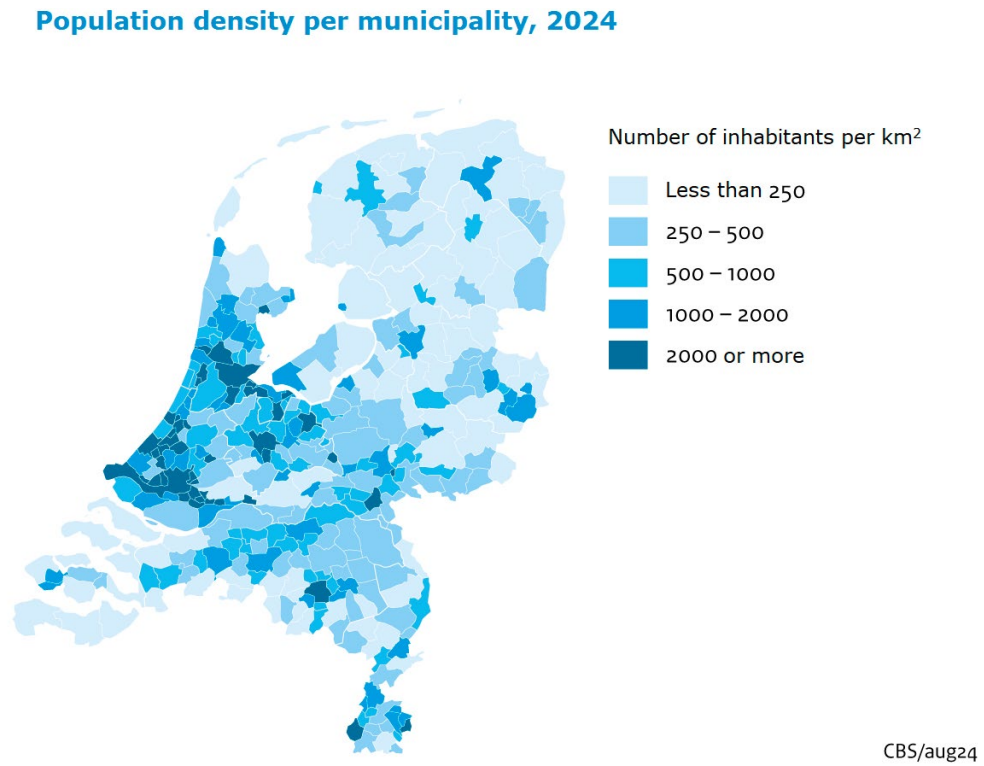


Figure 3.4: Population density map of the Netherlands (CLO, 2024a).



3.1.1.4 *Economic profile*

Changes in GDP

The Gross Domestic Product (GDP) of the Netherlands was €330 billion in 1995 and €1067 billion in 2023 (based on current prices).[11] In 2023 the GDP per capita was around 58 thousand euros. Figure 3.5 shows steady growth from 1995 overall, with a drop in GDP in the period 2009-2013 because of the financial and economic crisis, followed by economic recovery in the following years. Likewise, the impact of the COVID-19 pandemic initially caused a significant decline in GDP in 2020, resulting in a decrease of 3.9%. This was followed by a relatively swift rebound in 2021, with growth of 6.3% being recorded (CBS, 2024a). Figure 3.6 shows the contribution to GDP by the main industries (current prices).

[11] Based on provisional figures for 2023. Source: CBS 2024a, Approaches of domestic product (GDP) – National Accounts https://opendata.cbs.nl/statline/#/CBS/en/dataset/85865ENG/table?ts=1724423239227

Figure 3.5: Gross Domestic Product 1995-2023, in current and 2021 prices (CBS, 2024a).

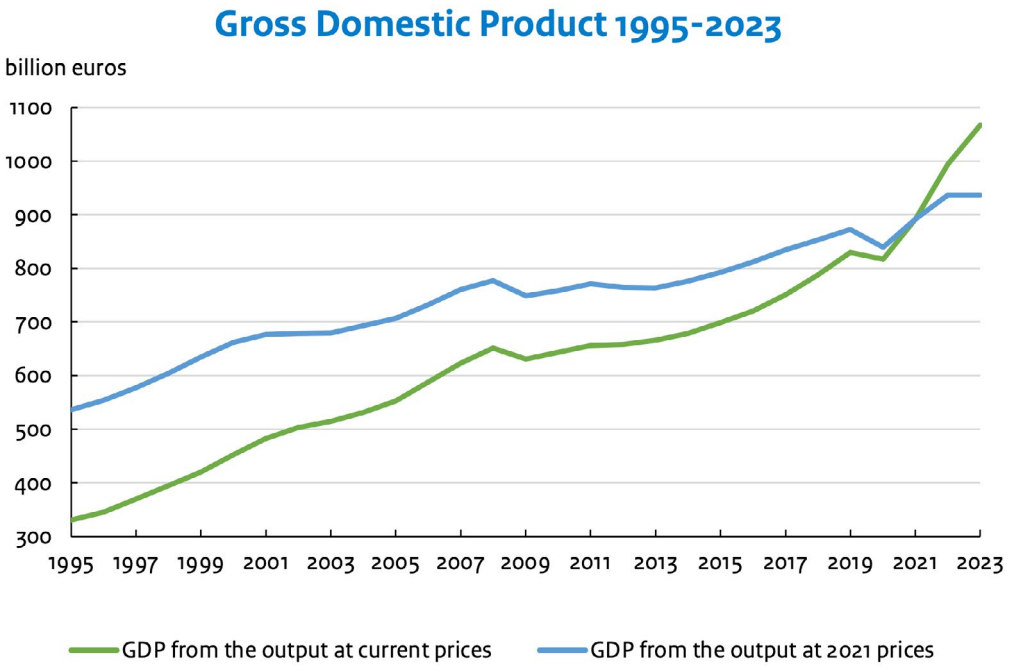
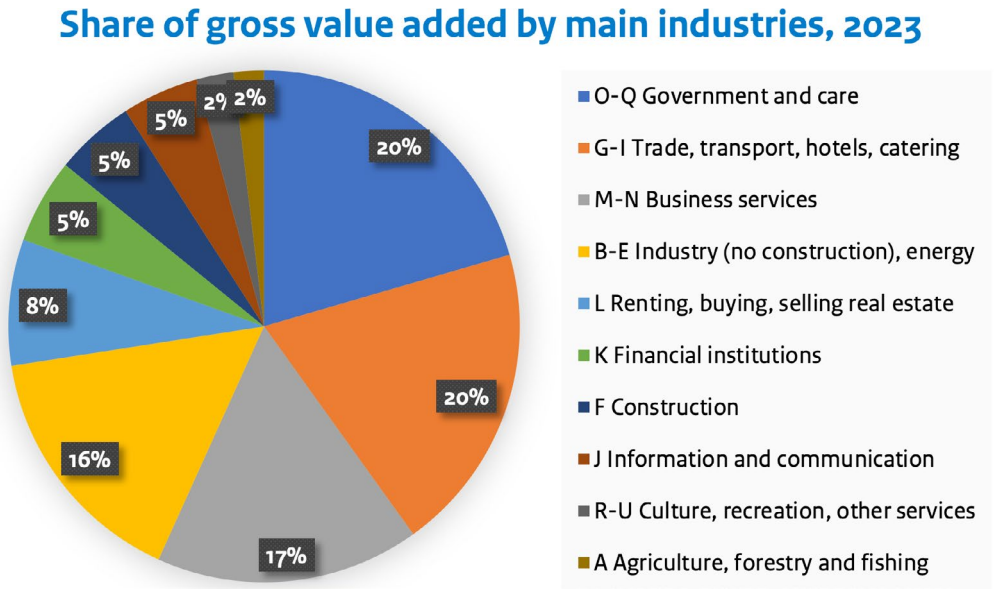


Figure 3.6: Contribution to GDP by the main industries in 2023 (current prices) (CBS, 2024a).



Imports and exports

The Netherlands has an extremely open economy. Many goods and services are imported and exported. This is due to the geographic location of the Netherlands, with its accessible ports and an extensive, highly developed and easily accessible hinterland. Overall, the Netherlands has been a net exporter for many years. Sectors which sell relatively large amounts of their goods abroad include agriculture and industry.

Due to the economic crisis that started in 2008, the import and export value of goods plummeted in 2009. International trade gradually recovered thereafter, and the import and export value of goods surged again. Since 2015, the total import value has increased by 68% to €779 billion in 2023; the total export value also grew by 68% to €864 billion (CBS, 2024b).

Figure 3.7: Changes in import and export values 2015-2023 period (*provisional figures) (CBS, 2024b).

In 2023, machinery and transport equipment accounted for nearly one-third of the value of goods imported to the Netherlands. Mineral fuels and chemical products had a share of around 19% and 14% respectively. The bulk of goods imports to the Netherlands (59%) originated from outside the European Union (EU). Goods from Germany accounted for the highest import value, followed by goods from China, the United States and Belgium (see Figure 3.8).

Overall, a large portion (32%) of the export value of goods in 2023 consisted of machines and transport equipment. Chemical products and mineral fuels both accounted for around 16% of the export value. Of all goods that were produced in the Netherlands, food and live animals made the biggest contribution relative to the export value. In terms of re-exports, the value of machines and transport equipment was the highest.

Most of the value of exports of Dutch goods remains within the European Union: in 2023 this figure was around 55%. The single most important destination is Germany, where the export value was over €200 billion. Belgium, France and the United Kingdom were the other most important destinations. The value of exports to these individual countries is, however, significantly lower than that of exports to Germany (see Figure 3.9; CBS, 2024b).

Figure 3.8: Top 10 countries in terms of imports, 2023 (provisional figures) (CBS, 2024b).

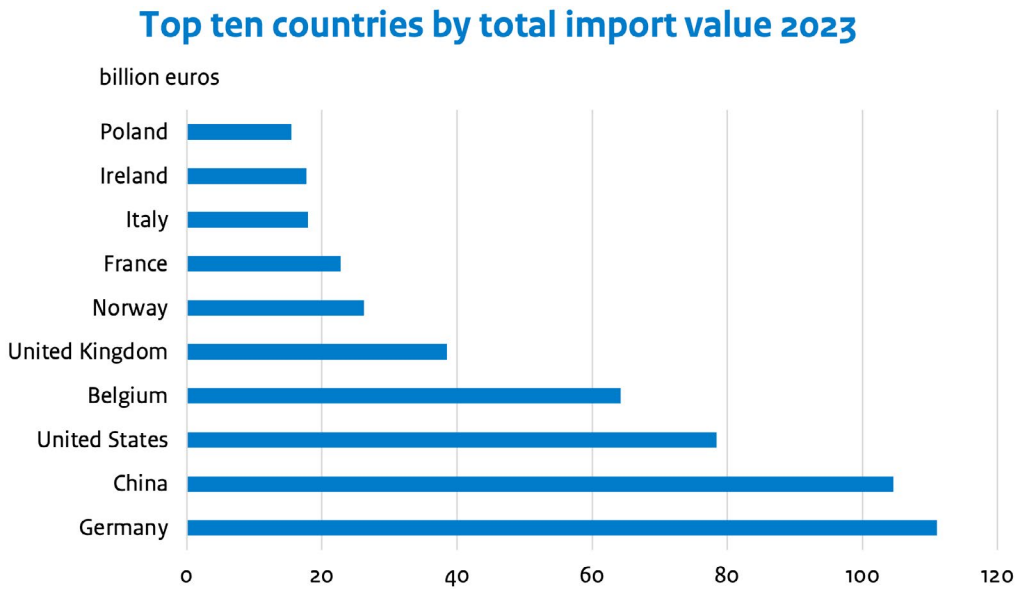
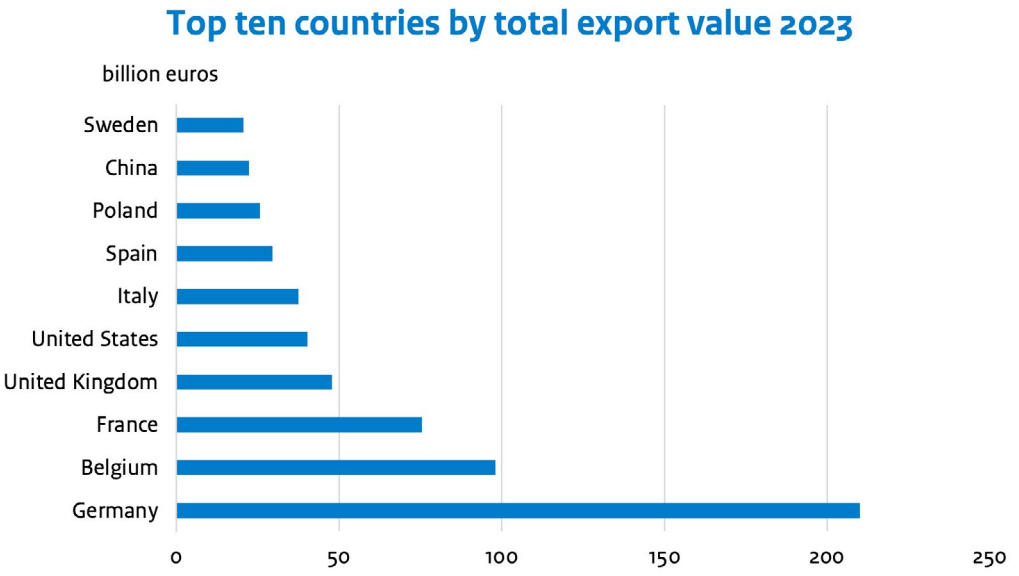


Figure 3.9: Top 10 countries in terms of exports, 2023 (provisional figures) (CBS, 2024b).



Important role for the transport sector

The transport sector has traditionally been an important one due to the country's favourable location for transporting goods from the coastal harbours to the EU inland destinations. The geographic location is also favourable for the oil refineries in Rotterdam, from which large amounts of petroleum products are exported. Rotterdam is among the largest ports in the world. The port functions as a main port (hub) for transporting all kinds of goods to a great many countries throughout Europe. Amsterdam Airport Schiphol is a key air transit point for the rest of Europe. These main port functions explain the relatively high use of bunker fuels.

3.1.1.5 *Climate profile*

The Netherlands is located in a so-called "temperate zone". Due to strong maritime influences the climate is much milder than in other areas at the same latitude. The 30-year annual average temperature at the centre of the country is 10.4°C, while the mean annual average at 52°N is close to 4°C. Besides this larger scale maritime – or rather oceanic – effect, the adjacent North Sea also has an (albeit minor) effect. This results in marked gradients in most climatological elements within the first few dozen kilometres from the coast. Inland gradients are generally small. Several climatological characteristics of the coastal and inland climate of the Netherlands are compared in Table 3.2.

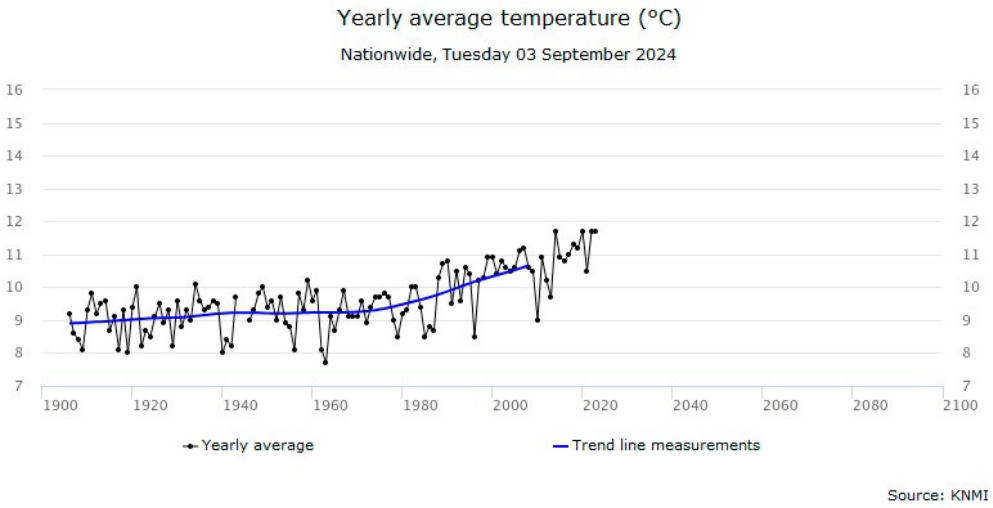
Table 3.2: Some climatological data for De Kooy (coastal station) and Twente Air Base (around 150 km from the coast), based on observations during the 1991-2020 period (KNMI, 2022).

	De Kooy (coastal station)	Twente Airbase (inland)
Mean temperature (°C)		
- January / July	4.0 / 17.5	2.8 / 18.1
Mean daily temperature amplitude (°C)		
- January / July	4.3 / 6.7	5.3 / 11.5
Mean relative humidity (%)		
- January / July	87.8 / 79.4	87.1 / 76
Mean annual duration of sunshine (hr)	1,878	1,685
Mean annual wind speed at 10m h (m/s)	5.6	3.5
Mean precipitation (mm)		
- Annual	786.6	784.3
- Driest/wettest month	34.9 / 96.5	43.7 / 79.4

Throughout the country, mean winter temperatures are about 4°C and mean summer temperatures are around 17°C. Coastal regions have more hours of sunshine than inland regions and a relatively narrow annual and diurnal temperature range. An increase of around 2°C has been measured in the Netherlands since 1961 (KNMI, 2022). The years 2014, 2020, 2022 and 2023 were the top four warmest years in the last 300 years, with an average temperature of 11.7°C; the average for the 1991-2020 period was 10.4°C (see figure 3.10). Accordingly, there was also a drop in the annual number of so-called "heating degree-days" (HDD), which is an indicator of the demand for spatial heating. This number of heating degree days has fallen sharply, from an average of 3,206 around 1950 to 2,676 over the last ten years, a decrease of 17% (PBL, et al., 2022). Mean monthly precipitation exhibits a prominent annual cycle; the driest months are March, April and May and the wettest are October and December. The local variation in mean annual precipitation deviates by no more than 16% from the national mean of 805 mm (KNMI, 2022).

More information about climatic effects and events in relation to climate change adaptation can be found in Section 4.2.

Figure 3.10: Yearly average temperature (black) and trend (blue) in the Netherlands (KNMI, 2024)[12].



Source: KNMI

3.1.1.6 *Energy profile*

In this section, trends and developments in the energy supply are described, broken down into the sub-topics of primary energy use, gas supply, electricity supply and refineries, after which the developments in energy consumption and prices are discussed. Natural gas is traditionally a key energy source. In recent years this changed significantly: due to earthquakes in the main natural gas production region (Groningen), the production in this region has formally ended and the Netherlands has gone from being a net exporter to a net importer of natural gas.

Another main development is the progress in the preparation of offshore wind farms. In 2023, approximately 4.0 GW was installed and in use, but preparations are underway to achieve a capacity of 21 GW by 2032 (CBS, 2024c).

Primary energy supply and final consumption

The total primary energy supply (TPES) initially rose from 2,829 PJ in 1990 to a high of 3,472 PJ in 2010 but has since declined to 2,615 PJ in 2023 (see Figure 3.11). This is broadly mirrored in the total final consumption (TFC), including non-energy use, which stood at 2,214 PJ in 1990, rising to 2,721 PJ in 2010 and subsequently dropping to 2,037 PJ in 2023 (CBS, 2024d). Natural gas has made the biggest contribution to this recent drop (see more details about natural gas production in the following section). In addition to natural gas, oil and petroleum products accounted for a stable relative share of around 41% in 2023. These are mainly used in the mobility sector and petrochemical industry. Other primary energy sources are renewables, coal and other energy commodities (nuclear energy, waste and other energy sources); Figure 3.12 illustrates the energy mix in 2023.

[12] More information and interactive tables are available (in Dutch) from the KNMI Climate Dashboard: https://www.knmi.nl/klimaatdashboard

Figure 3.11: Total primary energy supply (TPES) and total final consumption (TFC) (CBS, 2024d).

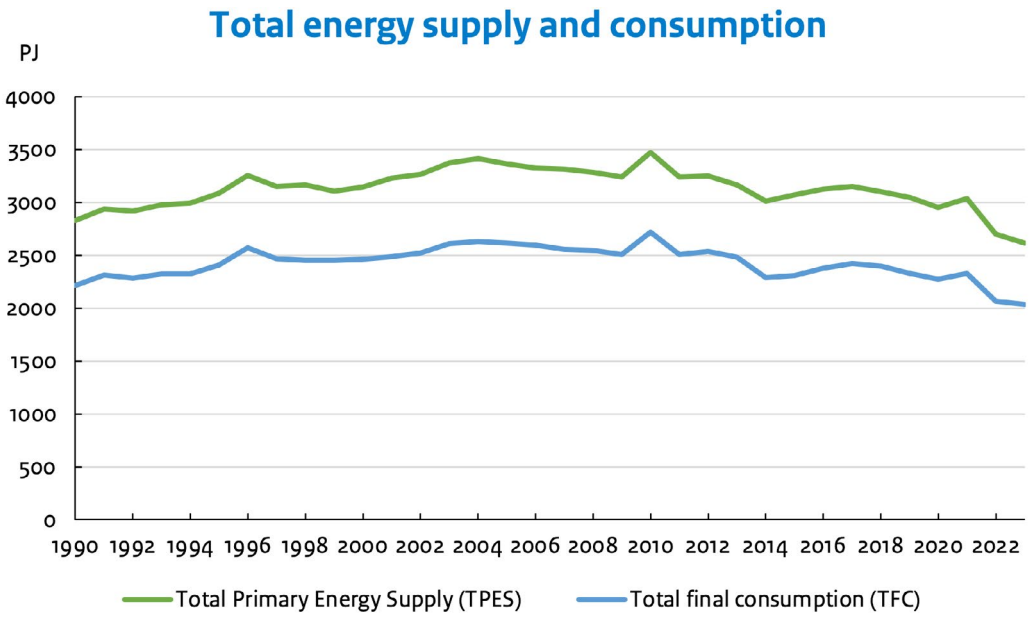
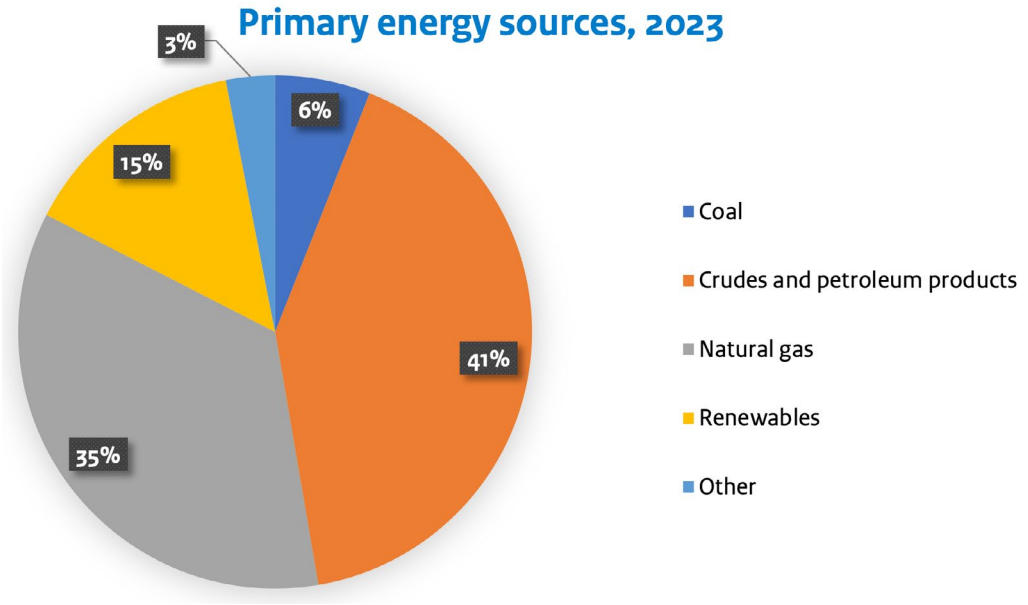


Figure 3.12: Primary energy sources (based on provisional figures for 2023) (CBS, 2024d).



Gas production

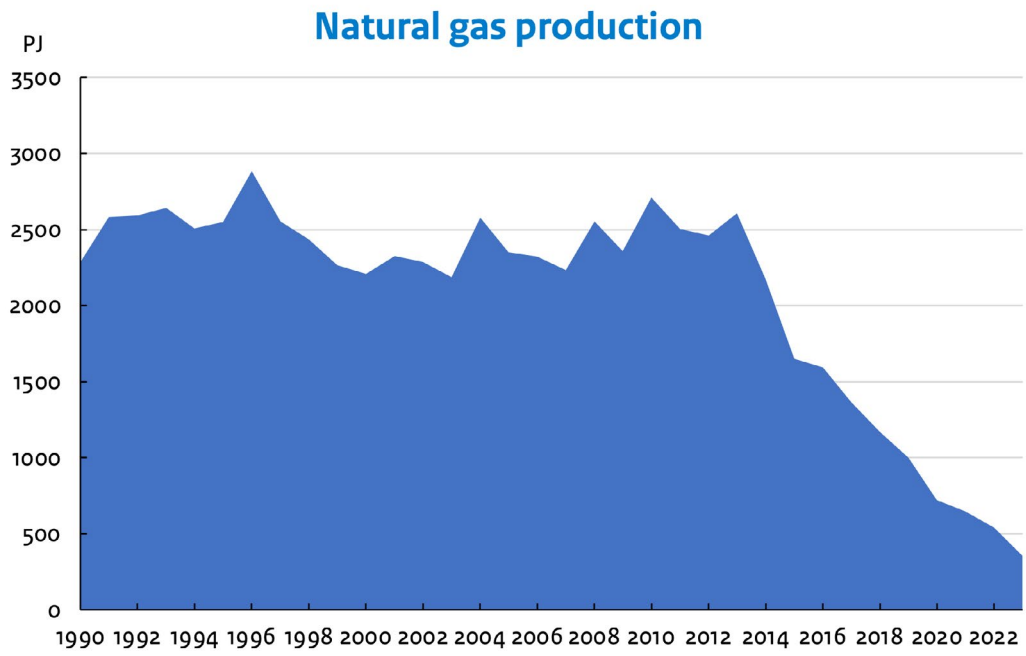
One relevant characteristic of the Netherlands is the availability of large domestic reserves of natural gas; this is one of the factors contributing to a relatively large chemical industry (which uses natural gas as chemical feedstock). The country's many refineries have also contributed significantly to this large industrial sector. Between 1990 and 2013, the yearly production of natural gas was relatively stable at around 2500 PJ (see Figure 3.13; CBS, 2024[e13]), but since then there has been a sharp drop in production. The reason for this was the decision to end the gas production field in Groningen (in the north of the Netherlands),

[13] CBS, 2024f, Energy balance sheet; supply, transformation and consumption (figures for 2022-2023 are revised provisional) https://opendata.cbs.nl/statline/#/CBS/en/dataset/83140eng/table

which had caused several earthquakes in the region, the strongest of which measured 3.4 on the Richter Scale. In order to reduce the risk of more severe earthquakes occurring and to improve the security of the inhabitants of the Groningen area, gas extraction from this field was reduced rapidly (87% from 2013 to 2020) and has formally ended by 2024. The reduction in extraction meant that already by 2018 the Netherlands went from being a net exporter to a net importer of natural gas. To enable the phasing out of low caloric gas production in Groningen, measures were taken to produce low caloric gas from high caloric gas and to switch large-scale consumers to the use of high-calorific gas.

"Green gas" generation has also started in recent years. This gas is generated from biomass, upgraded to natural gas quality and injected into the natural gas grid. Since 2011, liquid natural gas (LNG) has also been imported via the port of Rotterdam and (since 2022) Eemshaven, from countries including Algeria, Qatar and the United States.

Figure 3.13: Natural gas production in the Netherlands (CBS, 2024[e]).



Electricity production

Since 1990, the increase in electricity consumption was offset mainly by increased cogeneration and electricity imports. Boosted by a doubling of the installed capacity, the amount of combined heat and power (CHP) generation increased substantially from 1990 onwards, resulting in less fuel consumption for power generation compared to separate generation of electricity and heat.

Figure 3.14: Supply of electricity (CLO, 2024b).

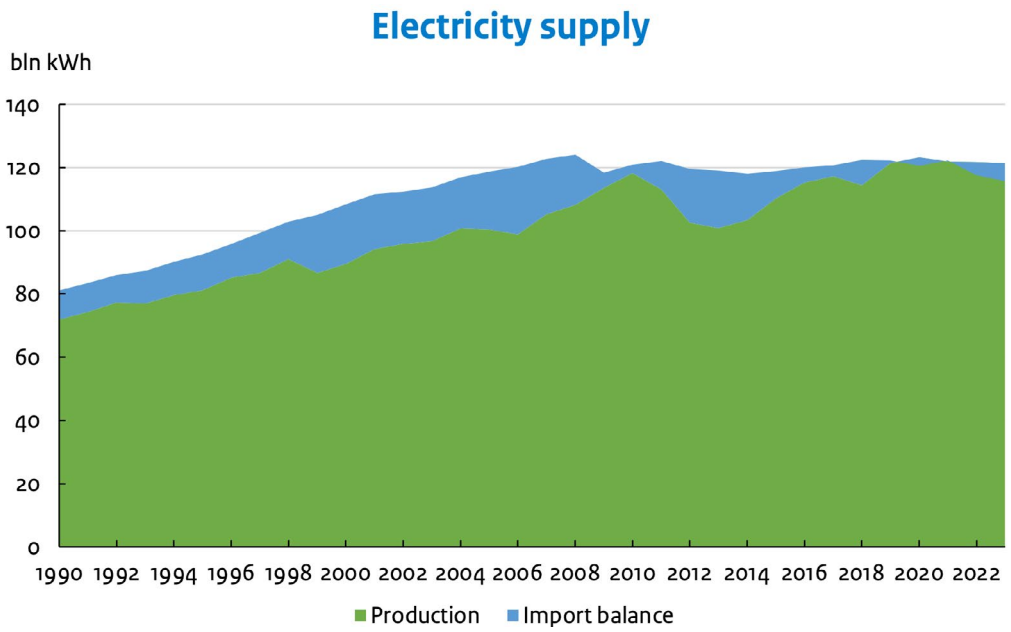


Figure 3.14 (CLO, 2024b) gives an overview of the electricity supply in the Netherlands during the 1990-2023 period. The supply of electricity is calculated as the sum of all domestic production plus the balance between electricity imports and electricity exports.

Since around 1999, the liberalisation of the European electricity market has resulted in higher net imports of electricity. In 2013, electricity imports reached their highest level ever as it became cheaper to import electricity than to produce it in the Dutch gas-fired plants. The majority of this electricity was imported from Germany, where increased quantities of electricity were produced by coal-fired plants, due to the low prices of coal, and where at some points during the year the higher production of renewable electricity led to a higher rate of generation than could be used within Germany. Imports also include electricity produced by hydropower in Norway.

The electricity supply has developed along similar lines since 2013. Production has increased while imports have declined. As a result, a relatively larger quantity of electricity produced in the Netherlands was consumed, at the expense of imports of electricity produced abroad. Domestic electricity production rose by 20% between 2013 and 2023, with 437PJ in 2023. The balance between electricity imports and exports (imports minus exports) has changed since 2013 when it stood at around 18 billion kWh; it has steadily dropped down towards zero (i.e. import and export of electricity being in balance), while in 2020, 2022 and 2023 net exports of electricity were recorded instead of imports. The estimate of Dutch electricity production is subject to uncertainty, because electricity imports and exports are highly dependent on developments abroad and the prices of fuels used for electricity production, as well as CO_2 prices under the EU ETS and the available supply of renewable electricity (CLO, 2024b).

Production of renewable electricity

In recent years, the contribution of fossil fuels to electricity production has fallen sharply in favour of renewable energy carriers. In 2016, 81% of total electricity production came from fossil fuels, while in 2023 this share has fallen to 48%. The relative contribution of electricity production from renewable energy carriers increased from 13% in 2016 to 47% by 2023, with electricity from wind energy (23%) and solar energy (17%) contributing most (CLO, 2024b).

Wind turbines are still mainly located on land, although in recent years the offshore wind capacity in the Dutch part of the North Sea has been increasing rapidly. The completion of the Borssele offshore wind farm in Zeeland alone was responsible for an increase of 1.5 GW in capacity, with an additional 2.2GW following

in 2023 with the completion of Hollandse Kust Noord and Hollandse Kust Zuid. By 2023, ten wind farms with a total capacity of 4.7 GW were in operation (see Table 3.3) and this figure is set to increase over the coming years. In 2022, the Dutch government raised the offshore wind energy target from 11.5 to around 21 GW by 2030 (EZK, 2022[14]). In 2024, the updated planning to realize 21 GW extended the completion date to 2032, due to lengthening lead times in spatial planning and necessary procedures for grid connections, overburdened supply chains and time required to connect the wind farms on the offshore grid (EZK, 2024[15]). By then, offshore wind farms will supply 16% of the Netherlands's energy requirement and 75% of the electricity needs (based on the current electricity consumption).

In recent years, the installed capacity of onshore wind energy increased from 3.0 GW in 2015 to around 6.2 GW in 2022.

Figure 3.15: Contribution of renewable electricity to electricity use 1990-2022 (CLO, 2024c).

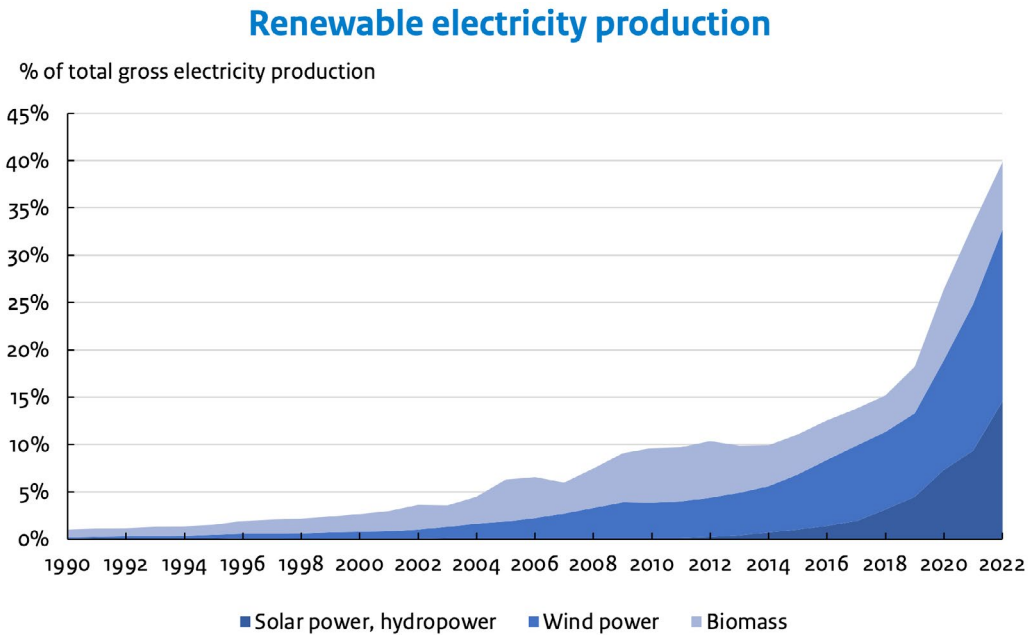


Table 3.3: Offshore wind farms in operation in the Netherlands (Source: RVO, 2023).

Name wind farm	Number of wind turbines	Capacity (MW)	In operation since
Hollandse Kust Noord	69	759	2023
Hollandse Kust Zuid	139	1529	2023
Borssele V	2	19	2021
Borssele I and II	94	752	2020
Borssele III and IV	77	731.5	2020
Gemini Windpark	150	600	2016
Luchterduinen	43	129	2015
Prinses Amaliawindpark	60	120	2008
Egmond aan Zee OWEZ	36	108	2007
Total	**670**	**4747.5**	

[14] EZK, 2022 https://www.rijksoverheid.nl/documenten/kamerstukken/2022/06/10/aanvullende-routekaart-windenergie-op-zee-2030

[15] EZK, 2024 https://open.overheid.nl/documenten/a5b91671-5b23-45b5-aa0b-72439730a4dc/file

The total installed capacity of solar power shows a steep increasing trend: it grew from 4.6 GW in 2018 to 23.9 GW in 2023 (CBS, 2024f). In 2023, around 55% of this capacity came from large-scale installations (>15 KW). In recent years, the rapid growth of sustainable sources (such as solar fields) created bottlenecks due to the limited net capacities in some regions.

Refineries

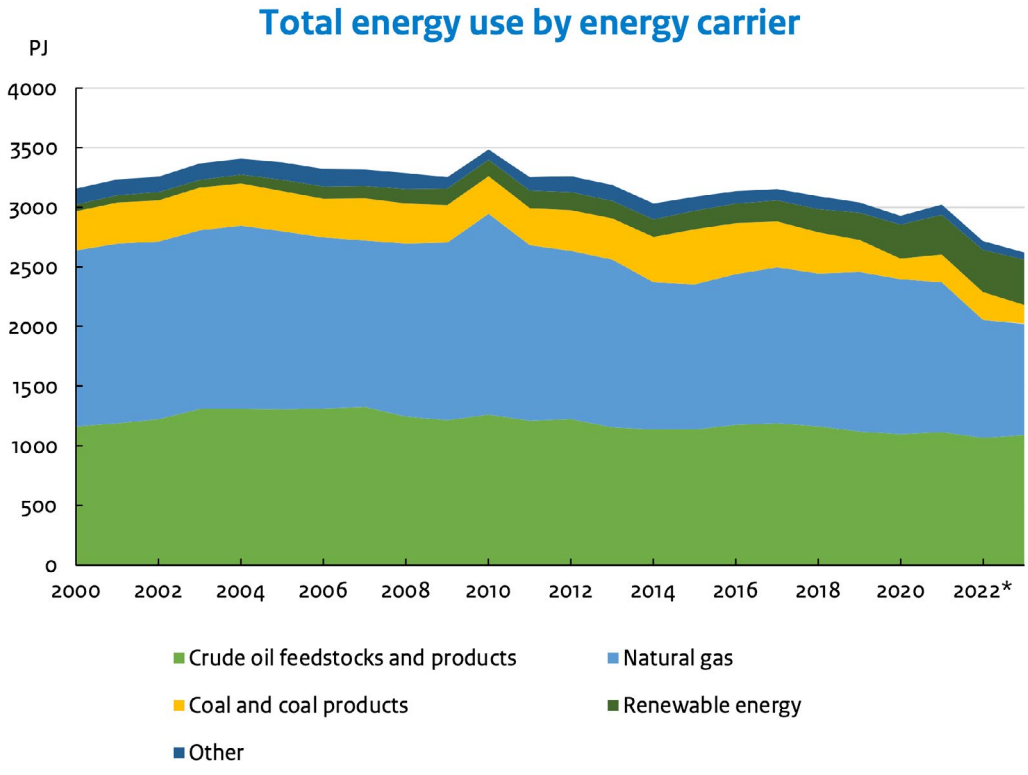
The Netherlands has six large refineries, five of which are in Rotterdam. These refineries have a combined total capacity of about 60 million tonnes of crude oil. The degree of utilisation is high, in some years reaching 100%. This high production level is related to the high efficiency rate, the proximity of many petrochemical industries and the influence of German demand. This makes Rotterdam one of the world's largest suppliers of bunker fuel oil and means that Amsterdam Airport Schiphol is amongst Western Europe's largest suppliers of jet fuel bunkers. The refineries in the Netherlands produce many relatively light oil products (LPG, naphtha, petroleum) from heavier crude oil with a sulphur content of 1.5%.

Energy consumption

During the 1990-2023 period, energy consumption in the Netherlands initially increased by 7%, reaching a maximum of 3,485 PJ in 2010; but energy consumption subsequently decreased, with the (preliminary) figure for 2023 falling to 2,621 PJ (CBS, 2024g). As presented in Figure 3.16, for most of the earlier period a significant portion of total energy consumption concerns the use of natural gas and in oil products. Coal was mainly used for the generation of electricity, while natural gas had a wide range of applications as a raw material, for electricity production, heating, transport, etc. The peak in natural gas use in 2010 was related to the additional gas use due to a cold winter.

Total energy consumption has fallen sharply since 2010, primarily because of a steep drop in natural gas consumption. This drop is related to a large extent to the drop in final consumption of natural gas for heating, because of milder winters and higher gas prices. The contribution of natural gas to electricity production has also declined. With the commissioning of three new coal-fired power plants in 2013-2015 the use of coal initially increased by more than a third, but has declined significantly since. Coal consumption for electricity production is set to decline further with the closure of coal fired power plants.

Figure 3.16: Total energy use by energy carrier, 2000–2023 (*preliminary figures) (CBS, 2024g).

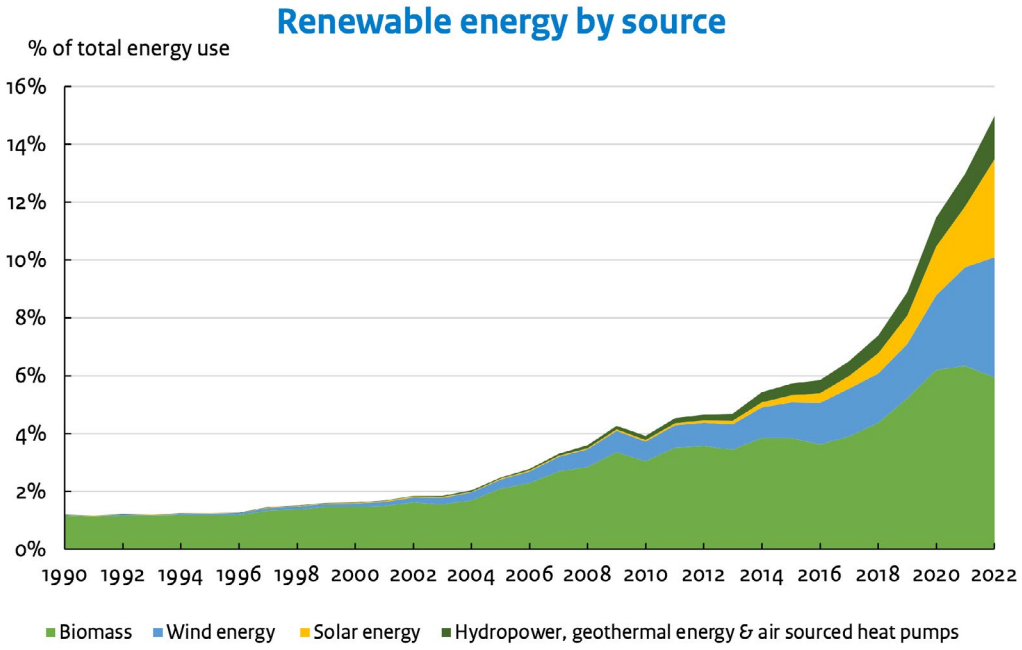


Renewable energy

The use of renewable energy (for heat, electricity and transport) remained low throughout the 1990s, with around 1.6% of the energy used in 2000 coming from renewable energy sources (CLO, 2024c). Since then, the share of renewable energy has risen gradually, reaching 15% in 2022 (277 PJ). This growth is a result of the Dutch government's stimulation programme, which subsidises the extra production costs of renewable electricity (where these are higher than the costs of conventional electricity production) and the introduction of the obligatory use of biofuels in transport.

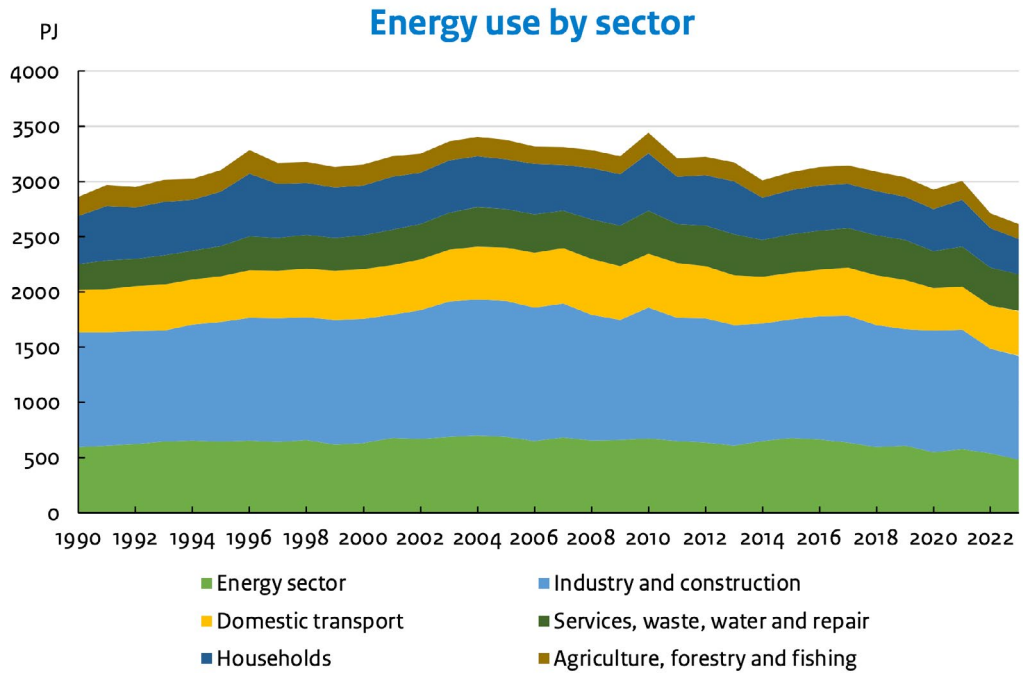
Nearly 40% of renewable energy originates from biomass, which concerns the production of electricity and heat in waste incineration plants, the use of biomass in the production of electricity and biofuels for transport. Wind energy is the second biggest source at around 28%, while solar power accounts for around 23%. There has been a steep upward trend in the production of both solar and wind energy (see Section 3.6.3 on renewable electricity production).

Figure 3.17: Contribution of renewable energy to energy use 1990–2022 (Source: CLO, 2024c).



Energy use by sector

Figure 3.18: Energy use by national sectors 1990-2022 (Source: CBS, 2024h).



Industry

Industry is the main user of energy in the Netherlands: about 35% of the nation's energy is used by industrial companies (see Figure 3.18). The key industrial use is in the chemical and pharmaceutical industry; in 2023 this was responsible for three quarters (75%) of industrial usage. The importance of the chemical and pharmaceutical industry has also had a major impact on changes in the use of energy carriers. The use of natural gas in industry has decreased since 1990 by around 35%, while the use of oil and petroleum products has increased by around 13%. Detailed information on contributions by various industrial sectors to greenhouse gas emissions, can be found in the National Inventory Report 2024.

Households

In households, natural gas is currently the primary form of energy used to heat dwellings, to produce hot tap water and for cooking. Due to warmer winters and energy-saving measures (further stimulated by higher energy prices in recent years), between 1990 and 2023 natural gas consumption fell from 350 to 203 petajoules (PJ). Total energy use by households stood at around 435 PJ in 1990 and in subsequent years gradually increased, although this fluctuation was also strongly related to weather conditions (for instance, energy usage by households spiked to 564 JP and 522 PJ, respectively, during the particularly cold winters of 1996 and 2010). However, since 2013 energy use by households has dropped to 322 PJ in 2023. During the 1990s electricity consumption rose by approximately 2% per year, but the increase has since then levelled off to around 1% per year. This was caused by a rise in the number of electrical appliances in households, but the rise was not as steep as in previous decades. New appliances are also more energy-efficient than older ones. New lighting, white goods (major domestic appliances) and other appliances that fall under European Ecodesign requirements use less electricity than their older counterparts.

Transport

Energy consumption by the transport sector remained fairly consistent in the 2000-2023 period, with road transport being the category consuming by far the most energy and demonstrating the most fluctuation (CBS, 2024j). As a consequence of the economic crisis and the purchase of more fuel-efficient vehicles, consumption decreased between 2009 and 2014. Since 2015 energy consumption has begun to rise again, albeit slowly. Due to regulations, the use of biofuels and electricity in road transport has increased

significantly since 2011. As a result of the COVID-19 pandemic, total energy consumption by road transport dropped by 14% between 2019 and 2020. Both domestic aviation and domestic shipping saw a decrease of 25% in energy consumption between 2019 and 2020, with consumption by rail transport dropping 6%. Energy usage in the transport sectors has rebounded somewhat since then, although total energy consumption in 2023 (404 PJ) remains well below that of 2019 (447 PJ).

The energy used for domestic shipping fluctuated significantly in the 2000-2021 period, increasing from 10.2 PJ in 2000 to 15.3 PJ in 2011 before dropping to 11.7 PJ in 2019. After a drop to 8.8 PJ in 2020, the energy used by the shipping industry rose slowly again to 11.3 PJ in 2023 (CBS, 2024h).

Other energy consumers

The rest of the energy is used by public and commercial buildings, services and agriculture. Energy use in the service sector has increased since 1990, reaching a high of 372 PJ in 2013; it stood at 332 PJ in 2023, an increase of around 40% compared to 1990 (see Figure 3.18; CBS, 2024h).

While there had been slight fluctuations in energy use in the agricultural sector over the past thirty years, it had remained relatively stable up to 2021 (at 173.8 PJ in 1990 and 173.4 PJ in 2021). However, due to a sharp decline in natural gas usage in 2022 and 2023, energy use in the agricultural sector dropped by about a quarter (to around 135 PJ). Most of the energy used by horticulture, which is the biggest consumer, concerns the use of natural gas for heating. This natural gas use is related to the outside temperature, so more is used in cold years, like 1996 and 2010, when gas use exceeded 150 PJ. Natural gas is not only used for heating greenhouses, but also for the generation of electricity with combined heat and power (CHPs) and gas motors. In the 2005-2009 period in particular, the number of gas motors increased. As a result of this development, electricity usage completely changed with the sector becoming a net exporter of electricity after 2005. However, the number of exports have declined since 2010, due to changing market conditions and the reduction of the total land area used by horticulture farms (Smit, 2023).

Energy prices

The Consumer Price Index (CPI) is used to measure consumer price inflation. It represents the price level of a package of goods and services as purchased by the average Dutch household, and for energy reflects changes in the prices of natural gas and electricity for household consumption (see Figure 3.19 for the price index of energy, as well as gas and electricity separately; CBS, 2024i).

Between 2000 and 2015 household energy bills increased steadily. With the increase in energy from raw materials, there was a stronger rise in consumer prices between 2016 and 2019. As a result of the COVID-19 pandemic, the electricity CPI saw a sharp drop to pre-2000 levels, which affected the energy CPI. However, both rebounded quickly thereafter. Following the Russian incursion into Ukraine and the resultant sudden scarcity in energy and raw materials, there was an unprecedented increase in energy prices, pushing prices to historically high levels in 2022 – as illustrated in figure 2.24 (CLO, 2024d). Prices have fallen somewhat from the peak reached in 2022/2023 but remain high. The high energy prices spurred measures within the Netherlands and Europe to combat and prevent the energy poverty and inflation that has been caused by these developments, as well as further hastening the transition to renewable energy sources.

Figure 3.19: Consumer price index energy, 1995–2023 (CBS, 2024l).

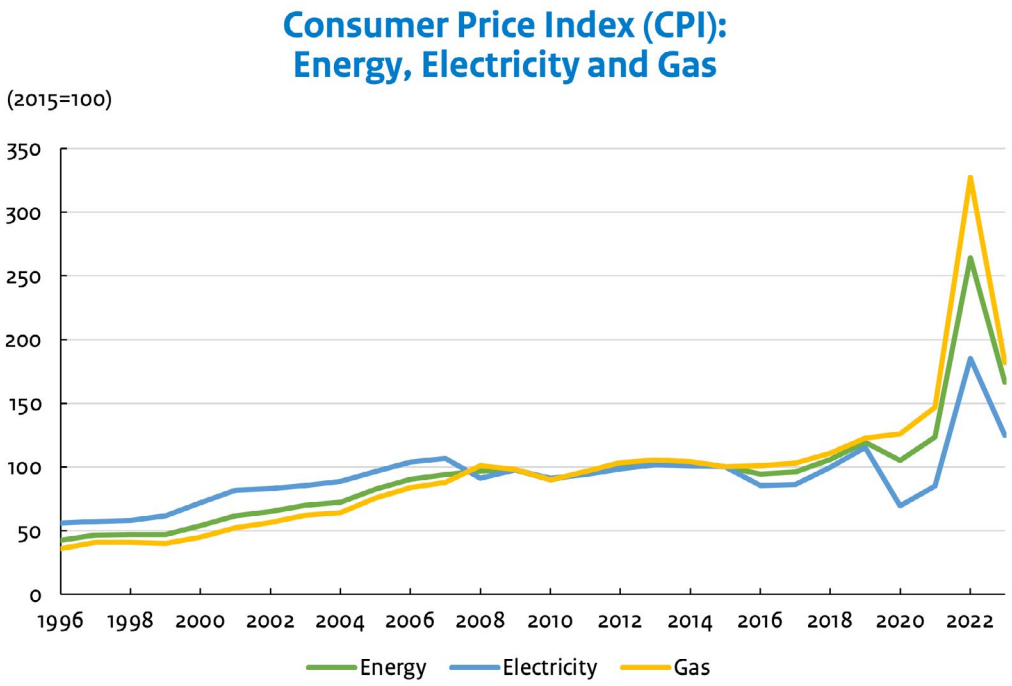


Figure 3.20: Consumer prices for electricity, excluding taxes, 2010–2023 (CLO, 2024d).

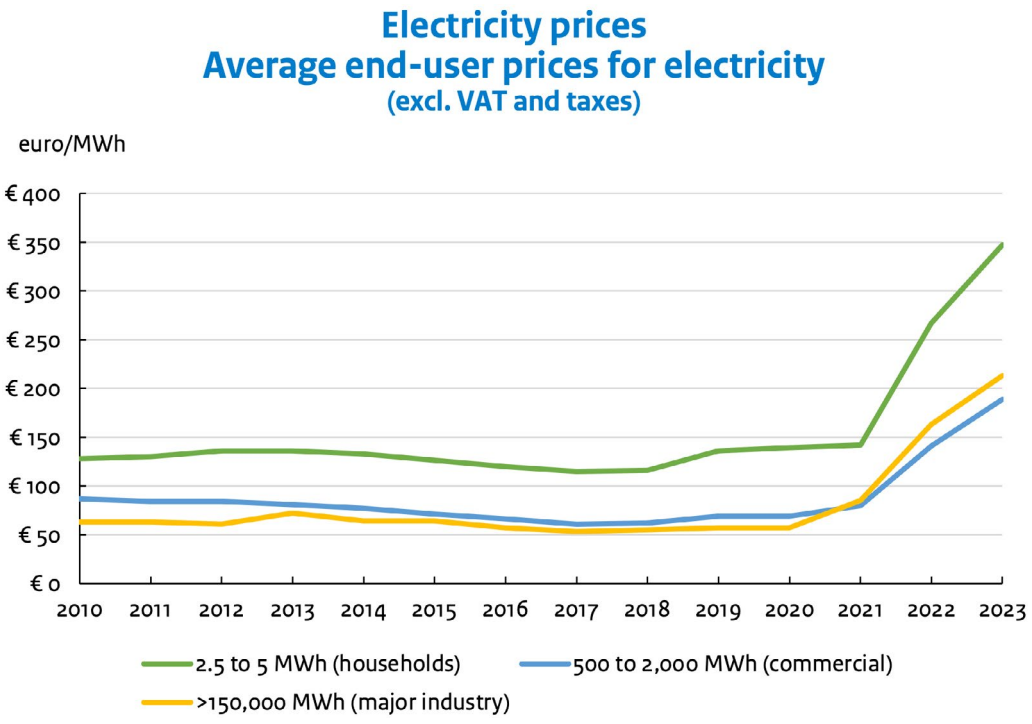


Figure 3.20 shows the changes in the average electricity price in the 2010-2023 period (CLO, 2024d). The electricity price depends on the prices for oil, coal and natural gas, among other things. Another important component is the cost of deployment of the power plant and transport networks. This is why fuel prices alone do not necessarily have a big impact on the price of electricity. In the late 1990s, the natural gas and electricity prices for consumers increased as a result of Energy Tax, which replaced the Regulatory Energy Tax (REB), which ended in 2004, and the Environmental Quality Electricity Production Tax (MEP).

The MEP was intended to stimulate renewable energy, and applied from 2001 to 2007. Since 1 January 2009, the transport costs for household users have been dependent on the connection type. This is referred to as the capacity rate. Before 1 January 2009, customers paid a fixed amount plus an amount for each unit of energy transported. In 2013 a new energy tax was introduced, the Sustainable Energy Surcharge. This surcharge was created to stimulate investment in sustainable energy.

Figure 3.21: Consumer prices for natural gas, excluding taxes, 2010–2023 (CLO, 2024d).

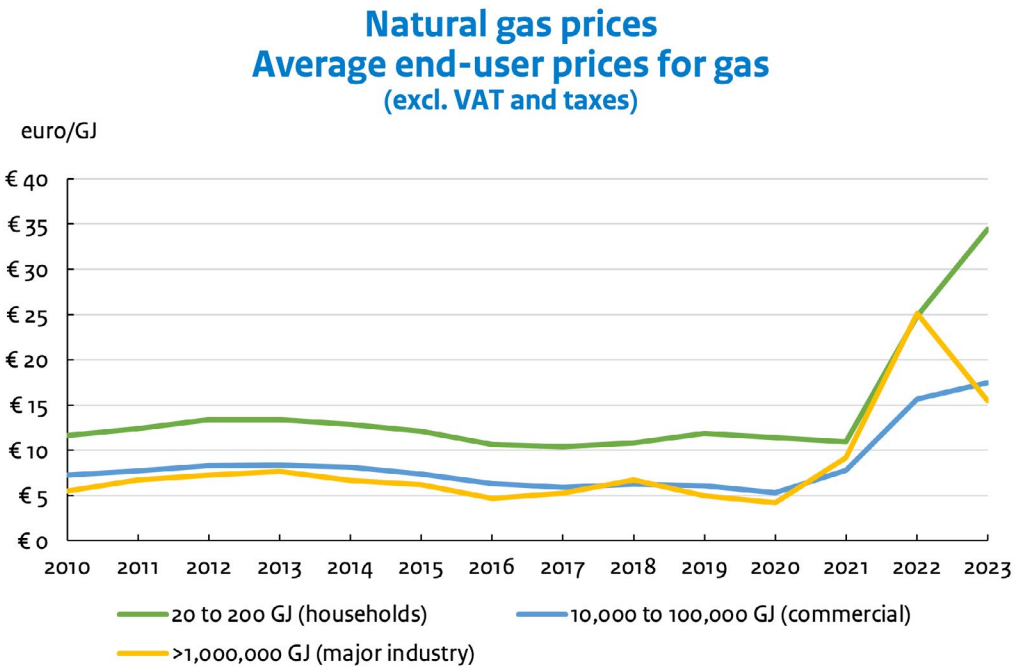


Figure 3.21 shows the changes in the natural gas price between 2010 and 2023 (CLO, 2024d). In general, the natural gas prices developed relatively stable until early 2021. Prices then initially rose due to the recovery of the global economy shortly after the corona crisis, when the high demand for gas could not adequately be met. Prices subsequently sharply increased to historically high levels due to the war in Ukraine, with limited gas supply and low filling levels of European gas supplies, although prices have dropped somewhat from the second half of 2023 onwards (CLO, 2024d).

3.1.1.7 *Transportation*

Transport volumes are influenced by demographic, economic, spatial and infrastructural factors.

Aviation

Aviation is highly concentrated at Amsterdam Airport Schiphol, by far the largest airport in the Netherlands. In 2023, Schiphol handled around 87% of all air passengers and 98% of all air freight in the Netherlands (see Table 3.4; CBS, 2024j). The four smaller airports handle the rest of the passengers and freight. Schiphol is one of Europe's largest airports in terms of the number of transport movements and number of passengers, as well as one of Europe's top five cargo hubs. In 2021, Schiphol was significantly impacted by ongoing COVID-19 travel restrictions. However, passenger volumes have since bounced back and approached pre-pandemic levels in 2023.

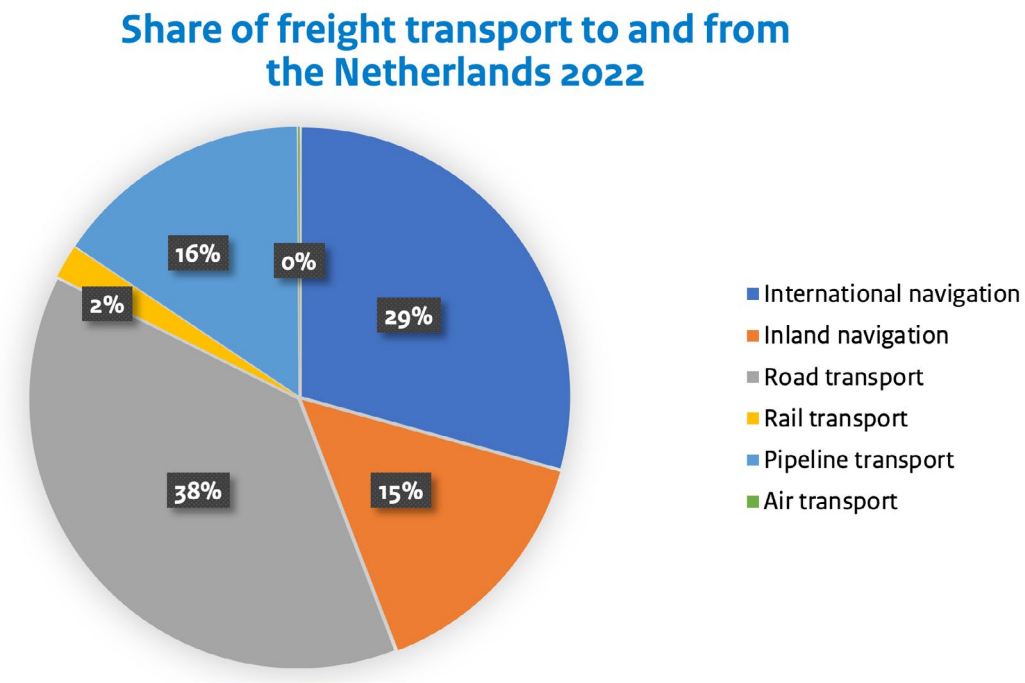
Table 3.4: 2023 (preliminary) figures for aviation (Source: CBS, 2024j).

Airports	Flights	Passengers	Cargo
	number	number	tonnes
Amsterdam Airport Schiphol	441,969	61,887,628	1,378,042
Rotterdam The Hague Airport	18,360	2,224,605	-
Eindhoven Airport	40,544	6,876,917	-
Maastricht Aachen Airport	3,935	223,152	32,275
Groningen Airport Eelde	1,181	108,535	-
Total	**505,989**	**71,320,837**	**1,410,317**

Goods transport to and from the Netherlands

Since 1998, freight transport has grown by over 20% to roughly 2032 million tonnes in total. Most goods are transported by road, with 38% of goods transport in Dutch territory – or around 777 million tonnes – taking place by road in 2022 (see Figure 3.22 – CLO, 2024[e]). Until 2007, the total quantity of goods transported by road rose each year. In 2008 it began to decline, partly due to the economic downturn. Since 2013 it has slowly begun to rise again. Other modes of transport followed the same pattern. Nearly two-thirds of all transported goods involved cross-border transport. In 2022, maritime transport (approx. 596 million tonnes) and inland shipping (approx. 301 million tonnes) accounted for 29% and 15% of goods transport, respectively. The relatively high percentage of maritime transport is largely due to the presence of the Port of Rotterdam, one of Europe's biggest ports.

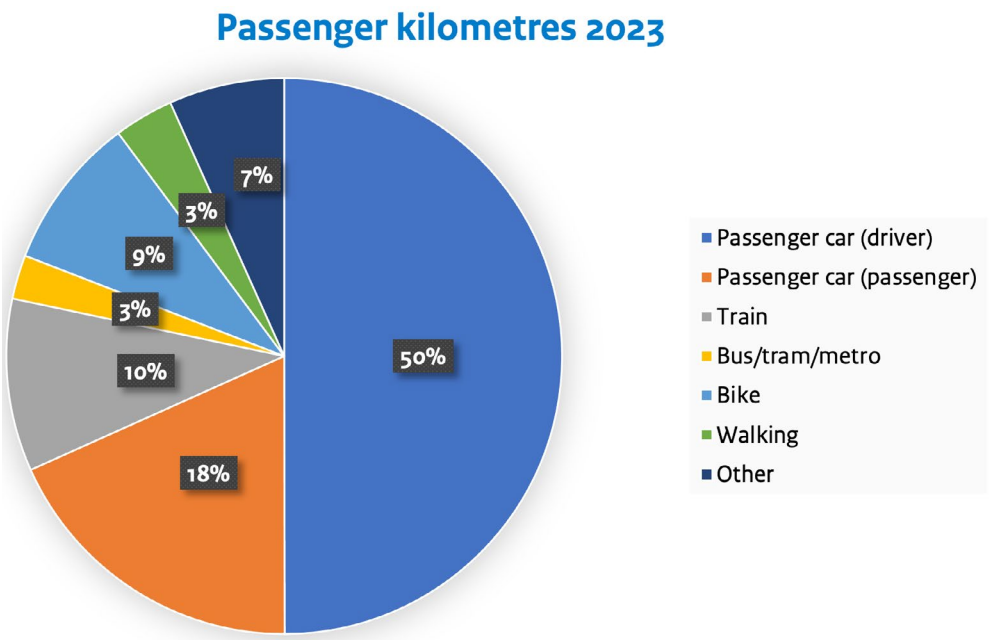
Figure 3.22: Freight transport to and from the Netherlands in 2022 (preliminary figures) (CLO, 2024[e]).



Passenger transport

In 2023, some 199 billion passenger kilometres were travelled (see Figure 3.23; CBS, 2024k), an increase of 6% compared to 2022. The majority (over 68%, i.e. 136 billion passenger kilometres) of these passenger kilometres were travelled by private car. Public transport accounted for around 13% (some 25 billion kilometres), still well below pre-pandemic levels. Nearly 9% of total passenger kilometres were travelled by bicycle (roughly 18 billion kilometres).

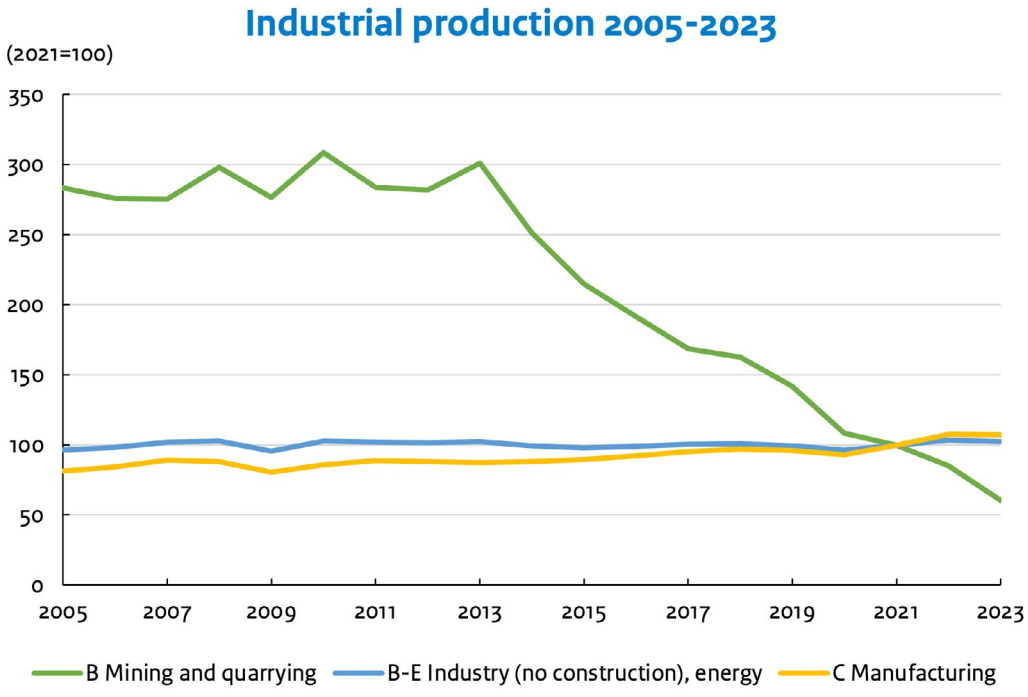
Figure 3.23: Passenger kilometres in 2023 (CBS, 2024k).



3.1.1.8 *Industry*

Compared to other EU countries, the industrial structure of the Netherlands is relatively energy-intensive in terms of energy use per € of production value. This is caused by several factors, including the chemical industry, which produces a high percentage of base chemicals compared to chemical industries in neighbouring countries such as Germany. Since 2013, the mining and quarrying industries have seen a sharp decline in production, as clearly illustrated in figure 3.24 (2021 prices; CBS, 2024l). This is related to the phaseout of low caloric gas production in Groningen. Overall, production across all other industries grew steadily, with the manufacturing industry growing the most (24%).

Figure 3.24: Industrial production 2005–2023 (2021=100) (Source: CBS, 2024l).



3.1.1.9 *Agriculture*

Agriculture in the Netherlands focuses on cattle breeding, crop production and horticulture, of which greenhouse horticulture is an important subsector. The proportion of horticulture in total agricultural production has increased over the years. Total final energy consumption of natural gas within the horticulture sector (taking cogeneration into account) stood at around 94 PJ in 2023 (CBS, 2024m). Due to the quota system for milk production ending in 2015, the number of dairy cows has been slowly increasing since 2008.

In 2023 there were over 50 thousand farms and horticultural enterprises in the Netherlands (CBS, 2024n). Of these companies, 26% were dairy farms and 22% were arable farms. In the 2000-2023 period, the total number of farms decreased by 48% while the economic size of agricultural holdings grew by more than 40%. The total land area under cultivation by the entire agricultural sector dropped by about 9% during the same period, from nearly 20,000 square kilometres to roughly 18,000 square kilometres (CBS, 2024n). The most important agricultural crops are cereals, maize for fodder, potatoes and sugar beets.

Legislation concerning manure resulted in a more even distribution of manure over agricultural areas, with excess manure increasingly used on arable cropland. The surface spreading of manure and the required manure injection and incorporation into the soil were banned by legislation concerning ammonia emissions. This resulted in more nitrogen being absorbed by grassland and cropland, subsequently leading to higher emissions of nitrous oxide. Furthermore, more farmers are looking for ways to process manure (e.g. separation of liquid and solid fractions) or to use manure as a raw material for energy production (fermentation, biogas). Relevant measures concerning manure are described in more detail under 3.4.7.2 Manure management.

Figure 3.25: Livestock numbers in the Netherlands 1980–2023 (CLO, 2024f).

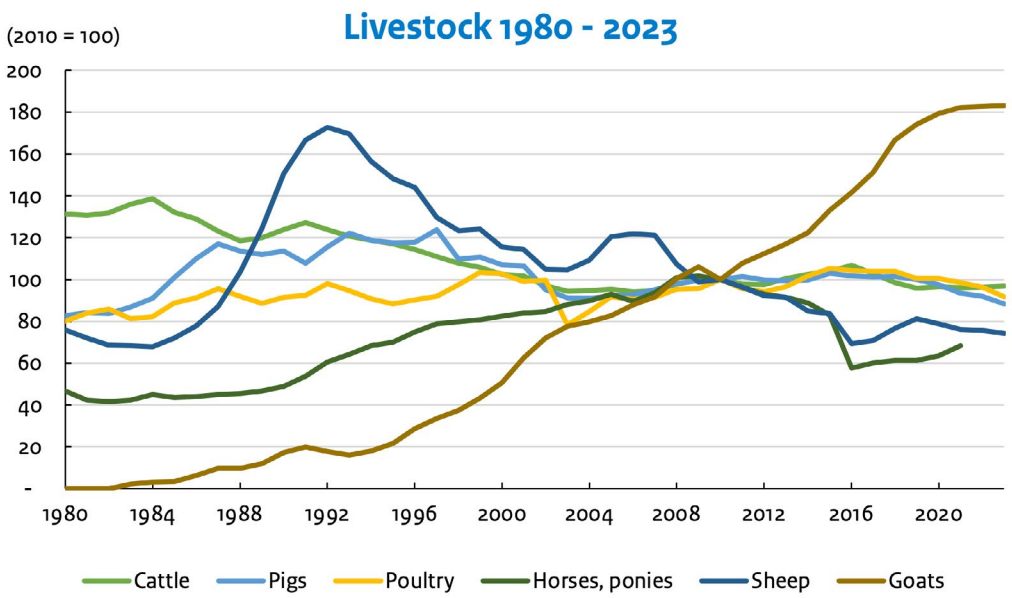


Table 3.5: Livestock numbers in the Netherlands 1990-2023 (CLO, 2024f).

	Unit	1980	1990	2000	2010	2015	2020	2023
Cattle	x 1,000	5226	4926	4069	3975	4134	3838	3846
o/w dairy cattle	x 1,000	2356	1878	1504	1479	1622	1593	1574
Swine	x 1,000	10138	13915	13118	12255	12603	11950	10826
Chickens	x 1,000	81155	92764	104015	101248	106763	101863	93004
Horses, ponies	x 1,000	67	70	117	143	118	90	97
Sheep	x 1,000	858	1702	1305	1130	946	890	839
Goats	x 1,000	-	61	179	353	470	633	647

Cattle and dairy herd

The number of cattle decreased by more than a quarter since 1980, with most of this decrease taking place in the period up to 2000 – see Table 3.5 and Figure 3.25 (CLO, 2024f). The number initially fell from 5.2 million in 1980 to 3.7 million in 2006, before increasing again to 4.3 million in 2016. It then fell again to 3.8 million in 2023. The sharp drop in 1984 coincided with the introduction of milk quotas within the European Union, causing the number of dairy and calf cows to fall by 42% between 1984 and 2011 to 1.47 million. In 2015, these milk quotas were abolished, resulting in an expansion of the dairy herd. From 2011 to 2016, the number of dairy and calf cows increased by 19% to 1.75 million.

Dutch livestock farming turned out to have produced more phosphate in 2015 than was allowed based on European agreements. The largest increase came from dairy farming. In response to this, the phosphate reduction plan for Dutch dairy farming came into effect in 2017, requiring companies to sell dairy cattle to halt the growth of the dairy herd. The phosphate content in compound feed was also reduced to reduce the amount of phosphate in manure. As a result of the phosphate reduction plan, the number of dairy and calf cows decreased by 10% to 1.58 million from 2016 to 2019. From 2015 to 2019, the number of young stock fell by 413 thousand to 0.92 million, a decrease of 31%. In 2023, the size of the dairy herd remained virtually unchanged with 1.57 million dairy and calf cows. The number of young stock rose to 0.99 million (CLO, 2024f).

Horses

The number of horses (and ponies) housed on farms increased from 67,000 to 145,000 between 1980 and 2009. Partly because of the financial crisis in 2008, the number of horses on farms decreased. Since 2017 the number of horses and ponies has increased again to 97 thousand in 2023. A great many horses are housed at locations other than farms, e.g. riding stables. It is not well known how many horses there are in the Netherlands, but according to estimates from the sector, there are between 400,000 and 450,000 horses in this country (CLO, 2024f).

Fewer sheep, more goats

As a result of the introduction of the milk quota in 1984, the expansion of a farm with dairy cows was often no longer an option. Farmers therefore started to keep more sheep, and the number of sheep has increased significantly (see figure 3.25). In 1980 there were 850,000 sheep in the Netherlands and in 1992 the peak number of 2.0 million sheep was reached. In that year, sheep were included under the manure legislation and there was a lower ewe premium, because of which the number of sheep started to fall. In 2006, the ewe premium, which was intended to provide income support to beef and dairy sheep farmers in adverse market conditions, was integrated into other government subsidy programmes. As a result, the number of sheep continued to decline after 2007, with a low of 780 thousand sheep being reached in 2016. These numbers have since stabilized somewhat with around 839 thousand sheep in 2023 (CLO, 2024f).

