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First Biennial Transparency Report from the European Union

Accompanying the document

Report from the Commission

First Biennial Transparency Report from the European Union to the United Nations Framework Convention on Climate Change (required under the Enhanced Transparency Framework)

{COM(2024) 552 final}

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1 NATIONAL INVENTORY REPORT

1.1 Introduction and key developments

This chapter provides key information about the EU's greenhouse gas (GHG) inventory.

The EU, as a party to the United Nations Framework Convention on Climate Change (UNFCCC) and to the Paris Agreement, reports annually on GHG inventories for the years from 1990 to the current calendar year (t) minus two (t-2), for emissions and removals within the territory of its Member States. The GHG inventory data presented in this chapter of the Biennial Transparency Report (BTR) is consistent with the GHG inventory of the EU submitted in its 2024 National Inventory Report.

Further details are given in the National Inventory Document, which is submitted as a stand-alone document.

The key recent developments in GHG emissions in the EU can be summarised as follows:

- Total net greenhouse gas emissions in the 27 Member States of the EU (EU-27) (including land use, land-use change and forestry (LULUCF), without international bunkers) were 3 133 million tonnes of carbon dioxide equivalents (CO_2eq) in 2022. Total net GHG emissions decreased by 32.6 % from 1990 to 2022. In absolute terms, the biggest reductions in emissions were achieved in public electricity and heat production (down by 495 million tonnes of CO_2 equivalent) between 1990 and 2022.
- In 2022, total net GHG emissions in the EU-27 (including LULUCF, without international bunkers) fell by 83 million tonnes, or 2.6 %, compared to 2021.

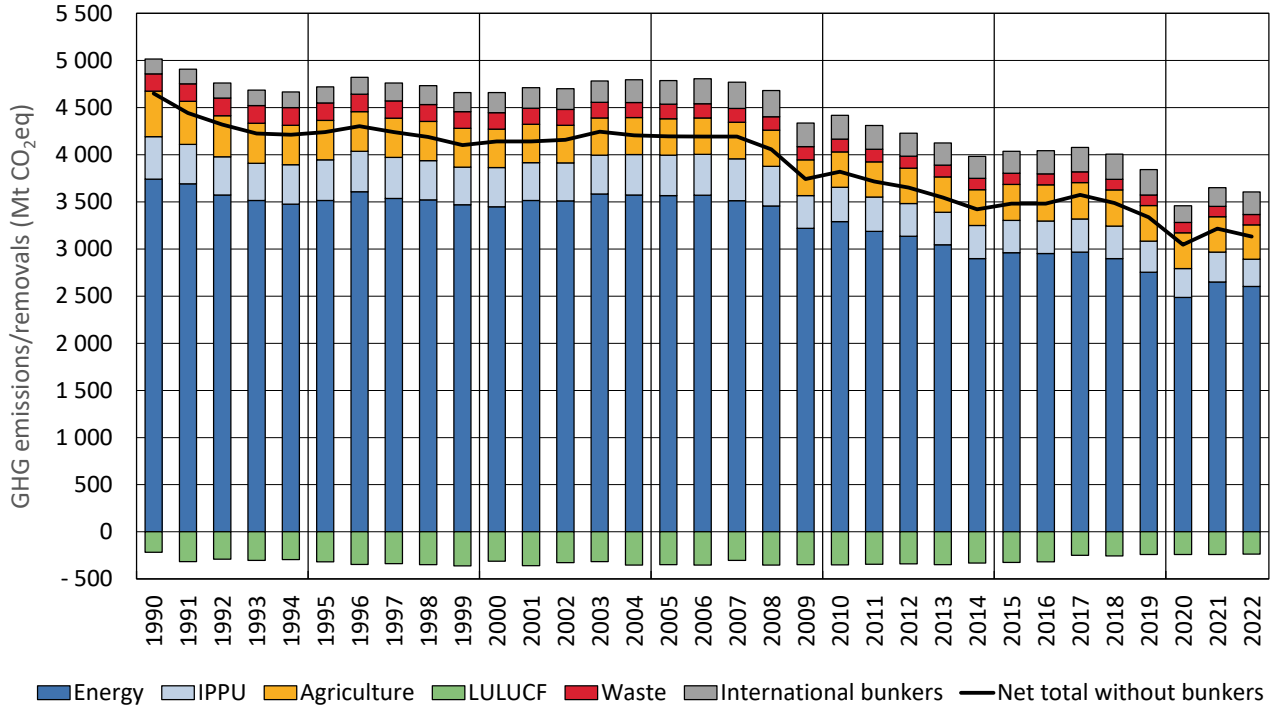
1.2 Summary of GHG emission trends

This section provides a brief description of the trends in GHG emissions.

1.2.1 Trends in total GHG emissions

In 2022, total net GHG emissions in the EU-27, including LULUCF and indirect carbon dioxide (CO_2) emissions, were 32.6 % (a drop of 1 516 million tonnes CO_2 equivalents) below 1990 levels. Emissions decreased by 2.6% (83 million tonnes CO_2 equivalents) between 2021 and 2022. Emissions from international aviation and navigation are excluded from national totals reported in the GHG inventory. The trends at sector level and in each sector's share of total EU-27 GHG emissions is shown in Figure 1.

Figure 1: GHG emissions/removals per sector, 1990 to 2022



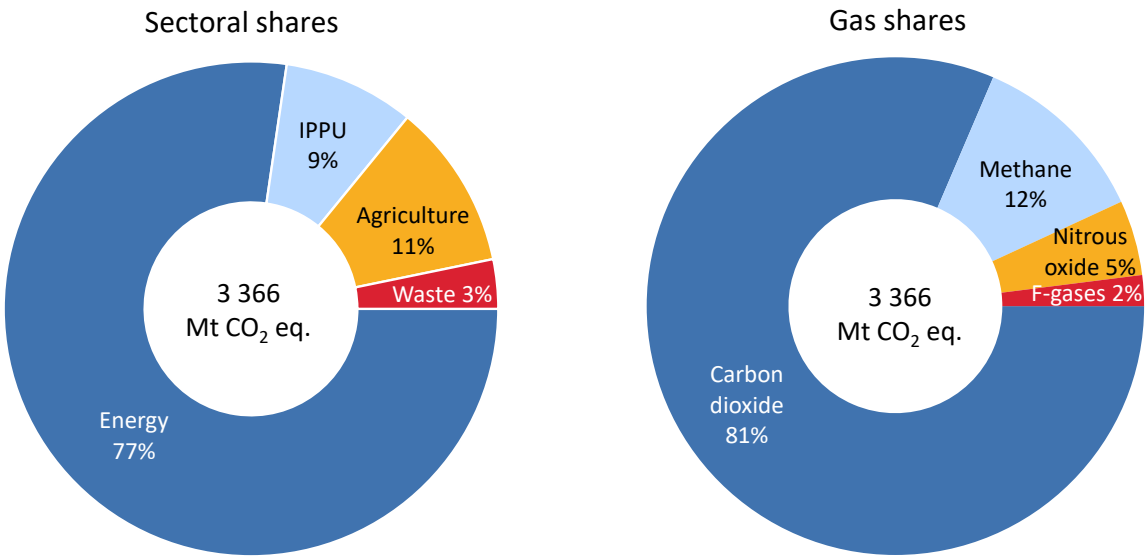
Note: All GHG inventory information presented in this report is based on the September 2024 version of the UNFCCC Common Reporting Table (CRT) tool. Further updates and corrections in the CRT tool may result in changes to the final GHG inventory data.

Source: Annual European Union GHG inventory 1990-2022

1.2.2 GHG emissions without LULUCF per sector and by gas in 2022

The share of each main sector and of each gas of the total EU-27 GHG emissions (excluding LULUCF) in 2022 is shown in Figure 2.

Figure 2: Share of total GHG emissions (excluding LULUCF and international bunkers) per sector and by gas in 2022



Note: Indirect CO_2 emissions are excluded. IPPU = Industrial processes and product use. F-gases = Fluorinated gases

Source: Annual European Union GHG inventory 1990-2022

2 INFORMATION NECESSARY TO TRACK PROGRESS

Key developments in progress towards the nationally determined contribution (NDC) target:

- In 2022, the net GHG emissions of the EU in the **scope of its NDC** were **31.8 %** below the 1990 level. Ambitious efforts are still needed to reach the -55 % NDC target by 2030.
- This is the first BTR submitted based on the updated NDC scope of 17 October 2023.
- In 2023, the EU increased its ambition:
  - 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;
  - 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;
  - The new LULUCF Regulation sets a target to increase land-based net removals in the EU by **an additional -42 million tonnes of CO_2 equivalent** ($MtCO_2$-eq) by 2030. This will result in total net removal at the EU level of -310 $MtCO_2$-eq[1].
- The most recent projections available at EU level show a continuing decrease in GHG emissions up to 2030 and beyond. In 2024 projections are **updated voluntarily** by Member States, therefore the current projections do not yet fully take account of the effects of the recently adopted mitigation policies in all Member States. **Only 11 Member States have updated their projections.** Projected emissions in 2030 **are still above the NDC target.**
- In 2022, the share of **renewable energy sources** in gross electricity production amounted to **38%**. The second biggest electricity source – nuclear – amounted to 22%. This despite the exceptionally hot and dry summer in many EU countries, which affected nuclear power generation. Electricity production in 2022 from all renewable energy sources combined exceeded electricity production from natural gas and coal combined.
- Although the consumption of fossil fuels has decreased in recent years due to higher energy efficiency and renewable energy generation, the EU is still dependent on imports of fossil fuels, in particular oil and natural gas. The share of **fossil fuels in the EU energy mix declined from 83% in 1990 to 71% in 2022**.
- In 2022, **electric cars made up approximately 22% of new car registrations**. At the end of 2022, more than 5 million battery and plug-in hybrid electric cars were on European roads.

[1] The average yearly net removals for the years 2016, 2017 and 2018, as reported in the 2020 greenhouse gas inventory submission, plus the additional -42 MtCO2-eq net removals result in total net removals of -310 $MtCO_2$-eq at the EU level. Any methodological adjustments in the inventory data reporting will be taken into account in the compliance check against the 2030 target.

In the updated NDC of the EU, which was communicated in October 2023, the EU and its Member States commit to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990.[2] This chapter provides detailed information on the EU's progress towards this NDC target. It includes:

- national circumstances and institutional arrangements (Section 2.1);
- description of the NDC (Section 2.2);
- information on the indicators, definitions, methodologies and the status of progress (Section 2.3);
- mitigation policies and measures (Section 2.4);
- a summary of GHG emissions and removals (Section 2.5); and
- projections for GHG emissions and removals (Section 2.6).

2.1 National circumstances and institutional arrangements

2.1.1 National circumstances

The NDC of the EU is implemented taking into account the specific circumstances of the EU and each Member State, such as population, economic development and climate. This section provides an overview of the national circumstances relevant to progress in implementing and achieving the EU NDC.

As the EU NDC contains an absolute GHG emissions reduction target, developments in the GHG-intensive sectors of the economy are particularly important. The decarbonisation of the energy sector, as described in Section 2.1.1.6 below, plays a key role in reducing GHG emissions and in implementing and achieving the EU's NDC.

2.1.1.1 Government structures

The EU comprises 27 Member States[3]. Every action taken by the EU is founded on treaties that have been approved by all Member States. Under these treaties, EU institutions adopt legislation in their areas of competence, which the Member States implement[4]. The main legislative and executive institutions of the EU include the European Parliament, the Council of the European Union, and the European Commission[5], as shown in Figure 3. Topics related to energy and the environment are a shared competence between the European institutions and the 27 Member States.

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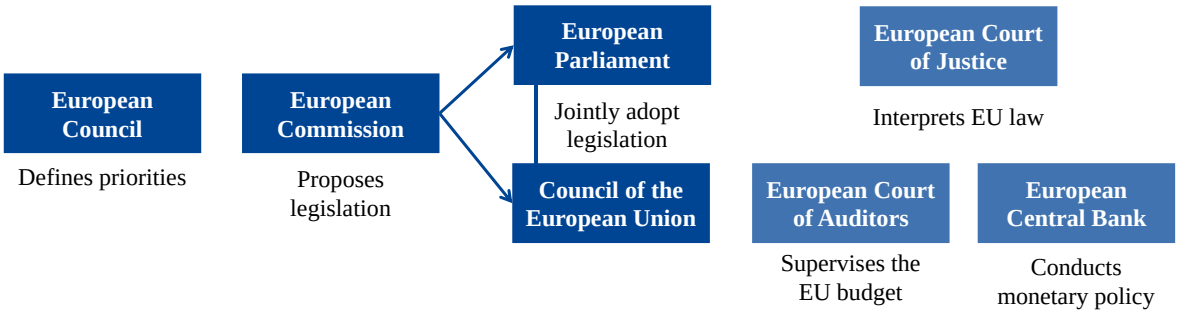
[2] Update of the nationally determined contribution of the European Union and its Member States, https://unfccc.int/sites/default/files/NDC/2023-10/ES-2023-10-17%20EU%20submission%20NDC%20update.pdf.

[3] 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 and Sweden.

[4] Founding agreements, https://european-union.europa.eu/principles-countries-history/principles-and-values/founding-agreements_en.

[5] Types of institutions and bodies, https://european-union.europa.eu/institutions-law-budget/institutions-and-bodies/types-institutions-and-bodies_en.

Figure 3: Institutions of the European Union



Source: Based on European Commission, Directorate-General for Communication[6]

The European Parliament represents the citizens of EU countries, who elect the members of the European Parliament every 5 years. It takes decisions on European laws jointly with the Council of the European Union. It also approves the EU budget.

The European Council is the meeting of the heads of state or government elected by the citizens through national elections. They decide on the general political direction and priorities of the EU. A separate body, the Council of the European Union, is the meeting of the ministers of Member States, which adopts legislation and coordinates policies. In the area of climate legislation, this usually takes place through meetings of the Member States' environment and climate ministers[7]. The Council of the European Union takes decisions on European laws jointly with the European Parliament.

The European Commission is the EU's main executive body. It makes proposals for new laws, which are scrutinised and approved by the European Parliament and the Council of the European Union. Proposals for new laws are supplemented by public consultations[8], as well as impact assessments, which set out the advantages and disadvantages of policy options. These impact assessments include input from non-governmental organisations, national authorities and expert groups that give advice on technical issues[9]. The European Commission manages EU policies and the EU's budget and ensures that Member States apply EU law correctly.

The work of these main EU institutions, which covers the legislative and executive tasks of the EU, is complemented by the work of the Court of Justice of the European Union, the European Central Bank and the European Court of Auditors. These three institutions are responsible for managing the judicial, financial and external audit aspects of the European Union.

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6 Ibid.

7 Environment Council configuration, https://www.consilium.europa.eu/en/council-eu/configurations/env/#gsc-main-content.

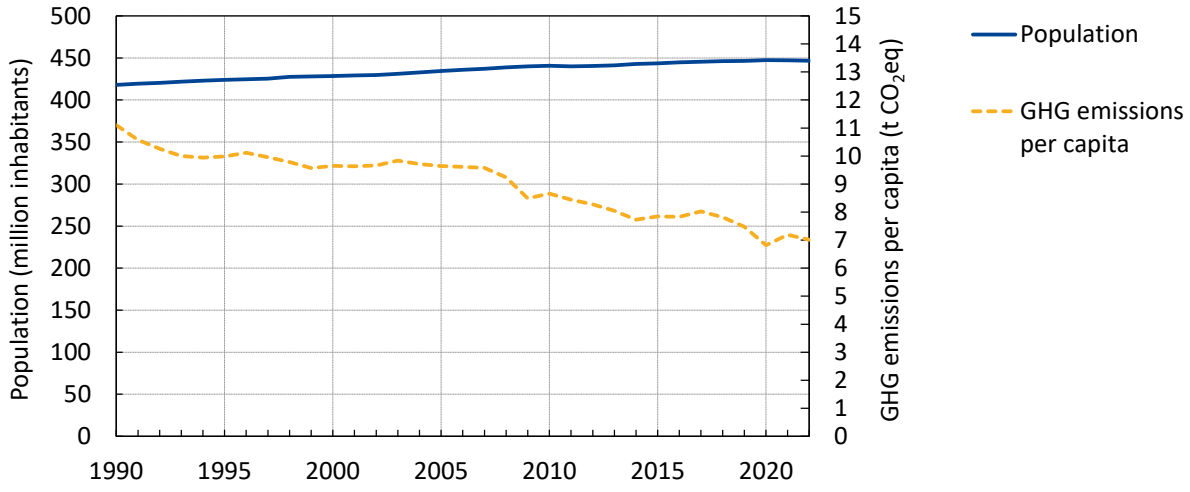
8 Have your say - Public Consultations and Feedback, https://ec.europa.eu/info/law/better-regulation/have-your-say_en.

9 How EU policy is decided, https://european-union.europa.eu/institutions-law-budget/decision-making-process/legislation_en.

2.1.1.2 Population profile

The 27 Member States of the European Union (EU-27) had a population of 447 million inhabitants in 2022. Their population has increased by 6.9 % since 1990. Figure 4 shows the population trend of the EU from 1990 to 2022, together with GHG emissions per capita, which showed a marked decrease over this period and reached 7.0 tonnes of CO_2 equivalents in 2020, approximately 37 % below the 1990 level.

Figure 4: Population of the EU-27 and GHG emissions per capita



Source: Own illustration based on data from Eurostat (Statistical Office of the European Union)[10] and the annual European Union GHG inventory 1990-2022. GHG emissions are in the scope of the EU GHG inventory, including LULUCF, excluding international bunkers.

The EU's population is distributed across its Member States and its outermost regions. The five most populous Member States (Germany, France, Italy, Spain and Poland) make up approximately two thirds of the EU's population. The average population density in the EU is 109 inhabitants per square kilometre (km^2)[11].

2.1.1.3 Geographical profile

The 27 Member States are situated in the western part of the European continent. Furthermore, various overseas territories of France, Spain and Portugal, known as the 'outermost regions', form part of the European Union. These include several islands in the Atlantic and Pacific Oceans, and French Guiana on the Atlantic coast of South America[12]. Some overseas countries and territories have a special relationship with an EU Member State but do not form part of the EU. These include Greenland, which is linked to Denmark, and several territories linked to France or the Netherlands. The European Union covers an area[13] of approximately 4.1 million km².

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[10] Population change, https://ec.europa.eu/eurostat/databrowser/product/view/demo_gind?lang=en.

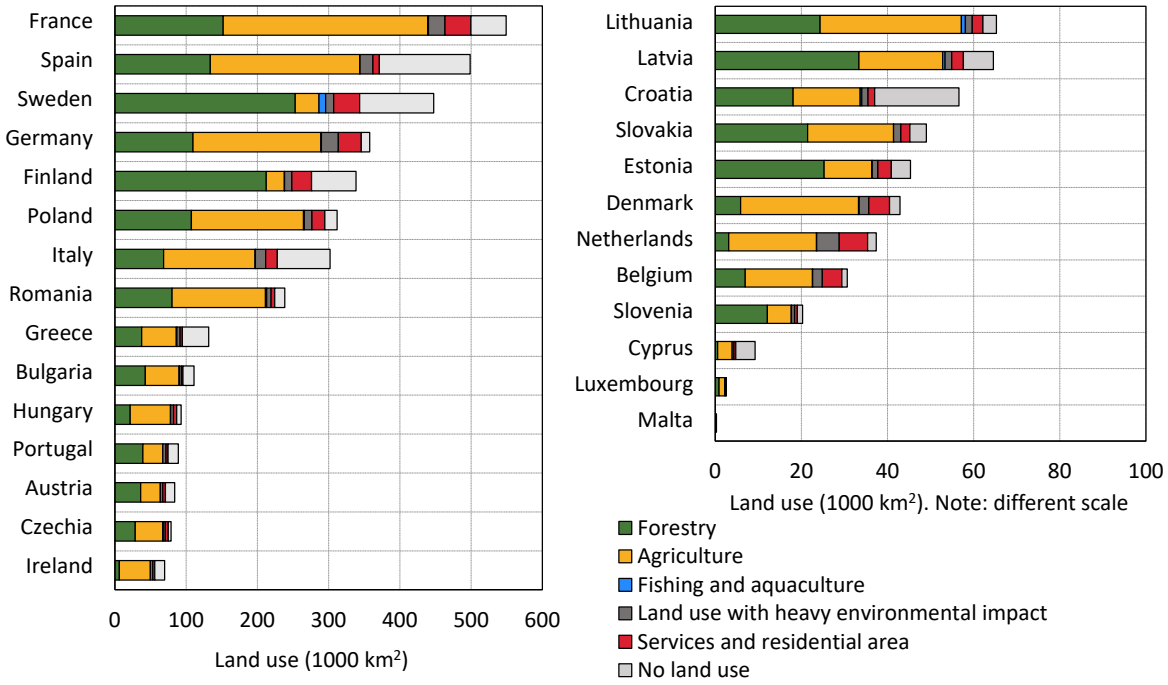
[11] Demography of Europe, 2023 edition, https://ec.europa.eu/eurostat/web/interactive-publications/demography-2023.

[12] The EU and its outermost regions, https://ec.europa.eu/regional_policy/policy/themes/outermost-regions_en.

[13] Land cover overview by NUTS 2 regions, https://doi.org/10.2908/LAN_LCV_OVW.

Figure 5 provides an overview of land use types in the EU Member States. Agriculture is the most common land use category in most EU Member States and accounts for around 39% of all land use in the EU, followed by forestry with 36%. In some southern European Member States (such as Spain or Italy) and some northern European Member States (such as Sweden or Finland), considerable areas are not used because they are not suitable for agriculture or forestry. Areas that are not used have a significant biological function for biodiversity.