In 1980 there were only a few thousand goats in the Netherlands. In the period from 1980 to 2009 the number of goats increased significantly. Since 1992, goats have also been subject to manure legislation. After increasing to almost 375 thousand in 2009, the number of goats dropped to around 350 thousand in 2010 because of culling due to Q fever. Since then, the number of goats has increased at a rapid pace, growing to 647 thousand by 2023.

Number of chickens and pigs decreased

The number of chickens in the Netherlands has continued to fluctuate over the past few decades. In 1980 there were 81 million chickens and in 2021 there were 93 million. The sharp decrease in 2003 was a result of the bird flu epidemic. In the spring of 2003, nearly 30 million chickens were culled. The number of broiler chickens has fluctuated around 45 million since 2003. In 2023 there were 41 million broiler chickens in the Netherlands. After 2003, the numbers of laying hens increased, reaching a peak of almost 48 million in 2010. After 2010, this number fluctuated erratically. In 2023 there were 43 million laying hens in the Netherlands.

In 1980, there were 10 million pigs in the Netherlands. This number peaked in 1997 at 15 million. In February 1997, an outbreak of swine fever caused a sharp drop in the pig population. There was a downward trend in the years to follow up until 2004 because of factors such as market developments and environmental and animal welfare measures. Over the past ten years, the number of pigs remained steady

at around 12.3 million on average. Due to recent legislation, the number of pigs decreased to 10.8 million in 2023 (CLO, 2024f).

3.1.1.10 *Forests*

The forested area in the Netherlands decreased slightly in 2021 compared to previous measurements to roughly 364,000 ha, which amounts to around 11% of the total land area used. The main causes of this are the felling of temporary forests established in the 1980s and 1990s, and the conversion of forest into other nature areas, such as heath corridors and sand drifts. Compared to previous periods, the establishment of new forested areas lagged behind in the 2013-2021 period.

Most of the forested area in the Netherlands was originally planted using regular spacing and just one or two species in even-aged stands, with wood production being the main purpose. The switch to multi-purpose forests (e.g. nature, recreation), which was first started in the 1970s, has had an impact on the management of these even-aged stands. Most of the forested areas in the Netherlands are currently managed according to Sustainable Forest Management principles. Newly established forests are also planted according to these principles. The results of this management style are clearly shown in the Seventh National Forest Inventory (see Figure 3.26; Schelhaas, et al., 2022). The Eight National Forest Inventory is currently ongoing and will run until 2026.

Dutch forests are becoming increasingly mixed, in many cases at the expense of unmixed coniferous stands. The share of broadleaved tree species exceeds the share of coniferous tree species for the first time since measurements began, in terms of surface area, volume and additional growth.

The stock of living wood has increased from 212 m^3/ha to 225 m^3/ha from 2013-2021. Standing dead wood has increased from 6.2 to 10.1 m3/ha and lying dead wood has increased from 6.6 to 9.3 m^3/ha. The felling volume remained more or less the same (1.15 million m^3 per year), while growth declined, likely due to drought and aging of forests.

Most forests are in the provinces of Gelderland and North Brabant; the least-forested province is Zeeland (see Figure 3.27, CLO, 2020a).

Figure 3.26: Types of forests in the Netherlands (Schelhaas et al., 2022).

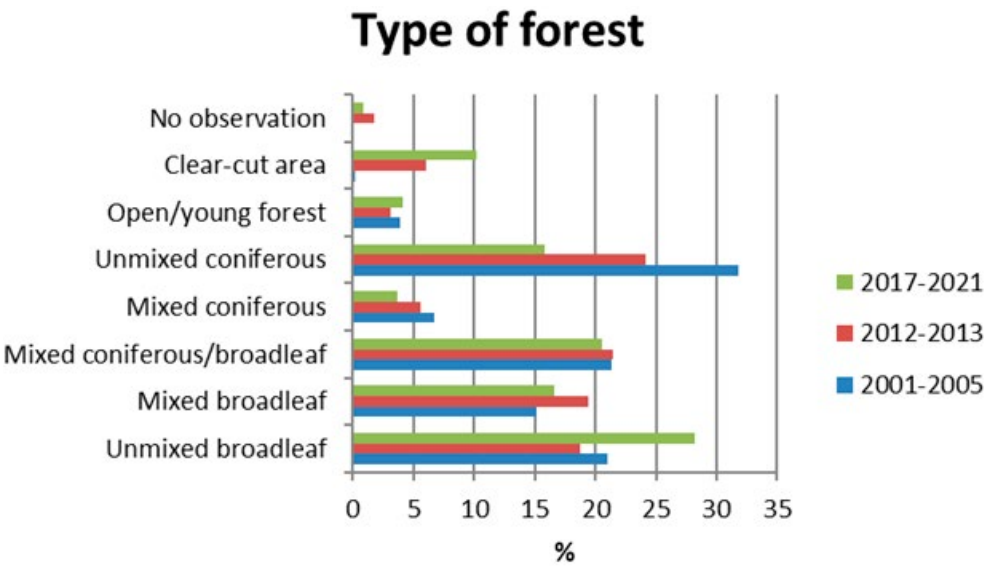
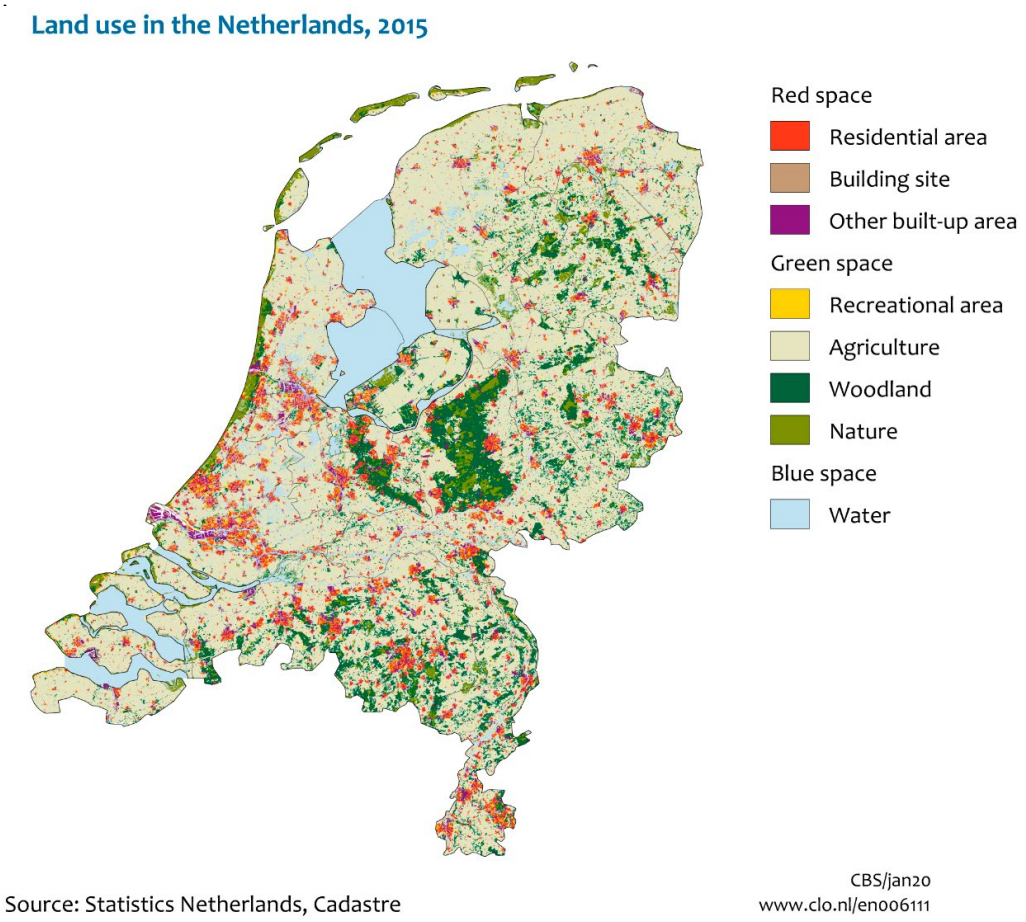


Figure 3.27: Land use in the Netherlands (CLO, 2020a)



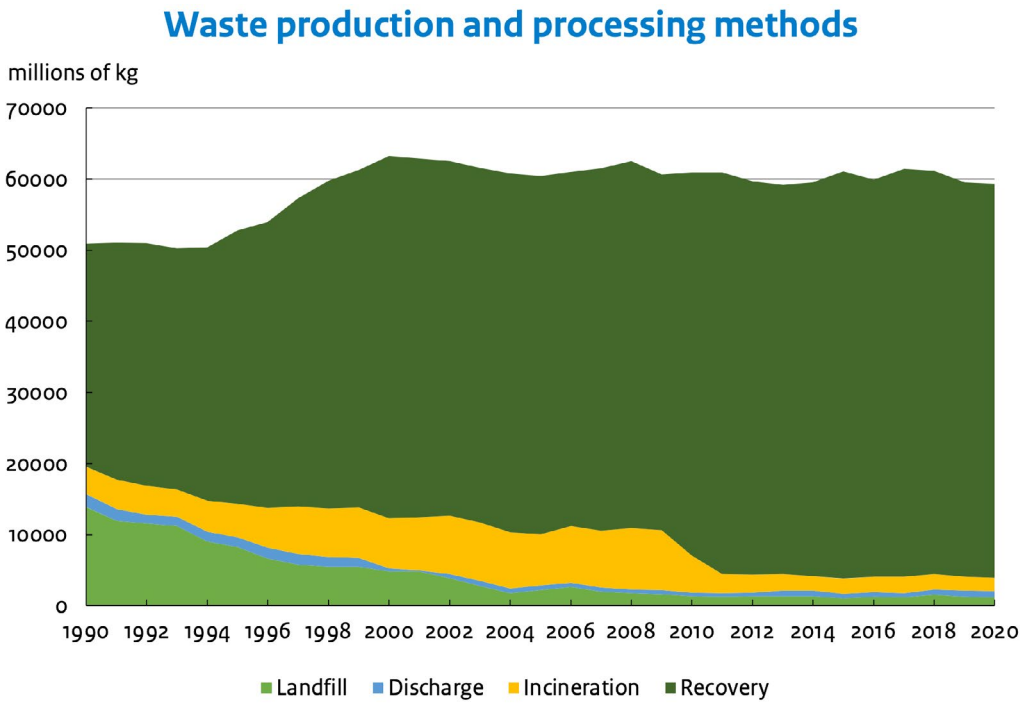
Source: Statistics Netherlands, Cadastre

3.1.1.11 *Waste*

The total yearly amount of waste produced in the Netherlands (excluding polluted soil, dredged spoils and animal manure) has remained relatively steady since 2000, as shown in Figure 3.28 (CLO, 2020b). Despite population growth and economic development, waste production remained fairly stable at around 60 million tonnes during the 2000-2020 period, partly because of governmental policies aimed at decoupling GDP growth and waste production.

Between 1990 and 2020, the rate of waste recovery (i.e. recycling and the use of waste for energy production) increased from 62% to 93% of the total amount (Figure 3.28). This included half of residential and office waste, most industrial waste and almost all demolition waste. Nearly all waste products from agriculture and coal-fired power plants were recycled. In 2020, approximately 4.0 million tonnes were not recovered, of which residential waste accounted for the largest share, followed by office waste. In 2020, some 1.1 million tonnes of waste were disposed of in landfill sites; in 1990 this figure was around fourteen times higher (13.9 million tonnes). Around 10% of this waste consisted of degradable carbon, leading to methane emissions (a few Mt CO_2-eq). The residual waste that is not disposed of in landfill is incinerated; after an increase in the volume of waste incinerated in the 1990s, quantities stabilised at around 7.5–8.5 million tonnes in the 2000s. From 2010 onwards incineration in waste incineration plants is reported under the category "waste recovery." Therefore, the amount of waste that is reported under the category "incineration" has been further reduced.

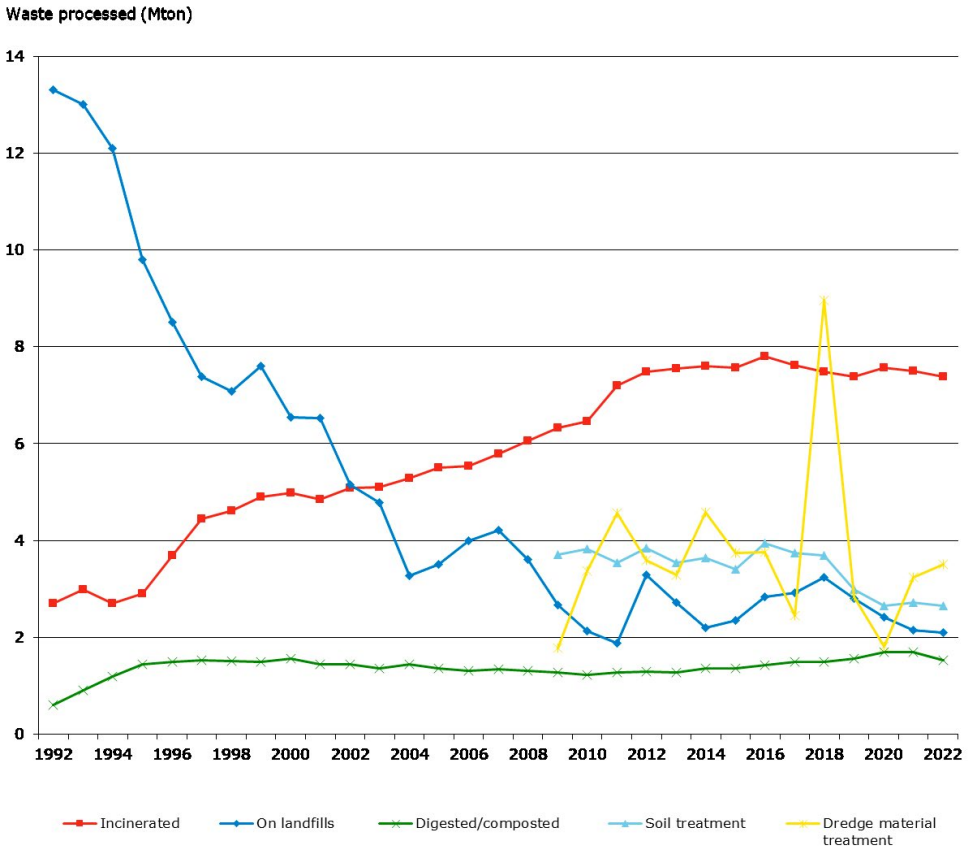
Figure 3.28: Waste production and processing methods 1990–2020 (CLO, 2020b).



The amounts of waste dumped at landfill sites have been substantially reduced because of the government's waste management policy. This focuses first and foremost on prevention. Reuse and waste incineration with energy recovery are next in line in terms of priority. The separation of waste streams at the source for recycling purposes is a key factor, in particular for the recycling of paper and glass, as well as garden and food wastes (compost). Figure 3.29 shows the developments in waste processing up to 2022 in more detail regarding the segment of waste that is processed within the Netherlands by landfills, waste incinerators, organic waste digestion/composting installations, treatment of soil and dredge material (RWS, 2024[16]). It clearly illustrates the sharp decline in landfilling since 1992, whereas incineration has increased.

[16] RWS, 2024. Afvalverwerking in Nederland, gegevens 2022. Note: This report covers part of the soil, dredging and waste streams and various processing techniques in the Netherlands, but not all processing techniques are covered.

Figure 3.29: Amount of waste processed, 1992 – 2022 (RWS, 2024).



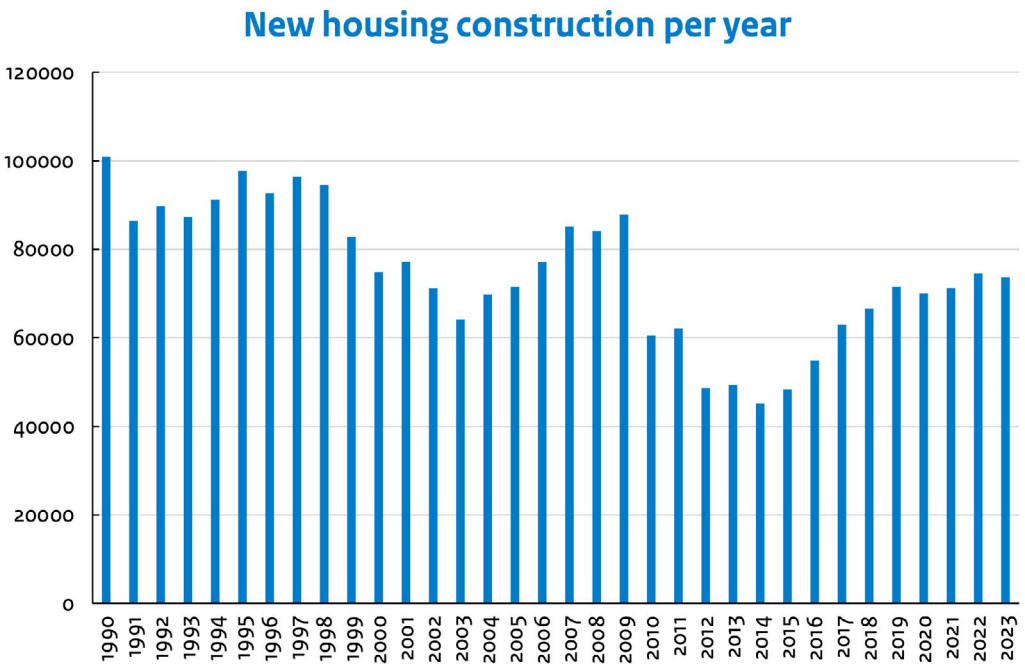
3.1.1.12 *Building stock and urban structure*

Housing stock and energy labels

As of 1 January 2024, there were 8.2 million homes in the Netherlands. That represented an increase of 40% compared to 1 January 1990. Between 1990 and 2023, 2.5 million new dwellings were built and more than 413 thousand were demolished (CBS, 20240).

Over the entire period an average of nearly 75,000 new homes were built per year. However, as is shown in Figure 3.30, this figure has changed over time. In the 1990s, the average number of new homes built per year was 92,000. The number of new dwellings built each year in the Netherlands decreased during the 1998-2003 period but rose again to nearly 88,000 in 2009. Then, because of the financial and economic crisis, production plummeted to only 61,000 new homes in 2010, reaching a low of 45,170 new homes added in 2014. Since then, the number of new homes built each year has started to increase again, reaching 73,638 in 2023.

Figure 3.30: Changes in numbers of new homes added per year (CBS, 2024o).

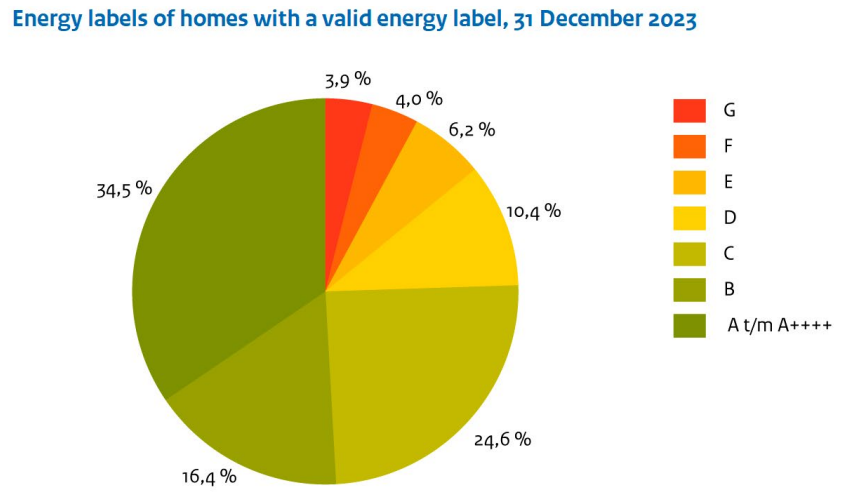


An energy label for homes and buildings was implemented in 2007. This label gives an overall impression of a home's energy efficiency and is valid for a period of ten years. Of the more than 8.2 million homes in the Netherlands, as of 1 January 2024 over 5 million had an energy label (CLO, 2024g). This corresponds to 61% of the total housing stock. Around 51% of the housing stock with an energy label consist of highly energy-efficient homes, with almost 35% possessing an A label (or higher) and 16% a B label (see figure 3.31).

A significant number of energy labels were issued in 2009, when many housing associations had their housing stock assessed. If a home subsequently obtains a new label – after energy-saving measures have been implemented, for example – the old label is "overwritten". This prevents labels from being counted twice. Since 2015, a great many new labels have been issued annually. This was due to the simplification of the label application process, for which the costs were also lowered. In addition, in 2015 penalties came into effect for anyone who tried to sell or let a house without a label (CLO, 2024g).

In 2010, 16% of the labels issued were green (A or B); by the end of 2023, this figure was 51% (see figure 3.32). The proportion of the energy-inefficient labels E, F and G declined from 25% in 2010 to 14% in 2023. However, issued labels are not representative of the entire housing stock, as there are still over 3.2 million houses, 39%, which do not have an official energy label. In most cases, energy labels are issued for newly built or rental properties.

Figure 3.31: Distribution of energy labels, 2023 (CLO, 2024g).



Source: RVO

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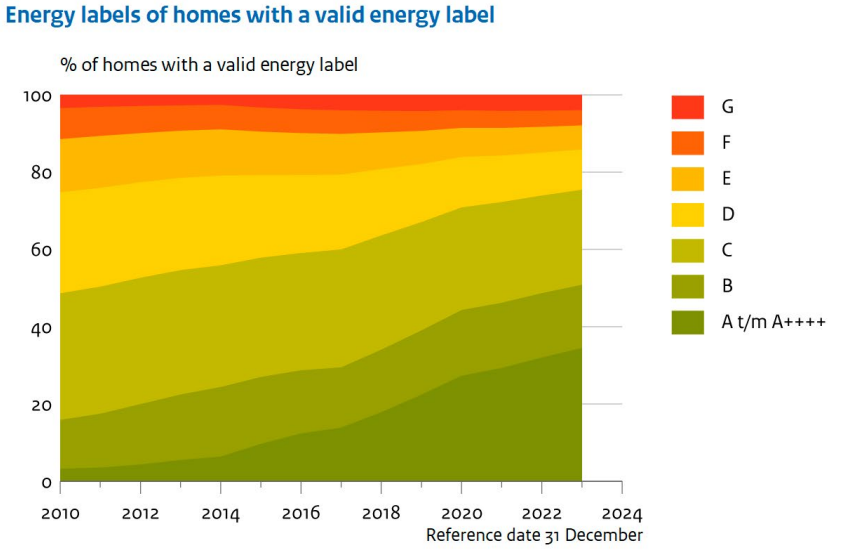
Figure 3.32: Prevalence of different energy labels within the labelled housing stock, trending towards more energy-efficient labels (A and B), 2010-2023 (CLO, 2024g).



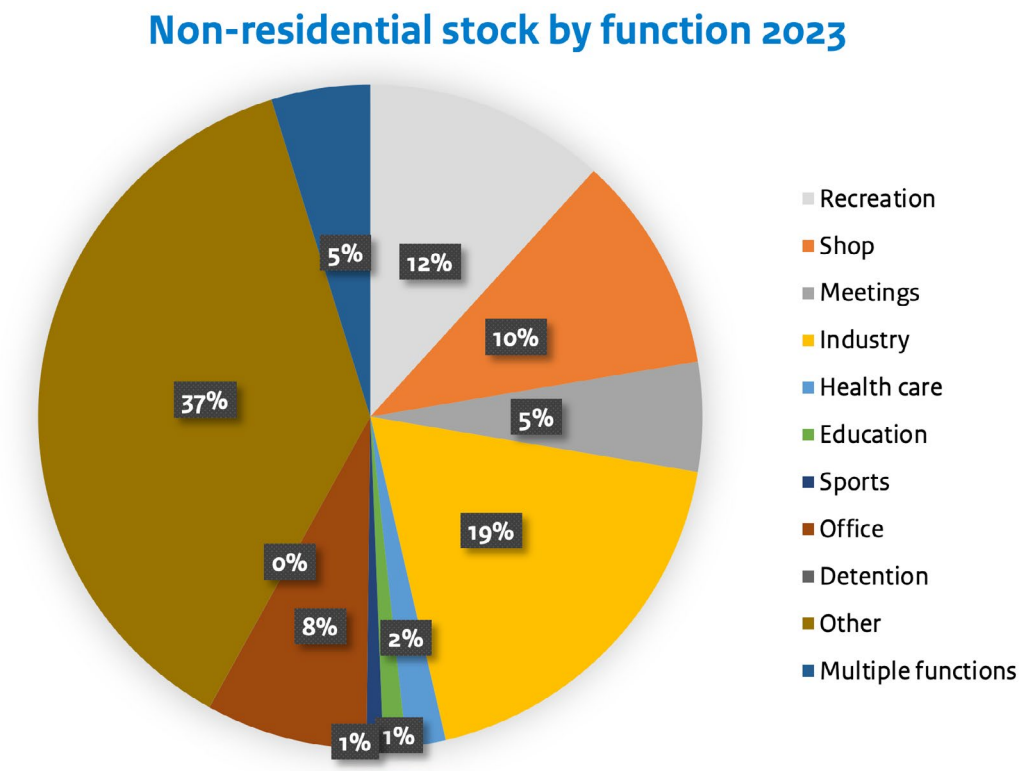
Source: RVO

PBL/aug 24
www.clo.nl/nl055610

Other buildings

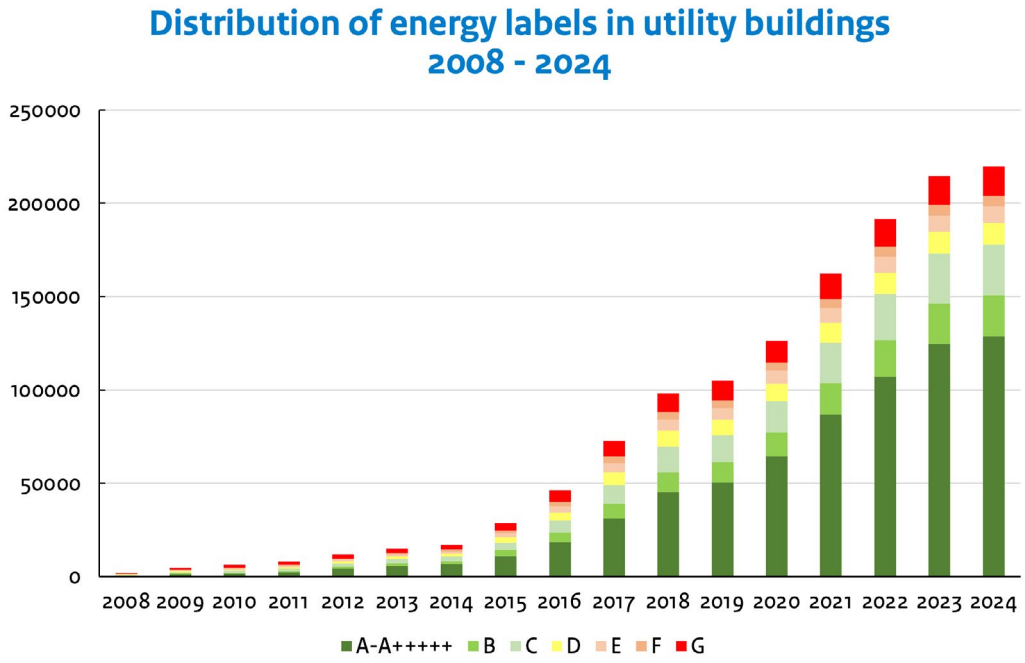
At the end of 2023 about 1.2 million non-residential buildings were in use in the Netherlands. This includes buildings for industrial use, offices, shops, premises of healthcare providers, education institutions and sport and recreation facilities. See Figure 3.33 for a breakdown of these categories as a percentage of the total number of buildings in the non-residential building stock.

Figure 3.33: Non-residential stock by function, 2023 (CBS, 2024p).



As of 2024 approximately 49% of all non-residential buildings with an energy label obligation had such a label, indicating the energy efficiency of the building. This obligation does not apply to certain smaller buildings and monuments. Figure 3.34 shows the increase in the distribution of energy labels for utility buildings from 2008 to 2024.

Figure 3.34: Distribution of energy labels in utility buildings, 2008-2024 (RVO, 2024).



3.1.2 Institutional arrangements

3.1.2.1 *Institutional arrangements for tracking progress*

As an EU Member State, the Netherlands contributes to the implementation of the European Union's NDC (see paragraph 3.2). To track progress of its implementing and achieving the European target for 2030, institutional arrangements are in place both on the EU-level as on Member State level, as outlined below. As such, those sections regarding specific arrangements at the EU-level may contain common text for the BTRs of the EU and the Member States.

Institutional arrangements in the European Union

The EU's Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action ('Governance Regulation') establishes a governance mechanism and specific arrangements to track the progress of the Union and its Member States towards the implementation and achievement of the EU's climate and energy targets and commitments under the UNFCCC and the Paris Agreement. These arrangements include the monitoring of GHG emissions and removals, the reporting of policies and measures, projections of GHG emissions and removals and progress on adaptation to climate change.
Under the Governance Regulation, the EU has established a Union Inventory System to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of the data reported by the EU and its Member States. This inventory system includes a quality assurance and quality control programme, procedures for setting emission estimates, and comprehensive reviews of national inventory data to enable the assessment of compliance towards climate goals.

Each EU Member State compiles its GHG inventory in accordance with the requirements of the Paris Agreement[17] and the relevant Intergovernmental Panel on Climate Change (IPCC) guidelines[18]. Inventory data on GHG emissions and removals, including information on methods, are submitted electronically using a reporting system managed by the European Environment Agency (EEA). The submitted data are subject to quality control procedures and feed into the compilation of the GHG inventory of the EU. Net GHG emissions, calculated from emissions and removals reported in the GHG inventory of the EU, are the key information used for tracking progress towards the EU NDC target of at least -55% net emission reduction by 2030 compared to 1990.

Given the scope of the EU NDC related to international aviation and navigation, a specific share of international aviation and navigation emissions as reported in the GHG inventory data is calculated based on the Joint Research Centre's Integrated Database of the European Energy System (JRC-IDEES) (JRC, 2024). Details on the methodology applied to identify GHG emissions from international aviation and navigation in the scope of the EU NDC, which are added to the national totals from the EU GHG inventory, are given in Annex 2 to this BTR.

Under the Governance Regulation each Member State must report to the Commission biennially on the status of implementation of its integrated national energy and climate plans (NECPs). This process allows the Commission to ensure that the EU and the Member States remain on track to achieve the climate-neutrality objective and progress on adaptation.

Under the Governance Regulation, Member States further operate national systems for policies and measures and projections and report standardised information, which is subject to quality and completeness checks. Based on the submitted data, the EEA compiles projections of GHG emissions and removals for the EU. The EU-wide information is summarised annually in the Climate Action Progress Report[19] by the

[17] Chapter II of the annex to decision 18/CMA.1, https://unfccc.int/documents/193408; and decision 5/CMA.3, https://unfccc.int/documents/460951.

[18] 2006 IPCC Guidelines for National Greenhouse Gas Inventories, https://www.ipcc-nggip.iges.or.jp/public/2006gl/; and on a voluntary basis: 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/.

[19] Climate Action Progress Report 2024 (under the Energy Union Reporting set out in the Governance Regulation), see https://climate.ec.europa.eu/eu-action/climate-strategies-targets/progress-climate-action_en

European Commission and in the 'Trends and projections' report by the EEA[20]. Both the Union and the national systems are subject to continuous improvements.

The national energy and climate plans (NECPs) were introduced by the Governance Regulation. For Member States, the NECP for 2021-2030 play a key role to enabling the tracking of progress towards the 2030 climate and energy targets. The update of the NECPs provides an opportunity for Member States to assess their progress, identify gaps and revise existing measures or plan new ones where needed.

Member States were due to submit their final updated NECPs, taking account of the Commission's assessment and recommendations, by 30 June 2024. Member States also report biennially on the progress of implementation of their National Energy and Climate Plan, the so-called "NECP Progress Reports", as required by the Governance Regulation. The progress reports integrate reporting on both the implementation of climate and energy policies, various indicators and the progress towards the achievement of contributions to EU targets.

Institutional arrangements in the Netherlands

Climate Act

The National Climate Act adopted in 2019[21] provides the legal basis for climate policies in the Netherlands. In this act, the target is set to reach net-zero emissions not later by 2050; and to achieve negative emissions thereafter. These targets have been aligned with the European Climate Law[22]. To achieve these long-term targets, the National Climate Act also sets the intermediate target for 2030 to achieve an emission reduction of 55% compared to 1990 levels.

The Climate Act also sets the framework to define policies and to monitor their progress. The government is required to adopt a national climate policy plan for the next 10 years, every five years. The first climate plan for the period 2021-2030 was published in 2019[23]. The next climate plan, for the period 2025-2035, is expected before the end of 2024. The Council of State, the highest legal advisor of the government, is consulted before adoption of the climate plan. The Ministry of Climate Policy and Green Growth (KGG) is responsible for the coordination of national climate policies.

The purpose of the national climate policy plan is to ensure not only the attainment of national climate targets but also commitments to the EU and UN. Therefore, the legal institutional arrangements in the national climate act also ensure the domestic implementation of the contribution of the Netherlands to the EU's nationally determined contribution.

The climate act also includes various provisions to monitor and evaluate the progress of the climate plan. The government needs to report annually to the Parliament on the progress of the climate plan. For this, the government uses a Climate Policy Dashboard[24], prepared by the Netherlands Enterprise Agency (RVO), to monitor and track progress of implementation of policies and measures. The climate act also requires the Netherlands Environmental Assessment Agency (PBL) to publish updated projections annually in which the impact of policies and measures is evaluated ex-ante. The government must address these projections in their Climate Policy letter to Parliament. Every two years, the government must evaluate the progress of the climate plan and should propose adjustments to the plan if deemed necessary, using the insights provided by the Climate Policy Dashboard and the projections.

[20] Trends and Projections in Europe 2024, see https://www.eea.europa.eu/en/analysis/publications/trends-and-projections-in-europe-2024

[21] https://wetten.overheid.nl/jci1.3:c:BWBR0042394&z=2023-07-22&g=2023-07-22

[22] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R1119

[23] https://open.overheid.nl/documenten/ronl-c66c8a00-ac14-4797-a8ea-973a98c5beeo/pdf

[24] https://dashboardklimaatbeleid.nl/

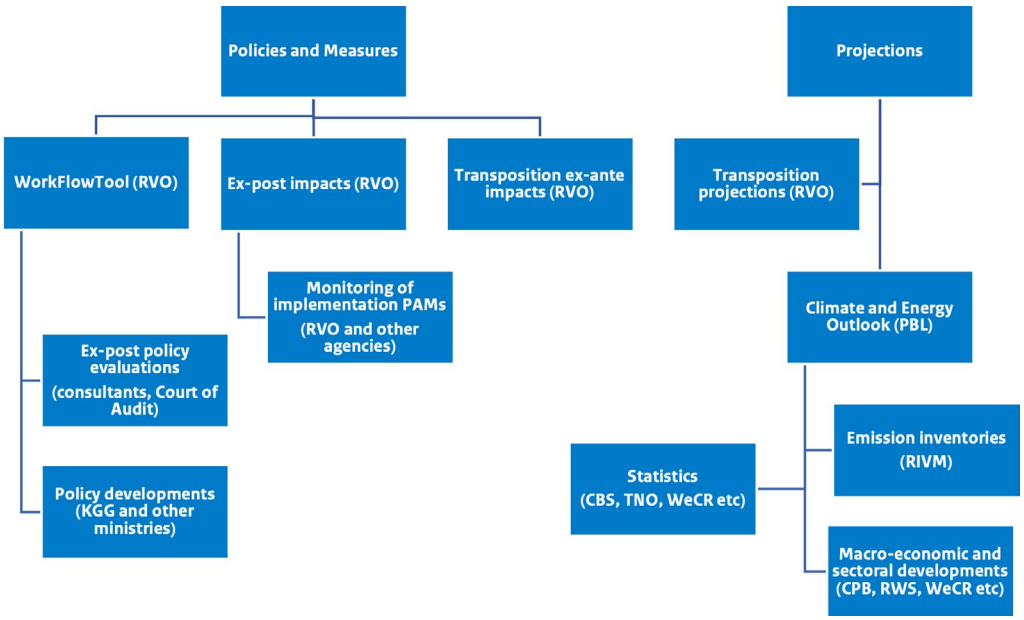
National Climate and Energy Outlook

Projections of greenhouse gases are reported in the annual Climate and Energy Outlook (KEV). The KEV-report describes policies and measures in place or planned and which are included in the projections regarding energy savings, renewable energy and greenhouse gas emission reductions in the Netherlands as a whole, as well as for various sectors. The KEV includes the policy variants 'with existing measures' (WEM) and 'with additional measures' (WAM). The projections include quantitative estimates for a sequence of four future years ending with 0 or 5 immediately following the reporting year. Since 2022, the KEV includes a projection horizon up to 2040. Methods used in the KEV are consistent with those defined in the guidelines of EU, UNFCCC and IPCC. The first KEV was published in 2019, which was the successor of the National Energy Outlook (NEV), which was published annually since 2014 (except for 2018).

These projections are developed by the Netherlands Environmental Assessment Agency (PBL), which is an independent governmental agency, in cooperation with Statistics Netherlands (CBS), TNO Energy Transition, the National Institute for Public Health and the Environment (RIVM) and the Netherlands Enterprise Agency (RVO). PBL has overall responsibility for the KEV and for the projections and the evaluative aspects in the report in specific (including the final editing of the report). This fits with their role in the Netherlands as an independent planning agency and guarantees an independent evaluative view. CBS provides various official statistics such as related to economic development and energy balances. RVO provides monitoring information on the implementation of many policies and measures. Where needed for specific data, other organisations supply input, e.g. some non-CO_2 greenhouse gas data are supplied by the National Institute for Public Health and the Environment (RIVM). An advisory committee in which all partners are represented, but also representatives from KGG, other ministries and the Council of State provides suggestions on set up of the KEV.

RVO is appointed by KGG to coordinate and submit the reports to the EU and UNFCCC. The KEV-report is used by RVO as the basis for reporting to the EU and UNFCCC on projections. This includes the projections themselves, but also information on policies and measures, the models used, the input parameters and sensitivity analyses. Since not all information that is required for the reporting to the EU and UNFCCC is published in the KEV-report itself, PBL and/or their partners provide RVO additional projection results and details.

Figure 3.35: National system for reporting on Policies and Measures and Projections.



The reporting on policies and measures to the EU and UNFCCC is based on various information sources (see figure 3.35). The progress on the implementation of policies and measures are described in the annual Climate Policy letter from the government to Parliament. To this end KGG, RVO and PBL work closely with the other ministries in collecting up-to-date information on their policies and measures. This policy information is collected using the WorkFlowTool, which serves as a single data source on policies and measures used by KGG, RVO and PBL. Before 2024, Excel sheets and Word documents were used by RVO and PBL to collect data on policies and measures.

The KEV is also used by RVO as a basis for the calculation of the ex-ante impact of PAMs on greenhouse gas emissions, as reported to the EU and UNFCCC (see Section 3.5.2). For the ex-post impacts and results, RVO uses (mostly internal) monitoring data from the implementation of policies and measures (such as subsidy schemes, tax deductions and reporting on the implementation of energy saving measures). Methodologies used to calculate impacts (such as on energy savings) are published on the RVO website[25].

Other regular evaluations

In addition to the framework provided by the Climate Act to monitor progress at the national level, the following (mandatory) regular evaluations are conducted for all policy areas:

- Ex-ante evaluation during policy preparation: Article 3.1 of the 2016 Government Accounts Act requires an assessment of the expected effectiveness and efficiency of new policy measures.
- Periodic evaluations of policy instruments: These evaluations typically assess the impact of a policy measure, focusing on effectiveness (is it working?) and efficiency (is the goal being achieved as cost-effectively as possible?). Since 2006, the Regulation on Periodic Evaluation Research (RPE) mandates that ministers must periodically conduct or commission policy evaluations and reviews.
- Periodic policy reviews: A policy review summarizes the knowledge regarding the effectiveness and efficiency of an entire policy area. Such a review examines the coherence between different forms of policy. Individual evaluations of policy instruments support this. In 2024, the policy review on national climate policies was published (CE Delft, 2024).
- Investigations by the Netherlands Court of Audit (ARK): The Court of Audit is a High Council of State, an independent institution, and not part of the government or parliament. The ARK has legal powers and several legally defined duties. It audits the state's revenues and expenditures and reports to parliament through an annual report on Accountability Day. In addition, the ARK conducts independent investigations, selecting the themes or policy areas for examination. The energy transition is one of the topics under investigation.

Stakeholder involvement

Regarding stakeholder involvement, the National Climate plan from 2019 is largely based on policies and measures in the Climate Agreement which was an agreement made in 2019 between approximately 150 parties (companies, civil society organizations and (local) governments) to reduce greenhouse gas emissions by 2030. The Climate Agreement Progress Meeting (VGO) discussed the progress of the Climate Agreement and fulfilled the (social) platform and signal function. As of fall 2022, the VGO has been replaced by the National Climate Platform (NKP). The NKP is tasked with setting up the conversation with social parties on climate policy, such as with companies, NGOs and citizens (including young people), among others. The NKP provides solicited and unsolicited advice based on reflections from society.

On a regional level, citizen participation is intensified in the Regional Energy Strategies (RESs) as wind and solar projects become more visible. With the war in Ukraine and high energy prices, residents seem increasingly positive about climate action, yet well-organized opposition to solar and wind projects sustain. In several places, citizen assemblies have been or are being organized, such as in in the regions of North Brabant and Gelderland. Furthermore, all energy regions strive for fifty% local ownership in 2030. Many - but not all - regions are working on policy measures to supporting local ownership, but it seems that more knowledge is needed among local councils to facilitate between developers and residents.

[25] https://english.rvo.nl/topics/energy-agreement/energy-and-climate-reports/national-reports-eu

Regarding projections, PBL and other KEV-partners consult stakeholders in order to collect accurate data. By doing this, models and knowledge are kept up to date. An important process in the preparation of the KEV which involves stakeholder engagement is the interviews and workshop sessions that are organized by PBL for each (policy) sector in the period February to April. Policy makers and other stakeholders relevant for the implementation of the policies are consulted to define accurate assumptions on the policies and measures in the modelling and/or to collect relevant data that may support the assessment of the policies and measures.

Arrangements for internationally transferred mitigation outcomes

No arrangements are in place to monitor the progress on internationally transferred mitigation outcomes (itmo's) as these are not used to achieve national climate targets nor in its contribution to the achievement of the EU's NDC.

3.1.2.2 *Institutional arrangements for implementation of the NDC*

The EU and its Member States have set up a comprehensive system for the implementation of the EU climate change mitigation targets. The European Climate Law[26] sets the goal of climate neutrality by 2050 and the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. These targets cover emissions and removals that are regulated in the Union law.

To ensure that the EU and its Member States achieve their target, the 2030 Climate and Energy Framework was put in place. The main policies of this framework are the EU Emissions Trading System (EU ETS)[27], which caps GHG emissions in energy, industry, aviation and maritime transport; the LULUCF Regulation which includes national net removal targets for the LULUCF sector; and the Effort Sharing Regulation (ESR) which establishes national reduction targets for GHG emissions not covered by the EU ETS or the LULUCF Regulation i.e. domestic transport (excluding aviation), buildings, agriculture, small industry and waste (see textbox 3.1). The implementation of the ESR is supported by additional sectoral policies and measures (details can be found in this BTR in the chapter on mitigation policies and measures). The legislative acts under the 2030 Climate and Energy Framework require the European Commission and the EU Member States to set up the institutional arrangements for implementing the specific policies and measures.

Textbox 3.1 Key European policies to reduce greenhouse gas emissions

The revised EU ETS Directive increases the level of ambition in the existing system from 43% to 62% emissions reductions by 2030, compared to 2005 levels and extend the system to also apply to international maritime transport. A separate carbon pricing system will apply to fuel combustion in road transport and buildings and small-emitting sectors (ETS2) with a 42% emission reduction target compared to 2005 across the sectors covered. The amended Effort Sharing Regulation (ESR) increased, for the sectors that it covers, the EU-level GHG emission reduction target from 29% to 40% by 2030, compared to 2005, which translates in updated 2030 targets for each Member State. The GHG emission reduction target for the Netherlands was raised from 36% to 48%. The new LULUCF Regulation sets an overall EU-level objective of 310 Mt CO_2 equivalent of net removals in the LULUCF sector in 2030, which is the sum of national targets of the greenhouse gas net emissions and removals by Member States in 2030. The national target for the Netherlands in the LULUCF sector is a net removal of 0.435 Mt CO_2-eq.

The ESR sets national targets for the reduction of GHG emissions in the Member States by 2030. Member States are also subject to gradually decreasing annual emission limits for each year from 2021 to 2030. The annual progress towards the national targets under the Effort Sharing Legislation is assessed by comparing GHG emission levels from the sectors covered by the ESR with the relevant

[26] Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), http://data.europa.eu/eli/reg/2021/1119/oj.

[27] This refers to the ETS1, i.e. the Emission Trading System for stationary sources (Chapter III of the ETS Directive) and for aviation and maritime transport (chapter II of the ETS Directive). Note that the 'Emissions trading system for buildings, road transport and additional sectors' (ETS2), added in 2023 as Chapter IVa of the ETS Directive, forms an instrument under the Effort Sharing Regulation (ESR).

annual emission allocations under the legislation (so called Assigned Emissions Allowances or AEA's). To achieve compliance under the ESR, Member States are permitted to use flexibility options to a certain extent.

Progress in the implementation of these policies and measures is monitored under the Governance Regulation. Relevant information which is reported regularly and archived at the EEA include GHG inventories, approximated GHG inventories for the previous year, information on policies and measures, projections, and progress towards the implementation of integrated National Energy and Climate Plans (NECP). This information helps the EU and its Member States to correct their course if progress towards the targets of the 2030 Climate and Energy Framework is behind schedule. As an example, the European Commission assesses the drafts of new or updated NECPs and provides recommendations for improved planning and implementation. In addition, the reported information is subject to quality checks, and the GHG inventories reported by EU Member States are subject to comprehensive reviews in 2025, 2027 and 2032.[28]

All EU legislation, including the legislation under the 2030 Climate and Energy Framework, is subject to a stakeholder engagement process. So-called 'better regulation tools' ensure that policy is based on evidence and the best available practice[29]. During the preparation of legislative proposals, the European Commission invites citizens, businesses and stakeholder organisations to provide their views on the subject of the new legislation. These comments are documented in a dedicated portal[30], and the European Commission reports on how it takes these comments into account in the development of the legislative proposals. Furthermore, the Governance Regulation sets requirements for Member States to ensure that the public is given early and effective opportunities to participate in the preparation of the NECPs.

3.2 Description of the Nationally Determined Contribution

Under their updated NDC[31] the EU and its Member States, acting jointly, are committed to a legally binding target of a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 by 2030. The term 'domestic' means without the use of international credits. The NDC consists of a single-year target, and the target type is 'economy-wide absolute emission reduction'. The scope of the NDC covers the 27 Member States of the EU. The 17 October 2023 updated NDC scope is supplemented by additional information to clarify the precise amount of international aviation and maritime emissions which are covered under the EU NDC. Details on the EU NDC can be found in 3.6 and in annex 1.

Table 3.6: Description of the NDC of the EU.

Information	Description
Target and description	Economy-wide net domestic reduction of at least 55% in greenhouse gas emissions by 2030 compared to 1990. The term 'domestic' means without the use of international credits.
Target type	Economy-wide absolute emission reduction.
Target year	2030 (single-year target)
Base year	1990
Base year value	Net greenhouse gas emissions level in 1990: 4 699 405 kt CO_2eq.
Implementation period	2021-2030

[28] Consolidated text (2023) of Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, https://eur-lex.europa.eu/eli/reg/2018/1999/2023-11-20.
[29] Decision-making process, https://ec.europa.eu/info/strategy/decision-making-process/how-decisions-are-made_en.
[30] Have your say – Public consultation and feedback, https://ec.europa.eu/info/law/better-regulation/have-your-say_en.
[31] The update of the nationally determined contribution of the European Union and its Member States, https://unfccc.int/sites/default/files/NDC/2023-10/ES-2023-10-17%20EU%20submission%20NDC%20update.pdf.

Information	Description
Geographical scope	EU Member States (Belgium, Bulgaria, Czechia, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden) including EU outermost regions (Guadeloupe, French Guiana, Martinique, Mayotte, Reunion, Saint Martin (France), Canary Islands (Spain), Azores and Madeira (Portugal)).
Sectors	Sectors as contained in Annex I to decision 5/CMA.3: Energy, Industrial processes and product use, Agriculture, Land Use, Land Use Change and Forestry (LULUCF), Waste. International Aviation: Emissions from civil aviation activities as set out for 2030 in Annex I to the EU ETS Directive are included only in respect of CO_2 emissions from flights subject to effective carbon pricing through the EU ETS. With respect to the geographical scope of the NDC these comprise emissions in 2024-26 from flights between the EU Member States and departing flights to Norway, Iceland, Switzerland and the United Kingdom. International maritime navigation: waterborne navigation is included in respect of CO_2, methane (CH_4) and nitrous oxide (N_2O) emissions from maritime transport voyages between the EU Member States.
Gases	Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), nitrogen trifluoride (NF_3)
LULUCF categories and pools	The included LULUCF categories and pools are as defined in decision 5/CMA.3.
Intention to use cooperative approaches	The EU's at least 55% net reduction target by 2030 is to be achieved through domestic measures only, without contribution from international credits. The EU will account and report for cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA.
Any updates or clarifications of previously reported information, as applicable	The information on the NDC scope contains clarifications/further details compared to the information provided in the updated NDC of the EU.

Note: This table is identical to table 'Description of a Party's nationally determined contribution under Article 4 of the Paris Agreement, including updates, which has been submitted electronically together with this BTR. This table is also annexed to this BTR.

Source: Updated NDC of the EU[32]

3.3 Indicators, definitions, methodologies and progress

3.3.1 Indicators

For the tracking of progress towards implementing and achieving the NDC of the EU, an indicator is used which has the same unit and metric as the EU NDC base year and target values. The chosen indicator 'EU NDC' is defined as 'annual total net GHG emissions consistent with the scope of the NDC in CO_2eq'. To track progress by the Netherlands towards the national targets for emissions covered by the ESR and LULUCF, two additional indicators ('NL ESR' and 'NL LULUCF') are included. Table 3.7 provides more information on these indicators.

[32] The update of the nationally determined contribution of the European Union and its Member States, https://unfccc.int/sites/default/files/NDC/2023-10/ES-2023-10-17%20EU%20submission%20NDC%20update.pdf.

Table 3.7: Indicators for tracking progress towards the EU NDC and national contributions.

Information	EU NDC	NL ESR	NL LULUCF
Selected indicator	Annual total net GHG emissions consistent with the scope of the EU NDC in CO_2eq.	Annual total GHG emissions in the Netherlands covered by the EU Effort Sharing Regulation (ESR) in CO_2eq.	Annual total net GHG emissions in the Netherlands covered by the EU Land Use, Land Use Change and Forestry (LULUCF) Regulation in CO_2eq.
Reference level and base year	The reference level is total net GHG emissions of the EU in the base year (1990). The reference level value for the EU is 4 699 405 kt CO_2-eq.	The reference level is total GHG emissions of the Netherlands in the base year 2005, that fall within the scope of the ESR. The reference level value is 128.1 Mt CO_2-eq.[33]	The reference level is the average GHG emissions of the Netherlands in the LULUCF sector for the years 2016, 2017 and 2018. The indicative reference level value is 5.4 Mt CO_2-eq[34].
Updates	This is the first time the reference level is reported, hence there are no updates. The value of the reference level may be updated in the future due to methodological improvements to the EU GHG inventory and to the determination of international aviation and navigation emissions in the NDC scope.	This is the first time the reference level is reported, hence there are no updates. The value of the reference level may be updated in the future due to methodological improvements to the NL GHG inventory.	This is the first time the reference level is reported, hence there are no updates. The value of the reference level may be updated in the future due to methodological improvements to the NL GHG inventory.
Relation to the NDC	The indicator is defined in the same unit and metric as the target of the NDC. Hence it can be used directly for tracking progress in implementing and achieving the NDC target.	The indicator relates to the progress towards the EU emission reduction target for emissions covered by the Effort Sharing Regulation (ESR). Progress towards the achievement of this target contributes to the achievement of the target of the EU NDC. The indicator is defined in the same unit and metric as the target in the EU NDC. Hence it can be used for tracking progress of the contribution by the Netherlands to the implementation and achievement of the NDC target.	The indicator relates to the progress towards the 2030 EU emission reduction target for emissions covered by the Land Use, Land Use Change and Forestry (LULUCF) Regulation. Progress towards the achievement of this target contributes directly to the achievement of the target of the EU NDC. The indicator is defined in the same unit and metric as the target in the EU NDC. Hence it can be used for tracking progress of the contribution by the Netherlands to the implementation and achievement of the NDC target.

[33] It should be noted that this reference value follows from the 2020 Comprehensive Review of the Netherlands National Greenhouse Gas Inventory Data pursuant to Article 4(3) of Regulation (EU) No 2018/842 and to Article 3 of Decision No 406/2009/EC; the subsequent Commission Implementing Decision (EU) 2020/2126 on annual emission allocations of the Member States, including the values of the 2005 GHG emissions per Member State (Annex I) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02020D2126-20240731); and Regulation (EU) 2023/857, which amended the binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 (set at -48% for the Netherlands) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R0857) . This resulted in a fixed 2030 ESR target for the Netherlands of 66.6 Mt CO_2eq.

[34] Please note, this in an indicative reference level based on the most recent data available (NIR2024). The reference value (used for accounting as per the EU LULUCF Regulation) will be determined by the reported values of the submission in 2032. As is stated, the value may still change due to methodological improvements.

Information	EU NDC	NL ESR	NL LULUCF
Definitions	Definition of the indicator 'annual total net GHG emissions in CO_2eq': Total net GHG emissions correspond to the annual total of emissions and removals reported in CO_2 equivalents in the latest GHG inventory of the EU. The totals comprise all sectors and gases listed in the table entitled 'Reporting format for the description of a Party's nationally determined contribution under Article 4 of the Paris Agreement, including updates'. Indirect CO_2 emissions are included from those Member States that report these emissions.	Definition of the indicator 'Annual total GHG emissions in the Netherlands covered by the EU Effort Sharing Regulation (ESR) in CO_2eq'. The emissions are defined as the annual total of emissions and removals reported in CO_2 equivalents in the latest GHG inventory of the Netherlands, minus the annual emissions in the Netherlands covered by the EU ETS and the LULUCF Regulation.	Definition of the indicator 'Annual total net GHG emissions in the Netherlands covered by the EU Land Use, Land Use Change and Forestry (LULUCF) Regulation in CO_2eq'. The emissions are defined as the annual total of emissions and removals from the LULUCF-sector reported in CO_2 equivalents in the latest GHG inventory of the Netherlands.

Note: The information in this table is identical to the information in Common Tabular Format (CTF) tables 1 ('Description of selected indicators') and 2 ('Definitions needed to understand the NDC') and 2 ('Definitions needed to understand the NDC') , which were submitted electronically together with this BTR. These tables are also annexed to this BTR.

Source: The reference level is based on the Annual European Union GHG inventory 1990-2022.

3.3.2 Methodologies and accounting approach

The EU uses the following accounting approach for tracking progress towards the joint EU NDC: annual GHG data from the national GHG inventory of the EU, complemented for international aviation and navigation with estimations from the Joint Research Centre's Integrated Database of the European Energy System (JRC, 2024). The total net GHG emissions are provided in the scope of the EU NDC and are compared to the economy-wide absolute emission reduction target as defined in the NDC. The EU will account for its cooperation with other Parties in a manner consistent with guidance adopted by the CMA.

As far as emissions and removals from the LULUCF sector are concerned, net emissions are used for tracking progress towards the 2030 target of the NDC based on all reported emissions and removals.

Details on methodologies and accounting approaches consistent with the accounting guidance[35] under the Paris Agreement can be found in CTF table 3 ('Methodologies and accounting approaches'), which was submitted electronically together with this BTR. This table is also annexed to this BTR.

Structured summary – status of progress

An important purpose of the BTR is to demonstrate where the EU and its Member States stand in implementing their NDC, and which progress they have made towards achieving it. The most recent information on GHG emissions and removals in the scope of the NDC constitutes the key information for tracking this progress. Table 3.8 summarises the current status of progress.

[35] Decision 4/CMA.1, Further guidance in relation to the mitigation section of decision 1/CP21, https://unfccc.int/documents/193407.

Table 3.8: Summary of progress towards implementing and achieving the NDC and the contribution by the Netherlands.

	Unit	Base year value	Values in the implementation period			Target level	Target year	Progress made towards the NDC
			2021	2022	2030			
Indicator: Total net GHG emissions consistent with the scope of the EU NDC	kt CO_2eq	4 699 405	3 272 650	3 205 223	NA	55% below base year level	2030	The most recent level of the indicator is 31.8% below the base year level.
Annual total GHG emissions in the Netherlands covered by the EU Effort Sharing Regulation (ESR) in CO_2eq.	Mt CO_2eq	128.1	92.9	84.8	NA	66.6 (48% below base year level)	2030	The most recent level of the indicator is 33.8% below the base year level.
Annual total net GHG emissions in the Netherlands covered by the EU Land Use, Land Use Change and Forestry (LULUCF) Regulation in CO_2eq.	Mt CO_2eq	5.4	4.4	5.1	NA	4.9 (0.435 Mt CO_2-eq below base year level)	2030	The most recent level of the indicator is 0.3 Mt below the base year level.

NA: Not Applicable.

Note that an annual emissions balance consistent with chapter III.B (Application of corresponding adjustment) will be provided in a subsequent BTR upon finalisation of relevant further guidance by the CMA, based on the annual information reported under Article 6.2.

Note: More detailed information can be found in CTF table 4 ('Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement'), which has been submitted electronically together with this BTR. This table is also annexed to this BTR.

Sources: The indicator values for the total GHG emissions in the EU are based on the Annual European Union GHG inventory 1990-2022. The values for total GHG emissions GHG emissions in the Netherlands are based on the Netherlands National Inventory Report 1990-2022.

Based on the GHG inventory data and data on international aviation and navigation for 2022, the EU and its Member States reduced net GHG emissions by 31.8% compared to 1990. The EU and its Member States made progress towards implementing and achieving their NDC. The legal and institutional framework is in place to make further progress in the years ahead and to achieve the NDC target by 2030.

3.4 Mitigation policies and measures

3.4.1 Introduction

This section describes policies and measures currently implemented or planned in the Netherlands that have (or are expected to have) a significant impact on GHG emissions up to 2030, according to the relevant MPGs (para. 80-81, 87-88).

After an introduction on the policy framework, the subsequent sections describe the most important policies and measures for each so-called climate sector. These climate sectors differ from the sectoral definitions according to the IPCC guidelines. Important differences occur in the sectors Energy and Process Emissions. The national climate sector Electricity includes emissions from energy companies producing electricity and/or heat. Emissions from heat and electricity produced by CHP installations owned by industrial (and horticultural) companies are allocated to the respective climate sectors (where horticulture is part of the Agricultural sector). Emissions from energy industries, such as from exploration and refinement, and Waste are allocated to the climate sector Industry. Another difference is the inclusion of emissions from

mobile machinery in the sector Mobility. The emissions reported in CTF tables accompanying this report, however, follow the sectoral definitions IPCC guidelines. Policies and measures with a substantial impact on multiple climate sectors are described in the section on cross-sectoral policies and measures.

Policies and measures that have been implemented up to May 2024 are included in both the 'with existing measures' (indicated as WEM) and 'with additional measures' (indicated as WAM) projection scenarios. Policies and measures that have been planned up to May 2024 are included in the WAM projection scenario only. Scheduled policies and measures have been officially proposed by the government but lack sufficient details or were announced after May 2024. The policy changes announced by the new Schoof-I government, in the Headline Agreement from May 2024[36] and the Governmental Programme[37] from September 2024, are therefore considered as scheduled measures (see Section 3.7). In annex 6 an overview can be found which policies and measures are included in which policy-variant of the projections described in section 3.7.

Some of the policies and measures discussed in this section are planned and/or adopted on EU-level (such as the EU ETS). Those that have a direct and significant impact on the GHG emissions in the Netherlands are discussed in the section. The EU BTR provides a more comprehensive overview of EU policies and measures.

3.4.2 General climate policy framework

To combat climate change, the Dutch government is committed to achieve a 55% reduction of the Netherlands' GHG emissions by 2030, compared to 1990 levels, and reach climate neutrality by 2050. These targets are enacted in the national Climate Act ("Klimaatwet") adopted on 28 May 2019, which initially called for a 49% reduction in GHG emissions by 2030 and a 95% reduction by 2050, both compared to 1990 levels. The Climate Act was amended in 2023 to the current targets[38], in line with the European Climate Law[39]. The ambition for the electricity system was further strengthened with the aim of a CO_2-free national electricity system by 2035, which should also be affordable and reliable.

To achieve these ambitions, the Climate Act also requires the government to adopt a national climate plan. The first plan, for the period 2021-2030, was published in 2020[40]. This plan aimed to achieve the target (at that time) of 49% reduction in 2030 compared to 1990 levels. The Climate Plan 2021-2030 is based on the National Climate Agreement[41], concluded in June 2019. Drafted and signed by the participating sectors, this agreement concerns their actions to help achieve the climate goals. The participating sectors are electricity, industry, built environment, traffic and transport, and agriculture. The National Climate Agreement can be regarded as the successor to the Agreement on Energy for Sustainable Growth ('Energy Agreement'), which served as the general policy framework in the 2013-2020 period, as was described in the Seventh National Communication (NC7) and the Third Biennial Report (BR3) from the Netherlands.

To meet the raised (current) ambition to reduce emissions by 55% in 2030, a climate policy programme ("Klimaatplan 2021-2030") was adopted in June 2022[42] with additional policies and measures. To meet this target with a higher level of certainty, the programme aimed to achieve a reduction of approximately 60% by 2030. This programme was further amended with additional policies and measures in 2023[43] after the KEV 2022 showed that the 55% ambition was not within reach yet. The programme also set indicative sectoral emission reduction targets (see Table 3.9 below).

[36] https://www.kabinetsformatie2023.nl/binaries/kabinetsformatie/documenten/publicaties/2024/05/16/hoofdlijnenakkoord-tussen-de-fracties-van-pvv-vvd-nsc-en-bbb/20240515+Hoofdlijnenakkoord+PVV+VVD+NSC+BBB-toegankelijk-v2.pdf
[37] https://www.rijksoverheid.nl/documenten/publicaties/2024/09/13/regeerprogramma-kabinet-schoof
[38] https://wetten.overheid.nl/BWBR0042394/2023-07-22
[39] https://ec.europa.eu/clima/eu-action/european-green-deal/european-climate-law_en
[40] https://www.rijksoverheid.nl/documenten/beleidsnotas/2020/04/24/klimaatplan-2021-2030
[41] https://www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-the-netherlands
[42] https://www.rijksoverheid.nl/documenten/beleidsnotas/2020/04/24/klimaatplan-2021-2030
[43] https://zoek.officielebekendmakingen.nl/kst-32813-1230.html

Table 3.9: Emissions, projections and indicative sectoral emission reduction targets (in Mt CO_2-eq).

Sector**	1990	2023*	Projection 2030 with existing and additional policies (WAM)	Bandwidth Projection 2030 (WAM)	Bandwidth projection 2030 including scheduled policies (WSM)	Indicative residual emissions
Reduction GHG emissions from 1990 (%)	0	35.6%	48.7%	44.4-51.8%	44.7-52,1%	
Total	228	147	117	110-127	109-126	96
Electricity	39.6	23.5	12.9	9.6-19.9	10.2-20.4	13.0
Industry	86.8	46.6	38.5	33.3-42.5	32.1-41.3	29.1
Built environment	29.7	17.3	15.6	12.6-18.2	11.6-17.3	13.2
Mobility	33.4	30.6	23.2	20.6-25.4	21.1-25.9	21.0
Agriculture	33.1	25.0	22.0	20.0-24.7	20.7-25.5	17.9
Land use	5.4	3.8	4.8	4.7-5.3	4.3-5.1	1.8
ETS1-sectors		58.9	43.8	38.4-51.8	37.8-51.2	
ETS2-sectors			41.1	36.4-44.4	36.0-43.9	
ESR-sectors		84.1	68.3	63.3-73.2	63.6-73.6	
Cumulative ESR, 2021-2030			800	781-819	783-821	

Sources: emissions 1990 and 2023 are from Emissieregistratie (2024b); projections are from (PBL, 2024).
Rounding may cause minor differences between totals and underlying figures.

*Emissions for 2023 concern preliminary figures.

**Note that the sectoral definitions used in this table are according to the Dutch national policy framework, which differ from the sectoral definitions according to the IPCC guidelines.

As part of the European Union, the Netherlands also contributes to the achievement of European climate and energy targets. The climate targets are based on the EU Climate Law, adopted in 2021, which sets the target of an GHG emission reduction of at least 55% in 2030 compared to 1990 levels and to reach climate neutrality by 2050. As described in Section 3.1, the 2030 target is divided into sub-targets for sectors covered by the EU ETS, sectors covered by the EU ESR and the LULUCF-sector. The (binding) targets on Member State-level have only been set for the non-ETS and LULUCF-sectors. There are also various targets related to energy consumption (see Table 3.10 for an overview). In accordance with the European Governance Regulation, the government published the updated National Climate and Energy Plan 2021-2030 in June 2024[44].
This plan states the contributions by the Netherlands to the achievement of European climate and energy targets and describes the (national) policies and measures to achieve these targets.

[44] https://www.rijksoverheid.nl/documenten/rapporten/2024/06/21/update-van-het-integraal-nationaal-plan-energie-en-klimaat-2021-2030

Table 3.10: Key national contributions by the Netherlands to European climate and energy targets as reported in its National Climate and Energy Plan 2021-2030.

Target	Contribution
Cumulative emission ceiling for ESR sectors 2021-2030 (binding)	830 megatons CO_2-equivalent
National target for land use emissions in 2030 (binding)	0.435 megatons CO_2-equivalent reduction in 2030 compared to the 2016-2018 average. From this, a provisional absolute residual emissions target for 2030 of 49 megatons CO_2-equivalent can be derived.
Contribution to EU target for renewable energy in 2030 (binding)	39%
Deployment of renewable hydrogen and RFNBOs (Renewable Fuels of Non-Biological Origin) in industry in 2030 (binding)	42% of hydrogen use in industry (60% in 2035)
Deployment of renewable energy in mobility in 2030 (binding)	14,5% reduction in greenhouse gas intensity or a renewable share of 29%. The Netherlands has opted for the first.
Growth in share of renewable heat and cold (binding)	0,8% between 2021-2025 and 1,1% between 2026-2030, with an indicative top-up of 1,1 percentage points per year between 2021-2025 and 0,8 percentage points between 2026-2030
Reduction in final energy consumption (Article 4 of EED) (binding)	1,609 petajoules by 2030
Target for reduction in primary energy consumption (Article 4 of EED)	1,935 petajoules by 2030
Cumulative savings on final energy consumption through national policy in the period 2021-2030 (Article 8 of EED) (binding)	1,300 petajoules[1]
ETS1 emissions in Europe in 2030 (binding)[2]	62% reduction compared to 2005
ETS2 emissions in Europe in 2030 (binding)[3]	42% reduction compared to 2005

[1] Excluding electrification and residual heat. If electrification and/or residual heat are included, the target will be increased.

[2] ETS1 is a target for all of the European Union; there is no specific national target.

[3] ETS2 is a target for all of the European Union; there is no specific national target.

The Netherlands has a new government ("Schoof-I") since July 2024, after general elections held in November 2023. The new (current) government upholds the existing climate ambitions but announced several policy changes in their Headline Agreement from May 2024[45]. In the Governmental Programme[46], published in September 2024, the announced policy changes were further specified. In line with the national Climate Act, the government will publish the 2nd national Climate Plan for the period 2025-2035 in the second quarter of 2025. A draft national Climate Plan 2025-2035 has been published on 24 October 2024 for public consultation (open to 5 December 2024)[47].

The policies and measures described in the following sections are currently in place and/or announced by the new (current) government (as of October 2024). A more comprehensive overview of policies and measures can be found in CTF table 5.

[45] https://www.kabinetsformatie2023.nl/binaries/kabinetsformatie/documenten/publicaties/2024/05/16/hoofdlijnenakkoord-tussen-de-fracties-van-pvv-vvd-nsc-en-bbb/20240515+Hoofdlijnenakkoord+PVV+VVD+NSC+BBB-toegankelijk-v2.pdf

[46] https://www.rijksoverheid.nl/documenten/publicaties/2024/09/13/regeerprogramma-kabinet-schoof

[47] https://www.internetconsultatie.nl/klimaatplan2024/b1

3.4.3 Electricity

The indicative emission limit for the electricity sector amounts to 13 Mt CO_2-eq by 2030. To achieve this, the sector is working on a rapid roll-out of renewable electricity and phasing out fossil-based production fuels. This makes the sector more sustainable and is an important contribution to sustainability in the other sectors that are increasingly electrifying. The aim is to have a CO_2-free electricity sector by 2035. An important measure to reduce emissions is the European Emissions Trading System (ETS), where producers need to buy allowances on the market for their emissions. Further, the Coal Prohibition Act prohibits the use of coal for electricity production from 2030 onwards. In addition, work has been done on the ambition of the Netherlands to significantly accelerate the deployment of wind energy at sea with the aim of the generation of 21,000 MW around 2030.

Additional focus is on the acceleration of CO_2-free flexible power, the further scaling up of the production of CO_2-free energy carriers (such as hydrogen) and preparations for the construction of two new nuclear power plants and exploration of two additional plants. The Netherlands is also investing in electricity storage by investing in battery innovations and making it compulsory to incorporate batteries at large-scale solar parks. This allows solar energy to be used even when the sun is not shining, and it relieves the electricity grid of peak surges. Hydrogen production at sea is also stimulated, as well as energy exchange with North Sea countries, enabling energy exchange and storage for a long time.

The challenges surrounding the electricity grid are addressed in the National Network Congestion Action Programme (LAN). Grid operators are stepping up investments to expand the grid faster and to use it flexibly and optimally. The government makes it legally possible to speed up procedures to reduce lead times of energy infrastructure projects.

The key sectoral policy instruments currently in effect that have a major impact on the electricity sector are described below.

3.4.3.1 *Minimum CO_2 price electricity production*

The 2019 Climate Agreement provides for the introduction of a minimum national CO_2 price for CO_2 emissions from electricity production in support of the EU-ETS. When the ETS price is lower than the national minimum price, companies pay a tax to cover the difference. This is to ensure that particularly low ETS prices do not discourage emission reduction actions. It is expected that the ETS price will remain at or above the minimum price through 2030. This should contribute to investments that are less harmful to the environment. The legislation entered into force on 5 April 2022.

3.4.3.2 *Closing of coal fired power plants*

The Coal Prohibition Act ensures the phase out the use of coal for electricity production from 2030 onwards. From 31 December 2024, only production plants with an electrical efficiency of 44% or higher are allowed to remain active. As of 1 January 2030, all plants that use coal for electricity production will be closed. As a result of this Act, one plant closed in 2024, and three plants still remain active.

3.4.3.3 *Off-shore wind energy*

Increasing the production of offshore wind energy is pivotal to meeting climate and energy targets for 2030 and beyond. On 11 February 2022, the Dutch government raised the offshore wind energy target from 11.5 to approximately 21 GW around 2030. The government is exploring ambitions of approximately 50 GW in 2040 and 70 GW in 2050, albeit there is uncertainty on how much offshore wind energy will be deemed necessary in the future. In June 2022, the Ministry of Economic Affairs and Climate Policy (EZK) published the new Offshore Wind Energy Roadmap 2030[48], which was updated in 2024[49]. This roadmap is the basis for (decisions on) tendering processes for new offshore windfarms and has been updated to reflect the three new and the two expired wind energy areas. Three new Offshore Wind Farm Zones were designated:

[48] https://www.rijksoverheid.nl/documenten/kamerstukken/2022/06/10/aanvullende-routekaart-windenergie-op-zee-2030

[49] https://www.rijksoverheid.nl/ministeries/ministerie-van-economische-zaken/documenten/kamerstukken/2024/04/25/update-aanvullende-routekaart-wind-op-zee

Nederwiek, Lagelander and Doordewind. At the same time, the government removed the previously designated Hollandse Kust (southwest) and Hollandse Kust (northwest) zones. These two zones turned out to be less desirable with a view to ecology, shipping and fishing.

The Regulation on Offshore Wind Energy 2015 and the Implementation Regulation on the Offshore Wind Energy Act, published on 3 July 2015, are meant to encourage the production of offshore wind energy. This legislative framework establishes statutory provisions for the allocation of suitable sites for offshore wind farms and the process of issuing permits and awarding subsidies for their construction and operation. The Netherlands Enterprise Agency (RVO) organises tenders since 2015 for the construction of wind farms. Bidders in these tenders can submit applications for a permit to build and exploit an offshore windfarm.

In 2020, the amended Act was adopted to improve the procedures for subsidy free allocation of offshore wind sites, which include modalities regarding biodiversity and natural habitat preservation.

3.4.3.4 *Nuclear energy*

Nuclear energy is one of the priorities of the government. The government wants to keep the Borssele Nuclear Power Plant open after 2033 and continue with the preparations from the previous government for the two new nuclear power plants in 2025. By keeping Borssele open longer, the Netherlands retains 485 MW capacity of CO_2-free electricity after 2033. Preparations for the construction of two nuclear power plants are ongoing. In addition, the government wants to build two additional nuclear power plants.

For this, a feasibility study will be made to map what is needed. Also, the government is exploring the potential and preconditions for development and construction of SMRs (Small Modular Nuclear Reactors) in the Netherlands.

3.4.3.5 *Main financial schemes*

Cooperative Energy Production Subsidy Scheme (SCE)

In addition to the SDE++, the Cooperative Energy Production Subsidy Scheme (SCE) specifically targets helping energy cooperatives and homeowners' associations (VvEs) to realize small-scale sustainable projects in the fields of solar, wind, and hydropower with local ownership. This allows for the short-term production of more sustainable electricity and encourages local participation.

The projects eligible for the SCE must be local and cooperative. There are requirements in place to ensure that the project is organized by a sufficient number of nearby participants. The subsidy is paid based on the actual amount of sustainable electricity produced. Like the SDE++, the subsidy is aimed at covering the "non-profitable portion" of the project relative to the market price of electricity.

During the 2021 SCE round, €92 million was made available, and over 650 cooperative projects received subsidies. In the 2022 SCE round, €150 million was allocated, supporting more than 130 projects. The 2023 SCE round, with an opening budget of €150 million, resulted in over 400 supported projects. The 2024 SCE round is currently open with a budget of €100 million.

3.4.4 Industry

The indicative emission limit for the industry sector amounts to 29.1 Mt CO_2-eq by 2030. To achieve this target, the Netherlands employs a diverse policy mix aligned with European climate policy. The reasons for this approach are, firstly, that industrial decarbonization must take place domestically rather than abroad, as sustainable industrial production is crucial for the long-term resilience of the economy and contributes to strategic autonomy. Investments in other countries could lead to the relocation of emissions, which would not help solve the global climate problem. Secondly, the Netherlands views industrial decarbonization as a catalyst for the broader energy transition and the shift towards a circular economy. The demand from industry for renewable energy carriers makes investments in new wind farms and infrastructure financially viable, benefiting other sectors as well.

Therefore, climate policy for the industry includes not only pricing and regulatory measures but also support for making the transition. This is done through subsidies for sustainability and innovation, as well as efforts to ensure the timely availability of renewable energy, raw materials, and the necessary infrastructure. The Clean Industrial Deal announced by the European Commission will strengthen the competitiveness and resilience of European industry. Not all companies are expected to undergo the transition. The Netherlands accepts that companies unwilling or unable to make this shift will eventually cease to exist.

3.4.4.1 *Main programmes*

National Programme for Industrial Sustainability (NPVI)
In March 2023, a National Programme for Industrial Sustainability (NPVI) was established. In this programme, government departments and local authorities collaborate with grid operators, industrial clusters, and industry representatives to address challenges such as the speed of permitting processes, matching supply and demand for renewable energy and infrastructure in industrial clusters, and ensuring the implementation of projects. The programme's execution began in April 2023 under the leadership of a national Steering Committee chaired by the Minister of Economic Affairs and Climate. A key element of the NPVI is its focus on industrial clusters. For the five geographical clusters and Cluster 6, a cluster coordinator has been appointed to promote cooperation between the government, industry, and grid operators. These cluster coordinators report to the national Steering Committee.

National CO_2-price
To meet the national emission reduction target, a minimum CO_2 price was introduced to complement the European Emissions Trading System (ETS). Its design, which includes an increasing tax rate and decreasing, tradable exemption rights, offers flexibility and time for making the necessary investments, reducing the risk of carbon leakage. The climate does not benefit if business activity and emissions are relocated abroad. A minimum price was implemented on January 1, 2023, and ensures that a minimum price applies to the exempted portion of the CO_2 tax. The tariffs can be found on this website[50].

The CO_2 levy for industry applies to large industrial companies that are also subject to the European Emissions Trading System (EU ETS); waste incineration plants, which will also fall under the EU ETS as of January 1, 2028; and companies that emit large quantities of nitrous oxide.

Carbon Capture and Storage
The Netherlands views Carbon Capture and Storage (CCS) as a necessary and effective solution for achieving CO_2 emission reductions, particularly in sectors where affordable sustainable alternatives are not yet available in the short term. CCS also plays a crucial role in enabling carbon removals. It's important that the focus on carbon removal does not come at the expense of further efforts to reduce greenhouse gas emissions.

When analysing the required capacity for carbon capture and storage, attention must be given to both fossil and non-fossil CO_2. The detailed development of policies around carbon removal will be further elaborated in the 2024 Climate Plan and a Carbon Removal Roadmap, as requested by the House of Representatives. The Netherlands promotes the use of Carbon Capture and Storage (CCS) primarily through the Stimulation of Sustainable Energy Production and Climate Transition (SDE++) subsidy scheme. For CCS projects, successful applicants can receive subsidies to cover the unprofitable portion of their projects. The SDE++ covers the capture, transport, and storage of CO_2. The subsidy is provided to the emitter and owner of the capture facility, but it also includes an amount for transport and storage costs, which can be paid to a third party providing these services.

Tailored approach
Since 2022, the government offers the largest industrial emitters in the Netherlands the opportunity for a so-called "tailored approach," ("Maatwerkafspraak") providing customized support for decarbonization efforts within the country. In addition to agreements on faster and more significant CO_2 reductions, where

[50] https://www.emissieautoriteit.nl/onderwerpen/tarieven-CO2-heffing

relevant, agreements are also made on improving the living environment, with a particular focus on reducing nitrogen emissions.

If a company is willing to make additional efforts within the framework of the tailored approach to help achieve the Dutch climate goals, reduce nitrogen emissions, and improve other aspects of the environment, the government is open to offering extra support to facilitate these projects. This support could involve addressing non-financial uncertainties (e.g., ensuring timely availability of energy infrastructure and a predictable permitting process) or reducing financial uncertainties (e.g., contributing to the "non-profitable top" of a business case). To qualify for the tailored approach, companies must have ambitious plans for decarbonization in the Netherlands and be willing to commit to additional greenhouse gas reductions beyond what is already required under the CO_2 tax.

The tailored approach primarily focuses on the fifteen largest industrial emitters. Two-thirds of industrial emissions come from these fifteen largest emitters, which emitted around 35 megatons in 2021. They are required to reduce their emissions by 16 megatons, bringing the total down to 19 megatons by 2030. This target includes an additional reduction of 3.5 megatons as part of the tailored approach, on top of the reduction required by the CO_2 tax. In 2023 it was agreed to extend the tailored approach to companies beyond the top 20 emitters. A tailored process has begun with three companies from the next largest emitters outside the top 20. This is expected to result in an additional reduction of 0.3 megatons by 2030.

For the largest emitters, the principle is that financial support for decarbonization should be provided through general subsidy schemes such as the SDE++, NIKI, and VEKI. However, if these generic instruments are not suitable for a specific project or business case, custom subsidies or financing may be considered. A total of €750 million has been reserved for such cases in the Climate Fund's tailored support package, including €200 million that already has been allocated to Nobian. An additional €229.6 million can be added in 2025 if certain conditions are met, as agreed in spring 2023.

As of May 1, 2024, eleven Expressions of Principles (EoPs) and one Joint Letter of Intent (JLoI) have been signed. If realized, these plans could contribute to a reduction of around 13 megatons of CO_2 by 2030.

Multi-year Infrastructure Energy and Climate Programme (MIEK)
The timely realization of energy and raw materials infrastructure is a critical prerequisite for achieving climate goals and maintaining economic viability for both existing and new industries. To address this, the Dutch government is overseeing national and provincial infrastructure projects through the Multi-year Infrastructure Energy and Climate Programme (MIEK) and the Provincial MIEKs (pMIEKs).

The project overviews for both MIEK and pMIEK reveal a gap between the desired completion dates of industrial clusters and the planned commissioning dates of grid operators. Challenges such as procedural delays, nitrogen emissions, and limited implementation capacity hinder the timely development of necessary infrastructure. The Netherlands is working to remove these barriers by collaborating with industry, grid operators, energy producers, and local governments to align the industry's desired timelines with the infrastructure's planned commissioning dates.

By the third quarter of 2024, each industrial cluster (see NPVI programme) will deliver a new Cluster Energy Strategy. Additionally, each province will submit a provincial Cluster Energy Strategy, which will outline the energy demand over time and the necessary energy infrastructure projects.

Circular Industry
The transition to climate neutrality and a circular economy are closely linked, with the goal of creating an economy that not only reduces greenhouse gas emissions but also improves biodiversity, ensures a cleaner environment, and secures the supply of raw materials. In February 2023, the National Circular Economy Programme (NPCE) 2023-2030 was submitted to the Dutch Parliament by the Ministry of Infrastructure and Water Management (see paragraph 3.4.8.8). This programme is crucial for the industrial sector, as reducing the use of new resources, reusing materials, and replacing fossil-based resources with renewable ones are

key to industrial sustainability and reducing CO_2 emissions across the entire supply chain, both in the Netherlands and abroad.

Key aspects for the industry are:

1. Strengthening the Connection with the Circular Economy: Building on the existing NPCE, the relationship between industrial climate measures and circular economy goals will be further developed.
2. Stimulating Market Demand for Emerging Technologies: The Netherlands, alongside Europe, will focus on source-based policies, such as mandatory recycling quotas and sustainable, circular (bio) raw materials. The country will explore reinforcing market incentives to make reuse and renewable raw materials more competitive.
3. Removing Regulatory Barriers: Regulatory obstacles are being scrutinized, as their removal is critical for launching circular production processes. Clearer rules and fewer barriers are essential for scaling these processes.
4. Policy Development for Sustainable Industrial Growth: In sectors like plastics, policies will be developed to encourage the use of recycled materials. The government has committed to introduce a mandatory percentage of recycled content in building materials. Similarly, the Netherlands will advocate for ambitious targets for renewable or recycled raw materials use in specific product groups within the EU.
5. Circular Economy and Scope 3 Emission Reductions in Tailored Agreements: Where relevant, circular economy and scope 3 (supply chain) emissions will be addressed in tailored agreements with industries. Additionally, the Netherlands will work at the EU level to push for better rewards for scope 3 emission reductions in European and international instruments and climate targets.

This combined focus on circularity and industrial decarbonization will help foster sustainable industrial markets and further integrate climate action across the economy.

In anticipation of future EU legislation, the Netherlands will introduce a national obligation by 2027 to promote the use of recycled plastic or bio-based plastic among plastic producers. The goal is to increase the mandatory share of recycled or bio-based plastic to 25%-30% by 2030. This regulation will carefully consider the competitive position of stakeholders in the supply chain compared to countries without similar national requirements. The obligation will apply to all plastics produced in the Netherlands for the Dutch market, excluding exports.

The Dutch government plans to support companies in this transition toward a circular plastic chain through the Climate Fund. Additionally, a significant amount of plastic waste is still incinerated at waste incineration plants (AVI's), despite being recyclable. This leads to the unnecessary loss of valuable materials and increased greenhouse gas emissions. Therefore, the Netherlands aims to improve plastic sorting, expand the pricing mechanisms on waste incineration (including plastic) at AVI's, and incentivize negative emissions technologies such as Carbon Capture and Storage (CCS) where appropriate.

Furthermore, additional funding will be made available to scale up circular innovations, reinforcing the broader circular transition in the plastic sector. These measures are part of the broader strategy to reduce emissions, improve material recovery, and create a more sustainable economy.

3.4.4.2 *Main financial schemes*

For the industry, several key programmes support sustainability and innovation, including the Stimulation of Sustainable Energy Production and Climate Transition Subsidy Scheme (SDE++), Demonstration Energy and Climate Innovation (DEI+) Subsidy Scheme, Accelerated Climate-related Investments in Industry (VEKI) as well as tax incentives like the Energy Investment Tax Allowance scheme (EIA) (EIA), Environmental Investment Allowance (MIA) and the Arbitrary Depreciation of Environmental Investment (VAMIL) schemes.

National Investment Subsidy for Climate Projects in Industry

The National Investment Subsidy for Climate Projects in Industry (NIKI) is a new subsidy instrument aimed at large-scale deployment of innovative technologies in green chemistry and electrification within the industry. It will support substantial sustainable investments by subsidizing the early years of these projects. The NIKI is expected to be published in the second half of 2024, with the first call for applications soon

after. A budget of €228 million has been allocated for the first round, with an additional €1 billion reserved for future rounds in the coming years.

3.4.4.3 *Policies for non-CO_2-greenhouse gas emissions in industry*

European F-gas Regulation

On 11 March 2024, the revised European F-gas Regulation entered into force[51]. According to the Impact Assessment, these will lead to around 16% additional emission reductions in Europe by 2030. It is expected that this reduction will also be achieved in the Netherlands. However, the Netherlands is considering additional efforts compared to the minimum requirements set out in the Regulation such as broader certification obligation, creation of a central database and differentiation by type of refrigerant in existing subsidy instruments for heat pumps.

EU Industrial Emissions Directive

The EU Industrial Emissions Directive (2010/75/EU), or IED, is the main EU instrument regulating pollutant emissions from industrial installations. Although the focus is on pollutants, application of the IED may also contribute to reducing GHG emissions. The IED covers around 50,000 installations in the EU, which are required to reduce harmful industrial emissions. In particular, the application of Best Available Techniques (BAT) must be applied to ensure operations in accordance with a permit (granted by the relevant Member State authorities). This permit should contain conditions set in accordance with the principles and provisions of the IED. For certain installations, such as large combustion plants, waste incineration and co-incineration plants, solvent using activities and titanium dioxide production plants, the IED also sets EU-wide emission limit values for SO_2, NO_x and dust.

3.4.5 Built Environment

Greenhouse gas emissions in the built environment have decreased from 29.1 megatons in 1990 to 19.6 megatons in 2022, due to stringent environmental requirements for new construction and improving the sustainability of the existing housing stock. This reduction occurred despite a significant increase in the number of homes in recent decades. The indicative emission limit for the built environment, which encompasses emissions from dwellings and utility buildings from (public) services, amounts to 13.2 Mt CO_2-eq by 2030. To reduce emissions, the demand for energy is reduced by insulating existing buildings and switching from natural gas to alternative and energy-efficient heat and cold supply based on renewable energy. This policy follows two interacting tracks. An area-oriented track in which plans are made under the direction of municipalities to make local districts sustainable and eventually natural gas-free. The second track focuses on individual buildings and building owners, which is described in the Programme Acceleration Sustainability Built Environment (PVGO).

[51] https://climate.ec.europa.eu/eu-action/fluorinated-greenhouse-gases/eu-rules_en

3.4.5.1 *Main programmes*

Programma Verduurzaming Gebouwde Omgeving (PVGO)
The PVGO is a programmatic approach with clear goals, milestones, progress measurements, and agreements with, among others, housing corporations, municipalities, and market participants. This programme builds on previously implemented policies and ensures a cost-effective approach to buildings, including thorough renovation of individual homes, a systematic approach and demand bundling for social housing, roadmaps, and a portfolio approach for commercial and social real estate. There is also significant focus on the greening of the energy infrastructure with local renewable energy, district heating networks, and green gas. Knowledge, innovation, and training for professionals are receiving an extra boost, and there is added attention to tackling energy poverty. Within the PVGO, there are five specific programme lines and two cross-cutting programmes. The five specific programme lines are:

1. Area-oriented approach to the heat transition (both the transition away from natural gas and the local insulation approach): This involves addressing existing homes and buildings on a street-by-street and neighbourhood basis under the direction of municipalities. Through a National Programme for Local Heat Transition, municipalities will receive adequate resources and support for their responsibilities. Additionally, a new legal framework for municipal powers in the local heat transition will be established.
2. Individual approach for owner-occupied and rental housing: Individual homeowners, both in the purchase and rental sectors, will receive easily accessible information, extensive support, subsidies, and financing options. There will also be a clear phase-out policy for poorly insulated homes, based on European guidelines, along with regulations for the sustainability of homes.
3. Approach for utility buildings (commercial and social): For professional building owners, an ambitious target for utility construction will be set. Norms for phasing out poor energy labels in utility buildings will also be introduced. Owners of utility buildings will be supported with subsidies, financing, and practical assistance.
4. Sources and infrastructure (for developing sustainable sources and accelerating the rollout of heat networks): Natural gas will be partially replaced by green gas, resulting in reduced CO_2 emissions and stimulating the development of sustainable sources and energy carriers. Furthermore, the instruments and conditions for new infrastructure (heat networks) and associated sustainable heat sources will be established.
5. Innovation in construction: Building and renovating will become more innovative, and sustainability in construction will be prioritized. This will begin with new market-ready products of higher (environmental) quality and lower costs for segments with many similar homes; thereafter, industrial and digital construction and renovation should become the standard across all suitable segments.

National Insulation Programme (NIP)
The National Insulation Programme (NIP) aims to insulate 2.5 million homes by 2030. The focus is on the 1.5 million poorly insulated homes (energy labels E, F, and G). The government supports the insulation of these homes through a combination of subsidies, assistance of households by municipalities, and minimum standards for rental properties. 750,000 owner-occupied homes of vulnerable households will be insulated through a local approach in collaboration with municipalities. Municipalities can submit multi-year plans to obtain additional funding on top of existing subsidy measures. These plans should focus as much as possible on improving homes with the worst energy labels (D and lower) and a low property value (WOZ).

- 1 million rental homes will be insulated by landlords according to the Housing Insulation Standard. Performance agreements have been made with social housing associations to invest approximately 1.7 billion euros annually, in return for the abolition of the landlord levy. Support is available for private landlords to insulate 325,000 rental homes to meet the standard for home insulation. Since 1 April 2023, the Subsidy Scheme for Sustainability and Maintenance of Rental Homes (SVOH) has been opened to all private landlords of rental properties.
- 750,000 owner-occupied homes will be insulated quickly on their own initiative using subsidies such as ISDE, SVVE, and the Heat Fund.

Additionally, energy savings will be achieved through accessible measures and the use of so-called “energy fixers”. These are coaches that help vulnerable residents to save energy with practical, low-costs measures.

National Programme to support the Local Heating Transition (NPLW)The National Programme to support the Local Heating Transition (NPLW) inspires and supports municipalities with knowledge and actionable perspectives so that they can act as directors in implementing this. The NPLW builds on the knowledge from the Natural Gas-Free Neighbourhoods Programme (PAW) and the Heat Expertise Centre (ECW).

The substantive support of the NPLW focuses on supporting the neighbourhood-oriented approach (specifically the heating programme, implementation plans, and the development of collective heating) and addressing individual heating solutions, such as the contingency approach (large-scale insulation and heat pumps for similar buildings) at a strategic and tactical level. The NPLW also supports and facilitates the operational tasks of municipalities in the local heat transition. This occurs through different means, such as a website, a help desk, account managers, and knowledge brokers matching supply and demand.

3.4.5.2 *Policy measures for new buildings*

The current energy performance standards require that all buildings should be nearly energy neutral as of 2021. This standard was already applied as of 2018 to buildings owned by the government. Also, new buildings under permits granted after July 2018 are not connected to the national gas grid, as this was implemented in the Progress Energy Transition Act. This helps to decrease reliance on natural gas in the building sector. Only in specific circumstances is a natural gas grid connection allowed.

The European Energy Performance of Buildings Directive (EPBD) was revised in 2024. One component of the EPBD is the Zero-Emission-Buildings standard for new buildings per 2030. A Zero-Emission-Building has a very high energy performance and does not cause GHG emissions. The EPBD is expected to be implemented in national legislation in 2025.

3.4.5.3 *Policy measures for existing buildings*

Investment Subsidy for Sustainable Energy and Energy Savings (ISDE)

Through the Investment Subsidy for Sustainable Energy and Energy Savings (ISDE), subsidies are provided for investments in five different types of interventions: 1) (hybrid) heat pumps, 2) solar water heaters, 3) insulation measures, 4) connections to heat networks, and 5) electric cooking facilities. The subsidy for (hybrid) heat pumps and solar water heaters is available for business parties and owner-occupiers. The subsidy for insulation measures, heat network connections, and electric cooking facilities is exclusively available for owner-occupiers. The programme specifies fixed subsidy amounts.

The subsidy is opened annually. In 2024, the ISDE has been allocated 600 million euros. Additionally, 5 million euros is available for subsidies within the ISDE for small wind turbines. The Dutch Recovery and Resilience Plan (HVP) from 2022 includes an expansion of the Investment Subsidy for Sustainable Energy and Energy Savings (ISDE). The financing of the ISDE has been further expanded following the REPowerEU package.

For Homeowners' Association (VvE), the subsidy for sustainability measures (SVVE) is available to implement sustainability measures. VvE's can apply for a subsidy for insulation or other energy-saving measures, such as a heat pump, solar boiler, or, for example, a central connection to a heat network.

Collective heat networks Subsidy Scheme (WIS)

To finance the non-profitable top of heat networks, the Collective heat network Subsidy Scheme (WIS) has been published. This measure involves a national subsidy scheme for heat networks to limit the non-profitable top. A total of 600 million euros is available from the Climate Fund, with an additional reservation of 1 billion euros starting in 2025. Furthermore, a development fund for heat cooperatives will be established. Additionally, efforts will be made to further promote geothermal energy and scale up green gas production.

Phasing out poor labels in commercial buildings

Commercial buildings are subject to the energy savings obligation which requires the implementation of energy savings measures (see paragraph 3.4.8.9). Furthermore, offices are legally required to have at least energy label C. To assist the operators of these buildings in improving the energy efficiency of their property, the government provides knowledge exchange and various subsidies (e.g. ISDE, DUMAVA, tax benefits).

The European Energy Performance of Buildings Directive (EPBD) was revised in 2024. One component of the EPBD is that by 2030, all commercial buildings should have a better energy performance than the worst 16% of 2020. Per 2033 all commercial buildings should have a better energy performance than the worst 26% of 2020. The EPBD is expected to be implemented in national legislation in 2025.

3.4.5.4 *Policy measures for products*

Ecodesign

The Ecodesign Directive (2009/125/EC) has been replaced by the Ecodesign for Sustainable Products Regulation (ESPR) ((EU) 2024/1781). Compared to the Ecodesign Directive, the scope of the ESPR is enlarged to cover almost all products, including intermediate products like steel or aluminium. It provides consistent rules for setting product-specific regulations at the EU level and improving the environmental performance of products. Also, the ESPR introduces a digital product passport and sets rules to prevent the destruction of unsold consumer goods. Currently, 29 product regulations are in force, covering a wide range of products and horizontal aspects such as electric motors, ventilation units, space and water heaters, process chillers, household appliances, televisions, light sources, smart phones and tablets and network standby. Implementing regulations establish minimum mandatory requirements for energy efficiency and, if relevant, for other environmental aspects such as noise, NO_x emissions, durability or repairability, and are revised regularly.

Energy Labelling

The Energy Labelling Regulation (EU/2017/1369) provides consistent rules for setting product-specific regulations on mandatory energy labels at the EU level. The Energy Labelling Regulation has also introduced a product database (EPREL) which supports market surveillance and the provision of product data to inform consumers by electronic means, e.g. websites and apps. Energy labels must be displayed on products for sale in physical shops and online. Currently, 15 energy labelling regulations are in force, covering products such as household appliances, televisions, space and water heaters, light sources, smart phones and tablets. Furthermore, a separate Regulation (EU/202/740) deals with tyres. For products that have eco-design requirements as well as an energy label, both instruments are developed within the same policy process.

3.4.5.5 *Energy poverty*

The Netherlands has adopted a comprehensive approach to tackling energy poverty, focusing on both immediate relief and long-term solutions. One of the key initiatives is the local insulation approach of the National Insulation Plan (NIP), which aims to improve the energy efficiency of homes, particularly for low-income households, through municipalities acting at the local level (see paragraph 3.4.5.1).

Complementing this effort is the "SPUK Energiearmoede" (Specific Allowance for Tackling Energy Poverty), which allows municipalities to directly assist households struggling with energy poverty, enabling them to invest in energy-saving measures, such as insulation and energy-efficient appliances. Municipalities can make their own decision on where to spend these resources, if they can identify that energy-poor households are supported in reducing their energy consumption and related bills in the short term. Many municipalities have focused on 'energy fixers' or 'energy coaches' who go door to door to provide information about energy saving measures, can give a proper referral to other relevant (social) services, and initiate supportive actions. Depending on the municipality, these energy fixers can be volunteers or employees of social or commercial parties. In addition, households with a low income or poor housing are helped with smaller energy-saving measures, such as installing of energy displays and radiator foil, and white goods schemes.[52] Currently, the resources from the SPUK Energiearmoede are available until 2025. A long-term strategy to combat energy poverty is in development.

Further, a National Energy Poverty Research Programme is conducted by TNO in cooperation with the ministries of the Interior and Kingdom Relations (BZK), Social Affairs and Employment (SZW), and Economic Affairs (EZK), various provinces, Netherlands Enterprise Agency (RVO, the Association of

[52] Aanpak energiearmoede | Home | Volkshuisvesting Nederland

Netherlands Municipalities (VNG) and CBS[53]. The programme develops up-to-date and targeted knowledge about energy-poor households and the effectiveness of the measures being taken. CBS annually publishes the Energy Poverty Monitor[54], a set of tables and microdata with the latest available information on the affordability of energy costs for households. This microdata has been used by TNO to calculate the situation for 2023[55].

3.4.6 Mobility

The indicative emission limit for mobility amounts to 21 Mt CO_2-eq by 2030. In doing so, policies stimulate 'zero-emission at the tailpipe' for passenger transport, freight transport and mobility in construction. This also significantly reduces environmental damage in other areas.

3.4.6.1 Road transport

The sustainable mobility policy for road transportation is based on four pillars: 1) active mobility and the greening of personal mobility, 2) electric passenger cars, 3) logistics, and 4) sustainable fuels.

EU CO_2 emissions performance standards

In 2009, the EU published legislation on CO_2 emissions from passenger cars in the form of Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles. The fleet average to be achieved by all cars registered in the EU is 130 grams per kilometre (g/km).
On 1 January 2020, Regulation (EU) 2019/631 entered into force, setting CO_2 emission performance standards for new passenger cars and vans. It replaced and repealed former Regulations (EC) 443/2009 and (EU) 510/2011, concerning cars and vans respectively. The new Regulation sets EU fleet-wide CO_2 emission targets applying from 2020, 2025 and 2030 and includes a mechanism to incentivise the uptake of zero- and low-emission vehicles. CO_2-emission standards were also introduced in 2019 with the Regulation (EU) 2019/1242 for heavy duty vehicles. As of 2021, emissions performance standards are specified at 95 g/km for cars and 147 g CO_2/km for vans. Starting in 2025 and 2030, Regulation (EU) 2019/631 sets stricter EU fleet-wide CO_2 emission targets, which are defined as a percentage reduction relative to 2021:

- Cars: 15% reduction in 2025 and 37.5% in 2030
- Vans: 15% reduction in 2025 and 31% reduction in 2030
- Heavy duty vehicles: 15% reduction by 2025 compared to 2019 levels

If the average CO_2 emissions of a manufacturer's fleet exceed its specific emission target in a given year, the manufacturer must pay – for each of its vehicles newly registered in that year – an excess emissions premium of €95 per g/km of target exceedance. Zero- and low-emission vehicles, cars and vans are assigned extra weight in the calculations.

In 2023, the Regulation was amended to strengthen the CO_2 emission performance standards for new passenger cars and vans and bring them in line with the EU's ambition to reach climate neutrality by 2050. This amendment strengthened the emission targets to 55% in 2030 for cars and 50% for vans, both relative to 2021 levels. From 2035 onwards, the emission reduction targets for both cars and vans are set at 100% (zero-emission). For heavy duty vehicles CO_2-emission reduction targets were set for 2030 (45%), 2040 (65%) and 2050 (90%). This was accompanied by the Alternative Fuels Infrastructure Regulation, which should ensure the timely availability of the recharging and refuelling infrastructure for zero-emission vehicles.

Active mobility shift

In 2021, €235 million was allocated for the greening of passenger transport and travel behaviour until 2030, followed by a structural €32 million per year thereafter. The implementation of this measure will align with

[53] Landelijk onderzoeksprogramma energiearmoede (energy.nl)
[54] Monitor Energiearmoede 2022 | CBS
[55] Energiearmoede in Nederland 2019-2023 (tno.nl)

the most recent IPCC Report (which emphasizes the importance of behaviour in the climate transition), focusing on the greening of travel behaviour. It specifically aims to involve all groups and sectors in making their behaviour more sustainable. Special attention is given to building support and carefully engaging with target groups. Greening personal transport targets not only work-related mobility but also recreational travel. For recreational travel, the focus is on "less CO_2 but not less recreation," in close collaboration with the sector.

Furthermore, the Netherlands continues to build on existing policies. The government also promotes cycling and walking in line with the National Cycling Ambition 2022-2025[56], the National Masterplan Walking[57] and the National Future Vision for Cycling 2040 established in the Tour de Force[58]. For instance, the government contributes €780 million to make new housing locations accessible by bike and on foot, and it consistently supports a national network of cycling routes. Through the campaign "Short trip? Just bike it!" and initiatives like Cycling Ambassadors and "Doortrappen," efforts are made to encourage behavioural change. A City Deal, "Cycling for Everyone," works with various partners to make cycling accessible to all.

Electric passenger cars and busses

The Netherlands accelerates the adoption of zero-emission passenger cars by raising the CO_2 target for work-related personal mobility. In the spring decision-making on 26 April 2023, the CO_2 target for the CO_2 reduction decision on work-related personal mobility was increased from 1 to 1.5 megatons by 2030. This encourages employers to promote the use of electric vehicles (EVs), public transport (OV), or bicycles for both business travel and commuting. The decision will take effect from 1 July 2024.

The Netherlands is focusing on the timely rollout of sufficient and smart charging infrastructure. To this end, the National Charging Infrastructure Agenda (NAL) has been developed under the direction of the Ministry of Infrastructure and Water Management (IenW), and in collaboration with public and private parties. The agreements within this agenda aim to ensure nationwide coverage of (fast) charging points, thereby meeting the expected charging demand for the growing number of electric vehicles. Partially funded resources have been allocated from the Climate Fund for the establishment of charging infrastructure for mobility. Moreover, the Netherlands is advocating for ambitious obligations regarding charging infrastructure within the EU to enable cross-border electric mobility. Subsidy schemes have been put into place for the implementation of both private charging infrastructure (Subsidy scheme for private charging infrastructure (Sprila) and public charging infrastructure (Subsidy scheme for public charging infrastructure (Spula)[59].

In the National Agreement on Zero Emission Regional Public Transport by Bus (BAZEB)[60] public transport authorities have committed to the goal that all busses commissioned from 2025 will be zero emission and the entire fleet for public transport by bus will be zero emission by 2030. From 2022 until 2024 the Specific Benefit Zero-Emission Buses (SpUk-ZEbus) is available to public transport authorities.

In 2023 Royal Dutch Transport association (KNV) representing coach companies, RAI Automotive Industry NL, several municipalities, and the national government have signed the Agreement on zero emission passenger transport by coach ("Afsprakenkader emissieloos touringcarvervoer")[61]. They agreed to incentivise the transition to zero emission passenger coach transport. As part of this agreement, a multi-year purchase subsidy for Zero Emission Passenger Coaches (STour)[62] was introduced in 2024. Only new, battery-electric coaches (M3) are eligible for the subsidy. The budget will be set annually.

[56] https://www.rijksoverheid.nl/documenten/kamerstukken/2022/07/18/nationaal-toekomstbeeld-fiets-en-fietsambitie-22-25
[57] https://ruimtevoorlopen.nl/nationaal-masterplan-lopen/
[58] https://open.overheid.nl/documenten/ronl-c7e81e32154ccb96643ac477e562518c37d24dea/pdf
[59] https://www.rvo.nl/subsidies-financiering/laadinfrastructuur
[60] https://zeroemissiebus.nl/bestuursakkoord/
[61] https://www.rijksoverheid.nl/documenten/rapporten/2023/12/13/bijlage-3-afsprakenkader-emissieloos-touringcarvervoer
[62] https://www.rvo.nl/subsidies-financiering/stour

In 2018 more than 30 municipalities, along with several industry representatives have signed an administrative agreement and accompanying covenant ("Bestuursakkoord Zero Emissie Doelgroepenvervoer (BAZED)") calling for zero-emissions Special Transport Services for people with reduced mobility in the Netherlands by 2025.

In the spring decision-making of 2024, the government decided to adjust the motor vehicle tax (MRB) for the higher weight of electric vehicles. Currently, owners of zero-emission vehicles do not pay motor vehicle tax (MRB), and starting January 1, 2025, they will pay a quarter rate. From January 1, 2026, this discount will end, causing the MRB for a zero-emission vehicle to be higher than that of a comparable petrol vehicle from that moment on. This is because the basis for the MRB is largely determined by the weight of the vehicle, and zero-emission vehicles are heavier than comparable fossil vehicles due to the weight of the battery.

A new rate discount for zero-emission vehicles will be introduced in the MRB: 25% in 2026, 2027, 2028 and 2029. In 2030 the rate will be set to zero. The discount applies to both the national part of the MRB and the provincial surcharges and will phase out after 2030. This measure makes the purchase of both new and second-hand electric vehicles more attractive for many people compared with a situation without measures. In addition, the Netherlands will investigate the necessity of additional tax measurements. In spring 2025 decision making will take place.

Road transport logistics

The BPM exemption for a business van (entrepreneur exemption) will be abolished starting January 1, 2025. However, the exemption in the BPM for zero-emission vans will remain in place. The funding for sufficient charging infrastructure, as described above for electric passenger cars, also applies to the logistics sector, public transport by bus, specialized transport, and construction. Also, several municipalities created low-emission zones in some Dutch city centres to improve air quality and to reduce CO_2-emissions[63].

Currently, several subsidy schemes are active in this sector, including the Subsidy Scheme for Zero-Emission Commercial Vehicles (SEBA), the Purchase Subsidy for Zero-Emission Trucks (AanZET). Additionally, there are significant efforts are being made to expand subsidy schemes for both public and private charging infrastructure, and work is ongoing to implement the Eurovignette Directive in the truck toll system.

On October 30, 2023, the "Clean and Emission-Free Construction" covenant was signed by 45 parties. These included the national government, local governments, industry associations, and clients in the construction sector. The covenant outlines agreements for making construction equipment more sustainable, particularly by setting emission requirements for construction machinery in construction, maintenance, and demolition projects. Over €1 billion has been allocated to support parties in this transition through various instruments under the "Clean and Emission-Free Construction" (SEB) programme. The Subsidy Scheme for Clean and Emission-Free Construction Equipment (SSEB) helps Dutch construction companies to make their tools, vessels, and vehicles more sustainable. Additionally, a knowledge programme is in place to focus on the impact of developments on the construction site, such as prefab construction, alternative materials, or digitalization. Funds are also available for national procurement services, such as ProRail and local governments that have signed the SEB covenant.

For heavy transport and goods transportation, the government is making performance agreements with the transport sector to reduce CO_2 emissions.). To assist the transport sector, funds from the truck toll system will be redirected to help finance the purchase of heavy electric vehicles.

Municipalities, provinces, energy producers, the national government and the business community signed a covenant for zero-emission cleaning vehicles at the beginning of 2019. From 2025, the solid waste disposal industry will only purchase vehicles on sustainable fuel or zero-emission vehicles. From 1 January 2030, all newly purchased solid waste removal vehicles will be zero emission[64].

[63] https://www.milieuzones.nl/node/400460
[64] https://rwsduurzamemobiliteit.nl/publicaties/convenant-presentatie-duurzame-voertuigen/

Sustainable energy carriers

The Netherlands aims to increasingly replace fossil fuels in mobility with biofuels, RFNBOs (Renewable Fuels of Non-Biological Origin, such as renewable hydrogen), and renewable electricity. For biofuels and RFNBOs, priority is given to shipping, aviation and part of the heavy road transport sectors. For renewable electricity, priority is given to the road transport sector. The National Energy System Plan ("Nationaal Plan Energiesysteem (NPE)")[65] outlines which energy carriers will supply the various modes of transport in the short, medium, and long term.

In April 2024 the government announced how it will implement the transport articles of the revised European Renewable Energy Directive (RED). Included is the possibility of using the so-called intermediate route. This route entails that the use of renewable hydrogen in refineries may, under certain conditions, count towards the RFNBO sub-obligations imposed on fuel suppliers for the mobility sector, in addition to the direct use of (hydrogen-based) fuels in road transport, shipping, inland navigation, and aviation. The government announcement clarifies that the direct use of (hydrogen-based) fuels in mobility will be prioritised over the intermediate route by means of a corrective factor. An external study was commissioned to determine this factor. The use of renewable hydrogen in refineries can only contribute partly to meeting the RFNBO sub-obligations. In this way it will not compete with the use of biofuels or renewable electricity in the mobility sector.

To meet the European objectives established in the REDIII, the Netherlands is reforming its Energy Transport System. This is a trading system in which fuel suppliers that provide fossil fuels are required to reduce a certain percentage of CO_2 supply chain emissions. They can achieve this either by supplying renewable energy themselves or by purchasing credits from parties that have delivered sustainable energy to the transport market. As part of this reform, the obligation on fuel suppliers will be increased to meet European targets. The Netherlands has committed to taking an additional step beyond the European goals. Since a significant portion of current road traffic will still run on fossil fuels in the coming years, this national ambition increase will focus on boosting the use of sustainable alternatives.

The biomass used for biofuels must meet sustainability criteria according to the Renewable Energy Directive (2009/28/EC), which was further strengthened in the revision of this directive in 2023. To limit the potential release of CO_2 stored in trees and soil during biofuel production, the revised directive introduces a new approach by setting limits on high-risk biofuels, bioliquids and biomass fuels with a significant expansion in land with high carbon stock. These limits affect the amount of these fuels that EU countries can count towards their national targets when calculating the overall national share of renewables and the share of renewables in transport. EU countries will still be able to use (and import) fuels covered by these limits, but they will not be able to include these volumes when calculating the extent to which they have fulfilled their renewable targets. These limits impose a freeze equivalent to 2019 levels for the period 2021-2023, which will gradually decrease from the end of 2023 to zero by 2030. The directive also introduces an exemption to these limits for biofuels, bioliquids and biomass fuels certified as low risk.

Compliance with these criteria must be demonstrated through one of the adopted certification systems[66]. These systems are checked using independent audits. All biofuels produced in the Netherlands fulfil these requirements. The share of renewable energy in the consumption of diesel and gasoline amounted to 18.9% of the energetic content in 2023 (NEA, 2024a). The raw materials for biofuels are mainly waste and residual materials such as used frying fat. Most raw materials for all biofuels are mainly imported from China, Indonesia, Malaysia and Brazil.

Renewable energy carriers are also promoted through a subsidy scheme to stimulate hydrogen in mobility ("Subsidieregeling Waterstof in Mobiliteit (SWiM)"). This subsidy scheme supports the development of a nationwide network of hydrogen refuelling stations. Alongside this, subsidies can be applied for to help cover the cost of purchasing hydrogen vehicles.

[65] https://www.rvo.nl/onderwerpen/energiesysteem/nationaal-plan-energiesysteem
[66] https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/voluntary-schemes_en

3.4.6.2 *Inland and maritime shipping*

The Netherlands has one of the largest maritime sectors in Europe, which requires the country to make a significant contribution to the European decarbonization challenge while also offering opportunities. The National Energy System Plan (NPE) details the energy demand from all sectors, including maritime shipping and inland navigation. For maritime shipping, the NPE highlights the important role of biofuels in the transition pathway. Due to the need for high volumetric energy density, carbon-based fuels are expected to remain crucial for maritime shipping.

For inland navigation, a broader mix of energy options is available. There are small-scale operations using electricity, hydrogen and swappable batteries. These technologies will need to be scaled up in the coming years. As a result, renewable fuels will play a key role in achieving the goal of an emission-free inland navigation sector by 2050. Since both maritime and inland navigation operate internationally, the government is committed to pushing for ambitious policy instruments at the international level to maximize the impact while maintaining a level playing field. The Netherlands has decided in 2024 to opt CO_2-emissions from inland navigation into ETS2, which connects a price to CO_2 emissions via fuel suppliers. This decision was preceded by an impact analysis conducted by the Expertise and Innovation Centre for Inland Navigation (EICB). Based on the impact analysis, the Dutch government made available a support package of €227 million Euros for the transition of inland ships to sustainable propulsion techniques.

For maritime shipping, the Netherlands is committed to reducing the impact on the environment. As with international aviation, the Netherlands prefers a global system to reduce GHG emissions from maritime shipping to maintain a level playing field.

In 2023, the IMO has adopted its 2023 IMO Strategy on the reduction of GHG emissions from shipping to replace the Initial Strategy dating from 2018. The 2023 Strategy lays down an ambition to reduce GHG emissions to net-zero by or around, i.e. close to 2050. The Strategy contains intermediate checkpoints to reduce emissions by at least 20% by 2030, relative to 2008, while striving for a reduction of 30%, and to reduce GHG emissions by at least 70%, striving for 80%, by 2040. In addition, it includes an ambition to supply at least 5% - 10% of the energy used by international shipping by 2030 with zero and near-zero GHG fuels, technologies and energy sources, and to adopt a basket of measures delivering on these targets by 2025.

Following the adoption of the Initial Strategy in 2018, the IMO has adopted so-called short-term GHG reduction measures. These short-term measures include amendments to the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI, which will require ships to improve their carbon intensity. These amendments combine technical and operational approaches to improve the energy efficiency of ships while also providing important building blocks for future GHG reduction measures. In addition, all ships are required to calculate their Energy Efficiency Existing Ship Index (EEXI) following technical means to improve their energy efficiency and to establish their annual operational carbon intensity indicator (CII) and CII rating. Carbon intensity links GHG emissions to the amount of cargo carried over the distance travelled.

The IMO is currently considering mid-term measures comprising a technical element, namely a goal-based marine fuel standard regulating the phased reduction of the marine fuel's GHG intensity and an economic element, based on a maritime GHG emissions pricing mechanism. These measures will have to be adopted as MARPOL Amendments in 2025.

Within the EU, there is now an agreement regarding regulations for standardizing and gradually reducing the greenhouse gas intensity of ships (in the FuelEU Maritime Regulation). Additionally, as of January 1, 2024, the pricing of greenhouse gas emissions will be integrated into the EU Emissions Trading System (ETS). Under FuelEU Maritime, the use of shore power will become mandatory for larger container and passenger ships starting in 2030, while the Alternative Fuel Infrastructure Regulation (AFIR) will require the provision of shore power in TEN-T ports for these segments. It is expected that EU instruments will only play a sufficiently supportive role in the energy transition after 2030. However, to achieve the goal of climate neutrality by 2050 and to prepare the sector for this, an acceleration of the transition is needed sooner. The Netherlands is working with the sector to determine how this can be achieved and what additional incentives are required.

To support this, a project has recently been financed from the National Growth Fund to have battery-electric inland vessels and charging stations operational on inland waterways by 2026. The National Growth Fund application for a Maritime Master Plan has also resulted in an allocation of €210 million, in addition to market investments. The Maritime Master Plan will provide demonstrations of alternative fuels (hydrogen, methanol, and carbon capture in LNG) on board ships in the coming years, along with a learning effect from sharing the results of these demonstrations. These demonstrations are an initial step, but more is needed in the coming years to make the pathway to climate-neutral shipping by 2050 feasible. Therefore, the Netherlands is reserving €111 million for the development of sustainable ships in the Multi-Year Programme 2025 of the Climate Fund. This reservation will be used to scale up innovative sustainable propulsion technologies in maritime shipping for operating on hydrogen and methanol, and entering and leaving ports on electric propulsion. This involves the early stages of scaling up, where there is still a significant unprofitable top. The Multi-Year Programme 2025 will elaborate on the design.

The Climate Fund will also allocate resources for the scale up of hydrogen and electricity as alternative fuels in inland navigation, amounting to €227 million. Additionally, the Netherlands will expand the availability of shore power for maritime and inland navigation, so that emissions of CO_2, NO_x, SO_x, and particulate matter from ships at the dock can be reduced. Alongside reduced deposition in Natura 2000 areas, this can contribute to the nitrogen space needed for significant investments in land-based infrastructure for the production, supply, and transport of sustainable fuels and energy carriers in the ports over the coming years. Maritime shipping can play an important role in this, both in terms of transport and the use of sustainable energy carriers. The ports will have a significant role in the production, supply, and infrastructure of sustainable energy carriers.

3.4.6.3 International aviation

The Netherlands is fully committed to and involved in addressing the challenges caused by climate change and is promoting resource-efficient, competitive and sustainable aviation. Due to its international character, the Netherlands prefers a global and European measures for reducing CO_2 emissions from international aviation.

The 41st ICAO assembly adopted a Long-Term Aspirational Goal (LTAG) of net-zero CO_2-emissions in 2050. To achieve this goal and to promote the sustainable growth of international aviation, ICAO is implementing a basket of measures including aircraft technology improvements, operational improvements, the use of sustainable aviation fuels (SAF), and market-based measures. Its Carbon Offsetting and Reduction System (CORSIA) for International Aviation is the world's first global carbon system and ensures carbon-neutral growth compared to 2020.

EU ETS

The EU Environment Council decided to include aviation in the EU ETS Directive (2008/101/EC) in December 2008, starting from 2012. Under the EU ETS, all airlines operating in Europe, European and non-European alike, are required to monitor, report and verify their emissions, and to surrender allowances against those emissions. To support the development of CORSIA, the EU decided in 2013 to temporarily limit the scope of the EU ETS with a 'stop the clock' policy. All flights between the EU and third countries are temporarily exempted from compliance with the monitoring, reporting and verification obligations associated with the EU ETS. All intra-EEA flights are within the scope of the EU ETS.

In 2017, the EU decided to continue the 'stop-the-clock' policy until 31 December 2023, i.e. after the start of CORSIA. This allowed time for a follow-up decision on the co-existence of CORSIA and EU ETS for international aviation. During the latest revision of the EU ETS in 2023, the reduced scope has been extended one last time, until the start of 2027. By July 2026, the Commission will carry out an assessment of whether more action is required for flights to and from Europe

The revision of the EU ETS in 2023 aimed to ensure a fair contribution of the aviation industry to the EU's climate objectives. This included an increase of the auctioning of allowances by phasing out free allowances and by applying a strengthened linear reduction factor to aviation. Additionally, the revision appropriately implemented ICAO's CORSIA through the EU ETS Directive. CORSIA applies to international flights

departing from or arriving at airports within the European Economic Area (EEA). For flights within the EEA, only the EU ETS will continue to apply.

ReFuelEU

The European ReFuelEU Aviation Regulation[67] adopted in 2023 promotes the increased use of SAF as the most significant measure to decrease aviation CO_2 emissions. The regulation is part of the Fit for 55 package to meet the emissions reduction target of 55% by 2030. It sets requirements for aviation fuel suppliers to gradually increase the share of SAF blended into the conventional aviation fuel supplied at EU airports. SAF includes synthetic aviation fuels, advanced and other aviation biofuels, as well as recycled carbon aviation-fuels. These blended aviation fuels are fully compatible with the current technology and certified to reach a SAF blend of up to 50%. Research and innovation are being devoted to increasing the maximum blending rate to 100% to untap the full potential of SAF. The Netherlands has played a significant role in the establishment of the European blending obligation for sustainable aviation fuels which became the ReFuelEU Aviation regulation. ReFuelEU will greatly contribute to the reduction of CO_2 emissions from aviation in Europe while maintaining a level playing field across the continent.

National aviation policies

The Dutch policy for the sustainability of aviation is outlined in the Aviation Policy Document 2020-2050. Alongside essential goals and measures at the global and European levels, national efforts are focused on in-sector reductions of CO_2 emissions from departing flights. The Dutch national goals for the CO_2-emissions of departing flights with an international destination are:

- Emissions equal to 2005 levels in 2030;
- Emission 50% of 2005 levels in 2050;
- Zero emissions in 2070.

The priority is given to measures that have a direct impact, namely sustainable aviation fuels and innovative technologies. This will create room for growth in aviation in the longer term as aircraft become quieter and cleaner, through innovations in aircraft design and fuels, including Sustainable Aviation Fuels (SAF) and hydrogen. An approach to the energy transition in aviation and a SAF roadmap to enable cleaner flying is in development and expected in 2025. The ambition is also that electric taxi procedures should be standard in 2030. Currently, the Dutch Ministry of Infrastructure and Water Management is exploring the possibilities to incentivise electric taxi operations by means of subsidies.

In 2023, the Dutch innovation strategy for aviation was presented, outlining strategic choices at the national level. This innovation strategy supports innovations that lead to climate mitigation and contributes to other innovation goals. From the National Growth Fund, up to €383 million has been allocated for the project Aviation in Transition, which aims to assist in the development of new ultra-efficient and hydrogen-powered aircraft. In 2023, sub-projects were initiated focusing on enabling demonstration flights powered by hydrogen and hydrogen-electric systems, as well as projects aimed at developing lightweight materials and innovative cabling and systems, with accompanying research already underway. Aviation in Transition is part of the Recovery and Resilience Plan.

The Climate and Transition Fund promotes the development of new technologies. In the Multi-Year Programme 2024, €100 million has been allocated for the development of gasification technology, which can produce sustainable kerosene. In the Multi-Year Programme 2025, an additional €500 million is proposed for gasification technology. Furthermore, proposals have been submitted for the Multi-Year Programme 2025 for Alcohol-to-Jet (€90 million allocation), biopyrolysis (€90 million allocation), and e-fuels (€60 million allocation, with a €150 million reservation). Alcohol-to-Jet and e-fuels are produced solely for aviation, while biopyrolysis can be applied more broadly than just for (aviation) fuels.

[67] https://transport.ec.europa.eu/transport-modes/air/environment/refueleu-aviation_en

The Netherlands has a dedicated policy approach for non-CO_2 climate effects of aviation, which was published in March 2023[68]. This focuses on more targeted research, global standards and European regulations, as well as regional and public-private cooperation.

A differentiated flight tax based on distance will be introduced. This measure aims to impose a heavier burden on the higher emissions from long-haul flights and will generate a budgetary revenue of €248 million per year. The increase in the flight tax will take effect on January 1, 2027 (via a separate legislative process or the Tax Plan 2026). The implementation will also consider the effects on emissions, network quality, and the hub function of Schiphol, as well as employment and the business climate.

3.4.7 Agriculture and land use

The indicative emission limit for the agricultural sector amounts to 17.9 Mt CO_2-eq by 2030. For land-use the limit is 1.8 Mt CO_2-eq. The emission reductions needed require special attention due to the biological processes involved and the interconnection with other challenges related to water, nature, manure, nitrogen, animal welfare, and a sustainable economic perspective for the sector. These challenges are being addressed as comprehensively as possible. The government promotes emission reduction, among other things, through innovations in housing, management, feed, breeding, and manure management.
The focus is on proven measures that reduce greenhouse gas emissions so that farmers can invest with a future-oriented mindset.

The government is working towards an approach targeted more on emission reductions. The national climate targets for agriculture will be translated into company-specific and area-specific objectives where necessary and feasible. To make the climate challenge for agriculture achievable, both at the company level and for the sector, requires a coordinated approach. It is important that the development of the sector is supported, for example, through generous and voluntary termination schemes.

Carbon sequestration in soils is improved, for instance, through sustainable management of agricultural soils, implementing the Forest Strategy and realizing wet nature. Green-blue infrastructure, agroforestry, and ecosystem services also contribute to alternative income models for agriculture.

The coherent package for greenhouse horticulture will be continued, with the covenant as an important component. For the realization of these goals, the availability of biogenic CO_2 as a fertilizer, timely realization of energy infrastructure, and combating grid congestion are essential.

3.4.7.1 *Main programmes agriculture*

European Common Agricultural Policy
Launched in 1962, the EU's common agricultural policy (CAP) is a common policy for all EU countries. It is managed and funded at European level from the resources of the EU's budget. It is primarily aimed to support farmers and improve agricultural productivity, ensuring a stable supply of affordable food. The key instrument is direct income support for farmers, but it also remunerates farmers for environmentally friendly farming and delivering public services not normally paid for by the markets; the CAP thus also has impact on greenhouse gas emissions.

Agricultural Nature and Landscape Management
The Agricultural Nature and Landscape Management (ANLb) encourages the use of agricultural production methods that have a beneficial impact on the climate, the landscape and its characteristics, natural resources, soil, water and biodiversity. Efforts will be made to optimise management in the existing habitats: open grassland (priority for meadow and water birds), open field (sufficient habitat for arable species), veining (including landscape elements) and extra efforts will be made for water and climate measures. As a result of the above-mentioned additional efforts, the ANLb will grow from 110,000 to 135,000 hectares in the next CAP.

[68] https://www.rijksoverheid.nl/documenten/kamerstukken/2023/03/30/beleidsaanpak-niet-co2-klimaateffecten-luchtvaart

National Programme for Agricultural Soils

The National Programme for Agricultural Soils (NPL) aims to ensure that by 2030 all agricultural soils are sustainably managed and that 0.5 megatons of CO_2 equivalents are sequestered annually in mineral agricultural soils, in line with the Climate Agreement. The programme was launched in 2019 and has the commitment of various supply chain parties. Between 2020 and 2030, €28 million is available for this purpose. To promote sustainable soil management and additional carbon sequestration in the soil, various approaches are being pursued. These include promoting knowledge development and dissemination, for example, through the Smart Land Use research programme and knowledge transfer to farms via the Agricultural Water Management Delta Plan (DAW). Furthermore, the NPL focuses on providing (financial) policy incentives for sustainable soil management through the Common Agricultural Policy/National Strategic Plan (CAP/NSP), with attention to innovation and renewal within the supply chain.

Sustainable soil management requires tailored solutions and a regional approach, as measures may differ depending on the soil type. Provinces play a key role as regional coordinators in implementing the NPL by translating carbon sequestration goals into measures that fit the regional characteristics of the soil. Finally, monitoring is also part of the NPL. Every five years, the Ministry of Agriculture, Nature and Food Quality conducts research into the quality of agricultural soils through a large-scale national survey: the "State of Dutch Agricultural Soils."

3.4.7.2 *Manure management*

Management of manure is highly influenced by the European Nitrates Directive, which prescribes general limits on applying animal manure on soils. Dutch farms that met certain conditions, such as a minimum of 80% acreage as grassland, higher limits were allowed. This partial exemption is referred to as 'derogation'. The exceptions will be phased out over the coming years in the following order: 250-240-230-200-170 kg N/ha per year, and in nutrient-polluted areas, 230-220-210-190-170 kg N/ha per year. Additionally, starting in 2023, no derogations were granted in Natura 2000 areas and groundwater protection areas.

Several policy instruments exist to stimulate emission reductions from manure. Subsidy schemes are available, such as for sustainable stables and manure management (SBV) and for substituting artificial fertilisers with manure. There are also financing instruments that enable investment in innovative stables, such as the Guaranteed Loans for Agriculture (BL/GL). In addition, there are several voluntary buy-out schemes for livestock-farmers as part of efforts to reduce phosphate and nitrogen emissions (such as the LBV and LBV+).

Sustainable Measures for Stables and Manure Management (Sbv) Subsidy

Integral approach towards reduction of ammonia and methane through measures in stables, encompassing two types of subsidy schemes, one for innovation and one for stimulating investments. Livestock farmers can receive subsidies to reduce greenhouse gases, ammonia, odours, and fine particles/endotoxins (integrated low-emission) at the source, while improving animal welfare and fire safety. This instrument consists of two modules: the first subsidy module focuses on research and development of the use of technical innovations and management measures (innovation module). The second subsidy module focuses on the application of proven technical innovations (investment module). For the investments, a subsidy can be given for up to 80% of the costs of purchase and installation of measures. The minimum subsidy amount is €25,000, and the maximum is €600,000 per livestock farm location.

National cessation scheme on livestock sites (LBV)

The National cessation scheme on livestock sites (LBV) is a voluntary subsidy programme aimed at the irrevocable termination of dairy, pig, and poultry farming locations. The goal of the programme is to achieve a structural reduction in nitrogen deposition in nitrogen-sensitive and overloaded Natura 2000 areas, while also impacting other objectives, such as reducing greenhouse gas emissions from agriculture. Farmers receiving a positive subsidy decision may, provided they meet all subsidy requirements, claim compensation for production losses amounting to 100% of the market value and compensation for the loss of production capacity valued at 100% of the age-adjusted replacement value per square meter of the animal housing (stables). The scheme was opened in 2023 with a budget of €500 million, divided into sectoral ceilings for dairy (€270 million), pigs (€115 million), and poultry (€115 million). The number of subsidy

applications submitted by the closing date of December 1, 2023, significantly exceeded the available budget of €500 million. In response, the government decided to increase the budget by €612 million, allowing all applications that meet the criteria to be positively processed.

National cessation scheme on peak load livestock sites (LBV+)
In addition to the LBV, the National cessation scheme on peak load livestock sites (LBV Plus) is part of the Peak Load Approach (APB), which aims to significantly reduce nitrogen deposition from approximately 3,000 locations (agriculture and industry) that have the greatest impact on nitrogen-sensitive and over-burdened Natura 2000 areas.

The National cessation scheme on peak load livestock sites (LBV Plus) is a subsidy programme that allows about 2,800 dairy, pig, poultry, and veal calf farming locations within the APB target group to voluntarily terminate operations irrevocably.

A threshold of 2,500 mol of nitrogen deposition (nitrogen load) applies to the APB and the subsidy scheme, covering overburdened Natura 2000 areas within 25 km. Farmers whose livestock locations meet the scheme's criteria can claim compensation of 100% of the market value of the production rights to be relinquished (based on the market value at the opening of the scheme), 120% for the loss of production capacity (based on a flat-rate, age-adjusted replacement value per square meter of animal housing), and a flat-rate contribution to demolition costs of €45 per square meter of animal housing.

The scheme opened on July 3 with a budget of €975 million. This budget was increased to €1.820 billion in April 2024. Initially, the scheme was set to close on April 5, 2024, but the opening period has been extended to December 20, 2024, coinciding with the budget increase. Both the budget increase and the extension of the application period have been approved by the European Commission.

3.4.7.3 *Horticulture*

A coherent package for the sustainability of greenhouse horticulture provides the sector and growers with guidance to realize the industry's ambition to be climate neutral by 2040. The government supports this ambition by implementing instruments to reduce the use of natural gas and promote alternatives such as electrification. This coherent package includes a variety of measures. An individual levy and fiscal measures are part of this package. In April 2023, the remaining emissions target was set at 4.3 megatons of CO_2-eq.

Covenant Energy Transition for Greenhouse Horticulture 2022-2030
The Covenant Energy Transition for Greenhouse Horticulture 2022-2030 has been signed by the ministries of Agriculture, Nature, and Food Quality (LNV), Economic Affairs and Climate Policy (EZK), and Finance (FIN), as well as by Greenhouse Horticulture Netherlands (trade organisation) and Greenports Netherlands. It also sets the ambition for a climate-neutral and profitable greenhouse horticulture sector by 2040. The overall framework includes both safeguarding and pricing mechanisms on one hand and stimulation and support on the other. The commitments regarding the tools include continuing the Greenhouse as an Energy Source Programme; replacing the existing CO_2 sector system with an effective, safeguarding pricing instrument starting in 2025; implementing a CO_2 tax for greenhouse horticulture; adjusting tax regulations (Tax Plan 2023 and 2024).

CO_2 levy for greenhouse horticulture
As of January 1, 2025, a CO_2 levy will be introduced for the greenhouse horticulture sector, aimed at securing the residual emission target of 4.3 Mt. The basis for the levy is the emission of CO_2 in the greenhouse horticulture sector. Currently, carbon dioxide emissions in greenhouse horticulture are caused by the combustion of natural gas in boilers and CHP (Combined Heat and Power) installations of both greenhouse horticulture companies and energy companies serving the sector.

Opt-in EU ETS2
In April 2024, the government decided to apply the ETS2 through the opt-in for fossil fuels used in agriculture. This includes fossil fuels used in agricultural machinery and stables. From the Climate Fund, €77 million has been reserved for the period between 2025 and 2030 to promote the sustainability of agricultural vehicles.

The government decided to exempt fisheries[69]. No decision has yet been made regarding the application of the opt-in for greenhouse horticulture. A decision is foreseen in the second quarter of 2025.

Greenhouse as an Energy Source (KaE)
Greenhouse as an Energy Source (KaE) is a long-term overarching programme involving the greenhouse horticulture sector and the government (since 2005). Greenhouse Horticulture Netherlands and the Ministry of Agriculture, Nature, and Food Quality collaborate on this initiative.

The knowledge and innovation programme encourages energy savings and the use of sustainable energy in greenhouse horticulture. It develops knowledge and (cultivation) techniques to save energy in greenhouses and to utilize more sustainable energy sources, such as bioenergy, sunlight, and geothermal energy. Regular research projects are conducted, and their results are made publicly available. Innovations that could represent breakthroughs for the sector are encouraged with input from entrepreneurs and cultivation advisors. Knowledge is shared through courses, meetings, publications, and the Greenhouse as an Energy Source website.

To stimulate sustainable investments, there are knowledge exchange programmes and subsidy schemes for technologies within this programme. Other themes under the programme include CO_2 (as plant fertilization), residual heat, biomass applications, and CHP (combined heat and power). Several policy measures fall under the KaE programme:

- A Proof-of-Principle research and demonstration budget.
- The New Cultivation (HNT): an awareness programme to promote new cultivation techniques among growers and advisors through courses and knowledge exchange.
- Subsidy Programme for Market Introduction of Energy Innovations in Greenhouse Horticulture (MEI): an investment subsidy programme for innovative techniques, managed by RVO (budget for 2022: €7 million).
- Acceleration Plan for Geothermal Energy and RNES Geothermal Energy: a guarantee fund for geothermal projects where drilling reveals a location with insufficient thermal capacity for heating purposes.
- Energy Savings in Greenhouse Horticulture (EG): an annual investment subsidy programme for energy-saving techniques.

Other subsidy schemes relevant for horticulture
The government emphasizes the balance between pricing and subsidization and has made funds available from the Climate Fund, namely €300 million for the Heat Infrastructure Subsidy Scheme for Greenhouse Horticulture (SWiG) and an additional €200 million for energy-saving measures through the European State Aid scheme. The horticulture sector can also make use of cross-sectoral subsidy schemes, such as the SDE++ and the EIA (see paragraph 3.4.8).

3.4.7.4 *Land use*

In the Netherlands, CO_2 emissions and sequestration of carbon within the scope of LULUCF occur in forests, grass- and cropland, the conversion of grassland into cropland (or vice versa), the loss of grass- or cropland due to new infrastructure and construction, the oxidation of peatland due to water management, and the conversion of forest into grassland (including non-forest nature, such as heathland), infrastructure, settlements or other land use categories and vice versa. In the 2019 national Climate Agreement, it was agreed to introduce policies to reduce GHG emissions and sequester carbon in (agricultural) soils, forests, nature and peat lands. This section will describe policies relevant to forests, nature and peat lands. The policies related to agricultural soils have already been described above (see paragraph 3.4.7.1).

European Land Use, Land Use Change and Forestry (LULUCF) regulation
The revision of the European Land Use, Land Use Change and Forestry (LULUCF) regulation came into force on May 11, 2023. The collective EU target for 2030 has been increased from 225 megatons of net carbon sequestration to at least 310 megatons of net carbon sequestration, to be achieved by capturing more

[69] https://www.rijksoverheid.nl/documenten/kamerstukken/2024/09/18/kamerbrief-uitvoering-van-het-ets2

carbon through land use than is emitted. As a result, the net carbon emission targets for 2030 at the Member State level have also been adjusted. The revised regulation sets new targets for the period 2026-2030, using a four-year budget for 2026-2029 and a binding target for 2030. If a Member State exceeds its four-year budget, the deficit will be multiplied by a factor of 1.08 and added to the national target for 2030. The four-year budget will be set in 2025. The binding national target for the Netherlands in 2030 is a reduction of 0.435 megatons CO_2 equivalent compared to the average for the years 2016-2018.

Nature

Nature areas, wild animals and plants in the Netherlands are protected by the Nature Conservation Act, which took effect on 1 January 2017. Provincial authorities set rules and regulations on nature protection in their own province. They are also responsible for environmental permits and exemptions. The national government is responsible for the policy on major water bodies and international nature policy.

Over the past decades, nature policy changed towards multi-purpose nature in which multiple functions are combined (e.g. nature, agriculture and recreation). The development of a nature network is a central theme in nature (and forest) policy. Implementation of nature policy including the development of the nature network has been decentralised from the national government to the provincial governments. The nature network is a cohesive network of high-quality nature wetland and terrestrial reserves, including Natura 2000 sites, that is foreseen to grow to a total size of 668,000 ha in 2027.

The challenge for nature cannot be seen in isolation from the challenges in agriculture. By connecting agriculture and nature, more space is created for both. Farmers are essential as stewards of our Dutch cultural landscape. To this end, the government is providing a substantial, long-term financial boost for agricultural nature management, allowing farmers and other land managers to be compensated on a long-term and market-based basis for their contribution to the landscape and the preservation and enhancement of biodiversity. In allocating these funds, the government will take the lead, working together with other authorities and stakeholders.

The government agreed to a one-time amount of €5 billion for a multi-year investment in the agricultural sector, including innovation, targeted management, a broad buyout scheme, nature policy, manure management, and fisheries. Additionally, €500 million per year is allocated for agricultural nature management by farmers. The Netherlands will also begin implementing the European Nature Restoration Regulation adopted in 2024, by drafting a national nature restoration plan, initially aimed at 2030.

Forests

In 2020, the government and the provinces announced a National Forest Strategy[70] to preserve biodiversity and sequester carbon. The implementation has started in 2021. The strategy aims to increase the forest area by 10% between 2020 and 2030. This would result in a total forest area of 407,000 hectares, realised with both reforestation and afforestation within and outside the current nature network. Within that network, a careful balance must be struck between forestation and other values important for nature and society. It is estimated that about 15,000 hectares of new forest can be added up to 2030. An estimated 19,000 hectares could be added outside the current nature network. Potential suitable areas are agricultural land, riverbanks and valleys, urban areas and windfarms. Regional and local authorities are in the lead to identify suitable areas. A national project organisation should facilitate the implementation. Up until 2022, a total of 823 hectares of new forest have been realised[71]. Various instruments including a forestation subsidy can be deployed to further stimulate participation by landowners. Forestation will also be included in other national programmes, such as those for rural Areas and for adaptation. In their capacity as landowners, the government and provinces themselves will include forestation in their management strategies.

[70] https://www.rijksoverheid.nl/documenten/kamerstukken/2020/11/18/uitwerking-ambities-en-doelen-landelijke-bossenstrategie-en-beleidsagenda-2030

[71] https://www.rijksoverheid.nl/documenten/rapporten/2023/12/19/bij12-natuur-in-nederland-stand-van-zaken-eind-2022-rapport-november-2023

Peat meadows

Based on the National Climate Agreement, policy instruments for peat meadow areas are being developed through a Peat Plan and research programme. The measures concern water infiltration systems (pressure drains, underwater drains), water level raising and other (wet) crops. In the first phase of the Peat Plan, the aim is to gain insight into possible measures for greenhouse gas reduction through peat meadow management through pilots, communities of practice and the National Greenhouse Gas Research Programme on Peat Meadows (NOBV). The knowledge questions in the first period mainly focus on joint learning for the implementation phase. The research phase is intended to use this to create a programme for the years 2024-2030 (peat plan phase 2) in which a larger-scale implementation of cost-effective methods that fit within a long-term peat meadow vision. The six provinces with the most coastal plain peat are drawing up area plans.

The Peat Plan 1st phase was published on July 13, 2020. The current action is the development of a second-phase peatland plan. This plan is foreseen in 2024.

In 2021, six peatland pilots started in the Netherlands which investigate whether and how management measures within the CAP can contribute to reducing CO_2 emissions in peatland areas. The pilots will be evaluated in 2025. Another initiative is the CAP Cooperation Measure Peat Meadows and Transition Areas N2000, where an annual compensation is possible for minor drainage (max. 40, 30 or 20 cm) and for the construction of a water infiltration system and digital groundwater monitoring wells on peat soil.

3.4.8 Cross-sectoral policies and measures

In addition to the sectoral approach, generic instruments are also used, such as emission trading (ETS), energy taxation, subsidies aimed at energy savings, (Energy Investment Deduction (EIA)) and renewable energy and CO_2 reduction (SDE++). Important fiscal instruments are the Environmental Investment Allowance (MIA)/ Arbitrary Depreciation of Environmental Investment (Vamil) which have a wide scope across different sectors.

Innovations are stimulated with instruments like Mission-driven Research, Development and Innovation (MOOI) and SME Innovation Stimulation Region and Top Sectors (MIT). Research and funding priorities are formulated in Multiannual Mission Innovation Programmes (MMIP's).

In addition, the Netherlands has adopted a National Energy System Plan (NPE) 2050, in which an integrated vision is developed for the transition of the various sectors and energy carriers. For the spatial planning of the energy infrastructure of national importance towards 2050, the Netherlands is working on the implementation of the Main Energy Structure Programme (PEH). In the Regional Energy Strategies (RES) regional and local governments formulate their plans to implement renewable energy. To prevent shortages of professionals leading to delays in the government has recently launched an Action Plan for Green and Digital Jobs.

3.4.8.1 *National Energy System Plan (NPE)*

To accelerate the energy system transition, the Dutch government has decided to take a more active role in steering the system's development. This decision comes as the rapid transformation of the energy system presents many complex coordination challenges. Public and private entities must make decisions to drive the energy transition from their respective roles but are often confronted with interdependencies and uncertainties about how the system will evolve. As a result, there is a need for government leadership to address these coordination issues and make balanced choices regarding the future direction of the energy system.

The development of the National Energy System Plan (NPE) is central to this strategy, setting out guiding choices for the long-term evolution of the energy system. The first NPE, published in December 2023[72], outlines key choices related to:

1. Maximizing the development of sustainable energy supply and infrastructure
2. Energy savings
3. Efficient use of energy and infrastructure
4. International connectivity
5. Collaborative governance

The NPE also includes development pathways for four energy chains: electricity, hydrogen, carbon, and heat. The NPE will be updated every five years, offering a comprehensive framework for energy system decisions. Additionally, there will be an annual Energy Note outlining the priorities for energy policy, as well as an Energy System Monitoring Report that tracks the progress of the energy system.

3.4.8.2 *Main Energy Structure Programme (PEH)*

A CO_2-neutral energy system requires more space than a fossil-based energy system. Therefore, the government has established the Main Energy Structure Programme (PEH)under the Environmental Planning Act, aimed at spatial planning and making spatial reservations for national energy infrastructure. The PEH evaluates potential energy system developments based on factors such as system efficiency, feasibility, overall welfare, space requirements, and environmental impacts.

Using different scenarios for the development of a climate-neutral energy system by 2050, the PEH assesses the necessary space to address bottlenecks in the energy system. The programme also seeks synergies with other spatial developments, such as the sustainability of the economy, urbanization, and nature conservation. The development of the PEH has been a collaborative effort, involving co-governments, grid operators, and other stakeholders.

Based on these analyses, the PEH has made several policy decisions for the future. The energy system of 2050 will be more energy-efficient and space-efficient by reusing existing space for energy projects and smartly clustering new spatial demands – such as for electrolysis and batteries – particularly in large industrial clusters. This approach will not only make the future energy system more efficient but will also minimize the impact of the energy transition on the immediate living environment. By proactively reserving space for future developments, energy projects can be realized more quickly.

Given the broad scope and range of the PEH, it also serves as an integrated energy plan for 2050, providing a solid foundation for future energy system developments. The Implementation Programme of the PEH is now focused on carrying out the various policy choices outlined in the PEH.

3.4.8.3 *National Programme Regional Energy Strategies (NPRES)*

The government has defined 30 'energy regions' to facilitate and integrate the increasing production of renewable energy on the local and regional level. All provinces, water boards and municipalities participate together with regional stakeholders. These stakeholders identify locations for renewable electricity production using onshore wind and solar, amounting to a production of up to 35 TWh on land by 2030, of which 50% is owned by local households and businesses. This replaces the previous Energy Agreement (2013) which provided for an onshore wind capacity of 6 GW by 2020. The inter-administrative programme NPRES (the National RES Programme) assists the 30 energy regions in drafting and implementing their strategies and coordinating with national policies.

The Regional Energy Strategies (RES) also include plans to use alternatives for natural gas used for heating buildings. Each region defines its own RES for the period up to 2030. Regions submitted their strategies by July 2021 and renew these every two years. The Netherlands Environmental Assessment Agency (PBL) analysed the strategies submitted in 2021, indicating that the plans add up to meet the renewable electricity

[72] https://www.rijksoverheid.nl/documenten/rapporten/2023/12/01/nationaal-plan-energiesysteem

production requirement, depending on timely capacity improvements of the power grid (PBL, 2021). Every year in December PBL publishes an annual progress report. So far, the prospects are good and the goal of 35TWh is still within reach.[73]

3.4.8.4 *Phasing out natural gas exploitation in the Groningen field*

The Groningen natural gas field is one of the major gas fields in the Netherlands. Gas extraction in Groningen has led to many earthquakes, making the area unsafe, for example, by causing damage to homes. Since 2018, gas production has therefore been gradually reduced, and on April 19, 2024, the Groningen gas field was permanently closed.

3.4.8.5 *Hydrogen*

Hydrogen and hydrogen carriers from renewable and low-carbon sources will become an indispensable link in a climate-neutral society. They will gradually replace an increasing share of the roles currently played by natural gas and oil in the energy and raw materials system. Several sectors, such as industry and mobility, can and must transition to CO_2-free hydrogen (and its carriers). The conversion of gas-fired power plants and tailored agreements with major industrial emitters will lead to increased demand for CO_2-free hydrogen. The EU has set binding targets for renewable hydrogen in the industry and mobility sectors (ReFuelEU).

The Netherlands stimulates the hydrogen production in its National Hydrogen Programme. The target is to have a domestic electrolysis capacity of 4 GW by 2030. Timely completion of a nationwide network of infrastructure and storage, prompt connections to newly constructed offshore wind farms, and adequate support for the unprofitable portion are essential for its feasibility. Resources from the Climate Fund have been reserved for this purpose. Additionally, €838 million has been allocated from the National Growth Fund for the research, demonstration, and investment programme GroenvermogenNL, parts of which are included in the Recovery and Resilience Plan. In the coming years, the Netherlands will develop a mix of instruments for scaling up renewable hydrogen.

The Netherlands opts for regulation and subsidies to significantly scale up the hydrogen market by 2030. The annual obligation for renewable fuels of non-biological origin (RFNBOs) in industry should provide potential exporters and producers with clarity about the demand for renewable hydrogen in the Netherlands. Subsidies will serve to strategically guide the market and cover part of the additional costs.

Approximately €1.6 billion has been made available from the Climate Fund for scaling up electrolysers to produce renewable hydrogen onshore and offshore. Additionally, reservations totalling over €5 billion for electrolysis are being made. These funds are intended to stimulate the production of electrolysers with a capacity of up to 1.000 megawatts, both on land and at sea. The specific financial instruments for this will be further developed. For H2Global, aimed at hydrogen imports, the Netherlands plans to launch an auction with Germany for a ten-year procurement contract for hydrogen (carriers) totalling €600 million (with both countries contributing €300 million). The tender will be globally issued, and the procured hydrogen will then be offered on the European market through short-term sales contracts via the Netherlands and Germany.

Various subsidy instruments (both generic and specific) are available to stimulate hydrogen. The Scaling-up Renewable Hydrogen Production via Electrolysis Subsidy (OWE) is the key subsidy instrument for the large-scale production of renewable hydrogen. These programmes are being further optimized, and the possibility of supporting industrial players transitioning to renewable hydrogen is being explored.

3.4.8.6 *Innovation programme for climate and energy*

Through its innovation policy, the Netherlands accelerates the development of new and improved applications necessary to meet the country's climate goals and to maintain a reliable, affordable, sustainable, safe, and widely supported energy system. The approach focuses and concentrates innovation efforts through mission-driven innovation policy, where all relevant parties work toward jointly formulated

[73] https://www.pbl.nl/publicaties/monitor-res-2023

societal missions. The missions formulated in response to the Climate Agreement require targeted innovation through a multi-year, programmatic approach. The Top Sector Energy has structured this approach into 13 Multi-Year Mission-Driven Innovation Programmes (MMIPs)[74].

These missions were developed with a broad group of stakeholders, including knowledge institutions, businesses, and societal organizations, as part of the Integrated Knowledge and Innovation Agenda for Climate and Energy (IKIA). The IKIA Climate and Energy 2024-2027 is currently implemented[75].

3.4.8.7 *Waste management plan*

Greenhouse gas emissions from the waste sector are part of the climate policy sector of Industry but affect all sectors. According to the Environment Management Act, the national government is required to adopt a waste management plan once every six years. The National Waste Management Plan for 2002–2012 was the first such plan. It was replaced in 2009 by a second plan for the 2009–2021 period, which remained in force until December 2017. The third plan, for the 2017–2029 period, is currently in place.

The current – third – plan aims to minimise the production of waste, maximise recycling and other recovery, and minimise the amount of waste that remains for disposal, especially landfill. Other targets are, for example, increasing the rate of separate collection of waste from households and businesses to 75%. This will reduce the amount of waste to be incinerated. Non-recyclable waste is incinerated in energy-efficient incinerators, which are all designated as installations for other recovery in accordance with the EU Waste Framework Directive. The third waste management plan also incorporates circular economy aspects, with a greater focus on waste as a reusable material for new products. This policy will also help to reduce energy consumption and GHG emissions.