Figure 5: Land use types in the EU Member States



Source: Own illustration based on Eurostat[14] data of 2018

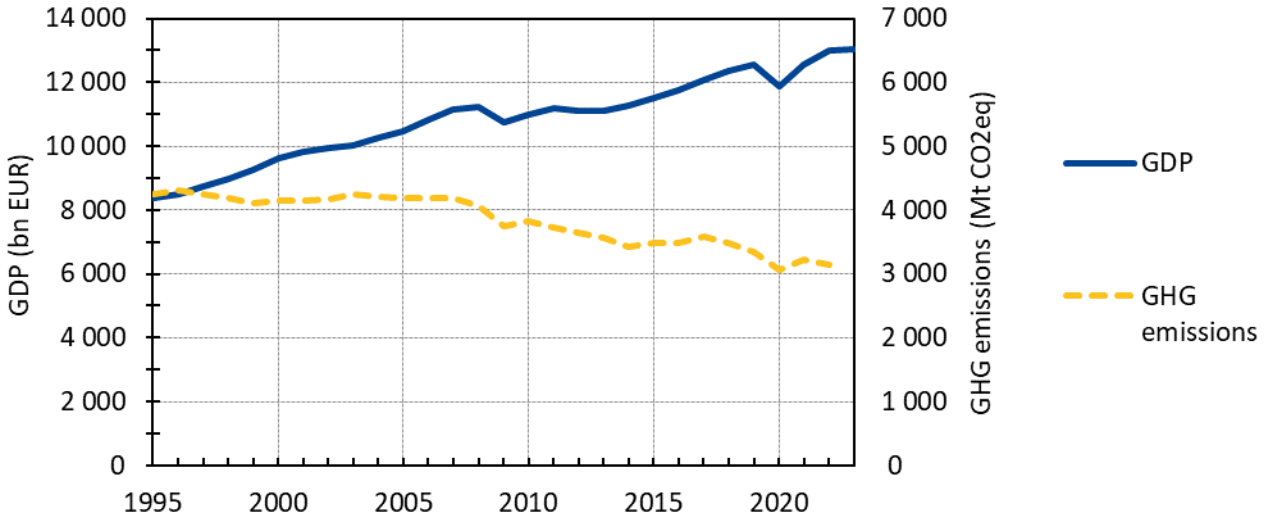
2.1.1.4 Economic profile

GHG emissions in the EU have decreased since 1990 despite a growing economy. Economic indicators are key to understanding the trends in GHG emissions and the effects of climate change mitigation policies.

Figure 6 shows the developments in the EU's gross domestic product (GDP). While the overall GDP of the EU-27 has grown in most years since 1995, there were decreases in GDP of more than 4% in 2009 and 2020 due to the global economic crisis and the COVID-19 pandemic, respectively.

[14] Ibid.

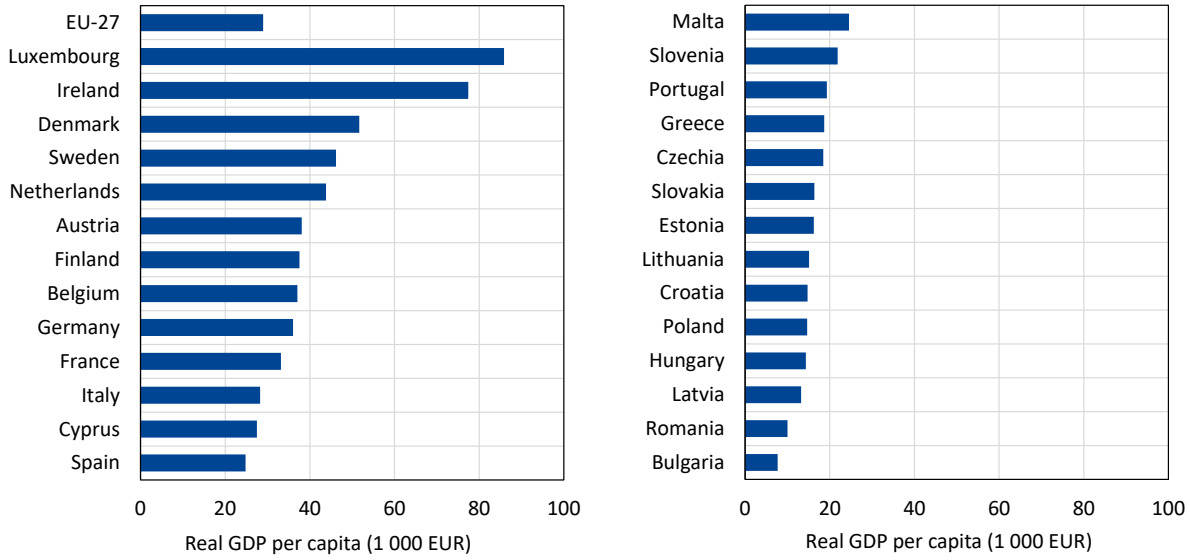
Figure 6: Trend in gross domestic product and GHG emissions of the EU-27



Note: Total GHG emissions of the EU are shown for comparison. Source: Own illustration based on Eurostat[15] and the annual European Union GHG inventory 1990-2022. GHG emissions are in the scope of the EU GHG inventory, including LULUCF, excluding international bunkers.

GDP per capita is distributed unevenly between Member States, as depicted in Figure 7. Luxembourg and Ireland are the Member States with the highest GDP per capita.

Figure 7: GDP per capita in EU Member States, 2023



Source: Own illustration based on Eurostat[16]

[15] GDP and main components, https://doi.org/10.2908/NAMA_10_GDP.

[16] Real GDP per capita, https://doi.org/10.2908/SDG_08_10.

2.1.1.5 Climate profile

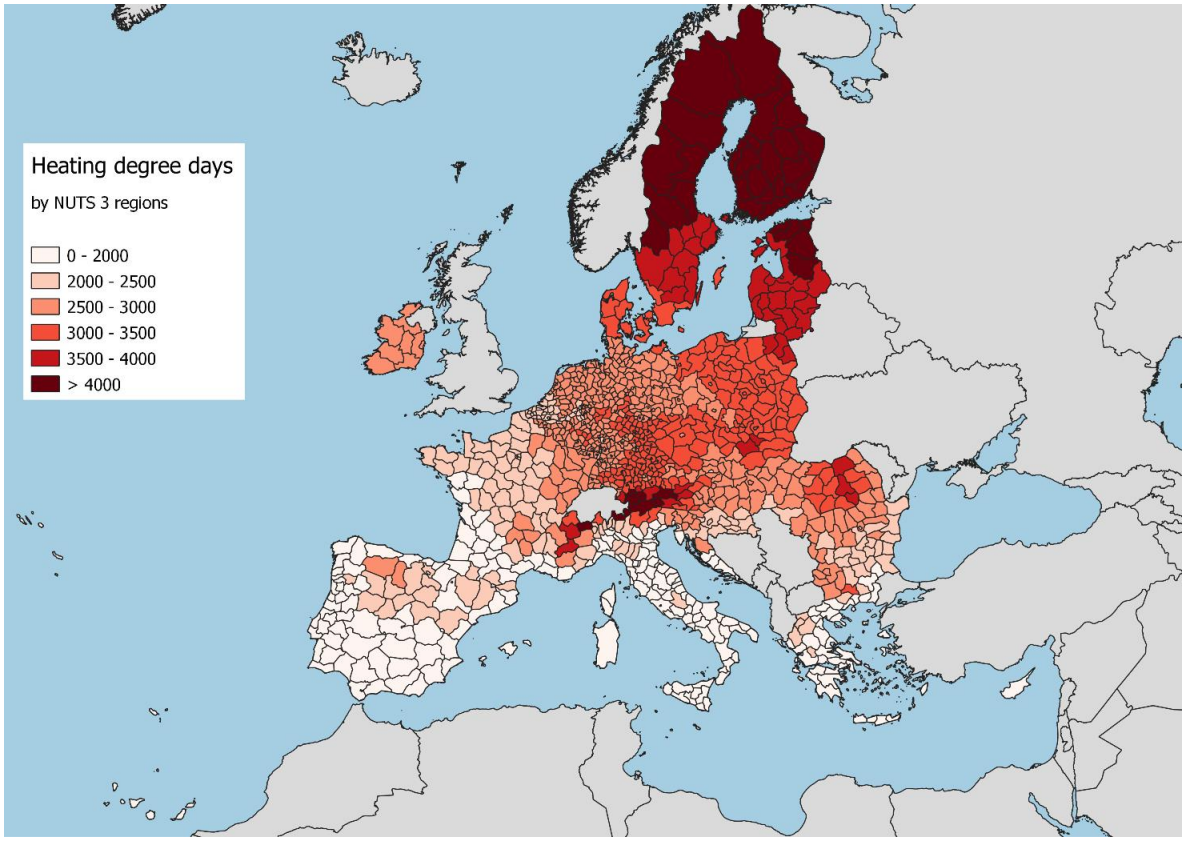
The Member States of the EU cover a wide range of climatic zones. Low temperatures in winter are particularly relevant for greenhouse gas emissions as they mean that heating is necessary, which in many cases depends on fossil fuels. High temperatures in summer require air conditioning and cooling, which is energy-intensive and may contribute to the emission of fluorinated gases.

Heating degree days and cooling degree days are commonly used to measure the energy requirements of buildings. The number of heating degree days is determined from the number of days with average daily temperatures below 15 °C and the temperature difference to a base temperature of 18 °C. The higher the number of such days in a year and the higher the temperature differences, the higher the resulting number of heating degree days. Likewise, the number of cooling degree days is determined from the number of days with average daily temperatures above 24 °C and the temperature difference to a base temperature of 21 °C[17].

Figure 8 shows that a there is a high number of heating degree days in northern Europe, but also in mountainous areas in central Europe and in the eastern parts of the EU, which are characterised by a continental climate with low temperatures in winter.

[17] Heating and cooling degree days – statistics, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Heating_and_cooling_degree_days_-_statistics.

Figure 8: Heating degree days in regions of the EU (average for 2013-2022)

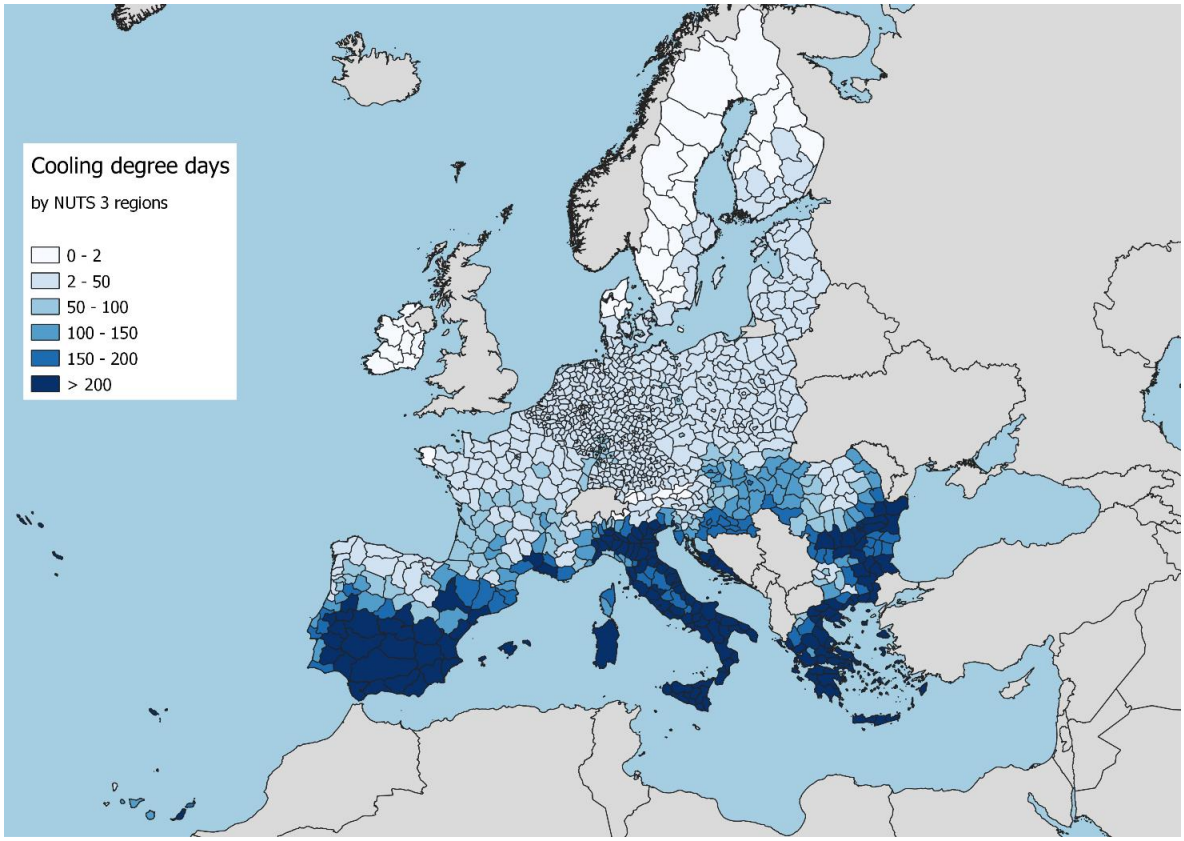


Source: Own illustration based on Eurostat[18]

Like heating degree days, cooling degree days show distinct differences between the northern and southern regions of the EU (Figure 9).

[18] Cooling and heating degree days by NUTS 3 regions – annual data, https://doi.org/10.2908/NRG_CHDDR2_A.

Figure 9: Cooling degree days in regions of the EU (average for 2013-2022)



Source: Own illustration based on Eurostat[19]

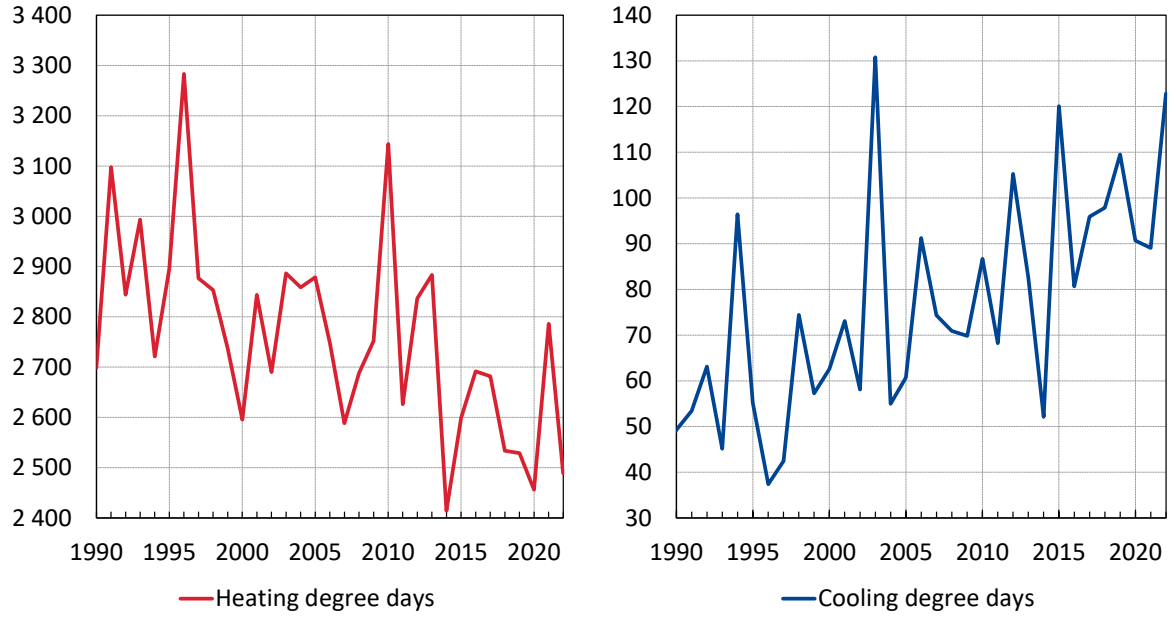
When looking at the annual averages of heating and cooling degree days across Member States between 1990 and 2020 (Figure 10), the effects of a warming climate can be observed, with decreasing demand for heating in winter and growing demand for cooling in summer.

Heating and cooling degree days show significant variations from year to year. This variability is particularly important because it affects energy consumption. Energy systems have to deal with higher energy demand due to hot or cold weather, and when it is cold the share of fossil fuels used for heating may increase. While most of the EU is in the temperate climate zone, extreme weather events such as heatwaves are expected to become more frequent in the future[20].

[19] Cooling and heating degree days by NUTS 3 regions – annual data, https://doi.org/10.2908/NRG_CHDDR2_A.

[20] IPCC AR6 WGI 2021 Regional Fact Sheet for Europe, https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_Europe.pdf.

Figure 10: Time series of heating and cooling degree days



Note: Annual values were determined by averaging the values of each Nomenclature of Territorial Units for Statistics (NUTS) 3 region.

Source: Own illustration based on Eurostat[21]

2.1.1.6 Energy

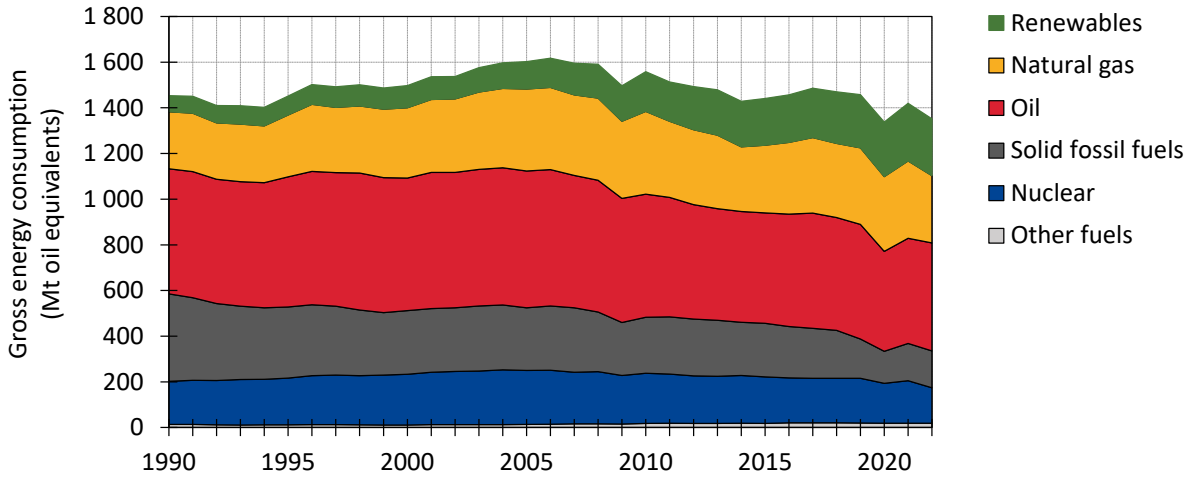
The energy sector is the biggest source of GHG emissions in the EU, however it is currently undergoing major transformations. Besides an accelerating shift towards renewable energy sources, the EU and its Member States are working on reducing their dependence on fuel imports.

As can be seen in Figure 11, gross inland energy consumption in the EU peaked in 2006 and has continued to fall since then. Notable decreases occurred in 2009 in the wake of the global financial crisis, in 2020 due to the COVID-19 pandemic, and in 2022 due to the energy crisis that was exacerbated by Russia's war of aggression against Ukraine. The overall decreasing trend over the past 15 years – despite a growing economy – can be attributed to a series of EU-wide policies and measures, including in the area of energy efficiency (see Section 2.4.3.1).

Over the whole period of time shown, the share of fossil fuels in the EU energy mix fell from 83% in 1990 to 71% in 2022, while the share of energy from renewable sources increased from 5% to 18%. However, the share of natural gas also increased between 1990 and 2022, from 17% to 21%.

[21] Cooling and heating degree days by NUTS 3 regions – annual data, https://doi.org/10.2908/NRG_CHDDR2_A.

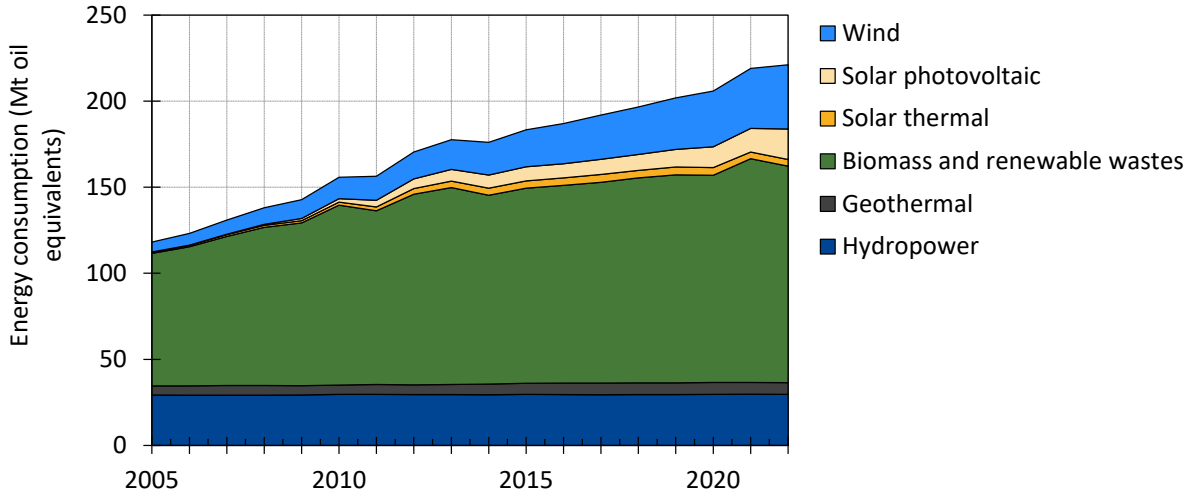
Figure 11: Gross inland energy consumption of the EU-27 by fuel



Source: Own illustration based on Eurostat[22]

The share of fossil fuels in the EU energy mix decreased from 83% in 1990 to 71% in 2022. Nuclear energy accounted for 11% and renewables for 18% of gross inland energy consumption in 2022. Energy consumption from renewable sources has increased significantly since 2005, as shown in Figure 12. Biomass constitutes the main renewable energy source, followed by wind and hydropower.

Figure 12: Energy consumption from renewable energy sources in the EU-27



Source: Own illustration based on Eurostat[23]

Looking specifically at the production of electricity, there has been a significant increase in gross electricity production from renewable energy sources in recent years (Figure 13), rising to 38% in 2022. The second biggest electricity source – nuclear – amounted to 22%. In 2022, electricity

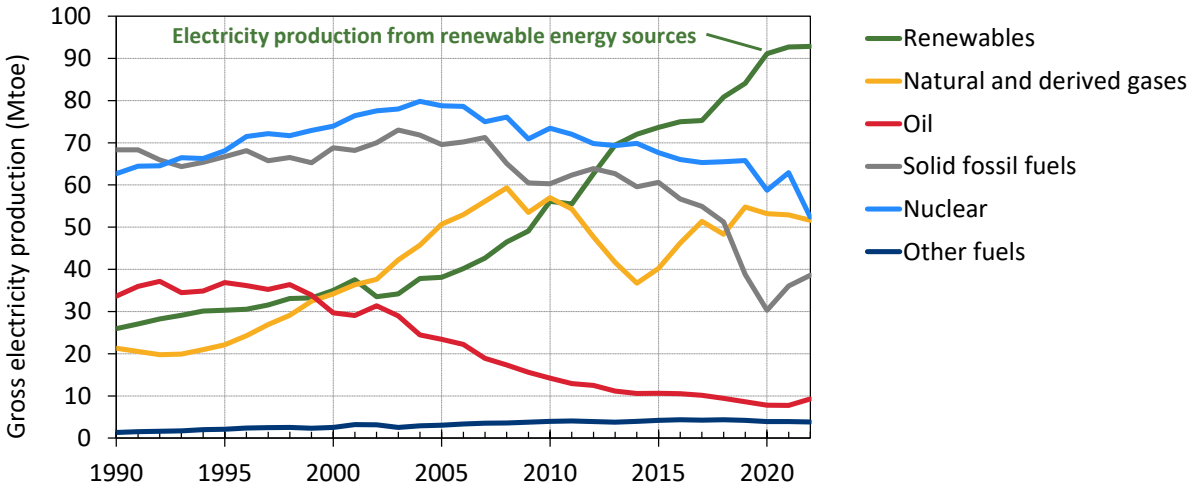
[22] Simplified energy balances, https://doi.org/10.2908/NRG_BAL_S.

[23] Supply, transformation and consumption of renewables and wastes, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_CB_RW; Use of renewables for electricity – details, https://ec.europa.eu/eurostat/databrowser/product/page/NRG_IND_URED.

production from all renewable energy sources combined exceeded electricity production from natural gas and coal combined. Renewables have been the biggest energy source in electricity production in every year since 2013. In 2022, gross electricity production from renewable energy sources exceeded the second biggest electricity source – nuclear – by 77%, and it also exceeded electricity production from natural gas and coal combined in that year.

Electricity production from renewable energy sources has more than doubled in the last 15 years, while electricity production from solid fossil fuels, oil and nuclear energy decreased in the same period. Natural gas continues to be a significant fuel for electricity generation.

Figure 13: Gross electricity production by fuel in the EU-27

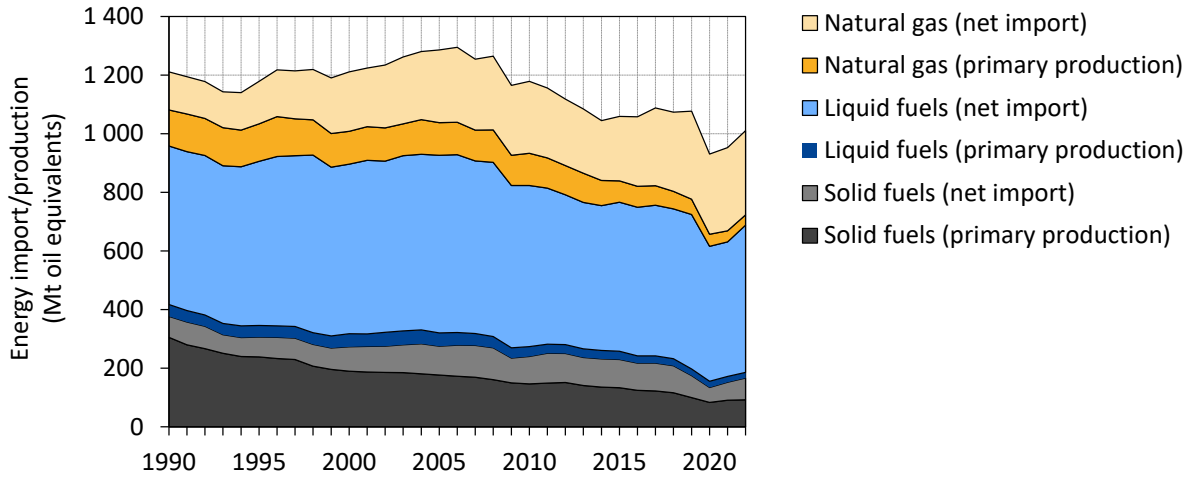


Source: Own illustration based on Eurostat[24]

While the use of renewable energy sources has exceeded other sources in electricity production, fossil fuels are still widely in use in the transport, buildings, industry and other sectors. Figure 14 shows the supply of fossil fuels from 1990 to 2022. The overall supply of fossil fuels fell over this period, but this decrease is mostly due to a decline in primary production within the EU (shown in dark colours), while net imports (shown in light colours) continue to play an important role. Net imports of natural gas more than doubled between 1990 and 2022.

[24] Production of electricity and derived heat by type of fuel, https://doi.org/10.2908/NRG_BAL_PEH.

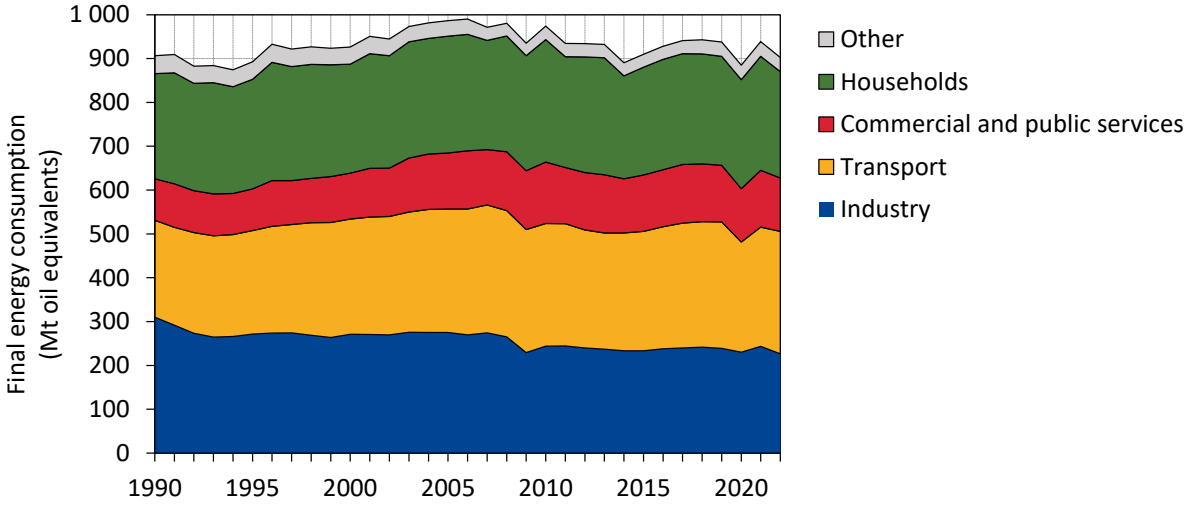
Figure 14: Supply of fossil fuels in the EU-27



Source: Own illustration based on Eurostat[25]

In the same period, final energy consumption[26] remained at roughly the same level, as shown in Figure 15. Though, compared to the highest final energy consumption value of 41 447 Mtoe back in 2006, 2022 final energy consumption decreased from its peak level by 8.9%[27]. While approximately 1.3 units of fossil fuels were produced or imported in 1990 for each unit of final energy consumed, approximately 1.1 units of fossil fuels were required in 2022 for each unit of final energy consumed. This shift can be explained by the increase in renewable sources in the energy mix and by the increased efficiency of the energy system.

Figure 15: Final energy consumption by sector in the EU-27



[25] Simplified energy balances, https://doi.org/10.2908/NRG_BAL_S.

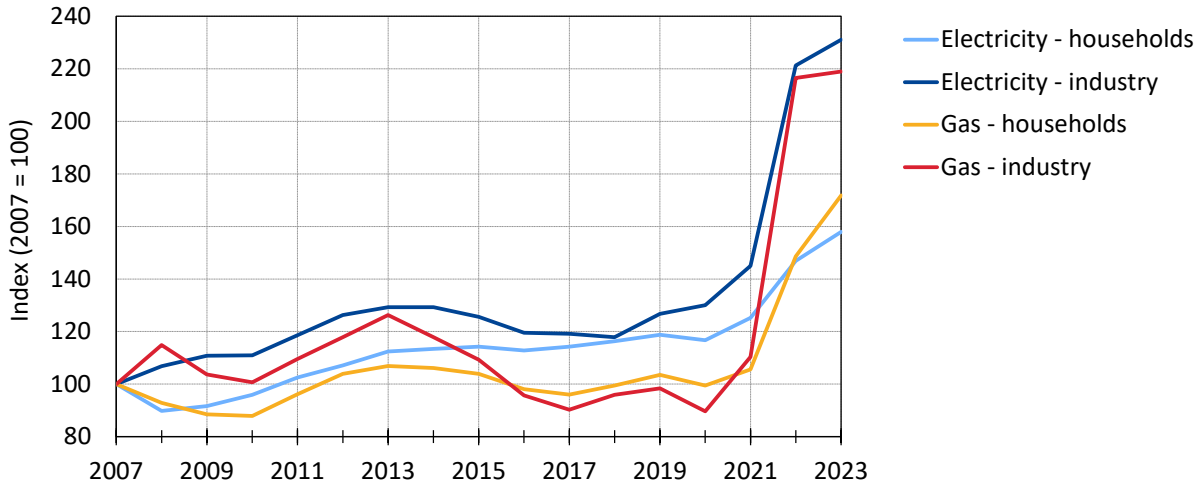
[26] Final energy consumption is the total energy consumed by end users; it is smaller than gross inland energy consumption because it does not include transformation and distribution losses.

[27] Energy statistics - an overview - Statistics Explained (europa.eu)

Source: Own illustration based on Eurostat[28]

The trends in end-user energy prices is shown in Figure 16. Prices for electricity had increased modestly since 2007, then with a significant increase in 2021. Natural gas prices remained at a level similar to 2007 until 2020. However, electricity and gas prices increased significantly in the EU during 2022. The energy crisis that started in 2021 continued in 2022 – exacerbated by Russia's war of aggression against Ukraine – driving energy prices, particularly for natural gas, to record highs. As such, in 2022, the increase in the use of coal and lignite for power generation, above the level recorded in 2021, boosted GHG emissions in the energy sector[29]. However, this increase was more than compensated by the reduced demand for both industrial and household energy, as a response to the high prices.

Figure 16: Average end-user energy prices in the EU-27



Source: Own illustration based on Eurostat.[30] *Prices are nominal, i.e. not adjusted for inflation.*

2.1.1.7 Transport

Currently, the transport sector is largely reliant on fossil fuels and constitutes an important source of GHG emissions. As can be seen in Figure 17, the volume of freight transport (expressed in tonne-kilometres – tkm) saw a decrease in 2009 due to the global economic crisis but has increased in most years since then. Freight transport within the EU (excluding maritime) is dominated by road transport, which accounted for approximately 78% of all inland freight transport tkm in 2022.

Like freight transport, passenger transport in the EU is dominated by road transport. There were small year-to-year increases in total passenger transport until 2019, followed by a pronounced decrease in

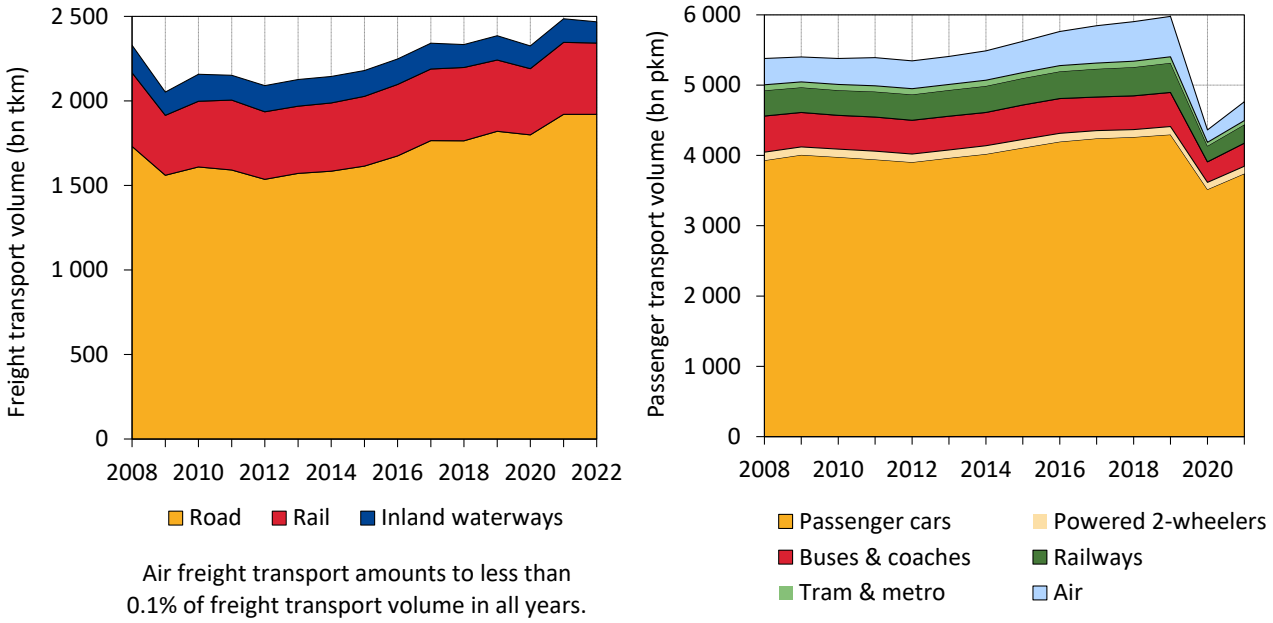
[28] Simplified energy balances, https://doi.org/10.2908/NRG_BAL_S.

[29] Together with the decreased level of nuclear and low hydro power production

[30] Energy statistics – prices of natural gas and electricity, https://ec.europa.eu/eurostat/databrowser/explore/all/envir?lang=en&subtheme=nrg.nrg_price&display=list&sort=category.

2020 due to the COVID-19 pandemic (Figure 17). In 2021, cars accounted for 78% of all passenger transport, expressed in passenger kilometres (pkm).

Figure 17: Freight and passenger transport volume in the EU-27



Source: Own illustration based on Eurostat[31] and EU Transport in figures[32]. Air transport in this graph covers only domestic and intra-EU transport. Maritime transport is not included.

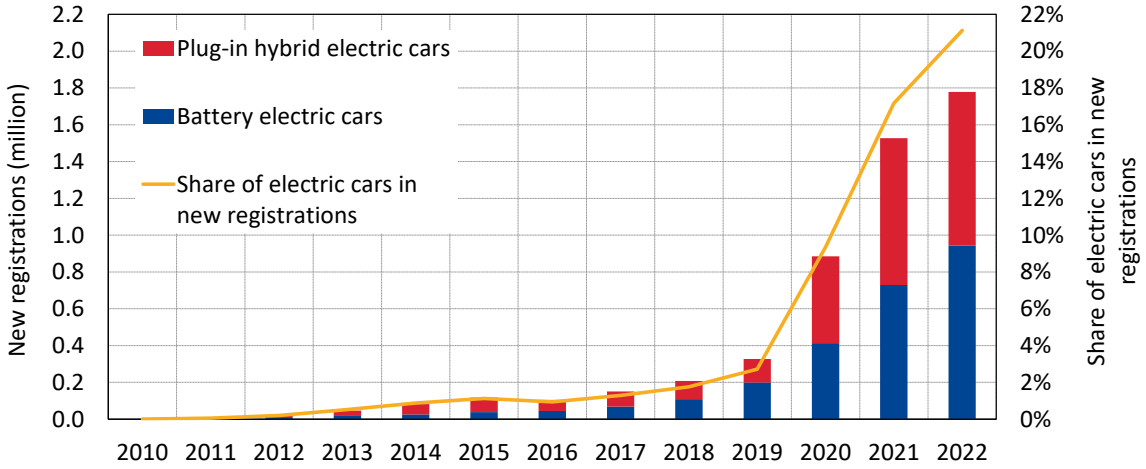
While fossil fuels currently dominate road transport, electric vehicles showed a strong increase in recent years and were supported by EU and national policies. Electric cars (battery electric and plug-in hybrid electric) accounted for approximately 21% of all new cars registered in the EU in 2022 (Figure 18). In the years ahead, electric passenger cars will play a key role in mitigating GHG emissions from road transport. A typical battery electric vehicle in the EU offers a substantial reduction in GHG emissions across its lifetime, compared with an equivalent internal combustion engine vehicle. The extent to which the GHG emissions advantage is realised during the use phase depends strongly on the electricity mix[33].

[31] Inland freight transport split by mode of transport, https://doi.org/10.2908/TRAN_HV_FRMOD.

[32] EU Transport in figures: Statistical pocketbook 2023, https://transport.ec.europa.eu/facts-funding/studies-data/eu-transport-figures-statistical-pocketbook/statistical-pocketbook-2023_en.

[33] Electric vehicles from life cycle and circular economy perspectives, https://www.eea.europa.eu/publications/electric-vehicles-from-life-cycle.

Figure 18: New registrations of electric vehicles in the EU

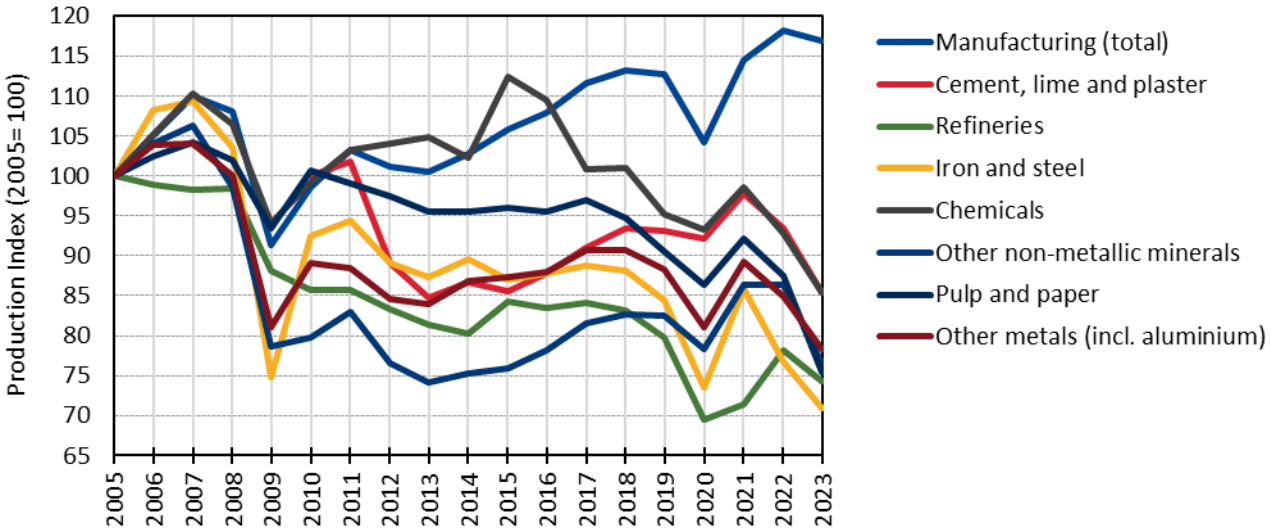


Note: Total of the 27 EU Member States. Source: Own illustration based on European Environment Agency data [34]

2.1.1.8 Industry

The industrial sector accounted for approximately 21% of total gross value added (GVA) in the EU in 2020[35]. Production values of total manufacturing increased over the past decade, but production values of energy-intensive sub-sectors decreased over that time period. (Figure 19). Large decreases in production in many sectors were observed in 2009 in the wake of the global economic crisis, in 2020 due to the COVID-19 pandemic and in 2022-2023 because of high energy prices. These decreases were most pronounced in the iron and steel sector.

Figure 19: Trends in production values of different industry subsectors in the EU-27



[34] New registrations of electric vehicles in the EU, https://www.eea.europa.eu/en/analysis/indicators/new-registrations-of-electric-vehicles.

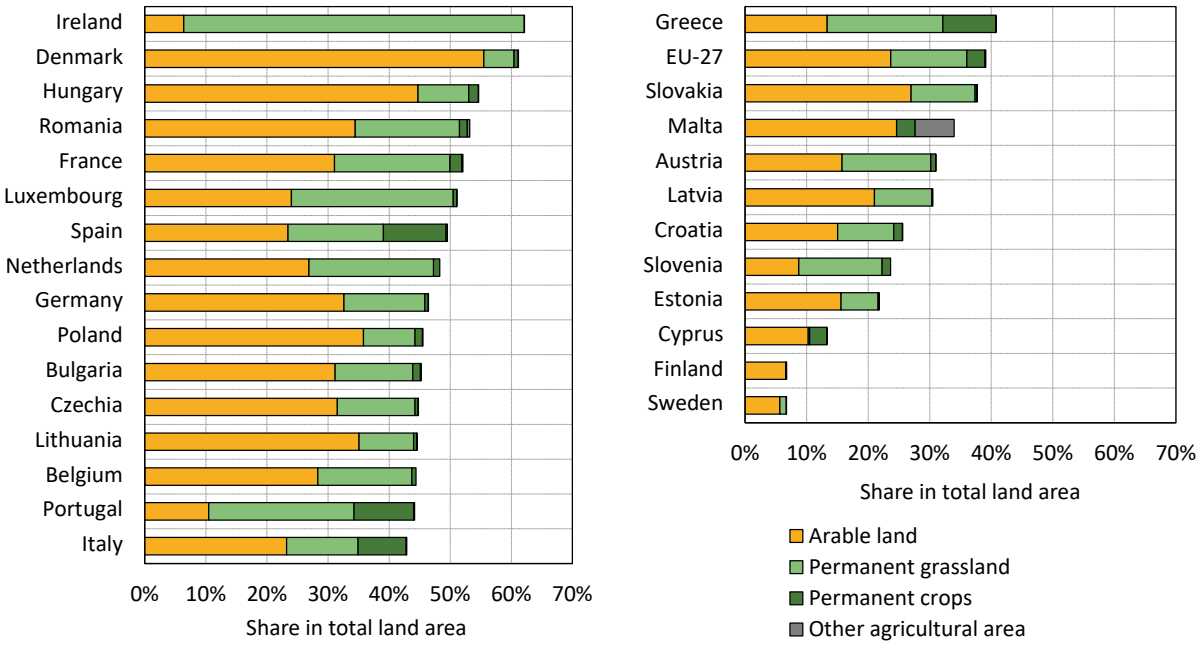
[35] National accounts aggregated by industry, https://doi.org/10.2908/NAMA_10_A64.