A mix of policy instruments is used to implement the current plan, ranging from legislation, licensing, information campaigns, agreements with stakeholders, levies, taxes, deposit systems and policy programmes. More information can be found in the Waste Management Plan.[76]

3.4.8.8 *National Circular Economy Programme*

The Netherlands aims to be fully circular by 2050. In a circular economy, we use resources and products efficiently and smartly. By extending the lifespan of products, we reduce the demand for raw materials. Additionally, we recycle used materials for new products and choose renewable resources that can be continuously replenished. This approach preserves the value of materials, resources, and products for as long as possible, thereby minimizing waste. This helps to reduce CO_2-emissions, lowers environmental impact of production and consumption, reduces biodiversity loss and enhances the security of supply for resources.

In February 2023, the government submitted the National Circular Economy Programme (NPCE) 2023-2030 to Parliament[77]. This programme builds on the Circular Economy Implementation Programme 2019-2023, which outlined the government's ambition to make the Netherlands fully circular by 2050 and is executed through five transition agendas: Consumer Goods, Plastics, Construction, Manufacturing, and Biomass and Food.

[74] https://topsectorenergie.nl/nl/maak-kennis-met-tse/missies/meerjarige-missiegedreven-innovatieprogrammas-mmips/
[75] https://www.topsectoren.nl/publicaties/publicaties/publicaties-2023/november/02/ikia-klimaat-energie-2024-2027
[76] https://lap3.nl/service/english/
[77] An English version can be found here: https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/beleidsnotas/2023/02/03/nationaal-programma-circulaire-economie-2023-2030/NPCE+Circulaire+Economie+rapport+Engels.pdf

The NPCE includes general measures aimed at more efficient resource use in the coming years, targeting four key areas:

1. reducing resource use,
2. substituting primary resources,
3. extending the lifespan of products and components, and
4. high-quality processing. Additionally, the NPCE specifies measures for priority product chains and supportive measures. These supportive measures encompass circular entrepreneurship, encouraging consumer behaviour change, and promoting education.

A circular economy positively influences restoration of biodiversity and a healthy and clean environment, availability of resources and contributes to the reduction of greenhouse gases. In the spring of 2023 and 2024, the Dutch government decided to take additional measures, including circular measures for which over €877 million has been allocated or reserved. Seven measures have been included to promote a circular industry (see section on industry 3.4.4.1). Three other measures focus on setting standards and encouraging bio-based construction, circular civil engineering, and circular demolition, thereby sitting at the intersection of industry and the built environment. These measures can contribute to national climate goals in the short term, targeting both the beginning and end of the supply chain, and include supporting policies aimed at knowledge building, innovation, skills, and behaviour. These measures focused on steering and facilitating (international) sustainable and circular chains not only advance the NPCE goals but also aim for an additional 2.5 Mt reduction in CO_2 emissions.

The government also aims to promote sustainable and circular supply chains that contribute to both national and global climate goals by valuing emission reductions in the whole supply chain. Therefore, it will explore to what extent a European greenhouse gas footprint will effectively contribute to the climate and resources transition.

In spring 2024, the Dutch government agreed on steps in three areas to make resource use more circular, thus contributing to climate goals. First, there will be a stronger focus on sustainable carbon use, especially within the chemical industry, by advocating for European policies and exploring additional necessary actions. Additionally, the government aims to set higher circular ambitions in national procurement and will examine how to implement these precisely. Lastly, circular resource use will become a requirement in subsidy programmes and other climate policy instruments. To support this, an assessment will be conducted on what the market can already provide and what is needed to set such conditions, such as certification for recycled materials.

The government also seeks to improve the alignment between the circular economy and climate and energy policy. In the elaboration of the National Climate Fund, including the tailored approach for industry, circularity is incorporated. Ongoing programmes from the National Growth Fund that contribute to circularity are similarly integrated and utilized in a cohesive manner. Various existing subsidy schemes are being analysed to assess whether circularity could be further emphasized as a key focus or requirement.

In the energy transition, it is crucial to adopt circular solutions to ensure the secure supply of critical metals and other essential resources and to prevent these from ending up in waste incinerators or overseas. This approach aligns closely with the National Raw Materials Strategy[78]. One of the design principles of the National Energy System Plan (see above) is therefore to establish conditions for the circular and sustainable use of resources in the future energy system.

Based on the results of the biennial Integrated Circular Economy Report (ICER) from the Netherlands Environmental Assessment Agency, the package of measures in the NPCE can be adjusted and expanded. The second ICER was published in 2023[79].

[78] https://www.rijksoverheid.nl/documenten/kamerstukken/2022/12/09/raw-materials-strategy-for-large-transitions
[79] https://www.pbl.nl/en/publications/integral-circular-economy-report-2023-assessment-for-the-netherlands

3.4.8.9 Key instruments

EU ETS 1

As prescribed by Directive 2003/87/EC, the European Trading System for GHG emissions (EU ETS) started in the EU on 1 January 2005, focusing on CO_2 emissions from large industrial emitters. Currently, the EU ETS covers emissions from electricity and heat generation, most manufacturing industries, maritime transport and intra-EU aviation (departing and landing within participating countries). It is a 'cap and trade' system, where participants buy emission allowances at auctions which they need to surrender up to their annual emissions. Only the manufacturing industry and international aviation receive (a part of their needed) emission allowances for free. Installations can trade emission allowances with one another, which ensures that emission reductions take place where they are the least expensive. Its geographical scope extends across the 27 Member States of the EU (EU-27) plus Norway, Iceland, Liechtenstein and the power sector in Northern Ireland. It covers around 40% of the EU's GHG emissions. In the Netherlands, around 350 companies are included in the ETS, which are responsible for around 41% of total GHG emissions in the country (NEA, 2024b).

In 2021, the EU ETS entered its fourth phase, which runs from 2021 until 2030. The legislative framework of the EU ETS for phase 4 was revised in 2018 to ensure emission reductions in support of the EU's 2030 emission reduction goal (40% relative to 1990 levels). The 2018 revision built on the reform of the ETS framework for phase 3 (2013 - 2020), which had changed the system considerably compared to the previous phases (2005 - 2007 and 2008 - 2012). Key improvements were the increased annual cap reduction factor of 2.2% as of 2021 and the reinforced Market Stability Reserve (the mechanism established by the EU to reduce the surplus of emission allowances in the carbon market and to improve the EU ETS's resilience to future shocks). In addition, dedicated funding mechanisms (the Innovation Fund and Modernisation Fund) were established in the industry and the power sector to meet the innovation and investment challenges of the low-carbon transition.

On 14 July 2021, the European Commission adopted a series of legislative proposals setting out how it intends to achieve at least 55% net reduction in GHG emissions by 2030. This included a proposal on the revision of phase 4 of the EU ETS. Key changes agreed in the 2023 revision of the ETS Directive are:

- The cap has been tightened to bring emissions down by 62% by 2030, compared to 2005 levels. This covers emissions from maritime transport, which have been included in the EU ETS from 2024.
- Free allocation of allowances to companies has been scaled down, in line with the tighter cap, and made conditional on the companies' decarbonisation efforts. For the aviation sector, free allocation will be removed as of 2026.
- The Market Stability Reserve has been revised to foster balance in the reformed EU carbon market.
- More resources have been mobilised to support people and businesses in the green transition. Member States have committed to using all EU ETS revenues (or financial equivalent) towards climate action and a just, green transition. The Innovation Fund and Modernisation Fund budgets have been increased accordingly.
- A new emissions trading system, called ETS2, has been created to cover emissions from buildings, road transport and additional sectors. The new system will become operational in 2027.

EU ETS 2

As part of the 2023 revisions of the ETS Directive, a new emissions trading system named ETS2 was created, separate from the existing EU ETS. This new system will cover and address the CO_2 emissions from fuel combustion in buildings, road transport and additional sectors (mainly small industry not covered by the existing EU ETS). The ETS2 will become fully operational in 2027. Although it will be a 'cap and trade' system like the existing EU ETS, the ETS2 will cover emissions upstream. It will be fuel suppliers, rather than end consumers such as households or car users, that will be required to monitor and report their emissions. These entities will be regulated under the ETS2, which means they will be required to surrender sufficient allowances to cover their emissions. Regulated entities will purchase these allowances at auctions. The ETS2 cap will be set to bring emissions down by 42% by 2030 compared to 2005 levels.

All emission allowances in the ETS2 will be auctioned, and a share of the revenues will be used to support vulnerable households and micro-enterprises through a dedicated Social Climate Fund (SCF). Member States will be required to use the remaining ETS2 revenues for climate action and social measures, and they will report on how this money is spent.

National Climate Fund

The Climate Fund is one of the key instruments to enable financing for measures that contribute to the goal of achieving at least a 55% CO_2 reduction by 2030. Over €35 billion has been reserved for a Climate Fund until the end of 2030 to reduce greenhouse gas emissions. This funding is in addition to other subsidies. The resources in the Climate Fund are divided into six categories: nuclear energy, CO_2-free gas power plants, energy infrastructure, early-stage scaling, industrial sustainability and SME innovation, and the sustainability of the built environment. The Climate Fund was formalized on February 1, 2024. The fund facilitates the implementation of climate policies and measures which contribute to:

- The construction of two nuclear power plants and a subsidy scheme for CO_2-free gas plants, ensuring that gas plants can use greenhouse gas-free gas to create greenhouse gas-free controllable power. There is also funding for energy infrastructure, such as infrastructure for hydrogen, heat, and charging infrastructure necessary for the energy transition. No technology or sector is pre-selected. This goal also includes early-stage scaling support for technologies, initially focusing on high-quality renewable energy carriers that can facilitate cost-effective greenhouse gas reduction when scaled up.
- Stimulating energy efficiency, renewable energy adoption, and other greenhouse gas-reducing and circular technologies in the business sector. This initially includes binding agreements with industry, along with support for greenhouse gas-reducing innovations in small and medium-sized enterprises (SMEs). This funding covers both reductions in energy-related and non-energy-related emissions, with a focus on additional reductions beyond existing policies. There is overlap with energy infrastructure and early-stage scaling. The goal also includes early-stage scaling support for other greenhouse gas-reducing technologies that become cost-effective with substantial scaling.
- Promoting energy efficiency, renewable energy, and carbon sequestration in the built environment (e.g., bio-based construction). This includes measures to reduce energy demand in buildings and encourage the use of renewable energy. Specific initiatives include the National Insulation Programme, sustainability of public real estate, and the promotion of hybrid heat pumps.

There is one decision-making moment per year that aligns with the existing budget cycle. Departments wishing to access funds from the Climate Fund can submit a substantiated proposal to the fund manager, the Minister for Climate and Green Growth. The fund manager's assessment is reflected in the draft Multi-Year Climate Fund Programme. The Netherlands Environmental Assessment Agency (PBL) and socio-economic experts provide independent evaluations of the fund manager's initial assessment, and all submitted measures. These recommendations are considered when drafting the final Multi-Year Programme.

The current government decided to increase the nuclear energy allocation within the Climate Fund by €9.5 billion to support the construction of two additional nuclear power plants. At the same time, the budget for the development of batteries and green hydrogen is being reduced by €1.2 billion, proportional to the current budget. All changes to the Climate Fund are reflected in the Climate Fund budget and explained in the 2025 Multi-Year Climate Fund Programme.

Stimulation of Sustainable Energy Production and Climate Transition Subsidy Scheme (SDE++)

The SDE++ (Stimulation of Sustainable Energy Production and Climate Transition Subsidy Scheme) is the most important mechanism to promote renewable energy in the Netherlands. This scheme focuses on the large-scale deployment of technologies that produce renewable energy and other technologies that reduce carbon dioxide (CO_2) emissions. SDE++ focuses on reducing emissions within the Netherlands in a cost-effective manner. It promotes the deployment of market-ready and relatively large-scale CO_2-reducing technologies by covering the non-profitable portion of these technologies through an operating subsidy. This subsidy instrument has several features that ensure it functions well by international standards, such as technology neutrality, internal competition, cost-effectiveness, and long-term certainty for investors. In 2020, the scheme was expanded so that, in addition to renewable energy production, CO_2-reducing technologies also became eligible for subsidies. These include technologies such as CCS and CCU, hydrogen

production via electrolysis, and the production of renewable heat through industrial heat pumps and electric boilers. These technologies support the transition across all sectors. Additionally, the SDE++ is focused on realizing subsidized production from onshore wind and solar PV (> 15 kilowatts). Due to the significant CO_2 reduction potential of CCS and its ability to reduce CO_2 relatively quickly and cost-effectively, the cap on CCS in the industry for the SDE++ scheme was removed starting with SDE++ 2023. To avoid unsustainable use of biomass resources, SDE++ applications using woody biomass for (low temperature) heat- and power production are no longer eligible.

In 2023, "fences" were introduced, ensuring sufficient budget remains for other, less cost-effective techniques in the SDE++.These so-called "fences" have increased the chances for technologies related to low-temperature heat, high-temperature heat, and molecules to receive subsidies. These technologies are currently less profitable but can achieve long-term cost reductions and are crucial for the climate transition. A portion of the 2023 SDE++ budget was reserved for these technology groups. In 2024, the SDE++ will again implement the use of fences. In the 2020, 2021, 2022, and 2023 subsidy rounds, respectively €4 billion, €5 billion, €13 billion, and €8 billion were made available. The government has decided to allocate €11.5 billion in 2024. Part of the SDE++ funds are reserved for an initial budget of €8 billion in 2025. The final budget for 2025 will be decided on in the spring of 2025. Until 2023, expenditures for the SDE schemes were covered by a levy on household and business energy consumption: the Sustainable Energy and Climate Transition Levy (ODE). ODE revenues flowed into the general budget and, in principle, covered the total cash expenditures for the SDE(+). As of 2023, this link was removed. The ODE rate was set to zero, and the levy was integrated into the energy tax. Therefore, since 2023, there has been no link between ODE rates and SDE funds, and the SDE++ is now funded from the Ministry of Climate Policy and Green Growth (KGG) budget.

Energy Taxation

The Regulatory Energy Tax (REB) was introduced in 1996, changing its name to Energy Tax in 2004. Taxing energy consumption makes energy saving more attractive (by changing behaviour or investing in energy-saving measures). The Energy Tax is levied on electricity and natural gas, and its level depends on 1) the consumer's energy consumption (the higher the consumption, the lower the energy tax levied (degressive tariff structure)) – and 2) specific agreements between the various sectors and the government. Tariffs are updated annually and published on the Tax Administration's website[80].

Industrial consumers pay much lower tariffs to secure a level playing field for these exposed companies. Various exemptions and lower tariffs apply, depending on the activities concerned. No energy tax is levied on fuels used for electricity production. Metallurgical and mineralogical activities are exempted. A lower gas tariff for the horticulture sector applies, which is linked to the specific sectoral emission system in that sector.

Several changes have been made to promote the production of renewable energy for private homeowners' cooperatives or associations. Since 2004, private homeowners have been allowed to settle the amount of electricity returned to the grid with their electricity consumption (since 2012 up to their annual consumption taken from the grid). Referred to as net metering, this stimulates the installation of PV-panels on home-owners' roofs. This scheme runs until the end of 2026.

In 2014, a lower tariff was introduced for private homeowners' cooperatives and associations that produce their own renewable energy. With effect from 2015, the electricity produced by landlords and tenants using solar panels was exempted from energy taxation. In 2021, this exemption ended and was replaced with a new subsidy scheme: the Cooperative Energy Production Subsidy Scheme (SCE).

[80] https://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/overige_belastingen/belastingen_op_milieugrondslag/tarieven_milieubelastingen/tabellen_tarieven_milieubelastingen?projectid=6750bae7%2D383b%2D4c97%2Dbc7a%2D802790bd1110

The energy tax is also subject to Value added taxation (VAT) of 21%. Solar panel owners were able to reclaim VAT on the investment in solar panels and their installation. Since 2023, the government introduced a zero VAT rate for the supply and installation of solar panels, which reduced administrative burden for solar panel owners and the Tax Administration.

Excise duty is another form of (energy) taxation, which is levied on (amongst others) petrol, diesel and LPG[81]. Finally, 2021 saw the introduction of a taxation for out-going passengers from airports in the Netherlands. This air passenger tax was €7,947 per passenger per flight in 2022.

In addition to the energy tax, a sustainable energy surcharge (ODE) was levied on electricity and natural gas consumed from the grid. The ODE was introduced in 2013 to cover subsidies granted to produce renewable energy and/or to reduce CO_2-emissions (the SDE++ subsidy instrument). The ODE tariffs differentiate between levels of energy consumption and between types of users (e.g. companies or residents). The ODE rate was set to zero from 2023 onwards as the financing of the SDE++ scheme is now included in the governmental budget.

Energy Investment Tax Allowance (EIA)
The Energy Investment Tax Allowance (EIA) is a tax relief programme that offers a direct financial advantage to companies in the Netherlands that invest in energy-saving equipment and sustainable energy. Entrepreneurs may deduct 45% of the investment costs for such equipment from their company's taxable profits over the calendar year in which the equipment was purchased. The list of eligible technologies is updated and published annually. Since 2013, the main focus of the EIA has been on energy-saving technologies instead of renewable energy options; for the latter, companies are referred to other schemes and measures (such as SDE++). The EIA budget in 2024 was €259 million. A similar programme (MIA Vamil) exists for other environmental measures.

Environmental Planning Act
The Environmental Planning Act (or the "Omgevingswet" in Dutch), which came into effect in 2024, serves as the foundation for streamlining environmental and permitting procedures, establishing a one-stop shop and implementing digitized processes. With this law, most existing individual environmental permits (except for specific nature legislation and environmental impact assessments) can be combined into a single environmental permit. This permit can be issued for projects at the national, provincial, and municipal levels.

A crucial component of the Environmental Planning Act is the Digital System for Environmental Planning (DSO). This online platform for environmental permits guides applicants to the appropriate authority and specifies the requirements (both substantive and formal) for a successful permit application. The platform connects competent authorities with permit applicants, functioning as a digital process for the Environmental Planning Act and acting as a national one-stop shop for environmental permits.

The National Strategy on Spatial Planning and the Environment (NOVI) is also included as an instrument to this Act. This strategy provides a long-term vision on the future development of the living environment in the Netherlands. The NOVI presents a perspective for tackling major spatial challenges such as climate change, the energy transition, the circular economy, accessibility and housing.

Energy saving obligation
The energy savings obligation requires companies and institutions with an annual energy consumption of 50,000 kilowatt-hours of electricity or 25,000 m^3 of natural gas (equivalent) to implement all energy-saving measures that have a payback period of five years or less from a list of Recognised Energy Saving Measures. These companies and institutions are also required to report every four years on the measures that were implemented. These obligations are enacted in legal decisions, as part of the Environmental Planning Act. In 2023, the legal decision on the energy saving obligation was updated:

[81] https://www.rijksoverheid.nl/onderwerpen/belasting-betalen/vraag-en-antwoord/accijns-betalen

As of July 2023, ETS companies, complex licensed companies, and the greenhouse horticulture sector are included under the energy savings obligation. The obligation has been expanded to include measures aimed at making energy use more sustainable. In addition to efficiency measures, transitioning to alternative energy carriers and measures for on-site renewable energy generation have also become mandatory if they can be recouped within five years. The payback period methodology and the Recognised Energy Saving Measures lists have been updated with the latest insights on energy prices, resulting in more mandatory measures.

Very large energy consumers—those using 10 million kilowatt-hours of electricity or 170,000 m^3 of natural gas (equivalent) per year—are required to investigate measures for making energy use more sustainable. This investigation obligation goes beyond the notification obligation that applies to medium-sized companies. Both reporting obligations exceed the requirements of the EED energy audit, as companies and institutions must create and execute an implementation plan to ensure the actual execution of the measures. The intention is to increase the payback period for the energy savings obligation to seven years by 2027. If all other factors remain constant, raising the payback period from five to seven years will result in more mandatory energy-saving measures. The further development will also consider the feasibility of the measures for companies and institutions. Additionally, resources will be made available to support small and medium-sized enterprises (SMEs) in implementing energy-saving measures.

EU Energy Efficiency Directive audit obligation

The EED energy audit is a requirement stemming from the European Energy Efficiency Directive (EED). Its aim is to raise awareness among companies and institutions about their energy use and the opportunities to save energy and transition to sustainable practices. The EED audit obligation provides a detailed overview of all energy flows within an enterprise. Additionally, the audit highlights potential energy-saving measures and their expected effects. This includes the energy consumption of buildings, installations, industrial processes, and business transportation. The audit is a requirement for large companies and institutions (non-SME's).

In the period from 2019 to 2023, a total of 2,734 EED audit reports were submitted, including ISO certifications. Sixty-four companies were issued a penalty under coercive measures, of which two were forfeited. By early 2024, all cases were closed.

R&D subsidy schemes

There are several subsidy schemes that stimulate research, development and demonstration (RD&D) projects that contribute to achieving the climate targets of the Netherlands. These schemes are designed according to the principles of mission-oriented innovation policy. This policy approach directs the RD&D towards large societal challenges by setting clear goals (i.e. missions), developing innovation programmes and coordination across different sectors. One of these missions – similar to the Climate Agreement - is to develop a CO_2-free economy.

The energy innovation subsidy schemes in the Netherlands are structured according to these missions as well as according to innovation phases (Technology Readiness Level; TRL). The main energy innovation subsidy schemes are:

- Mission-Driven Research, Development, and Innovation (MOOI) scheme. This scheme aims to support large scale, multidisciplinary innovation research and development project (TRL3-6) that contribute to achieving the goals of the missions. Specific areas of focus are for example offshore and onshore renewable energy production and system integration.
- Energy and Climate Research & Development (EKOO) scheme. Similar to the MOOI, this scheme focuses on research and development projects (TRL3-6) that contribute to the mission goals set in the innovation programmes. However, this scheme aims to support smaller and often on more specific innovation projects that do not fit the MOOI-scheme.
- Demonstration Energy and Climate Innovation (DEI+) scheme. This scheme offers support to pilot, demonstration and scale-up projects (TRL> 7) the lead to CO_2-reduction. This covers a large variety of potential theme's including renewable energy production, hydrogen production, energy storage and other innovations that promote flexibility.

Just Transition Fund (JTF)

One of the important European funds contributing to achieving a just climate transition in the Netherlands and within Europe is the European Just Transition Fund (JTF). The main objective of the JTF is to enable regions that are dependent on income and employment from fossil fuels to enter the energy transition in a fair and equitable manner. This transition considers social and economic aspects as well as environmental effects. The total JTF budget for the Netherlands amounts to approximately €623 million. The programme runs from 2021 to 2027.

The Just Transition Fund supports regions that are most impacted by the transition to climate neutrality and prevents regional disparities within the European Union from widening. To make Europe fully climate-neutral by 2050, a transition of emission-intensive industries is necessary, which comes with significant socio-economic challenges. The Just Transition Fund provides financial support to vulnerable regions for this purpose.

The budget allocated to the Netherlands are directed towards six regions that are most severely affected by the consequences of the climate transition and therefore face significant transitional challenges.

These include regions with large emission-intensive industries: Groningen-Emmen, IJmond, Groot-Rijnmond, West Noord-Brabant, Zeeuws-Vlaanderen, and Zuid-Limburg. The projects focus on three tracks:

Track 1: Innovation. The resources for the innovation track are directed towards projects that lead to economic diversification, modernization, and conversion.

Track 2: Investments in technology, systems, and infrastructure. The funds reserved for this track go to projects that develop the "hardware" necessary for the transition.

Track 3: Labour Market. Approximately half of the available funds are foreseen for labour market-related projects. This includes creating new employment opportunities, upskilling and reskilling employees and job seekers, assisting job seekers in their job search, and actively integrating job seekers into the labour market. There is an additional focus on youth.

Action Plan for Green and Digital Jobs

To prevent a shortage of skilled workers from causing delays in the execution of the transition, the Action Plan for Green and Digital Jobs was published at the beginning of 2023. With this plan, the Netherlands is taking various steps to ensure high-quality employment and training for the transition. Addressing labour market shortages in technology and ICT is a joint responsibility of employers, employees, education, and the government. Action is required on several fronts. The Netherlands focuses on four pillars:

- Increase intake in science and technology (STEM) education; The demand for technicians and ICT professionals has been rising for years, but the intake into education is not sufficient to meet the labour market demand. Considering societal challenges such as the climate and digital transitions, it is important to encourage more young people to pursue education and careers in technology and ICT.
- Maintaining and increasing the intake in the STEM labour market. Given the significant outflow of technicians from technology and ICT, it is crucial to focus on retention. In addition to policies aimed at stimulating lateral entry from other sectors, matching supply and demand, and lifelong learning (LLL), it is also important to look more broadly at the inflow of specific target groups.
- Labour productivity growth: The solution to the shortages is not only to be found in helping more people into jobs but also by focusing on labour productivity growth through (process) innovations and digitalization.
- Strengthen governance and combat fragmentation; The government sees a clear role for the government in addressing labour market shortages due to the social, economic, and societal consequences. This means that the government intends to take more active and focused action than before in removing obstacles and resolving bottlenecks that prevent the matching of supply and demand.

In 2024, a governance structure for the Action Plan for Green and Digital Jobs will be implemented. This will build on the strengths and collaboration between existing structures. The goal is to achieve:
- One clear implementation structure for education, businesses, and regional governments.
- Improved effectiveness of governance by keeping communication lines short and focused.
- A recognisable regional goal regarding labour market shortages. In the fall of 2024, a first progress report will be delivered.

3.4.9 Policies and measures that are no longer in place

Compared to the 8th National Communication and 5§ Biennial Report submitted by the Netherlands, the following policies and measures are no longer in place:

Renewable Energy Transition Subsidy Scheme (HER+) expired in 2023 and was continued as part of the Demonstration Energy and Climate Innovation (DEI+) schemes and Top Sector Energy/Mission-Driven Research, Development, and Innovation (TSE/MOOI);

SEEH expired in 2022 and has been replaced by the SVVE subsidy scheme (for private housing associations); Sustainability scheme Reduction Landlord charges for Housing Associations (RVV) was ended in 2022 after abolition of the landlord levy for social housing associations;

Programme and large-scale pilots on natural gas free neighbourhoods (PAW) was ended in 2022; new programmes have been introduced to reduce emissions in the built environment;

Subsidy scheme Reduction Energy Use Dwellings (RRE/RREW) was ended in 2022; new programmes have been introduced to reduce emissions in the built environment;

Renovation acceleration programme and subsidy scheme "Renovatieversneller" was ended in 2024; new programmes have been introduced to reduce emissions in the built environment;
- Subsidy scheme LNG for road transport expired in 2021;
- POP3: Investment subsidy for calf barns expired in 2019;
- Economic Recovery Fund (EHF) for green economic recovery in agriculture ended after 2022;
- Price cap energy bills *was only for* the year 2023.

3.5 Impacts of policies and measures

3.5.1 Introduction

This paragraph reports on the impacts of policies and measures, in accordance with the relevant MPGs (para. 85, 86, 89, 90).

3.5.2 Expected and achieved GHG emission reductions

The expected impacts of policies and measures on the reduction of GHG emissions are summarised in Tables 3.11 and 3.12 below. The expected impacts are calculated by RVO based on the National Climate and Energy Outlook 2024 from (PBL, 2024), using the WAM projection scenario (see section 3.7). The assumptions used and calculation steps used are described in Annex 3.

The impacts are presented for groups of policies and measures affecting the various sectors rather than for individual policy measures. It is often impossible or arbitrary to distinguish between the impacts of individual instruments and programmes that focus on the same (sub)sectoral activity. Changes are the cumulative result of multiple policies and measures, rather than individual policy measures. For example, energy taxation interacts with subsidies provided. By estimating the impacts on (sub)sectoral level, the risk of double counting is also reduced considerably.

Table 3.11: Expected GHG emission reductions of policies and measures in Mt CO_2-eq.

Emission reduction in Mt CO_2-eq (*including CCS*)	2025				2030			
Name	**Total**	**ETS**	**ESR**	**LULUCF**	**Total**	**ETS**	**ESR**	**LULUCF**
Group of PAM's electricity sector	22.2	18.7	3.5	-	31.3	23.9	7.3	-
Group of PAM's industry	4.7	3.2	1.5	-	15.2	12.2	3.0	-
Group of PAM's buildings	2.5	0.0	2.4	-	4.5	0.1	4.5	-
Group of PAM's transport	0.8	-	0.8	-	1.9	0.0	1.9	-
Group of PAM's agriculture	1.0	-	1.0	-	3.1	-	3.1	-
Group of PAM's LULUCF	0.0	-	-	0.0	0.0	-	-	0.0
National total	**31.2**	**21.9**	**9.2**	**0.0**	**56.0**	**36.2**	**19.8**	**0.0**

Table 3.12: Expected GHG emission reductions of policies and measures by gas.

Emission reduction in Mt CO_2-eq (including CCS)	2025	2030
CO_2	28.8	50.5
CH4	1.4	3.6
N2O	0.9	1.5
HFC	0.2	0.3
PFC	0.0	0.0
SF6	0.0	0.0
National total	**31.2**	**56.0**

Although the KEV2024 includes projections for the years 2035 and 2040, the expected emission reductions are reported only for the years 2025 and 2030. This is because there are no projections (in the KEV) available after 2030 on the avoided energy consumption resulting from national policies and measures, as required by article 8 of the EU EED.

The achieved impacts of policies and measures have not been reported as insufficient data was available. For instance, there is no scenario available which could be used as a counterfactual without the climate policies and measures that were in place in 2020. In the Netherlands, policies and measures are regularly evaluated ex-post to assess their effectiveness and efficiency, but this is usually done on an individual bases (see also section 3.1.2). Such ex-post evaluations are not suitable to be used to assess the impact on GHG emissions in a coherent way.

Impact on longer-term trends

Although current policies and measures aim to achieve emission reduction targets for 2030, the impacts will not end after 2030. Many will result in structural changes in sectors (like investments in new energy production facilities and grids, improved insulation of dwellings, new industrial production processes etc). The KEV2024 shows that the emissions with policies and measures currently foreseen, decrease to 52-61% in 2035 compared to 1990 levels (PBL, 2024). Emissions are foreseen to decrease further up to 2040, although at a slower rate, showing that additional policies are needed to achieve long-term targets.

3.5.3 Economic and social impacts of policy measures

In line with the Paris Agreement and the Convention, the Netherlands is committed to prevent dangerous anthropogenic interference with the climate system. Ambitious mitigation goals are necessary to ascertain a future for all countries, limiting the detrimental impacts of climate change on societies, economies and our natural environment. Policies and measures reducing greenhouse gas emissions have, like any policy intervention, also (unintended) costs (such as on lifestyles) and other benefits (such as improved air quality). Knowledge on (expected) costs and benefits help policy makers to design climate policies and measures that maximize benefits at the lowest possible costs. In the Netherlands, several (ex-ante) analyses have been

made on the economic and social impacts of (European) climate policies. The main findings are summarized in this section.

3.5.3.1 *Economic impact of the European "Fit-for-55 Package"*

In 2022, the Dutch Central Planning Bureau (CPB) provided an economic analysis of the European "Fit-for-55" package, which was proposed by the European Commission on July 14, 2021. The analysis examines the extent to which the package can achieve CO_2 reduction in a cost-effective manner and the potential consequences for the Netherlands. The review focuses on the key components of the package and its overall impact.

At the time, it was not yet possible to provide a detailed calculation of the package's effects on public finances and the financial burden on businesses and households. This is partly because the package sets out goals and obligations that still need to be specified with national measures. Therefore, the economic analysis does not (explicitly) account for (new) national policies that will need to be developed to meet both national and European ambitions for 2030. Nevertheless, the analysis provides a qualitative indication of the possible economic effects of stricter European climate and energy policies for the Netherlands.

Overall, the package takes a step toward achieving CO_2 reduction more cost-effectively (CPB, 2022). The European Commission's "Fit-for-55" package broadly focuses on pricing CO_2 emissions, encouraging businesses and households to take the negative external effects of CO_2 emissions into greater account. The package aims to reduce the risks of decreased competitiveness for European companies and carbon leakage (the transfer of emissions to non-EU countries) through an EU carbon border adjustment mechanism (CBAM), as analysed further below.

The macroeconomic effects of the package are expected to be limited. The European Commission's impact assessment report shows model estimates ranging from -0.4% to +0.5% of GDP in the EU by 2030. The competitiveness of companies is largely maintained through the allocation of free allowances and the introduction of the CBAM. However, the effects on household purchasing power from higher CO_2 prices may not be equally distributed. Significant disparities could also arise between countries and sectors. Countries that are more heavily impacted by the higher CO_2 prices will be compensated through funds, which are financed by ETS revenues. Additionally, a portion of the ETS revenues will flow to member states. For the Netherlands, these revenues could amount to approximately €3.4 billion by 2030, compared to €0.9 billion in 2021. This increase is primarily due to the higher CO_2 price and the revenues from the new ETS2.

Energy-intensive industries in the Netherlands will need to accelerate their decarbonization efforts due to higher ETS prices. Companies without cost-effective reduction options will face an increased financial burden. As described in Chapter 2.2, the effects of carbon leakage, production losses, and employment impacts at the macro level appear to be limited. Additionally, Dutch industry is supported by subsidies such as the SDE++ scheme. However, the effects on specific sectors and companies could be much more significant. On the other hand, a higher ETS price reduces the unprofitable gap for CO_2-reducing projects, lowering the subsidy required per project.

The introduction of emissions trading for buildings and road transport will lead to an increased financial burden for households and businesses. The extent of this burden will depend on the CO_2 price and how excise duties and energy taxes are adjusted in response to rising prices. The tight labour market in the Netherlands makes it challenging to rapidly decarbonize the built environment. A sufficient number of skilled workers and technicians are needed to insulate homes and install heat pumps. Due to the tight labour market, this is currently a challenge in the Netherlands. In 2022, the Netherlands Environmental Assessment Agency (PBL) conducted research on labour market constraints in implementing climate policy to reduce national greenhouse gas emissions by (at least) 55% by 2030. The research indicated that the most significant challenges for implementing climate policy are expected in technical professions at the higher education level, such as engineers and architects, and, to a slightly lesser extent, in technical and skilled trades at the vocational level, such as machinery mechanics, metalworkers, and construction workers.

3.5.3.2 *Effects of carbon pricing on industrial activity*

Current policies encourage companies to reduce their use of fossil fuels by explicitly pricing carbon through mechanisms like a CO_2 tax or emissions trading systems (ETS). Additionally, this is done via fuel excises, subsidies, standards, and restrictions. All these measures, either explicitly or implicitly, determine how expensive or appealing it is for companies to emit carbon. Rising carbon costs might negatively impact economic activity and the competitiveness of companies. Furthermore, businesses may seek to avoid locally increased carbon costs by relocating their activities to regions with weaker regulations. This could lead to an increase in CO_2 emissions in other parts of the world, making domestic climate measures less effective due to so-called carbon leakage effects.

In 2023, the Dutch Central Planning Bureau (CPB) conducted research on international business-level evidence regarding the impact of both explicit and implicit carbon costs on economic activity (CPB, 2023a). This study utilized production data from 3.1 million companies across 32 countries and 15 industrial sectors between 2000 and 2019. The research found limited evidence of negative impacts on performance indicators such as profitability, productivity, and revenue growth for the average industrial company.
However, there was a slight reduction in employment, around 2%, linked to a USD 50/tCO_2 increase in carbon costs. Conversely, investments increased in response to higher carbon costs.

The effects vary significantly across different groups of companies. Performance impacts were most pronounced in sectors sensitive to carbon leakage and in EU countries. Notably, small decreases in employment were observed in capital-intensive businesses and smaller firms within leakage-prone sectors, primarily in mining, cement, and basic metals. In these sectors, capital-intensive firms increased their investments, and smaller firms improved productivity. Across all subgroups, profitability and the likelihood of exiting the market were minimally affected by rising carbon costs.

These findings suggest that companies primarily respond to increasing carbon costs by adjusting their production processes rather than relocating their operations. Nonetheless, relocation and carbon leakage could become more significant for countries with more ambitious climate policies than their counterparts. This will depend on several factors beyond direct carbon prices, such as agglomeration advantages, tax systems, policy design, and institutional factors. Additionally, forward-looking companies are anticipating upcoming changes in climate policy and potentially shifting consumer behaviour worldwide. This study emphasizes that climate policy, particularly on an international level, can be tightened with limited economic harm.

3.5.3.3 *Intergenerational distribution of financial burden due to climate change*

In 2023, the Dutch Central Planning Bureau (CPB) conducted an exploratory study on the intergenerational effects of climate change and climate policies (CPB, 2023b). To better understand the intergenerational distribution of financial burdens, the study estimated the costs of climate change, focusing on three main types of costs.

1. **Damage:** Climate change will result in physical environmental changes in the Netherlands, such as droughts, heatwaves, flooding, river overflows, and rising sea levels. These changes will impose significant financial burdens on the country.
2. **Adaptation Costs:** To address these physical impacts, the Netherlands may need to implement adaptation measures, such as raising dikes and improving water management systems. These policies also come with substantial costs.
3. **Mitigation Costs:** The government aims for the country to be climate-neutral by 2050. Mitigation policies, such as reducing CO_2 emissions, will also incur financial costs. The extent to which the government will bear these costs depends on policy choices. For example, measures that discourage or ban CO_2 emissions may not cost the government much, while subsidies for green initiatives will put a strain on the public budget.

While some of these costs may be absorbed by the government, others will ultimately fall on households and businesses. The study emphasizes the importance of understanding how these financial burdens will be distributed across generations, as current climate policies will have long-term effects on both present and future generations.

Most of the costs associated with climate change and climate policy are likely to fall on future generations. In the Netherlands, both the costs of climate change and the financial burdens of climate policy are expected to increase over time. In addition, future generations will also face the negative consequences of climate change that are difficult or impossible to quantify in monetary terms.

Financing climate change costs through debt could further increase the financial burden on future generations. Estimating these costs is highly uncertain, particularly over long-time horizons. However, it is likely that the costs will be substantial. Moreover, the impact of climate change on the Netherlands will largely depend on international efforts to mitigate climate change. Global collaboration and ambitious climate action will play a crucial role in determining the scale of the consequences and associated costs that future generations will have to bear.

3.5.3.4 *Effects of the Carbon Border Adjustment Mechanism (CBAM)*

In 2023, the EU decided to implement the Carbon Border Adjustment Mechanism (CBAM) for certain sectors covered by the Emissions Trading System (ETS). The aim is to reduce carbon leakage due to companies relocating their production to regions with less stringent climate regulations. Under CBAM, importers of products in specified sectors will pay an import fee corresponding to the carbon emissions generated during production, based on the ETS price. If the country of origin has already applied a carbon price, this amount will be deducted from the import fee. CBAM will be gradually introduced over a nine-year period from 2026 to 2034. During this time, free allowances for the affected sectors will be phased out at a faster rate than those for other ETS-covered sectors.

A joint study by the Netherlands Bureau for Economic Policy Analysis (CPB) and the Netherlands Environmental Assessment Agency (PBL) analysed the effects of CBAM compared to the previous situation, where companies in CBAM sectors received free allowances. The study finds that CBAM is more effective at reducing carbon leakage than free allowances (CPB and PBL, 2024). Carbon leakage under CBAM is expected to be about one-third lower than under the ETS with free allowances.

CBAM raises import costs by pricing the carbon content of imported products, while free allowances offset the increase in production costs resulting from EU climate policies. On average, production outside the EU is more carbon-intensive than within the EU, which means that the increase in import costs due to CBAM will be greater than the reduction in production costs from free allowances. Consequently, CBAM improves the competitiveness of European companies within the EU market compared to non-EU companies. It is expected to lead to increased production within the EU, reduced reliance on relatively more polluting imports from non-EU countries, and a smaller carbon leakage due to production relocation.

3.6 Summary of greenhouse gas emissions and removals

The Netherlands submitted its most recent National Inventory Report (1990-2022 period) to the UNFCCC in November 2024 as a separate report. The NIR consists of the National Inventory Document (NID) with accompanying methodology reports and the Common Reporting Tables (CRT), which together provide a complete overview of the Netherlands' greenhouse gas inventory in quantitative and qualitative terms. Chapter 2 of this BTR provides a summary of the main trends in national greenhouse gas emissions and removals as described in the NIR 2024, with summary tables to be found in CTF table 6. Throughout the summary in Chapter 2 and CTF table 6, it should be noted that more detailed explanations are provided in the NIR 2024 (Emissieregistratie, 2024a).

For more detail on the methodology applied for the identification of GHG emissions from international aviation and navigation in the scope of the EU NDC, please refer to Annex 2 of this BTR.

3.7 Projections of greenhouse gas emissions and removals

3.7.1 Introduction

The 8th National Communication, as well as the Fifth Biennial Report, described the projections published in the National Climate and Energy Outlook 2022 (PBL, 2022). The updated projections in the current Biennial Transparency Report are based on the National Climate and Energy Outlook 2024 (PBL, 2024[82]). Section 3.7.2 presents the main projection results for greenhouse gases for the years 2025 – 2040 across the various sectors. Section 3.7.3 offers an assessment of the aggregate effects of policies and measures and the uncertainty and sensitivity analyses. The methodologies and assumptions underlying the projections are described in more detail in section 3.7.4. Projections on EU-level can be found in the EU BTR.

The projections described in this chapter are based on the National Climate and Energy Outlook 2024 (*Klimaat- en Energieverkenning*, "KEV 2024") published by the Netherlands Environmental Assessment Agency ("PBL"), which describes the most plausible developments based on the best available information about prices, markets, technology and policies. Assumptions on policies have also been taken into account up to the 1st of May 2024. New insights gained after the 1st of May 2024, such as the policies set out in the outline agreement of the new coalition government (*Hoofdlijnenakkoord*, published on 16 May 2024), have been taken onboard, to the extent possible, for those policy developments that were sufficiently concrete. However, the subsequent Governmental Programme of the government (*Regeerprogramma*, published on 13 September 2024) which further specified these policies, could no longer be incorporated into the calculations.

Statistics on greenhouse gas emissions for the year 2023 are still provisional. The KEV 2024 incorporates new insights into economic and demographic developments, sectoral developments, fossil fuel prices, and CO_2 prices and policies. New insights into exogenous modelling assumptions were taken into account up to May 2024, using official national statistics, mostly from Statistics Netherlands (CBS) and the Pollutant Release and Transfer Register (PRTR) of the National Institute for Public Health and the Environment (RIVM), where available. This approach means that the base year for most modelling parameters is 2022 or, where possible, 2023. Data on greenhouse gas emissions are in line with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and available on the basis of the Global Warming Potentials (GWPs) from the Fifth Assessment Report (AR5) by the IPCC.

The KEV 2024 includes an uncertainty analysis that takes into account uncertainties concerning economic development as well as energy and CO_2 prices and policies. Projection results for key indicators (such as the national emission of greenhouse gases) are presented with a 90% probability range, which is denoted by the lower and upper value of the range shown in square brackets: [x-y]. It should be noted that there are many uncertainties in (expected) developments in energy markets, especially the electricity sector. The activities in this sector are highly dependent on developments outside the Netherlands, such as fuel and CO_2 prices, weather conditions and the demand for and supply of electricity in other European countries. As a result, the import, export and price of electricity can also fluctuate sharply from year to year. The uncertainty in such developments is therefore calculated for several possible European market developments and incorporated into several scenarios for the electricity sector. A more detailed explanation of the calculation method of the uncertainty analysis will be provided in Schouten et al. (expected 2025). In line with national and European climate targets, emissions from land use, land use change and forestry (LULUCF) are by default included in the projections on the national level (unless mentioned otherwise).

Variant "With Existing Measures" (WEM)

This variant encompasses currently implemented and adopted policies and measures as from 1 May 2024. It includes measures that are sufficiently concrete and have been made binding, such as the European Emissions Trading System 2 (ETS2), subsidies for renewable energy and the concrete and binding measures of the 2019 Climate Agreement. In the case of the national government measures are deemed binding after

[82] The National Climate and Energy Outlook 2024, including sectoral background reports and tables, is available [in Dutch] from: https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2024

agreement by the Senate; in the case of the European Union this follows approval by the European Council and the European Parliament; and in the case of the provinces this is through the Provincial Executive (*Gedeputeerde Staten*).

Variant "With Additional Measures" (WAM)
In addition to all measures in the WEM variant, this variant encompasses planned policies and measures which have been published but not yet officially implemented by May 2024. Nevertheless, they were specific enough to be included in the modelling. The policies included in the WAM variant differ only slightly from those in the WEM variant, resulting in broadly similar projection results for the WEM and WAM variants. The background report '*Beleidsoverzicht en factsheets beleidsinstrumenten*' (PBL & TNO, 2024)[83] contains an overview of all considered policy instruments per sector (as well as cross-sectoral instruments), whether and how the instrument has been included in the KEV 2024, and how these instruments have been accorded across the WEM, WAM and WSM variants. Due to the largely similar projection results and limited differences between WEM and WAM, for the sake of clarity the graphical presentation in the KEV 2024 – graphs which have been incorporated throughout the relevant sections below – often only shows the WAM variant. However, the projection results for both the WEM and WAM variant are consistently referenced in the sections below and the detailed figures for both variants are included in the CTF tables.

Variant "with scheduled measures" (WSM)
Since 2021, the KEV includes the new policy variant "with scheduled measures". This variant also includes the planned policies and measures up to May 2024 which were *not* specific enough to be included in the modelling. This also covers policy plans, intentions or outlines that were public and officially communicated before the summer recess on July 5, 2024, but which had not yet been submitted for consultation by May 1. Often these scheduled measures have been elaborated to a more limited degree. The most important scheduled measures that could still be included in the estimates are specified in the National Climate and Energy Outlook (KEV 2024), alongside the scheduled measures for which no estimate could be made in this iteration of the KEV because they had not yet been sufficiently developed to be able to be analysed quantitatively. Examples of "scheduled" policies that were included in this variant are the increased budget for the Investment Subsidy for Sustainable Energy and Energy Savings (ISDE) and the proposed raising of the maximum speed to 130 km/h on highways. As mentioned above, a complete list of the policies and measures included in the projections, either as implemented, planned or as scheduled, can be found in a dedicated background report (PBL & TNO, 2024). It should be noted that detailed results of the WSM variant are not available and are therefore not included in the common tabular format (CTF) tables in this report.
The results are, however, discussed in the sections below as relevant.

A variant "Without Measures" is not included in the projections, because climate and energy policies have been implemented in the Netherlands as early as the 1990s. Since then, policies have been elaborated (such as subsidy schemes for sustainable energy production and energy efficiency policies), discontinued (such as the Benchmarking Covenant) or newly created, both nationally (such as the Climate Agreement agreed in 2020) or as a result of European policies (such as the ETS and Ecodesign) and their revisions. In addition to cross-sectoral policies, each sector has its specific policies. This has resulted in a complex framework of policies and measures, making the development of a variant "Without Measures" (e.g. no new policies after 2000) very difficult, as well as a highly theoretical exercise.

In annex 6 an overview can be found which policies and measures are included in which policy-variant of the projections

[83] PBL & TNO, 2024 'Beleidsoverzicht en factsheets beleidsinstrumenten'. Available (in Dutch) from: https://www.pbl.nl/system/files/document/2024-10/pbl-2024-beleidsoverzicht-en-factsheets-beleidsinstrumenten-achtergronddocument-bij-de-kev-2024_5627.pdf

3.7.2 Projection results

3.7.2.1 *General trends*

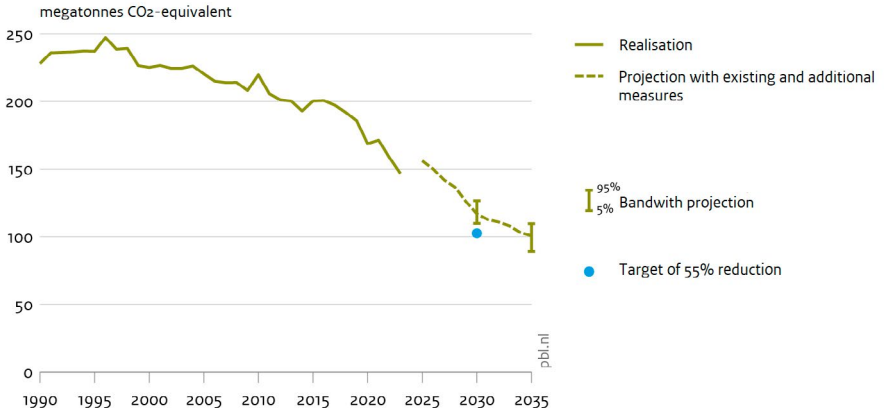
National greenhouse gas emissions will continue to fall towards 2030

Figure 3.36 presents the historical and projected emissions of greenhouse gases in the period 1990-2035. After a peak in 1996, annual emissions have largely been decreasing in the Netherlands. This has been mainly due to lower non-CO_2 emissions from industry and agriculture. CO_2 emissions have also decreased, mostly in the energy sector and the built environment sector. Based on existing policies (the "With Existing Measures" or WEM variant), greenhouse gas emissions are expected to fall to 114 - 131 Mt CO_2-eq by 2030 (including LULUCF and indirect CO_2 emissions). The WAM variant, which also includes additionally planned policies, results in only slightly lower emissions with a decrease to 110-127 Mt CO_2-eq by 2030, which is an emission reduction of 44.4-51.8% compared to 1990 levels (see Figure 3.36).

Figure 3.36 shows a slight jump between the emissions of 2023 and projections for 2025, before continuing to decline. This is due to the expected return to lower energy prices which will see industrial activity bounce back, the completion of maintenance on the blast furnaces at the main steel plant in the Netherlands (which had resulted in lower emissions in 2023) and electricity demand that will increase further after 2023. The energy consumption of greenhouse horticulture is also expected to rebound further after relatively low consumption in the preceding years.

The possible reduction of emissions from scheduled policies and measures (from the WSM variant) is estimated, on balance, to be relatively small with an additional reduction of 1 Mt CO_2-eq in 2030. Scheduled policies and measures in certain sectors result in higher emissions than the WAM variant (such as for the mobility sector with the proposed raising of the maximum speed to 130 km/h on highways), while in other sectors they lead to greater reduction (such as the impact on the built environment from the increased budget for the Investment Subsidy for Sustainable Energy and Energy Savings (ISDE)). Overall, this would result in emissions by 2030 that would be 44.7-52.1% below 1990 levels. In all variants, the national target to reduce greenhouse gas emissions with 55% by 2030 compared to 1990 levels is not achieved.

Figure 3.36: National emissions of greenhouse gases, 1990-2035 (WAM variant) (source: KEV2024).



Emissions of greenhouse gases are projected to decrease further after 2030

Based on the WEM variant, the emissions of greenhouse gases will further decrease after 2030 from 114-131 Mt to 92.9-114 Mt CO_2-eq by 2035 (including LULUCF). A similar decrease is seen under the WAM variant, with the emissions of greenhouse gases decreasing from 110-127 Mt CO_2-eq in 2030 to 89.1-110 Mt CO_2-eq by 2035 (including LULUCF) – 51.9-60.9% lower than 1990 levels. Emissions will continue to decline across all sectors between 2030 and 2035, with the largest declines, both absolute and relative, expected in the electricity and mobility sectors. Electricity emissions will decrease because the capacity of solar and wind energy will increase further towards 2035, while electricity demand will decrease. In the mobility sector, the substantial increase in the number of zero-emission vehicles as a result of European policy development

is the main reason for the further decrease in emissions. It should however be noted that the uncertainties associated with exogenous and/or autonomous developments beyond 2030 are substantial.

Like the projections for 2030, the possible additional reduction of emissions from scheduled policies and measures (from the WSM variant) up to 2035 is estimated to be limited. As in the estimates for 2030, the emissions for 2035 in the electricity, mobility and agriculture sectors are higher in the estimate including scheduled policies and measures (WSM) than in the estimate based solely on the WAM variant. Based on scheduled policies and measures, this results in an expected decrease in greenhouse gas emissions to 87.6-109 Mt CO_2-eq by 2035. This is an emission reduction of 52.3-61.6% from 1990 levels.

Looking towards 2040, greenhouse gas emissions are expected to decline further in almost all sectors after 2035. However, as described in the Climate and Energy Outlook, there are currently limited policies which detail further major emission reductions by 2040. In February 2024, the European Commission proposed a European climate target for 2040 of a net 90% greenhouse gas emission reduction compared to 1990 (EC 2024[84]). European decision-making on the 2040 target still has to take place, however.

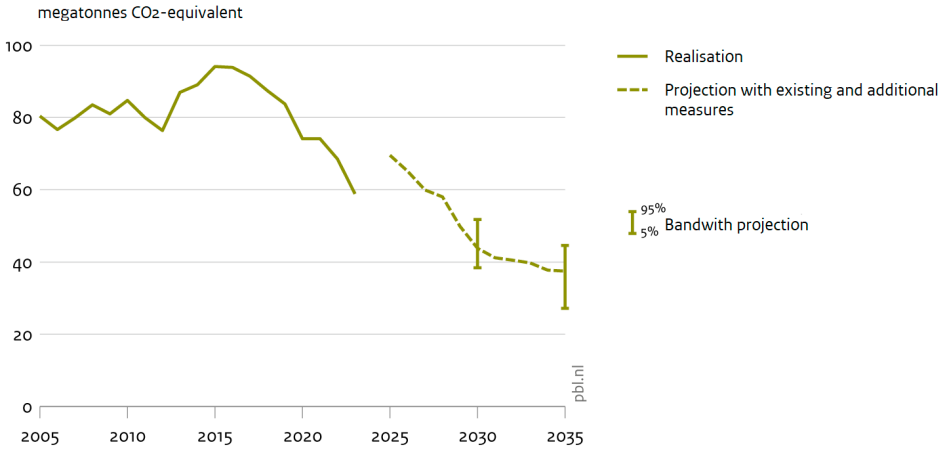
Emissions covered by the European emission trading systems (ETS1 & ETS2)
As part of the revisions of the EU Emission Trading System (ETS) Directive in 2023, a new system termed ETS2 was created – separate from the existing EU ETS (now distinguished as ETS1) – which from 2027 onwards will address emissions from fuel combustion in buildings, road transport and additional sectors (mostly small industry not yet covered by the original EU ETS1, which is focused on heavy industry and power plants).[85] Greenhouse gas emissions from companies in the Netherlands covered by the original European Emission Trading System (EU ETS1) have been declining since 2015, mostly due to increased use of renewable energy and lower electricity production from coal-fired power plants.

In 2023, ETS1-emissions fell to 58.9 Mt CO_2-eq (around 40.1% of the total national GHG emissions), which represents a drop of 9.6 Mt CO_2-eq in ETS1-emissions compared to 2022.

Based on the WEM variant, ETS1-emissions are expected decrease further to 44.5 [39.2-52.6] Mt CO_2-eq by 2030. This is almost the same in the WAM variant, with ETS1-emissions expected to decrease to 43.8 [38.4-51.8] Mt CO_2-eq by 2030, representing a drop of 45.5% [35.6-52.2%] in ETS1-emissions compared to 2005 levels (see figure 3.37). This further decrease after 2023 is largely due to the ban on the use of coal for electricity production from 2030 onwards. The possible additional reduction of ETS1-emissions by also incorporating scheduled policies and measures (the WSM variant) in the estimates, results in a slight further decrease of ETS1-emissions to 37.8-51.2 Mt CO_2-eq by 2030. Between 2030-2035 ETS1-emissions in the WEM and WAM variant are expected to drop further to, respectively, 38.5 [28.4-45.9] and 37.5 [27.2-44.6] Mt CO_2-eq by 2035. For the WSM variant which also includes scheduled policies and measures, ETS1-emissions drop to 25.8-43.4 Mt CO_2-eq by 2035. However, it should be noted that the estimates for 2035 and beyond are uncertain. This is partly due to significant uncertainty about the CO_2 price development in the ETS1 and the elaboration of relevant European and national policy after 2030.

[84] EC (2024), 2040 climate target, February 2024, Brussels. https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2040-climate-target_en
[85] https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets2-buildings-road-transport-and-additional-sectors_en

Figure 3.37: Historical national ETS1-emissions and projections (WAM variant), 2005-2035 (source: KEV2024).



Regarding the emissions within the scope of the new ETS2 (active from 2027 onwards), the WEM variant shows an expected drop to 39.0 [34.9-42.4] Mt CO_2-eq by 2030. Under the WAM variant these are expected to drop to 41.1 [36.4-44.4] Mt CO_2-eq by 2030, which represents a decrease of 19.1% [12.5-28.3%] compared to the estimates for 2025 (the slightly higher WAM figures are largely the result of additional measures in the mobility sector). The possible additional reduction of ETS2-emissions by also including scheduled policies and measures (the WSM variant) is estimated to be quite limited, with ETS2-emissions dropping instead to 36.0-43.9 Mt CO_2-eq by 2030.

Between 2030-2035 the ETS2-emissions in both the WEM and WAM variant are anticipated to decrease further, reaching respectively 32.0 [28.0-36.3] and 34.2 [29.6-38.2] Mt CO_2-eq by 2035. Again, the WSM variant does not show a significant further drop compared to WAM, reaching 29.0-37.6 Mt CO_2-eq by 2035. However, for all variants the development of the ETS2-price and the elaboration of European and national policy after 2030 are important factors contributing to the uncertainty for the 2035 estimates.

Emissions covered by the European Effort Sharing Regulation

Under the European Effort Sharing Regulation (ESR), EU Member States have agreed on national targets for greenhouse gases that fall within the ESR-scope (2021-2030 period). The ESR covers most emissions from mobility, the built environment and agriculture, as well as emissions from smaller industry, including waste processing (see also chapter 3.1.2). This concerns emissions that fall outside the EU ETS1 for heavy industry and the energy sector, and are not related to land use. The ESR-emissions also include the ETS2-emissions, as well as emissions from certain activities that fall outside both ETS1 and ETS2, such as emissions of non-CO_2 greenhouse gases from industry and livestock and arable farming. While the ETS2 only concerns CO_2 emissions related to fossil fuel deliveries, the ESR covers all greenhouse gas emissions.

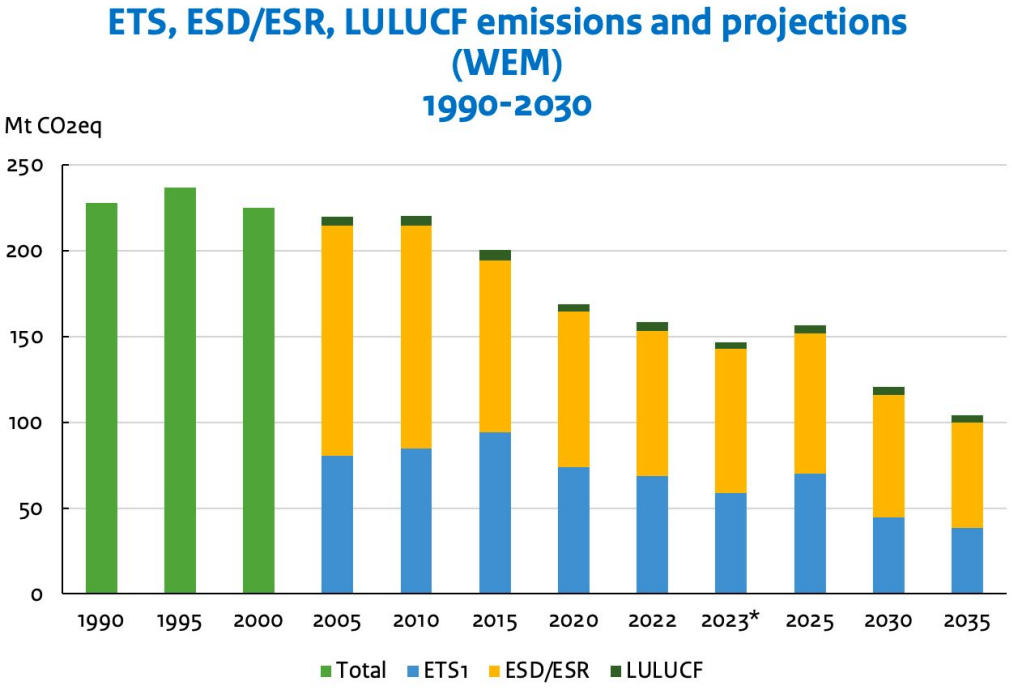
The ESR works with annual emission ceilings for the period 2021-2030, which must be added up to a cumulative emission ceiling for each Member State. This cumulative emission allowance for the Netherlands amounts to 830 Mt CO_2-eq, based on a 48% emissions reduction in 2030 compared to 2005.

National ESR-emissions amounted to 84.1 Mt CO_2-eq in 2023. The majority of these emissions came from mobility (36 %), followed by agriculture (30%) and the built environment (20%). In the 2021-2030 period, emissions covered by ESR are expected to decrease further across all sectors. In the projections with existing measures (WEM), emissions are expected to decrease to 71.3 [66.3-76.4] Mt CO_2-eq by 2030. Under the WAM variant this decrease is slightly more pronounced, with emissions expected to decrease to 68.3 [63.3-73.2] Mt CO_2-eq by 2030. For the WSM variant which also includes scheduled policies and measures, ESR-emissions drop to 63.6-73.6 Mt CO_2-eq by 2030. This minor increase compared to the WAM variant is due to the contrary effects of scheduled policy development in the built environment, mobility and agriculture. Based on the annual emissions between 2021 and 2023 and the estimated ESR-emissions between 2024 and 2030, the cumulative emissions under the WEM variant are expected to amount to 810 [791 – 830] Mt CO_2-eq for the 2021-2030 period; while under the WAM variant the cumulative emissions amount to 800 [781-819] Mt CO_2-eq

over the same period. Following the WAM variant, this would remain 30.1 [11.0-49.4] Mt CO_2-eq below the allocated emission allowance of 830 Mt CO_2-eq for the Netherlands.

The above mentioned cumulative ESR-emissions for 2021-2030 from the most recent Energy and Climate Outlook (KEV 2024), are considerably lower than in the KEV 2022. This is partly explained by the fact that the effects on emissions of the pandemic and the high energy prices as a result of the war in Ukraine could not yet be sufficiently determined in the KEV 2022, and resulted in lower-than-expected emissions in 2022 and 2023. Furthermore, additional policy development has since taken place for the built environment, mobility and small industry, which could be incorporated in the KEV 2024 estimates.

Figure 3.38: Historical emissions and projections (ETS/non-ETS split), 1990-2035, in Mt CO_2-eq. Note: ETS2 is not incorporated in this graph, due to overlap with the ESD/ESR scope. Figures for 2023 are preliminary.



Projections of sectoral emissions

The following sections elaborate on the projections of sectoral greenhouse gas emissions. In Table 3.13, the projected sectoral emissions of greenhouse gases are compared to the indicative targets for remaining emission levels set by the government (totals shown include LULUCF and indirect CO_2 emissions). Based on both the WEM and WAM variant, projected emissions in 2030 are above the targeted levels for most sectors, except for the electricity sector.

Please note that, the sectoral definitions used in this chapter are according to the Dutch national policy framework. These differ from the sectoral definitions according to the IPCC guidelines. This gives rise to important differences when it comes to the electricity sector and the industrial sector. Under the Dutch national policy, emissions from energy companies producing electricity and/or heat are included within the electricity sector. Emissions from heat and electricity produced by combined heat and power (CHP) systems owned by industrial (and horticultural) companies are allocated to the respective (end-use) sectors. Emissions from energy industries, such as from fossil fuel extraction and refining, are allocated to the industrial sector. Another difference is the inclusion of emissions from mobile machinery in the mobility sector. The projections reported in CTF tables 7 and 8 of this report, however, follow the sectoral definitions according to the IPCC guidelines and offer more detailed figures, including projections from the latest inventory year up to 2040 and a breakdown by sector and gas, in accordance with the relevant MPGs (para. 92-102).

Table 3.13: Projections of national sectoral greenhouse gas emissions (in Mt CO_2-eq) with existing (WEM), additional (WAM) and scheduled (WSM) policies and measures compared to the indicative targets set for remaining emission levels (KEV2024).

Sector**	1990	2023*	Projection 2030 (WEM)	Range	Projection 2030 (WAM)	Range	Projection 2030 (WSM), range	Indicative residual emissions	Projection 2035 (WEM)	Range	Projection 2035 (WAM)	Range	Projection 2035 (WSM), range
Reduction GHG emissions from 1990 (%)	0	35.6%	46.9%	42.5-50.0%	48.7%	44.4-51.8%	44.7-52.1%		54.4%	50.0-59.3%	55.8%	51.9-60.9%	52.3-61.6%
Total	**228**	**147**	**121**	**114-131**	**117**	**110-127**	**109-126**	**96**	**104**	**92.9-114**	**101**	**89.1-110**	**87.6-109**
Electricity	39.6	23.5	13.7	10.4-20.8	12.9	9.6-19.9	10.2-20.4	13.0	8.7	5.6-17.3	7.9	4.6-16.2	4.9-16.4
Industry	86.8	46.6	38.6	33.5-42.6	38.5	33.3-42.5	32.1-41.3	29.1	37.0	26.6-39.1	36.6	26.4-38.8	24.6-37.2
Built environment	29.7	17.3	15.7	12.7-18.4	15.6	12.6-18.2	11.6-17.3	13.2	13.6	11.1-16.4	13.4	10.9-16.2	9.9-15.2
Mobility	33.4	30.6	25.7	23.2-28.0	23.2	20.6-25.4	21.1-25.9	21.0	20.1	17.1-23.4	18.1	15.2-21.1	15.7-21.5
Agriculture	33.1	25.0	22.2	20.2-24.9	22.0	20.0-24.7	20.7-25.5	17.9	20.5	18.6-23.1	20.2	18.4-22.8	19.1-23.8
Land use	5.4	3.8	4.8	4.7-5.3	4.8	4.7-5.3	4.3-5.1	1.8	4.5	4.0-4.9	4.5	4.0-4.9	3.6-4.7
ETS1-sectors	-	58.9	44.5	39.2-52.6	43.8	38.4-51.8	37.8-51.2		38.5	28.4-45.9	37.5	27.2-44.6	25.8-43.4
ETS2-sectors	-	-	39.0	34.9-42.4	41.1	36.4-44.4	36.0-43.9		32.0	28.0-36.3	34.2	29.6-38.2	29.0-37.6
ESR-sectors	-	84.1	71.3	66.3-76.4	68.3	63.3-73.2	63.6-73.6						
Cumulative ESR 2021-2030		-	810	791-830	800	781-819	783-821						

Sources: emissions 1990 and 2023 are from Emissieregistratie (2024b); projections are from PBL (2024). Please note that rounding may cause minor differences between totals and underlying figures.

*Emissions for 2023 concern preliminary figures.

**Note that the sectoral definitions used in this table are according to the Dutch national policy framework, which differ from the sectoral definitions according to the IPCC guidelines. Please note that more detailed projections along the sectoral definitions of the IPCC guidelines, including projections up to 2040 and breakdown by gas, are provided in CTF table 7 & 8.

3.7.2.2 *Electricity*

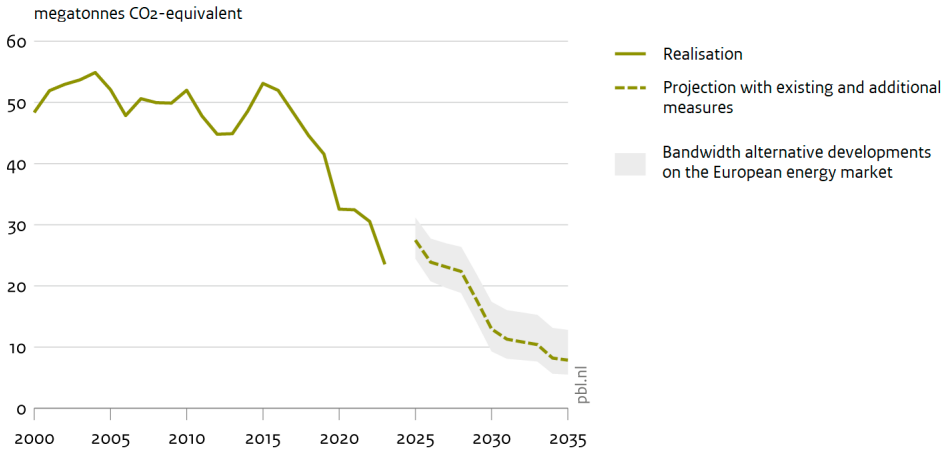
Emissions from the electricity sector encompass emissions from electricity and heat production and distribution by energy companies. By contrast, emissions from the combustion of fuels for use in buildings and horticulture are excluded and described in the sections below. In addition, emissions from energy industries (fossil fuel extraction and refining) are included in the industrial sector. CO_2 accounts for nearly all greenhouse gas emissions in the electricity sector. Less than 1% of emissions comes from methane and nitrous oxide, which is associated with processing and combusting fossil fuels. Emissions from the electricity sector are entirely covered by the European Emission Trading System. Important measures for these sectors are the Stimulation of Sustainable Energy Production and Climate Transition (SDE++) subsidy scheme, the roll-out of offshore wind farms, the ban on the use of coal for electricity production, and the closure of coal-fired power plants.

Projections of emissions from electricity production are relatively uncertain due to the high level of integration within the Northwest European electricity market. Price differentials between countries within this market result in changes in the export and import of electricity. Together with different assumptions about supply and demand, this has a major effect on projected electricity production and therefore on emissions in those countries. This concerns both structural developments (such as future investments in gas-fired power stations in Germany or the development of green hydrogen production in Europe), and incidental events (for example the impact of much lower precipitation in Norway in 2018 on hydroelectricity, which resulted in significantly reduced net imports from Norway to the Netherlands in 2019). Therefore, the projection is presented as a range of emissions accounting for uncertainties related to production and consumption patterns within the entire Northwest European market (illustrated in Figure 3.39 by the grey area). Other uncertainties within the Netherlands (e.g. uncertainties concerning fuel prices and economic development) are included in the 90% probability range.

Between 2000 and 2015, annual emissions ranged around 50 Mt CO_2-eq, depending on import and export patterns and relative price differences between coal and natural gas (see Figure 3.39). In 2020, emissions dropped to 32.7 Mt CO_2-eq due to the (temporary) closure of coal-fired power plants, increasing renewable energy production and due to measures in response to the COVID pandemic. By 2023 these emissions dropped further to 23.5 Mt CO_2-eq because of strong growth in renewable energy production, which contributed to a further decline in coal-fired production. Temporary maintenance on the blast furnaces at the main steel plant in the Netherlands (Tata Steel) also contributed to lower emissions in the electricity sector in 2023, as recovered blast furnace gas is otherwise used in the Velsen power plant to generate electricity.

Following a slight temporary jump between the emissions of 2023 and projections for 2025 – due to the expected bounce back in industrial activity, completion of maintenance on the aforementioned blast furnaces, and increased electricity demand – emissions are expected to decline further until 2030. In the WEM variant, emissions in the electricity sector are expected to drop sharply to 10.4 – 20.8 Mt CO_2-eq in 2030. Similarly in the projections with existing and additional measures (WAM), emissions in the electricity sector are expected to drop to 10-20 Mt CO_2-eq in 2030, representing a decrease of 67% [50-76%] compared to 1990 levels. This is largely due to the ban on the use of coal for electricity production from 2030 onwards, alongside the strong increase in the production of electricity from solar and wind energy which will further reduce electricity production from gas-fired power stations. In addition, the proposed emission reduction measures by Tata Steel (more production with hydrogen via direct-reduced steel production) have a significant impact – approximately 4 Mt CO_2-eq – on the estimated emissions in the electricity sector in 2030.

Figure 3.39: Historical emissions and projections (WAM variant) in the electricity sector, 2000 – 2035 (KEV 2024).

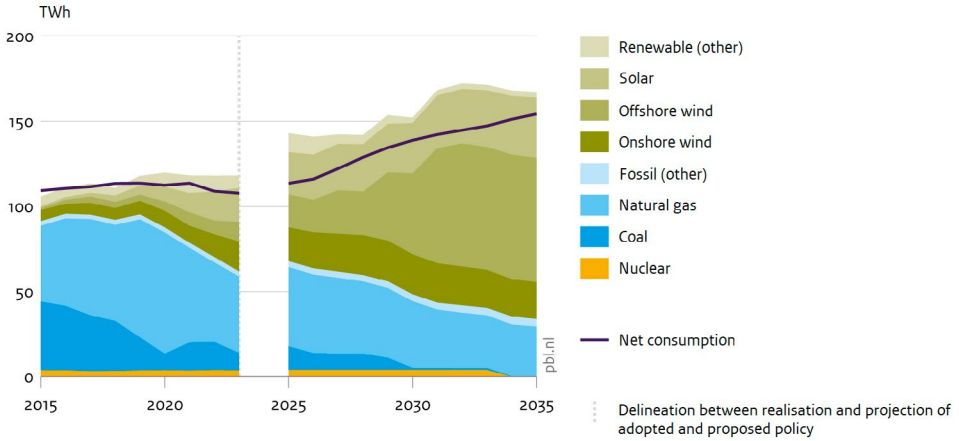


There are no scheduled policies and measures (the WSM variant) for the electricity sector that are expected to have an effect by 2030. However, scheduled policies and measures for other sectors do lead to a small increase in the overall electricity demand, which shifts the emissions range for the electricity sector slightly upwards by about 0.5 Mt CO_2-eq compared to the range in the WAM variant. Based on current projections, the likelihood that greenhouse gas emissions from the electricity sector in 2030 will be at or below the national indicative residual emissions (13.0 Mt CO_2-eq) is assessed to be around 35% under the WAM variant and around 30% under the WSM variant.

Between 2030-2035, emissions in the electricity sector are anticipated to decrease further, reaching 5.6-17.3 Mt CO_2-eq by 2035 under the WEM variant, and 4.6-16.2 Mt CO_2-eq by 2035 in the WAM variant. On balance, the WSM variant does not show any further changes in emissions by 2035 compared to the WAM figures. However, it should be reiterated that there are significant uncertainties for the 2035 estimates. Alongside the previously mentioned uncertainty following from the high level of integration in the European electricity market, this also concerns, for instance, insufficient clarity on European and national policy developments for potential negative emissions in ETS1; or the possible extended activity of the national nuclear power plant in Borssele beyond 2034.

Figure 3.40 shows the development of the demand for and production of electricity for different energy sources under the WAM variant. Due to the electrification of energy demand, it is expected to increase from a net consumption of 108 terawatt hours (TWh) in 2023 to a net consumption of 154 TWh in 2035. As illustrated in the figure, a steady increase in electricity production from renewable sources is visible from 2018 onwards, accompanied by a decrease in production from coal and natural gas. These trends are expected to continue towards 2035, with solar- and wind power covering 77% of total electricity production by 2035. By far the largest increase in production comes from offshore wind.

Figure 3.40: Electricity production by source and electricity consumption (WAM variant) (KEV 2024).



Based on the assumptions about ETS1-price development, the electricity sector is expected to still have emissions in 2040, but it is highly uncertain how large the remaining emissions would be. This will depend, among other things, on the development of flexibility in the electricity system (storage, interconnections), and the development of supply and demand in the rest of Europe. According to the current plans of for the EU ETS1, which includes the electricity sector, no new emission allowances will be issued from 2040 onwards. Emissions from the electricity sector that fall under ETS1 are then only possible if emission allowances are available from previous years or if negative emissions are achieved. However, it is still uncertain whether and how negative emissions will be made possible in ETS1 and what this means for the price of emission allowances in ETS1.