Note: For cement, lime and plaster, data are available from 2010 onwards. Hence, the production index for this subsector is 100 for 2010. Source: Own illustration based on Eurostat[36]

2.1.1.9 Agriculture

The proportion of agricultural land in the total land area varies widely between Member States (Figure 20). Ireland has the highest share of agricultural area, which is predominantly grassland. Finland and Sweden have the smallest shares of agricultural areas, and these are mostly arable land. Overall, approximately 39% of the EU's surface area is used for agriculture. Of this area, 61% is arable land, 32% is permanent grasslands and 8% is permanent crops.

Figure 20: Share of agricultural land in total land area in the EU and its Member States



Source: Own illustration based on Eurostat[37]*, data for 2022*

The main sources of GHG emissions from agriculture include methane emissions from enteric fermentation and manure management, plus some nitrous oxide emissions from manure management, which all depend, among other things, on livestock size. Livestock populations in the EU showed varying trends over the past three decades (Figure 21). The swine, cattle and sheep populations decreased between 1990 and 2022 by 18%, 31% and 37% respectively, while the population of poultry was roughly the same in 2022 as in 1990.

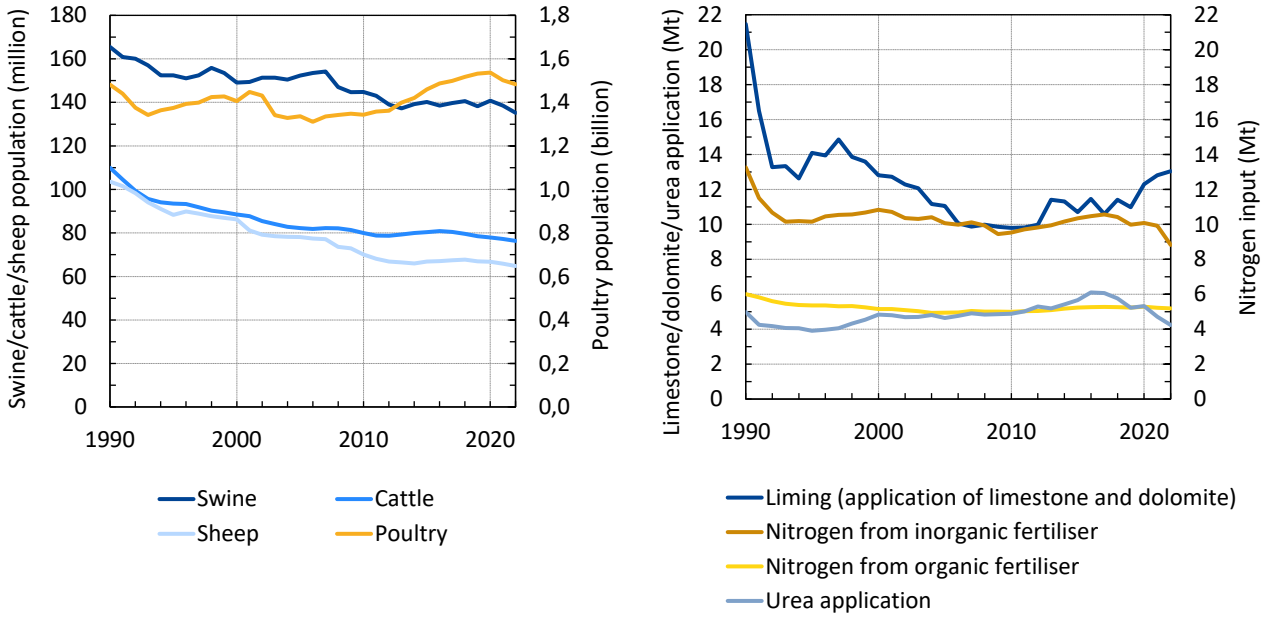
The application of fertilisers is another important source of greenhouse gases. These include nitrous oxides from nitrogen containing fertilisers and CO_2 from the application of limestone, dolomite and urea-based fertilisers. As can be seen in Figure 21, liming and the application of inorganic fertiliser

[36] Ibid.

[37] Utilised agricultural area by categories, https://doi.org/10.2908/TAG00025.

decreased considerably between 1990 and 2022 (by 39% and 33% respectively), while urea application decreased by 15% and nitrogen from organic fertiliser by 14%.

Figure 21: Livestock population and fertiliser application in the EU



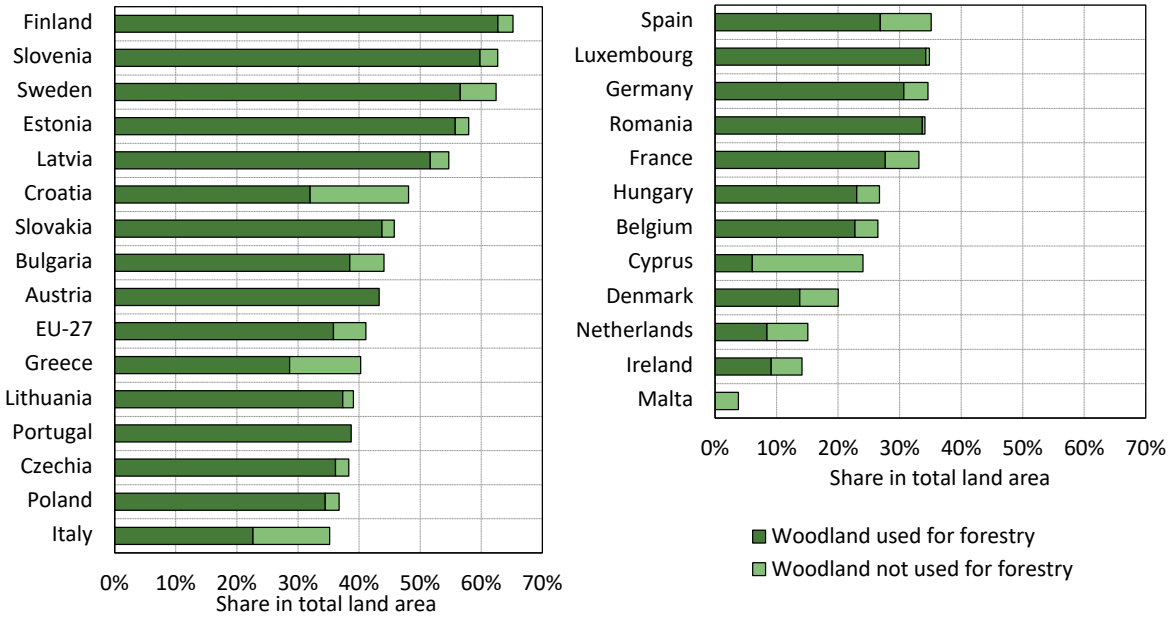
Source: Own illustration based on the annual European Union GHG inventory 1990-2022

2.1.1.10 Forests

Woodland is the most important land category in the EU, accounting for 41% of all land. The share of woodland in individual Member States ranges from 65% in Finland to 4% in Malta, as shown in Figure 22. The vast majority of all woodland is used for forestry, i.e. economic activities. Mostly in southern European Member States, larger shares of woodland are exploited economically. The management of the EU's forests plays a significant role in climate change mitigation because they constitute a significant carbon sink and stock. However, this forest sink has been declining in recent years, due to a combination of many factors, including increased harvest rates (partly due to natural disturbances, but mainly because increasing socio-economic pressures over forest biomass, for instance for energy production), lower growth due to droughts, forest fires and age-related effects.[38]

[38] Korosuo A., Pilli, R., Abad Viñas, R., Blujdea, V. N. B., Colditz, R. R., Fiorense, G., Rossi, S., Vizzarri, M. and Grassi, G. (2023), The role of forests in the EU climate policy: are we on the right track? Carbon Balance and Management, 2023, 18(1), 15, https://cbmjournal.biomedcentral.com/articles/10.1186/s13021-023-00234-0.

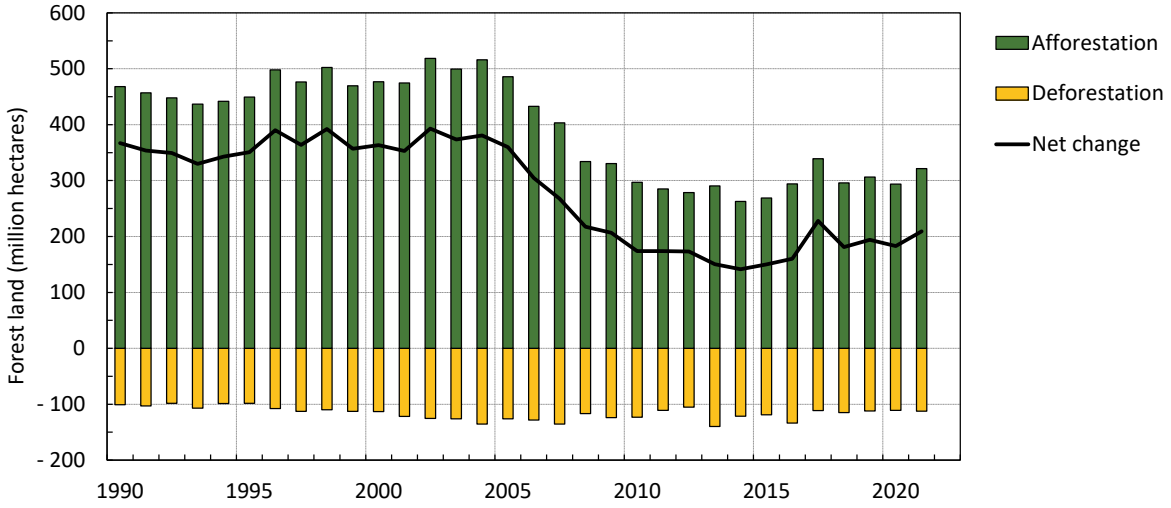
Figure 22: Share of woodland in total land area in the EU and its Member States



Source: Own illustration based on Eurostat,[39] data of 2018. In this dataset, woodlands are areas covered by trees with a canopy of at least 10%.

In recent decades, the area of forest land increased in the EU, as the afforested area was larger than the deforested area in every year (Figure 23). However, the afforested area decreased considerably after 2005, and the net increase in forested areas became less pronounced than before.

Figure 23: Areas of afforestation and deforestation in the EU, 1990-2021



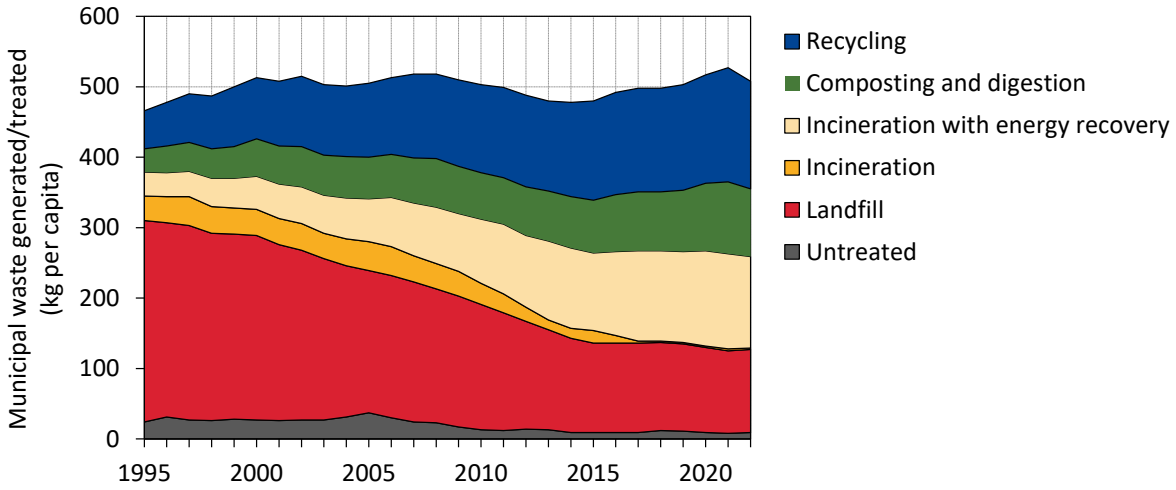
Source: Own illustration based on changes in areas between the previous and the current inventory year, as reported in the 2023 GHG inventory of the EU.

[39] Land cover overview by NUTS 2 regions, https://doi.org/10.2908/LAN_LCV_OVW.

2.1.1.11 Waste

While there has been little variation in the overall amount of municipal waste generated in the EU over the past decades, there has been a significant shift in waste treatment from landfilling to incineration with energy recovery, composting/digestion and recycling (Figure 24). This shift is due to EU-wide waste management policies and is a significant factor in the mitigation of GHG emissions. The shift away from landfill is reducing methane emissions. Waste incineration causes CO_2 emissions, but with energy recovery it can substitute the incineration of fossil fuels for heat or electricity generation.

Figure 24: Treatment of municipal waste in the EU, 1995-2022



Source: Own illustration based on Eurostat[40]

[40] Treatment of waste by waste category, hazardousness and waste management operations, https://doi.org/10.2908/ENV_WASTRT.

2.1.2 Institutional arrangements

2.1.2.1 Institutional arrangements for tracking progress

The EU and its Member States have specific arrangements in place to track progress in implementing and achieving the EU NDC. These arrangements include the tracking of GHG emissions and removals, the reporting of policies and measures, and projections of GHG emissions and removals. These processes are specified in the Regulation on the Governance of the Energy Union and Climate Action (the Governance Regulation)[41] and in the Directive setting up a system for greenhouse gas emission allowance trading (the ETS Directive)[42].

Under the Governance Regulation, the EU has created an EU 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.

Each EU Member State compiles its GHG inventory in accordance with the requirements of the Paris Agreement[43] and the relevant Intergovernmental Panel on Climate Change (IPCC) guidelines[44]. 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 to track progress towards the EU's NDC target to reduce net emissions by 2030 by 55% compared to 1990.

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.

These emissions are calculated based on the Joint Research Centre's Integrated Database of the European Energy System (JRC-IDEES) 45. Details of the methodology used to identify GHG

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41 Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, http://data.europa.eu/eli/reg/2018/1999/oj.

42 Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, as amended, http://data.europa.eu/eli/dir/2003/87/2024-03-01.

43 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.

44 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/.

45 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, https://publications.jrc.ec.europa.eu/repository/handle/JRC137809.

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 the annex of this report.

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 operate national systems for policies, measures and projections and submit standardised information, which is subject to quality assurance and quality control. Based on the data submitted, the EEA compiles projections of GHG emissions and removals for the EU. This EU-wide information is summarised annually in the Commission's Climate Action Progress Report[46] and in the EEA's Trends and Projections Report based on approximated inventories data of the previous year (n-1).

2.1.2.2 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[47] 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.

The 2030 climate and energy framework were put in place to ensure that the EU and its Member States achieve their target. The main elements of this framework are: (i) the EU Emissions Trading System (EU ETS)[48], which caps GHG emissions in energy, industry, aviation and maritime transport; (ii) the LULUCF Regulation, which includes national net removal targets for the LULUCF sector; and (iii) the Effort-Sharing Regulation (ESR) which sets 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 (details can be found in this report 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 under the framework.

Progress in implementing these policies and measures is monitored under the Governance Regulation. Relevant information, which is reported regularly and archived by the EEA, includes GHG inventories, approximated GHG inventories for the previous year, information on policies and measures, projections, and progress in implementing the integrated national energy and climate plans

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[46] EU Climate Action Progress Report 2024, https://climate.ec.europa.eu/document/download/d0671350-37f2-4bc4-88e8-088d0508fb03_en?filename=COM_2024_498_F1_REPORT_FROM_COMMISSION_EN_V4_P1_3729454.PDF

[47] 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.

[48] This refers to 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).

(NECPs). 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 gives recommendations on improving planning and implementation. In addition, the reported information is subject to quality checks, and the GHG inventories reported by EU Member States will be subject to comprehensive reviews in 2025, 2027 and 2032[49].

All EU legislation, including the legislation under the 2030 climate and energy framework, is subject to a stakeholder engagement process. 'Better regulation tools' ensure that policy is based on evidence and the best available practice[50]. During the preparation of a legislative proposal, the European Commission invites individuals, businesses and stakeholder organisations to provide their views on the subject dealt with by the new legislation. These comments are documented in a dedicated portal[51], and the European Commission reports on how it takes these comments into account in the development of its legislative proposal.

2.2 Description of the nationally determined contribution

Under their updated NDC[52] 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. Details of the EU NDC can be found in Table 1.

NDC Scope

The scope of the EU NDC updated on 17 October 2023 NDC scope includes a specific share of CO2 emissions from flights subject to effective carbon pricing through the EU ETS and carbon dioxide, methane and nitrous oxide emissions for waterborne navigation voyages within the EU.

This section provides further details on the inclusion of these emissions in the EU's NDC.

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[49] 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.

[50] Decision-making process, https://ec.europa.eu/info/strategy/decision-making-process/how-decisions-are-made_en.

[51] Have your say – public consultation and feedback, https://ec.europa.eu/info/law/better-regulation/have-your-say_en.

[52] 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.

International aviation

EU NDC scope - International aviation: comprises emissions from civil aviation activities as set out for 2030 in Annex I to the EU ETS Directive only in respect of CO2 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 2024-2026 from flights between the EU Member States and departing flights to Norway, Iceland, Switzerland and the United Kingdom. International aviation also covers CO2 emissions from non-domestic flights between EU Member States and the Outermost Regions (OMRs) (*)

(*) From 1 January 2024, the revised EU ETS also covers non-domestic flights to and from outermost regions that were previously exempted. The outermost regions of the EEA Member Countries are: i) **France:** French Guiana, Guadeloupe, Martinique, Mayotte, Reunion, Saint Martin; ii) **Spain:** Canary Islands; iii) **Portugal:** Azores, Madeira.

By July 2026, the Commission will make a legislative proposal to revise the EU ETS that will include the scope of the EU ETS for aviation. According to the revised EU ETS Directive, from 1 January 2027, flights involving third countries not applying ICAO's CORSIA scheme will also be covered by the EU ETS, except for flights involving most small island countries and Least Developed Countries. Depending on the assessment preparing the legislative proposal, the revised scope may be changed so that flights to third countries applying ICAO's CORSIA scheme will also be covered by the EU ETS. Consequently, the target scope will be adjusted accordingly.

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

International maritime

EU NDC Scope – international maritime for waterborne navigation: the EU NDC only covers CO2, methane and nitrous oxide emissions from voyages within the EU Member States for maritime transport activities, so from voyages that depart in one Member State and arrive in a different Member State. (**)

(**) For waterborne maritime 100% of emissions from voyages departing from a port under the jurisdiction of an EU Member State and arriving at a port under the jurisdiction of another EU Member State; iv) 100% of emissions within a port under the jurisdiction of an EU Member State. No size threshold was specified.

This is not the EU ETS1 scope. Indeed, the EU ETS is broader as it covers 50% of the emissions from voyages starting or ending at EU port, emissions when ships are at berth in EU ports and all emissions

from voyages within the EU. The EU ETS only covers CO2 emissions in 2024-25 (and CH4 and N2O emissions as from 2026) as well as emissions from large ships (above 5 000 gross tonnage) performing maritime transport activities.

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

Table 1: 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
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	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 Iceland, Norway, 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 journeys 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 net reduction target of at least 55% by 2030 is to be achieved through domestic measures only, without contribution from international credits. The EU will account 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 scope of the NDC contains clarifications/further details compared to the information provided in the updated NDC of the EU.

Note: This table is identical to the 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.

Source: Updated NDC of the EU[53]

As specified in Table 1, the NDC covers the emissions and removals from all sectors of the EU GHG inventory. In addition, CO_2 emissions from specific international flights (covered by the EU Emissions Trading System) and GHG emissions from maritime voyages between EU Member States are included in the scope of the NDC.

2.3 Indicator, definitions, methodologies and progress

2.3.1 Indicator

To track progress in implementing and achieving the NDC of the EU, an indicator is used which has the same unit and metric as the NDC base year and target values. The chosen indicator is 'annual total net GHG emissions consistent with the scope of the NDC in CO_2eq'. Table 2 provides more information on this indicator.

Table 2: Indicator to track progress

Information	Description
Selected indicator	Annual total net GHG emissions (in CO_2eq) consistent with the scope of the NDC.
Reference level and base year	The reference level is the 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	This is the first time the reference level has been reported, hence there are no updates. The value of the reference level may be updated in the future because of methodological improvements to the EU GHG inventory and to the determination of international aviation and navigation emissions within the scope of the NDC.
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 to track progress in implementing and achieving the NDC target.
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.'

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'), which were submitted electronically together with this BTR.

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

2.3.2 Methodologies and accounting approach

The EU and its Member States use the following accounting approach for tracking progress towards the EU NDC: annual GHG data from the national GHG inventory of the EU, complemented for international aviation and navigation by estimates from the Joint Research Centre's Integrated

[53] 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.

Database of the European Energy System[54]. 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 Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA).

For emissions and removals from the LULUCF sector, 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[55] under the Paris Agreement can be found in CTF Table 3 ('Methodologies and accounting approaches'), which was submitted electronically together with this BTR.

2.3.3 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 what progress they have made towards achieving it. The most recent data on GHG emissions and removals in the scope of the NDC constitute the key information for tracking this progress. Table 3 summarises the current status of progress.

Table 3: Summary of progress towards implementing and achieving the NDC

	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	At least 55% below base year level	2030	The most recent level of the indicator is 31.8% below the base year level.

NA: not applicable.

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

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.

Source: the indicator values are based on the annual European Union GHG inventory 1990-2022.

[54] 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, https://publications.jrc.ec.europa.eu/repository/handle/JRC137809.

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

Based on the GHG inventory data and data on international aviation and maritime navigation in the scope of the NDC for 2022, the EU and its Member States have reduced net GHG emissions by 31.8 % compared to 1990. This demonstrates that the EU and its Member States have made progress in 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.

2.4 Mitigation policies and measures

2.4.1 Introduction

In order to mitigate global climate change, there is an urgent need to reduce the emissions of greenhouse gases and to remove more greenhouse gases by sinks. The European Union and its Member States have implemented mitigation policies and measures for many years, which have successfully contributed to the reduction of greenhouse gas emissions in recent years. These include the EU Emissions Trading System (EU ETS) and a wide range of policies and measures addressing all sectors of the economy.

To ensure that the EU and its Member States will achieve their updated NDC target of an economy-wide net domestic emission reduction of at least 55% by 2030 compared to 1990, the EU has strengthened and expanded its climate change policies and measures.

The European Green Deal, a comprehensive and holistic plan to become the first climate neutral continent by 2050, was adopted in 2020. It acts as a catalyst for more ambitious targets and policies and measures.

2.4.1.1 The 2030 climate and energy framework

The EU's 2030 climate and energy framework were created to ensure that the EU and its Member States achieve their climate change mitigation commitments under the Paris Agreement, as communicated in the EU's NDC. The main elements of this framework are the EU ETS, the ESR and the LULUCF Regulation. Details on this legislation can be found in sections 2.4.2 and 2.4.7.1.

The 2030 framework was first established in line with the EU's original NDC of 2015, which stipulated a 40% reduction in GHG emissions by 2030 compared to 1990[56]. In 2020, the EU and its Member States updated their NDC and committed to a net reduction of at least 55% by 2030 compared to 1990[57]. To meet this more ambitious target, a comprehensive package of legislation (the 'Fit for 55 package') was adopted in 2023 and 2024. Only the adoption of the energy taxation directive is still pending. The key items in this legislative package are:

- more rapid emission reductions under the EU ETS up to 2030 and an extension of the ETS to maritime transport emissions;
- a more ambitious emissions reductions to be achieved by EU Member States by 2030 under the ESR;

[56] Intended nationally determined contribution of the EU and its Member States, https://unfccc.int/sites/default/files/LV-03-06-EU%20INDC.pdf.
[57] The update of the nationally determined contribution of the European Union and its Member States, https://unfccc.int/sites/default/files/NDC/2022-06/EU_NDC_Submission_December%202020.pdf.

- a more ambitious renewable energy and energy efficiency targets;
- various updates to existing legislation, such as stricter CO_2 emission standards for cars; and
- new measures, including a carbon border adjustment mechanism, a new and separate ETS for road transport, buildings and small industry not covered by the existing ETS together with a social climate fund, a methane regulation and updated EU rules to decarbonise gas markets and promote hydrogen.

More information on these initiatives can be found in the following sections.

The Regulation on the Governance of the Energy Union and Climate Action ('the Governance Regulation')[58], is a critical piece of legislation that sets common rules for the planning, reporting and monitoring of progress towards its 2030 climate and energy targets and its international commitments under the Paris Agreement. The Governance Regulation requires EU Member States to draft, communicate and implement integrated NECPs and to regularly report on their progress in implementing them. The Governance Regulation also sets out the detailed reporting obligations on GHG emissions, policies and measures, projections, adaptation and support provided to developing countries.

2.4.1.2 The EU's long-term strategy and the Climate Law

In addition to the 2030 target, the EU and its Member States committed to the objective of a climate-neutral EU by 2050. This objective was agreed by the European Council in December 2019 and communicated in March 2020 as the EU's long-term low GHG emissions development strategy under the Paris Agreement[59]. With the submission of its long-term strategy, the EU became the first large economy that committed to economy-wide climate neutrality. In addition to the EU as a whole, several Member States communicated their own long-term strategies under the Paris Agreement[60].

The EU long-term strategy ("Clean Planet for All", Nov 2018) for the reduction of greenhouse gas emissions, as requested by the European Council in March 2018, confirms the EU's lead in global climate action. The strategy presents a vision to achieve climate neutrality by 2050, through a fair transition encompassing all sectors of the economy. It mentions seven strategic priorities, including reaping the full benefits of bioeconomy and creating essential carbon sinks.

The binding objective of climate neutrality by 2050 is enshrined in the European Climate Law[61], which entered into force in July 2021. The European Climate Law also contains the 2030 climate target of reducing domestic emissions by at least 55% compared to 1990. It constitutes a net target,

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[58] Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, http://data.europa.eu/eli/reg/2018/1999/oj.

[59] Long-term low greenhouse gas emission development strategy of the European Union and its Member States, https://unfccc.int/sites/default/files/resource/HR-03-06-2020%20EU%20Submission%20on%20Long%20term%20strategy.pdf.

[60] Communication of long-term strategies, https://unfccc.int/process/the-paris-agreement/long-term-strategies.

[61] 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.

i.e. removals of CO_2 from the atmosphere are taken into account. However, the total amount of removals which can be counted towards the achievement of the target is limited to a maximum of 225 megaton (Mt) CO_2eq.

The European Climate Law also sets out the process for developing the 2040 climate target, which will take into account an indicative greenhouse gas budget for 2030 to 2050. Based on a detailed impact assessment[62] and the advice of the European Scientific Advisory Board on Climate Change set up by the Climate Law, on 6 February 2024 the European Commission presented its 2040 climate target communication and recommended reducing the EU's net GHG emissions by 90% by 2040 relative to 1990[63]. Based on the scenarios presented in the impact assessment, this requires a further deployment of carbon capture, substantial reductions of GHG emissions in the land sector and a fully developed carbon management industry by 2040. Carbon capture will need to cover all emissions from industrial processes emissions and deliver sizeable carbon removals. In addition, high levels of production and consumption of e-fuels will be necessary to further decarbonise the energy mix.

Finally, the European Climate Law requires the EU and Member States to adopt adaptation strategies and sets out the rules for assessing progress towards the climate targets.

2.4.1.3 The environment action programmes

The overall environment policy of the European Union is guided by environment action programmes.

The eighth environment action programme, which entered into force in May 2022, constitutes the EU's legally agreed common agenda for environment policy up to 2030. It contains six priority objectives, several of which are directly related to climate action:

- achieving the 2030 GHG emission reduction target and climate neutrality by 2050;
- enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change;
- advancing towards a regenerative growth model, decoupling economic growth from resource use and environmental degradation, and accelerating the transition to a circular economy;
- pursuing a zero-pollution ambition, including for air, water and soil, and protecting people's health and well-being;
- protecting, preserving and restoring biodiversity, and enhancing natural capital; and
- reducing environmental and climate pressures relating to production and consumption.

The Commission, assisted by the European Environment Agency and the European Chemicals Agency, monitors, assesses and reports annually on progress towards these priority objectives. In

[62] Communication from the Commission: Securing our future – Europe's 2040 climate target and path to climate neutrality by 2050, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024SC0063.
[63] Communication from the Commission: Securing our future – Europe's 2040 climate target and path to climate neutrality by 2050, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2024%3A63%3AFIN.

March 2024, a mid-term evaluation[64] of the environment action programme was completed. The review noted that good progress had been made towards the target of reducing net GHG emissions but called for greater ambition if the EU is to achieve almost three times the average annual reduction rate of the last decade, especially in the buildings and transport sectors. It also emphasised the need for a significant increase in carbon removals. A full evaluation will be carried out by 2029.

2.4.1.4 Cross-cutting and sectoral policies and measures

The following sections provide an overview of EU policies and measures in all economic sectors including cross-cutting policies and measures. They focus on the policies and measures currently in place, outline some pending legislative proposals and provide information on planned updates.

The policies and measures presented in this report focus on the EU level. Additional policies and measures are implemented at the national, subnational and local levels. Policies at EU level provide the overall framework and help to ensure that the EU and its Member States will meet their commitment to reduce greenhouse gas emissions. Each EU Member State implements its own policies within this framework. Details on each EU Member State's policies and measures can be found in the transparency reports produced every 2 years and in national communications submitted by these countries under the UNFCCC[65].

This chapter is structured as follows:

- Section 2.4.2 provides details on the EU's cross-cutting policies and measures, including the EU Emissions Trading System, effort-sharing legislation and other strategies and funds that contribute to climate change mitigation.
- Sections 2.4.3 to 2.4.8 describe the EU policies and measures in each economic sector.

In addition to the description of policies and measures in this chapter, structured information on each policy and measure can be found in the common tabular format (CTF) tables attached to this report. CTF Table 5 includes the following for each policy and measure:

- the name and a brief description;
- the sector(s) and greenhouse gas(es) concerned;
- the type of instrument (regulatory, fiscal, economic, etc.);
- the status (planned, adopted, implemented) and year of implementation;
- the body or bodies responsible for implementation; and
- an estimate of the mitigation impact, if available.

These policies and measures are closely interlinked. For example, the targets under the EU effort-sharing legislation can only be met if various EU and national policies are implemented across

[64] Report from the Commission on the eighth environment action programme mid-term review, COM/2024/123 final, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024DC0123.
[65] First biennial transparency reports, https://unfccc.int/first-biennial-transparency-reports.

different sectors, and it is difficult to attribute a planned or achieved emission reduction to a specific policy and measure. In many cases, it is not possible to estimate the mitigation impact of a single policy or measure. The main reasons why such estimates are not available are the following:

- No policy can be singled out as there are numerous co-benefits from policies specifically targeting climate change and other sectoral policies.
- Impact assessments are conducted for all proposals for new EU legislation; however, the final legislation may differ from the proposal and may combine various options examined in the impact assessment.
- Impact assessments consider a combination of policies and measures. For example, the impact assessment for the 2030 climate and energy framework considered a combination of measures to increase energy efficiency and renewable shares and initiatives to complement and strengthen other legislation.
- Some policies and measures focus on electricity consumption, and quantitative information on reductions in electricity consumption is available. However, the impact of these policies and measures on GHG emissions depends on the electricity mix, which is influenced by other European and national policies and changes over time.

2.4.2 Cross-cutting policies and measures

The main EU cross-cutting measures under the 2030 climate and energy framework are the EU ETS and the Effort-Sharing Regulation. They are complemented by other cross-cutting policies, initiatives and funds.

2.4.2.1 EU Emissions Trading System

The EU ETS[66] works on the 'cap-and-trade' principle. A cap is set on the total amount of certain greenhouse gases that may be emitted by the installations covered by the system. The cap is reduced over time so that total emissions fall. Within the cap, operators must surrender enough allowances to cover their emissions and can trade allowances with each other if necessary. The EU ETS came into operation in 2005. The second phase ran from 2008 to 2012, and the third phase ran from 2013 to 2020, contributing substantially to EU-wide reductions in GHG emissions by 2020. The fourth phase of the EU ETS runs from 2021 to 2030.

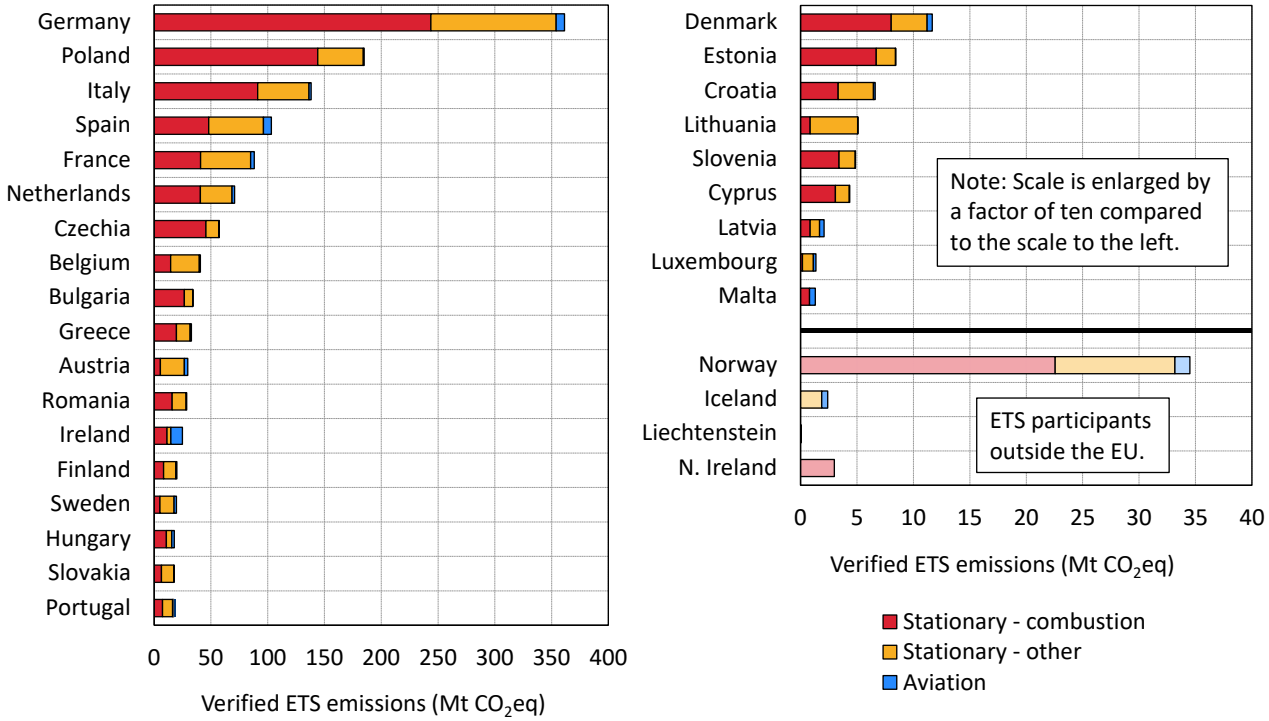
The EU ETS applies to electricity generation in all EU countries plus Iceland, Liechtenstein, Norway and Northern Ireland. The EU ETS limits emissions from around 10 000 installations in the power and heat sector and the manufacturing industry and from airlines operating within the EU and departing to Switzerland and the United Kingdom. In 2022, those emissions accounted for 37% of the EU's total GHG emissions[67]. Since 2020, the EU ETS has been linked to the Swiss ETS under an agreement with Switzerland. As of 2024, the EU ETS also covers emissions from maritime transport.

[66] Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, as amended, https://eur-lex.europa.eu/eli/dir/2003/87/2024-03-01.

[67] Greenhouse gas emissions under the EU Emissions Trading System, https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emissions-under-the.

Figure 25 provides an overview of verified emissions in the EU Member States in 2022. The share of combustion emissions, other stationary emissions and aviation emissions depends on the types of major industries and the main sources of electricity and heat generation, and on whether the Member State administers a major airline. Total verified EU ETS emissions in 2022 amounted to 1 333 Mt CO_2eq. For reference, the figure also includes emissions of EU ETS participants outside the EU, namely Iceland, Norway, Liechtenstein and Northern Ireland.

Figure 25:EU ETS emissions in 2022



Note: Switzerland's ETS emissions amounted to 5.7 Mt of CO_2eq in 2022[68]*. This value is provided for information as the Swiss ETS is outside the EU ETS, but an agreement links the two systems.*

Source: European Environment Agency[69]

The EU ETS covers the following gases and sectors, focusing on emissions that can be measured, reported and verified with a high degree of accuracy:

- carbon dioxide (CO_2) from
  - electricity and heat generation;
  - energy-intensive sectors, including oil refineries, steelworks and factories producing iron, aluminium, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals;
  - the capture and transport of CO_2 for geological storage in sites permitted under the EU Carbon Capture and Storage Directive (see 2.4.2.5);

[68] Swiss Emissions Trading Registry, https://www.emissionsregistry.admin.ch/crweb/public.

[69] EU Emissions Trading System (ETS) data viewer, https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1.

- aviation, limited to flights within the European Economic Area[70] and flights departing to Switzerland and the United Kingdom;
- maritime transport, and more specifically 50% of emissions from voyages from third countries to the EU and from the EU to third countries and 100% of emissions from voyages between two EU ports and when ships are in EU ports[71];

- nitrous oxide (N_2O) from the production of nitric, adipic and glyoxylic acids and glyoxal; and
- perfluorocarbons (PFCs: CF_4 and C_2F_6) from the production of aluminium.

Participation in the EU ETS is mandatory for companies in these sectors, but in some sectors only installations above a certain size are included. From 2024, municipal waste incinerators above a certain threshold also need to monitor and report their emissions under the EU ETS[72].

The legal framework of the EU ETS is set out in the ETS Directive. The Directive was revised in 2018 to ensure emission reductions that help to meet the 2030 Climate and Energy Framework target. Following the update of the EU's 2030 GHG emissions reduction target from -40% to -55% under the 2030 Climate and Energy Framework, the ETS Directive and related legislation were revised again in 2023 to ensure that the EU ETS can contribute substantially to the more ambitious 2030 target. The revisions, most of which came into effect on 1 January 2024, focused on:

- tightening the EU ETS cap to bring down emissions by 62% compared with 2005 levels by 2030;
- including emissions from maritime transport in the system;
- reducing and eliminating free allocation in the manufacturing industry and aviation;
- strengthening the Market Stability Reserve;
- introducing a new emissions trading system (ETS2) for buildings, road transport and other sectors from 2027 (see 2.4.2.2);
- setting up the Social Climate Fund to address the social impacts of ETS2[73].

As shown in Figure 26, the sectors covered by the stationary ETS have shown decreasing emissions in recent years.

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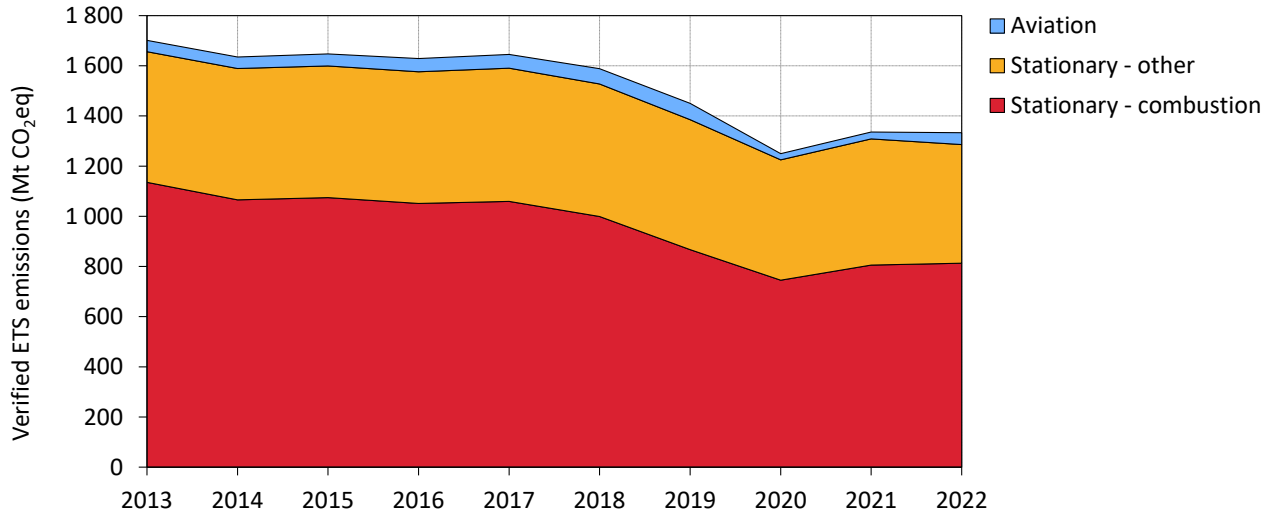
[70] The European Economic Area consists of the EU, Norway, Iceland and Liechtenstein.

[71] As of 2026, the EU ETS will also cover methane (CH_4) and nitrous oxide (N_2O) emissions from maritime transport. The NDC covers emissions from maritime transport voyages between the EU Member States

[72] EU Emissions Trading System (EU ETS), https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets_en.

[73] Report from the Commission to the European Parliament and the Council on the functioning of the European carbon market in 2022 as required by Articles 10(5) and 21(2) of Directive 2003/87/EC, COM(2023)654 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023DC0654.

Figure 26: ETS emissions in the EU, 2012-2022



Source: European Environment Agency[74]

Greenhouse gas (GHG) emissions from sectors covered by the EU ETS can be estimated with a high degree of accuracy as they are subject to detailed monitoring, reporting and verification. However, the impact of the implementation of the EU ETS on GHG emissions compared with a hypothetical situation where the EU ETS is not implemented is difficult to estimate. This is due to the interaction of several factors, such as GDP growth, the impact of other instruments such as the Renewable Energy and Energy Efficiency Directives and the impact of specific policies and measures adopted by EU Member States. As a result, there is no comprehensive *ex post* or *ex ante* evaluation available of the impact that the EU ETS has on GHG emissions alone. This report considers an 'illustrative impact' of the EU ETS on stationary installations in EU Member States by applying the overall EU ETS target (-62%) to the base year emissions from stationary installations. ETS emissions in 2005 are available from the EU ETS data viewer [75] and have been corrected upwards to reflect the current scope of the EU ETS (new countries, activities and gases have been included in the EU ETS since 2005). Illustrative GHG emissions consistent with the target can be estimated by applying the ETS targets of -62% to the 2005 emissions level, as shown in Table 4.

Table 4: Illustrative impact of the implementation of the EU ETS in 2030 on stationary sectors

Year	Base year (2005) GHG emissions	Reduction target	Impact on GHG emissions
2030	2 059 Mt CO_2eq	-62%	-1 276 Mt CO_2eq

Note: GHG emissions and illustrative impacts shown here include stationary installations located in EU Member States only.

[74] EU Emissions Trading System (ETS) data viewer, https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1.

[75] Ibid.

Source: EU ETS data viewer, Directive 2003/87/EC as amended

The latest verified ETS emissions reported by Member States show a 15.5% decrease in emissions in 2023 relative to 2022 levels. The decrease was mainly due to lower emissions from electricity production, resulting from an increase in renewable electricity production. ETS emissions in 2023 were 47% below 2005 levels[76] and are therefore well on track to meet the 2030 target of a 62% reduction across the sectoral and geographical scope of the ETS.

2.4.2.2 Emissions Trading System 2

In 2023, a new emissions trading system (ETS2)[77] was introduced, which also covers CO_2 emissions from road transport, buildings and small industries not covered by the existing EU ETS. The introduction of carbon pricing in those sectors will provide a market incentive for investments in building renovations and low-emission mobility. Like the existing EU ETS, ETS2 is a 'cap-and-trade' emission mechanism, but it will address fuel suppliers rather than end consumers such as households or car users. Fuel suppliers will have to monitor and report emissions from fuels supplied by them and buy sufficient allowances at auctions to cover these emissions. The ETS2 cap will be set in such a way as to bring emissions down by 42% by 2030 compared with 2005 levels. Part of the revenues will be earmarked for the Social Climate Fund (see 2.4.2.11), and EU Member States will be required to use their remaining revenues for climate action and social measures. The annual monitoring and reporting cycle will start on 1 January 2025.

By then, regulated entities covered by ETS2 are required to have a greenhouse gas emissions permit and an approved monitoring plan for monitoring and reporting on their annual emissions. Every year, they must report on their emissions in the previous year by 30 April. From 2026, the reported data for a given year will have to be verified by an accredited verifier. From 2028, once the annual verified emissions are reported, regulated entities will have to surrender an equivalent number of allowances by 31 May of that year. Over the course of 2027, an additional 30% of allowances will be auctioned to provide market liquidity. ETS2 is expected to become fully operational in 2027. However, if gas or oil prices are exceptionally high in 2026, the launch of the ETS2 system could be postponed until 2028 to ensure a smooth implementation.