3.7.2.3 *Industry*

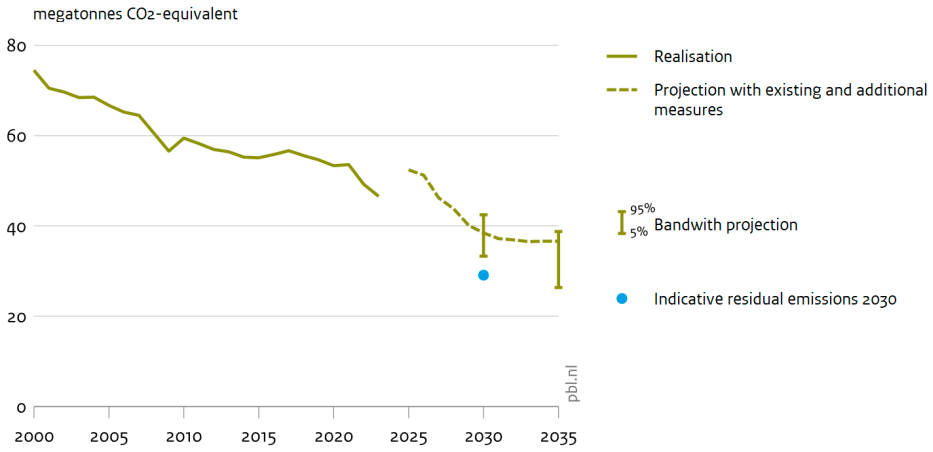
Emissions from the industrial sector comprise emissions from manufacturing and the food & beverages industry, construction companies, refineries, cokes industry, extraction and distribution of fossil fuels, waste management and (drinking) water companies. Key policy measures in this sector are the EU ETS, the national CO_2 surcharge, SDE++ subsidies and energy savings obligations. Between 2000 and 2023, total emissions from the industrial sector decreased from 74 to 46.5 Mt CO_2-eq, mainly due to sharply decreasing emissions of methane, nitrous oxide and fluorinated gases (see Figure 3.41). This was largely the result of, respectively, a gradual decline of methane emissions from landfills, mitigation measures in the production of nitric acid, and EU regulation incrementally reducing and banning usage of particular F-gases.

In the WEM variant, GHG emissions in the industry sector are expected to decrease further to 38.6 [33,5 - 42,6] Mt CO_2-eq in 2030. As few additional policies are taken into account, the projections including additional measures are similar to the WEM variant, with emissions in the industry sector decreasing to 38.5 [33.3-42.5] Mt CO_2-eq in 2030, representing a decrease of approximately 56% [51-62%] compared to 1990 levels (Figure 3.41). In the projections with scheduled policies and measures (the WSM variant), GHG emissions in the industry sector are expected to decrease to 32-41 Mt CO_2-eq by 2030. The expected decrease after 2023 is largely due to emission reduction projects influenced by emission pricing (ETS1 and national CO_2 surcharge) and the SDE++ subsidy. To a significant degree, emissions of CO_2 are projected to decrease in the chemical industry, refineries and waste incineration plants by using Carbon Capture and Storage (CCS), amounting to around 5-10 Mt CO_2 captured and stored by 2030. Other contributions to this decrease come from electrification – although this is expected to still be affected by grid congestion in 2030 – and energy efficiency improvements. Based on current projections, the likelihood that greenhouse gas emissions from the industry sector in 2030 will be at or below the national indicative residual emissions (29.1 Mt CO_2-eq) is assessed to be less than 5% under both the WAM and WSM variant.

Between 2030-2035, emissions in the industry sector are anticipated to decrease slightly in both the WEM and WAM variant, respectively reaching 37.0 [26.6-39.1] and 36.6 [26.4-38.8] Mt CO_2-eq by 2035. When including scheduled policies and measures (the WSM variant), this decreases to 25-37 Mt CO_2-eq in 2035, with part of the additional decrease related to additional subsidy schemes for emission reduction measures from the Climate Fund. After 2030, the emission reduction is mainly driven by the increasing ETS1 price and the SDE++. These lead to a slight further reduction in emissions, because more investment projects become profitable.

Like the electricity sector, the projections for the industrial sector are considered highly uncertain due to developments in the energy markets. Energy intensive industries have responded to increasing energy prices by lowering their production levels. The projections assume a return to previous production levels, but within the range continue to take into account a potentially permanently lower production level. As such, some of the main underlying uncertainties are variations in production volumes and the energy and emission intensity of production processes, as well as whether several major emission reduction projects will be realized before 2030; while for 2035, the uncertainty concerning production levels results in a much lower end of the range (see figure 3.41).

Figure 3.41: Historical emissions and projections (WAM variant) for the industrial sector (KEV2024).



3.7.2.4 *Built environment*

The emissions from the built environment encompass the emissions from dwellings and non-residential buildings in the services sector (such as offices, schools and hospitals), but exclude emissions from buildings in the industrial and agricultural sectors (which are allocated to those sectors). CO_2 emissions arise from the use of natural gas for spatial heating, cooking and tap water. Yearly fluctuations largely follow changes in the mean temperatures during winter. Projections are modelled using historical emissions which are normalised for an average winter. The projected demand for heating and cooling also takes into account increasing mean temperatures, in line with (national) climate scenarios. Non-CO_2 emissions occur but are small compared to CO_2 emissions. They include methane slip from gas boilers and nitrous oxide from product use (i.e. dissolvents and spray cans).

The emissions in the built environment hovered around 30 Mt CO_2-eq between 2000-2010, but subsequently decreased – more rapidly so in recent years due to changing heating behaviour of households because of high energy prices – to 17.3 Mt CO_2-eq in 2023. This drop occurred despite a significant increase in the number of households and floor area of non-residential buildings, and was the result of increased insulating measures and the growing use of highly efficient boilers.

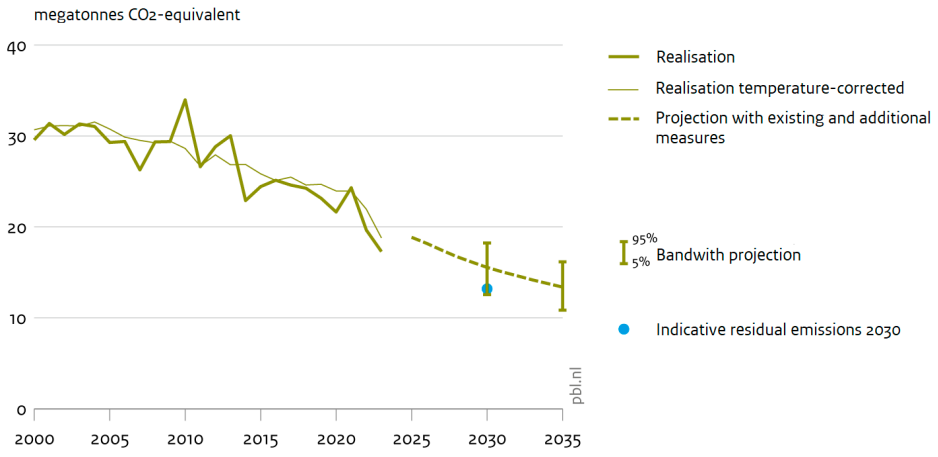
In the projections with existing measures (WEM), emissions in the built environment are expected to decrease further to 15.7 [12.7-18.4] Mt CO_2-eq in 2030. The projections with existing and additional measures (WAM) barely differ, with emissions in the built environment expected to reach 15.6 [12.6-18.2] Mt CO_2-eq in 2030, representing a decrease of approximately 48% [39-58%] compared to 1990 levels (Figure 3.42).

The further decrease between 2023 and 2030 is mainly due to an increase in the number of heat pumps and insulation measures. Higher temperatures due to climate change also play a role; the expected effect of climate change is that the heat demand in 2030 will be approximately 3% lower than in 2020. In the projections with scheduled policies and measures (the WSM variant), emissions in the built environment are expected to decrease, on balance, to 12-17 Mt CO_2-eq by 2030. While certain developments in the WSM variant may slightly increase emissions, such as the cancellation of the policy scheduled by the previous government to instate mandatory (end-of-life) replacement of gas boilers with hybrid heat pumps, these impacts are offset by other national and European developments in the built environment, resulting in expected emissions in the WSM variant that are 1 Mt CO_2-eq lower in 2030 than under the WAM variant.

Key uncertainties are how heating behaviour will develop (strongly linked to energy prices), whether winters will be warm or cold and how quickly the number of heat pumps will increase. The uncertainty analysis also takes into account that a shortage of heat pump installers and grid congestion can hinder the transition to heat pumps. Based on current projections, the likelihood that greenhouse gas emissions from the built environment in 2030 will be at or below the national indicative residual emissions (13.2 Mt CO_2-eq) is assessed to be around 10% under the WAM variant and around 20% under the WSM variant.

Between 2030-2035, emissions in the built environment are expected to decrease further in both the WEM and WAM variant, albeit at a slightly reduced pace, reaching, respectively, 13.6 [11.1-16.4] and 13.4 [10.9-16.2] Mt CO_2-eq by 2035 (see figure 3.42). The downward trend is mainly driven by the increase in the number of heat pumps, improvements in the existing housing and building stock and warmer winters because of climate change. The rate at which gas consumption decreases is expected to slow somewhat after 2030. When including scheduled policies and measures (the WSM variant), emissions in the built environment decrease to 10-15 Mt CO_2-eq in 2035. It should be reiterated that projections beyond 2030 are very uncertain, partly due to significant uncertainties about the development of European and national policy after 2030. The policy instruments for the period after 2030, such as subsidy schemes, have largely not yet been sufficiently developed.

Figure 3.42: Historical emissions and projections (WAM variant) for the built environment (KEV2024).



3.7.2.5 *Mobility*

The mobility sector encompasses emissions from mobility and transport in the Netherlands. This includes emissions from mobile machinery from other economic sectors. Road traffic and transport is responsible for around 85% of these emissions. With a share of 98%, CO_2 emissions make up the lion's share of total emissions. Emissions related to international aviation and maritime shipping are excluded here as they are not included in the national total, and instead discussed separately in section 3.7.2.8.

The emissions in the mobility sector hovered around 40 Mt CO_2-eq between 2000-2010, but subsequently decreased as a result of weaker growth in road traffic, a more economical vehicle fleet under the influence of the European standards for CO_2, mandatory blending of petroleum and diesel with biofuels and tax

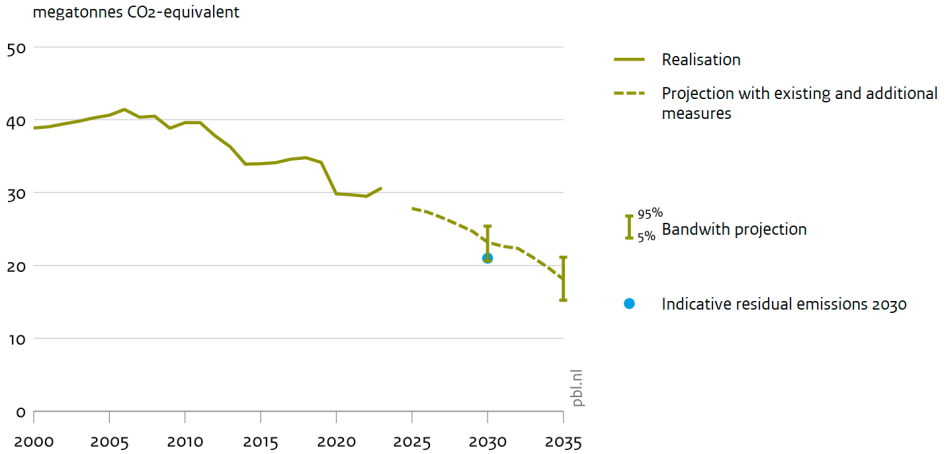
incentives to boost uptake of fuel-efficient vehicles. Emissions in 2020 fell below 1990 levels due to the impact of the COVID pandemic, although traffic volumes did rebound subsequently. In addition, the maximum speed limit on motorways during day times was lowered from March 2020 from 130 km/h to 100 km/h to reduce nitrogen oxide emissions, which also contributed to a more economic fuel consumption (although in coming years this measure may be partially reversed in certain areas, based on new scheduled policies and measures). In 2023, emissions in the mobility sector stood at 30.6 Mt CO_2-eq.

Greenhouse gas emissions in the mobility sector are expected to decrease further between 2023 and 2030, reaching 25.7 [23.2-28.0] Mt CO_2-eq by 2030 in the WEM variant. Under the WAM variant this is expected to reach 23.2 [20.6-25.4] Mt CO_2-eq by 2030, which would represent a drop in emissions of 31% [24-38%] compared to 1990 levels (see figure 3.43). This decrease is mainly due to an increasing share of zero-emission vehicles and an increasing use of renewable fuels. Passenger vehicle emissions are expected to decrease by an estimated 2.7 Mt CO_2-eq (almost 19%) between 2023 and 2030, while the total number of passenger vehicle kilometres are expected to increase during this period. In the projections with scheduled policies and measures (the WSM variant), emissions in the mobility sector are expected to reach 21.1-25.9 Mt CO_2-eq by 2030. This slight increase compared to the WAM variant is mainly due to the government's intention to increase the maximum speed on motorways to 130 km/hour; depending on the number of areas where this measure is implemented, this is likely to increase fuel consumption. For the mobility sector, the uncertainty range of the projections are mainly determined by uncertainty about energy prices, fuelling behaviour, the use of biofuels, economic development and the market penetration of electric vehicles. Based on current projections, the likelihood that greenhouse gas emissions from the mobility sector in 2030 will be at or below the national indicative residual emissions (21.0 Mt CO_2-eq), is assessed to be around 10% in the WAM variant and less than 5% in the WSM variant.

Between 2030-2035, emissions in the mobility sector are expected to decrease further in both the WEM and WAM variant, reaching respectively 20.1 [17.1-23.4] and 18.1 (15.2-21.1] Mt CO_2-eq by 2035 (see figure 3.43). The main reason for the further decline after 2030 is the substantial increase in the number of zero-emission vehicles. Until 2030, the market share of zero-emission vehicles in new sales is expected to increase relatively quickly, but the share in the total vehicle fleet will remain modest. After 2030, this share will increase rapidly because of the European CO_2 standards for new road vehicles. When including scheduled policies and measures (the WSM variant), emissions in the mobility sector instead decrease to 15.7-21.5 Mt CO_2-eq in 2035 (again affected by the aforementioned intention to increase the maximum speed on certain motorways).

Driven by European policy, the increase in the number of zero-emission vehicles in road traffic is expected to lead to a further decrease in CO_2 emissions towards 2040. About a quarter of vehicle kilometres in 2030 are expected to be emission-free, while this is expected to increase to around half of vehicle kilometres in 2035 and roughly three quarters by 2040 (although the CO_2 reduction from electrification of the vehicle fleet is partially dampened by the increase in traffic volume). It should be noted that the projections beyond 2030 are very uncertain for the mobility sector, due to significant uncertainties about the development of European and national policy after 2030.

Figure 3.43: Historical data and projections (WAM variant) of greenhouse gas emissions from mobility (KEV2024).



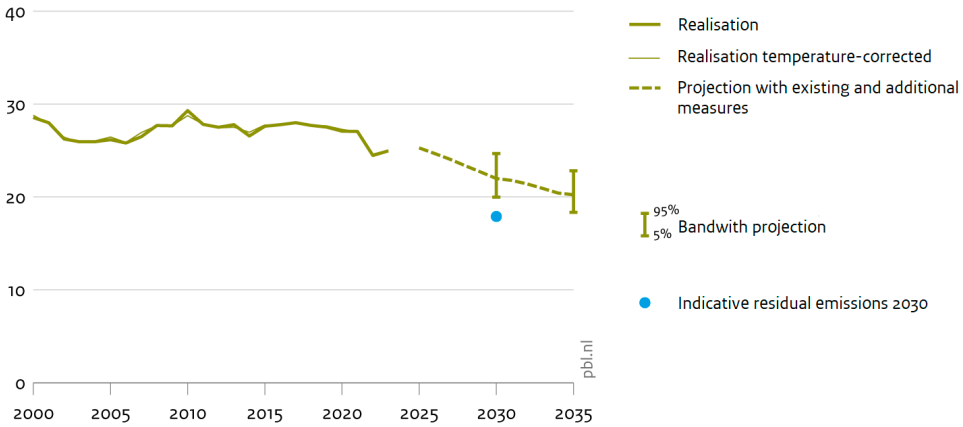
3.7.2.6 *Agriculture*

Emissions from agriculture encompasses energy-related CO_2 and methane emissions from (mainly) the horticulture and process emissions of methane and nitrous oxide from cattle, manure management and the use of fertilisers. Methane made up around 56% of total agriculture sectoral emissions in 2023, and largely takes the form of process emissions. CO_2 made up around 24% and nitrous oxide 20%. Total emissions in 2023 amounted to 25.0 Mt CO_2-eq, of which 6.8 Mt CO_2-eq was energy-related (mainly greenhouse horticulture) and 18.2 Mt CO_2-eq was process-related.

Greenhouse gas emissions in the agriculture sector are expected to decrease between 2023 and 2030, reaching 22.2 [20.2 – 24.9] Mt CO_2-eq by 2030 in the WEM variant and 22,0 [20,0-24,7] Mt CO_2-eq in the WAM variant (see figure 3.44). This would represent a drop in emissions of around 34% [25-40%] compared to 1990 levels. The projected decrease in greenhouse gas emissions between 2023 and 2030 is mainly the result of decreasing emissions from livestock farming and arable farming and, to a lesser extent, from lower energy consumption in greenhouse horticulture. The reduction in emissions from livestock farming is largely driven by expected reductions in livestock herds, partly resulting from the expiration of the derogation that the Netherlands had previously been granted from the (higher) European limits for the amount of nitrogen from manure that can be applied annually. In the projections with scheduled policies and measures (the WSM variant), emissions in the agriculture sector are expected to reach 20.7-25.5 Mt CO_2-eq by 2030. This slight increase compared to the WAM variant is mainly due to scheduled measures that would see a more limited reduction in the (dairy) livestock herd, amongst others following from the government intention to reverse the phasing out of the current derogation from the Nitrate Directive (subject to approval from the European Commission). Based on current projections, the chance that greenhouse gas emissions from the agriculture sector in 2030 will be at or below the national indicative residual emissions (17.9 Mt CO_2-eq) is assessed to be less than 5% for both the WAM and WSM variant.

The downward trend in agricultural emissions is expected to continue towards 2035 in both the WEM and WAM variant, reaching respectively 20.5 [18.6-23.1]] and 20.2 [18.4-22.8] Mt CO_2-eq by 2035 (see figure 3.44). The decline is mainly driven by a decrease in the use of fossil energy, especially in greenhouse horticulture. This trend driven by declining fossil energy use is expected to continue towards 2040. When including scheduled policies and measures (the WSM variant), emissions in the agriculture sector instead decrease to 19.1-23.8 Mt CO_2-eq in 2035. It should be noted that the projections beyond 2030 are very uncertain for the agriculture sector, due to significant uncertainties about the development of European and national policy after 2030.

Figure 3.44: Historical and projected emissions (WAM variant) from agriculture (KEV2024).



3.7.2.7 LULUCF

Emissions and removals from land use, land use change and forestry do not include emissions from the use of manure and fertilisers in the agricultural sector. Emissions and removals from agricultural soils are included in the LULUCF sector. CO_2 emissions are dominant. Although removals of CO_2 occur in forests and wetlands, the LULUCF sector in the Netherlands is a net emitter of CO_2.

Net emissions from LULUCF declined from 5.4 Mt CO_2-eq in 2000 to 5.1 Mt CO_2-eq in 2022. The main emission sources are grasslands (on peatland), croplands and soils in the built environment. Since 2000, emissions declined primarily due to changed use of grassland and forest management. Forests are the main net sink of CO_2, which has, however, been declining gradually since 2000. Forests are becoming relatively older (meaning less CO_2 is removed per hectare) and net deforestation has increased. Emissions from grassland are declining because of its conversion to cropland as well as the construction of new infrastructure and buildings, which both result in a net release of CO_2 from the soil.

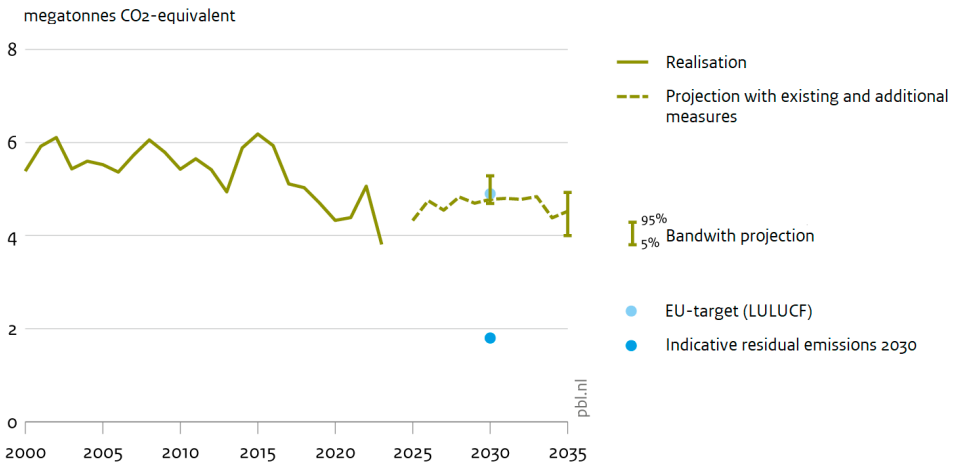
Projected net emissions from LULUCF will decrease to nearly 4.8 [4.7-5.3] Mt CO_2-eq in 2030 in both the WEM and WAM variants, which is about 11% below 1990 levels (see figure 3.45). This is the result of various developments. It is expected that emissions from grassland will decrease as the area shrinks due to conversion to build land and the implementation of policies aiming to reduce CO_2 emissions from peat soils. Emissions from built land will slowly decrease as new buildings are increasingly built within the existing built environment. Forests, however, are expected to take up slightly more CO_2 as the result of the growth of existing forests. Policies on reforestation and nature development are foreseen to have minimal impact. In the WSM variant, projected net emissions could be somewhat lower, between 4.3-5.1 Mt CO_2-eq in 2030, which can be explained by a lower increase of built land and increased carbon storage in mineral soils. Based on current projections, the chance that greenhouse gas emissions and removals from LULUCF in 2030 will be at or below the national indicative residual emissions (1.8 Mt CO_2-eq) is assessed to be less than 5% for both the WAM and WSM variant.

Between 2030 and 2035, projected net emissions decline somewhat further, mainly due to the growth of existing forests, to 4.5 [4.0-4.9] Mt CO_2-eq in 2035 in both the WEM and WAM variants. Between 2035 and 2040, net emissions are projected to increase again, mainly due to increasing emissions from built land and declining carbon storage in mineral soils.

The revision of the European Land Use, Land Use Change and Forestry (LULUCF) Regulation came into effect on May 11, 2023. The collective goal for the EU in 2030 has been raised from 225 megatons of net carbon storage to at least 310 megatons of net carbon storage, to be achieved by capturing more carbon through land use than is emitted by land use. This revision also adjusts the net carbon storage targets for 2030 at the Member State level. The revised regulation sets new objectives for the period 2026-2030, with a four-year budget for the years 2026-2029 and a binding target for the year 2030. The four-year budget will be established in 2025. The binding national target for 2030 is a reduction of 0.435 Mt CO_2-eq compared to the

average of the years 2016-2018. This translates in an emission target of 4.9 Mt CO_2-eq in 2030. This target falls within the range of projected net emissions for 2030.

Figure 3.45: Historical and projected emissions (WAM variant) from LULUCF (KEV2024).



3.7.2.8 *International shipping and aviation*

In accordance with international climate agreements, emissions from international navigation and aviation are not allocated to the national totals of the Netherlands. This also applies to emissions from inland shipping with a destination or departure outside of the Netherlands. Energy consumption for international aviation is, however, included in the energy savings targets of the EU EED. Similarly, energy consumption attributable to international shipping counts towards the target for the total gross end consumption of renewable energy under the Renewable Energy Directive (RED). Substantial amounts of bunker fuel are sold in the Netherlands for international shipping and aviation in Europe. In 2023, around three-quarters of the bunker fuel sold was used for international maritime shipping, 17% for international aviation and 6% for international inland shipping. CO_2 accounts for 99% of the total greenhouse gas emissions from this sector. Nitrous oxide and methane emissions make up a relatively small part of total missions.

Emissions from sold bunkers fuels to international maritime shipping and aviation amounted to 43.7 Mt CO_2-eq in 2023, which is 4% lower than in 2022. This decrease is mainly due to shipping, as fewer goods were transhipped in Dutch seaports due to declining world trade, and sales of bunker fuels fell by almost 8% (sales of biofuels to maritime shipping also decreased). On the other hand, bunker fuel sales to international aviation increased by 7% in 2023 as the sector continued its recovery after the pandemic.

Emissions from bunker fuel sales to international navigation and aviation are expected to decrease slightly between 2023 and 2030, reaching a combined total of 41.5 [36.7-46.8] Mt CO_2-eq by 2030 in the WAM variant. Emissions from bunker fuels sold to international shipping in the Netherlands are expected to decrease from 31.1 Mt CO_2-eq in 2023 to 28.0 [23.7-33.0] Mt CO_2-eq in 2030. This decrease is the result of a trend decline in sales of bunker fuels to the maritime sector, which is expected to continue into 2030, in combination with new policy measures to make shipping more sustainable that came into effect last year. Emissions from international aviation are expected to increase from 10.1 Mt CO_2-eq in 2023 to 11.4 [10.3-12.9] Mt CO_2-eq in 2030. This growth is mainly the result of the continuing recovery from the pandemic years, although the increase in emissions is dampened somewhat by taking into account European policies on emission trading and the mandatory use of sustainable aviation fuels. The blending percentage of renewable fuels in aviation will increase from approximately 2% in 2023 to 6% in 2030, as a result of the European blending obligation under the ReFuelEU Aviation Regulation. The Netherlands encourages the production of renewable aviation fuels through the Climate and Transition Fund.

After 2030, bunkering of renewable fuels by international aviation and shipping is anticipated to increase further as a result of European renewable fuel obligations. This is expected to lead to a further decrease in greenhouse gas emissions in international aviation and shipping towards 2040. This is the result of the

ratcheting up of European obligations for the use of renewable energy in aviation (ReFuelEU Aviation) and for greenhouse gas emission reductions in maritime fuels (FuelEU Maritime). The carbon intensity of shipping fuels must be reduced by 31% across the entire fuel chain by 2040 compared to the 2020 level. For aviation fuels, the blending obligation will increase to 34% in 2040 through ReFuelEU Aviation.

3.7.3 Assessment of the aggregate effects of policies and measures and uncertainty analysis

3.7.3.1 *Effects on emissions of greenhouse gases*

This section gives an overview of the projected effects of policies and measures (see table 3.14). As detailed in the previous section, based on existing policies (the "With Existing Measures" or WEM variant), greenhouse gas emissions are expected to fall to 114-131 Mt CO_2-eq by 2030. This is an emission reduction of 42.5-50.0% from 1990 levels. The WAM variant, which also includes additionally planned policies, results in only slightly lower emissions with a decrease to 110-127 Mt CO_2-eq by 2030, a reduction of 44.4-51.8% compared to 1990 (see Figure 3.36). The possible reduction of emissions from scheduled policies and measures (from the WSM variant) is estimated, on balance, to be relatively small with an additional reduction of 1 Mt CO_2-eq in 2030. Scheduled policies and measures in certain sectors result in higher emissions than the WAM variant (such as for the mobility sector with the proposed raising of the maximum speed to 130 km/h on highways), while in other sectors they lead to greater reduction (such as the impact on the built environment from the increased budget for the Investment Subsidy for Sustainable Energy and Energy Savings (ISDE)). Overall, this would result in emissions by 2030 that would be 44.7-52.1% below 1990 levels. In all variants, the national target to reduce greenhouse gas emissions with 55% by 2030 compared to 1990 levels is not achieved.

Based on the WEM variant, the emissions of greenhouse gases will further decrease after 2030 from 114-131 Mt to 92.9-114 Mt CO_2-eq by 2035 (including LULUCF). A similar decrease is seen under the WAM variant, which are projected to drop from 110-127 Mt in 2030 to 89.1-110 Mt CO_2-eq by 2035 (including LULUCF). This is 51.9-60.9% lower than 1990 levels. Based on scheduled policies and measures (WSM), this results in an expected decrease in greenhouse gas emissions to 87.6-109 Mt CO_2-eq by 2035. This is an emission reduction of 52.3-61.6% from 1990 levels.

Table 3.14: Greenhouse gas emissions 1990-2040, central range of projections including existing (WEM) and including planned (WAM) policies and measures, split by sector and gas (KEV2024)*.

(Mt CO_2-eq)			Projections (WEM)				Projections (WAM)			
	1990	2022	2025	2030	2035	2040	2025	2030	2035	2040
Sector (CRT)										
Energy	126.3	92.8	96.6	74.7	65.5	56.2	96.1	73.1	63.9	54.8
Transport	27.8	25.4	23.8	22.2	16.7	10.2	24.2	20.2	15.1	9.2
Industrial processes and product use	26.1	13.8	11.8	10.7	11.0	11.9	11.7	10.5	10.8	11.8
Agriculture	25.2	18.0	17.9	16.0	15.8	15.5	17.8	15.8	15.6	15.3
Forestry/LULUCF	5.4	5.1	4.3	4.8	4.5	4.9	4.3	4.8	4.5	4.9
Waste management/ waste	16.3	2.9	2.6	2.2	1.9	1.7	2.6	2.2	1.9	1.7
CCS	*NO*	*NO*	*-0.9*	*-10.3*	-11.5	-11.6	-0.9	-10.1	-11.4	-11.7
Indirect CO2 emissions	*0.9*	*0.5*	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*
Gas										
CO_2 emissions including net CO_2 from LULUCF	167.5	131.6	130.3	97.4	82.6	68.4	130.2	93.9	79.2	65.7
CO_2 emissions excluding net CO_2 from LULUCF	162.8	127.2	126.6	93.3	78.7	64.2	126.5	89.8	75.4	61.5
CH4 emissions including CH4 from LULUCF	36.3	18.5	18.2	16.0	15.2	14.4	18.1	15.8	15.0	14.2
CH4 emissions excluding CH4 from LULUCF	35.7	17.9	17.6	15.5	14.6	13.9	17.5	15.2	14.4	13.7
N2O emissions including N2O from LULUCF	16.1	6.6	6.5	5.9	5.7	5.5	6.5	5.9	5.6	5.5
N2O emissions excluding N2O from LULUCF	16.0	6.5	6.4	5.8	5.6	5.4	6.4	5.8	5.5	5.4
HFCs	4.7	1.0	0.8	0.7	0.4	0.4	0.8	0.7	0.4	0.4
PFCs	2.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
SF6	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0
Total with LULUCF	**227.2**	**158.0**	**156.9**	**130.5**	**115.4**	**100.4**	**156.6**	**126.6**	**111.8**	**97.6**
Total without LULUCF	**221.8**	**152.9**	**152.6**	**125.7**	**110.9**	**95.5**	**152.3**	**121.8**	**107.2**	**92.7**
Total with LULUCF, incl. indirect CO_2 + CCS	**228.1**	**158.4**	**156.4**	**120.6**	**104.3**	**89.2**	**156.2**	**116.9**	**100.7**	**86.4**
Total without LULUCF, incl. indirect CO_2 + CCS	**222.7**	**153.4**	**152.1**	**115.9**	**99.8**	**84.4**	**151.8**	**112.1**	**96.2**	**81.5**

*Note: Totals are net emissions, taking into account projected carbon capture and storage (CCS). However, the exact sectoral attribution of CCS (i.e. across the Energy and IPPU sector) could not yet be made in this iteration; projected CCS is therefore indicated in a separate row and national totals are provided both with and without CCS.

Looking towards 2040, greenhouse gas emissions are expected to decline further in almost all sectors after 2030. However, as described in the Climate and Energy Outlook, there are currently limited policies which detail further major emission reductions by 2040.

The expected impact of policies and measures on emissions in 2030 is also described in section 3.5.2.

3.7.3.2 *Uncertainty analysis*

The projections make use of the best information available up to May 2024. However, many developments are largely exogenous to the modelling – such as the economy, demography, import fuel prices, technology and human behaviour – for which assumptions are used about their future development. As future developments are inherently uncertain, these factors have a significant influence on the modelled trends. The effects of policy measures can also be uncertain, because the behaviour of targeted groups is usually difficult to predict. Therefore, an uncertainty analysis is included in the KEV2024 that considers key uncertainties concerning economic development, as well as energy and CO_2 prices and the impact of policies. The 'central' resulting values reflect the development which can be expected on average. Projection results for key indicators (such as the national emission of greenhouse gases) are also presented with an upper and lower value of a 90% probability range. This range is denoted between the brackets [and]. Uncertainties regarding weather influences are not included. The KEV2024 does not include a sensitivity analysis on the impact of specific key uncertainties. It must be noted that insights in (expected) developments on energy markets were taken into account up to May 2024. More recent developments are not included in the modelling. For (import) fuel prices, however, relatively high price sparks on the short term have been included in the 90% probability range.

In addition, projections of electricity production in the Netherlands are relatively uncertain due to the integration within the Northwest European electricity market. Price differentials between countries usually result in swift changes in export and import of electricity, thus influencing emissions within those countries. Therefore, the projection results for the electricity sector are presented as a range of emissions instead of a single 'central'. As no single 'central' value is assigned to the electricity sector, the 'central' projection results of national totals are also assigned as a range. This range takes into account uncertainties related to production and consumption patterns within the entire NW European market. Other uncertainties (such as fuel import prices and economic development in the Netherlands) are included in the 90% probability range.

The KEV2024 also includes projection results for 2035 and 2040. Where the projection up to 2030 can be considered as an ex-ante impact assessment of climate and energy policies, the projection results after 2030 must be considered as an outlook. The results are even more uncertain compared to the projections up to 2030 as exogenous factors and market behaviour are difficult to predict for such long periods. Equally important are the uncertainties related to European and national policies after 2030. With some exceptions (such as the continuation after 2030 of the EU ETS, EU performance standards on energy and CO_2 and the SDE++), there are yet policies to be defined for the period after 2030. Policies therefore play a limited role in the outlook. Emissions developments after 2030 are mostly driven by assumed developments of exogenous factors, such as energy and CO_2 prices and autonomous factors such as technological development. Therefore, only ranges for emission developments after 2035 are given in the KEV2024.

The varying degrees of uncertainty surrounding the exogenous and other factors are shown by means of uncertainty ranges with a 90% probability range, which means that an outcome outside the given ranges is very improbable but still conceivable. This range is calculated using a Monte Carlo analysis taking into account the key uncertainties for the various sectors, reflected as upper and lower values. The uncertainty calculations produce ranges in the total emissions of 15% for 2030 (see Table 3.15).

Table 3.15: Projected national emissions with uncertainty ranges, 2020-2030, in Mt CO_2-eq, including LULUCF.

	2030	
	WEM	WAM
Central range	121	117
Uncertainty range	114-131	110-127
Deviation from central range	-6% / +8%	-6% / +9%

3.7.4 Description of methodology

3.7.4.1 *Models and methods used*

The KEV2024 used a combination of models to construct an energy balance sheet of energy consumption and production in the Netherlands that reflects on the past and projects the future. The quantitative developments in the underlying activities form the basis of the projections and include the production of electricity and goods, the use of devices, the heating of buildings, the number of kilometres travelled, cattle size, etc. Statistics Netherlands (CBS) collects information from questionnaires completed by businesses as well as information registered by network companies and government institutions to construct a historical overview. These statistics are used to calibrate the models. For the projections, the expected changes to these activities are calculated based on assumptions about developments in the economy, demographics, the energy market and climate. The projections also include confirmed and announced projects as well as the intended policy measures of government institutions and other social actors. Based on this information expected levels of activity are formulated, which includes, for instance, the expected production in all industrial sectors, the expected housing and building stock, the expected number of kilometres driven, the number of livestock and the area of greenhouse horticulture or other land use types. The expected levels of activity are converted into the relevant energy usage and the necessary energy production. Expected developments in technology are an important aspect of these calculations, especially those relating to improved energy efficiency and CO_2 mitigating measures (such as renewable energy and CCS technologies). Finally, the energy consumption and production are converted into CO_2 emissions.

The projections of non-energy-related emissions are determined using specific models (like for agriculture and LULUCF) and/or spreadsheet tools (like for IPPU and waste). A brief description of the models used to create the overview is included in Annex 4.

3.7.4.2 *Key variables and assumptions*

The key variables used in the projections are listed in the annex of the National Climate and Energy Outlook 2024, with detailed tables also being made available directly in the accompanying tabular format to the KEV 2024.[86] These key variables have been incorporated in CTF table 11 'Key underlying assumptions and parameters used for projections'.

3.8 Other information

According to paragraph 103 of the annex to decision 18/CMA.1, 'each Party may provide any other information relevant to tracking progress made in implementing and achieving its NDC under Article 4 of the Paris Agreement'. All relevant information can be found in sections 3.1 to 3.7, above. Hence, no additional information is provided here.

[86] The detailed tables with key variables (in Dutch) are available from: https://www.pbl.nl/downloads/pbl-2024-tabellenbijlage-klimaat-en-energieverkenning-2024-5492ods

4 Climate change impacts and adaptation

4.1 National circumstances, institutional arrangements and legal frameworks

This first section of the adaptation chapter of the BTR will explain the institutional arrangements and governance of adaptation in the Netherlands, in which the different roles and responsibilities within the government related to adaptation will be explained. An outline of the national circumstances of the Netherlands which covers the geographic, demographic and economic profile of the country, including in relation to adaptation, can be found in the previous chapter 4.1 National circumstances and institutional arrangements. More specific information on the climate in the Netherlands in relation to climate adaptation can also be found in section 4.2. Lastly, this section will outline the relevant legal and policy frameworks concerning the Dutch adaptation policy. It will differentiate between the international, European, and National level in this regard.

4.1.1 Institutional arrangements and governance

The Netherlands has established comprehensive institutional arrangements to address climate adaptation, involving multiple government levels, specialized agencies, and collaborative frameworks. At the national level, the Ministry of Infrastructure and Water Management (IenW) is the coordinating ministry charged with national climate change adaptation. It formulates and oversees the implementation of the National Climate Adaptation Strategy (NAS, 2016) and actively coordinates with other ministries on domestic and international adaptation efforts. Additionally, within the Dutch institutional set-up, there is an important role for the Delta Programme. This programme, which is overseen by an independent Delta Programme Commissioner, aims to protect against flooding, ensure freshwater supply, and enhance climate resilience by 2050 through cross-sector collaboration. Further information on the Delta Programme can be found in section 4.1.3.

Regional and local governments play crucial roles in implementing tailored adaptation strategies. Provinces develop regional plans aligning with national policies, while municipalities integrate adaptation into local planning and infrastructure projects. Moreover, the Netherlands has independent political entities charged with managing water levels, quality, and flood protection. These 'Water Boards' leverage their expertise for effective adaptation measures, tailored to the specific regional circumstances for the area contained within its jurisdiction. Public-private partnerships enhance adaptation projects by leveraging private sector expertise and resources. Community involvement is also critical, with the government and local authorities engaging citizens through consultations and participatory planning.

Internationally, the Netherlands shares its expertise and learns from global experiences through its bilateral and EU programmes, and participating in relevant international fora including the UNFCCC and UN Water. This multi-layered governance structure, strong collaboration, and robust community engagement is crucial to continuously improve the Netherlands remains resilience to climate change.

4.1.2 Legal and policy frameworks and regulations

4.1.2.1 *International Level*

The Netherlands adheres to a range of international laws and policies to bolster its climate change adaptation efforts, aligning national strategies with global commitments to enhance resilience and mitigate climate impacts. Central to this are the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Paris Agreement, which provide the international legal architecture for climate action and international cooperation in this regard. For adaptation, particularly the Paris Agreement hold relevance to the Netherlands, as it sets a specific goal for climate change adaptation. This 'Global Goal on Adaptation' contained in Article 7.1. of the Paris Agreement marks the fundamental aspiration of the international community to work towards a climate resilient world.

Importantly, the 5th meeting of the Conference of the Parties of the Paris Agreement (CMA 5) has delivered a framework to guide all adaptation efforts towards reaching the Global Goal on Adaptation.[87] The Netherlands considers the UAE Framework to be an important milestone in international climate and adaptation policy. As the central international framework for climate change adaptation, the UAE Framework will be duly considered in the national and international activities that the Netherlands undertakes in the field of climate change adaptation. Moreover, the Netherlands actively supports and advocates for its implementation by all parties to increase the convergence and effectiveness of adaptation actions globally.

Policies and programmes within the adaptation chapter of the BTR are directly linked to one or several of the targets of the UAE framework. The bullets below give an indication of the interlinkages in this current chapter of the BTR with the thematic targets contained in the UAE Framework:

- The delta programme and related water and spatial adaptation policies described in sections 4.4.1. and 4.5.1. contribute directly to the target contained in Art. 9(a) (**water**) of the UAE framework
- The sections 4.4.2 and 4.5.2. describe the Netherlands' policies on agriculture, nature and the environment with regards to adaptation. This links to the content of the target contained in Art. 9(b) (**food and agriculture**) and Art. 9(d) (**ecosystems and biodiversity**)
- The link between health and adaptation is outlined in sections 4.4.3. and 4.5.3. These policies are relevant for Art.9(c) (**health**)
- Sections 4.4.4. and 4.5.4. outline the role of infrastructure and the larger economy. These sections show clear interlinkages with the targets contained in Art. 9(e) (**Infrastructure and human settlement**) and Art. 9(f) (**Poverty eradication and livelihoods**)

4.1.2.2 *European Union Level*

The legal framework for adaptation in the Netherlands stems from both the European and national level. Within the European Union (EU), legislation formulated that the EU level is binding to all its Member States. In 2021 the EU adopted *Regulation 2021/1119: European Climate Law.*[88] This Regulation encapsulates the core elements of the EU's *Green Deal* policy. It stipulates specific actions which Member States must undertake in their respective climate policy. On adaptation it specifies that the EU Commission and the 27 Member States should adopt and implement national adaptation strategies and plans. Moreover, it mandates Member States to regularly report on their progress in implementing adaptation measures.

This reporting feeds into the European Environment Agency's (EEA) monitoring process, which evaluates overall progress and identifies gaps. The Regulation also ensures that adaptation measures are integrated into broader EU policies, including agriculture, water management, and disaster risk reduction. This holistic approach ensures coherence and maximizes the effectiveness of adaptation efforts. Regarding data sharing, the Regulation promotes the development and dissemination of high-quality climate data and information to support adaptation planning and implementation. This includes enhancing platforms like the European Climate Adaptation Platform (Climate-ADAPT).[89] Lastly, it also includes a review mechanism

[87] See: UNFCCC, Decision 2/CMA.5, (2023).

[88] European Union, *Regulation2021/1119*, 'establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law')'.

[89] European Union, 'Climate Adapt', available from: https://climate-adapt.eea.europa.eu/en

to assess and update adaptation policies periodically. This ensures that the strategies remain relevant and effective in light of new scientific findings and evolving climate conditions.

4.1.2.3 *National level*

The Netherlands has established a comprehensive legal framework to address climate change adaptation and mitigation, cantered on key legislative instruments such as the Delta Act, the Climate Act, and the Climate Agreement. The Delta Act, formally known as the Delta Act on Water Safety and Freshwater Supply, is a cornerstone of Dutch water management policy (National Delta Programme, 2024[90]). It established the Delta Programme and the Delta Fund to ensure long-term protection and sustainable management of the country's vulnerable delta region. This act mandates the development of adaptive strategies to address sea-level rise, extreme weather, and other climate impacts, integrating climate projections into spatial planning and infrastructure development.

The Delta Programme is an integrated, adaptive management plan designed to protect the Netherlands against flooding, ensure a sufficient freshwater supply, and improve overall water system resilience. It employs dynamic planning, a multilayered safety approach, and stakeholder collaboration, involving national, regional, and local governments, private sectors, and civil society organizations. It exists of three core elements:

- **Flood Risk Management:** Enhancing and maintaining dikes, dams, and flood barriers to withstand extreme weather and sea-level rise.
- **Freshwater Supply:** Ensuring the availability of freshwater resources for agriculture, industry, and households through improved water management practices and infrastructure.
- **Spatial Adaptation:** Integrating climate adaptation measures into spatial planning to create resilient urban and rural areas.

The Delta Fund, established by the Delta Act, provides consistent and long-term funding for water management and climate adaptation projects through annual national budget allocations, supporting sustainable and effective adaptation measures with a long-term perspective and flexible resource allocation. The Delta Commissioner, an independent official, oversees the programme, ensuring coherence, progress, stakeholder coordination, and regular reports to the government and parliament.

In addition to the Delta Act and Delta Programme the Netherlands has adopted the Climate Act and the Climate Agreement. The Climate Act sets legally binding targets for greenhouse gas emission reductions, aiming for a 55% reduction by 2030 and climate neutrality by 2050, while the Climate Agreement outlines measures to achieve these targets, promoting renewable energy, energy efficiency, and sustainable practices.[91]

Additionally, two policy frameworks are important in the shaping of Dutch adaptation policy. These are the National Climate Adaptation Strategy and the recently adopted 'Water en Bodem Sturend' (WBS) ('Water and Soil as the Guiding Principles').[92]

The NAS, adopted in 2016, provides the central comprehensive framework for national climate adaptation, integrating various sectors and government levels to enhance resilience across the country. The objective of the NAS of the Netherlands is ensuring a physical living environment in 2050 that will be structurally less vulnerable to climate change through the use of climate adaptation measures. The Nationaal Uitvoeringsprogrammema Klimaatadaptatie, adopted in 2023 (NUPKA – *National Implementation Plan Climate Adaptation*) operationalizes the NAS by detailing specific actions, timelines, and responsibilities for implementation. Together, these initiatives ensure a cohesive and coordinated approach to climate adaptation, aligning national policies with local actions to effectively manage climate risks and enhance the resilience of Dutch society and infrastructure. Both the NAS and NUPKA will be further outlined in section 4.3.

[90] More information on the Netherlands' National Delta Programme is available from: https://english.deltaprogramma.nl/

[91] The Netherlands, 'Climate Policy' (2024), Climate policy | Climate change | Government.nl; see also the revised Climate Act [in Dutch]: https://wetten.overheid.nl/BWBR0042394/2023-07-22

[92] The Netherlands, 'Water en Bodem Sturend' (2023), available (in Dutch) at: https://www.rijksoverheid.nl/documenten/kamerstukken/2022/11/25/water-en-bodem-sturend

WBS emphasizes that sustainable management of water and soil resources should drive spatial planning and policy development. Given challenges from climate change, urbanization, and environmental degradation, a water and soil-centric approach ensures long-term ecological and socio-economic resilience. This involves recognizing the value of natural water and soil systems, preserving, and restoring them, and incorporating natural processes into planning. Moreover, it stipulates that spatial planning must integrate water and soil management, in particular in areas prone to flooding or degradation, prioritizing sustainable development. Identifying and mitigating risks such as flooding and drought, and enhancing resilience through adaptive measures, are crucial. Strategies to help communities adapt to climate change should focus on enhancing the natural adaptive capacity of water and soil systems and promoting low-carbon land use practices.

4.2 Impacts, Risks and Vulnerabilities

This section will focus on the impacts, risks and vulnerabilities that the Netherlands faces because of climate change. It will consist of a segment explaining the current climate in the Netherlands, an elaboration on the recently produces climate scenarios – which offer a view on ongoing developments in our climate - and an outline of the main risks and vulnerabilities, detailed by sector (further elaboration on the plans and policies dealing with these risks and vulnerabilities will be provided in the sections 4.4 and 4.5.).

4.2.1 Current Climate in the Netherlands

The Netherlands has become warmer. Average temperatures in De Bilt (the central meteorological point of measurement in the Netherlands) increased by 2.3 °C between 1901 and 2020 (KNMI, 2021). In all four scenarios that KNMI (Royal Netherlands Meteorological Institute) developed for the Netherlands (KNMI, 2023a-b), the temperature is expected to increase further. Around both 2050 and 2100, the effects of global warming will be felt most intensely in summer (June, July, August). The stronger warming in the summer will partly be caused by the drier soils. The wind is also expected to blow more often from the east, bringing warm, dry air. In the Netherlands the temperature rise is affecting the hottest summer days and the coldest winter days most. Extreme precipitation in the Netherlands has increased as well and it is likely that it will further increase in future. This trend includes higher frequencies and intensities of extreme precipitation. There are indications that higher humidity of the air from a warmer climate will result in larger clusters of showers, including 'supercells' that may cause both downbursts – sudden sharp increases in wind speed – and hailstorms.

Sea level will continue to increase, not only during this century, but for many hundreds of years to come, even if greenhouse gas emissions were to be halted today. This is because the ice sheets are no longer in equilibrium with the present (and future warmer) climate. Even if the temperature remains stable, they will continue to shrink. The rate and extent of sea-level rise will thus depend on the extent by which climate and land ice are brought further out of balance during the following years. The total amount of greenhouse gases emitted plays an all-important role here.

4.2.2 Climate scenarios

In 2023, the KNMI published its update of four climate scenarios for the Netherlands for around 2050, 2100 and 2150 (the first and second set of scenarios were published in 2006 and 2014[93] respectively)[94]. The data for sea-level rise are based on new insights from the IPCC including the potentially accelerated disintegration of the Antarctic ice sheet. In KNMI'23, the drought problem in the Netherlands and surrounding regions has been mapped out better, and the changes in precipitation extremes during summer showers have been better substantiated. There are also more accurate estimates of the global temperature rise caused by given increases in greenhouse gases. Just as with the KNMI'14 scenarios, the new climate scenarios can be used to

[93] For more information on these 2014 scenarios, see: http://www.climatescenarios.nl/
[94] For more information on these 2023 scenarios, see: www.knmi.nl/klimaatscenarios.

evaluate the possible impacts of climate change on various sectors, and so supplement and update the risk assessments of the National Climate Adaptation Strategy.

The extent to which the climate will change depends on the amount of greenhouse gases that will be emitted in the future and on the sensitivity of the climate system. Therefore, two emission scenarios have been adopted:

- The first is a high emission scenario (denoted by a capital 'H') in which emissions will continue to increase considerably until 2080 and then level off, based on SSP5-8.5. Around 2100, this will result in global warming of 4.9°C relative to the global average temperature in the period 1850-1900 (based on the best estimate for climate sensitivity).
- In the low emission scenario (denoted by a capital 'L'), emissions are rapidly reduced, and greenhouse gases are removed from the atmosphere, based on SSP1-2.6 in line with the Paris Agreement to limit global warming to well below 2°C. Around 2100, this will have resulted in global warming of 1.7°C.

It has been decided to work with a wide range of emission scenarios to make the consequences of international climate policy choices as clear as possible, and to allow for a reliable risk assessment of the potential consequences of climate change for the Netherlands. The changes in the Dutch climate will likely take place within this bandwidth. Additional calculations are conducted to consider the effects of a scenario with moderate emissions on specific applications (National Climate Scenarios, KNMI 2023b).

In all scenarios, as the climate heats up, the Netherlands will experience drier summers and wetter winters. The climate models give different results for the extent of these changes. Two variants for each emission scenario have been selected to depict these different extents:

- a 'wet' scenario (denoted by a lower case 'n', from 'nat' in Dutch), in which the winters are much wetter and the summers slightly drier, and
- a 'dry' scenario (denoted by a lower case 'd', from 'droog' in Dutch), in which the winters are slightly wetter and the summers much drier.

Combining the two emission scenarios (H and L) with the two 'wet' (n) and 'dry' (d) variants results in the climate scenarios Hn, Hd, Ln and Ld. These are the new KNMI'23 climate scenarios, which replace the KNMI'14 climate scenarios. Climate change in the Netherlands is likely to occur within the boundaries of these climate scenarios and so they are suitable for assessing the effects of climate change on most applications.

The climate is already changing, and we are noticing this in the increase in extremes of heat, drought and precipitation. The science of 'climate attribution' has demonstrated that the frequency of extreme weather events has already increased as a result of human-induced climate change. The KNMI'23 climate scenarios reveal what else awaits the Netherlands if greenhouse gas emissions continue to increase at the current rate until 2080. They also reveal that the extent of climate change and its consequences will be much less severe if the world would abide by the Paris Agreement. All four scenarios show that the Netherlands in any case faces sea level and temperature rises, drier summers and wetter winters (figure 4.1). The extent of the change varies per scenario. Climate scenarios enable users to consider the possible consequences of climate change and the resulting extreme weather conditions and make the necessary decisions to ensure the Netherlands remains a safe, sustainable and habitable country to live in.

Figure 4.1: The four KNMI'23 climate scenarios.

Table 4.1 (1): Climate scenarios for the Netherlands, projected values for 2050 and 2100 relative to the reference period 1991-2020.

Season	Variable	Indicator	Climate in 1991-2020 = reference period	**2050** (2036-2065)				**2100** (2086-2115)			
				Ld	Ln	Hd	Hn	Ld	Ln	Hd	Hn
	Global temperature rise compared to 1991-2020			+0.8°C	+0.8°C	+1.5°C	+1.5°C	+0.8°C	+0.8°C	+4.0°C	+4.0°C
	Global temperature rise compared to 1850-1900			+1.7°C	+1.7°C	+2.4°C	+2.4°C	+1.7°C	+1.7°C	+4.9°C	+4.9°C
Year	Sea level along the Dutch coastline	average level	0 cm [1]	+24 (16-34) cm	+24 (16-34) cm	+27 (19-38) cm	+27 (19-38) cm	+44 (26-73) cm	+44 (26-73) cm	+82 (59-124) cm	+82 (59-124) cm
		rate of change	3 mm/year [1]	+3 (1-6) mm/year	+3 (1-6) mm/year	+5 (4-8) mm/year	+5 (4-8) mm/year	-1 (-4-4) mm/year	-1 (-4-4) mm/year	+11 (6-23) mm/year	+11 (6-23) mm/year
	Temperature	average	10.5°C	+0.9°C	+0.9°C	+1.6°C	+1.5°C	+0.9°C	+0.9°C	+4.4°C	+4.1°C
	Precipitation	amount	851 mm	0%	+3%	-2%	+3%	0%	+3%	-3%	+8%
	Solar radiation	average	120 W/m²	+5.8 W/m²	+4.8 W/m²	+5.4 W/m²	+2.5 W/m²	+5.8 W/m²	+4.8 W/m²	+7.1 W/m²	+1.3 W/m²
	Humidity	average relative humidity [2]	82%	-1%	-1%	-1%	0%	-1%	-1%	-1%	+1%
	Evaporation	potential evaporation (Makkink)	603 mm	+7%	+6%	+9%	+6%	+7%	+6%	+17%	+11%
	Wind	average wind speed	4.8 m/s	-0.1 m/s	-0.1 m/s	0.0 m/s	0.0 m/s	-0.1 m/s	-0.1 m/s	-0.1 m/s	-0.1 m/s
Winter	Temperature	average	3.9°C	+0.7°C	+0.7°C	+1.2°C	+1.3°C	+0.7°C	+0.7°C	+3.7°C	+3.9°C
		average daily maximum	6.3°C	+0.7°C	+0.7°C	+1.1°C	+1.2°C	+0.7°C	+0.7°C	+3.5°C	+3.6°C
		average daily minimum	1.4°C	+0.7°C	+0.7°C	+1.2°C	+1.4°C	+0.7°C	+0.7°C	+4.0°C	+4.2°C
	Precipitation	amount	218 mm	+4%	+5%	+4%	+7%	+4%	+5%	+14%	+24%
		number of wet days (0.1 mm)	57 days	0.0 days	0.0 days	0.0 days	+0.6 days	0.0 days	0.0 days	0.0 days	+1.1 days
		days with >= 10 mm	5.4 days	+0.4 days	+0.5 days	+0.5 days	+0.8 days	+0.4 days	+0.5 days	+1.6 days	+2.5 days
		10-day total precipitation exceeded once every 10 years	109 mm [3]	-2%	+2%	0%	+2%	-2%	+2%	+8%	+15%
	Solar radiation	average	34 W/m²	+1.2 W/m²	+1.5 W/m²	+0.8 W/m²	+0.4 W/m²	+1.2 W/m²	+1.5 W/m²	-0.7 W/m²	-1.5 W/m²
	Humidity	average relative humidity [2]	87%	0%	0%	+1%	+1%	0%	0%	+1%	+2%
	Wind	average wind speed	5.6 m/s	-0.1 m/s	-0.1 m/s	0.0 m/s	+0.1 m/s	-0.1 m/s	-0.1 m/s	+0.1 m/s	+0.2 m/s
		days with wind direction between north and west	13 days	+0.1 days	-0.8 days	0.0 days	+0.1 days	+0.1 days	-0.8 days	-1.7 days	-1.0 days

Table 4.1 (2): Climate scenarios for the Netherlands, projected values for 2050 and 2100 relative to the reference period 1991-2020.

Season	Variable	Indicator	Climate in 1991-2020 = reference period	2050 (2036-2065)				2100 (2086-2115)			
				Ld	Ln	Hd	Hn	Ld	Ln	Hd	Hn
Spring	Temperature	average	9.6°C	+0.8°C	+0.7°C	+1.3°C	+1.1°C	+0.8°C	+0.7°C	+3.6°C	+3.3°C
		average daily maximum	13.7°C	+0.9°C	+0.8°C	+1.2°C	+1.0°C	+0.9°C	+0.8°C	+3.3°C	+2.9°C
		average daily minimum	5.5°C	+0.7°C	+0.7°C	+1.4°C	+1.3°C	+0.7°C	+0.7°C	+3.9°C	+3.7°C
	Precipitation	amount	153 mm	+1%	+3%	0%	+4%	+1%	+3%	+4%	+10%
	Solar radiation	average	161 W/m²	+6.6 W/m²	+5.2 W/m²	+3.2 W/m²	+0.8 W/m²	+6.6 W/m²	+5.2 W/m²	-0.2 W/m²	-4.8 W/m²
	Humidity	average relative humidity [2]	78%	-1%	-1%	0%	0%	-1%	-1%	+1%	+2%
	Evaporation	potential evaporation (Makkink)	190 mm	+6%	+5%	+6%	+4%	+6%	+5%	+10%	+6%
	Drought	maximum precipitation deficit April and May	76 mm	+11%	+6%	+15%	+5%	+11%	+6%	+21%	+8%
	Wind	average wind speed	4.7 m/s	-0.1 m/s	-0.1 m/s	0.0 m/s	0.0 m/s	-0.1 m/s	-0.1 m/s	+0.1 m/s	0.0 m/s
Summer	Temperature	average	17.3°C	+1.2°C	+1.1°C	+2.1°C	+1.7°C	+1.2°C	+1.1°C	+5.1°C	+4.7°C
		average daily maximum	21.7°C	+1.4°C	+1.2°C	+2.2°C	+1.7°C	+1.4°C	+1.2°C	+5.4°C	+4.7°C
		average daily minimum	12.9°C	+1.0°C	+1.0°C	+1.9°C	+1.8°C	+1.0°C	+1.0°C	+5.0°C	+4.9°C
	Precipitation	amount	235 mm	-8%	-2%	-13%	-5%	-8%	-2%	-29%	-12%
		1-day total precipitation exceeded once every 10 years [4]	63 mm [3]	+4 (1-6)%	+5 (2-7)%	+6 (2-9)%	+9 (5-14)%	+4 (1-6)%	+5 (2-7)%	+15 (5-26)%	+26 (12-41)%
		hourly precipitation exceeded once per year [4]	16 mm [3]	+4 (2-6)%	+6 (3-8)%	+6 (2-9)%	+11 (6-16)%	+4 (2-6)%	+6 (3-8)%	+15 (5-26)%	+31 (17-46)%
	Solar radiation	average	206 W/m²	+12 W/m²	+9.1 W/m²	+14 W/m²	+7.4 W/m²	+12 W/m²	+9.1 W/m²	+24 W/m²	+11 W/m²
	Humidity	average relative humidity [2]	77%	-2%	-1%	-2%	-1%	-2%	-1%	-4%	-1%
	Evaporation	potential evaporation (Makkink)	286 mm	+8%	+6%	+11%	+7%	+8%	+6%	+22%	+14%
	Drought	maximum precipitation deficit for April-September	160 mm	+22%	+13%	+35%	+15%	+22%	+13%	+79%	+37%
		maximum precipitation deficit for April-September exceeded once every 10 years	265 mm	+16%	+9%	+30%	+16%	+16%	+9%	+63%	+30%
	Wind	average wind speed	4.2 m/s	-0.1 m/s	-0.1 m/s	-0.1 m/s	-0.1 m/s	-0.1 m/s	-0.1 m/s	-0.2 m/s	-0.2 m/s
Autumn	Temperature	average	11.2°C	+1.0°C	+0.9°C	+1.8°C	+1.6°C	+1.0°C	+0.9°C	+5.0°C	+4.8°C
		average daily maximum	14.5°C	+1.1°C	+1.1°C	+1.9°C	+1.6°C	+1.1°C	+1.1°C	+5.1°C	+4.6°C
		average daily minimum	7.8°C	+0.9°C	+0.9°C	+1.8°C	+1.7°C	+0.9°C	+0.9°C	+5.1°C	+5.1°C
	Precipitation	amount	245 mm	+4%	+5%	+1%	+4%	+4%	+5%	+1%	+13%
	Solar radiation	average	77 W/m²	+3.7 W/m²	+3.5 W/m²	+3.7 W/m²	+1.4 W/m²	+3.7 W/m²	+3.5 W/m²	+5.4 W/m²	+1.0 W/m²
	Humidity	average relative humidity [2]	85%	-1%	0%	-1%	0%	-1%	0%	-1%	0%
	Wind	average wind speed	4.7 m/s	-0.1 m/s	-0.1 m/s	-0.1 m/s	0.0 m/s	-0.1 m/s	-0.1 m/s	-0.2 m/s	-0.1 m/s

The scientific insights in the 2021 IPCC report, on which the KNMI'23 climate scenarios are based, build on those of the previous IPCC report, which in turn formed the basis for the KNMI'14 climate scenarios. The KNMI'23 climate scenarios are based on the latest, high-resolution climate models and observations.

The main changes in the KNMI'23 scenarios compared to the 2014 scenarios are as follows:
- The scenarios are directly linked to the emission scenarios, and thus to climate policy.
- The scenarios look further ahead to 2150. (For sea-level rise to 2300.)
- The changes are compared to the most recent reference period for the Dutch climate, 1991-2020.
- The scenarios indicate a stronger increase of drought.
- The sea-level rise scenarios are based on improved understanding of the influence of Antarctica and include estimates of the highest possible future sea level.
- Better substantiation of the increase in extreme summer precipitation. The increase in the most extreme precipitation remains unchanged high; the increase in less extreme showers (occurring a few times a year) is lower than described in the KNMI'14 scenarios.
- The scenarios include additional information about high temperatures.
- The scenarios also describe the future climate change on the BES Islands.

Users of the climate scenarios indicated that water scarcity is one of the main challenges for the future, especially after the recent dry years. In response to this, the KNMI'23 climate scenarios do not only distinguish two high emission (H) and low emission (L) scenarios, but also distinguish two variants (d and n) that differ in the degree of decrease of summer precipitation and the increase in winter precipitation.

The KNMI'14 climate scenarios used two other variants (based on changes in air circulation patterns), but these were not directly linked to drought and were not correlated between the seasons, as has been done for the KNMI'23 scenarios. Consequently, annual precipitation increases in all the KNMI'14 climate scenarios, while in KNMI'23 some scenarios show a decrease, and some show an increase in annual precipitation. The use of dry and wet variants resulted in a narrower range in temperature change in the low and high emission scenarios than in the 2014 scenarios.

4.2.3 Risks and Vulnerabilities

The KNMI climate scenarios have also been combined with socioeconomic scenarios (so-called 'Welvaart en Leefomgeving' (WLO), (translation 'Prosperity and Environment') to form the Delta Scenarios[95]. These scenarios combine plausible views of future climate trends (slow/rapid) and national socioeconomic developments (limited versus strong changes), looking ahead to 2050 and 2100.

The first set of Delta Scenarios was drawn up in 2012 and launched in 2013, with an update following in 2018 (Deltares, 2018). Its hydrological conditions were based on the KNMI'06 scenarios, while its socioeconomic trends derived from WLO 2006 (WLO, 2006). The latest Delta Scenarios have been published in 2024[96] and take into account aspects of the KNMI'23 climate scenarios for the Netherlands. The Delta Scenarios are the basis for the risk and vulnerability assessments that are developed in the Netherlands at the national and subnational level. A substantial part of the impacts relates to the issues addressed in the Delta Programme: protection against flooding, the supply of fresh water and spatial adaptation to flooding, and heat stress in the built environment.

The KNMI'14 climate scenarios were launched in 2014, and the socioeconomic scenarios received an update in 2015. Also in 2015, global agreements were set down in Paris on the restriction of global warming to a maximum of 2 degrees Celsius by 2100. In 2017–2018, these new insights into socio-economic trends and the Paris climate agreements were incorporated into an interim update of the Delta Scenarios. An assessment of these new scenarios and agreements for the Delta Scenarios concluded that the new insights fall within

[95] For more information on the Delta Scenarios, see: https://english.deltaprogramma.nl/delta-programme/knowledge-development/delta-scenarios

[96] Delta Programma, 'Deltascenarios 2024' (only available in Dutch) (2024), https://www.deltaprogramma.nl/deltaprogramma/kennisontwikkeling-en-signalering/deltascenarios

the bandwidth of the Delta Scenarios; as such, the Delta Scenarios are still a proper basis for the selection of measures. Table 4.2 summarises the most important risks and opportunities for various sectors as derived from the KNMI'14 scenarios.

Table 4.2: Sectoral implications for the Netherlands (KNMI 2015).

Coastal impacts	Storm surges will show little change, but the sea level rise will continue; until now, the process of sea level rise is relatively slow. Coastal protection measures require continuous monitoring to detect the expected acceleration of the sea level rise in the near future
Flooding	Increased winter rainfall will increase peak discharge and flooding risks of the Rhine, Meuse and smaller rivers
Water resources	In two of the four scenarios, drought will increase in summer and lead to water shortages, water quality issues and salinisation; sea level rise will contribute to saltwater intrusion
Health	Temperature rise will lead to reduced mortality during winter and increased mortality in summer; during hot summers, air quality will deteriorate; there is great uncertainty about possible trends in infectious diseases; a further increase in the number of 'allergy days' due to the extension of the growing and flowering season
Mobility	Traffic disruption due to heavy showers may increase; slippery roads under icy conditions and damage to roads become less likely, but rutting will increase during summer heat waves
Energy	The energy demand for heating houses, factories and offices will decrease, but more energy will be required for air conditioning; the demand for inland cooling water for electricity production will reduce as fossil fuel-powered energy production will gradually phase out
Agriculture	Potential crop yields will increase with a longer growing season and higher CO_2 concentrations, but changes in precipitation and the prevalence of extreme events could threaten harvests; dry years will present a particular challenge; pests and diseases may increase
Nature	The risks are the greatest for ecosystems that depend on precipitation, e.g. heathlands, dry grasslands, rain-fed moorland pools and raised bogs; fens in nature reserves surrounded by deeply drained polders that depend on the inlet of surface water are also highly susceptible; increased risk of natural fires; climate zones are shifting, and biodiversity will change

The National Climate Adaptation Strategy has its basis in the KNMI'14 scenarios and elaborates on the four climate trends ('Hotter', 'Wetter', 'Drier' and 'Rising Sea Level') to characterise the implications of climate change for nine sectors: water and spatial management; nature; agriculture, horticulture and fisheries; health and welfare; recreation and tourism; infrastructure (road, rail, water and aviation); energy; IT and telecommunications; and public safety and security.

4.3 Adaptation priorities and barriers

The barriers and priorities of the Dutch adaptation policy will be discussed in this section. This will be done through an elaboration on the National Climate Adaptation Strategy, its evaluation and the National Implementation Programme for Climate Adaptation. Those documents form the basis of Dutch adaptation policy and indicate both the challenges as well as the priorities of adaptation policy in the Netherlands. These documents logically also form the basis of sectoral adaptation policies (discussed in section 4.4) and the implementation thereof (discussed in section 4.5).

4.3.1 Adaptation challenges and gaps, and barriers to adaptation

The National Climate Adaptation Strategy (introduced in section 4.1.3) focuses on integrating climate adaptation into various sectors, including water management, agriculture, infrastructure, health, and biodiversity. The strategy prioritizes a multi-level governance approach, fostering collaboration between national, regional, and local authorities, as well as engaging stakeholders from the private sector and civil society. Key actions include improving climate data and risk assessments, enhancing adaptive capacity through innovation and knowledge dissemination, and ensuring that adaptation measures are sustainable and economically viable.

The NAS was formally evaluated in 2022 (Graaff, Leewis & Loeber, 2022). The evaluation was aimed to investigate whether the implementation of the NAS was happening satisfactorily or whether adjustments are required to ensure the necessary pace in the implementation of adaptation actions. The 2022 evaluation underscored that adaptation policy requires further intensification to obtain its objectives. At the same time, risks have increased in due to climatological factors as well as non-climatological factors, such as population growth, the ageing population of the Netherlands, and further urbanisation.

The evaluation of the NAS concluded in 2022 that the implementation of adaptation policy in the Netherlands needs to be expedited. In addition, it formulated three core recommendations on how to achieve this aim. These recommendations are:

1. Set concrete targets for adaptation actions and policies, and ensure more clarity regarding progress and effectiveness.
2. Ensure better coordination and more emphasis on implementation.
3. Place more emphasis on the effects of climate change for 'people, culture and nature'.

4.3.2 Domestic priorities and progress towards those priorities

In response to the outcomes of the evaluation the Netherlands formulated a National Implementation Programme for Climate Adaptation (*Nationaal Uitvoeringsprogrammema Klimaatadaptatie* – NUPKA).[97]

The NUPKA should organise work towards the second iteration of the National Climate Adaptation Strategy, which is scheduled to be adopted in 2026. Its objective is to enhance making the Netherlands climate resilience at a faster pace. To get to this point, it follows three principles: Smarter, more intensive, and more inclusive adaptation. *Smarter adaptation* concerns increasing the knowledge in the general population regarding the negative impacts of climate change and how best to deal with it. This means that existing knowledge needs to be accessible and applicable. Where necessary, the Netherlands will work on knowledge development in this regard.

More intensive adaptation means that the Netherlands will put considerations of the negative impacts of climate change central in all relevant policies. Preparing for the negative impacts of climate change and accompanying increasing weather extremes will be a core consideration in the investments made by the government regarding construction, maintenance, renovation and replacement.

More inclusive adaptation entails that adaptation policy in the Netherlands must be designed to work for everyone and all sections of the population should be awarded the necessary attention.

Additionally, the NUPKA also categorised adaptation action in four policy domains:

1. *Water:* The emphasis of this domain are the challenges the Netherlands faces in regards to water safety (including sea level rise), freshwater availability and water quality domain. It includes large existing programmes such as the Delta Programme and the National Water programme.
2. *Agriculture, nature and the environment*: this domain centres around soil and water and cultivation related adaptation, to ensure a climate resilient agricultural system, strengthening nature and improving the natural environment.
3. *People and culture:* Heat stress and the impacts of climate change to health and (mental) wellbeing form the core of this domain. This is a relatively new emphasis in Dutch adaptation policy. Additionally, it focusses on solutions of possible climate related risks to historical cultural heritage.
4. *Work and livelihoods*: this domain focusses on climate resilient public spaces, the built environment and infrastructure. Infrastructure, and vital networks and processes in particular, requires attention with regards to linkages in which a disruption in one system or location can have impacts on others across the country.

[97] The Netherlands, 'Nationaal Uitvoeringsprogramma Klimaatadaptatie' (only available in Dutch) (2023), https://open.overheid.nl/documenten/dpc-2f1a2258b86c19919999b03a927ca9e3ba0498af/pdf

With regards to these separate policy domains listed above, section 4.4 will further elaborate how these policy domains are currently operationalised through sector-specific policies, goals and actions. Section 4.5 will elaborate on the progress made on the implementation of these policy domains to provide for an in-depth understanding of the current status of adaptation policy and action in the Netherlands.

4.4 Adaptation strategies, policies, plans, goals and actions to integrate adaptation into national policies and strategies

Section 4.4 focuses on adaptation policies and strategies. In this section adaptation policies in the Netherlands will be outlined along the relevant sectors included in the NUPKA. Concretely, this means the current section will inquire into 1) water; 2) agriculture, nature, and the environment; 3) people and culture; and 4) work and livelihoods. The progress in implementing these policies and strategies will be discussed in section 4.5.

4.4.1 Water

4.4.1.1 *Flood risk management*

Climate change and adaptation measures are strongly integrated into the water policy agenda. Increasingly extreme river discharges and the rise in sea levels are addressed in the Delta Plan on Water Safety, which is part of the National Delta Programme.[98]

From 1 January 2017, new standards for flood risk management have entered into force.[99] These new standards are based on flood probabilities, whereas the old standards were based on probabilities of exceeding water levels. These new standards signify a major leap in flood risk management policy. New knowledge accompanies these new standards as well as new forms of organisation. Dyke reinforcement continues to play the most important part in keeping the Netherlands safe from flooding. The Netherlands conducts a Safety Assessment of its flood defence systems every twelve years. The Third Safety Assessment (2014)[100] of the existing primary flood defence system acknowledged the importance of the considerable effort devoted to compliance with old, statutory flood protection standards. The implementation of reinforcement projects has been reprioritised based on the new standard. In 2050 all of the Netherlands' primary dykes will have to meet the 2017 standards, strengthening the country's safety from riverine flooding.

In addition to the reinforcement of dykes, other more integrated solutions are taken into consideration. An example is the Room for the River programme (Ruimte voor de Rivier), where the river manager has cooperated closely with provinces and municipalities to find solutions not just for water safety but for multiple goals (see: Rijkswaterstaat, 2024).

The Delta Programme has adopted a risk-based approach. Not only the probability of flooding but also the consequences of flooding, such as fatalities, damage and disruption, are included in this approach. A tolerable individual risk level (i.e. a basic safety level for individual loss of life due to flooding) of 1/100,000 or 10^{-5} per year is set for everyone living or working in an area that is protected by dykes, dunes or dams (Delta Programme, 2013). This risk-based approach results in differentiated levels of protection as an economically efficient method to reduce the risk. A risk-based approach also recognises opportunities offered by so-called multi-layered safety. In accordance with the European Flood Directive, the Delta

[98] For an overview of the most recent insights and policy recommendations of the Delta Programme, see https://english.deltaprogramma.nl/documents/publications/2023/09/19/brochure-outlines-delta-programme-2024-english

[99] For more information, see: https://www.helpdeskwater.nl/onderwerpen/waterveiligheid/primaire/nieuwe-normering/

[100] Third Safety Assessment (2014): https://www.helpdeskwater.nl/onderwerpen/wetgeving-beleid/handboek-water/thema-s/waterveiligheid-0/toetsing-primaire/

Programme from 2013 onwards propagates a three-layer safety model:

1. The first level of safety is protection against flooding (dykes, dunes, barriers and dams), minimising the probability of a flood. This measure is and remains the basis of our safety during high water.
2. Spatial planning is the second layer of multi-layered safety and can limit the effects of flooding in the areas behind the dykes, thus contributing to water safety. A good spatial structure will provide physical protection of vital or vulnerable functions, which is an important component of the Delta Programme for Spatial Adaptation.
3. The third layer is emergency management. Adequate crisis management will limit the impact of a flood in terms of casualties and fatalities. This responsibility has been assigned to the Water Crisis and Flood Management Task Force (*Stuurgroep Management Watercrises en Overstromingen*), which includes representatives of all relevant parties, including ministries, water authorities, regional disaster management authorities and highway authorities. The Ministry of Justice and Security and the Security Council are working alongside partners in the water sector on the 'Water and Evacuation' project. This project recently produced guidelines for the regional disaster management authorities on the ways to integrate water safety into their practices and procedures.