2.4.2.3 The Carbon Border Adjustment Mechanism (CBAM)

The CBAM was established by Regulation (EU) 2023/956 (CBAM Regulation)[78] as part of the European Green Deal and was introduced to put a price on GHGs emitted during the production of carbon-intensive goods imported into the EU and to encourage cleaner industrial production in non-EU countries[79].

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[76] Record reduction in 2023 ETS emissions due largely to boost in renewable energy, https://climate.ec.europa.eu/news-your-voice/news/record-reduction-2023-ets-emissions-due-largely-boost-renewable-energy-2024-04-03_en.

[77] ETS2: buildings, road transport and additional sectors, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets2-buildings-road-transport-and-additional-sectors_en.

[78] Regulation (EU) 2023/956 establishing a carbon border adjustment mechanism, http://data.europa.eu/eli/reg/2023/956/oj.

[79] Carbon Border Adjustment Mechanism (CBAM), https://trade.ec.europa.eu/access-to-markets/en/news/carbon-border-adjustment-mechanism-cbam.

The CBAM is being introduced in phases. The transitional phase started in 2023 and is based on Commission Implementing Regulation (EU) 2023/1773[80]. It introduces the new mechanism gradually, requiring only that the reporting of GHG emissions be embedded in imports, without imposing financial obligations. The transitional phase (2023-2026) covers the following sectors that are most at risk of carbon leakage: cement, iron and steel, aluminium, fertilisers, electricity and hydrogen. The final phase of CBAM will enter into force in January 2026 and will be phased in as free allocation in the respective sectors under the EU ETS is phased out.

Under the final CBAM arrangements, importers of goods in the CBAM sectors will be required to register with national authorities. They will also need to purchase CBAM certificates corresponding to the carbon price that would have been paid if the goods had been produced under the EU's carbon pricing rules. EU importers will then report the emissions embedded in their imports and surrender a corresponding number of CBAM certificates to cover them[81].

2.4.2.4 Effort-sharing legislation

For sectors outside the scope of the EU ETS and the LULUCF Regulation, binding annual greenhouse gas emission targets have been set for the EU Member States. These sectors, which include transport, buildings, agriculture, non-ETS industries and waste, account for almost 60% of total domestic EU emissions. The effort-sharing legislation set binding annual greenhouse gas emission targets for Member States for 2013–2020 and 2021–2030.

For the period up to 2020, the Effort-Sharing Decision[82] (ESD) set a reduction target of around 10% relative to 2005 levels by 2020 for total EU emissions from the sectors covered by the legislation. National targets under the ESD ranged from -20% to +20% below 2005 emissions. In 2020, the EU's emissions in the effort-sharing sectors were 16.3% lower than in 2005. This means that the EU overachieved its 2020 ESD target by six percentage points[83].

The Effort-Sharing Regulation (ESR)[84], which covers **the period up to 2030**, was adopted in 2018. It originally required economic sectors not covered by the EU ETS to contribute to the overall target by reducing emissions by 30% relative to 2005 levels by 2030. The resulting 2030 targets ranged from 0% to 40% below 2005 levels. **Following the update of the EU's 2030 GHG emissions reduction target** from (gross) -40% to (net) -55% as part of the European Green Deal, the ESR was amended[85] in 2023. As a result, the effort-sharing sectors are required to collectively contribute to a

[80] Commission Implementing Regulation (EU) 2023/1773 of 17 August 2023 laying down the rules for the application of Regulation (EU) 2023/956, http://data.europa.eu/eli/reg_impl/2023/1773/oj.
[81] Carbon Border Adjustment Mechanism, https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en.
[82] Decision No 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, http://data.europa.eu/eli/dec/2009/406/oj.
[83] Effort sharing 2013-2020: targets, flexibilities and results, https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2013-2020-targets-flexibilities-and-results_en.
[84] Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement, as amended, http://data.europa.eu/eli/reg/2018/842/2023-05-16.
[85] Ibid.

40% reduction in GHG emissions at EU level by 2030, with Member States' targets ranging from -10% to -50% below 2005 levels.

The ESR accounts for Member States having different capacities to take action by setting differentiated targets depending on their GDP per capita and requiring higher-income Member States to contribute more to the EU target. However, an approach for higher-income Member States based solely on relative GDP per capita, like that used for the Member States' 2020 targets, would mean that some of them would incur relatively high costs to reach their targets. Therefore, the targets have been adjusted to ensure cost-effectiveness for Member States with an above-average GDP per capita. In addition to the EU Member States, Iceland and Norway have agreed to implement the ESR and to commit to binding annual emission allocations for 2021 to 2030[86].

The ESR maintained most of the flexibilities introduced by its predecessor, the ESD. In years with emissions below their annual allocations, Member States can bank surpluses for use in later years. For high cumulative surpluses, banking limits have been added. In years with emissions above the annual limit, Member States can borrow a limited amount of allocations from the following year. This allows Member States flexibility in dealing with annual fluctuations in emissions due to weather or economic conditions. Member States can also buy and sell allocations from and to other Member States. This is an important way to ensure that emission reductions are cost-effective. It allows Member States to cut emissions where they are cheapest to cut and to use the revenue to invest in modernisation.

For additional flexibility, the ESR allows nine Member States[87] to use a limited amount of their ETS allowances to offset emissions in effort-sharing sectors from 2021 to 2030. This applies to Member States that have national reduction targets significantly higher than both the EU average and their cost-effective reduction potential or that did not allocate any EU ETS allowances to industrial installations free of charge in 2013.

Finally, to stimulate additional action in the land use sector, from 2021 to 2030 Member States are allowed to use up to 262 million credits from this sector under the EU LULUCF Regulation (see 2.4.7.1) to comply with their national ESR targets. All Member States can use these arrangements to achieve their targets, but there is more flexibility for Member States with a larger share of emissions from agriculture. This reflects the fact that the mitigation potential of emissions from agriculture is lower.

As with the EU ETS, the impact of the ESR on GHG emissions in 2030 compared with a hypothetical situation where this legislation is not implemented is difficult to assess because of its interactions with other policies and external factors. This report presents the 'targeted impact' of the ESR, which is the reduction in emissions in the sectors covered by this legislation between the 2005 base year and the 2030 target year. ESR base year emissions were published in Commission Implementing Decision

[86] Effort sharing 2021-2030: targets and flexibilities, https://ec.europa.eu/clima/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en.

[87] Belgium, Denmark, Ireland, Luxembourg, Malta, Netherlands, Austria, Finland and Sweden.

(EU) 2020/2126[88]. Illustrative GHG emissions in the target year 2030 were estimated by applying the effort-sharing target of -40% to the 2005 emissions levels, as shown in Table 5.

Table 5: Illustrative impacts of the implementation of effort-sharing legislation in 2030

Year	Base year (2005) GHG emissions	Reduction target	Impact on GHG emissions
2030	2 517 Mt CO_2eq	-40%	-1 007 Mt CO_2eq

Note: Base year emissions for the 2030 target include GHG emissions in the effort-sharing sectors of EU-27 and the total is calculated using GWPs from the IPCC's Fifth Assessment Report. Source: Commission Implementing Decision (EU) 2020/2126[89]

2.4.2.5 Carbon Capture and Storage Directive

Some emissions of GHGs (e.g. from cement production) are inherent to industrial processes and are difficult to reduce substantially. To minimise such emissions and achieve climate neutrality, carbon capture and storage will play an important role. The Carbon Capture and Storage (CCS) Directive[90] constitutes the legal framework for the geological storage of CO_2. It covers all CO_2 storage in geological formations in the EU and the entire lifetime of storage sites. It also contains provisions on the capture and transport components of CCS[91].

2.4.2.6 Carbon removals and carbon farming (CRCF)

The Regulation on carbon removals and carbon farming (CRCF) was adopted in 2024[92]. It aims to provide an EU-wide harmonised framework for cost-effective certification of permanent carbon removals, carbon farming and carbon storage in products in the EU. It lays down quality criteria and provisions to streamline monitoring, reporting and certification processes to ensure that carbon removals are reliable and meet high standards. With the support of an expert group[93], the Commission is currently developing certification methodologies setting out specific rules for carbon removal, carbon farming and carbon storage practices to ensure that these processes comply with the quality criteria. Priority is given to the most technologically mature activities, which will be the subject of delegated acts to be published in the coming years. The Climate Resilient Debt Clause does not cover

[88] Commission Implementing Decision (EU) 2020/2126 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030, http://data.europa.eu/eli/dec_impl/2020/2126/oj.

[89] Commission Implementing Decision (EU) 2020/2126 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030, as amended, http://data.europa.eu/eli/dec_impl/2020/2126/2024-07-31.

[90] Directive 2009/31/EC on the geological storage of carbon dioxide, https://eur-lex.europa.eu/eli/dir/2009/31/oj.

[91] A legal framework for the safe geological storage of carbon dioxide, https://ec.europa.eu/clima/eu-action/carbon-capture-use-and-storage/legal-framework-safe-geological-storage-carbon-dioxide_en.

[92] Union certification framework for permanent carbon removals, carbon farming and carbon storage in products, https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ENVI/DV/2024/03-11/Item9-Provisionalagreement-CFCR_2022-0394COD_EN.pdf.

[93] Expert Group on Carbon Removals (E03861), https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=3861.

CCS and carbon capture and utilisation (CCU) using fossil carbon, as these technologies do not remove carbon from the atmosphere.[94]

Certification covers:

- Permanent removals. These can involve industrial technologies that capture carbon from the atmosphere and store it for several centuries. Examples include direct air carbon capture with storage (DACCS) and bioenergy with carbon capture and storage (BECCS).
- Carbon farming and soil emission reductions. This can include a broad range of practices, such as rewetting and restoration of peatlands and wetlands; agroforestry and mixed farming, integration of trees or shrubs with crop and/or livestock management; implementation of soil protection measures through catch crops, cover crops, conservation tillage and hedgerows; reforestation and sustainable forest management; and improved fertiliser use and efficiency.
- Carbon storage in long-lasting products. This can include storage of atmospheric or biogenic carbon in long-lasting products like wood-based products for construction and bio-based materials, which are used long-term. Short-lived products like paper and furniture are not included.

2.4.2.7 EU taxonomy for sustainable activities

To meet the EU's climate targets, it is vital to invest in low greenhouse gas emissions and climate-resilient development. Ensuring that financial flows are consistent with such development is also one of the three goals of the Paris Agreement, as stipulated in its Article 2(1)(c).

In July 2020, the Taxonomy Regulation[95] entered into force. The legislation created the basis for a classification system that companies and investors can use to decide whether certain economic activities can be considered environmentally sustainable.

After the Taxonomy Regulation entered into force, the Commission started to develop delegated acts laying down the technical screening criteria under which specific economic activities could be considered to make a substantial contribution to the six environmental objectives. The first delegated act on sustainable activities for climate change mitigation and adaptation objectives was adopted in December 2021[96]. In June 2023, the Commission adopted a taxonomy environmental delegated act specifying a set of EU taxonomy criteria for determining whether an economic activity makes a substantial contribution to one or more of the non-climate environmental objectives (water,

[94] Q&A on the provisional agreement on the Regulation establishing an EU-wide voluntary framework for certifying permanent carbon removals, carbon farming and carbon storage in products (CRCF Regulation), https://climate.ec.europa.eu/document/download/a8abe1c4-a3c6-4c94-be0e-4b76f7fd0308_en?filename=policy_carbon_faq_crcf_regulation_en.pdf.

[95] Regulation (EU) 2020/852 on the establishment of a framework to facilitate sustainable investment, http://data.europa.eu/eli/reg/2020/852/oj.

[96] Commission Delegated Regulation (EU) 2021/2139 supplementing Regulation (EU) 2020/852, https://eur-lex.europa.eu/eli/reg_del/2021/2139/oj.

pollution, circular economy and biodiversity). At the same time, the Commission adopted amendments to the above-mentioned delegated act in the area of climate change[97].

2.4.2.8 Corporate Social Responsibility Directive

The Corporate Sustainability Reporting Directive (CSRD)[98], which came into force in January 2023, requires all large companies and all listed companies (except microenterprises) to disclose information on how external sustainability factors (such as climate change) influence their activities and how their activities affect people and the environment, including the climate. This helps investors, consumers and other stakeholders to evaluate the sustainability performance of companies. The Directive strengthens the existing rules introduced by the Non-Financial Reporting Directive (NFRD)[99] and ensures alignment with other sustainable finance initiatives.

The CSRD will be applied in several stages and its scope will be gradually extended to include more companies. In 2025, companies already subject to the NFRD will be the first to report under the new rules for the 2024 financial year. Companies are required to report using the European Sustainability Reporting Standards (ESRS), a set of common mandatory standards. The first set of ESRS was published in December 2023[100]. The standards apply to all companies, irrespective of their economic sector, and cover environmental, social and governance topics, including climate change and the circular economy. Sector-specific ESRS will be adopted by mid-2026[101].

2.4.2.9 Bioeconomy strategy

The bioeconomy strategy, which was first adopted by the European Commission in 2012 and updated in 2018, guides the EU's approach to the production, consumption, processing, storage, recycling and disposal of biological resources. The strategy aims to ensure food and nutrition security; manage natural resources sustainably; reduce dependence on non-renewable, unsustainable resources; mitigate and adapt to climate change; and strengthen competitiveness and create jobs[102].

The updated strategy proposed three main areas for action: strengthening and scaling up bio-based sectors, deploying local bioeconomies, and understanding the ecological boundaries of the bioeconomy[103]. The progress report on the EU's bioeconomy strategy[104], published in June 2022, discussed new national and regional bioeconomy strategies, achievements in central and eastern

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[97] Implementing and delegated acts, https://ec.europa.eu/info/law/sustainable-finance-taxonomy-regulation-eu-2020-852/amending-and-supplementary-acts/implementing-and-delegated-acts_en.

[98] Directive (EU) 2022/2464 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting, http://data.europa.eu/eli/dir/2022/2464/oj.

[99] Directive 2014/95/EU amending Directive 2013/34/EU, http://data.europa.eu/eli/dir/2014/95/oj.

[100] Commission Delegated Regulation (EU) 2023/2772 supplementing Directive 2013/34/EU as regards sustainability reporting standards, http://data.europa.eu/eli/reg_del/2023/2772/oj.

[101] Corporate sustainability reporting, https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en#legislation.

[102] Bioeconomy strategy, https://research-and-innovation.ec.europa.eu/research-area/environment/bioeconomy/bioeconomy-strategy_en.

[103] A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment, https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A52018DC0673.

[104] Progress report on the EU bioeconomy strategy, https://op.europa.eu/s/wqus.

European countries and the mobilisation of private investment and research and innovation in food and other bio-based industries.

The updated strategy states that „a sustainable European bioeconomy is necessary to build a climate neutral future in line with the climate objectives of the Paris Agreement. This was also reflected by highlighting bioeconomy as one of the seven strategic priorities in the "A Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy"[105] communication from the Commission.

To help achieve the objectives of the EU's bioeconomy strategy, the European Commission launched a bioeconomy monitoring system, which provides comprehensive, robust and reliable information to monitor all areas of the bioeconomy[106]. In 2023, the European Commission published a first assessment based on the bioeconomy monitoring system, in which it concluded that Europe was generally moving towards the strategy's objectives, but that environmental challenges remained, and more policy coordination was needed[107].

2.4.2.10 Covenant of Mayors for Climate and Energy

The EU Covenant of Mayors for Climate and Energy brings together more than 12 000 local governments[108] voluntarily committed to implementing ambitious climate and energy objectives in the EU Member States. Signatory cities pledge action to support the implementation of the EU's 55% GHG emission reduction target by 2030 and the adoption of a joint approach to climate change mitigation and adaptation. To translate their political commitment into practical measures and projects, Covenant signatories undertake to submit, within 2 years of the date of the local council decision, a sustainable energy and climate action plan outlining the key actions they plan to take[109] and to periodically monitor the progress achieved.

In 2016, the EU Covenant of Mayors joined forces with the Compact of Mayors to form the Global Covenant of Mayors for Climate and Energy, the world's largest climate initiative for cities. It brings together more than 13 000 local governments in more than 140 countries around the world[110] voluntarily committed to pursuing ambitious climate and energy objectives.

2.4.2.11 Other cross-cutting policies and measures: Funds

Reducing greenhouse gas emissions requires financial resources and investment decisions consistent with the long-term goals. The EU's funds play an important role in financing this transition. Below are the main funds[111] that are used to finance climate action. There are three main groups of funds: funds financed by the revenue from emission trading system, funds under the Cohesion policy and common agricultural policy and other funds under the EU budget.

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[105] COM(2018) 773 final
[106] EU bioeconomy monitoring system, https://knowledge4policy.ec.europa.eu/bioeconomy/monitoring_en.
[107] Trends in the EU bioeconomy, https://dx.doi.org/10.2760/835046.
[108] Key figures, https://eu-mayors.ec.europa.eu/en/key_figures.
[109] Covenant initiative, https://www.eumayors.eu/about/covenant-initiative/objectives-and-scope.html.
[110] Global Covenant of Mayors for Climate & Energy, https://www.globalcovenantofmayors.org/.
[111] It is to be noted that those EU funds that are provided to EU Member States and are administered by national authorities qualify as state aid and are therefore subject to EU State aid rules

Funds financed by revenues from emission trading system

- **Modernisation Fund**: Launched in 2018 for the 2021-2030 period, this Fund helps modernise the energy system and improve energy efficiency in 13 lower-income EU Member States. It focuses on investments in renewable energy, energy efficiency, energy storage, energy networks and just transition in carbon-dependent regions. Its objective is to help beneficiary Member States achieve their climate targets. The total revenues to the Modernisation Fund are expected to amount to EUR 57 billion from 2021 to 2030, based on a carbon price of EUR 75/t CO_2[112].

- **Innovation Fund**: The Innovation Fund provides funding for innovative low-carbon technologies across all EU Member States. The Fund focuses on highly innovative clean technologies and big flagship projects that offer European added value and can bring significant reductions in emissions and greenhouse gases. The Innovation Fund has a budget of EUR 40 billion for 2020-2030 (based on a carbon price of EUR 75/tCO_2)[113].

- **Social Climate Fund (SCF)**: The SCF is a new fund created alongside ETS2 and set to become operational in 2027 (see section 2.4.2.2). The SCF will provide Member States with dedicated funding to support the most vulnerable groups, such as households facing energy or transport poverty. The SCF will finance support for structural measures and investments in energy efficiency and building renovation, clean heating and cooling, renewable energy integration, zero- and low-emission mobility solutions, and temporary direct income support. The SCF will be financed by auctioning emission allowances from ETS2 and the ETS. Together with a mandatory 25% contribution from the Member States to their social climate plans, the SCF should mobilise at least EUR 86.7 billion over 2026-2032[114].

Cohesion funds and common agricultural policy funds

- **European Regional Development Fund (ERDF)**: The ERDF provides funding to public and private bodies in all EU regions to reduce economic, social and territorial disparities. It supports investments through specific national and regional programmes. In 2021-2027, the ERDF's objective is to make Europe and its regions more competitive and smarter; greener, low-carbon and resilient; more connected; more social, and closer to people. The ERDF has a budget of EUR 226.1 billion for 2021-2027, of which 30% should contribute to climate action[115].

- **Cohesion Fund**: The Cohesion Fund provides support to EU Member States with a gross national income per capita below 90% of the EU-27 average to strengthen the economic, social and territorial cohesion of the EU. It supports investments through specific national and regional programmes. The Fund mainly contributes to investments in environmental and

[112] Modernisation Fund, https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/modernisation-fund_en.
[113] Innovation Fund, https://cinea.ec.europa.eu/programmes/innovation-fund_en.
[114] Social Climate Fund, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/social-climate-fund_en.
[115] European Regional Development Fund, https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/european-regional-development-fund-erdf_en.

trans-European transport network projects undertaken by public and regional authorities. The Cohesion Fund has a budget of EUR 48.0 billion for 2021-2027, of which 37% should contribute to climate action[116].

- **Just Transition Fund**: The transition to a low-carbon economy brings about major socio-economic changes, particularly in regions dependent on carbon-intensive industries. The Just Transition Fund aims to mitigate the socio-economic impact of this transition in regions facing the greatest challenges and to support their economic diversification, for example by investing in small and medium-sized enterprises (SMEs) worker upskilling and reskilling, and environmental rehabilitation, so that no region of the EU is left behind in the transition to climate neutrality. The fund alleviates the socio-economic costs of the green transition and supports the economic diversification and reconversion of the affected areas. The Just Transition Fund has a budget of EUR 19.3 billion for 2021-2027[117].

- **European Agricultural Guarantee Fund (EAGF)**: The EAGF helps farmers provide a secure supply of safe, healthy, and affordable food. Through the EAGF, EU countries must offer, among other things, green direct payments for sustainable a climate-friendly farming methods. The EAGF has a budget of EUR 291.1 billion, with a climate contribution target of 40% for 2023-2027.

- **European Agricultural Fund for Rural Development (EAFRD)**: The EAFRD provides funding for rural development programmes. Rural development programmes encourage the sustainable management of natural resources and climate action and aim to achieve a balanced territorial development of rural economies. The EAFRD has a budget of EUR 95.5 billion, with a climate contribution target of 40% for 2023-2027[118].

Other funds

- **Recovery and Resilience Facility (RRF)**: The RRF was set up in response to the COVID-19 pandemic to mitigate the economic and social impact of the pandemic and make European economies and societies more sustainable and resilient. It finances reforms and investments aligned with EU priorities carried out in EU Member States from the start of the pandemic in February 2020 until 31 December 2026. It has a total budget of around EUR 650 billion. Member States were required to allocate in their national plans for spending RFF support at least 37% of their budget to climate measures and 20% to digital measures[119]. The mid-term evaluation of the RFF, which was finalised at the beginning of 2024, showed that the total

[116] Cohesion Fund, https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/cohesion-fund-cf_en.
[117] Just Transition fund, https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/just-transition-fund_en.
[118] European Agricultural Fund for Rural Development, https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/european-agricultural-fund-rural-development-eafrd_en.
[119] Recovery and Resilience Facility, https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en.

estimated climate expenditure of around EUR 275 billion amounted to more than 40% of the total allocations under the plans, surpassing the 37% target[120].

- **Programme for Environment and Climate Action (LIFE)**: One of LIFE's (from *L'Instrument Financier pour l'Environnement* – the financial instrument for the environment) objectives is to facilitate the transition to a sustainable, circular, energy-efficient, renewable-energy-based, climate-neutral and resilient economy. The budget of the LIFE programme is implemented through four sub-programmes: nature and biodiversity; circular economy and quality of life; climate change mitigation and adaptation; and clean energy transition. All four sub-programmes contribute to climate change mitigation and adaptation. The programme supports demonstration, and best practice projects, coordination and support actions, capacity building, and governance projects. Its budget for 2021-2027 is EUR 5.4 billion[121].

- **InvestEU Fund**: The InvestEU Fund leverages substantial private and public repayable financing (e.g. loans, equity investments) through an EU budget guarantee granted to implementing partners (e.g. the European Investment Bank (EIB) Group, other international financial institutions or national promotional banks). It operates in four policy areas: sustainable infrastructure; research, innovation and digitisation; SMEs; and social investment and skills. The total investment to be mobilised is estimated at more than EUR 372 billion across the EU, of which at least 30% need to contribute to climate objectives[122].

- **Horizon Europe**: This is the EU's main funding programme for research and innovation, with a budget of EUR 95.5 billion for 2021-2027 of which 35% is allocated to climate-related actions. Its aims are to tackle climate change, help to achieve the UN Sustainable Development Goals and boost the EU's competitiveness and growth. Horizon Europe provides funding through specific calls for research and innovation projects for specific EU missions, each of which operates as a portfolio of actions such as research projects, policy measures and even legislative initiatives. Of the five EU missions, two specifically focus on the climate: adaptation to climate change and climate-neutral and smart cities[123].

2.4.3 Energy policies and measures

In line with its commitments under the Paris Agreement, the EU adopted the 'Clean energy for all Europeans' package[124] in 2019 to support the transition from fossil fuels to clean energy. The package

[120] Mid-term evaluation of the Recovery and Resilience Facility, https://commission.europa.eu/document/download/17c82840-518c-4c3d-ba98-7dae436b3a70_en?filename=SWD_2024_70_1_EN_autre_document_travail_service_part1_v4.pdf.

[121] Programme for Environment and Climate Action (LIFE), https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/programme-environment-and-climate-action-life_en.

[122] InvestEU, https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/investeu_en.

[123] Horizon Europe, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en.

[124] Clean energy for all Europeans package, https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en.

consisted of eight laws on buildings, renewable energy, energy efficiency, electricity market design and the governance system of the energy union.

In July 2021, the Commission took a major step towards achieving the more ambitious target of reducing greenhouse gas emissions by 55% by 2030 by adopting a package of proposals to amend the EU's climate and energy policies (see Section 2.4.1.1).

In May 2022, the Commission presented the REPowerEU plan[125] in response to the hardship and disruption caused on the global energy market by the Russian Federation's unprovoked and unjustified full-scale invasion of Ukraine. The measures in the REPowerEU plan relate to energy savings, the diversification of energy supplies, and the accelerated roll-out of renewable energy to replace fossil fuels in homes, industry and power generation. For the medium term, the plan proposed measures to bring down emissions and energy costs for consumers and industry, including increasing the 2030 energy efficiency targets and increasing the share of renewables in the EU's energy consumption beyond the 40% target originally proposed in 2021[126]. Of the total budget allocated to the REPowerEU Plan, EUR 20 billion comes from the EU ETS.

To coordinate gas purchases among European companies, the Commission set up the EU Energy Platform in 2022 and launched a demand aggregation and joint purchasing mechanism, called AggregateEU, in 2023. During four tendering rounds in 2023, buyers and sellers were matched in deals covering 42 billion m^3 to meet European demand[127].

Between August 2022 and March 2024, natural gas demand in the EU was reduced by 18%, or 125 billion m^3 of gas. Over the same period, renewable energy production increased. Since 2022, installed solar energy capacity in the EU has increased by 96 GW and wind capacity by 33 GW, bringing the share of renewables in electricity production to 46%[128].

2.4.3.1 Energy efficiency

The Energy Efficiency Directive (EED) is the main legal act addressing energy efficiency in the EU. In December 2018, an amendment[6] to the Directive entered into force, introducing a new EU energy efficiency headline target of at least 32.5% by 2030 relative to the 2007 Price-Induced Market Equilibrium System (PRIMES) modelling projections for 2030.

In October 2023, the revised Energy Efficiency Directive[129] entered into force. It is part of the EU Green Deal package and the REPower EU plan and significantly raises the EU's energy efficiency ambitions, aiming to reduce its dependence on fossil fuel imports from the Russian Federation. The 'energy efficiency first' principle became legally binding for the first time, which means that EU Member States must take it into account in all relevant policy and major investment decisions taken

[125] REPowerEU plan, COM(2022) 230 final

[126] Renewable energy statistics - Statistics Explained, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics.

[127] EU Energy Platform, https://energy.ec.europa.eu/topics/energy-security/eu-energy-platform_en.

[128] REPowerEU at a glance, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en#saving-energy.

[129] Directive (EU) 2023/1791 on energy efficiency and amending Regulation (EU) 2023/955 (recast), http://data.europa.eu/eli/dir/2023/1791/oj.

in the energy and non-energy sectors. Particular attention is paid to sectors with high energy-saving potential (heating and cooling, industry and energy services).

Changes to the previous directives include the following:

- The new target is defined as an additional 11.9% reduction in energy consumption by 2030, compared with the projections of the 2020 EU reference scenario. As a result, total EU energy consumption by 2030 should not exceed 992.5 million tonnes of oil equivalent (Mtoe) for primary energy and 763 Mtoe for final energy. To set indicative national contributions, EU countries can use either the projections of the 2020 EU reference scenario or the version updated in 2023. If the national contributions do not add up to the EU target, the Commission will implement an ambition gap mechanism.

- The binding annual energy savings rate for final energy consumption has been increased from 0.8% (up to 2023) to 1.3% for 2024-2025, 1.5% for 2026-2027 and 1.9% from 2028 onwards.

- Member States are now required to take measures to implement energy efficiency improvements for people experiencing or at risk of energy poverty and vulnerable customers, including, where appropriate, people living in social housing. Some of these measures are expected to be financed by revenues from ETS allowances for buildings and transport or from the new Social Climate Fund.

- Specific energy-saving measures have been put in place for the public sector, including a new obligation for the public sector to reduce annual energy consumption by 1.9% each year, an extension to all levels of public government of the obligation to renovate at least 3% of the total floor area of public buildings each year, and an obligation to include energy efficiency requirements more systematically in public procurement procedures.

- Requirements have been introduced for businesses based on a new energy-consumption-based approach. The largest energy users (consuming more than 100 TJ per year) that do not yet have energy management systems in place will have to do so in future. The burden on smaller, less energy-using businesses should be reduced.

- A new obligation to monitor the energy performance of data centres has been introduced, with an EU-level database collecting and publishing data.

- Stricter energy efficiency requirements have been laid down for the heating and cooling supply, including district heating. For district heating and cooling, the definition of efficient systems will be progressively tightened to move away from fossil-fuel-based systems. For cogeneration, additional criteria will be introduced for specific emissions for high-efficiency cogeneration (270 g CO_2/kWh).

The most recent energy efficiency statistics from Eurostat[130], which were published in December 2023, indicate that primary energy consumption in 2020 reached its lowest level since 1990 (the first year for which data are available). However, this level remains 24.5% above the 2030 target, which means that efforts to improve efficiency need to be maintained in the years ahead. After an increase in 2021 to 32.1% above the 2030 target, primary energy consumption dropped again in 2022 but was still 26.7% above the 2030 target. Final energy consumption in 2022 was 940.5 Mt, or 23.3% above the 2030 target.

The main impact of the revised EED will be that the EU will be able to use less energy without compromising the provision of the desired services. This reduction in energy use will bring co-benefits such as improved energy security and reduced environmental impacts. As the combustion of fuels for energy currently accounts for approximately 75% of the EU's GHG emissions, reducing energy use is vital, alongside decarbonising the energy supply, to achieving the EU's 2030 emissions target[131].

Buildings

Buildings account for about 40% of the EU's total energy consumption and for 36% of its energy related GHG emissions. Currently, about 75% of the building stock is considered energy-inefficient[132]. This means that action in the building sector is crucial for achieving the EU's energy and decarbonisation goals.

The EU has adopted legislation in this area, including the Energy Performance of Buildings Directive (EPBD)[133] amending the previous EPBD and the EED (see above).

A major goal of the amended EPBD is to accelerate the renovation of the existing building stock through strengthened long-term renovation strategies and by mobilising investments in this area. All EU countries must develop a long-term renovation strategy to ensure that their national building stock becomes highly energy-efficient and decarbonised by 2050. These strategies are part of the integrated national energy and climate plans (see Section 2.1.2.2)[134]. Another major goal is that from 2021, all new buildings should be nearly-zero-energy buildings, with a very significant share of any remaining energy needs to be met by renewable sources. According to the impact assessment accompanying the proposal to revise the EPBD, the provisions could reduce CO_2 emissions by 38 Mt and improve the CO_2 emissions of buildings by 1.32 kg/m²[135]. In addition to the EPBD, the EED also addresses energy

[130]Energy efficiency statistics, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_efficiency_statistics#Primary_energy_consumption_and_distance_to_2020_and_2030_targets.
[131] Impact Assessment Report Accompanying the Proposal for a Directive of the European Parliament and of the Council on energy efficiency (recast), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52021SC0623.
[132] Directive (EU) 2024/1275 on the energy performance of buildings (recast), http://data.europa.eu/eli/dir/2024/1275/oj.
[133] Directive (EU) 2018/844 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency, http://data.europa.eu/eli/dir/2018/844/oj.
[134] Directive (EU) 2024/1275 on the energy performance of buildings (recast), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401275&pk_keyword=Energy&pk_content=Directive.
[135] Executive Summary of the Impact Assessment Accompanying the document Proposal for a Directive of the European Parliament and of the Council amending Directive 2010/31/EU on the energy performance of buildings, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52016SC0415.

efficiency in buildings and sets, for example, the goal of carrying out energy-efficient renovations on at least 3% (by floor area) of buildings owned and occupied by central government.

The impact assessment also identifies a number of positive social and economic effects. The renovation of old buildings could lift up to 3.2 million households (out of 23.3 million existing ones) out of energy poverty and reduce the annual energy expenditure for businesses and households by EUR 24-36 billion. The revised EPBD will boost the sector by creating a EUR 80-120 billion renovation market for SMEs and generate about 220 000 additional jobs by 2030 compared with the reference scenario.

Due to the ambitious 55% net greenhouse gas reduction target in 2030 compared to 1990, further improvements to the existing legislation was necessary. Following a proposal for a revision of the Energy Performance of Buildings Directive[136] in 2021, the revised EPBD entered into force in May 2024[137]. It aims to help achieve the target of reducing emissions in the buildings sector by at least 60 % relative to the 2015 levels by 2030 and sets out a pathway for Europe to achieve a zero-emission and fully decarbonised building stock by 2050.

The specific objectives are to:

- increase the rate and scope of building renovations: the main measures include the introduction of minimum energy performance standards, complemented by stricter energy performance certificates, the introduction of building renovation passports, a definition of deep renovation, and enhanced long-term renovation strategies (building renovation plans);
- ensure that new buildings are in line with the 2050 climate neutrality objective: the main measure is the introduction of a standard for zero-emission buildings;
- integrate buildings into decarbonised and digitalised energy systems: the main measure is strengthened requirements for electric vehicle charging infrastructure in buildings; and
- improve information on the energy performance and sustainability of buildings through the use of digital tools: this includes the calculation and disclosure of indicators quantifying the global-warming potential of buildings throughout their life cycle.

In addition, the Commission published the strategy ‘A Renovation Wave for Europe – Greening our buildings, creating jobs, improving lives’[138] in 2020 to boost renovation in the EU. It aims to double annual energy renovation rates over the next 10 years. It also seeks to minimise the footprint of buildings through resource efficiency and circularity combined with turning parts of the construction sector into a carbon sink.

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[136] Proposal for a Directive on the energy performance of buildings (recast), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0802.

[137] Directive (EU) 2024/1275 on the energy performance of buildings (recast), .

[138] A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757&uri=CELEX:52020DC0662.

Energy labelling and ecodesign

The EU's energy labelling and ecodesign legislation helps to improve the energy efficiency of products on the EU market.

The EU Energy Labelling Framework Regulation[139] lays down specific labelling requirements for energy-related products placed on the EU market. The energy label is a widely recognised feature on household products like light bulbs, television sets and washing machines, and has helped consumers to choose products that are more energy-efficient and encouraged manufacturers to innovate by using more energy-efficient technologies.

Since March 2021, the energy label rating system has used only A to G rankings instead of the previous A+++ to D ratings. Four product groups were required to implement the new rating system from 1 March 2021, with new labels for light bulbs and lamps applicable from 1 September 2021[140].

Ecodesign legislation sets common EU-wide minimum standards to permanently remove the worst-performing products from the market. The current Ecodesign Directive[141] has a long track record of delivering benefits to businesses, consumers and the environment. In 2022, primary energy savings from ecodesign and labelling measures amounted to 1 072 TWh for households in EU-27. This represents a 12% reduction[142] and is projected to increase to 1418 TWh (or an 18% reduction) by 2030. As a result of the measures taken, the associated GHG emissions decreased by 135 Mt of CO_2eq (11%) in 2022 and are projected to increase to 139 Mt of CO_2eq (17%) by 2030. Of the energy savings in 2022, 60% came from the residential sector, 25% from the tertiary sector, 10% from industry and 5% from transport and other sectors[143].

A new Ecodesign for Sustainable Products Regulation for more environmentally sustainable and circular products was adopted in April 2024[144]. It extends the existing Ecodesign legislation to the widest possible range of products and broadens the scope of the requirements to be met by products (see also Section 2.4.8.2)[145].

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[139] Regulation (EU) 2017/1369 setting a framework for energy labelling and repealing Directive 2010/30/EU, http://data.europa.eu/eli/reg/2017/1369/oj.

[140] State of the Energy Union 2021 – Contributing to the European Green Deal and the Union's recovery, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:950:FIN.

[141] Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32009L0125.

[142] Ecodesign Impact accounting; Overview report 2023, https://circabc.europa.eu/ui/group/418195ae-4919-45fa-a959-3b695c9aab28/library/cefbb265-3a07-4cf5-82d1-d47e04e8fdd2/details.

[143] Ecodesign for Sustainable Products Regulation, https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products-regulation_en.

[144] Regulation (EU) 2024/1781 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202401781.

[145] Green Deal: New proposals to make sustainable products the norm and boost Europe's resource independence, https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2013.

Along with the new Regulation, the Commission also adopted an Ecodesign and Energy Labelling Working Plan for 2022-2024[146] to cover new energy-related products and update and increase the level of ambition for products already regulated, as a transitional measure until the new Regulation entered into force[147].

2.4.3.2 Renewable energy

The recast Renewable Energy Directive (RED)[148], which came into force in December 2018, is the main legal act governing the use of renewable energies in the EU. The recast act:

- sets a binding renewable energy target for the EU, which must ensure that at least 32% of its gross final energy consumption comes from renewable sources by 2030;
- lays down a set of rules to facilitate the increase of renewable energy in electricity, heating and cooling, and transport;
- lays down sustainability criteria for bioenergy;
- contains provisions that allow ordinary members of the public to play an active role in the development of renewables through renewable energy communities and self-consumption of renewable energy;
- sets an increased target of 14% for the share of renewable fuels in transport by 2030; and
- strengthens the sustainability criteria for bioenergy[149].

Since the first Renewable Energy Directive was adopted, the share of renewable energy sources in EU energy consumption has almost doubled from 12.5% in 2010 to 23% in 2022[150].

To ensure that the higher climate ambitions set out in the European Green Deal are met, the Commission proposed a revision of the Renewable Energy Directive[151] in July 2021. The amending Directive entered into force in November 2023 and sets an overall binding EU target for renewable energy of at least 42.5%, with an aspirational target of 45%[152]. In addition, the new Directive aims to facilitate the electrification of various sectors and sets renewable energy targets for heating and cooling, transport, industry, buildings and district heating and cooling. It also promotes electric vehicles and smart charging. Permitting procedures for renewable energy projects and related

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[146] Ecodesign and Energy Labelling Working Plan 2022-2024 2022/C 182/01, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022XC0504%2801%29&qid=1651649049970.

[147] Green Deal: New proposals to make sustainable products the norm and boost Europe's resource independence, https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2013.

[148] Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources (recast), http://data.europa.eu/eli/dir/2018/2001/oj.

[149] Renewable Energy Directive, https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en.

[150] Ibid.

[151] Proposal for a Directive amending Directive (EU) 2018/2001 […] as regards the promotion of energy from renewable sources, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0557.

[152] Directive (EU) 2023/2413 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC, http://data.europa.eu/eli/dir/2023/2413/oj.

infrastructure will be simpler and faster. The new Directive also focuses on bioenergy, which will be needed to replace fossil fuels.

To this end, the sustainability criteria for bioenergy have been improved, and two new delegated acts for the use of renewable hydrogen were adopted in 2023. The Delegated Act on a methodology for renewable fuels of non-biological origin[153] lays down the conditions under which hydrogen, hydrogen-based fuels, and other energy carriers may be considered renewable fuels of non-biological origin (RFNBOs). The Act lays down a minimum threshold for GHG emissions savings of recycled carbon fuels[154] and provides a methodology for calculating life-cycle GHG emissions for RFNBOs.

Additionally, in 2021, the Commission published an impact assessment report accompanying its proposal to amend the Renewable Energy Directive. All the core scenarios considered in the impact assessment achieve the 55% net GHG target in 2030. In all the core scenarios, renewable fuels play a major role as they are considered to have zero emissions in the energy system and contribute to GHG emissions savings by displacing GHG-emitting fossil fuels[155].

The analysis of energy-related costs shows that by 2030, household energy expenditures, including those for transport and buildings, will slightly increase from 2015 levels, rising from 24.1% to around 25.6-25.8% of private consumption. Renovation and equipment costs, especially for heating, are highest in the strong regulatory scenarios, driven by the uptake of renewables and heat pumps. Transport costs are expected to remain stable due to gains from fuel efficiency standards. While high carbon prices may lead to higher energy purchase costs, regulatory measures can mitigate this impact. Notably, lower-income households tend to spend a larger share of their budgets on energy, which underlines the need for targeted support. Employment projections show that there is potential for modest job growth if favourable financing conditions are met.

In 2022, the share of renewables in EU's electricity production was 39%. It was a record year for new solar photovoltaic capacity, adding 41 GW (a 60% increase), and for the first time, wind and solar power overtook fossil fuels in May 2022. The share of renewable energy sources in the overall EU energy mix is expected to reach at least 23%, although some Member States are struggling to meet their national binding targets[156].

Offshore renewable energy is key to the EU's ambitious energy and climate targets for 2050. With this in mind, in November 2020 the Commission published an EU strategy on offshore renewable energy[157], which assesses the potential contribution of this sector and proposes ways forward to support its long-term sustainable development. The strategy sets ambitious targets for offshore wind capacity – at least 60 GW by 2030 and 300 GW by 2050 – and for ocean (e.g. wave and tidal) energy

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[153] Commission Delegated Regulation (EU) 2023/1184 of 10 February 2023 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin, http://data.europa.eu/eli/reg_del/2023/1184/oj.

[154] Ibid.

[155] Impact assessment report accompanying the proposal for a Directive of the European Parliament and the Council amending Directive (EU) 2018, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=SWD:2021:621:FIN.

[156] Share of energy from renewable sources, https://ec.europa.eu/eurostat/databrowser/view/nrg_ind_ren/default/table?lang=en.

[157] An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:741:FIN&qid=1605792629666.

capacity – at least 1 GW by 2030 and 40 GW by 2050 is an impressive shift scale up of ambition for the sector in less than 30 years, at a speed unparalleled by the past development of other energy technologies. It also encourages public and private investment in new infrastructure and research, makes it easier for different regions to work together more efficiently, and provides a clear and stable legal framework[158].

2.4.3.3 Energy taxation

The Energy Taxation Directive[159] sets out EU rules for the minimum taxation of energy products, such as motor fuel, heating fuel and electricity.

However, since its adoption in 2003, energy markets and technologies in the EU have undergone significant developments, and the EU's international commitments, including the Paris Agreement, and its regulatory framework on energy and climate change, have evolved considerably.

In July 2021, the Commission adopted a proposal for a revision of the Energy Taxation Directive[160]. The revision seeks to align the taxation of energy products with EU energy and climate policies, promote clean technologies and remove outdated exemptions and reduced rates that currently encourage the use of fossil fuels. The main changes proposed include the following[161]:

- Fuels will be taxed according to their energy content and environmental performance rather than their volume. This will better reflect the environmental impact of individual fuels, helping businesses and consumers to make cleaner, more climate-friendly choices.
- The classification of energy products for taxation purposes will be simplified to ensure that the most environmentally harmful fuels are taxed the most. Products covered by the Directive are grouped and ranked according to their environmental performance. Fuels that have the greatest negative impact on the environment will be subject to higher minimum rates.
- Exemptions for certain products and home heating will be phased out so that fossil fuels can no longer be taxed below the minimum rates. Member States will be able to support vulnerable households and protect people against energy poverty.
- Fossil fuels used in aviation, shipping and fishing should no longer be fully exempt from energy taxation in the EU; this is a crucial measure given the role of these sectors in energy consumption and pollution.

[158] Offshore Renewable Energy Strategy, https://ec.europa.eu/commission/presscorner/detail/en/fs_20_2099.
[159] Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity, http://data.europa.eu/eli/dir/2003/96/oj.
[160] Proposal for a Council Directive restructuring the Union framework for the taxation of energy products and electricity (recast), https://eur-lex.europa.eu/legal-content/ EN/ALL/?uri=CELEX%3A52021PC0563.
[161] Revision of the Energy Taxation Directive, https://taxation-customs.ec.europa.eu/green-taxation-0/revision-energy-taxation-directive_en.

2.4.3.4 Energy system integration and cross-cutting initiatives

In July 2020, the Commission presented the EU strategy for energy system integration[162]. This strategy proposes concrete policy and legislative measures at EU level to gradually shape a new integrated energy system, while accommodating the diverse starting points of Member States. Sector integration means linking various energy carriers – electricity, heat, cooling, and gas, solid and liquid fuels – with each other and with end-use sectors such as buildings, transport and industry[163].