4.4.1.2 *Freshwater supply*

The Delta Decision on Freshwater Supply (Delta Programme, 2024a) and the associated Delta Plan on Freshwater Supply (Delta Programme, 2024b) are intended to foster sufficient freshwater supply in the Netherlands now and in future, an attractive living environment and a strong economic position. All over the Netherlands, measures aimed at the efficient use, retention, storage and supply of fresh water are in progress (Delta Programme, 2023). Land use should be adapted to the water and soil system and the availability of fresh water. This is translated in a guideline for spatial planning and a sequence for regional water management starting with efficient use of water and subsequently: retention, smart distribution and finally acceptance of shortage of water.

4.4.1.3 *Spatial climate adaptation*

The Delta Plan on Spatial Adaptation focuses on spatial adaptation to more intense rainfall, drought and heat, as well as on measures to reduce the impact of flooding through spatial planning should a flood occur. The realisation of a water-resilient and climate-proof design will be achieved by working on seven ambitions (steps in the process of becoming climate-proof) (Figure 4.2):

1. mapping out vulnerabilities;
2. conducting a risk dialogue and drawing up a strategy;
3. drawing up a programme of measures;
4. capitalising on opportunities for linkages with other spatial development initiatives;
5. improving the knowledge basis and encouraging and facilitating local governments and private parties (including network organisations);
6. regulating and embedding;
7. improving the responsiveness to calamities.

Figure 4.2: The seven ambitions for water-resilient and climate-proof spatial planning (Delta Plan on Spatial Adaptation, 2018[101]).

In urban areas, municipal authorities and regional water authorities are jointly responsible for reducing the risk of pluvial flooding (flooding because of heavy precipitation). Government authorities decide how they address water challenges. So-called Water Plans are developed at different scales and with different legal status; for example, a Water Plan at the level of municipalities, a Municipal Sewerage Plan (including rainwater collection), a Provincial Water Plan, a Water Management Plan of the water authorities and a country-wide National Water Plan.[102] These different water plans together offer opportunities for water-inclusive planning.

[101] For more information, see: https://english.deltaprogramma.nl/three-topics/spatial-adaptation/delta-plan

[102] The Netherlands 'Nationaal Water Programma 2022-2027' (available only in Dutch) (2021), https://open.overheid.nl/documenten/ronl-0c5086b3029ab6a4ab28d52838ce44d5e6285d1a/pdf

4.4.1.4 *Measures coordinated by the Delta Programme*

Each year a Delta Programme report is sent to the Dutch parliament containing an update on the actual situation regarding climate adaptation and forecasting the programmes of measures (reports available in English).[103] Concrete projects for climate change adaptation presently focus on mainstreaming and 'no regret' options. Implementation is often realised by regional and local authorities, especially where spatial developments are concerned. Coalitions of the willing for regional and local initiatives are on the increase. The most important results continue be the Climate Agreements between the national government, the Association of Provinces of the Netherlands (IPO) and the Association of Netherlands Municipalities (VNG); the development and use of the National Climate Portal; the Climate Impact Atlas[104]; and follow-up on the 'climate stress tests' carried out by regional governments, municipalities and network organisations between 2019 and 2020.

4.4.2 Agriculture, Nature, and the Environment

Agriculture, horticulture and fisheries

The objective of the National Climate Adaptation Strategy of the Netherlands is ensuring a physical living environment in 2050 that will be structurally less vulnerable to climate change through the use of climate adaptation measures. This means that damage and disruption caused by climate change are limited as much as possible and that opportunities are seized. The Dutch ministry of Agriculture, Fisheries, Food security and Nature (LVVN) aims to ensure that all entrepreneurs in agriculture and horticulture, and those responsible for nature areas are prepared to deal with climate change (such as an increase in heat, extreme precipitation, prolonged drought, sea level rise and salinization) in a sustainable and effective way.
To achieve this and to prevent divestments and maladaptation, three strategies are used over time:

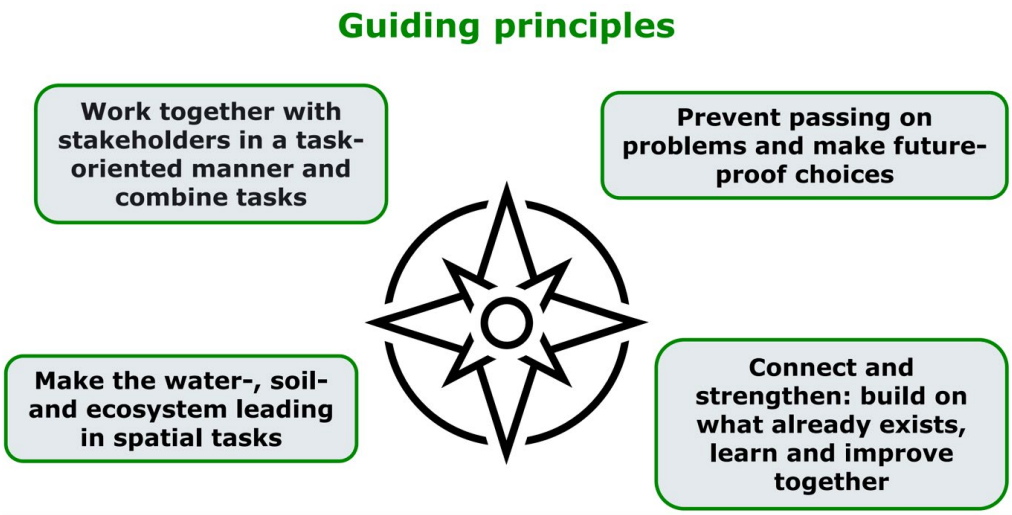
1. optimization of the current situation in the short term, such as sustainable soil management and more efficient use of the available water, including water retention and reuse.
2. move along with climate change in the medium term by adapting to natural conditions and by using innovative measures.
3. long-term transformation through fundamental and (eco and food) systematic changes.

This approach helps to see whether a measure taken now fits in the longer-term perspective. In this way inefficiency and lock-in can hopefully be prevented. It will be developed together with stakeholders in an area-specific and soil and water-robust manner through, for example, space reservations for future adaptation measures, the construction of water buffers, innovative cultivation systems and nature-based solutions at suitable locations.

The 'guiding principles' (figure 4.3) provide guidance in developing and implementing policy and make clear choices. These principles are overarching; they are sufficiently abstract so that they can be used in different contexts in the transition to a climate-proof and nature-inclusive society. When preparing for and adapting to climate change, the principles help to facilitate, accelerate and provide direction to these changes.

[103] See for instance the Netherlands' Delta Program 2024 (2023): available at: https://english.deltaprogramma.nl/documents/publications/2023/09/19/delta-programme-2024-english
[104] Available from: http://www.klimaateffectatlas.nl/en/

Figure 4.3: Guiding Principles for Climate Adaptation in the Food and Agriculture Sector.



In order to establish concrete Climate Adaptation objectives and to provide a long-term perspective for the agricultural sector, the Netherlands has introduced a Climate Adaptation Action Programme, also specified for agriculture and nature. The Agriculture Climate Adaptation Action Programme (January 2020)[105] aims to ensure that all entrepreneurs in agriculture and horticulture are prepared sustainably and effectively in 2030 to deal with changes in the climate. The action programme contains five pillars to achieve a more climate resilient agriculture, namely the water system, the soil system, crops and cultivation systems, livestock farming and the supporting instruments, namely the regional approach, knowledge and innovation, and risk management.

The programme mainly has a national approach, but the Dutch agricultural system can still learn a lot from other countries, both in Europe and beyond. Dutch agriculture is expected to switch in the (possibly near) future to, for example, more drought and saline resistant crops. To make that change, it is important that Dutch farmers, researchers and policymakers can learn from good international examples.

Table 4.3: Five pillars of climate adaptation policy in the food and agriculture sector[106].

Pillar 1. The water system encompasses climate adaptation actions aimed at increasing the resilience of the water system to be better prepared for drought, flooding and deterioration of water quality, such as salinity and nutrient pollution, now and in the future. National, regional and local cooperation aims to minimise damage caused by climate change. In this pillar, there is structural cooperation with the Delta Programmes Freshwater and Spatial Adaptation and utilization of good practices and experiences of farmers and water boards.

Pillar 2. The soil system encompasses climate adaptation actions aimed at improving the health of agricultural soils by applying soil measures to, among others, increase the water storage, water infiltration, and the water purification capacity of the soil, as described in the National Programme for Agricultural Soils. In addition, improving soil quality (physical, chemical and biological) can support crops in coping with extreme weather conditions. Sustainable soil management can include using organic and green manure, lighter machines or drones, and permanent grassland.

[105] https://www.government.nl/topics/agriculture/documents/reports/2020/01/30/action-programme-for-climate-adaptation-in-agriculture

[106] For more information, see: https://www.government.nl/topics/agriculture/documents/reports/2020/01/30/action-programme-for-climate-adaptation-in-agriculture

Pillar 3. The crops and cultivation system encompasses climate adaptation actions aimed at making crops and cultivation systems more resilient to climate change as described in the Vision for the Future of Plant Protection by 2030. Climate-resilient crops are, for example, crops that are more resistant to diseases and pests, drought, salt or flooding, such as certain maize varieties, sorghum, cranberries and wine grapes. In 2022 the National Grow Fund funds the CROP-XR project to develop robust and extra-resilient agricultural crops. In addition, this pillar aims to gain knowledge about adaptive cultivation systems and, where necessary, to improve regulations that restrain measures, such as hail covers, to protect crops against frost and extreme showers.

Pillar 4. Livestock Farming encompasses climate adaptation actions aimed at making livestock, such as dairy cattle, pigs and poultry, more climate-proof, as described in the Benchmark for Sustainable Livestock Farming, the action plan for heat stress and the policy on new barn systems. Due to climate change, farm animals experience more heat and UV radiation. In addition, livestock gets exposed to new animal diseases due to climate change. Adaptation measures can include grazing and transport during the night, ventilators, and places with shadow in the meadow.

Pillar 5. Supporting Instruments consist of three supporting instruments: 1) a regional approach, 2) knowledge and innovation, and 3) risk management. These instruments cut across the four pillars and provide integral support for the objectives of these pillars. An example of a supporting instrument is the Multiperil Crop Insurance which agricultural entrepreneurs can use to insure against damage resulting from weather extremes.

Next to learning from other countries, we aim to strengthen the connection between national and international policies and form a coherent adaptation framework. Therefore, we stimulate the international network to use the 'optimization, moving along, transformation' strategies for forming and facilitating climate adaptation and sustainable policies and activities. This will not only contribute to mainstreaming but also promote the integration and implementation of adaptation practices.

Nature and the Environment

Climate change is likely to have a considerable impact on the realization of the current conservation goals for biodiversity. Solutions will often have a strong spatial impact on the already intensively used Dutch landscape. The national government and the provinces have a major task in realizing the obligations of the Birds and Habitats Directives (VHR). The Nature Pact and the Nature Programme, including the 'Nature Inclusive Agenda' are aimed at achieving this task. Climate-proof nature is the basis for realizing that task. In general, the Dutch nature policy adapts by:

- Achieving 70% of the VHR targets in and around the protected nature areas by 2030. This is done by focusing on more acreage for natural systems, creating robust connections and by improving conditions so that nature becomes more resilient;
- Promoting the basic quality of nature in a broader sense by working together with other programmes towards a nature-inclusive society;
- Promoting the use of Nature-Based Solutions (NBS), for multifunctionality.

With the action programme for Climate Adaptation Nature, as a vital component of the NAS, the Dutch government aims to steer towards resilient and climate-proof nature and to use nature as climate adaptation-solution in the physical living environment, using the three strategies above. LVVN is committed to limiting the effects of the greatest human-induced climate risks on nature and biodiversity - and stimulate to use nature in climate adaptation in the physical living environment. Recognizing that biodiversity provides resilience and is therefore the cornerstone of effective climate adaptation, the objective is to have all national and sub-national actors, in 2030, equipped to:

- minimize climate risks on the nature to be managed;
- realize (new) climate-robust and resilient nature;
- using nature for climate adaptation, such as nature-based solutions (NBS) / nature-inclusive solutions.

While this strategy is again mainly developed as national policy, they also have an international outlook. Nature cannot be contained by national borders, and as climatic regions will shift, therefore learning from other countries is as relevant as ever.

The action programme of LVVN contains seven actions and five supporting instruments to achieve a more climate resilient environment. Implementing the seven actions by the target group (the national government, local authorities and those responsible for nature management) contributes to a future-proof Netherlands. The five supporting instruments are: communities of practice, pilots, stakeholder meetings and communication products, policy framework, and knowledge products.

Table 4.4: Actions regarding adaptation in the Nature and Environment Sector.

Action 1. Identify vulnerability of nature to climate change by examining external pressures and the resilience of ecosystems. Climate stress tests are conducted to assess these effects. It's crucial to enhance the role of nature in these tests and evaluate both its resilience and the opportunities for climate adaptation. Studies provide insights into current and future risks, revealing opportunities for nature restoration and its use as a climate adaptation measure. This information guides adjustments to policy, design, and management of areas to better protect and utilize natural resources.

Action 2: Take advantage of linking opportunities for climate adaptation with nature and other tasks due to pressing environmental challenges and limited funding. Integrating nature-based solutions can address issues in water, soil, climate, agriculture, safety, and health. Initiating a climate-proof organization in the Netherlands requires using these solutions to tackle multiple challenges efficiently, making the most of limited space. Long-term, area-specific solutions should be developed, and linking opportunities should be sought and utilized in all actions.

Action 3: (further) developing adaptation strategy and action perspective for future-proofing nature and implementing nature-inclusive solutions. These strategies are tailored to the specific challenges and identities of areas, outlining necessary steps for conservation, restoration, and use of nature while taking climate change into account. They involve national, regional, and local cooperation to achieve climate, water, soil, and nature goals. Prioritized areas for climate risk measures are identified based on vulnerabilities and opportunities. The strategies include concrete measures, costs, and timelines to reduce climate vulnerability. LVVN will support developing appropriate, area-oriented action perspectives for current and future scenarios.

Action 4: Stimulate, facilitate and connect to integrate climate adaptation with nature into rural areas, urban environments, and large waters. LVVN and stakeholders stimulate, facilitate, and connect this integration across various domains. They promote sharing knowledge, tools, and experiences to avoid redundancy and accelerate adaptation efforts. A shared vision of the future and solutions using guiding principles are conveyed. The government leads in stimulating, facilitating, and connecting future-proof nature and nature-inclusive solutions with other tasks, ensuring widespread implementation and collaboration.

Action 5: Prepare for and act in the event of disasters for better preparation for climate change-induced disasters, including floods, heat, drought, and indirect effects like dike breaches and invasive species. Future-proof policies and climate-robust design can minimize damage to nature from severe weather. Nature-based solutions enhance area resilience. Stakeholders must prepare, communicate, and collaborate on disaster response, defining roles and responsibilities to mitigate damage. While complete prevention is unlikely, coordinated efforts can significantly reduce impacts.

Action 6: Provide and secure direction for climate adaptation to ensure a climate-proof Netherlands. This action emphasizes the need for clear guidance on achieving a future-proof environment, integrating living water, soil, and ecosystems. A framework must be established to ensure choices meet specific preconditions, using shared goals and guiding principles, shared solutions, and an appropriate policy framework. This direction must be structurally embedded in the policy, design, and management of the physical environment to address the various major challenges effectively.

Action 7: Implementing measures in practice for climate adaptation in nature. After identifying vulnerabilities and opportunities (Action 1), developing strategies (Actions 2 and 3), sharing knowledge (Action 4), and establishing a framework (Action 6), it's crucial to execute these measures. This involves task-oriented, local, or large-scale actions to create climate-robust nature and adaptive solutions. Measures must balance short-term optimizations and long-term transformations, avoiding negative impacts or maladaptation. Practical implementation ensures that policy, design, and management actions are effectively carried out to address the effects of climate change on nature now and in the future.

4.4.3 People and Culture

4.4.3.1 *Health and welfare*

The Ministry of Health, Welfare and Sport (MoH) is increasingly aware of the possible effects and growing risks of climate change, specifically heat stress and smog, exposure to uv-radiation, flood related health risks and water quality, mental health consequences and a changing risk profile for infectious diseases, allergens and food safety. Although these risks are already being addressed within regular policy, additional challenges due to climate change ask for refinement and intensifications. In 2023, the NUPKA was launched with an overview of the national actions that have been and are being put forward to make the Netherlands more resilient to climate change. Health is an integral part of the programme and has two chapters that are specifically relevant: 'The heat resilient city' and 'Staying healthy in times of climate change'.

The heat resilient city

The Dutch approach is best summarised with the three G's: *gebied, gebouw en gedrag* (area, building and behaviour). Since 2023 a 'National Approach Climate Adaptation for the Built Environment' has been started by the Ministry of the Interior and Kingdom Relations in cooperation with the Ministry of Infrastructure and Water Management and the Ministry for Agriculture, Fisheries, Food Security and Nature.[107] Its focus is to stimulate the adaptation of the built environment to become more resilient to the changing climate, specifically water excesses and periods of drought and heat. Its main goal is to stimulate local and regional governments and owners of buildings to prepare for climate changes and to disseminate knowledge and best practices.

In 2007, a 'National Heat Plan' was prepared as a preventive measure in a cooperative project between the Ministry of Health, the National Institute for Public Health and the Environment (RIVM), the Dutch Red Cross, ActiZ (trade association of approximately 400 healthcare organizations) and the Regional Health Services GGD. This plan was subsequently updated in 2015. It now offers a range of specific measures that can be taken locally by institutions and care providers to ensure that they are ready and act appropriately in periods of sustained heat. The National Heat Plan focuses on people that are vulnerable for heat stress and the action to be taken when a formal heat wave warning is issued. In 2024 the Ministry of Health has asked the RIVM to evaluate the National Heat Plan. The results are due at the end of the year. Part of the evaluation is to explore the consequences of a scenario with extreme heat conditions that the Netherlands has not yet experienced.

[107] The Netherlands, 'Nationale Aanpak Klimaatadaptatie Gebouwde Omgeving Fase 1' (only available in Dutch) (2022), https://www.rijksoverheid.nl/documenten/rapporten/2022/11/23/nationale-aanpak-klimaatadaptatie-gebouwde-omgeving-fase-1

Staying healthy in times of a changing climate

Another impact of climate change is the spread of infectious diseases and allergens. Monitoring of vectors and vector-borne diseases is undertaken by the National Institute for Public Health and the Environment (RIVM) as well as the Netherlands Food and Consumer Product Safety Authority (NVWA) in cooperation with local authorities. Government policy seeks to prevent the establishment of exotic (i.e. non-indigenous) mosquito populations in the Netherlands and the diseases that they can carry (e.g. dengue). If monitoring reveals the presence of exotic mosquitoes, they will be exterminated. When mosquitoes have established themselves in parts of the Netherlands and extermination is not a viable option, policy will be directed at controlling the risks and the hindrance. In addition, environmentally related diseases – especially ones associated with exposure to water of poor quality – are under surveillance. Finally, communication on possible health risks and effective actions to mitigate these risks is made available.

Fuelled by the experiences with Covid-19, the Ministry of Health and the Ministry of Agriculture have started in 2022 a joined National Action Plan for the Strengthening of the Zoonotic Disease Policy.[108] Some actions in this plan are directly related to or influenced by climate change.

Climate change may also contribute to changes in the amount of pollen, arachnids, and insects, that can have allergenic effects on people. In that regard, the focus is on regular policy (monitoring and regular medical treatment) and additional research and dissemination of knowledge (e.g. Bomenkompas, a compass for tree planting, a tool to support considerations on pollen exposure in the planting of additional greenery).[109]

Health care sector

A specific point of interest is the resilience of the health care sector. The health care sector should be prepared for climate extremes, like heat waves and floodings, and be prepared for necessary changes in capacities, for example due to rises in certain patient numbers. In the Netherlands this is primarily a responsibility for the health care sector itself.

4.4.4 Work and Livelihoods

4.4.4.1 Infrastructure

The Delta Programme and the National Climate Adaptation Strategy addresses the question of how to develop and maintain vital infrastructure in view of its resilience to climate change and extreme weather. The Delta Decision Water Safety ensures protection against flooding from rivers and the sea. Adaptation to Sea Level Rise and increased variation in river discharge are key aspects of this decision. For example, a National Knowledge Programme on Sea Level Rise has been initiated by The Ministry of Infrastructure and Water Management and the Delta Commissioner in 2019, to assess how the Dutch Delta can adapt to rising Sea Levels. This programme will run until 2026 and produces reports on the extent to which the sea level may rise along the Dutch coast as well as how the Netherlands can best respond to sea level rise.
The Delta Decision on Fresh Water has as its aim to provide for fresh water, both in quantity and quality. Adaptation to drought, decreased river discharge and increased salinization due to sea level rise are important challenges for the Netherlands. Furthermore, the Delta Decision on Spatial Adaptation stipulates that the national government must conduct stress tests to find out more about the resilience of the roads, railways, and waterway networks (inland shipping). Moreover, it also outlines that the national government should pay attention to heat stress, droughts, extreme precipitation and flooding, as part of these stress tests

[108] The Netherlands, 'National Action Plan for the Strengthening of the Zoonotic Disease Policy' (2022), https://www.government.nl/documents/reports/2022/07/06/national-action-plan-for-the-strengthening-of-the-zoonotic-disease-policy

[109] Leiden Universtitair Medisch Centrum, 'Bomenkompas' (only accessible in Dutch) (2024), https://www.lumc.nl/over-het-lumc/maatschappelijke-rol/bomenkompas/

4.4.4.2 *Energy, IT and Telecommunications*

Since the publication of the NAS, the definition of 'vital' or 'critical' infrastructure has been expanded to include the supply systems for energy, IT, telecommunications and drinking water, in addition to the infrastructure mentioned in the previous section (NAS, 2016). Risks of climate change, and possible approaches or measures to mitigate those risks, are one component of the 'all-hazard' safety and security approach which seeks to identify and manage all risks to the vital infrastructure in the Netherlands.

Ensuring continuity in energy provision is a priority as it is a driving force of many vital and critical processes. The Dutch energy grid has a high level of energy security, but climate change potentially leads to increasing risks of failure. The evaluation and progress report of the 'National Approach Critical and Vulnerable Infrastructure' (Twynstra Gudde, 2021) calls on the grid operators to collaboratively assess the risks of climate change to the energy grid and, where needed, think up and perform efficient and effective measures to tackle these risks. In spatial policies for energy infrastructure and individual energy projects, climate adaptation is consistently considered by performing a so-called environmental assessment (planMER or projectMER).

Furthermore, the NUPKA has identified a need to further specify policy goals for climate adaptive energy infrastructure. These goals will be formulated in the process of reiterating the Dutch National Climate Strategy (NAS) in 2026.

4.5 Progress on implementation of adaptation

Section 4.4 outlined the relevant policies and plans related to adaptation in the sectors outlined in the NUPKA. The present section will expand on that by explaining the progress which has been made in the implementation of these policies and plans. It follows the same structure as section 4.4.

4.5.1 Water

4.5.1.1 *Flood Risk Management*

Over the past decades, enormous investments have been made to improve the water safety of the Netherlands. Those investments are mainly policy driven: e.g. the new standards for flood protection, or*better knowledge on failure of levees leading to a need to reinforce. While reinforcing, climate change is taken into account, making for a 'future proof' design. Flood Risk Management in the Netherlands focusses on the coastal zone and the country's large rivers:

- ***Coastal zone:*** The Dutch Delta Act stipulates that further erosion and subsequent movement of the Dutch coastline should be prevented. To do so, the Netherlands actively uses sand replenishment and includes it as its primary strategy for coast retention in its Delta Plan for Water Safety. It enables the coastal foundation zone to grow concurrently with the rise in sea level. Where possible, this process occurs by distributing and transferring sand naturally along the coast (such as the 'Sand Motor' project, an artificial sand bank created off the coast of The Hague to let ocean currents, wind and waves gradually spread the sand[110]). In addition, the government is opting for a cohesive approach to spatial development of the coastal zone which allows for a balanced development of nature, economy and accessibility in the existing coastal areas.
- ***Rivers:*** To increase the discharge capacity and flood protection along the main rivers, the Netherlands has enacted two main programmes, Room for the River (Ruimte voor de Rivier) and the Meuse projects (Maaswerken). Under both programmes over 30 projects have been completed with the aim of widening the rivers to increase the peak discharge. Since 2015, the Rhine can handle a peak discharge level of 16,000 m^3/s and the Meuse a discharge level of 3,800 m^3/s. Where possible and cost-effective, measures are already being implemented to enable discharges of 18,000 m^3/s by the Rhine and 4,600 m^3/s by the Meuse. To anticipate these higher discharges, reservation zones for future flood protection or peak storage have been designated.

[110] For more information about the Zandmotor, see: https://dezandmotor.nl/en/about-the-sand-motor/

Water boards contribute on a structural basis to the current Flood Protection Programme. As part of an Administrative Agreement on Water Affairs (concluded on 23 May 2011), regional water authorities became co-financers of the investments needed to improve the primary flood defence systems which are operated and maintained by these authorities, since they fall within their jurisdiction. The co-financing is equally distributed between the water authorities and the Delta Fund. This agreement also mentions the need to cooperate on water management issues to increase effectivity.

Sea level rise is an issue of specific interest for the Netherlands. The speed and amount of sea level rise after 2050 are highly uncertain, and determine the effort required to keep the Netherlands safe in the long run. This is why in 2019, a research programme on sea level rise was launched by the national government. In this programme, government authorities and knowledge institutes work together to develop knowledge relevant for future adaptation of the Netherlands. It addresses subjects such as the effects of sea level rise of up to five meters on the current flood management and freshwater availability approach, and the development of possible alternative strategies for the more distant future. Up until 2023, the programme has researched what solutions could technically be possible. In 2026 further reports will be published which outline the societal consequences and the potential of successful implementation of measures to withstand sea level rise (Delta Programme, 2023b).

4.5.1.2 *Freshwater Supply*

The innovative approach in this domain is the so-called Smart Water Management, which aims at efficient operational water management by using IT and reaching across administrative water management boundaries. New applications to this end, such as information screens, have proven their value in recent calamities. Tools to achieve a behavioural change, such as serious games, also prove effective. The use of a risk-based approach to strengthen freshwater availability in operational water management looks promising. Freshwater supply and retention measures are increasingly linked to spatial planning and developments, especially the ones involving drought issues. The measures set out in the Delta Plan on Freshwater Supply have been implemented according to schedule. For some measures, an integrated approach has been adopted.

4.5.1.3 *Spatial Climate Adaptation*

A number of municipalities have developed or have started to develop adaptation policies and even released local adaptation strategies; for example, the cities of Rotterdam (with its Rotterdam climate initiative) and Amsterdam (Amsterdam Rainproof).[111] Many more examples exist, as can be seen on the map showing examples of climate adaptation measures which is available on the national climate portal (mentioned in section 4.4.1).[112]

Provinces and Regional Water Authorities are implementing adaptation measures in the regional water system. Most of the measures consist of creating 'space for water' in order to store precipitation water. In many cases, the parties involved prefer integrated solutions, combining water issues with other space-consuming issues (housing, leisure, biodiversity, farming, and so on) in order to create more value for society as a whole.

The Association of Netherlands Municipalities (VNG) is monitoring its members' response to increasingly severe and protracted rainfall. Approximately one third of the investments in water management tasks at this level are intended to improve rainwater drainage. Measures focus on separating the precipitation run-off from sewage water. They include increased infiltration of precipitation, retaining groundwater at levels beneficial to the ecosystem and increased capacity to remove excess water. Municipalities are required to compensate for lost infiltration capacity.

[111] See: Amsterdam Weerproef, 'About Weerproef' (2024), https://www.rainproof.nl/English

[112] Klimaatadaptatie Nederland, 'Climate Adaptation Knowledge Portal' (2024), Home - Spatial adaptation (klimaatadaptatienederland.nl)

4.5.2 Agriculture, Nature, and the Environment

4.5.2.1 *Agriculture, horticulture and fisheries*

The Action programme for climate adaptation in agriculture started in 2020 and will run until 2030. Since the commencement of the programme, the awareness that climate change affects agricultural business operations and requires changes has been growing. This is largely due to extreme weather-events in the last years, especially drought and flooding, as well as strengthened governance, through the Action programme, in this domain.

During the initial years of the Action programme on agriculture (2020-2021) the emphasis largely focuses on increasing awareness, knowledge development, and building a stakeholder network. In the Knowledge and Innovation Agenda of the Ministry of Agriculture, Fisheries, Food Security and Nature (which runs from 2019-2030) a range of projects has been initiated since its inception. Additionally, initiatives for knowledge dissemination have been taken, as the main goal of the programme is that it gives agricultural entrepreneurs and nature managers perspective for action: to cope with the challenges arising from climate change and also to find opportunities (e.g. crops that can be grown because of temperature rise). On the international level, initiatives for exchange of knowledge and experience have been started in the network of agricultural and nature attachés.

Together with stakeholders in the financial sector a first exploration has been done on how climate change will affect the financial sector in its relation to agriculture. This exploration will be deepened in a working conference with more stakeholders for agriculture and nature in 2025, aiming at concrete initiatives c.q. pilot cooperation projects achieving climate adaptation goals, with the use of nature-based solutions as climate adaptation measure.

The Dutch government has also initiated an integrated area approach for rural areas in all provinces. In this integrated approach the soil and water guiding principle has become an important test criterion for plan assessment. This means that climate adaptation consideration will be included in this approach for the rural areas in the country.

4.5.2.2 *Nature and the Environment*

Awareness has also increased in relation to the fact that climate change affects international obligations for the conservation of nature reserves and that an integrated approach in rural areas is necessary to cope with this. Regarding the link between adaptation and nature, a similar Action Programme will commence in 2025 and continue until 2030.

As nature in the Netherlands is under increased pressure from the effects of climate change, a constant reassessment is required of aspects such as the foreseen extension and localization of the Dutch National Ecological Network (now called 'Nature Network Netherlands') to meet climate change challenges. The Nature Network Netherlands is tasked with strengthening connections between existing natural areas in the Netherlands. In 2023, the Dutch Environmental Assessment Agency (PBL) also found that acquiring and restoring nature will require more time, is more resource intensive than previously thought and that increased prioritization can contribute to strengthen nature policies in this regard (PBL, 2023).

4.5.3 People and Culture

4.5.3.1 *Health and Welfare*

As part of the National Climate Adaptation Strategy, a monitor for climate adaptation is being developed, coordinated by the Netherlands Environmental Assessment Agency. In May of 2024 they published a first report[113] that is considered as the starting point of the monitoring process, which includes the risks of

[113] The Netherlands, 'Klimaatrisico's in Nederland' (only available in Dutch) (2024) (https://www.rijksoverheid.nl/documenten/rapporten/2024/05/14/bijlage-2-rapport-pbl-2024-klimaatrisicos-in-nederland)

climate change for public health. Most of the national actions are aimed at adapting regular policy, by creating more awareness and disseminating knowledge. Municipal health departments and municipalities provide various forms of support to prevent climate-related health effects, such as heat, infectious diseases, and exposure to allergens. They are responsible for monitoring risks as well as for public information about these risks.

Several research projects have started (The Dutch Research Agenda (running since 2025)[114], the LIFE-IP Climate Adaptation (2022-2027)[115]) and will deliver results in the coming years. An example is the LIFE-IP project that develops a guide for municipal health authorities (GGDs) and municipalities that explains how policymakers can take health into account in climate adaptation policy.[116]

The heat resilient city
In response to the increased exposure to the sun because of the increase of sunny days and high temperatures in the summer, several stakeholders concerned with exposure to uv-radiation, skin cancer and other health effects (e.g. cataract) have united in the *Zonkracht Actie Platform* (translation: Sun Power Action Platform) to work together on effective policy measures. They partnered in the public campaign for healthy sun behaviour that has been launched in the Netherlands in 2022, supported financially by the MoH. During a two-year period, people in the Netherlands will be stimulated and supported to protect themselves better against uv-radiation.

Health Care Sector
Regarding the challenges related to climate change adaptation, the MoH will, conduct an exploration of the healthcare sector's need for support in climate adaptation and in what regards; for example the adaptation to the (new) demand for care or the healthcare infrastructure.

The Ministry of Health has joined international networks (such as the Alliance for Action on Climate Change and Health (ATACH) and the WHO European Environment and Health Process (EHP) Partnership on health sector climate action) to learn from other countries and supports the preparation of the health care sector through regional networks. The Netherlands has also stimulated worldwide action on building climate resilient and environmentally sustainable health systems, such as by taking the initiative together with Peru for a new WHA Resolution on Climate Change and Health, which was adopted by consensus during the World Health Assembly in May 2024.

4.5.4 Living and Livelihoods

4.5.4.1 *Infrastructure*

The climate-proofing of the urban area against flooding is improved by local measures (drainage, green roofs and water squares) or by spatial measures such as the construction of new open water (ditches, canals and ponds). An example of adaptation to changing weather patterns is checking how this relates to the design guidelines for infrastructure in order to account for the changing characteristics of rainfall. Regarding the progress of the implementation programme for climate change adaptation (mentioned in section 4.4.4), Rijkswaterstaat[117] strives to at least maintain the current functionality of the road network despite the effects of climate change. Rijkswaterstaat also examines whether it is necessary to update and amend the guidelines for road design and maintenance. The aim is to take into account the risks imposed

[114] Nederlandse Organisatie voor Wetenschappelijk Onderzoek, 'Dutch Research Agenda' (2024), Dutch Research Agenda (NWA) | NWO
[115] Klimaatadaptatie Nederland, 'LIFE-IP Climate Adaptation (2024), https://klimaatadaptatienederland.nl/en/policy-programmes/other-programmes-networks/life-ip-climate-adaptation/
[116] Klimaatadaptatie Nederland, 'Gezondheid in klimaatadaptatiebeleid' (only available in Dutch) (2024), https://klimaatadaptatienederland.nl/beleid/programma-netwerken/life-ip-klimaatadaptatie/projecten/kennisdoorwerking-tools/gezondheid-klimaatadaptatiebeleid/
[117] Rijkswaterstaat is part of the Dutch ministry of Infrastructure and Watermanagement, and is responsible for the design, construction, management and maintenance of the Netherlands' primary infrastructure facilities (https://www.rijkswaterstaat.nl/en).

by climate change in the procedures for replacing essential water management structures such as locks and dams, as well as the plans for new infrastructure.

Rijkswaterstaat has also produced its own Climate Impact Atlas (2022), showing the hotspots related to national road and water infrastructure. [118] Rijkswaterstaat has also prepared an implementation programme.[119] ProRail, the asset manager of the national rail infrastructure, researched potential climate impact on the national rail infrastructure and published the results in their Climate Impact Atlas Rail[120] in 2024. The results of the stress tests (mentioned in section 4.4.4) are also published in the Climate Impact Atlases of Rijkswaterstaat and ProRail in order to disseminate both knowledge and best practices. These are updated when new versions of the stress tests become available.

Both Rijkswaterstaat and ProRail prepared an implementation programme to adapt the national road, water, and rail infrastructure to the expected climate change[121]. Since the start of the programmes both organisations have implemented measures to deal with risks during calamities that are associated with, for*example, flooding and extreme weather. For the design of new infrastructure, climate change will be taken into account. Rijkswaterstaat foresees to update its implementation programme in 2026. ProRail will further research potential risks and implement measures to maintain the functionality of the rail network in the coming years. Special attention will go to the stability of the embankments.

Water & inland navigation

Municipalities, water authorities, provinces and the government are working together on the ambitions set out by the Delta Plan on Spatial Adaptation (DPRA) to act climate-proof as of 2020 and to have realised a climate-proof infrastructure by 2050. To this end, the Climate Resistant Networks programme maps out the risks of climate change for the main water system, main road network and the main waterway network. The*first round the stress tests have resulted in the first Climate Resistant Networks Implementation Agenda 2022. This shows that drought in combination with riverbed erosion leads to bottlenecks for navigability in inland waterways. An updated Implementation Agenda will be presented in 2026. For this, new stress tests and risk dialogues will take place in 2024 and in 2025.

Severe droughts in recent years, such as the droughts in 2018 and 2022, have emphasized the complexity of water distribution in a water system that serves many different goals and functions. The navigability of the main waterways is an important goal. Making inland waterways climate-proof necessitates an (inter)national and integrated approach to flood risk management, navigability, freshwater availability, water quality, ecology and an (economically) attractive living environment. The *Integrated River Management* (IRM) programme will lay out, among other things, the options and necessary choices to facilitate all river functions in a changing climate. The main policy choices to maintain navigable waterways relate to the improvement of the (intended) riverbed position and sediment management, discharge and storage capacity on the Meuse and the Rhine tributaries. These choices will be implemented before 2050. Formal decisions regarding the official start of the next phase of this programme are expected late 2024, with further concretization of the choices regarding the intended riverbed position, sediment management, discharge and storage capacity planned for late 2026.

[118] Rijkswaterstaat, 'Rijkswaterstaat Klimaateffectatlas' (only available in Dutch) (2024), https://geostenen.grid.rws.nl/portal/apps/Cascade/index.html?appid=d6ca4e4ddf5743d7b201a70cd4f1c422

[119] Tweede Kamer der Staten Generaal, 'Uitvoeringsagenda Klimaatbestendige Netwerken' (only available in Dutch) (2022), https://www.tweedekamer.nl/kamerstukken/detail?id=2022D12333&did=2022D12333

[120] Prorail, 'Klimaateffectatlas' (only available in Dutch) (2024), https://maps.prorail.nl/portal/apps/sites/#/klimaat

[121] Tweede Kamer der Staten Generaal, 'Uitvoeringsagenda Klimaatadaptatie Hoofdspoorweginfrastructuur' (only available in Dutch) (2023), https://www.tweedekamer.nl/kamerstukken/detail?id=2023D24213&did=2023D24213

4.6 Monitoring and evaluation of adaptation actions and processes

This section will outline the monitoring and evaluation processes of adaptation actions undertaken by the Netherlands. Specifically, it will outline the current use of evaluation processes, developments in monitoring and evaluation, the use of indicators, and the results of monitoring and evaluation.

4.6.1 Monitoring and Evaluation

Monitoring and evaluation of adaptation policy in the Netherlands occurs at the national and subnational levels. Currently, there are monitoring and evaluation systems in place or being developed at the national level (through the NAS and the Delta Programme), as well as at the provincial and municipal level.[122]

The NAS is required to undergo a periodic comprehensive evaluation. This first such evaluation (introduced in this Chapter in section 4.3.1) was concluded in 2022. These evaluations involve in-depth assessments of the effectiveness, efficiency, and equity of adaptation policies and measures. They help identify best practices, gaps, and areas needing improvement. The 2016 NAS serves as a baseline for the monitoring and evaluation of adaptation actions in this regard.

The monitoring programme of the Dutch Delta Programme ('Monitoring, Analysing, Acting') focuses on the questions whether the implementation:
1. is on schedule and within budget (output),
2. is achieving the set goals (outcome),
3. is addressing the tasks in an integrated manner and
4. takes place with participation of other parties (authorities, companies, NGOs and citizens).

The Delta Programme publishes annual progress reports that evaluate the implementation and effectiveness of adaptation measures. The Delta Programmes annual reports are always sent to the parliament of the Netherlands. These reports assess various aspects, such as flood risk management, freshwater supply, and spatial planning, providing a comprehensive review of the progress and identifying areas for improvement.

Additionally, Rijkswaterstaat is tasked with monitoring and evaluating a wide range of parameters relevant to climate adaptation policy related to the North Sea, coastal waters, and major rivers. This includes tracking water levels, tidal heights, wave conditions, salinity, temperature, and flow rates. By providing real-time online information on water levels along the coast and in major rivers, Rijkswaterstaat enables the assessment of climate resilience measures. Additionally, they offer six-hour advance predictions of water levels, which are crucial for evaluating the effectiveness of strategies designed to mitigate the impacts of rising sea levels and extreme weather events associated with climate change.

4.6.2 Developments in Monitoring and Evaluation

To strengthen monitoring and evaluation, the Netherlands is currently in the process of developing a comprehensive national monitoring and evaluation system. The Dutch Environmental Assessment Agency (PBL) is tasked by the Ministry of Infrastructure and Water Management to develop such a system. This system will be based on their study: 'Navigating towards a climate-resilient country' (Navigeren naar een klimaatbestendig Nederland).[123] This system will not only look at impact and output monitoring (what has been done), but also in outcome and impact (what has been achieved, how much more resilient did we become). It will entail monitoring the progress of the implementation programme, monitoring the extent to which climate adaptation measures are effective in terms of risk reduction and monitoring the development of climate change risks to all sectors. The first step in de development of such a system is to assess the impacts and risks from climate change. The report on current climate impacts and risks has been published on the

[122] Klimaatadaptatie Nederland, 'Initiatieven rondom Monitoring' (only available in Dutch) (2024), https://klimaatadaptatienederland.nl/kennisdossiers/monitoring/initiatieven/

[123] Planbureau voor de Leefomgeving, 'Navigeren naar een klimaatbestendiger Nederland' (only available in Dutch) (2021), https://www.pbl.nl/uploads/default/downloads/pbl-2021-navigeren-naar-een-klimaatbestendig-nederland-4619.pdf

14th of May 2024[124]. A similar report regarding future impacts and risks, based on the recent national climate scenario's (2023), will be available early 2026.

Parallel to this, the monitoring system will be developed. The first step has been finalized, describing the current actions on monitoring in the Netherlands[125]. Based on this, as well as on the climate risks, an assessment will be made to find tools available for monitoring, gaps in knowledge, possible indicators (focusing on impact, output, outcome and impact). Ultimately, a monitoring scheme will be drafted. This monitoring scheme will be fully operational in 2026 and will guarantee a structured monitoring of the progress on climate adaptation. The results will be added to the website www.klimaatadaptatienederland.nl.

4.6.3 Indicators used

Given the fact that the national monitoring system is currently under development, a list of indicators will be included in the next Biennial Transparency Report.

4.6.4 Results

Monitoring and evaluation of adaptation policy the Netherlands has resulted in an evaluation report of the NAS and subsequently the development of the NUPKA. As mentioned in section 3.3.1, the evaluation of the NAS yielded the following results:

1. Set concrete targets for adaptation actions and policies, and ensure more clarity regarding progress and effectiveness.
2. Ensure better coordination and more emphasis on implementation.
3. Place more emphasis on the effects of climate change for 'people, culture and nature'.

These results were addressed by the NUPKA and will, during the development of the second iteration of the NAS, be fully integrated in the overall national adaptation policies.
Moreover, the results from the monitoring and evaluation conducted through the Delta Programme leads to concrete recommendations for improvement of the overall Dutch adaptation strategy.
These recommendations are also sent to parliament.

4.7 Loss and Damage

In addition to adaptation policy, the Netherlands also takes action in regard to loss and damage.
This section will detail the aspects of climate change that have loss and damage implications as well as the Netherlands policy response to this.

The 2023 KNMI climate scenario's (outlined in section 4.2.) highlight the potential of accelerated sea level rise and changes in precipitation extremes during summer showers, which makes the Netherlands vulnerable for floods during weather extremes.

Regarding its policies to avert, minimize and address loss and damage, the Netherlands follows a comprehensive approach and recognizes that adaptation policy forms an important component of averting, minimizing and addressing loss and damage. In this regard, various adaptation policies and actions outlined in sections 4.4. and 4.5. of the present chapter contribute to averting, minimizing and addressing loss and damage. Additionally, the Netherlands has undertaken various steps to better reduce, manage and, where possible, prevent risk from climate change induced disasters. The country has shown a strong commitment to enhancing disaster risk governance, especially in water management, through initiatives like the Water Law and the National Water Programme.

[124] Planbureau voor de Leefomgeving, 'Klimaatrisico's in Nederland' (only available in Dutch) (2024), https://www.pbl.nl/downloads/pbl-2024-klimaatrisicos-in-nederland-5359.pdf
[125] Climate Adaptation Services, 'Inventory Monitor Climate Adaptation Policy Implementation' (2024), https://climateadaptationservices.com/en/projecten/inventory-monitor-climate-adaptation-policy-implementation/

The establishment of the *Beleidstafel Hoogwater en Wateroverlast* (Policy Forum on Water Inundation and High Water) further underscores the government's investment in disaster risk governance. Recommendations from the Beleidstafel Hoogwater en Wateroverlast report advocate for a legal framework for small water bodies and a more risk-oriented approach to water inundation, including the need to educate citizens about flood risks and their roles in crisis situations. For further information, see the report published by the Beleidstafel Hoogwater en Wateroverlast.[126]

Historically, Dutch policy has emphasized disaster prevention over preparedness and response. However, concerns about the adverse impacts of climate change as well as a flooding event which occurred in the Dutch province of Limburg in 2021, have highlighted the importance of preparedness and response. Recommendations from the Beleidstafel Hoogwater en Wateroverlast stress prioritizing these measures alongside traditional prevention efforts.

4.8 Cooperation, good practices, experience and lessons learned

The present section will outline efforts to share information, good practices, experience and lessons learned on science, policy and planning specifically related to climate change adaptation. It should be noted that a broader overview of international activities and projects undertaken by the Netherlands, including detailed information on financial, technology development and transfer and capacity-building support provided and mobilized under Articles 9–11 of the Paris Agreement, is provided in chapter 5 of this BTR.

Additionally, this section will also provide details on the good practices and lessons learned concerning adaptation policy.

4.8.1 Cooperation

4.8.1.1 *Exchange of Science, planning and policies relevant to adaptation*

The Ministry of Infrastructure and Water Management cooperates with various international partners with the aim to share and exchange of knowledge and expertise, with sustainable solutions central. Water is a driving force for climate adaptation. We deploy targeted resources to improve the water safety and water security of countries and people worldwide and to position the Netherlands as a 'Centre of Excellence'. This includes accelerating and increasing Dutch policy influence in various international arenas (UN, EU, coalitions, etc.) and through bilateral cooperation through various instruments (see explanation below).

The Netherlands actively promotes a central position for water within the UN and in other multilateral forums. This commitment is aimed at securing the outcomes of the UN 2023 water conference with the organizers of the 2026 water conference.

4.8.1.2 *Policy innovation*

International cooperation in the field of water and climate adaptation is detailed in the policy under the Dutch International Water Ambition (NIWA). In 2024, the policy will be recalibrated in line with the international tasks and the coalition agreement of the new Dutch government.

In relation to the Water Action Agenda (UN water conference 2023), the Netherlands has committed to the continuation or scaling up of several instruments. These instruments can be used to increase water safety and water security in specific countries. This concerns Partners for Water (deployment in eight delta countries, six thematic approach countries and subsidy scheme worldwide), Blue Deal (together with the water boards), Water as Leverage (urban resilience),

[126] https://open.overheid.nl/documenten/ronl-cddbc01e11cbe749215a9adde1803b2f346f50e0/pdf (only available in Dutch)

International Panel for Delta's and Coastal Areas (IPDC, Supporting in adaptation strategies in 16 countries and islands) and Disaster Risk Reduction and Surge (aimed at preventing water disasters worldwide). These instruments form the basis for shaping bilateral cooperation.

Another initiative is the close collaboration with the *Global Commission on the Economics of Water (2022-2025)*. The Global Commission is redefining the way we value and govern water for the common good. The Commission will present the evidence and the pathways for changes in policy, business approaches and global collaboration to support climate and water justice, sustainability, and food-energy-water security. The Netherlands is an active member.

4.8.1.3 *Integration of adaptation actions into planning at different levels*

The Netherlands actively supports strengthening adaptation planning. In this regard we share our experiences internationally and contribute to the formulation of national adaptation plans and strategies. The International Panel for Deltas and Coastal Areas (IPDC) is a specific instrument that supports countries and islands in drafting their climate adaptation strategy. It is demand driven and action oriented. The IPDC aims to be a leading network of countries, financial institutions and organizations involved in climate adaptation worldwide. The programme has the ambition to be ground-breaking in the way information is exchanged, how to learn together, develop solutions and action plans, and make decisions. The IPDC network ensures that the necessary knowledge to create delta solutions is available and actively shared on a range of issues, including adaptation measures, projects, and good practice. The programme supports its members in making choices, be it in projects or in adaptation strategies. The programme supports Small Island States in their specific challenges to climate change and sea level rise. To ensure impact the IPDC works at three levels within the partner countries: government level (policy), scientific level (science base) and action holder level (stakeholders and implementation).

Another good example of good cooperation with emphasis on planning at different levels is the Water as Leverage programme (WAL). Water as Leverage aims to accelerate urban climate change adaptation worldwide. The programme uses innovative interventions developed in and with vulnerable communities. It works with partners who will supervise the implementation. Results-driven collaboration is essential across all sectors, layers of government, and stakeholders. Water as Leverage promotes sustainable social, economic, and water climate resilience, serving as a catalyst for development. With research by design, WAL gives substance to project development innovatively and inclusively. It connects urban climate action (mitigation and adaptation) with social development, employment, sustainable economic development and biodiversity recovery.

4.8.1.4 *Cooperation to strengthen science, institutions and adaptation*

The Netherlands is an active member of the UNESCO Intergovernmental Hydrological Programme (IHP). It is the only intergovernmental cooperation programme of the UN system dedicated to water research and management, and related education and capacity development. It addresses national, regional, and global water challenges, by supporting the development of sustainable and resilient societies. This phase, covering 2022-2029, identifies key water priority areas to support in achieving the 2030 Agenda and the Sustainable Development Goals (SDGs). The Netherlands has put more emphasis (in the ninth national IHP programme) on the combination of water and climate adaptation.

4.8.1.5 *Improving durability and effectiveness of adaptation actions*

A few examples of effective programmes that the Netherlands are implementing with their international partners are listed in table 4.5 below.

Table 4.5: overview of examples of international programmes on climate change adaptation that the Netherlands are implementing with their international partners.

Programme	Goal	Countries
Partners for Water Programme (2022-2027):	Partners for Water supports delta countries worldwide with the adoption of sustainable and integrated approaches to water management. Through long-term partnerships and the use of our network, knowledge and finance, we aim to co-create solutions to complex water issues in our partner countries.	Bangladesh, Colombia, Egypt, India, Indonesia, Mozambique, and Vietnam.
Disaster Risk Reduction and Surge Support (2023-2027):	Goal: The DRRS programme operates in all disaster management cycle phases: mitigation, preparedness, response and recovery. Foreign governments and humanitarian actors can request support. Every intervention is tailor-made. DRRS can assemble a team with relevant stakeholders and (local) experts based on the challenge and expertise needed.	Global (specially for ODA countries)
International Panel for Deltas and Coastal Areas (2023-2026):	Its mission is to bring water to the heart of climate adaptation action. In this way, the IPDC aims to be an effective international platform to act on improving lives, livelihoods and ecosystems in deltas, coastal areas, and islands. It supports in knowledge exchange, Technical Assistance, capacity development and training (webinars).	Indonesia, Vietnam, Bangladesh, Egypt, Colombia, Argentina, South Africa, Barbados, Caribbean Islands part of the Kingdom of the Netherlands: Curacao, Aruba, St. Maarten, Bonaire, St. Eustatius and Saba.
Water as Leverage (2018-2026):	Water as Leverage aims to inspire transformative, design-driven solutions to urban water and climate challenges in many regions across the globe.	Indonesia, India, Bangladesh and Colombia
Blue Deal (2018-2030):	Helping 20 million people in 40 catchment areas around the world to gain access to clean, sufficient and safe water. In 2024 there are 17 partnerships in 15 countries. The cooperation is focused on knowledge exchange between water managers.	Argentina, Burkina Faso, Colombia, eSwatini, Ethiopia, Ghana, Indonesia, Kenya, Mali, Mozambique, Palestinian Territories, Peru, Romania Vietnam, South-Africa.

4.8.2 Good Practices, Experiences and Lessons Learned

In its striving to adapt to climate change, the Netherlands is implementing a wide variety of climate change adaptation actions. These measures are undertaken at various levels of government, in all parts of the country, to combat various climate change-related challenges. To ensure transparency, as well as to learn from ongoing adaptation actions, a website has been created which comprises a large number of climate change adaptation measures.[127] The website currently presents 269 examples of different types of adaptation actions and is publicly available. The website does not only list the various examples of adaptation measures, but also includes a description for all projects, in which significant background information about the project is included. For finalised projects a discussion on results and lessons learned is also included. This not only increases the transparency of our adaptation policy, but also helps identify important factors for success and good practices regarding adaption.

[127] Klimaatadaptatie Nederland, 'Examples' (2024), https://klimaatadaptatienederland.nl/en/examples/.

5 Support provided and mobilized

Pursuant to Article 13, paragraph 9, of the Paris Agreement in accordance with the relevant modalities, procedures and guidelines (MPGs), the Netherlands has, in this chapter and the accompanying common tabular format (CTF), provided information on financial, technology development and transfer and capacity-building support provided and mobilized under Articles 9–11 of the Paris Agreement. In order to provide this information in a clear and consistent manner, this chapter is structured along the lines of the relevant MPGs (decision 18/CMA.1, para. 118 - 129).

5.1 National circumstances and institutional arrangements

The Netherlands support for climate action in developing countries has been integral part of its international cooperation. Policy documents such as Investing in Global Prospects[128] (Dutch Ministry of Foreign Affairs, 2018) and, subsequently, Do what we do best[129] (2022) have set out the development and trade agenda, which overall aim has been to contribute to the achievement of the SDGs and the objectives of the Paris Agreement. While a new government has been installed in July 2024, it was at the time of preparing this report too early to say what impact this will have on Dutch financial, technology development and transfer and capacity-building support.

The Minister for Foreign Trade and Development Cooperation (Ministry for Foreign Trade and Development as of July 2024) is responsible for the programming and planning of climate finance including support to capacity building and technology transfer. The Netherlands has been committed to contribute in the international effort to support mitigation and adaptation activities in developing countries. Since 2010, and despite challenges such as Covid-19, the Netherlands realized a year-on-year increase in its climate finance, including both public and mobilized private climate finance. This has been achieved by an allocation of additional resources for climate-specific action, a better integration of climate objectives in development cooperation and a more effective mobilization of private finance for climate action.

The Netherlands has aimed to provide balanced support to mitigation and adaptation. To support mitigation, we among others invest in providing access to renewable energy and on halting deforestation. To support adaptation, we focus on climate-smart agriculture, climate-resilient infrastructure, integrated water resource management, the provision of climate-resilient water, sanitation and hygiene services (WASH). A number of activities contribute to both adaptation and mitigation, as there is a growing awareness that many challenges are interlinked and are best addressed in an integrated manner (e.g., climate smart agriculture).

The Netherlands has adopted a Feminist Foreign Policy[130]. Therefore, gender equality and intersectionality are important crosscutting issues, as climate action is most effective when it builds on the capacities and addresses the aspirations, needs as well as the vulnerabilities of marginalized peoples.

In line with the above policies, the Netherlands has focused its bilateral aid relationships on countries in West-Africa/Sahel, Northern-Africa, Middle East and the Horn of Africa.

[128] https://www.government.nl/documents/policy-notes/2018/05/18/investing-in-global-prospects
[129] https://www.government.nl/documents/policy-notes/2022/10/10/policy-document-for-foreign-trade-and-development-cooperation-do-what-we-do-best
[130] https://www.government.nl/latest/news/2022/11/18/feminist-foreign-policy-netherlands

However, given the global challenge that climate change presents, there has been flexibility to provide support to programmes and initiatives that target climate change at a global level beyond the regions listed.

5.1.1 Description of the systems and processes used to identify, track and report on support provided and mobilized through public interventions.

The Ministry of Foreign Affairs is responsible for the identification, tracking and reporting on the provision (i.e., public climate finance) and mobilization of (private) climate finance mobilized through public interventions. The Climate Division within the Directorate of Inclusive Green Growth is responsible for tracking and reporting on climate finance.

The Netherlands assesses proposals for projects and programmes through an elaborate process of reviewing and assessing intake documents, so-called 'quality@entry reviews' and, finally, project/programme appraisals (reviewed and approved at several levels) to make sure that activities will meet the demands and needs of all stakeholders and are founded on solid policy and context analyses, (climate) risks and vulnerability assessments, proven theories of change, earlier evaluations and contain proper mechanisms for monitoring evaluation and learning (MEL).

To support policy officers in their climate mainstreaming work, the Ministry has adapted project intake-, appraisal and report assessment forms. These forms, among others, require that responsible policy officers to, on a comply or explain basis, address climate change explicitly throughout the project cycle. A Climate Mainstreaming Toolbox provides easy access and/or links to both internal as well as other relevant (e.g., OECD) reports, guidelines, country climate profiles, etcetera. Awareness and knowledge of staff on climate change is furthermore enhanced through personal and formal communications, ad hoc training, workshops and orientation sessions, and an online training course (currently under revision).

Tracking, measuring, and reporting of public and mobilized private finance, is integrated into the Ministry's existing management information systems for project data, and is based on the allocation of OECD Climate Mitigation and Climate Adaptation Markers, on OECD provided imputed climate percentages for core contributions to multilateral institutions, or, in some cases (where OECD published imputed percentages are not available), on a climate percentage determined by the Ministry itself. Relevant elements of the Ministry's Management Information System are furthermore made available to the public through a climate finance dashboard[131].

To measure and report on annual mobilized private finance, also based on OECD methodology, the Ministry uses the assistance of a consultancy firm.

For further details on the methodologies for measuring and reporting on public and mobilized private climate finance, please refer to relevant subsequent sections.

5.1.2 Description of challenges and limitations.

Overall policies for foreign trade and development cooperation, such as the policy documents "Investing in Global Prospects" adopted in 2018 and "Do what we do best" adopted in 2022, are determined when a new government takes office and approved by Parliament. They clarify thematic priorities, focus countries or regions, cross-cutting issues, channels, key initiatives and the general budgetary framework. Consequently, they are translated into more detailed policies, in multi-annual strategic plans and theories of changes. The latest elections took place in November 2023 and the new government was installed in July 2024. During the drafting of this BTR it was too early to assess/describe the impact of these changes on the Netherlands' policies, strategies and actions.

[131] https://public.tableau.com/views/ClimateFinanceNL/Summary?:showVizHome=no

Budgets in the Netherlands are subject to annual budget cycles. In the fall of each year the government proposes a new budget for the following year, which is then approved by Parliament before the end of the year. The amount of climate finance that the Netherlands can provide is largely dependent on the budget for foreign trade and development cooperation. The Netherlands' contributions to the International Development Association (IDA), the International Finance Corporation (IFC) and the International Bank for Reconstruction and Development (IBRD) of the Works Bank Group and the Asian Infrastructure Investment Bank (AIIB), which are partially used to support climate action in developing countries, are dependent on the budget of the Ministry of Finance.

The climate-relevant programmes and activities that the Netherlands will support are thus dependent on the prevailing policies and approved annual budgets. Given the annual budget cycle, and the always ongoing approval of new programmes and activities, the Netherlands can only provide an estimate of its climate finance for one year ahead.

An important challenge at the more technical level, as also highlighted in a recent evaluation of our climate policy[132] and the OECD Development Co-operation Peer Reviews of the Netherlands[133], is to make sure that our support is more accessible to and better reaches and/or achieves impact for the intended target groups, in particular the poorest and those in the most vulnerable situations. Efforts to mobilize climate finance from the private sector could focus more on adaptation and on development additionality. There is furthermore room for further improvements in defining, measuring and reporting on the impacts of the climate actions supported (such as reduction of CO_2 emissions and/or increase in climate change resilience), both at individual programme and at aggregated sectoral or thematic levels.

Some of these recommendations are already being addressed, for instance through a recent advice to strengthen country partnership approaches, through Netherlands' support to and partnerships with programmes, organizations and alliances such as Reversing the Flow[134], the International Institute for Environment and Development (IIED)[135], the Climate and Development Knowledge Network (CDKN)[136], the African Activists for Climate Justice (AACJ)[137] and the Global Alliance for Green and Gender Action(GAGGA)[138] to strengthen (research and lobby & advocacy for) Locally Led Adaption, through a study to estimate impact on CO_2 emissions, and also through the introduction of new result frames, programme and result registration software and management systems. Nonetheless, these and other challenges need and will continue to get further attention.

Finally, it is recognized that tracking and measuring climate finance based on Rio markers is an approximation at best and therefore not perfect. Given the limitations in institutional and human resources capacity and the fact that there are no other common (generally agreed) methodologies to determine climate relevance of programmes in more disaggregated ways, it is, in our view, still the best option for now.

[132] https://english.iob-evaluatie.nl/results/international-climate-policy
[133] https://www.oecd-ilibrary.org/docserver/67b0a326-en.pdf?expires=1721223735&id=id&accname=ocid49027884&checksum=E1716E40121163C48E925168C02EC752
[134] https://english.rvo.nl/subsidies-financing/rtf
[135] https://www.iied.org/
[136] https://cdkn.org/
[137] https://www.oxfamnovib.nl/donors-partners/about-oxfam/projects-and-programs/african-activists-for-climate-justice-project-aacj
[138] https://gaggaalliance.org/

5.1.3 Information on experience and good practices in relation to public policy and regulatory frameworks to incentivize further private climate financing and investment

The Netherlands' ambition is to green the instruments for foreign trade and development cooperation in support of the goals of the Paris Agreement and the SDG agenda. This ambition was originally among others set out in a letter from the Minister for Foreign Trade and Development Cooperation to the House of Representatives on 'International financing instruments for global prospects' in February 2019[139] and the "Netherlands' Global Climate Strategy" in October 2022[140].

Bilateral financing instruments that fall within the budget of Foreign Trade and Development Cooperation have been phasing out public-funded grants for coal projects and for exploration and development of new oil and gas reserves in developing countries from 2020 and have set ambitious targets for mobilizing green investment.

With the bilateral financing instruments, the Netherlands supports initiatives such as Partnering for Green Growth & the Global Goals 2030 (P4G)[141] and the Netherlands Advisory Board for impact investing (NAB)[142]. While P4G helps early-stage investments by the private sector to become investment-ready, the NAB is working towards ecosystem changes to enable SDG and climate relevant investments by the private sector in emerging markets and developing countries.

Regarding the general export instruments – such as trade missions, embassy support and export credit insurance – the government is taking steps, in consultation with the business community, to promote greening of these export instruments and to support Dutch businesses more effectively in international projects aimed at supporting climate adaptation and the energy transition, including in developing countries.

The Dutch initiative ILX[143] provides pension funds with access to a novel asset class of development finance. Benefits of ILX are twofold: on the one hand ILX mobilizes institutional investors for SDG's and climate goals, including climate adaptation, on the other hand it enables MDB's to better leverage their balance sheets.

In addition, the Netherlands sees a leading role for multilateral banks in financing the energy transition, low emission climate-resilient development pathways and climate adaptation. To this end, it advocates that these institutions set the most ambitious objectives for climate finance possible and phase out financing for fossil fuel projects. The Netherlands also considers that multilateral banks play an important role in scaling-up financing, including by mobilising private sector funding, and removing barriers to green investments in developing countries.

5.1.4 Efforts taken to enhance comparability and accuracy of information reported on financial support provided and mobilized through public interventions, such as through use of international standards or harmonization with other countries, institutions, and international systems.

The Netherlands measures and bases its reporting on agreed OECD Rio Markers and Methodologies. It is also actively and continuously involved in discussions within OECD and other relevant bodies on further enhancing comparability and accuracy of information reported, both on public and mobilized private climate finance as well as on capacity building and technology development & transfer. An external consultant measures our mobilized private climate finance yearly, including to ensure the adequate compliance with the OECD methodologies and a harmonisation of methods over the years.

[139] https://www.tweedekamer.nl/downloads/document?id=2019D06418
[140] https://www.government.nl/documents/publications/2022/12/22/global-climate-strategy
[141] https://p4gpartnerships.org/
[142] https://www.nabimpactinvesting.nl/
[143] https://www.ilxfund.com/

5.2 Underlying assumptions, definitions, and methodologies

In line with the MPGs, and to enhance the transparency of reporting, this section provides a description of the underlying assumptions, methodologies, and definitions, as applicable, used to identify and/or report the financial, capacity development and technology development and transfer support.

5.2.1 Description of the underlying assumptions, methodologies, and definitions for the current reporting

This section provides information in relation to the different MPGs/questions in sub-sections (a) – (t) below.

(a) **The chosen reporting year (calendar year, fiscal year).**
The Netherlands reports on the basis of calendar years.

(b) **The conversion between domestic currency and United States dollars.**
For the reporting years 2021 and 2022, the Netherlands used the OECD exchange rates[144], as follows:
2021: 1 € = 1.183 USD (=1/0.845)
2022: 1 € = 1.053 USD (=1/0.950)

(c) **The status (committed, disbursed).**
The status of Netherlands climate finance reported is as follows:
- For public climate finance: disbursed (amount provided per year)
- For mobilized private climate finance: committed (value of new contracts, subsidies, etc., whereby the value is reported in the year the commitments were made and taking into account the share attributed to the Netherlands).

(d) **The channel (bilateral, regional, multi-bilateral, multilateral).**
For multilateral flows, we use the OECD definition as follows:
- Channelled via multilateral organisations that pool contributions of several governments.
- Multilateral organisations can allocate these flows at their discretion in accordance with multilaterally agreed rules and procedures.

In CTF Tables III.2-2021 and III.2-2022, the Netherlands reports on multilateral climate finance comprising:
- the contributions to multilateral climate change funds;
- the climate-specific share of our core contributions to the GEF;
- the climate-specific share of our core contributions to multilateral financial institutions, including regional development banks; and
- the climate-specific share of our core contributions to specialised UN agencies.

Depending on the scope of the programmes, all other programmes are financed through either global, regional, or bilateral channels. This includes the climate-specific share of our non-core contributions to multilateral organisations for country-specific or region-specific programmes. The Netherlands does not generally refer to the term multi-bilateral in its management systems.

Activities channelled through global, regional, or bilateral channels are reported in CTF Tables III.1-2021 and III.1-2022. The additional information provided in the last column of this table also includes information on the contracting party. In many cases, the contracting party is also the main implementing agency.

(e) **The funding source (official development assistance (ODA), other official flows (OOF), other).**
The source of all Netherlands public climate funding is ODA as defined by OECD/DAC.

[144] https://data.oecd.org/conversion/exchange-rates.htm

(f) **The financial instrument (e.g., grant, concessional loan, non-concessional loan, equity, guarantee, insurance, other (specify)).**
Netherlands public climate finance comprises grants only.

Mobilized private finance involves various instruments for which we apply OECD/DAC definitions.

(g) **Information on instruments and funding sources reported, including how a Party has determined finance to be concessional and/or ODA, including by using information such as grant equivalency, institution and/or instrument-based approaches.**
See responses under (e) and (f). In line with OECD guidelines and definitions, the Netherlands follows an activity-based approach for climate finance reporting.

(h) **The type of support (e.g., adaptation, mitigation, cross-cutting).**
The Netherlands applies the OECD/DAC reporting directives for mitigation and adaptation (OECD, 2023). For activities that involve both mitigation and adaptation components, we categorized the activity as mitigation when the Rio marker or (imputed) climate percentage for mitigation has a higher score than that for adaptation. Similarly, we categorized the activity as adaptation when the Rio marker or (imputed) climate percentage for adaptation has a higher score than that for mitigation. Where the distribution between adaptation and mitigation is not known or when both markers and climate percentages have the same score, we categorized the activity as cross-cutting.

(i) **The sector.**
For the sector the Netherlands applies OECD/DAC definitions as proposed by the OECD (2024a) concerning the OECD/DAC sector classification with UNFCCC data collection.

(j) **The subsector.**
For the subsector, the Netherlands is using the 5-digit OECD/DAC CRS purpose code[145].

(k) **Whether it supported capacity-building and/or technology development and transfer objectives.**
In the view of the Netherlands, when new technology and knowledge are successfully introduced, the key issue is not the transfer based on the agency of the outsider, but the translation and appropriation based on the agency of the insider. Capacity is not built but mutually mobilized and developed. As such, the emphasis should be on learning and behavioural change, rather than through the outside lens of teaching, training and technical assistance. Technology development and translation and capacity mobilization and development in developing countries form an integral part of many activities that support climate change mitigation or adaptation. Given the multitude of activities and the variation in types and scope of capacity and technology development activities, and in the absence of common markers, flags or definitions for learning and technology development in our management information system[146], activities have, based on a project-by-project review, been identified to contribute to capacity and/or technology development and translation. The scope and purpose thereof are included in the descriptions in the tables.

It is envisaged that, when the new result framework recently introduced in the Ministry's management system is fully operational, it will be possible to, in a qualitative sense, also report on the results of capacity building and technology transfer support in the future.

[145] https://webfs.oecd.org/oda/DataCollection/Resources/DAC-CRS-CODES.xls

[146] The OECD (2024b) published a guidance document with a proposed methodology to identify and label climate-related capacity building activities and climate-related technology transfer activities in the CRS. Although the Netherlands has been considering if and to what extent this methodology could form a starting point for further improving the (automized) identification and tracking of technology transfer and capacity building activities, the current approach based on project-by-project reviews is for the moment still considered to be the most appropriate.

(l) **The support as being climate specific.**

The Netherlands follows the following methods to determine the climate relevance of programmes:

- For most programmes, we determine the climate relevance on the basis of the allocation and score of the OECD/DAC Rio-markers[147]. For purposes of calculating our climate finance, we consider a programme having a climate marker 'significant' to be 40% climate specific and a programme having a climate marker 'principal' to be 100% climate specific.
- For other programmes, in particular for those programmes concerning core contributions to multilateral institutions or programmes involving large amounts of finance and for which we consider the 40/100% too crude a sub-division, we determine the climate specificity as follows:
  - where available, we applied OECD/DAC 'Imputed climate-related shares'[148]; or
  - where those OECD/DAC percentages were not available, we have estimated the climate-relevant shares ourselves (where possible in consultation with the implementing agencies concerned).

Table 5.1 contains the shares/percentages applied for climate finance in 2021 and 2022 respectively.

[147] For the allocation and score of OECD/DAC Rio-markers, we generally apply the definitions and (scoring) criteria presented in the (OECD, 2023)

[148] https://webfs.oecd.org/climate/Imputed_multilateral_shares_climate.xlsx

Table 5.1: Climate shares/percentages applied to calculate climate finance support to multilateral organizations and selected programmes in 2021 and 2022[149].

Programme/Institution	Climate percentage used	
	2021	2022
Imputed climate-related shares published by OECD/DAC		
IFAD	36%	37%
CIF	100%	100%
GEF	84%	84%
GCF	100%	100%
Montreal Protocol	100%	100%
LDCF	100%	100%
AsDB concessional	13%	13%
AfDB concessional	35%	35%
AfDB non-concessional	36%	36%
IDA	31%	32%
IFC	NR	30%
IBRD	NR	30%
Climate-related shares estimated by the Netherlands		
UNEP	30%	30%
UNCDD	20%	NR
WHO	9%	9%
WFP	12.5%	12.5%
UNICEF	1%	NR
UNDP Core	5%	5%
UNDP SDG Fund	NR	10%
ILO	NR	1%
UNFPA	NR	1%
UN WOMEN	NR	1%
ICRC	NR	10%
UNOCHA	NR	3.5-5%

(Note: NR = No climate finance reported)

[149] For the BTR for 2021 and 2022, we used the OECD imputed shares tables for respectively 2019 and 2020, to ensure consistency with earlier climate finance reports to parliament and EU.

(m) **Information on the efforts taken to avoid double counting.**
The Netherlands reports public climate finance on the basis of inflows. Hence there is no risk of double counting with support provided by other countries.

(i) Information on how double counting among multiple Parties involved in the provision of support was avoided.
As indicated above, since the Netherlands is reporting on the basis of inflows, double counting of public climate finance among multiple parties is avoided.

(ii) Information on how double counting among multiple Parties involved in the mobilization of private finance through public interventions was avoided, including the methodologies and assumptions used to attribute the mobilized resources through public interventions reported to the Party that reports them, if possible relative to the type of instrument used for the mobilization.
For reporting mobilized private finance, the Netherlands uses the methods for treating and measuring private mobilisation programmes, as agreed upon within WPSTAT of the OECD[150].

(iii) Information on how double counting was avoided between the resources reported as provided or mobilized, and the resources used under Article 6 of the Paris Agreement by the acquiring Party for use towards the achievement of its NDC.
As already indicated above, since the Netherlands is reporting on the basis of inflows, double counting of public climate finance among multiple parties is avoided.
Regarding mobilized private climate finance, the Netherlands only reports the mobilised private finance that can be attributed to the Netherlands, the amounts contributed by other public actors are not taken aboard. Within this calculation, we follow the agreed OECD methodologies.

(iv) How support is attributed between multiple recipient countries, in cases where a project involves multiple recipient countries and where this information is reported on a country-by-country basis.
Since the support to projects involving multiple countries is not reported on a country-by-country basis but on the basis of total disbursements for the projects as a whole, there is no risk of double counting.

(n) **The definition of public and private finance, in particular where entities or funds are mixed.**
Public finance is finance provided by the Netherlands government from the ODA budgets of the Ministry of Finance (concerning transfers to IDA, IBRD and IFC) and the Ministry for Trade and International Cooperation.

Netherlands mobilised private finance, in line with OECD definitions, consists of that proportion of finance from private sources mobilised by bilateral and multilateral finance interventions in support of activities in developing countries which can be attributed to the Netherlands. Measurement of mobilised private finance is carried out in accordance with OECD methodologies[151].

For the private finance mobilised by the Netherlands through its share in MDBs, until 2022, we have calculated the best possible estimate based on the data available as described in the yearly published reports on private finance mobilised. From 2022 onwards, we base this calculation on the yearly "Joint Report on Multilateral Development Banks' Climate Finance" as published by the MDBs. Besides the funds that are funded by the Ministry of Foreign Affairs, FMO also is mobilizing private capital from its own balanced sheet, which is also included in the reporting. The annual measurement and analysis of mobilised private finance are carried out with the assistance of a consultant and the results are published on the government's website.[152] A summary of the results for 2021 and 2022 is presented in this report in section 5.3.3.
More details are provided in CTF Tables III.3-2021 and III.3-2022.

(o) **How private finance was assessed as mobilized through public interventions.**
(i) Identify a clear causal link between a public intervention and mobilized private finance, where the activity would not have moved forward, or moved forward at scale, in the absence of the Party's intervention.
For attribution of mobilized private finance from public interventions, the Netherlands is adhering to the

[150] https://one.oecd.org/document/DCD/DAC%282024%2940/ADD1/FINAL/en/pdf
[151] https://one.oecd.org/document/DCD/DAC%282024%2940/ADD1/FINAL/en/pdf
[152] https://www.government.nl/documents/reports/2022/04/04/mobilised-private-climate--biodiversity-finance-report-2021 and https://www.government.nl/documents/reports/2023/06/30/mobilised-private-climate-and-biodiversity-finance

OECD methods on private sector mobilisation. A clear causal link can be substantiated based on these methods for instruments such as co-financing and guarantees.

However, this proves to be more complex in the case of TA and the OECD has provided methodological suggestions on this point. To date, the Netherlands has not reported on mobilized private finance from TA sources. However, with the publication of official OECD guidelines on the measurement of mobilisation through TA, the Netherlands will start reporting on these as of 2024.

(ii) Provide information on the point of measurement (e.g. point of commitment, point of disbursement) of the private finance mobilized as a result of the public intervention, to the extent possible in relation to the type of instrument or mechanism used for the mobilization.
The Netherlands is using the point of commitment when reporting on mobilized private finance as a result of public intervention. More information on the calculations methods of the Netherlands can be found in the earlier mentioned annual consultants' reports.

(iii) Provide information on the boundaries used to identify finance as mobilized by public intervention.
The reporting of the Netherlands is based on the OECD-DAC methodology on calculating private finance mobilization to determine the private finance mobilized by public interventions funded by the Ministry of Foreign Affairs of the Netherlands. For the calculation of mobilized private finance, the Netherlands is using six out of the seven calculation methods for the different financial instruments:

- Syndicated loans
- Shares in collective investment vehicles
- Guarantees
- Direct investment in companies
- Credit lines
- Standard grants and loans in simple co-financing arrangements

For further details on this mechanism, please refer to the OECD-DAC methodology.

(p) **How it seeks to ensure that support provided and mobilized through public interventions effectively addresses the needs and priorities of developing country Parties for the implementation of the Paris Agreement, as identified in country-driven strategies and instruments, such as biennial transparency reports, NDCs and national adaptation plans.**
The Netherlands' support for climate action in developing countries is an integral part of its international cooperation policy. Since Dutch public climate finance is all financed from ODA, our bilateral activities and contributions to multilateral institutions and development banks have been primarily intended to support the poorest and most vulnerable countries and communities. The Netherlands has furthermore been targeting more than half of its public climate finance for adaptation.

Of the Dutch partner countries, mostly situated in the Sahel, the Horn of Africa, the Middle East and North Africa, most are least developed countries (LDCs), many are fragile and conflict-affected states and all of them are vulnerable to climate change.

An evaluation of the Netherlands' international climate policy for the period was published in 2024[153].
The evaluation was based, among others, on a study of climate finance provided in the period 2010–2019 which was published by the Ministry's Evaluation Department in 2021[154]. According to the report, 60% of the public climate finance evaluated reached the poorest countries. For mobilised private climate finance that percentage was 50%. To further improve the focus on the most vulnerable people, women and girls, the report furthermore presented a number of practical recommendations for programme identification, design and monitoring and evaluation.

[153] https://english.iob-evaluatie.nl/results/international-climate-policy
[154] https://english.iob-evaluatie.nl/results/climate-financing

To address the needs of our partner countries, we work with a multitude of actors, including national, regional and local authorities, multilateral organisations, non-governmental organisations, private-sector organisations, farmers organisations, water boards, and so on. These organisations all have their own processes to ensure that their activities meet the needs of their target populations.

With regards to (earmarked) bilateral activities funded with public climate finance, we require implementing organisations to carry out context, problem and stakeholder analyses, and in that process also refer to climate profiles such as those published by IPCC, prepared by the Ministry itself or available at other organisations such as USAID, African Development Bank, World Bank, UNDP, and not least also to National Determined Communications (NDCs), National Adaptation Plans (NAPs) and other relevant national policies and strategies. In the programme Theory of Change and Monitoring, Evaluation and Learning (MEL) strategy, implementing organisations funded by the Netherlands are expected to explain how the programme intends to address climate risks and vulnerabilities, and with what results. To demonstrate and promote locally-led climate action and, through training, lobby and advocacy, improve access to finance, the Netherlands actively partners with and supports the NDC partnership, programmes such as Reversing the Flow[155], knowledge brokers such as Climate & Development Knowledge Network (CDKN)[156] and International Institute for Environment and Development (IIED)[157], and with civil society partnerships such as Voices for Climate Action (VCA)[158], African Activists for Climate Justice (AACJ)[159] and Global Alliance for Green and Gender Action (GAGGA)[160].

Considerable part of the Netherlands' climate finance is provided through (core) contributions to multilateral (climate) funds such as GCF and GEF, to multilateral organisations such as WFP, UNICEF, UNDP and UNEP, and to multilateral development banks. In those cases, the Netherlands does not have direct control of the selection of programmes and (focus) countries but has been playing an active role, through scheduled board meetings and dialogues and direct communications, in asking those organisations to increase the climate relevance of their activities, to direct their activities towards the poorest and most vulnerable countries, and to also develop the necessary processes, safeguards, guidelines, manuals, etc. in that regard.

Fund managers receiving Dutch funds aiming at supporting and mobilising private sector finance and investments are provided with instructions regarding objectives, scope and focus, and are expected to report and be evaluated accordingly. In with the above, these programmes are also required to align their financing with local needs and country-driven strategies. For the Dutch Fund for Climate and Development (DFCD)[161] , for instance, there is a requirement that 65% of the investments is directed at adaptation and that 25% should be directed to least developed countries as determined by the OECD-DAC country list. In addition, the DFCD works with a "landscape approach". With this approach DFCD invests across sectors and collaborates with various stakeholders to ensure that projects align with the local contexts to extend the impact beyond company boundaries.

(q) **How it seeks to ensure that support provided and mobilized through public interventions is in line with the long-term goals of the Paris Agreement.**

As elaborated earlier, the elaborate programme identification, preparation/design and MEL process requires responsible programme officers and implementing organizations to, in collaboration with and the full participation of all stakeholders, carry our climate context, risk and vulnerability analyses and to explain climate relevance and define and monitor climate actions and results in explicit terms, thereby referring to the Paris Agreement, relevant NDCs, NAPs and other relevant international and national policies.

[155] https://english.rvo.nl/subsidies-financing/rtf
[156] https://cdkn.org/
[157] https://www.iied.org/
[158] https://voicesforjustclimateaction.org/about-us/
[159] https://aacj.africa/
[160] https://gaggaalliance.org/
[161] https://www.thedfcd.com/

(r) **An indication of what new and additional financial resources have been provided, and how it has been determined that such resources are new and additional.**

As reported in the previous Biennial Reports (BR) and National Communications (NC), the Netherlands delivered on its Fast-Start Finance commitment in the 2010–2012 period. Since then, following the growing understanding that development and climate action are best pursued in an integrated manner, we have chosen a more integrated approach in line with our pledge to contribute a fair share to the needed financing of climate action in developing countries. Over the years, we have also actively engaged with the private sector to raise additional funding for climate action, as presented in Section 5.3.3.

The financial resources disbursed over 2021 and 2022 as reported in this report are considered new and additional to the financial disbursements reported in the Biennial Reports and National Communications over the years 2011–2020. Dutch support for climate action in developing countries is financed from the budgets of the Ministry of Finance and the Ministry for Foreign Trade and Development Cooperation. This budget is approved by Parliament annually, providing new and additional resources to the budgets approved in previous years, whereby formally the financial support to developing countries for climate action provided from this budget in a given year is considered new and additional.

The Netherlands' total annual climate finance has increased substantially from € 493 million in 2015 to some € 1,843 million in 2023. This increase is partly the result of more effectively mainstreaming/ integrating climate mitigation and adaptation in new development cooperation programmes. A substantial part also comes from year-on-year increases in the climate budget of the Ministry for Trade and Development Cooperation.

Concrete examples of substantial new and additional financial commitments made by the Netherlands in recent years include:

- € 200 million to the Dutch Fund for Climate and Development (DFCD), for the period 2019-2037;
- € 120 million to the Green Climate Fund (GCF), for the period 2019-2023 (first GCF replenishment);
- USD 44 million to the World Bank's Regional Off-grid Electrification Project in the Sahel for the period 2019-2026;
- € 35.6 million for the AGRI-3 Fund for the period 2020-2039;
- USD 160 million to Climate Investment Funds (CIF), for the period 2021-2031;
- USD 20 million to NDC Partnership, including its Partnership Action Fund, for the period 2021-2025;
- USD 114M to PSNP 5/Productive Safety Net Programme Phase 5 in Ethiopia, for the period 2021-2026;
- USD 70M for World Bank/ESMAP for Electrifying Africa for the period 2021-2028;
- A total of about € 220 million for the period 2021-2025 for strengthening Civil Society Organizations active in lobby and advocacy in the areas of climate (justice), nature, biodiversity and sustainable/resilient WASH and Food Security;
- € 100M for the Pro-Arides programme, for the period 2021-2030.
- € 46M for DGIS - IHE Delft Programmatic Cooperation (DUPC3), for the period 2021-2027.
- € 124 million to the Global Environment Facility (GEF), for the period 2022-2026 (8th GEF replenishment);
- € 45 million to the Least Developed Countries Fund (LDCF), for the period 2022-2026;
- € 19 million to Climate Energy Response Facility (CERF), for the period 2022-2025;
- € 15 million to the Climate & Development Knowledge Network (CDKN), for the period 2022-2026;
- € 15 million to the Amazon Bioeconomy and Forest Management Multi-Donor Trust Fund of the Inter-American Development Bank (IDB) for the period 2022-2026;
- € 14 million to Central African Forest Initiative (CAFI), for the period 2022-2024;
- € 60M to CASCADE/Catalysing Strengthened Policy Action for Healthy Diets and Resilience, for the period 2022-2027;
- € 200M to CGIAR/Consortium of International Research Centres, for the period 2022-2027;
- € 16M to STEP CHANGE/Accelerating Adaptation to Climate Change, for the period 2022-2027;
- € 80M for the Global Alliance for Improved Nutrition (GAIN), for the period 2022-2027.
- € 45M for WaterWorx II, for the period 2022-2026.
- € 105M to One Acre Fund 2023-2027;
- € 60M additional commitment to FMO AEF/Access to Energy Fund for the period 2023-2030;
- € 80M to EnDev/Energising Development for the period 2023-2027;

- € 100M to AAAP/Africa Adaptation Acceleration Programme for the period 2023-2028;
- € 55MM to Water@Heart of Climate Action programme, for the period 2023-2028;
- € 140M to the Green Climate Fund (GCF), for the period 2023-2028 (second GCF replenishment).
- € 100M to the Soil Values West Africa programme, for the period 2023-2033.
- € 39.5M for CIEMER/NCEA National Commission for Environmental Assessment, for the period 2023-2032.
- € 30M for the Manguana – Food Systems Beira Corridor Programme, for the period 2023-2027.
- € 24M to NL CGIAR Partnership II, for the period 2024-2028.
- € 20M for the Sustainable Agriculture for Forest Ecosystems (SAFE) programme, for the period 2024-2028.
- USD 27M for ADRiFi MDTF - Supporting adaptation capacity through increased parametric insurance penetration in Africa (SACPIP -AFRICA), for the period 2024-2029.
- € 65M for the WASH UNICEF ASWA Phase III programme, for the period 2024-2027.

In addition to public climate finance, our contribution to international climate finance also includes private climate finance mobilized by public means. As further elaborated in section 5.3.3, the Netherlands has, with the help of external experts, been measuring and reporting the annual amount mobilized in line with OECD guidelines. These data are published each year in publicly accessible reports. Although the Netherlands did have a policy to mobilize private climate funding also before Copenhagen, it has had, subsequently, a policy and accompanying measures to also do so for climate action specifically.

Regarding adequacy and predictability, it is in principle not possible to provide meaningful commentary on the adequacy of the flow of resources at aggregate level, since no formal decision exist on the share (of the USD 100 billion) to be borne by each country. In 2020, when the USD 100 billion agreed to in Copenhagen and Paris was due, the Netherlands contributed about USD 1.3 billion in public and mobilised private climate finance (not including its share of climate financing through the EU). In 2023, the Netherlands contributed € 1,84 billion, more than the € 1,8 billion target set for 2025 in the government's policy "Do what we do best" adopted in 2022[162]. We believe that, with that amount and the year-on-year increases before that, the Netherlands has contributed its fair and meaningful share of the total due by developed countries. It is recognised though that there is a wide variety of 'fair share' calculations.

Since, at the programme and activity levels, budgets are based on programme proposals and requests, and also formally committed through contracts and/or grant decisions, the Netherlands believes that budgets are generally both adequate and predictable.

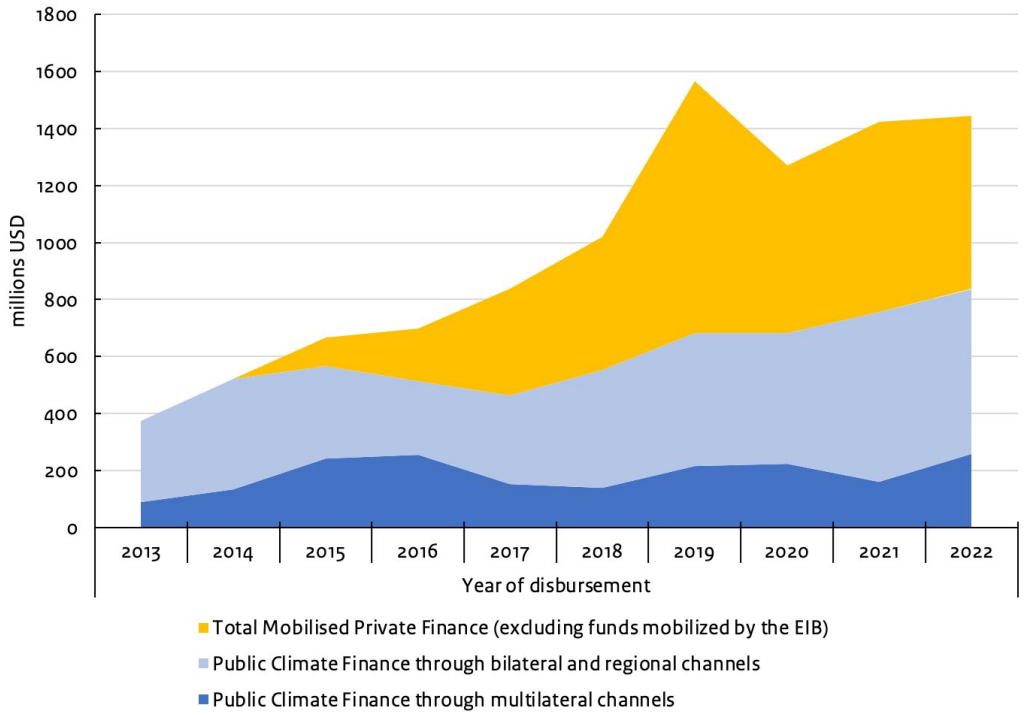
(s) **How the information provided reflects a progression from previous levels in the provision and mobilization of finance under the Paris Agreement.**

As also indicated in the previous section, there has been a consistent progression from previous levels in the provisions and mobilization of finance under the Paris Agreement.

That progression is well illustrated in figure 5.1 presenting public and mobilized private climate finance figures (in USD millions) for the period 2014 to 2022. For further details on climate finance, please refer to section 5.3.

[162] https://www.government.nl/documents/policy-notes/2022/10/10/policy-document-for-foreign-trade-and-development-cooperation-do-what-we-do-best

Figure 5.1: Public and mobilized private climate finance figures (in USD millions) for the period 2013 to 2022.



(t) **Information on reporting on multilateral finance.**
Additional information on reporting on multilateral finance is provided per sub question as follows:

(i) Information on whether the multilateral finance reported is based on the Party's inflow contribution to a multilateral institution and/or on the Party's share in the outflow of the multilateral institution.
Multilateral finance reported by the Netherlands is based on its contribution (inflow) to the respective multilateral institutions.

(ii) Information on whether and how multilateral finance has been reported as climate-specific and how the climate-specific share was calculated, including by, for example, using existing international standards.
For core contributions to multilateral institutions, we determine the climate specificity as follows: where available, we apply the OECD/DAC Imputed climate-related shares (see above); or where those OECD/DAC percentage are not available (e.g., for UNDP, UNEP, UNICEF, WFP, IFAD, UNCCD, OCHA, etc.), we have as already indicated in section 5.2.1(l), estimated the climate-relevant shares ourselves.

The climate specific finance is then calculated as being the funds provided (inflow) to the multilateral institution times the climate percentage thus determined.

(iii) Information on whether multilateral finance has been reported as core/general, with the understanding that the actual climate finance amount it would transfer into depends on the programming choices of the multilateral institutions.
Multilateral finance has been reported as core, with, indeed, the understanding that the actual climate finance amount it would transfer into depends on the programming choices of the multilateral institutions. In our dialogue with those institutions, the Netherlands, like other members states, encourage institutions to not only increase the climate relevance of their programmes but to also report more explicitly on it.

(iv) Information on whether and how multilateral finance has been attributed to the reporting Party.
As also indicated above, attribution to the Netherlands of public climate finance is calculated as being the funds provided (inflow) to the multilateral institution times the (imputed) climate percentage/share published by OECD/DAC or estimated by us (see table 5.1 in section 5.2.1 (l)).

For the private finance mobilised by the Netherlands through its share in MDBs, until 2022, we have calculated the best possible estimate based on the data available as described in the yearly published reports on private finance mobilised.

As of 2022, the calculation for the private climate finance mobilised by the MDBs is based on data in the yearly "Joint Report on Multilateral Development Banks' Climate Finance". The attribution factor is calculated by looking at the Netherlands' capital share in the Banks and the financial contribution to the MDB funds.

5.2.2 Description of the underlying assumptions, definitions and methodologies used to provide information on technology development and transfer and capacity-building support

Technology development and transfer and capacity building in developing countries forms an integral part of many activities that support climate change mitigation or adaptation. The national results framework for development cooperation, of which climate action is an integral part, does not include specific cycles, indicators, assumptions, definitions and methodologies for capacity building or technology transfer support for climate change, as these are usually one element of more wide-ranging activities. Our indicators are generally geared towards measuring the results of the activity as a whole rather than individual elements of it.

Although the Netherlands has recently developed and introduced a new results and reporting framework, the indicators proposed for technology transfer and capacity building are seen to be contributing to 'enabling environment' in the broad sense and will require the programmes to report results in broad qualitative terms, rather than on specific indicators. Moreover, it will take time for this new result framework and the reporting related to it, to be fully operational.

For purposes of the current report, the Netherlands has identified and reported on activities with technology development and capacity mobilization aspects based on the description of programmes in the relevant programme and appraisal documents. CTF Table 4 and 5 contain a long list of programmes containing elements of technology and capacity development a more detailed description of some of these examples are described in in sections 5.4 and 5.5.

For the future, the Netherlands will continue to take active part in ongoing discussions within OECD/DAC and other relevant fora on how to conceptualize, identify and classify capacity and technology development activities more systematically.

5.3 Information on financial support provided and mobilized under Article 9 of the Paris Agreement

Committed to scaling up its support for mitigation and adaptation activities in developing countries, the Netherlands has realised a year-on-year increase in climate finance after having delivered on its commitment of Fast-Start Finance during 2010–2012. Table 5.2 below provides a summary of public and mobilised private finance over the years 2013–2022. Detailed information on public climate finance in BTR reporting years 2021-2022 is presented in CTF Tables III.1,2 and 3 (for years 2021 and 2022 respectively).

For mobilised private finance, the details for 2021–2022 are presented in section 5.3.3 and Tables III.3-2021 and III.3-2022. Regarding the latter, it should be noted that the Netherlands started to track private climate finance mobilised by public finance in 2015 only, in accordance with the 'Joint Statement on Tracking Progress Towards the USD 100 Billion Goal', which major donors adopted that year. As data and methodological limitations are still a serious constraint, the reported amounts should be considered as best estimates currently available.

Table 5.2: Public and Mobilised Private Climate Finance provided by the Netherlands from 2013–2022 (rounded figures in millions USD).

Funding type and channel	Year of disbursement									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Public Climate Finance through multilateral channels	90	135	243	256	152	139	217	224	161	259
Public Climate Finance through bilateral and regional channels	285	387	324	257	313	415	466	458	596	578
Total Public Climate Finance	**375**	**521**	**568**	**513**	**465**	**554**	**683**	**683**	**757**	**837**
Total Mobilised Private Finance[163]	**NA**	**NA**	**99**	**186**	**372**	**467**	**882**	**588**	**665**	**607**
Grand Total	**375**	**521**	**666**	**699**	**837**	**1022**	**1521**	**1271**	**1422**	**1444**

Over the period 2021–2022, total adaptation expenditures amounted to a little over 49% of Dutch public climate finance (€ 705 million out of € 1.433 million) and mitigation expenditures to more than 28% (€ 404 million). Much of public climate finance also supported cross-cutting activities (€ 324 million or close to 23%), mainly due to substantial contributions through multilateral organisations, in particular multilateral development banks[164].

5.3.1 Bilateral, regional and other channels

The Netherlands works with a wide range of global, regional, national and local partners including governmental structures, multilateral organisations, funds, private sector organisations, knowledge institutes and non-governmental organisations (NGOs) & civil society organisations (CSO's), to support climate action in developing countries.

In countries with which we maintain a bilateral aid relationship and where we fund programmes through funds delegated to our Embassies, we focus largely on climate-smart agriculture, integrated water resource management and climate resilient WASH services. Examples of Netherlands-supported activities provided through our Embassies include a Healthy village (WASH) programme[165] in Ethiopia, the Bangladesh Delta Plan 2100[166], the Beira Masterplan[167] in Mozambique and a programme aiming at food security and enhanced resilience in the context of climate change in Mali[168].

Centrally financed programmes such as EnDev[169], WaterWorX[170], Blue Deal[171], CAW[172], AACJ[173] and GAGGA[174] emphasise providing access to renewable energy, halting deforestation, promoting climate-smart agriculture, integrated water resources management, providing climate-resilient WASH services,

[163] These figures exclude funds mobilized by European Investment Bank (EIB) to avoid double counting with the reporting by EU.
[164] This distribution is based on expenditures of each activity attributed to adaptation, mitigation and/or cross-cutting. In CTF tables III.1, 2 and 3, activities are classified to contribute to either adaptation, mitigation or cross-cutting, which results in a different distribution: 42% for adaptation, 15% for mitigation and 43% for cross-cutting.
[165] Progress Monitoring Healthy Village Ethiopia - Max Foundation
[166] Delta Plan 2100 (bdp2100kp.gov.bd)
[167] Masterplan Beira (EKN) | Project Database CMS (rvo.nl)
[168] Programme d'Appui à la Sécurité Alimentaire et la Résilience des Populations aux Crises Climatiques et Sociales dans la Region de Mopti. | Akvo RSR
[169] Energising Development - EnDev (rvo.nl)
[170] About us (waterworxprogramme.com)
[171] Blue Deal - Dutch Water Authorities
[172] ADF Climate Action Window | African Development Bank Group (afdb.org)
[173] Home - African Activists for Climate Justice (aacj.africa)
[174] GAGGA – Global Alliance for Green and Gender Action (gaggaalliance.org)

and strengthening Civil Society Organizations to lobby and advocate for climate justice. Through Netherlands' earmarked support to the UNICEF programme for Acceleration to Sanitation and Water for All (ASWA), a contribution is made to adoption and sustained use of sustainable, climate-resilient water supply, sanitation and hand hygiene facilities, in communities, schools and health care facilities, with a focus on gender and social inclusion in eight countries.

Under its thematic priorities, the Netherlands also support key multilateral programmes such as the World Bank's Consultative Group for International Agricultural Research (CGIAR)[175], the World Bank's Energy Sector Management Assistance Programme (ESMAP)[176], the Clean Cooking Alliance[177], the Central African Forest Initiative (CAFI)[178], and the World Bank's Cooperation in International Waters in Africa (CIWA)[179]. In most cases, these centrally funded programmes target multiple countries, including countries or regions beyond the focus of the Netherlands' development cooperation.

In addition to the multilateral programmes mentioned above, the Netherlands has also supported a number of trust funds to scale-up adaptation finance in other organisations. An example is a contribution of 20 million USD to the Water Resilience Trust Fund at the Asian Development Bank[180]. This fund prioritizes activities that focus on achieving local water and sanitation resilience, aligned with countries' needs, national development priorities in the water sector, and sector plans for addressing climate change. Another example is our contribution to the Climate Action Window (CAW) of the African Development Bank[181] with 100 million USD in 2023. This window is an agile, fast and open opportunity to easily access climate finance for adaptation. So far, a pipeline of 41 priority projects were selected for a total amount of 321 million USD.

Finally, and as further elaborated on in section 4.3.3, the Netherlands also supports a number of funds and programmes such as Climate Investor One[182], the Dutch Fund for Climate and Development[183], Solidaridad and the AGRI-3 Fund[184] which are specifically designed to mobilise private climate finance and investments.

The total contributions through bilateral, regional and other channels amounted to € 504 million in 2021 and € 548 million in 2022. Tables III.1-2021 and III.1-2022 provide a detailed overview of Dutch climate finance through bilateral, regional and other channels disbursed in 2021 and 2022 in both € and USD. A summary of the total provision of climate-specific public finance contributions through bilateral and regional channels in 2013–2022 is provided in Table 5.3 below (figures in millions USD).

Table 5.3: Total provision by the Netherlands of climate-specific financial contributions through bilateral, regional and other channels in 2013–2022 (rounded figures in millions USD).

	Year of disbursement									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Climate-specific contributions through bilateral, regional and other channels	285	387	324	257	313	415	467	458	596	578

[175] CGIAR: Science for humanity's greatest challenges
[176] Home | ESMAP
[177] Home | Clean Cooking Alliance
[178] Welcome | Central African Forest Initiative (CAFI)
[179] Cooperation in International Waters in Africa (CIWA) (worldbank.org)
[180] Water Resilience Trust Fund under the Water Financing Partnership Facility | Asian Development Bank (adb.org)
[181] ADF Climate Action Window | African Development Bank Group (afdb.org)
[182] Climate Investor 1 – Climate Fund Managers
[183] https://thedfcd.com/
[184] Home - AGRI3 Fund

5.3.2 Multilateral channels (core funding)

Multilateral climate change funds to which the Netherlands contributed core funding include the Green Climate Fund (GCF)[185], the Global Environment Facility (GEF)[186], the Least Developed Countries Fund (LDCF)[187] and the Climate Investment Funds (CIFs)[188].

The Netherlands continues to play an active role in the GCF through its commitment of € 100 million at the Initial Resource Mobilisation in 2014 and € 120 million at the First Replenishment in 2019 and € 140 million at the second replenishment in 2023. The Netherlands shares a GCF Board seat with Denmark and Luxembourg. In the GCF board, our priorities are focused on: mobilising private sector engagement and funding; facilitating access to the fund (e.g. by diminishing administrative burdens), enhancing access for the most vulnerable countries, such as Least Developed Countries (LDCs); enhancing the role of civil society, strengthening gender policies for enhancing access for women, and making sure supporting that adequate policy frameworks are in place that should rank as global best practices, e.g. on gender, integrity, accountability, Environmental and Social Safeguards, etc.

The Netherlands also continues to provide active support to the GEF with a contribution of € 84 million at the 7th Replenishment in 2018, € 124 million at the 8th Replenishment in 2022 and via an active Council Seat, shared with Finland and Estonia. Within GEF, Dutch priorities are very similar to those in the GCF: enhanced access for LDCs, mobilising private finance, enhancing access for women, adherence to adequate fiduciary standards, etc. The Netherlands agrees with the current strong focus on biodiversity within GEF.

The Netherlands is also a regular donor to the Least Developed Countries Fund (LDCF) that is wholly dedicated to climate adaptation activities in LDCs.

The Netherlands continued to provide active support for the Climate Investment Funds (CIFs) and the Trust Fund Committees of the CIFs. The Netherlands committed USD 10 million in 2020 for green and inclusive Covid recovery, USD 100 million in 2021 to the Renewable Energy Integration Programme and USD 50 million in 2023 for the Nature, People and Climate Programme.

The Netherlands is also a major donor of core funding to multilateral development banks such as the World Bank (IDA, IFC and IBRD), the Asian and African Development Banks, IFAD and the United Nations' agencies and funds that provide significant support to climate action in developing countries.

The total climate specific contributions through multilateral channels amounted to € 136 million in 2021 and € 246 million in 2022. Tables III.2-2021 and III.2-2022 give further details of Dutch multilateral core and climate finance disbursed in 2021 and 2022 in both € and USD. A summary of the total provision of public climate finance support through multilateral channels in 2013–2022 is provided in Table 5.4 below (figures in millions USD).

[185] Homepage | Green Climate Fund
[186] Home | GEF (thegef.org)
[187] Least Developed Countries Fund - LDCF | GEF (thegef.org)
[188] The Climate Investment Funds (CIF)

Table 5.4: Total provision by the Netherlands of public climate finance support through multilateral channels in 2013–2022 (figures in millions USD).

Allocation channel of public financial support for climate action	Year of disbursement									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Climate-specific contributions through multilateral channels, including:	**40.16**	**18.21**	**12.40**	**31.83**	**36.60**	**55.00**	**65.49**	**106.92**	**98.61**	**118.33**
Global Environment Facility	14.53	15.05	0	15.77	15.20	28.19	16.23	19.49	16.90	27.42
Least Developed Countries Fund	25.00	0	0	0	0	9.10	8.00	15.50	22.49	24.01
Montreal Protocol	631.05	3.16	3.34	3.34	4.07	3.73	3.73	3.73	3.73	3.34
Green Climate Fund	0	0	9.05	12.72	17.33	13.98	37.53	58.20	35.49	31.59
Climate Investment Fund	0	0	0	0	0	0	0	10.00	19.99	31.97
Financial institutions, including regional development banks:	**44.02**	**93.50**	**188.82**	**161.56**	**66.12**	**155.73**	**129.73**	**97.12**	**42.53**	**108.68**
World Bank (IDA and IBRD)	43.74	13.93	133.84	139.50	22.84	113.32	95.67	51.31	16.73	80.97
International Finance Corporation	0	13.11	6.07	2.40	5.05	9.88	0	13.38	0	6.24
African Development Bank		55.70	37.84	13.25	15.83	11.89	18.42	31.92	24.95	20.75
Asian Development Bank	0	0.53	4.05	0.40	3.92	1.99	1.46	0.51	0.84	0.72
European Bank for Reconstruction and Development	0.03	0	0	0	0	0.91	0	0	0	0
Other – Asian Infrastructure Investment Bank	0	0	0	0	18.48	17.73	14.18	0	0	0
United Nations bodies, including:	**5.72**	**22.79**	**42.22**	**62.75**	**49.45**	**28.31**	**22.06**	**20.26**	**20.00**	**32.38**

Allocation channel of public financial support for climate action	Year of disbursement									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
United Nations Development Programme	3.59	1.96	1.64	1.52	1.91	1.89	1.76	1.12	1.77	2.11
United Nations Environment Programme	1.78	1.87	2.90	1.68	1.71	0.73	2.52	2.41	2.53	2.26
World Food Programme	0	0	0	0	5.69	4.55	5.29	6.03	5.32	9.87
Food and Agriculture Organisation of the United Nations	0.31	0.33	1.12	6.00	12.14	12.80	0	0	0	0
International Fund for Agricultural Development	0	12.68	18.07	39.39	22.22	0	11.46	9.25	9.00	8.53
Other	0.03	0	1.85	1.42	5.78	8.34	1.57	1.45	1.37	9.61
Grand Total	**89.90**	**134.50**	**243.44**	**256.14**	**152.18**	**139.04**	**217.28**	**224.31**	**161.14**	**259.39**

5.3.3 Information on finance mobilized through public interventions

Climate change cannot be addressed by governments alone. The private sector must take part in the transformative change that is needed for low-carbon, climate-resilient development and climate adaptation. The knowledge and the financial resources from private sector sources are indispensable.

The Netherlands focuses on the mobilisation of blended and/or innovative finance through its private sector development portfolio, its cooperation with MDBs and FMO and through the development of specific funds tailored to public-private cooperation. In line with its foreign trade and development cooperation strategy and the Global Climate Strategy, the Netherlands strives to further increase the mobilised private finance for climate.

For example, Dutch activities such as Access to Energy Fund's contribution to Climate Investor One, the Dutch Fund for Climate and Development (DFCD) and its contribution to Climate Investor Two, and the AGRI-3 Fund are designed to mobilise and attract private investors, as well as FMO delegated funds like MASSIF[189] and Building Prospects[190].

On top of these commitments, we support initiatives such as the Climate Advisory Partnership with IFC or the High Impact Partnership on Climate Action of the EBRD to scale up private and innovative climate finance in developing countries. We also finance innovative programmes working on the lower end of the mobilisation scale, like the Mobilising More for Climate programme which is combining local efforts to protect vulnerable ecosystems with the development of fundable business propositions to support the livelihoods of local stakeholders.
Finally, the Netherlands is also mobilizing private finance for climate through supporting pioneering activities, such as ILX Fund I, which mobilized more than USD 1 billion from three of the largest Dutch pension funds. Given the limited role of blended finance in these structures and considering the scope of

[189] MASSIF | Dutch Government Fund | Dutch Development Bank - FMO
[190] Building Prospects | Dutch Government Fund - FMO

OECD methodology for mobilized private finance, this type of mobilized private climate finance is currently not attributed to the Netherlands.

We are aware that at the global level most private finance mobilised is in support of mitigation. Therefore, the Netherlands decided to focus explicitly on mobilising the private sector for adaptation in programmes such as the Dutch Fund on Climate and Development.

Following years of work in the Research Collaborative on Tracking Private Climate Finance[191] – which the Netherlands also supported – major donors adopted the Joint Statement on Tracking Progress Towards the USD 100 Billion Goal in September 2015, agreeing on a common understanding of mobilised private climate finance and a common methodology. Since then, the Research Collaborative further refined methodologies in collaboration with the OECD DAC. Using these methodologies, and excluding private finance mobilized by EIB[192] to avoid double counting with EU, the Netherlands mobilised € 561 million in private climate finance in 2021 and another € 576 million in 2022 (see below tables 5.5 and 5.6). Tables III.3-2021 and III.3-2022 present detailed information in USD in line with CTF format.

Data limitations still presented serious constraints in some cases, so the reported amounts should be considered as best estimates. All information on the Netherlands' mobilization efforts is also published yearly in reports that are available to the public.[193]

Table 5.5: Private climate finance mobilized with public interventions in 2021.

Mobilized private finance in 2021	
Multidonor Funds and Programme (x € million)	**133.3**
Green Climate Fund (GCF)	25.2
Global Environment Facility (GEF)	9.1
Least Developed Countries Fund (LDCF)	1.4
Climate Investment Funds (CIF)	0.1
Global Agriculture and Food Security Programme (GAFSP)	12.9
IDH ISLA	2.4
Sustainable Trade Initiative (IDH)	12.5
IDH Farm Fit Fund	4.0
One Acre Fund	1.7
Private Infrastructure Development Group (PIDG)	47.0
Climate Investor One	15.7
International Network for Bamboo and Rattan	1.3
Netherlands Programme	**69.1**
Solidaridad Practice for Change	1.2
Geodata for Agriculture and Water	1.6
CRAFT	4.5
2SCALE	6.0
Dutch Fund for Climate and Development (DFCD)	3.1
Climate Investor Two (DFCD – Water Facility)	5.1
Clean Cooking Alliance	0.1
AGRI3	5.3
FINISH Mondial	30.3
SDG7 Results	11.8
FMO	**120.0**
AEF-I	1.7
FMO-A	118.3
Multilateral Development Banks (excluding EIB)	**238.8**

[191] Assessing the alignment of finance with climate goals | OECD
[192] Homepage | European Investment Bank (eib.org)
[193] Mobilized private climate and biodiversity finance 2021 and Mobilized private climate and biodiversity finance 2022

Mobilized private finance in 2021	
Asian Development Bank	17.9
African Development Bank	12.6
Asian International Investment Bank	4.4
European Bank for Reconstruction and Development	18.7
Inter American Development Bank	2.9
IFC	27.4
World bank	155.0
Total	**561.2**

Table 5.6: Private climate finance mobilized with public investments in 2022.

Mobilized private finance in 2022	
Multidonor Funds and Programme (x € million)	**111.13**
Aceli	1.67
Climate Investor One (CI1)	23.01
FINISH Mondial	22.83
Green Climate Fund (GCF)	12.99
Global Agriculture and Food Security Programme (GAFSP)	0.98
Global Environment Facility (GEF)	12.54
IDH – Farm Fit Fund (IDH-FFF)	4.18
IDH – Initiative for Sustainable Landscapes (IDH – ISLA)	2.10
IDH – Sustainable Trade Initiative (IDH – STI)	13.62
International Network for Bamboo and Rattan (INBAR)	0.22
Least Developed Countries Fund (LDCF)	0.04
One Acre Fund (OAF)	1.38
Private Infrastructure Development Group (PIDG)	15.32
Private Sector Development Programme Middle East & North Africa (PSD-MENA)	0.11
SNV Hortinvest (SNV-HI)	0.13
Netherlands Programmes	**38.67**
2SCALE	6.20
AGRI3	0.05
Clean Cooking Alliance (CCA)	0.63
Climate Resilient Agribusiness for Tomorrow (CRAFT)	2.36
DGGF Track 1 – RVO	0.67
DGGF Track 2 – Seed Capital & Business Development	0.37
Geodata for Agriculture and Water (G4AW)	0.56
Health Insurance Fund (HIF)	0.12
Mobilising More for Climate (MOMO4C)	0.16
SDG7 Results	26.77
Solidaridad – Practice for Change (SOL-PFC)	0.78
FMO	**150.03**
Access to Energy Fund – (AEF)	1.69
Building Prospects (BP)	0.83
DFCD – Land Use Facility (DFCD-LUF)	2.34
DFCD – Origination Facility (DFCD-OF)	1.79
DFCD – Water Facility (also called Climate Investor Two – CI2)	5.13
FMO-A	138.25
Multilateral Development Banks (excluding EIB)	**276.42**
Asian Development Bank	8.64
African Development Bank	6.05
European Bank for Reconstruction and Development	117.84
Inter-American Development Bank	2.97
World Bank Group	140.91
Total	**576.26**

A brief description of some of the programmes mentioned in the tables above is presented below.

Further details on all the programmes/funds can be found in the earlier mentioned publicly available reports for 2021 and 2022 and on the individual websites of the programmes (see additional information in Tables III.3-2021 and III.3-2022).

SDG7: The SDG7 Results facility[194], implemented by the Netherlands Enterprise Agency[195], aims to give 2 million people in developing countries access to renewable energy through access to electricity and access to clean cooking solutions in homes. The facility also contributes to low-carbon climate resilient development; less gender inequality; private sector development and employment; and, mobilisation of private investments in the decentralised renewable energy sector. The SDG 7 Results programme is active in 10 countries in Africa and Asia. The mobilization of private finance is essential to pre-finance activities while subsidies are disbursed on the basis of verified results.

DFCD: The Dutch Fund for Climate and Development (DFCD)[196] is a climate resilience fund, dedicated to supporting climate adaptation and mitigation projects which benefit vulnerable communities and landscapes. DFCD provides access to finance for promising early-stage initiatives, helping them to develop and grow into scalable projects that are resilient to the effects of climate change. To maximise potential for investment, DFCD first seeks to de-risk and develop the projects through the Origination Facility (implemented by SNV and WWF), building their capacity to grow with financial (including debt and equity) and technical assistance. Successful projects will graduate to the financing facilities of the DFCD, the Water Facility (implemented by Climate Fund Managers) and the Land-Use Facility (the national development bank FMO).

2SCALE: 2SCALE[197], the largest incubator for inclusive agribusiness in Africa, offers a range of support services to private partners – companies and farmer groups – enabling them to produce, transform and supply quality food products to local, national and regional end-user markets, including Base of the Pyramid consumers. The 2Scale programme incubates and accelerates inclusive business through partnerships with companies (mainly African small- and medium-sized enterprises) that want to build commercially viable strategies in African food industry.

CRAFT: The Climate Resilient Agribusiness for Tomorrow (CRAFT) project[198] is private sector-driven intervention working through and promoting viable business cases that are climate-smart, inclusive, scalable and have a clear value proposition to all stakeholders, in particular smallholder farmers. CRAFT contributes to increased availability of accessible and resilient food for the growing populations in Kenya, Tanzania, and Uganda.

PIDG: The Private Infrastructure Development Group (PIDG)[199] works with public and private partners to bridge financing gaps, directing capital and expertise into projects that promote climate resilience and sustainable growth. Working throughout the project lifecycle, PIDG reduces financial risk, transform markets and build local capacity, creating a deep and lasting impact.

IDH: IDH[200] mobilises private sector investment and support for new business models creating better jobs, better incomes, a better environment, and gender equity. IDH is a not-for-profit organisation that is accelerating and upscaling sustainable trade by building impact-oriented coalitions of front-running companies, civil society, governments, knowledge institutions and other stakeholders in several sectors. IDH receives Dutch support for and reports on four programmes mobilizing private finance: the IDH - Sustainable Trade Initiative, the IDH - Initiative for Sustainable Landscapes, the IDH - Farm Fit Fund and the SNV Hortinvest.

[194] SDG 7 Results: Access to renewable energy (rvo.nl)
[195] Netherlands Enterprise Agency (rvo.nl)
[196] Home (thedfcd.com)
[197] https://www.2scale.org/
[198] Home - The Climate Resilient Agribusiness for Tomorrow (CRAFT) (crafteastafrica.org)
[199] Home - PIDG (Private Infrastructure Development Group)
[200] About - IDH - the Sustainable Trade Initiative (idhsustainabletrade.com)

5.4 Information on support for technology development and transfer provided under Article 10 of the Paris Agreement

5.4.1 Strategies employed to support technology development and transfer, including case studies

The Netherlands is at the forefront of developing innovative, resilient and sustainable techniques in many of the relevant sectors and regards technology development and translation as an important element of its actions to promote climate adaptation and mitigation worldwide. The government is keen to mobilize Dutch knowledge and expertise to support local actors' self-development in the Global South. The government is not alone in this, knowledge institutions and companies are also participating. For example, the Netherlands Organisation for Applied Scientific Research (TNO), has its own Tech Transfer programme[201] and an Innovation for Development programme[202], which focuses on low and middle-income countries. Other organisations like Deltares work on and actively share and exchange knowledge and innovative solutions such as flood models in the field of water and aquifer recharge and storage in drought-prone sandy areas.

Technology development and knowledge translation are important tools for green economic growth in developing countries. However, technology development and translation of knowledge never stand alone, and can only happen successfully if other elements and preconditions such as the presence of a regulatory framework, the mobilization of existing local agency, capacity and knowledge and low transaction costs are met. This also applies to climate. To facilitate technology translation and the mutual mobilization of knowledge regarding climate action, the Netherlands is assessing local capacities (rather than capacity gaps), mobilizing those and matching those with capacity of outsiders. Where possible, local actors lead their capacity, knowledge and technology development processes to their decision making in the field of climate action. By focusing on innovation as an emerging property of collaboration among local and external actors, the interlinkages between capacities, technologies and knowledge translations become clear. Innovation is not seen as an end in itself, but as a means to achieve increased climate ambitions.

In general, the Netherlands aims to strengthen the interfaces between knowledge (scientific and indigenous), policy and practice. Too often these operate within silos and within different organizations and professional communities. Too often efforts go into one silo while the highest added value lies in linking the silos and brokering the interfaces. Sustained and effective capacity management requires knowledge brokering. A good example is the Step Change programme where climate-related knowledge brokers in Africa, Asia and Latin America are supported and awarded. Its Climate and Development Knowledge Network[203] is facilitating knowledge-based policy development and policy-based practice, implementation and investment.

Good examples of support for the development and enhancement of capacities and technologies include a range of programmes implemented by the Netherlands Enterprise Agency such as the Energising Development Partnership Programme (EnDev) and the Climate and Energy Response Facility (CERF). Other examples are the Energy Sector Management Assistance Programme (ESMAP) and the Consultative Group for International Agricultural Research (CGIAR). Good examples in water include the activities under the WaterWorX, Blue Deal, G4AW and, in Bangladesh, Indonesia and Egypt, the Joint Cooperation Programmes. More information on these programmes is presented below and can also be obtained from their websites.

Energising Development (EnDev)[204]: In collaboration with other development partners, efforts are being made to ensure access to renewable energy for the poorest households in developing countries, who currently do not have access to electricity or clean cooking. EnDev is a strategic partnership consisting of various donors

[201] From research to impact - Tech Transfer EN (tno.nl)
[202] Innovation for development | TNO
[203] Home | Climate & Development Knowledge Network (cdkn.org)
[204] Energising Development (EnDev)

and partners, including the Netherlands, Germany, Norway and Switzerland. It invests in capacity building and technology transfer for market development for decentralised energy solutions such as solar energy systems and clean cooking solutions. The programme focuses on households, social institutions (such as schools and health centres) and micro, small and medium-sized enterprises in developing countries and supports market development for modern energy facilities, particularly in rural areas. By the end of 2023 EnDev has successfully achieved access to sustainable energy for 31.6 million people, of which 24.2 million gained access to modern cooking solutions and 7.4 million access to electricity. In addition, EnDev has supported over 102,000 micro, small and medium sized enterprises with access to modern energy for productive use and more than 33,000 social institutions with access to modern energy.

Energy Sector Management Assistance Programme (ESMAP)[205]: ESMAP (a World Bank programme) helps governments in developing countries with knowledge, policy support and project preparation to accelerate the energy transition and achieve universal access to energy. ESMAP thus makes an important contribution to giving developing countries access to sustainable energy technology and investments, including in the field of solar and wind, geothermal energy, electricity storage, clean cooking and green hydrogen.

Climate and Energy Response Facility (CERF)[206]: CERF is a flexible facility with a focus on climate change mitigation. CERF facilitates the follow-up of policy dialogues on climate mitigation ambitions and actions between Dutch diplomatic missions and partner countries. The facility focuses on solving challenges and co-creating practical solutions that suit the local context. CERF also aims to mobilise experts from different professional disciplines, financiers and local stakeholders to speed up transition pathways.

Energy Transition Facility (ETF): With this programme, the Netherlands supported countries in the Middle East and North Africa in the transition to sustainable energy from 2017 to early 2022. Dutch diplomatic missions, together with countries, focused on concrete solutions that fit well into the local context. This was done through knowledge sharing, policy advice and capacity building on themes such as solar energy, circular economy, offshore wind energy and renewable hydrogen. CERF is the successor programme for ETF.

Consultative Group for International Agricultural Research (CGIAR)[207]*:* The Netherlands has been supporting the CGIAR financially for a long time and has committed itself to doing the same for the period 2022–2027. The CGIAR's new 2030 strategy focuses on climate change as a context for research in the field of food security. It aims to advance agricultural science and innovation for the development and uptake in developing countries of new agricultural knowledge and practices so as to ensure food security in the face of climate change and other challenges. Since 2017, a specific partnership programme has been added that connects Dutch science, private sector cooperation and knowledge and expertise to the CGIAR research for global food security. This partnership is managed by the Netherlands Organisation for Scientific Research (NWO).

Geodata for Agriculture and Water (G4AW)[208]*:* G4AW aims to provide the right information at the right time to the most important actors in the food production chain: farmers, fishermen and pastoralists. Food producers can help to improve and increase food production sustainable. G4AW supports initiatives where geodata, such as satellite and mobile data, are converted to relevant information on climate, weather and hazards and even timely agricultural advice, thus empowering food producers and other stakeholders in developing countries to make better decisions based on reliable real-time data. Also, micro-insurances and/or microloans combined with information services can help guarantee the continuity of food production and improve self-reliance.

WaterWorX[209]*:* WaterWorX is a programme of Water Operator Partnerships (WOPs). The programme, which contributes to both technology transfer and capacity building, invests in long term partnership between water and sanitation utilities focusing on the transfer of knowledge to improve the access and quality of

[205] Energy Sector Management Assistance Program (ESMAP)
[206] Climate and Energy Response Facility (CERF)
[207] Consultative Group for International Agricultural Research (CGIAR)
[208] Geodata for Agriculture and Water (G4AW)
[209] *WaterWorx*

services, and building together a more inclusive, (climate) resilient and sustainable water sector. At the initiative of this programme an Expert Communities of Practice have among others been established with UN-Habitat/Global Water Operator's Partnership Alliance (GWOPA) to share knowledge and best practices, for instance on solutions for climate-resilient water resources management, water treatment and production, and water losses reduction, etc.

Joint Cooperation Programmes; Through the cooperation between Dutch and local knowledge institutes in Bangladesh, Egypt and (formerly also) Indonesia, knowledge and (e.g., flood) models are being developed and shared to respond to needs in, for instance, the (integrated) water management, polder development, flood control, and Delta planning and the like.

5.4.2 Support provided at different stages of the technology cycle

Support for technology development and transfer is an integral part of many activities related to climate change mitigation or adaptation, encompassing both hardware (equipment) and software (know-how, methods, models, practices). The private sector and several knowledge institutes partner in providing this support. The combined innovative and financial strengths of these parties are essential to meet the challenges of climate change, with the local government, NGOs and communities in the lead.

There is no general policy or strategy on providing support at different stages of the technology cycle. However, since programmes are developed in consultation with all relevant stakeholders and taking into account local policies and context, interventions including those concerning technology development & translation are generally expected to be designed in a way that they address local timelines, aspirations and priorities.

5.4.3 Support for the development and enhancement of endogenous capacities and technologies of developing country Parties

To increase viability and sustainability of climate action and depending also on the outcome of a thorough analysis of local context, policies, aspirations and strategies, stakeholders, and needs, demands and priorities, programmes in general and those containing elements of technology and capacity development more particularly will where possible respect and mobilize endogenous knowledge and solutions, favouring them over 'imported' ones. In many instances, the best solution may contain a mix of both. For instance, in situations where building with nature offers (cost)effective opportunities. As discussed elsewhere, and recognizing that local partners already have proven capabilities and technologies, we generally also prefer to refer to terms such as capacity 'development' and capacity 'mobilization' over capacity building. Or to mutual technology and knowledge 'translations', rather than technology 'transfer'. These concepts highlight the agency of many actors, which is needed to generate an effect. They also highlight the nature of knowledge being a social construction and cognitive capacity rather than some-thing that can be shared, transferred or stored.

A concrete example of our support to endogenous technologies, is our support to the Clean Cooking Alliance[210]. Other examples of programmes where local or locally-led solutions are tested, supported and/or, through small grants, research, and/or lobby & advocacy, promoted, include our support to SDG7 Results (improved cooking), the Climate and Development Knowledge Network (CDKN, see below)[211], the AfDB-implemented Africa Adaptation Acceleration Programme (AAAP)[212] and the Global Centre on Adaptation[213], and programmes such as Leading from the South[214], Reversing the Flow[215], Water at the Heart of Climate Action[216],

[210] Home | Clean Cooking Alliance
[211] Home | Climate & Development Knowledge Network (cdkn.org)
[212] Africa Adaptation Acceleration Program | African Development Bank Group (afdb.org)
[213] Home - Global Center on Adaptation (gca.org)
[214] Leading from the South
[215] Reversing the Flow - RtF (rvo.nl)
[216] Water at the Heart of Climate Action | Department of Economic and Social Affairs (un.org)

the earlier mentioned EnDev, and partnerships under the Power of Voices subsidy framework such the African Activists for Climate Justice (AACJ), the Global Alliance for Green and Gender Action (GAGGA), Amplifying Voices for Climate Action (VCA) and the Green Livelihoods Alliance (GLA).

Clean Cooking Alliance: Nearly one out of three people are forced to rely on polluting cooking fuels like charcoal, wood, and kerosene. Such "dirty cooking" is a major source of carbon emissions and kills some four million people each year. CCA and its partners are working to address this global crisis. CCA supports governments, facilitates innovation, builds markets, and expands the ecosystem to help families around the world access clean cooking solutions[217].

EnDev: The Strengthening the Entrepreneurial Ecosystem for Clean Cooking (SEE-CC) programme[218] implemented in partnership with EnDev has through the development of Biogas technology and training in design and construction, been putting emphasis on the facilitation of prefabricated bio-digester technologies in Burkina Faso, Kenya, Niger, Mali and Uganda. Prefabricated technology has already proven to be more scalable in Kenya, to a large extend due to the fact that prefabricated suppliers sell their products on a "lease to own" basis. Quick installation, constant quality and warranties have further helped to scale this market in Kenya. Expectation is that this approach can be replicated in other countries as well.

CDKN: As part of its commitment to turning climate knowledge into climate-resilient action, CDKN is providing Knowledge-to-Action (K2A) grants in Benin, Cameroon, Kenya, Mozambique and South Sudan. Each project is mobilising and combining indigenous, local and scientific knowledge to help inform ecosystem-based land-management practises, improve access to finance and respond to gender-based vulnerabilities. All of the projects are locally led, meaning that local actors are integral to the design, implementation, governance and monitoring of each project's activities. These local actors include small-scale farmers in South Sudan and Mozambique, pastoralists and herders in Kenya, religious leaders and local government in Benin, and young people in urban areas in Cameroon. More information on the five projects can be found on CDKN's website[219].

Reversing the Flow (RtF): This programme supports communities in vulnerable situations by strengthening their water security. RtF aims to make communities more resilient with locally led water, landscape restoration and climate adaptation actions. Local partners, called hubs, will support communities in organising and leading these actions themselves[220]. The hubs are well-embedded in the communities they work with and can therefore take existing technologies, knowledge and aspirations as the starting point (rather than needs, deficiencies and gaps). This positive and empowering approach is thus combined with high trust. On this basis we have already seen that communities continue and scale up many pilot initiatives by themselves. In the Masai area in Kenya the community also contracted a plumber from their own community to maintain the drinking water system with a salary derived from contributions of all water users. This shows that new endogenous institutions emerge out of the collaboration of local and external actors.

Consultative Group for International Agricultural Research (CGIAR)[221]: As already discussed elsewhere, the Netherlands-supported CGIAR's new 2030 strategy aims to advance agricultural science and innovation for the development and uptake in developing countries of new agricultural knowledge and practices so as to ensure food security in the face of climate change and other challenges.

[217] Home | Clean Cooking Alliance
[218] Strengthening the Entrepreneurial Ecosystem for Clean Cooking (SEE-CC) - EnDev
[219] From knowledge to climate-resilient action - five African organisations selected for CDKN grants | Climate & Development Knowledge Network
[220] Reversing the Flow - RtF (rvo.nl)
[221] Consultative Group for International Agricultural Research (CGIAR)

5.4.4 Efforts to encourage private sector activities related to technology development and transfer and how such efforts support developing country Parties

As already highlighted in section 5.3.3, the Netherlands believes that the private sector has an important role to play in the transformative change that is needed for low-carbon, climate-resilient development. The knowledge and the financial resources from private sector sources are indispensable. The Netherlands focuses on the mobilisation of blended and/or innovative finance through its private sector development portfolio, its cooperation with MDBs and FMO and through the development of specific funds tailored to public-private cooperation.

Many of the examples described in the previous sections such as the African Biodigester Component programme[222] [223] and the clean cooking programme supported through EnDev include elements or components geared at encouraging private sector to not only invest in climate action as such, but also in the development and sharing of relevant knowledge, technology and capacity necessary to achieve long-lasting impact in the partner countries. Supporting the Productive Use of Energy (PUE) in agricultural value chains to increase productivity and value-addition can be one of the most relevant means to improve smallholder farmers livelihoods and increase their resilience to climate change while contributing to GHG emissions reduction. In January 2021, the IKEA Foundation in partnership with EnDev began promotion of PUE in the dairy and horticultural value chains in Ethiopia, Kenya and Uganda[224]. The project focuses on the establishment of scalable business cases and cross-country learning, using PUE technologies that provide affordable energy services to smallholder farmers[225].

The Climate and Energy Response Facility (CERF)[226] works with Dutch diplomatic missions in almost 40 countries to ensure a just and inclusive green energy transition. The goal is to contribute to accelerated climate change mitigation and adaptation activities in these countries. CERF focuses on sectors where Dutch expertise adds value to climate-related challenges. These sectors include, but are not limited to, circular economy, deforestation and renewable energy, such as solar, offshore wind and green hydrogen. CERF aims to contribute to policy developments, increased climate investments and trade and innovation in the field of climate change mitigation and adaptation. Cooperation between governments, businesses and knowledge institutes lies at the heart of this. Concrete examples of initiatives supported by the facility include advancing green hydrogen knowledge in India, Jordan and Algeria and supporting China's circular construction transition.

With Partnering for Green Growth and the Global Goals 2030 (P4G), the Netherlands contributes to helping early-stage businesses become investment ready and supporting country climate transitions in food, water and energy systems. P4G supports partnerships consisting of a local company and an NGO to enable knowledge and technology transfer in the field of climate and the SDGs. "Closing the loop on textile waste"[227] is an example funded in 2022, the Dutch social impact venture Enviu works together with sorting facilities in Kenya and Bangladesh to turn post-production waste into virgin-quality fibres using a rejuvenation technology.

5.4.5 Efforts to accelerate, encourage and enable innovation, including research, development and deployment efforts, and collaborative approaches to research and development

As already outlined above, the Netherlands is active in several international partnerships to stimulate technological development in the essential sectors for the climate transition in emerging economies and developing countries. Below are some further examples:

[222] Sustainable Energy for Smallholder Farmers in Ethiopia, Kenya, and Uganda - EnDev
[223] Video on biodigester technology in Uganda
[224] Productive Use of Energy - EnDev
[225] Sustainable Energy for Smallholder Farmers in Ethiopia, Kenya, and Uganda - EnDev
[226] Climate and Energy Response Facility (CERF): (rvo.nl)
[227] Closing the Loop on Textile Waste | P4G (p4gpartnerships.org)

Glasgow Breakthroughs: at the United Nations COP26 climate summit in Glasgow in 2021, initiatives were launched aimed at international cooperation to accelerate the development and roll-out of clean and sustainable technologies. In this context, the Netherlands has joined the Glasgow Breakthroughs for clean energy, for zero-emission vehicles and for affordable and sustainable hydrogen.

International Energy Agency (IEA): The IEA conducts research, collects data, analyses and reports. The information this provides plays an important role in international energy and climate policy. At the request of the Ministry of Economic Affairs and Climate Policy, advisors from the Netherlands Enterprise Agency (RVO) are using their expertise to participate in a number of *Technology Collaboration Programmes* (TCPs) of the IEA. A TCP is a group of (international) experts that deals with one energy technology and helps governments and industries worldwide to further develop this technology. Each TCP in which the Netherlands participates has its own mission that fits within the goals of the IEA, including energy security, environmental protection, economic growth, and engaging influential organisations. In this way, these TCPs accelerate the global transition to a cleaner energy future. In addition to participating in TCPs, the Netherlands has contributed financially to several research reports on clean energy financing and labour markets under the IEA's *Clean Energy Transitions Programme*. This programme focuses on accelerating the energy transition in developing countries.

Clean Energy Ministerial (CEM): The Netherlands is a member of the CEM, which aims to stimulate existing clean energy technologies in an international context in order to combat climate change. This is done through campaigns and initiatives involving both public and private parties. The business community and knowledge institutions are involved in this as much as possible. Over the past years, the Netherlands has been actively involved in working groups and campaigns on, among other things, the roll-out of technologies for solar and wind energy and for electric vehicles, in which cost reduction is an important spearhead. Linked to the CEM is the international partnership *Mission Innovation*, in which innovation is central. Through this context, the Netherlands is, for example, working with India on innovative solutions to accelerate the commercialisation of integrated biorefineries.

5.4.6 Knowledge generated

Depending on context, sector and type of activity, knowledge is being developed and shared in many different ways. CTF Table III.4 lists the activities at the implementation phase in 2021–2022 that included support for technology development and transfer. The activities listed are those in which, based on the description of the programme in its appraisal memorandum, components with technology development and transfer aspects were identified.

As also clarified during the BR4 review, the national results framework for development cooperation, of which climate action is an integral part, does not include specific indicators for capacity or technology development support for climate change (including on GHG emissions), as these are usually one element of more wide-ranging activities. Our indicators are generally geared towards measuring the results of the activity as a whole rather than individual elements of it. The Netherlands is in the process of introducing a new result and reporting framework to better capture, mostly in qualitative terms, what capacity has been developed and/or what technology has been developed, it will take several years for that new system to be fully operational.

Knowledge generation and learning is a mutual process that happens in interaction. Our partners and we ourselves need to have a learning and listening attitude in order to be able to match outsiders' support with local aspirations, past experiences and context. The learning and unlearning of Dutch development partners (government staff, NGOs, knowledge institutes and private sector) is a great asset for our effective and sustainable cooperation. It enables the Netherlands to continue to play a relevant and appreciated role in development while at the same time it benefits Dutch staff and organizations. Dutch knowledge and expertise are of high relevance because our partners know how to embed it and where to resource it from a vast pool of experiences, both domestically and abroad.

5.5 Information on capacity-building support provided under Article 11 of the Paris Agreement

5.5.1 Strategies employed to provide capacity-building support, including case studies

Capacity development of local partners in developing countries forms an integral part of many activities that support climate change mitigation or adaptation. The Dutch strategy takes a positive approach by assessing the capacities already there, identifying the aspiration and facilitating the further self-development of capacities whereby outsiders' support can be instrumental. Another feature of our strategy is that mobilization and development of capacity of local partners in developing countries is not so much a separate activity or stand-alone project but forms an integral part of many activities that support climate change mitigation or adaptation. Self-development of capacity requires self-determination. Local partners, communities, knowledge guardians and decision makers have the opportunity to decide and co-design the activities. Capacity development is focused on individuals, organisations, institutions as well as at the systemic level.

At the systemic level, the Netherlands supports the NDC Partnership[228], which has a key role to play in building the capacity of governments to formulate and implement enhanced Nationally Determined Contributions. As one of the founding members (and former co-chair in 2019 and 2020), the Netherlands has focused on further strengthening the NDCP through both political and financial support.

The Netherlands-supported West Africa Food System Resilience Facility (FSRF) is a multi-partner technical advisory facility for the West Africa Food System Resilience Programme (FSRP)[229]. The development objective of FSRP is to increase preparedness against food insecurity and improve the resilience of food systems in Burkina Faso, Mali, Niger, Togo, Chad, Ghana and Sierra Leone. The technical advisory facility is organized around three pillars: (I) Strategy and Partnerships, consisting of support to ECOWAS, CILSS and CORAF in the design of regional flagship initiatives and related partner engagement, (II) Evidence, Analytics and Delivery Mechanisms, consisting of the development of technical, policy and strategy notes to build the evidence base and close knowledge gaps, and (III) Learning and Capacity Building.

Examples of programmes supporting partnerships between Dutch and local knowledge and educational institutions aiming at local institutional development and (also individual) capacity building in the areas of water management and WASH include the Dutch support to the Bangladesh Delta Plan (BDP2100) programme[230], the Orange Knowledge Programme (OKP)[231], and the Joint Cooperation Partnerships (JCPs) in Indonesia, Bangladesh and Egypt. Programmes supporting similar partnerships between water companies and organizations such as water boards and municipalities responsible for water management and sanitation include the WaterWorX and Blue Deal programmes. Some of these programmes are discussed in more detail below.
The Orange Knowledge Programme (OKP) is a Dutch funding programme. It contributes to societies' social and economic development by strengthening knowledge and skills of professionals and organizations. This is achieved through focusing on education, in collaboration with Dutch knowledge organizations. Water, energy and climate are among the priority themes on which the programme offers opportunities. In 2023, the programme awarded scholarships and training in some 30 countries, mostly in Africa.

The Joint Cooperation in Applied Research (JCAR) programme[232] is based on cooperation and joint implementation of activities between Egyptian and Dutch institutes and agencies. The programme provides support to the Egyptian Ministry of Water Resources to prepare for future water challenges, enhance integrated planning, development and management of water resources, and improve environmental assessment and strategy development.

[228] NDC Partnership
[229] Western and Central Africa – West Africa Food System Resilience Program (FSRP) (worldbank.org)
[230] Delta Plan 2100 (bdp2100kp.gov.bd)
[231] Orange Knowledge Programme | Study in NL
[232] JCAR (jcar-water.nl)

In the WaterWorX programme[233], also discussed in the previous section as contributing to technology development & transfer, ten Dutch drinking water companies have established partnerships with 41 water operators (utilities) in 16 developing countries. The objective of these partnerships is to combine capacity, knowledge, networks and financial means to ensure sustainable and climate resilient access to water for 1 million, mainly urban and poor, people. Improving the technical, operational, and financial capacity of local water utilities via water operator partnerships (WOPs) is at the heart of the programme. This is done through peer-to-peer knowledge exchange and strategic investments. The programme, which also contributes to improving the enabling policy and regulatory framework for sustainable service delivery, is instrumental in ensuring knowledge development and exchange and in facilitating access to additional finance. The Blue Deal programme[234], supporting similar types of partnerships between Dutch Water Boards and local water boards and municipalities, focuses among others on institutional capacity building in integrated water management, water safety, flood control and sanitation.

The Agri-Food programme for integrated resilience and economic development in the Sahel (Pro-ARIDES)[235] is a 10-year programme that contributes to a more resilient and sustainable Sahel in Burkina Faso, Mali and Niger. The programme supports systems change in four dimensions – landscape, market, governance and equity. It strengthens the capacities of various actors – local food producers and cooperatives – to adopt climate smart technologies and practices that withstand and recover from climate shocks and other natural disasters through landscape restoration and asset building. Also, Micro, Small and Medium Enterprises (MSMEs) and women's and youth organisations are supported to participate in policy proposes, while various institutions are strengthened to restore social contract.

Examples of capacity development activities in the area of private sector development include the Challenge Fund for Youth Employment, the support to Centre for the Promotion of Imports from developing countries (CBI) and the Solidaridad pathways to prosperity programme.

The goal of the Challenge Fund for Youth Employment[236] is to support robust and innovative ideas for creating or improving decent work prospects for youth, especially young women. Green employment creation has been a thematic focus of the calls for solutions in several countries. By matching jobs for youth, the Fund strives to leverage youths' skills in work that they are excited to do e.g., in waste management, renewable energy and circularity. Several examples in which technology transfer/capacity building has been supporting to green jobs are Mr Green Africa[237] in Kenya, and African Clean Energy[238] and Proteen[239] in Uganda.

CBI[240] is the Centre for the Promotion of Imports from developing countries. It supports the transition towards inclusive and sustainable economies and helps small and medium-sized enterprises (SMEs) strengthen their economic, social and environmental sustainability. The programme achieves this by helping them to export products and services to Europe and regional markets. Examples of their activities include Fresh Fruits in Ethiopia[241] and Climate Smart Agriculture in Uganda[242].

In the Pathways to Prosperity programme[243], Solidaridad is focusing on climate-smart regenerative agricultural practices and ecosystem services to improve livelihoods for smallholders. Solidaridad works in value chains that are high-risk sectors for climate change such as textile and leather production, and tropical agricultural products such as palm oil, coffee, cotton and cocoa. The programme aims to make

[233] WaterWorX (vei.nl)
[234] Blue Deal - Unie van Waterschappen
[235] Home | Pro-ARIDES (proarides.org)
[236] Challenge Fund for Youth Employment
[237] Kenya: Mr Green Africa - Challenge Fund for Youth Employment
[238] Uganda: African Clean Energy - Challenge Fund for Youth Employment
[239] Uganda: Proteen - Challenge Fund for Youth Employment
[240] CBI
[241] Fresh Fruits in Ethiopia
[242] Climate Smart Agriculture in Uganda
[243] Pathways to Prosperity program

smallholder farming more climate resilient. Activities include the diversification of production models, offering skills/knowledge (via training/apps) on sustainable and climate-resilient agricultural production and orchestrating stewardship over natural resources and ecosystem services. Furthermore, climate services are offered through climate adaptive service delivery. Input provision hubs provide climate-resilient seeds and species. Furthermore, service providers integrate sustainable agricultural practices and provide training on climate-smart agriculture.

Under the newly started 'Power of Voices' (POV) Grant Programme, the Netherlands also supports a number of partnerships with a strong focus on strengthening local civil society organisations involved in both local and international lobbying and advocacy for climate action. Such partnerships include the Global Alliance for Green and Gender Action (GAGGA), the African Activists for Climate Justice (AACJ), the Amplifying Voices for Just Climate Action (VCA) Programme and the Green Livelihoods Alliance Forests for a Just Future Programme (GLA).

CTF Table III.5 includes capacity building activities or activities with capacity-building elements that were at the implementation phase in 2021–2022. The Netherlands identifies activities with relevant capacity-building elements based on the description of the activity in its appraisal memorandum.

5.5.2 How capacity-building support that was provided responds to the existing and emerging capacity-building needs, priorities and gaps identified by developing country Parties in the areas of mitigation, adaptation, and technology development and transfer

As elaborated earlier, the Netherlands' support for climate action in developing countries is an integral part of its international cooperation policy. Since Dutch public climate finance is all financed from ODA, our bilateral activities and contributions to multilateral institutions and development banks are primarily intended to support the poorest and most vulnerable countries and communities.

Of the Dutch partner countries, mostly situated in the Sahel, the Horn of Africa, the Middle East and North Africa, most are least developed countries (LDCs), many are fragile and conflict-affected states and all of them are vulnerable to climate change.

To address the needs and aspirations of our partner countries, we work with a multitude of actors, including national, regional and local authorities, multilateral organisations, non-governmental organisations, private-sector organisations, farmers organisations, water boards, and so on. These organisations all have their own processes to ensure that their activities meet the needs and aspirations of their target populations.

We require implementing organisations to carry out context, problem and stakeholder analyses, and in that process also refer to climate profiles such as those published by IPCC, prepared by the Ministry itself or available at other organisations such as USAID, AfDB, WB, UNDP, and not least also to National Determined Communications (NDCs), National Adaptation Plans (NAPs) and other relevant national policies and strategies. In the programme Theory of Change and Monitoring, Evaluation and Learning (MEL) strategy, implementing organisations funded by the Netherlands are expected to explain how the programme intends to address climate risks and vulnerabilities, and with what results.

5.5.3 Policies that promote capacity-building support

Given the vast knowledge, expertise and experience in the Netherlands, in particular in areas such as WASH, water management, food security and energy, we believe that we have an important role to play in supporting and facilitating capacity development. It is not only the professional knowledge but the capacity of many Dutch professionals to translate this to the context at hand and to interact closely with local actors which makes the real difference. Enabling capacity self-development is consequently an important element of our development policies and international strategies, both for the Ministry for Foreign Trade and Development Cooperation as a whole, as well as for policies developed for different themes more specifically.

5.5.4 Involvement of stakeholders

As elaborated above under (b) and (c), to address the aspirations and needs of our local partners countries, we work and also require our implementing partners to work with a multitude of actors, including national, regional and local authorities, multilateral organisations, non-governmental organisations, private-sector organisations, farmers organisations, water operators, water boards, and so on.

Given our feminist foreign policy based on intersectionality, we address the multiple socio-economic and cultural marginalization processes in the societies where we facilitate development. This means a special focus on women, youth, Indigenous Peoples, LGBTI+, smallholder food producers and others.
The 'involvement' of these stakeholders is preferably not in the form of involving them in consultations regarding our activities but in ensuring that our partners get meaningfully involved in the lives and livelihoods of those marginalized people.

5.5.5 How support for capacity-building actions in developing country Parties that was provided promotes the sharing of lessons learned and best practices

The Netherlands believes that sharing of lessons and best practices is an essential element of facilitating capacity self-development. Rather than referring to capacity building, we generally prefer to refer to "capacity development" or even "capacity mobilisation". Where "capacity building" suggests a top-down and starting from scratch process, capacity development and/or mobilization are based on the premise that there is much knowledge and capacity to start with, and that this capacity can only be mobilized and developed further through a two-way (north-south or south-south) process of learning and sharing lessons and best practices. The joint cooperation programmes discussed earlier are good examples of how knowledge institutes in different countries can develop through north-south learning and sharing.
Good examples of programmes where south-south learning and sharing is actively supported and promoted are the NDC Partnership[244] and the Climate & Development Knowledge Network (CDKN)[245].

[244] NDC Partnership
[245] Climate & Development Knowledge Network (CDKN)

6 Improvements in reporting

According to paragraph 7 of the MPGs, the subject of this chapter is 'information on areas of improvement in relation to its reporting pursuant to chapters II, III, IV, V and VI'. These areas of improvement may be identified by the Party or by the technical expert review team. This chapter will become more important in the second and subsequent BTR.

As this is the first BTR reported by the Netherlands and the review thereof has yet to take place, there are currently not yet any specific areas of improvement as identified by the technical expert review team that can be listed in this chapter. Nonetheless, in line with paragraph 7 of the MPGs, there are still areas of improvement that can be identified by the Party itself. Important improvements that have been taken place in the Netherlands are:

Since 2024, *information on policies and measures* is being collected using the so-called WorkFlowTool, which is a web-based dashboard. This tool was implemented to collect information from ministries in a more consistent and efficient way. The collected information is used by the ministry of Climate Policy and Green Growth for coordination purposes, by the Climate Policy Dashboard to monitor their progress, by PBL to assess their impact in the National Energy and Climate Projections and by RVO for reporting purposes (such as for the BTR and to the EU). Previously, information on policy and measures was collected by different actors (RVO, PBL and the ministry) on various moments using different methods, resulting in inconsistencies and inefficiencies.

The *time horizon in the projections* included in the National Climate and Energy Outlook, as prepared by the Netherlands Environmental Assessment Agency (PBL), has been extended from 2030 (in the previous national report) to 2040 in the current BTR. This has been done to provide policy makers with insights on the possible need for additional policies in the period between 2030 and 2040. It must be noted that uncertainties of the projections between 2030 and 2040 are substantial compared to the projections up to 2030 (which involve many uncertainties as well), due to the highly uncertain long-term development of the economy, technologies, energy prices, international trade, etcetera.

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7 Annexes to the BTR

Note: Annex 1 and 2 contain common information for the EU and Member States BTRs.

Annex 1: Common tabular formats on information necessary to track progress

Description of a Party's nationally determined contribution under Article 4 of the Paris Agreement, including updates[a]

Description	
Target(s) and description, including target type(s), as applicable[b], [c]	Economy-wide net domestic reduction of at least 55% in greenhouse gas emissions by 2030 compared to 1990. The term 'domestic' means without the use of international credits. Target type: Economy-wide absolute emission reduction.
Target year(s) or period(s), and whether they are single-year or multi-year target(s), as applicable	Single year target, 2030.
Reference point(s), level(s), baseline(s), base year(s) or starting point(s), and their respective value(s), as applicable	Base year: 1990. Net greenhouse gas emissions level in 1990: • 4 699 405 kt CO_2eq.
Time frame(s) and/or periods for implementation, as applicable	2021-2030
Scope and coverage, including, as relevant, sectors, categories, activities, sources and sinks, pools and gases, as applicable	Geographical scope: EU Member States (Belgium, Bulgaria, Czechia, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden) including EU outermost regions (Guadeloupe, French Guiana, Martinique, Mayotte, Reunion, Saint Martin (France), Canary Islands (Spain), Azores and Madeira (Portugal)). Sectors covered, as contained in Annex I to decision 5/CMA.3: • Energy • Industrial processes and product use • Agriculture • Land Use, Land Use Change and Forestry (LULUCF) • Waste International Aviation: Emissions from civil aviation activities as set out for 2030 in Annex I to the EU ETS Directive are included only in respect of CO_2 emissions from flights subject to effective carbon pricing through the EU ETS. With respect to the geographical scope of the NDC these comprise emissions in 2024-26 from flights between the EU Member States and departing flights to Norway, Iceland, Switzerland and United Kingdom. International Navigation: Waterborne navigation is included in respect of CO_2, methane (CH_4) and nitrous Oxide (N_2O) emissions from maritime transport voyages between the EU Member States. Gases: • Carbon Dioxide (CO_2) • Methane (CH_4) • Nitrous Oxide (N_2O) • Hydrofluorocarbons (HFCs) • Perfluorocarbons (PFCs) • Sulphur hexafluoride (SF_6) • Nitrogen trifluoride (NF_3) • The included LULUCF categories and pools are as defined in decision 5/CMA.3.

Description	
Intention to use cooperative approaches that involve the use of ITMOs under Article 6 towards NDCs under Article 4 of the Paris Agreement, as applicable	The EU's at least 55% net reduction target by 2030 is to be achieved through domestic measures only, without contribution from international credits. The EU will account and report for its cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA.
Any updates or clarifications of previously reported information, as applicable[c]	The information on the NDC scope contains clarifications/further details compared to the information provided in the updated NDC of the EU.

Note: This table is to be used by Parties on a voluntary basis.

[a] Each Party shall provide a description of its NDC under Article 4, against which progress will be tracked. The information provided shall include required information, as applicable, including any updates to information previously provided (para. 64 of the MPGs).

[b] For example: economy-wide absolute emission reduction, emission intensity reduction, emission reduction below a projected baseline, mitigation co-benefits of adaptation actions or economic diversification plans, policies and measures, and other (para. 64(a) of the MPGs).

[c] Parties with both unconditional and conditional targets in their NDC may add a row to the table to describe conditional targets.

[d] For example: recalculation of previously reported inventory data, or greater detail on methodologies or use of cooperative approaches (para. 64(g) of the MPGs).

1 **Structured summary: Description of selected indicators**

Indicator(s) selected to track progress[a]	Description
EU NDC	Annual total net GHG emissions in the EU consistent with the scope of the NDC in CO_2eq.
Information for the reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate[b]	The reference level is total net GHG emissions of the EU in the base year (1990). The reference level value for the EU is 4 699 405 kt CO_2eq.
Updates in accordance with any recalculation of the GHG inventory, as appropriate	This is the first time the reference level is reported, hence there are no updates. The value of the reference level may be updated in the future due to methodological improvements to the EU GHG inventory and to the determination of international aviation and navigation emissions in the NDC scope.
Relation to NDC[c]	The indicator is defined in the same unit and metric as the target of the NDC. Hence it can be used directly for tracking progress in implementing and achieving the NDC target.

Indicator(s) selected to track progress[a]	Description
NL ESR	Annual total GHG emissions in the Netherlands covered by the EU Effort Sharing Regulation (ESR) in CO_2eq.
Information for the reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate[b]	The reference level is total GHG emissions of the Netherlands in the base year 2005, that fall within the scope of the ESR. The reference level value is 128.1 Mt CO_2-eq. [246]
Updates in accordance with any recalculation of the GHG inventory, as appropriate	This is the first time the reference level is reported, hence there are no updates. The value of the reference level may be updated in the future due to methodological improvements to the NL GHG inventory.
Relation to NDC[c]	The indicator relates to the progress towards the EU emission reduction target for emissions covered by the Effort Sharing Regulation (ESR). Progress towards the achievement of this target contributes to the achievement of the target of the EU NDC. The indicator is defined in the same unit and metric as the target in the EU NDC. Hence it can be used for tracking progress of the contribution by the Netherlands to the implementation and achievement of the NDC target.

Indicator(s) selected to track progress[a]	Description
NL LULUCF	Annual total net GHG emissions in the Netherlands covered by the EU Land Use, Land Use Change and Forestry (LULUCF) Regulation in CO_2eq
Information for the reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate[b]	The reference level is the average GHG emissions of the Netherlands in the LULUCF sector for the years 2016, 2017 and 2018. The indicative reference level value is 5.4 Mt CO_2-eq[247].
Updates in accordance with any recalculation of the GHG inventory, as appropriate	This is the first time the reference level is reported, hence there are no updates. The value of the reference level may be updated in the future due to methodological improvements to the NL GHG inventory.
Relation to NDC[c]	The indicator relates to the progress towards the 2030 EU emission reduction target for emissions covered by the Land Use, Land Use Change and Forestry (LULUCF) Regulation. Progress towards the achievement of this target contributes directly to the achievement of the target of the EU NDC. The indicator is defined in the same unit and metric as the target in the EU NDC. Hence it can be used for tracking progress of the contribution by the Netherlands to the implementation and achievement of the NDC target.

Notes: (1) Pursuant to para. 79 of the MPGs, each Party shall report the information referred to in paras. 65–78 of the MPGs in a narrative and common tabular format, as applicable. (2) A Party may amend the reporting format (e.g. Excel file) to remove specific rows in this table if the information to be provided in those rows is not applicable to the Party's NDC under Article 4 of the Paris Agreement, in accordance with the MPGs. (3) The Party could add rows for each additional selected indicator and related information.

[a] Each Party shall identify the indicator(s) that it has selected to track progress of its NDC (para. 65 of the MPGs).

[b] Each Party shall provide the information for each selected indicator for the reference point(s), level(s), baseline(s), base year(s) or starting point(s) and shall update the information in accordance with any recalculation of the GHG inventory, as appropriate (para. 67 of the MPGs).

[c] Each Party shall describe for each indicator identified how it is related to its NDC (para. 76(a) of the MPGs).

[246] It should be noted that this reference value follows from the 2020 Comprehensive Review of the Netherlands National Greenhouse Gas Inventory Data pursuant to Article 4(3) of Regulation (EU) No 2018/842 and to Article 3 of Decision No 406/2009/EC; the subsequent Commission Implementing Decision (EU) 2020/2126 on annual emission allocations of the Member States, including the values of the 2005 GHG emissions per Member State (Annex I) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02020D2126-20240731); and Regulation (EU) 2023/857, which amended the binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 (set at -48% for the Netherlands) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R0857) . This resulted in a fixed 2030 ESR target for the Netherlands of 66.6 Mt CO2eq.

[247] Please note, this in an indicative reference level based on the most recent data available (NIR2024). The reference value (used for accounting as per the EU LULUCF Regulation) will be determined by the reported values of the submission in 2032. As is stated, the value may still change due to methodological improvements.

2 **Structured summary: Definitions needed to understand NDC**

Definitions[a]	
Definition needed to understand each indicator:	
Annual total net EU GHG emissions	Total net GHG emissions correspond to the annual total of emissions and removals reported in CO_2 equivalents in the latest EU GHG inventory. The totals comprise all sectors and gases listed in the table entitled 'Reporting format for the description of a Party's nationally determined contribution under Article 4 of the Paris Agreement, including updates'. Indirect CO_2 emissions are included from those Member States that report these emissions.
Any sector or category defined differently than in the national inventory report:	
{Sector} Not applicable	
{Category} Not applicable	
Definition needed to understand mitigation co- benefits of adaptation actions and/or economic diversification plans:	
{Mitigation co-benefit(s)} Not applicable	
Any other relevant definitions:	
Not applicable	

Definitions[a]	
Definition needed to understand each indicator:	
Annual total NL GHG emissions covered by the EU ESR Regulation	Annual total GHG emissions in the Netherlands covered by the EU Effort Sharing Regulation (ESR) in CO_2eq'. The emissions are defined as the annual total of emissions and removals reported in CO_2 equivalents in the latest GHG inventory of the Netherlands, minus the annual emissions in the Netherlands covered by the EU ETS and the LULUCF Regulation.
Any sector or category defined differently than in the national inventory report:	
{Sector} All sectors covered in the GHG emission inventory of the Netherlands minus the emissions in the Netherlands covered by the EU ETS and the LULUCF Regulation	
{Category} Not applicable	
Definition needed to understand mitigation co- benefits of adaptation actions and/or economic diversification plans:	
{Mitigation co-benefit(s)} Not applicable	
Any other relevant definitions:	
Not applicable	

Definitions[a]	
Definition needed to understand each indicator:	
Annual total net NL GHG emissions covered by the EU LULUCF Regulation	Total net GHG emissions correspond to the annual total of emissions and removals reported in CO_2 equivalents in the latest EU GHG inventory. The totals comprise all sectors and gases listed in the table entitled 'Reporting format for the description of a Party's nationally determined contribution under Article 4 of the Paris Agreement, including updates'
Any sector or category defined differently than in the national inventory report:	
{Sector} Only applicable to emissions from the LULUCF sector	
{Category} Not applicable	

Definitions[a]
Definition needed to understand mitigation co- benefits of adaptation actions and/or economic diversification plans:
{Mitigation co-benefit(s)} Not applicable
Any other relevant definitions:
Not applicable

Notes: (1) Pursuant to para. 79 of the MPGs, each Party shall report the information referred to in paras. 65–78 of the MPGs in a narrative and common tabular format, as applicable. (2) A Party may amend the reporting format (e.g. Excel file) to remove specific rows in this table if the information to be provided in those rows is not applicable to the Party's NDC under Article 4 of the Paris Agreement, in accordance with the MPGs. (3) The Party could add rows for each additional sector, category, mitigation co-benefits of adaptation actions and/or economic diversification plans, indicator and any other relevant definitions.

[a] Each Party shall provide any definitions needed to understand its NDC under Article 4, including those related to each indicator identified in para. 65 of the MPGs, those related to any sectors or categories defined differently than in the national inventory report, or the mitigation co-benefits of adaptation actions and/or economic diversification plans (para. 73 of the MPGs).

3 **Structured summary: Methodologies and accounting approaches – consistency with Article 4, paragraphs 13 and 14, of the Paris Agreement and with decision 4/CMA.1**

Reporting requirement	Description or reference to the relevant section of the BTR
For the first NDC under Article 4:[a]	
Accounting approach, including how it is consistent with Article 4, paragraphs 13–14, of the Paris Agreement (para. 71 of the MPGs)	Net GHG emissions, calculated from emissions and removals from the GHG inventory of the EU and supplemented with data on international aviation and navigation collected in the Joint Research Centre's Integrated Database of the European Energy System (JRC-IDEES), are used to quantify progress towards implementing and achieving of the NDC in respect of the NDC target. This approach promotes environmental integrity, transparency, accuracy, completeness, comparability and consistency and ensures the avoidance of double counting, as described below. Existing methods and guidance under the Convention are taken into account, as described below.
For the second and subsequent NDC under Article 4, and optionally for the first NDC under Article 4:[b]	
Information on the accounting approach used is consistent with paragraphs 13–17 and annex II of decision 4/CMA.1 (para. 72 of the MPGs)	The European Union accounts for anthropogenic emissions and removals corresponding to its NDC consistent with paragraphs 13–17 and annex II of decision 4/CMA.1, as detailed below.
Explain how the accounting for anthropogenic emissions and removals is in accordance with methodologies and common metrics assessed by the IPCC and in accordance with decision 18/CMA.1 (para. 1(a) of annex II to decision 4/CMA.1)	The accounting for anthropogenic emissions and removals is based on the data contained in the EU GHG inventory, which is compiled in accordance with the 2006 IPCC Guidelines. The accounting for emissions from international aviation and navigation in the scope of the NDC is based on activity data, emission factors and methods which are in line with the IPCC guidelines. The accounting approach is also in accordance with decision 18/CMA.1 because the EU GHG inventory conforms with the provisions of chapter II of the Annex to decision 18/CMA.1.
Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1)	The GHG data used for accounting is based on the GHG inventory of the EU. The methodology used for accounting consists of a balancing of GHG emissions and removals, which is consistent with the methodologies used in the GHG inventory of the EU.

Reporting requirement	Description or reference to the relevant section of the BTR
Explain how overestimation or underestimation has been avoided for any projected emissions and removals used for accounting (para. 2(c) of annex II to decision 4/CMA.1)	Not applicable. Projected emissions and removals are not used for accounting.
For each NDC under Article 4:[b]	
Accounting for anthropogenic emissions and removals in accordance with methodologies and common metrics assessed by the IPCC and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement:	
Each methodology and/or accounting approach used to assess the implementation and achievement of the target(s), as applicable (para. 74(a) of the MPGs)	The methodology used to assess the implementation and achievement consists of a comparison of the reduction of net GHG emissions from the GHG inventory national total, including a share of GHG inventory international aviation and navigation emissions in line with the NDC scope, with the NDC target. The EU will account for its cooperation with other Parties in a manner consistent with guidance adopted by the CMA.
Each methodology and/or accounting approach used for the construction of any baseline, to the extent possible (para. 74(b) of the MPGs)	Progress is tracked by comparing annual net emissions with net emissions in the base year. No baseline is constructed.
If the methodology or accounting approach used for the indicator(s) in table 1 differ from those used to assess the implementation and achievement the target, describe each methodology or accounting approach used to generate the information generated for each indicator in table 4 (para. 74(c) of the MPGs)	Not applicable. The methodology/accounting approach used for the indicator in table 1 is the same as the methodology/accounting approach used to assess the implementation and achievement the target.
Any conditions and assumptions relevant to the achievement of the NDC under Article 4, as applicable and available (para. 75(i) of the MPGs)	Not applicable. The NDC is unconditional.
Key parameters, assumptions, definitions, data sources and models used, as applicable and available (para. 75(a) of the MPGs)	Net GHG emissions are the key parameter used for tracking progress in implementing and achieving the NDC. The GHG inventory of the EU is the data source used. Details on assumptions, definitions and models used for determining net GHG emissions can be found in the National Inventory Document of the EU.
IPCC Guidelines used, as applicable and available (para. 75(b) of the MPGs)	2006 IPCC Guidelines; and 2019 refinement to the 2006 IPCC Guidelines for some source categories.
Report the metrics used, as applicable and available (para. 75(c) of the MPGs)	100-year time-horizon global warming potential (GWP) values from the IPCC Fifth Assessment Report.

Reporting requirement	Description or reference to the relevant section of the BTR
For Parties whose NDC cannot be accounted for using methodologies covered by IPCC guidelines, provide information on their own methodology used, including for NDCs, pursuant to Article 4, paragraph 6, of the Paris Agreement, if applicable (para. 1(b) of annex II to decision 4/CMA.1)	Not applicable.
Provide information on methodologies used to track progress arising from the implementation of policies and measures, as appropriate (para. 1(d) of annex II to decision 4/CMA.1)	Progress arising from the implementation of policies and measures is expressed in a reduction of GHG emissions or increase of GHG removals. The methodology used to assess such progress is based on the estimation of GHG emissions and removals in the GHG inventory of the EU and on data on international aviation and navigation monitored in the Joint Research Centre's Integrated Database of the European Energy System (JRC-IDEES).
Where applicable to its NDC, any sector-, category- or activity-specific assumptions, methodologies and approaches consistent with IPCC guidance, taking into account any relevant decision under the Convention, as applicable (para. 75(d) of the MPGs)	Sector-, category- and activity-specific assumptions, methodologies and approaches applicable to the NDC are described in the national inventory document of the EU and are consistent with IPCC guidance. Emissions from international aviation and navigation in the scope of the NDC are determined based on activity data from the JRC-IDEES, using emission factors and methodologies consistent with IPCC guidance.
For Parties that address emissions and subsequent removals from natural disturbances on managed lands, provide detailed information on the approach used and how it is consistent with relevant IPCC guidance, as appropriate, or indicate the relevant section of the national GHG inventory report containing that information (para. 1(e) of annex II to decision 4/CMA.1, para. 75(d)(i) of the MPGs)	The EU does not disaggregate emissions and removals on managed land into those considered to result from human activities and those considered to result from natural disturbances.
For Parties that account for emissions and removals from harvested wood products, provide detailed information on which IPCC approach has been used to estimate emissions and removals (para. 1(f) of annex II to decision 4/CMA.1, para. 75(d)(ii) of the MPGs)	The EU accounts for emissions and removals from harvested wood products as an integral part of net GHG emissions and removals in the scope of the NDC. GHG emissions and removals from harvested wood products are determined in accordance with the production approach, as defined in Annex 12.A.1 to Volume 4 of the 2006 IPCC Guidelines for National GHG Inventories.
For Parties that address the effects of age-class structure in forests, provide detailed information on the approach used and how this is consistent with relevant IPCC guidance, as appropriate (para. 1(g) of annex II to decision 4/CMA.1, para. 75(d)(iii) of the MPGs)	The EU does not address the effects of age-class structure in forests in the accounting approach for its NDC.
How the Party has drawn on existing methods and guidance established under the Convention and its related legal instruments, as appropriate, if applicable (para. 1(c) of annex II to decision 4/CMA.1)	The EU has drawn on existing methods and guidance established under the Convention by using an NDC target which is an advancement of the quantified economy-wide emission reduction target for 2020, which was communicated and tracked under the Convention.

Reporting requirement	Description or reference to the relevant section of the BTR
Any methodologies used to account for mitigation co- benefits of adaptation actions and/or economic diversification plans (para. 75(e) of the MPGs)	The NDC does not consist of mitigation co-benefits of adaptation actions and/or economic diversification plans. Hence these co-benefits were not accounted for, and no related methodologies were used.
Describe how double counting of net GHG emission reductions has been avoided, including in accordance with guidance developed related to Article 6 if relevant (para. 76(d) of the MPGs)	GHG emissions and removals from the EU's GHG inventory, complemented with JRC-IDEES data for determining the share of emissions form international aviation and navigation in the NDC scope, are used for tracking the net GHG emission reductions. Emissions and removals are reported in line with IPCC guidelines, with the aim of neither over- nor underestimating GHG emissions. GHG emissions and removals are reported by the EU and its Member States in their respective GHG inventories. For tracking progress towards implementing and achieving the EU NDC, only those net GHG emission reductions are counted which are reported at EU level. For cooperative approaches under Article 6, corresponding adjustments are made in a manner consistent with guidance adopted by the CMA.
Any other methodologies related to the NDC under Article 4 (para. 75(h) of the MPGs)	Not applicable.
Ensuring methodological consistency, including on baselines, between the communication and implementation of NDCs (para. 12(b) of the decision 4/CMA.1):	
Explain how consistency has been maintained in scope and coverage, definitions, data sources, metrics, assumptions and methodological approaches including on baselines, between the communication and implementation of NDCs (para. 2(a) of annex II to decision 4/CMA.1)	The scope, coverage, definitions, data sources, metrics and approaches are consistent between the communicated NDC and its implementation, as described in the BTR.
Explain how consistency has been maintained between any GHG data and estimation methodologies used for accounting and the Party's GHG inventory, pursuant to Article 13, paragraph 7(a), of the Paris Agreement, if applicable (para. 2(b) of annex II to decision 4/CMA.1) and explain methodological inconsistencies with the Party's most recent national inventory report, if applicable (para. 76(c) of the MPGs)	The GHG inventory of the EU is the primary source for the GHG data used for accounting. The share of GHG inventory emissions from international aviation and navigation in the scope of the NDC have been determined separately based on JRC-IDEES data, using emission factors and methodologies consistent with IPCC guidance. There are no methodological inconsistencies with the most recent national inventory report.
For Parties that apply technical changes to update reference points, reference levels or projections, the changes should reflect either of the following (para. 2(d) of annex II to decision 4/CMA.1):	
Technical changes related to technical corrections to the Party's inventory (para. 2(d)(i) of annex II to decision 4/CMA.1)	No technical changes related to technical corrections to the GHG inventory were applied to update reference points, reference levels or projections.

Reporting requirement	Description or reference to the relevant section of the BTR
Technical changes related to improvements in accuracy that maintain methodological consistency (para. 2(d)(ii) of annex II to decision 4/CMA.1)	No technical changes related to improvements in accuracy were applied to update reference points, reference levels or projections.
Explain how any methodological changes and technical updates made during the implementation of their NDC were transparently reported (para. 2(e) of annex II to decision 4/CMA.1)	Methodological changes and technical updates are reported in the chapter entitled 'recalculations and improvements' of the National Inventory Document of the EU. GHG emissions from international aviation and navigation in the scope of the EU NDC are reported for the first time in this BTR (see Annex 3 to the BTR).
Striving to include all categories of anthropogenic emissions or removals in the NDC and, once a source, sink or activity is included, continuing to include it (para. 3 of annex II to decision 4/CMA.1):	
Explain how all categories of anthropogenic emissions and removals corresponding to their NDC were accounted for (para. 3(a) of annex II to decision 4/CMA.1)	The indicator used for tracking progress towards implementing and achieving the NDC target comprises all categories of anthropogenic emissions and removals corresponding to the NDC.
Explain how Party is striving to include all categories of anthropogenic emissions and removals in its NDC, and, once a source, sink or activity is included, continue to include it (para. 3(b) of annex II to decision 4/CMA.1)	The scope of the NDC of the EU covers all categories of emissions and removals reported in the GHG inventory, in line with IPCC guidelines. Member States report some specific source categories as 'not estimated' when the estimates would be insignificant as defined in paragraph 32 of the annex to decision 18/CMA.1. Information on these categories is provided in Common Reporting Table 9 of the respective Member States' GHG inventory submission. Besides including all sectors listed in decision 18/CMA.1, a share of emissions from international aviation and navigation are also included in the NDC scope.
Provide an explanation of why any categories of anthropogenic emissions or removals are excluded (para. 4 of annex II to decision 4/CMA.1)	All categories of anthropogenic emissions and removals contained in the national total of the EU GHG inventory are included in the NDC.
Each Party that participates in cooperative approaches that involve the use of ITMOs towards an NDC under Article 4, or authorizes the use of mitigation outcomes for international mitigation purposes other than achievement of its NDC	
Provide information on any methodologies associated with any cooperative approaches that involve the use of ITMOs towards an NDC under Article 4 (para. 75(f) of the MPGs)	The EU will account and report for its cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA, when applicable.
Provide information on how each cooperative approach promotes sustainable development, consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	The EU will account and report for its cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA, when applicable.

Reporting requirement	Description or reference to the relevant section of the BTR
Provide information on how each cooperative approach ensures environmental integrity consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	The EU will account and report for its cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA, when applicable.
Provide information on how each cooperative approach ensures transparency, including in governance, consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	The EU will account and report for its cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA, when applicable.
Provide information on how each cooperative approach applies robust accounting to ensure, inter alia, the avoidance of double counting, consistent with decisions adopted by the CMA on Article 6 (para. 77(d)(iv) of the MPGs)	The EU will account and report for its cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA, when applicable.
Any other information consistent with decisions adopted by the CMA on reporting under Article 6 (para. 77(d)(iii) of the MPGs)	The EU will account and report for its cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA, when applicable.

Notes: (1) Pursuant to para. 79 of the MPGs, each Party shall report the information referred to in paras. 65–78 of the MPGs in a narrative and common tabular format, as applicable. (2) A Party may amend the reporting format (e.g. Excel file) to remove specific rows in this table if the information to be provided in those rows is not applicable to the Party's NDC under Article 4 of the Paris Agreement, in accordance with the MPGs.

[a] For the first NDC under Article 4, each Party shall clearly indicate and report its accounting approach, including how it is consistent with Article 4, paras. 13–14, of the Paris Agreement (para. 71 of the MPGs).

[b] For the second and subsequent NDC under Article 4, each Party shall provide information referred to in chapter III.B and C of the MPGs consistent with decision 4/CMA.1. Each Party shall clearly indicate how its reporting is consistent with decision 4/CMA.1 (para. 72 of the MPGs). Each Party may choose to provide information on accounting of its first NDC consistent with decision 4/CMA.1 (para. 71 of the MPGs).

4 Structured summary: Tracking progress made in implementing and achieving the NDC under Article 4 of the Paris Agreement[a]

	Unit, as applicable	Reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate (paras. 67 and 77(a)(i) of the MPGs)	Implementation period of the NDC covering information for previous reporting years, as applicable, and the most recent year, including the end year or end of period (paras. 68 and 77(a)(ii–iii) of the MPGs)		Target level[b]	Target year or period	Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras. 69–70 of the MPGs)
			2021	2022			
Indicator(s) selected to track progress of the NDC or portion of NDC under Article 4 of the Paris Agreement (paras. 65 and 77(a) of the MPGs):							
Annual total GHG emissions and removals in the EU consistent with the scope of the NDC	kt CO_2eq[248]	4 699 405	3 272 650	3 205 223	55% below base year level	2030	The most recent level of the indicator is 31.8% below the base year level.
Where applicable, total GHG emissions and removals consistent with the coverage of the NDC (para. 77(b) of the MPGs)	kt CO_2eq		3 272 650	3 205 223			
Contribution from the LULUCF sector for each year of the target period or target year, if not included in the inventory time series of total net GHG emissions and removals, as applicable (para. 77(c) of the MPGs)	NA		NA	NA			
Each Party that participates in cooperative approaches that involve the use of ITMOs towards an NDC under Article 4 of the Paris Agreement, or authorizes the use of mitigation outcomes for international mitigation purposes other than achievement of the NDC, shall provide (para. 77(d) of the MPGs):							
If applicable, an indicative multi-year emissions trajectory, trajectories or budget for its NDC implementation period (para. 7(a)(i), annex to decision 2/CMA.3)	kt CO_2eq		To be reported in subsequent BTR	To be reported in subsequent BTR			
If applicable, multi-year emissions trajectory, trajectories or budget for its NDC implementation period that is consistent with the NDC (para. 7(b), annex to decision 2/CMA.3)	NA		NA	NA			

[248] Net GHG emissions in the scope of the NDC

	Unit, as applicable	Reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate (paras. 67 and 77(a)(i) of the MPGs)	Implementation period of the NDC covering information for previous reporting years, as applicable, and the most recent year, including the end year or end of period (paras. 68 and 77(a)(ii–iii) of the MPGs)		Target level[b]	Target year or period	Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras. 69–70 of the MPGs)
			2021	2022			
Annual anthropogenic emissions by sources and removals by sinks covered by its NDC or, where applicable, from the emission or sink categories as identified by the host Party pursuant to paragraph 10 of annex to decision 2/CMA.3 (para. 23(a), annex to decision 2/CMA.3) (as part of para. 77 (d)(i) of the MPGs)	kt CO_2eq		3 272 650	3 205 223			
Annual anthropogenic emissions by sources and removals by sinks covered by its NDC or, where applicable, from the portion of its NDC in accordance with paragraph 10, annex to decision 2/CMA.3 (para. 23(b), annex to decision 2/CMA.3)	kt CO_2eq		3 272 650	3 205 223			
If applicable, annual level of the relevant non-GHG indicator that is being used by the Party to track progress towards the implementation and achievement of its NDC and was selected pursuant to paragraph 65, annex to decision 18/CMA.1 (para. 23(i), annex, decision 2/CMA.3)	NA		NA	NA			
Annual quantity of ITMOs first transferred (para. 23(c), annex to decision 2/CMA.3) (para. 77(d)(ii) of the MPGs)	kt CO_2eq		To be reported in subsequent BTR	To be reported in subsequent BTR			
Annual quantity of mitigation outcomes authorized for use for other international mitigation purposes and entities authorized to use such mitigation outcomes, as appropriate (para. 23(d), annex to decision 2/CMA.3) (para. 77(d)(ii) of the MPGs)	NA		NA	NA			
Annual quantity of ITMOs used towards achievement of the NDC (para. 23(e), annex to decision 2/CMA.3) (para. 77(d)(ii) of the MPGs)	kt CO_2eq		To be reported in subsequent BTR	To be reported in subsequent BTR			
Net annual quantity of ITMOs resulting from paras. 23(c)-(e), annex to decision 2/CMA.3 (para. 23(f), annex to decision 2/CMA.3)	kt CO_2eq		To be reported in subsequent BTR	To be reported in subsequent BTR			
If applicable, the cumulative amount of ITMOs, divided by the number of elapsed years in the NDC implementation period (para. 7(a)(ii), annex to decision 2/CMA.3)	NA		NA	NA			

	Unit, as applicable	Reference point(s), level(s), baseline(s), base year(s) or starting point(s), as appropriate (paras. 67 and 77(a)(i) of the MPGs)	Implementation period of the NDC covering information for previous reporting years, as applicable, and the most recent year, including the end year or end of period (paras. 68 and 77(a)(ii–iii) of the MPGs)		Target level[b]	Target year or period	Progress made towards the NDC, as determined by comparing the most recent information for each selected indicator, including for the end year or end of period, with the reference point(s), level(s), baseline(s), base year(s) or starting point(s) (paras. 69–70 of the MPGs)
			2021	2022			
Total quantitative corresponding adjustments used to calculate the emissions balance referred to in para. 23(k)(i), annex to decision 2/CMA.3, in accordance with the Party's method for applying corresponding adjustments consistent with section III.B, annex to decision 2/CMA.3 (Application of corresponding adjustments) (para. 23(g), annex to decision 2/CMA.3)	kt CO_2eq		To be reported in subsequent BTR	To be reported in subsequent BTR			
The cumulative information in respect of the annual information in para. 23(f), annex to decision 2/CMA.3, as applicable (para. 23(h), annex to decision 2/CMA.3)	kt CO_2eq		To be reported in subsequent BTR	To be reported in subsequent BTR			
For metrics in tonnes of CO_2 eq. or non-GHG, an annual emissions balance consistent with chapter III.B (Application of corresponding adjustment), annex, decision 2/CMA.3 (para. 23(k)(i), annex to decision 2/CMA.3) (as part of para. 77 (d)(ii) of the MPGs)	kt CO_2eq		To be reported in subsequent BTR	To be reported in subsequent BTR			
For metrics in non-GHG, for each non-GHG metric determined by participating Parties, annual adjustments resulting in an annual adjusted indicator, consistent with para. 9 of chapter III.B (Corresponding adjustments), annex to decision 2/CMA.3, and future guidance to be adopted by the CMA (para. 23(k)(ii), annex to decision 2/CMA.3)	NA		NA	NA			
Any other information consistent with decisions adopted by the CMA on reporting under Article 6 (para. 77(d)(iii) of the MPGs)	The EU will account and report for its cooperation with other Parties in a manner consistent with the guidance adopted by CMA1 and any further guidance agreed by the CMA in a subsequent BTR or initial report, when applicable.						

Notes: (1) Pursuant to para. 79 of the MPGs, each Party shall report the information referred to in paras. 65–78 of the MPGs in a narrative and common tabular format, as applicable. (2) A Party may amend the reporting format (e.g. Excel file) to remove specific rows in this table if the information to be provided in those rows is not applicable to the Party's NDC under Article 4 of the Paris Agreement, in accordance with the MPGs. (3) The Party could add rows for each additional selected indicator.

[a] This table could be used for each NDC target in case Party's NDC has multiple targets.

[b] Parties may provide information on conditional targets in a documentation box with references to the relevant page in their biennial transparency report.

The section 'Assessment of the achievement of the Party's NDC' of CTF table 4 is not included here because it applies after the end of the BTR period only, and the CTF reporting tool does not allow filling in this information at this point in time.

Annex 2: Methodology applied for the identification of GHG emissions from international aviation and navigation in the scope of the EU NDC

The following annex contains common information for the EU and MS BTRs.

The scope of the EU NDC goes beyond national GHG emissions and removals in the scope of the national GHG inventory; it also includes specific emissions from international aviation and navigation. This annex describes the methodology for identifying these emissions.

International aviation and maritime emissions are estimated by using the Joint Research Centre's Integrated Database of the European Energy System (JRC-IDEES).[249] It allows to split the international transport CO_2 emissions reported in the GHG inventory into intra-EU/extra-EU and intra-EEA/extra-EEA categories and the ongoing flights from the EU to UK and Switzerland, backwards in time (i.e. for the time period back to 1990).[250] In this annex, EEA stands for European Economic Area, which comprises the 27 EU Member States, Iceland, Liechtenstein and Norway. For international transport, JRC-IDEES applies a decomposition methodology that reconciles the scopes of available primary statistics and harmonises historical data on international aviation and maritime emissions, energy use, and transport activity. The resulting annual dataset covers 1990-2021 and distinguishes domestic, intra-EU/intra-EEA, and extra-EU/extra-EEA activity for each EU Member State, Norway and Iceland.

In aviation, JRC-IDEES distinguishes passenger and freight modes, with three geographical categories of flight origin/destinations for each mode: domestic, intra-EEA + UK, and extra-EEA + UK. Intra-EU, the UK, and EEA categories are also used internally during calibration but aggregated for reporting. For each mode/category combination, JRC-IDEES estimates activity (as passenger-km or tonnes-km), energy use and CO_2 emissions, aircraft stock (expressed as representative aircraft), load factors, and aircraft efficiencies.
As country-specific activity statistics are not available, the decomposition first allocates EU-level activity data from the Transport Pocketbook[251] of the European Commission's Directorate-General for Mobility and Transport to each country and flight category.

[249] European Commission, Joint Research Centre, Rózsai, M., Jaxa-Rozen, M., Salvucci, R., Sikora, P., Tattini, J. and Neuwahl, F., JRC-IDEES-2021: the Integrated Database of the European Energy System – Data update and technical documentation, Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/614599.

[250] The JRC-IDEES analytical database is designed to support energy modelling and policy analysis, by combining primary statistics with technical assumptions to compile detailed energy-economy-emissions historical data for each key energy sector. For aviation, EEA emissions includes emissions related to the UK but not to Switzerland, where total CO_2 emissions for the scope are additionally estimated from EUROCONTROL data.

[251] Statistical pocketbook 2023, https://transport.ec.europa.eu/facts-funding/studies-data/eu-transport-figures-statistical-pocketbook/statistical-pocketbook-2023_en.

For passenger modes, this allocation calculates average load factors using Eurostat data on total passengers and flights. These load factors and total flight numbers are combined with average flight distances from EUROCONTROL, the pan-European organisation dedicated to air traffic management, to yield an initial estimate for passenger transport activity. For intra-EU activity, a uniform scaling factor is then applied across Member States to match total EU-level Transport Pocketbook data. Freight activity follows a similar process, using a 'representative flight' concept with a common load factor across all Member States to account for mixed passenger-freight flights.
Next, the decomposition estimates fuel use from EUROCONTROL data, by deriving a distance-dependent average aircraft efficiency, then applying it to the country-specific ensemble of flights and routes. The final step scales the estimates to meet Eurostat energy balances for total domestic and international consumption back to 1990 values, maintaining intra-EEA/extra-EEA fuel use ratios derived from EUROCONTROL. JRC-IDEES additionally reports resulting differences with submissions by Parties to the UNFCCC. The above process is followed throughout the entire decomposition period (1990-2021). Data gaps are estimated from the existing indicators as follows:

- The process iterates backwards towards 1990, starting from the oldest years in which data is available in each Member State.
- Average flight distance is kept constant for early years without EUROCONTROL data (generally before 2004).
- If the load factor (passengers per flight) cannot be calculated due to a lack of passenger and/or flight data, it is estimated from the trend of the existing time series.
- Missing numbers of flights are calculated from the load factor and the passengers carried.
- If no passenger data is available, the total mileage is estimated from the energy consumption, and combined with average flight distance to estimate the number of flights. The number of flights is then combined with the load factor to estimate the total passengers carried.
- For early years without data, constant values are assumed for the factors used to *i)* scale intra-EU activity to the Transport Pocketbook, *ii)* adjust the estimated fuel use to EUROCONTROL data for specific routes, and *iii)* scale this adjusted fuel use to Eurostat energy balances (e.g. before 1995 for Transport Pocketbook data; before 2004 for EUROCONTROL data).

For international maritime transport, JRC-IDEES estimates data both for intra-EU/extra-EU and intra-EEA/extra-EEA geographical categories. The emission estimates in the GHG inventory already include CO_2, CH_4, and N_2O gases. Transport activity (tonnes-km) is estimated from Eurostat data on gross weight of transported goods, using port-level and country-level data for intra-EU and extra-EU categories, respectively. Intra-EU activities are then scaled to match the Transport Pocketbook totals, accounting for domestic coastal shipping (calibrated separately in JRC-IDEES). Next, transport activity is combined with data reported under the monitoring, reporting and verification system for maritime transport under the EU ETS ('THETIS MRV'[252]), namely EU-level mileage data and country-specific vessel sizes to estimate load factors (tonnes per movement). The load factors and resulting annual mileage (km) are calibrated to meet EU-level THETIS MRV mileage. The annual mileage is in turn combined with THETIS MRV average efficiency to yield a total technical energy consumption, with corresponding emissions derived from default emissions factors. This energy consumption is scaled to Eurostat energy balances so as to minimise discrepancy to total intra-EU THETIS MRV emissions. As with aviation, JRC-IDEES reports corresponding differences to submissions under the UNFCCC. Early years with data gaps are estimated from existing indicators as follows:

- The process iterates backwards towards 1990, starting from the oldest years in which data is available in each Member State.
- Average distance of voyages is kept constant for early years without Eurostat activity data (generally before 1997-2000).
- If the load factor (tonnes per movement) cannot be estimated due a lack of activity data, it is kept constant.
- If activity data is not available, it is estimated from Eurostat energy consumption.
- Missing mileage data is derived from the activity and load factor estimates.

[252] THETIS MRV, https://mrv.emsa.europa.eu/#public/eumrv.

- For early years without data, constant values are assumed for the factors used to i) scale intra-EU activity to the Transport Pocketbook, ii) scale estimated mileage to meet EU-level THETIS MRV mileage, and iii) scale domestic and intra-EU CO_2 emissions estimated from energy consumption so as to match total THETIS MRV CO_2 emissions.
- Finally, the ratios between the estimated MRV emissions and the CO_2 emissions for the reported transport activity (for intra-EU/EEA and extra-EU/EEA categories) between 2018 and 2021 are used to calculate the MRV compliant estimates back to 1990 levels.

For the year 2022, the international navigation and aviation emissions under the EU NDC scope have been estimated by applying the same share of those emissions on the total international navigation and aviation emissions (as reported in the GHG inventory) as in 2021.

Aviation emissions covered by the EU NDC scope

Emissions	Domestic aviation		Intra-EEA aviation			Extra-EEA aviation
	Domestic EU flights (e.g. Palermo Milan)	Domestic "non-EU EEA" flights (e.g. Oslo to Bergen)	Flights between "non-EU EEA" countries (from Oslo to Reykjavik)	Flights within the EEA, departing from EU airports	Flights to/from EU airports to OMRs	departing flights from EU airports to UK and Switzerland
Current NDC commitment	Yes	No	No	Yes	Yes From Jan 2024	Yes

Maritime navigation emissions covered by the EU NDC

Emissions	Domestic maritime navigation		International maritime navigation				Within ports	
	Voyages within a MS (e.g. Valencia - Barcelona)	Voyages within NO/IS *(e.g. Oslo - Bergen)*	Voyages between two EU MS *(e.g. Valencia - Rotterdam)*	Voyages between a MS and NO/IS *(e.g. Rotterdam - Oslo)*	Voyages between an EU MS and a third country	Voyages between NO/IS and a third country (or IS/NO)	emissions within a port of an EU MS *(reported under domestic emissions)*	emissions within a port of NO or IS (or another third country)
Current NDC commitment (CO_2; CH_4; N_2O)	Yes	No	Yes	No	No	No	Yes	No

Annex 3: Assumptions and methods used to calculate the expected impacts of policies and measures

Introduction

This annex describes the method that was applied to report on the estimated GHG emission reductions from policies and measures. The results are discussed in paragraph 3.7.3.

General method

- The ex-ante impact of policies and measures on GHG emissions as reported by the Netherlands is based on the projections made by PBL in the National Climate and Energy Outlook (KEV) of 2024[253]. Data from the KEV has been processed and transposed by the Netherlands Enterprise Agency (RVO).
- The KEV provide projections for 2030 on (a.o.) GHG emissions, (renewable) energy production and energy consumption, taking into account the impact of policies and measures. This is done for both existing, additional (planned) and scheduled policies and measures in three scenario's: with existing measures (WEM), with additional measures (WAM) and with scheduled measures (WSM). The quantitative impact of (individual) policies and measures is, however, not given in the KEV. Therefore, RVO defined a baseline which makes comparison to the projections in the KEV possible. This was done for three categories of emissions reductions: energy savings, renewable energy production and the reduction of non-CO_2-emissions.
- The baseline assumes no further improvements in energy-efficiency, renewable energy production and non-CO_2 emission reductions after 2020. In this way, the calculated impact on CO_2-emissions can be attributed to policies and measures implemented or planned (those that show impact after 2020) in the national Climate Plan 2021-2030.
- RVO aggregated the impacts from these categories of emission reductions to the sector level as most projection results in the KEV are also given on a sectoral level. For this purpose, the sectoral definitions that were applied in the KEV were used.
- CO_2 emission factors from the KEV2024 were used by RVO in order to calculate the impact of renewable energy production and energy savings on CO_2-emissions (see table 1 below).
- Depending on which energy carrier is avoided in combination with the technology used, the reduced CO_2-emissions were allocated to a sector[254] and ETS or non-ETS. CO_2-emission reductions due to the avoidance of electricity consumption from the reference park, were always allocated to the energy sector and ETS. Emission reductions due to the avoidance of gasoline/diesel consumption are allocated to the transport sector and non-ETS (ESR). The allocation of CO_2-emission reductions due to the avoidance of natural gas consumption depends on the technology/measure. CO_2 emission reduction due to heating technologies applied by households and services are allocated for 1% to ETS and 99% to non-ETS. This allocation is based on the projected ETS and non-ETS CO_2-emissions in 2030 for the built environment in the KEV2022. In a similar way, the allocation of CO_2-emission reductions due to technologies generally applied in industry (i.e. biomass boilers), an allocation ratio of 81/19 for ETS/non-ETS was used.

[253] https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2024

[254] CO_2-emission reductions were allocated to the sectors: energy, industry, built environment (householders & services), transport (includes mobile machinery), agriculture or LULUCF

Data sources

- Projections of GHG emissions, renewable energy and energy savings are based on the National Climate and Energy Outlook (KEV) 2024 from the Netherlands Environmental Assessment Agency (PBL) (publicly available).
- For this purpose, the policy variant With existing and Additional policies and Measures (WAM) in the KEV 2022 was used. Some policies and measures were not specific enough to be included in the modelling of the KEV. This results in an underestimation of the calculated impact on CO_2-emissions;
- Detailed results on energy consumption and emissions are derived by RVO from the KEV-database ('MONIT') (not publicly available);
- Detailed results on energy savings related to article 8 of the EED are derived from PBL data (not publicly available) underlying the aggregated and cumulative energy savings as reported in the KEV;

CO_2 emission reduction from renewable energy production

- In order to calculate the avoided CO_2 emissions from renewable energy production, the emission factor was multiplied with the amount of energy produced avoiding the consumption of coal, natural gas and/or gasoline/diesel in 2025 and 2030. In order to exclude the impact of policies and measures implemented prior to 2021, the renewable energy production level in 2020 was used as a baseline. The assumption is that all renewable energy production after 2020 can be attributed to policies and measures implemented after 2020. This results in an overestimation of avoided CO_2-emissions in 2025 and 2030 as some renewable energy production in those years results from installations that were supported prior to 2020.
- It was assumed that one unit of renewable energy production, avoids the consumption of one unit of fossil fuel. In case of electricity, the amount electricity produced from renewable energy sources (such as wind) avoids electricity production from the reference park of baseload power plants[255],[256]. Renewable heat technologies (such as heat pumps) avoid natural gas consumption (and may increase electricity consumption from the reference park). Biogas is assumed to replace natural gas.
- The possible impacts of renewable energy production on the import or export of electricity has not been taken into account. Therefore, the calculated CO_2 emission reductions must be considered as a rough indication.

CO_2 emission reduction from phasing out of coal-fired power plants

- From 2030 onwards, power plants are not allowed to produce electricity using coal. The impact of this policy measure is based on the avoided consumption of coal for electricity production. The consumption level in 2029 is used as an estimation for the consumption level in 2030 without this policy measure. This seems a reasonable assumption since it is expected that only the newly built and modern coal power plants will produce as long as possible in order to maximise their returns. Older coal power plants are already closed by 2029. The CO_2-emission reduction in 2030 is calculated by multiplying the coal consumption with the emission factor for coal (see Annex I);
- There are two other important consequences of this policy measure. The first is that the production of renewable energy from biomass decreases significantly as co-firing of biomass in the coal power plants ends in 2030 as well. The second is that the CO_2-emission factor of electricity from the reference park is significantly lower in 2030 than previously. This results in significantly lower CO_2-emission reductions from electricity from renewable energy production and savings on electricity consumption than previously.

[255] The methodology for the reference park is described in https://www.cbs.nl/nl-nl/achtergrond/2012/39/berekening-van-de-CO2-emissies-het-primair-fossiel-energiegebruik-en-het-rendement-van-elektriciteit-in-nederland

[256] This implies that there are no effects assumed on import or export of electricity. This assumption leads to a (possibly significant) overestimation of CO_2-emission reductions as the electricity market in the Netherlands is strongly interlinked to neighbouring countries.

CO_2 emission reduction from energy savings

- Similar to the calculation of CO_2-emissions from renewable energy production, energy savings result in the avoidance of (fossil) energy consumption (electricity, natural gas or gasoline/diesel). The amount of energy saved is based on the energy savings in accordance to article 8 of the EED that was projected in the KEV. PBL has estimated the cumulative energy savings for the period 2021-2030 (only) on an aggregated sectoral level.
- Energy savings in the KEV are determined by comparing the energy use in a certain year compared to a virtual baseline assuming a 'frozen' efficiency level as it was in 2020. In this way, the impact of policies and measures in the national Climate plan 2021-2030 can be estimated. Data on a more disaggregated level was made available to RVO which enabled the calculation of energy savings per energy carrier in 2025 and 2030;
- Electric vehicles consume electricity and avoid the consumption of gasoline and/or diesel[257]. This results in the reduction of CO_2-emissions, calculated using the emission factor for gasoline/diesel. CO_2-emissions in ETS increase somewhat due to the additional electricity consumption (produced by the reference park).
- The projected natural gas and electricity consumption that is replaced with renewable energy production in or on the building itself (such as from ambient heat used by heat pumps) are counted as energy savings. As this would overlap with the renewable energy projections in the KEV (which include energy consumption such as from solar panels and heat pumps), renewable energy production from solar PV are excluded in the calculation of the CO_2-emission reductions from energy savings in the built environment. The use of ambient heat by heat pumps has been counted as energy savings and not as renewable energy.
- By using only energy savings in accordance to article 8 of the EED implies that energy savings resulting from the national implementation of European policies (such as EU ETS, Ecodesign etc) are not taken into account. Only impacts resulting from national policies that are additional to European policies are taken into account. This means that the resulting impact on CO_2-emission reductions from energy savings is underestimated;
- These energy savings have nevertheless been used as the basis for the calculation of CO_2-emission reductions as there was no alternative data on impacts available. Therefore, the calculated CO_2 emission reductions must be considered as a rough indication. An advantage of using this data is that the impact of policies and measures on energy savings in accordance to article 8 of the EED is also monitored ex-post, which ensures (to some extent) consistency between the ex-post and ex-ante impacts.
- The possible impacts of energy savings on the import or export of electricity has not been taken into account

CO_2 emission reductions from CCS

- The projected amount of CO_2 captured and stored in the KEV is taken as the CO_2-emissions being reduced due to Carbon Capture and Storage (CCS). The (additional) amount of energy required for CCS is not taken into account as there is no data provided on this in the KEV. Assuming that this (additional) energy consumption is not entirely from renewable energy sources, this results in an overestimation of the impact of CCS.

Non-CO_2 emission reductions

- Non-CO_2 emission reductions are based on the difference between the projected non-CO_2 emissions in 2020 and 2030 according to the KEV The assumption is that all changes in non-CO_2 emissions are caused by the impact of policies and measures. Disaggregated data provided by PBL allowed RVO to allocate non-CO_2 emission reductions to sectors and ETS or non-ETS.
- This (relatively simplistic) approach has been used in absence of parameters that allowed for a more sophisticated baseline. Therefore, the calculated GHG emission reductions must be considered as a rough indication.

[257] An 50/50 average for gasoline/diesel was assumed

GHG emission reduction from land use changes & forestry

- GHG emission reductions in the LULUCF sectors are from the impact assessment of existing policy measures in the LULUCF-sector, as part of the KEV 2024, in WUR (2024). The policy measures concerned are the peat meadow policies implemented in the provinces of Friesland and Utrecht. These policy measures result in a combined annual emission reduction of 0.0378 Mt CO_2.
- Other policy measures in the LULUCF-sector, such as the Agricultural Nature and Landscape Management (ANLb), are not taken into account as the impacts could not be assessed in the KEV2024. Therefore, the calculated GHG emission reductions are probably an underestimation

Emission factors

Annex 3 Table 1: CO_2 emission factors from the KEV2024 used (in Mt CO_2 per petajoule).

Energy carrier	2025	2030	Remark
Electricity	0,13	0,08	Reference park (baseload power plants)
Natural gas	0,0562	0,0562	Excluding biogas injected into the natural gas grid
Gasoline	0,0722	0,0722	Excluding blended biofuels
Diesel	0,0725	0,0725	Excluding blended biofuels
Gasoline/diesel	0,07235	0,07235	Average of gasoline and diesel
Coal	0,0927	0,0927	

Sources

PBL (2024) Klimaat- en Energieverkenning 2024. Netherlands Environmental Assessment Agency (PBL), The Hague. https://www.pbl.nl/system/files/document/2024-10/pbl-2024-klimaat-en-energieverkenning-2024-5490.pdf

WUR (2024) Ramingen van emissies van broeikasgassen en verwijdering van CO_2 door de LULUCF-sector 2023-2040. Achtergronddocument bij de Klimaat- en Energieverkenning 2024. Wageningen University & Research (WUR), Wageningen. https://www.pbl.nl/system/files/document/2024-10/pbl-2024-wur-ramingen-van-emissies-broeikasgassen-en-verwijdering-van-co2-door-de-LULUCF-sector-2023-2040_5688.pdf

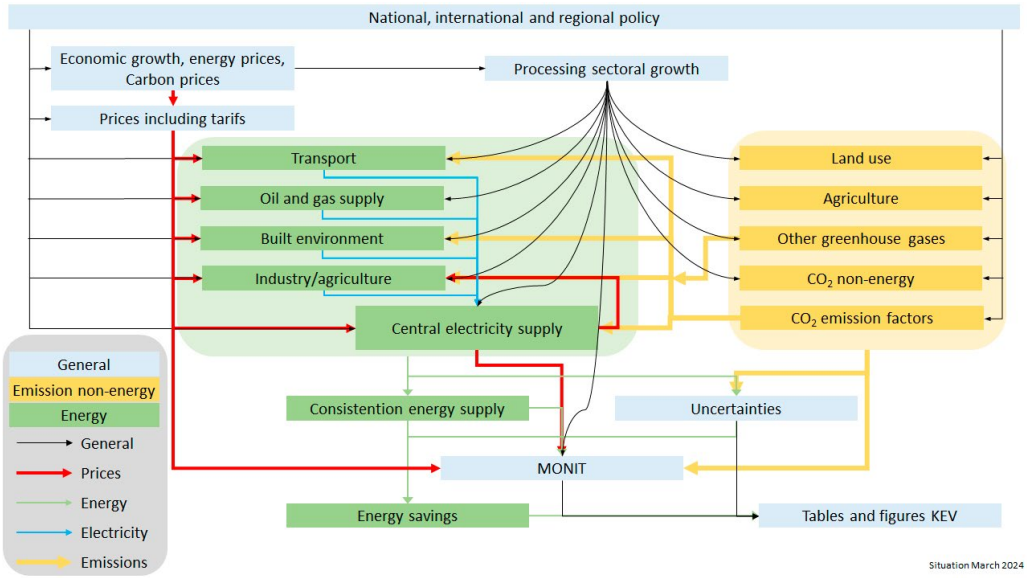
Annex 4: Modelling systems for projections

This annex briefly describes the modelling system for projections of greenhouse gas emissions. In the Netherlands, a combination of modelling tools is used. The National Energy Outlook Modelling System (NEOMS) is the primary modelling suite, which has been developed for over 20 years by Energy Research Centre of the Netherlands (ECN) and PBL Netherlands Environmental Assessment Agency for projections and policy evaluations. In 2018, the NEOMS was transferred to PBL.

National Energy Outlook Modelling System

NEOMS is a suite of models to simulate the various parts and sectors of the Dutch Energy System[258]. Some constituent models have been developed in spreadsheets (Excel) and Python, some are optimization models developed in AIMMS or GAMS. Although each model is unique, the general starting point is a detailed inventory of the existing portfolio of (economic) activities in all sectors like industrial production, transportation volumes etc. The models translate the activity levels in an (projected) energy demand and supply using assumptions on energy prices, policies and technologies. The models are calibrated using recent national statistics on energy demand and supply, investments, added value and data available from other sources (e.g. world market prices for oil, gas and coal from IEA and futures markets, monitoring of government programmes). Building on the drivers for developments in the energy system, such as economic growth, population growth, behavioural change and technological development- some as endogenous effort, some defined exogenously - the models simulate the development of the system, activity levels and the uptake of alternative technologies therein, taking into account consumer preferences and market behaviours and the impact of policies thereupon. Combining expected technology deployment and the demand for various products and energy services results in projections of final and primary energy consumption, greenhouse gas emissions and air pollutants. Most energy demand and supply models provide data on investment costs and costs for operation and maintenance.

Annex 4 Figure 1: National Energy Outlook Modelling System



[258] For more information, see: https://www.pbl.nl/kev/rekenmodellen-klimaat-en-energieverkenning-kev

The NEOMS enables the exchange of data between 12 energy models, producing consistent and detailed results. Detailed results include energy demand, supply, emissions, technology uptake, investments, costs, prices, policy impacts. The total system includes about 22 sub-sectors with all relevant technologies and fuels per sub-sector. Their CO_2 emissions are also calculated.

The NEOMS models currently cover the following sectors and their corresponding models:

- **Energy demand**
  - Industry and agriculture (E2-Mission),
  - Service sector (SAVE-Services),
  - Households (Hestia and EVA),
  - Transport (various models).
- **Energy supply**
  - Combined heat and power (E2-Mission),
  - Electricity supply (Competes),
  - Refineries (SERUM),
  - Renewables (RESolve-E and E2-Mission),
  - Gas and oil supply.

The outputs of the separate models are combined in a model of the total energy sector (SELPE) in which the validity and consistency of the energy system as a whole is verified. Ultimately, all the results feed into MONIT-Conversion, a tool that calculates the energy savings per sector and produces aggregated results for all kinds of analyses, for example for the presentation tool MONIT.

Energy demand

E2-Mision (industry, agriculture and CHP)
E2-Mission is a simulation model that calculates the energy demand of industry and agricultural sectors and the sectoral implementation of combined heat and power generation. The future energy demand is calculated based on the economic growth per subsector and measures taken.

SAVE-Services (services sector)
SAVE-Services is a simulation model for the services sector. Based on the economic growth per subsector and the measures taken, the model calculates the future gas and electricity demand.

Hestia (households)
Hestia models the energy efficiency of the housing stock and simulates the investment behaviour of house owners at the level of individual houses. The model calculates the development of the gas, electricity and heat consumption until 2050. Hestia is open source and open access.

EVA (households)
EVA uses a detailed stock database to calculate the national electricity use of household appliances.
EVA offers a detailed view on the impact of changes in the penetration of appliances and autonomous or policy driven (mostly 'Ecodesign') changes in energy consumption.

Transport
The transport model is a tool to incorporate the results of the calculations of all kind of models specific for the transport sector used at PBL into the databases of NEOMS. This enables the other models to use these data for their calculations.

Energy Supply

COMPETES (electricity supply)
COMPETES is used to calculate decisions in investments and operations for centralised electricity production in the EU. Based on the Dutch sectoral electricity demand, hourly electricity production from intermittent renewables and sectoral implementation of combined heat and power, the remaining demand is covered by COMPETES, taking into account the merit order of the supply curve of centralised electricity generators and electricity trade with the neighbouring countries. COMPETES also provides the commodity prices for electricity.

SERUM (refineries and oil supply)
SERUM is an optimization model for the Dutch oil refining sector. Based on expectations about the demand for oil products, environmental measures and crude properties, SERUM calculates the required crude intake, the required refining configuration and the energy use for the whole process. Based on energy use and energy carriers, emission developments are calculated.

RESolve-E (renewables)
The aim of the RESolve-E model is to provide data about renewable energy production. For the renewable energy production that is eligible to receive a subsidy via the SDE subsidy scheme, the SDE budget constitutes a ceiling for the total production. Because renewable energy can contribute to realising the energy performance coefficient standards for new buildings, the renewable energy production of Hestia and SAVE-Services serve as input for RESolve-E. Many renewable energy technologies have been transferred from RESolve-E to E2-Mission, so RESolve-E does not cover heat production technologies anymore. Ultimately, RESolve-E will be fully incorporated by other models (e.g. E2-Mission, COMPETES).

Gas/oil production (gas and oil supply)
In this model, the supply of natural gas and crude oil is calculated based on the availability of natural gas in the 'Groningen' gas field, and the other onshore as well as the offshore fields for gas and oil. Exogenous assumptions are made about the volume for gas storage, gas export and oil export. If demand exceeds this production, natural gas and oil will be imported. The model calculates the amount of energy needed for production, storage and transport as well as losses in the grid.

Other models and tools in NEOMS

Energy prices
The energy prices tool provides electricity and gas prices for the different sectors as defined in NEOMS. These data can be used by the NEOMS models.

SELPE (validity and consistency check)
SELPE is an optimisation model that is used to model the entire Dutch energy sector. Most of the constraints are set by the above-mentioned models. The aim of this model is to check the feasibility and consistency of the outcomes of the other models, for example verifying that the total electricity demand does not exceed the electricity supply.

MONIT
The output of the SELPE model is very detailed. MONIT-Conversion can aggregate its results into any format needed by the user. The output is made available to MONIT, and can also be made available to external parties. Another function of this tool is to calculate the energy efficiency indicators. The tool is used to present the combined results of the models in such a way that they can be used in all kinds of reports, together with historical data.

Non-energy models
The results from NEOMS are used and/or complemented with the modelling of non-CO_2 emissions and non-energy related CO_2-emissions (LULUCF). This is done using sectoral models (agriculture and LULUCF) and spreadsheet tools (industry and other sectors).

Agriculture

For the calculation of the agricultural emission projections, the National Emission Model for Agriculture (NEMA) is used (Vonk et al., 2018)[259]. NEMA models CH_4, NH_3, N_2O, NO_x, PM_{10}, $PM_{2.5}$ and CO_2 emissions from agriculture using a methodology in compliance with the IPCC and EMEP Guidelines. Usually the model runs with historical input data calculating the emissions for the National inventory report and the Informative inventory report. Input data for projections are based on the estimated effects of existing policies and expert judgement using other models, research and historical trends. Institutes involved in estimating input data are Wageningen Economic Research, Wageningen Environmental research, Wageningen Livestock Research and PBL.

LULUCF

The forestry projection is based on calculations with the EFISCEN (European Forest Information Scenario) model[260]. The projections of the other categories are expert based projections. The historical trends are used as input for these projections. A modelling tool is only applied at the LULUCF category forestry and only for carbon dioxide. Forestry inventories, updated every four years, are used for the LULUCF category forestry. The inventory supplies up-to-date forest data, as input for the modelling.

Waste

Methane from waste disposal is calculated using a spreadsheet model. The annually varying factors in this calculation are:

- the annual quantity of deposited waste;
- the carbon content;
- the amount of landfill gas extracted.

IPPU

CO_2 emissions from non-energy processes have been projected by a separate methodology that uses activity levels of industrial subsectors and other sectors (as they appear in the NEOMS). The activity levels for companies are expressed as added value, for transport as the transport volume and for households as the number of dwellings or inhabitants. Historical process and product use emissions are scaled using the change in activity level of these (sub)sectors. Relevant NEOMS sectors for industrial processes are Building materials, Organic chemistry, Iron and steel and Non-ferro metals. For solvent use the relevant NEOMS sectors are Transport and Organic chemistry. For liming it is Agriculture, and for indirect emissions (often oxidation of NMVOCs) Water and Waste, Construction, Organic chemistry, Households, Energy companies, Services, Agriculture, Refineries and Transport.

Nitrous oxide emissions from the industry: Nitric acid and Caprolactam production
The emissions for the future years have been calculated via a calculation sheet.
The input variables, in both the production of Nitric acid and Caprolactam, in this calculation sheet are the realized emission (in CO_2-eq.) from the Dutch PRTR in 2017 (the base year) a starting point;

- the growth series(economic developments) according to the KEV;
  For nitric acid, the growth series “chemical industry - fertilizer” is used and for caprolactam the series “chemical industry”;
- if measures will be taken in future years:
  - of the measure(s);
  - the reduction percentage(s)of the measure(s).

HFC emissions from Stationary cooling

Also for this source, a calculation sheet has been used to calculate the emissions for the future years. As a result of the EU regulation on F-gases that came into force on 1 January 2015, the use of HFCs (calculated in CO_2 equivalents) should drop by 79% between 2015 and 2030. This target applies EU-wide, but has also been assumed to apply to the Netherlands. The 2022 suggested amendment to the regulation has not yet been

[259] https://english.rvo.nl/sites/default/files/2018/04/Vonk-et-al-2018-Methodology-report-agriculture-2018.pdf
[260] https://www.efi.int/publications-bank/manual-european-forest-information-scenario-model-efiscen-41

considered in the projection. Taking the 2019 usage figure as starting point, usage figures for the years between 2019 and 2030 have been determined through modelling of the yearly stock reduction.

HFC emissions from Air conditioning Mobile

For this source the emissions for the future years have also been calculated via a calculation sheet. The European Directive 2006/40 / EC (MAC Directive (EC, 2006)) prohibits the use of refrigerants with a GWP> 150 in new cars from 2017. Taking this ban into account, the emissions for future years are calculated using an emission factor per year of construction and the size of the car park as input variables .The data on the development of the car fleet are from the KEV. The emission factors per construction year are determined using the leakage percentages from a number of surveys.

Annex 5: Modalities, procedures and guidelines

This BTR follows the requirements according to decision 18/CMA.1[261], which sets out the modalities, procedures and guidelines (MPGs) for the transparency framework for action and support referred to in Article 13 of the Paris Agreement. The full description of the MPG's can be found on the UNFCCC website: https://unfccc.int/resource/tet/o/oompg.pdf

[261] Available from: https://unfccc.int/resource/tet/o/oompg.pdf

Annex 6: Policies and measures included in the policy variant of the National Climate and Energy Outlook

The following table indicates which of the policies and measures reported in this BTR are included in the respective policy variants of the National Climate and Energy Outlook (KEV) 2024. A comprehensive overview of the included policies in the KEV can be found in the background report to the KEV[262].

Table 1 Policies and Measures included in the projection variants of the National Climate and Energy Outlook 2024

PaM number	Title	Projection variant(s)
1	Energy Tax	With Additional Measures | With Existing Measures
2	Energy Investment Tax Allowance scheme (EIA)	With Existing Measures
3	Fuel-Efficient Driving (Ecodriving)	With Existing Measures
4	Gas Act	With Existing Measures
5	Targeted Approach for Industrial Peak Polluters (API)	With Scheduled Measures
6	Subsidy for Zero Emission Passenger Coaches (STour)	With Additional Measures
7	Greenhouse as an Energy Source Program (KaE)	With Existing Measures
8	Active Mobility	With Existing Measures
9	Market Introduction of Energy Innovations in Greenhouse Horticulture (MEI) Subsidy Program	With Existing Measures
10	Energy Savings in Greenhouse Horticulture (EG) Subsidy Scheme	With Existing Measures
11	Abolition of the reduced energy tax rate for greenhouse horticulture	With Existing Measures
12	Agricultural Nature and Landscape Management (ANLb)	With Existing Measures
13	Phasing out energy tax exemption for natural gas consumption in electricity generation	With Existing Measures
14	The Environment Buildings Decree of the Netherlands (Bbl)	With Scheduled Measures | With Existing Measures
15	Lower Value Added Tax on isolation	With Existing Measures

[262] https://www.pbl.nl/publicaties/beleidsoverzicht-en-factsheets-beleidsinstrumenten-achtergronddocument-bij-de-klimaat-en-energieverkenning-2024

PaM number	Title	Projection variant(s)
16	Capacity Restrictions on Airports (Schiphol)	With Existing Measures
17	Extending mortgage options for energy saving measures	With Existing Measures
18	Sectoral emission trading system in horticulture	With Existing Measures
19	Topsector Energy: Consortia Approach (TKI)	Not Included
20	Circular Plastics NL (CPNL)	With Existing Measures
21	National Heat Fund (earlier NEF National Energy Saving Fund)	With Additional Measures | With Existing Measures
22	CO_2 Emission Performance Standards for Passenger Cars and Vans	With Existing Measures
23	Covenant Energy Transition for Greenhouse Horticulture 2022-2030	With Existing Measures
24	MIT Innovation Credit for SMEs	With Existing Measures
25	Investment Subsidy for Sustainable Energy and Energy Savings (ISDE)	With Additional Measures | With Scheduled Measures | With Existing Measures
26	Choose the Best Tyre	With Existing Measures
27	Temporary Subsidy Scheme for Renewable Heat Projects (HEHW)	Not Included
28	Phase-out of derogation for animal manure above EU standards from 2022	With Existing Measures
29	Differentiated Lending Standards for Mortgage Credit	With Existing Measures
30	Decree on CO_2 Reduction for Work-Related Passenger Mobility (Employer Approach)	With Existing Measures
31	Reduction of gas production levels	With Existing Measures
32	DIY Voucher	With Existing Measures
33	Energy Performance Compensation (EPV)	With Existing Measures
34	Demonstration scheme Climate technologies & innovations in transport	Not Included
35	Guaranteed Loans for Agriculture (BL/GL)	With Existing Measures
36	Ecodesign for Sustainable Products Regulation	With Existing Measures
37	Green Deal 225 Car sharing II	With Existing Measures
38	Eco-Scheme	With Existing Measures
39	Heat Program (including Municipal heat transition visions (TVW), advice scheme (EAW) & knowledge centre on heat (ECW))	With Existing Measures
40	Environment & Planning Act	With Existing Measures
41	Green Deal 230 Sea transport, inland shipping and harbours	Not Included
42	Energy Efficiency Directive (EED) Audit Obligation	With Existing Measures
43	Emission Label System for Inland Shipping	Not Included
44	Energy Labelling	With Existing Measures
45	EU ETS1	With Existing Measures
46	National Program for Regional Energy Strategies (NP RES)	With Existing Measures

PaM number	Title	Projection variant(s)
47	Peatland Plan (Veenplan) and National Research Program on Greenhouse Gases in Peatlands (NOBV)	With Existing Measures
48	Climate Act	With Existing Measures
49	Roadmaps for sustainability & Performance standards for office & service buildings	With Existing Measures
50	Insulation standard for dwellings	With Existing Measures
51	Subsidy scheme for building and maintenance of sporting accommodations (BOSA)	With Existing Measures
52	EU Blending Obligation for Sustainable Aviation Fuels (SAF)	With Existing Measures
53	EU CO_2 Emission Standards for Heavy-Duty Vehicles	With Existing Measures
54	Climatecampaign 'Everybody acts'	With Existing Measures
55	Financial Support from the National Government for Municipal Execution Costs of Natural Gas-Free Neighborhoods	With Existing Measures
56	Fosfate production rights dairy cattle	With Existing Measures
57	National Programme for Agricultural Soils (NPL)	With Existing Measures | With Scheduled Measures
58	Common Agricultural Policy (GLB) Pilots	With Existing Measures
59	Demonstration Energy and Climate Innovation (DEI+) Subsidy Scheme	With Existing Measures
60	Multi-Year Mission-Driven Innovation Program (MMIP) B1: Methane Emission Reduction in Livestock Farming	With Existing Measures
61	Multi-Year Mission-Driven Innovation Program (MMIP) B4: Carbon Storage in Forests and Nature	With Existing Measures
62	Accelerated Climate-related Investments in Industry (VEKI)	With Existing Measures
63	NieuweWarmteNu! (NWN) National Growth Fund Programme	With Existing Measures
64	The New Cultivation Method ("Het Nieuwe Telen")	With Existing Measures
65	Coal Prohibition Act	With Existing Measures
66	Impulse Funds for Peat Meadow Areas	With Existing Measures
67	SDE++ Sustainable Energy Production and Climate Transition Subsidy Scheme	With Existing Measures
68	Stimulation scheme natural gas free rental housing (SAH)	With Existing Measures
69	Minimum CO_2 price for electricity production	With Existing Measures
70	Investment Subsidy for the Climate-Neutral Manufacturing Industry (IMKE)	With Existing Measures
71	Digital Platform Verbeterjehuis.nl ("Improve your house")	With Existing Measures
72	Subsidy Scheme Electric Passenger Cars (SEPP)	With Existing Measures
73	IPCEI Hydrogen wave 2	With Existing Measures
74	Subsidy Scheme Circular Economy Projects (SCK)	With Existing Measures

PaM number	Title	Projection variant(s)
75	Mission oriented R&D and innovation (MOOI) subsidy scheme	With Existing Measures
76	Insulation of Homes in Groningen and North Drenthe (measures 28 and 29)	With Scheduled Measures
77	Energy performance certificate (EPC): requirement EPC C for office buildings	With Existing Measures
78	Clean Air Agreement (SLA)	With Existing Measures | With Additional Measures
79	Buy out scheme livestock farmers by Provinces	With Existing Measures
80	Cooperative Energy Production Subsidy Scheme (SCE)	With Existing Measures
81	National CO_2 pricing system for industry	With Existing Measures
82	Knowledge and Innovation Platform Public Buildings (KIP-MV)	With Existing Measures
83	National cessation scheme on livestock sites (LBV)	With Existing Measures
84	National cessation scheme on peak load livestock sites (LBV Plus)	With Existing Measures
85	Private Motor Vehicle and Motorcycle Registration Tax (BPM)	With Additional Measures | With Existing Measures
86	Green Investment Scheme	With Existing Measures
87	MIA/VAMIL Environmental Investment Allowance & Arbitrary Depreciation of Environmental Investment Schemes	With Existing Measures
88	Heavy Goods Vehicle Charge (HGVC)	With Additional Measures
89	Zero-emission Cleaning Vehicles Covenant	With Additional Measures
90	Knowledge, Scaling, and Practical Experience Program (KOP) for Clean and Emission-Free Construction(SEB)	With Existing Measures
91	Knowledge Infrastructure for Nuclear Energy	Not Included
92	Coal Tax	With Existing Measures
93	Measure for optimizing dairy cattle feed rations (structural approach to nitrogen)	With Scheduled Measures
94	Tailored Approach for Industry	With Scheduled Measures
95	Multi-Year Experiments on Effective Renovation Flows (MEER) Subsidy	With Existing Measures
96	Multi-year Infrastructure Energy and Climate Programme (MIEK)	With Existing Measures
97	Subsidy Scheme for the Sustainability and Maintenance of Rental Properties (SVOH)	With Existing Measures
98	Minimum CO_2 price for Electricity and Industry sectors	With Existing Measures
99	Subsidy scheme for Sustainable Social Real Estate (DUMAVA)	With Additional Measures | With Existing Measures
100	Municipal Instruments for the Heat Transition Act (WGIW)	With Additional Measures
101	Motor Vehicle Tax	With Existing Measures
102	Subsidy module agricultural business advice and education (SABE)	With Existing Measures

PaM number	Title	Projection variant(s)
103	Specific Benefit Zero-Emission Buses (SpUk-ZEbus)	With Existing Measures
104	Subsidy Scheme for Clean and Emission-Free Construction Equipment (SSEB)	With Existing Measures
105	Purchase Subsidy for Zero Emission Trucks (AanZET)	With Additional Measures
106	National Insulation Program (NIP)	With Existing Measures
107	National Program to support the Local Heating Transition (NPLW)	With Existing Measures
108	Electricity Act	With Additional Measures
109	National Access Point for Charging Station Data	With Existing Measures
110	National Approach Biobased Building (NABB)	Not Included
111	National Protein Strategy (NES) and Bean Deal	With Existing Measures
112	Heating Act	With Existing Measures
113	DEI+CE Demonstration Scheme Energy & Climate Innovations Circular Economy	With Existing Measures
114	National Investment Subsidy for Climate Projects in Industry (NIKI)	With Scheduled Measures
115	Renewable Energy Transition Scheme (HER+)	With Existing Measures
116	National Performance Agreements (NPA) Housing Corporations	With Existing Measures
117	National Battery Strategy	Not Included
118	Maritime Master Plan	With Existing Measures
119	Zero Emission Services for Inland Shipping	With Existing Measures
120	Investment plans of system operators	With Existing Measures
121	National Growth Fund	With Existing Measures
122	Invest-NL	Not Included
123	Make the Switch	With Existing Measures
124	GoChem (KIEM-Go-Chem)	With Existing Measures
125	Sustainable Industry Infrastructure Program (PIDI)	Not Included
126	Sustainable Measures for Stables and Manure Management (Sbv) Subsidy	With Scheduled Measures
127	Non-productive investments in agricultural businesses	With Existing Measures
128	Non-productive investments in non-agricultural businesses	With Existing Measures
129	Subsidy Scheme for the Remediation of Pig Farms (Srv)	With Existing Measures
131	Meadow grazing (structural approach to nitrogen)	With Existing Measures
132	National Approach to Biobased Construction (Standardisation)	Not Included
133	Voluntary purchase scheme for veal farms in the province of Gelderland	With Existing Measures
134	7th Nitrates Action Programme	With Existing Measures
135	Zero Emission Ground-based Operations at Airports	With Existing Measures

PaM number	Title	Projection variant(s)
136	POP3 Subsidy For Making Stables More Sustainable And Reducing Nitrogen (Calf Sector)	With Existing Measures
137	Transition program Sustainable Agriculture	With Existing Measures
138	Economic Recovery Fund (EHF): Investing in Green Economic Recovery in Agriculture	With Existing Measures
139	Decarbonisation Support for Cluster 6	With Existing Measures
140	National Research Program on Greenhouse Gases in Peatlands (NOBV)	With Existing Measures
141	Common Agricultural Policy (GLB)	With Existing Measures
142	CAP (GLB) Cooperation Measure Peat Meadows and Transition Areas N2000	With Existing Measures
143	Offshore Wind Development Framework	With Additional Measures | With Scheduled Measures | With Existing Measures
144	Administrative Agreement on Zero Emission Public Bus Transport (BAZEB)	With Additional Measures
145	Administrative Agreement on Zero Emissions Transport Services for people with reduced mobility (BAZED)	With Existing Measures
146	Subsidy Scheme for Zero Emission Company Cars (SEBA)	With Existing Measures
147	Supporting Policy Framework to Stimulate Electric Passenger Car Usage	With Additional Measures | With Existing Measures | Not Included
148	Subsidy for Electric Taxiing for Aviation	With Scheduled Measures
149	Subsidy Scheme for the Sustainability of Inland Navigation Vessels (SRVB)	With Additional Measures
150	Subsidy Scheme Sustainable Shipbuilding (SDS)	Not Included
151	Support Program for Public Real Estate Sustainability	With Existing Measures
152	Roadmap and Convenant Clean and Zero Emission Construction Equipment	With Existing Measures
153	National Cooperation Program for Shared Mobility (Natuurlijk!Deelmobiliteit)	With Existing Measures
154	Collaboration between Peatland and Natura 2000 Subsidy Scheme	With Existing Measures
155	Subsidy Scheme for Sustainability for Homeowners' Associations (SVVE)	With Existing Measures
156	Productive Investments in Green-Blue Sectors and Animal Welfare	With Existing Measures
157	Programma Natuur (Program Nature)	With Existing Measures
158	Programme Offshore Wind Landfall Connections 2031 - 2040 (VAWOZ)	Not Included
159	National Circular Economy Program (NPCE)	With Existing Measures
160	Smart Land Use (SL) Research Program	With Existing Measures
161	Small Modular Reactors (SMRs) programme	Not Included
162	Support Scheme for Clean and Emission-free Construction (SEB) by Local Governments	With Existing Measures
163	Subsidy Scheme for Process Support in Renovation Streams (SPOR)	With Existing Measures

PaM number	Title	Projection variant(s)
164	Heat Infrastructure in Greenhouse Horticulture (SWiG) Subsidy	With Existing Measures
165	Subsidy Scheme Private Charging Infrastructure at Companies ((SPriLa))	With Additional Measures
166	Subsidy Hydrogen in Mobility (SWiM)	With Additional Measures
167	Temporary Subsidy Shorepower Seagoing Vessels	With Existing Measures
168	Covenant City Logistics (zero-emission zones)	With Existing Measures
169	Action Plan for the Sustainability of Temperature-Controlled Transport	Not Included
170	Stimulating Sustainable Travel Behaviour	With Existing Measures
171	Flight Tax Rates	With Existing Measures
172	National Charging Infrastructure Agenda (NAL)	With Additional Measures | With Existing Measures
173	Collective Heat Networks Subsidy Scheme (WIS)	With Additional Measures | With Existing Measures
174	Informing and Facilitating Work-Related Passenger Mobility (Employer Approach)	With Existing Measures
175	Collective Heating Act (WCW)	With Additional Measures

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This publication was commissioned by the ministry of Climate Policy and Green Growth.

Publication number: RVO-002-2025/RP-DUZA

NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs that implements government policy for agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

Netherlands Enterprise Agency is part of the ministry of Economic Affairs.