Hydrogen is an important part of the overall EU strategy for energy system integration. The EU hydrogen strategy[164], which was adopted in 2020, outlines a vision for creating a European hydrogen ecosystem through research and innovation to scale up production and infrastructure on an international level. It lists 20 action points that were implemented by the second quarter of 2022[165]. The strategy explores how producing and using renewable hydrogen can help to decarbonise the EU economy in a cost-effective way, in line with the European Green Deal. For renewable hydrogen, two delegated acts relating to the Renewable Energy Directive were adopted in 2023.

In October 2022, the Commission adopted the EU action plan 'Digitalising the energy system'[166]. The system-wide action plan aims to support the development of a sustainable, (cyber)secure, transparent and competitive market for digital energy services and highlights how new technologies can help improve the efficient use of energy resources, facilitate the deployment of renewables and optimise the energy system integration while saving energy and costs for EU consumers and companies. It also promotes investments in smart grids.

The European Strategic Energy Technology Plan (SET Plan) is a key stepping-stone to boost the transition towards a climate-neutral energy system through the development of low-carbon technologies in a fast and cost-competitive way. Through its 14 implementation working groups[167] (IWGs) and related European Technology and Innovation Platforms (ETIPs), the SET Plan activities have focused on the six priorities of the Research, Innovation and Competitiveness dimension of the Energy Union. The revised SET Plan (2023) will aim to enable the EU to become a global leader in the development of innovative renewable energy technologies and to increase the EU's manufacturing capacity for clean energy technologies in line with the ambition of the Green Deal Industrial Plan, so that it doubles - in a resilient and competitive way - its current share of renewable energy to reach at least 42.5% by 2030, with innovative renewable energy technology representing at least 5% of new installed renewable energy capacity.

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[162] Powering a climate-neutral economy: An EU Strategy for Energy System Integration,https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2020:299:FIN.

[163] EU strategy on energy systems integration, https://energy.ec.europa.eu/topics/energy-system-integration/eu-strategy-energy-system-integration_en.

[164] A hydrogen strategy for a climate-neutral Europe, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0301.

[165] Energy – Hydrogen, https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en.

[166] Digitalising the energy system - EU action plan, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0552.

[167] https://setis.ec.europa.eu/implementing-actions_en

2.4.3.5 Methane Regulation and action

Methane is the most important greenhouse gas after carbon dioxide, and there is significant potential for mitigation that can lead to methane emission reductions in the short to medium-term. The EU methane strategy[168] set out a pathway for reducing methane emissions in the three main emitting sectors: agriculture, energy and waste. It outlined a comprehensive policy framework combining cross-sectoral and sector-specific action within the EU while promoting similar action internationally.

On the basis of this strategy, a regulation on methane emissions reduction in the energy sector was adopted in April 2024 (the Methane Regulation)[169]. The new Regulation covers:

- improved measurement, reporting and verification of the energy sector's methane emissions;
- mandatory leak detection and repair and a ban on venting and flaring practices;
- an obligation for EU countries to develop mitigation plans for abandoned coal mines and inactive oil and fossil gas wells; and
- a methane transparency requirement for imports, which includes requirement for Member States to collect information on whether and how exporting countries or entities have a measuring, reporting and verification (MRV) system in place and abate methane emissions.

In this context, the Commission is a co-founder of the Global Methane Pledge, which commits participating countries to the collective goal of reducing global methane emissions by at least 30% from 2020 levels by 2030[170]. More than 155 countries, which collectively account for just over 50% of global methane emissions caused by human activity, had joined the methane pledge by May 2024. The EU is also a partner of the Lowering Organic Waste Methane (LOW-Methane), a spinoff of the Global Methane Pledge launch at COP28 in Dubai, which ambition is to deliver at least 1 million metric tons of annual waste sector methane reductions well before 2030 working with 40 subnational jurisdictions and their national government counterparts, and to unlock over $10 billion in public and private investment.

2.4.4 Transport policies and measures

In 2022, transport emissions (including emissions from international aviation and navigation) comprised 28.9% of the EU's total greenhouse gas emissions[171]. Following 6 years of steady growth, EU transport emissions dropped in 2020 due to the reduction in transport activity during the COVID-19 pandemic. However, they rebounded in 2021 and continued their upward trend in 2022, surpassing 1990 levels[172].

[168] EU strategy to reduce methane emissions, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0663.
[169] Regulation (EU) 2024/1787 on methane emissions reductions in the energy sector and amending Regulation (EU) 2019/942, https://eur-lex.europa.eu/eli/reg/2024/1787/oj.
[170] Global Methane Pledge, https://www.globalmethanepledge.org/.
[171] EEA greenhouse gases – data viewer, https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer.
[172] Transport and mobility, https://www.eea.europa.eu/en/topics/in-depth/transport-and-mobility.

The Commission presented the sustainable and smart mobility strategy in December 2020. It has since put in place a set of transport policy proposals to help reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.

2.4.4.1 Sustainable and smart mobility

The sustainable and smart mobility strategy, with its action plan[173] of 82 initiatives, lays the foundation for the EU transport system to achieve its green and digital transformation and become more resilient to future crises. The strategy's key features are outlined below.

By 2030:

- at least 30 million zero-emission cars will be in operation on European roads;
- 100 European cities will be climate-neutral;
- high-speed rail traffic will double across Europe;
- regular public transport for journeys under 500 km in the EU will be climate neutral;
- automated mobility will be deployed on a large scale;
- zero-emission marine vessels will be market-ready.

By 2035:

- zero-emission large aircraft will be market-ready.

By 2050:

- nearly all cars, vans, buses and new heavy-duty vehicles will be zero-emission;
- rail freight traffic will double;
- high-speed rail traffic will triple;
- there will be a fully operational, multimodal Trans-European Transport Network (TEN-T) for sustainable and smart transport with high-speed connectivity.

The strategy identifies a total of 82 initiatives and sets out specific measures to be taken in 10 key areas (flagship areas):

- boosting the uptake of zero-emission vehicles, vessels and aeroplanes, renewable and low-carbon fuels and related infrastructure;
- creating zero-emission airports and ports;
- making interurban and urban mobility healthier and more sustainable;
- greening freight transport;
- pricing carbon and providing better incentives for users;
- making connected and automated multimodal mobility a reality;
- boosting innovation and the use of data and artificial intelligence for smarter mobility;
- strengthening the single market;
- making mobility fair and just for all;

[173] Sustainable and Smart Mobility Strategy – putting European transport on track for the future, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789.

- improving safety and security across all modes of transport.

2.4.4.2 Transport contribution to 55% emission reduction by 2030

To deliver a more ambitious climate policy and the targeted reduction of GHG emissions by at least 55% by 2030 compared to 1990 levels, the Commission launched the following transport proposals in 2021:

- amendment of the Regulation setting CO_2 emission performance standards for new passenger cars and for new light commercial vehicles (Section 2.4.4.3);
- revision of the Alternative Fuels Infrastructure Directive (Section 2.4.4.7);
- revision of the Energy Taxation Directive (see this section);
- new ReFuelEU Aviation Regulation (Section 2.4.4.5);
- new FuelEU Maritime Regulation (Section 2.4.4.6);
- revision of the Renewable Energy Directive (Sections 2.4.4.4 and 2.4.3.2).

With the exception of the revision of energy taxation, all policies have entered into force since the last biennial report was completed. Other policies and measures are also closely related to the transport sector. These include the new separate emissions trading system for fuel distribution for road transport and buildings (ETS 2), the phasing out of free emission allowances for aviation, the implementation of the global carbon offsetting and reduction scheme for international aviation (CORSIA), and the inclusion of shipping emissions in the EU ETS (Section 2.4.4.5). The transport sector is also covered by the Effort-Sharing Regulation and the Energy Efficiency Directive (Sections 2.4.2.4 and 2.4.3.1).

The proposed revision of the Energy Taxation Directive[174] also directly relates to the transport sector. Firstly, the proposal introduces a new tax rate structure based on the energy content and environmental performance of fuels and electricity (Section 2.4.3.3). Secondly, it broadens the taxable base by including more products and removing some of the current exemptions and reductions. Consequently, kerosene used as fuel in the aviation industry and heavy oil used in the maritime industry should no longer be fully exempt from energy taxation. Over 10 years, the minimum tax rates for these fuels should gradually increase to at least EUR 10.75/gigajoule (GJ) EU-wide, while sustainable fuels for these sectors should benefit from a minimum rate of zero to encourage their uptake.

2.4.4.3 Efficiency and technical standards

On passenger car and light duty vehicle fuel efficiency, in April 2023, the European Parliament and the Council amended the Regulation on CO_2 emission performance standards[175]. The amendment increased the CO_2 emission performance standards for new passenger cars and vans from 2030 onwards (compared to 2021 levels):

[174] Proposal for a Council Directive restructuring the Union framework for the taxation of energy products and electricity (recast), https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52021PC0563.

[175] Regulation (EU) 2023/851 amending Regulation (EU) 2019/631 as regards strengthening the CO_2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition, http://data.europa.eu/eli/reg/2023/851/oj.

- from 2030: 55% for cars and 50% for vans;
- from 2035: 100% for cars and 100% for vans.

This is expected to reduce total CO_2 emissions from cars and vans by 32-33 % by 2030 and 54-66 % by 2035 compared to 2005[176].

From 2025 onwards, the fleet targets are based on the worldwide harmonised light vehicles test procedure (WLTP), replacing the new European driving cycle (NEDC) emission test procedure. With stricter CO_2 emission targets in place since 2020, the average WLTP emissions from new cars decreased from 130.3 g CO_2/km in 2020 to 108.1 g CO_2/km in 2022[177]. The average WLTP emissions from new vans decreased from 200.3 g CO_2/km in 2020 to 183.8 g CO_2/km in 2022[178]. The reductions are mainly attributable to the increase in electric vehicle registration, which reached 23% for cars and 6% for vans in 2022.

On heavy-duty vehicle (HDV) fuel efficiency, in May 2024, the revised Regulation setting CO_2 emission performance standards for new HDVs[179] was adopted. The Regulation's scope has been extended to cover smaller lorries, urban buses, long-distance buses and trailers. Exemptions apply to certain types of vehicle, such as those used by the armed forces and fire services. The Regulation introduces new, more stringent CO_2 emission reduction targets for 2030 (45%), 2035 (90%) and 2040 (90%) in addition to the existing target of 15% by 2025 (reference period: 1 July 2019 to 30 June 2020). It also introduces a 100% zero-emission target for urban buses by 2035. The projected cumulative emission reductions between 2031 and 2050 are 730-996 Mt CO_2eq[180]. The Commission will review the effectiveness of the amended Regulation in 2027.

Stricter CO_2 targets are expected to lead to a gradual increase in employment across the EU. By 2050, these policies could create between 81 000 and 121 000 additional jobs, with the most ambitious scenarios yielding the highest employment gains. Sectors such as electronics, power and hydrogen are looking at significant job growth, while the petroleum refining and automotive sectors are likely to shrink due to reduced demand for internal combustion engine components. SMEs generally find zero-emission vehicles (ZEVs) affordable, though microenterprises might struggle to purchase new ZEVs in certain categories. Financial aid and second-hand markets make matters a bit easier by gradually making ZEVs more affordable. Smaller enterprises, particularly in less affluent Member States, benefit from higher savings relative to earnings, but face relatively higher initial costs.

[176] Revision of the CO_2 standards for cars and vans: Questions & Answers, https://climate.ec.europa.eu/system/files/2021-07/eu-climate-action_delivering_vehicles_qa_co2_standards_en.pdf.
[177] CO_2 emissions performance of new passenger cars in Europe, https://www.eea.europa.eu/en/analysis/indicators/co2-performance-of-new-passenger?activeAccordion=546a7c35-9188-4d23-94ee-005d97c26f2b.
[178] CO_2 emissions performance of new vans in Europe, https://www.eea.europa.eu/en/analysis/indicators/co2-performance-emissions-of-new.
[179] Regulation (EU) 2024/1610 amending Regulation (EU) 2019/1242 as regards strengthening the CO_2 emission performance standards for new heavy-duty vehicles and integrating reporting obligations, http://data.europa.eu/eli/reg/2024/1610/oj.
[180] Impact Assessment Part 1, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52023SC0088.

The Monitoring and Reporting Regulation[181] is the basis for the HDV Regulation. The Monitoring and Reporting Regulation requires Member States to monitor the numbers of heavy-duty vehicles registered for the first time and report this information to the Commission. In 2021, this Regulation was amended by a delegated Regulation[182] to include special purpose vehicles.

On car tyre labelling, the Regulation on the labelling of tyres[183] establishes a framework for harmonising the tyre parameter information to be given to end-users. It sets information requirements to facilitate consumer purchase decisions that take both safety and environmental aspects into account, promoting fuel-efficient, long-lasting and safe tyres with low noise levels. Energy labels have been required for car and van tyres since 2012, and the 2021 revision expanded this to tyres for buses and lorries.

On clean vehicles, the Directive on the promotion of clean and energy-efficient road transport vehicles[184] promotes clean mobility in public procurement tenders, boosting the demand for and further deployment of low- and zero-emission vehicles. It defines clean vehicles and sets national targets for their procurement. It applies to different means of public procurement, including purchase, lease, rent and relevant service contracts. A review is scheduled for 2027.

2.4.4.4 Fuels from renewable energy sources

The main EU-wide policies and measures that influence GHG emissions from transport fuels are the revised Renewable Energy Directive, the ReFuelEU Aviation Regulation (Section 2.4.4.5) and the FuelEU Maritime Regulation (Section 2.4.4.6).

The revised Renewable Energy Directive entered into force in November 2023 (Section 2.4.3.2)[185]. For the transport sector, it sets a target of 14.5% lower greenhouse gas intensity of transport fuels by 2030 or 29% renewable energy in final energy consumption by 2030. The Directive also includes a target for renewable fuels of non-biological origin[186]. Member States should also establish a credit mechanism to promote electromobility. Under this mechanism, economic operators that supply renewable electricity for electric vehicles at public charging stations will receive credits they can sell to fuel suppliers who can use them to fulfil the fuel supplier obligation.

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[181] Regulation (EU) 2018/956 on the monitoring and reporting of CO_2 emissions from and fuel consumption of new heavy-duty vehicles, https://eur-lex.europa.eu/eli/reg/2018/956/2022-03-14.

[182] Commission Delegated Regulation (EU) 2021/1429 of 31 May 2021 amending Regulation (EU) 2018/956 of the European Parliament and of the Council as regards the data on new heavy-duty vehicles to be monitored and reported by Members States, https://eur-lex.europa.eu/eli/reg_del/2021/1429/oj.

[183] Regulation (EU) 2020/740 on the labelling of tyres with respect to fuel efficiency and other parameters, https://eur-lex.europa.eu/eli/reg/2020/740/2020-06-05.

[184] Directive (EU) 2019/1161 amending Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles, https://eur-lex.europa.eu/eli/dir/2019/1161/oj.

[185] Directive (EU) 2023/2413 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC, http://data.europa.eu/eli/dir/2023/2413/oj.

[186] Commission Delegated Regulation (EU) 2023/1184 of 10 February 2023, http://data.europa.eu/eli/reg_del/2023/1184/oj.

The Fuel Quality Directive[187] applies to petrol, diesel and biofuels used in road transport and to gasoil used in non-road mobile machinery. It required a reduction in the greenhouse gas intensity of fuels of at least 6% by 2020. The more ambitious target of the revised Renewable Energy Directive repealed this target. Data are still being collected and reported for 2022 and 2023. The average greenhouse gas intensity of the fuels and energy supplied in the 27 Member States in 2021 was 89 g CO_2eq/Megajoule. This is 1 g lower than in 2019. However, with an average reduction of 5.5% compared to the 2010 baseline, it still falls short of the target of 6%[188].

2.4.4.5 Aviation

The ReFuelEU Aviation Regulation[189], which entered into force in November 2023, aims to increase both demand for and supply of sustainable aviation fuels (SAF). It obliges aviation fuel suppliers at EU airports[190] to gradually increase the minimum share of SAF supplied to aircraft operators from 2% in 2025 to 70% in 2050. The obligation also includes an increase in the minimum share of synthetic aviation fuels from 1.2% in 2030 to 35% in 2050. Airports are required to guarantee that aircraft operators can access all the necessary infrastructure to deliver, store and refuel with the required shares of SAF. The Regulation obliges all aircraft operators departing from EU airports to refuel with at least 90% of the fuel necessary for their flights. This measure aims to tackle economic tankering, whereby aircraft operators load more fuel than necessary at the departure airport to avoid refuelling at the destination airport. This leads to excessive weight, which in turn leads to excessive emissions. According to its impact assessment, the Regulation will lead to life-cycle emission reductions in the aviation sector of up to 6.8% by 2030 and at least 65% by 2050 compared to the baseline scenario (development under current trends without further EU action)[191].

The main factor determining the success of the Regulation and the transition in the aviation sector is the scaling up of the production of SAF. There is complete scientific agreement about the need for and benefits of SAF but SAF prices are still higher than the prices of conventional fuels. These price projections are based on conservative assumptions, accounting for future uncertainties. Biofuel production costs remain high, especially for feedstock. Feedstock and renewable electricity are largely sourced from the EU, and fierce competition in the transport sector drives up prices. The policy should lead to substantial job creation in the SAF industry.

Aviation activities have been included in the EU ETS since 2012. Starting in 2024, 20 million emissions allowances (estimated market value EUR 1.6 billion) will be reserved to bridge the cost gap between conventional jet fuel and sustainable aviation fuels (SAF) to speed up their adoption. The EU ETS currently applies to flights within the European Economic Area (EEA) and flights

[187] Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC, http://data.europa.eu/eli/dir/1998/70/2018-12-24.
[188] Quality of petrol and diesel fuel used for road transport in the European Union (reporting year 2021), https://data.consilium.europa.eu/doc/document/ST-14662-2023-INIT/en/pdf.
[189] Regulation (EU) 2023/2405 on ensuring a level playing field for sustainable air transport (ReFuelEU Aviation), https://eur-lex.europa.eu/eli/reg/2023/2405/oj.
[190] Airports located on the EU mainland with at least 800 000 passengers or 100 000 tonnes of freight (Articles 2(2) and 3(1) of the ReFuelEU Aviation Directive).
[191] Impact Assessment Accompanying the Proposal for a Regulation on ensuring a level playing field for sustainable air transport, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021SC0633.

departing to Switzerland and the UK. For flights outside the EEA, the EU ETS applies the provisions of CORSIA to EU-based carriers (Section 2.4.2.1).

At international level, ICAO has developed a framework CORSIA[192] to offset part of CO2 emissions from international aviation that is intended to be applied by all major emitters. CORSIA's aim is to offset emissions from international aviation above a pre-defined baseline. From 2024, the baseline is set at 85% of 2019 emissions. If that level is exceeded, countries should require airlines to offset their share through the cancellation of CORSIA emissions units or the use of CORSIA eligible fuels. As of 2024, 126 countries participate in CORSIA.[193]

2.4.4.6 Maritime transport

Reducing greenhouse gases emissions from fossil fuel-dependent sectors, such as maritime transport, is pivotal for the implementation of the European Green Deal. It necessitates a mix of policy measures combining technological solutions and carbon pricing. As a result, the European Union adopted a series of measures to ensure that maritime transport contributes to the increased EU climate effort and to the Paris Agreement commitments, alongside continuing to push for global action at the International Maritime Organization. This basket of measures included the extension of the EU Emissions Trading System (ETS) to maritime transport, a new regulation to accelerate the uptake of renewable, low-carbon fuels and clean energy technologies for ships (the 'FuelEU Maritime' regulation), and a revision of existing directives on alternative fuel infrastructures and renewable energy.

Starting from 1 January 2024, the EU Emissions Trading System has been extended to cover CO_2 emissions from large ships entering ports in the European Economic Area regardless of the flag they fly. By defining the maximum amount of greenhouse gases that can be emitted under the system, the EU ETS ensure that all the sectors covered under its scope contribute to the EU's climate objectives following a pre-defined trajectory. In addition, by sending a price signal, it incentivises energy efficiency, low-carbon solutions, and reductions of the price difference between alternative fuels and traditional fuels.

The EU ETS extension to maritime transport builds on the requirements of the Maritime MRV Regulation, which has required shipping companies to report their emissions on voyages to and from EU ports since 2018. In 2023, around 13,000 vessels of over 5,000 gross tonnage (GT) that visited EU ports during the year reported verified emissions under the THETIS-MRV system.

The FuelEU Maritime Regulation[193], which enters into force in 2025, lays down rules limiting the greenhouse gas intensity of the energy used on board ships above 5 000 gross tonnage calling at European ports, regardless of the flag they fly. The rules apply to 50% of the energy used for voyages starting or ending outside the EU and 100% of the energy used for voyages between two EU ports. The annual average reduction in greenhouse gas intensity will gradually increase (-2% in 2025 to -80% in 2050 compared to the average in 2020). The targets cover not only CO_2 but also methane and

[192] Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).
[193] ETS aviation: Council and Parliament strike provisional deal to reduce flight emissions, https://www.consilium.europa.eu/en/press/press-releases/2022/12/07/ets-aviation-council-and-parliament-strike-provisional-deal-to-reduce-flight-emissions/.

nitrous oxide emissions over the full lifecycle of the fuels used onboard, on a Well-to-Wake (WtW) basis. The Regulation contains an obligation for passenger and container ships to use onshore power supply while moored at a quayside unless they use another zero-emission technology as of 2030.

Based on the fifth annual report from the European Commission on CO_2 emissions from maritime transport[194], CO_2 emissions from ships under the scope of the MRV decreased from 147.1 Mt CO_2eq in 2019 to their lowest level of 126.5 Mt CO_2eq in 2021 (due to the economic effects of the COVID-19 pandemic combined with the change of scope following the UK's withdrawal from the EU), then reaching 135.5 Mt CO_2eq in 2022. In 2022, container ships produced the largest amount of total emissions, at 28%, followed by bulk carriers (14%) and oil tankers (12%).

2.4.4.7 Infrastructure

The Alternative Fuels Infrastructure Regulation[195] entered into force in October 2023. It sets specific national targets for deploying alternative fuels infrastructure in the EU by 2025 or 2030, in particular:

- recharging stations of at least 150 kW for cars and vans need to be installed every 60 km on the EU's main transport corridors (core TEN-T network) by 2025;
- recharging stations of at least 350 kW for HDVs need to be installed every 60 km along the core TEN-T network and every 100 km along the TEN-T comprehensive network by 2030;
- hydrogen refuelling stations serving both cars and lorries must be deployed from 2030 onwards in all urban nodes and every 200 km along the TEN-T core network;
- maritime ports welcoming a minimum number of large passenger vessels or container vessels must provide shore-side electricity for such vessels by 2030;
- airports must provide electricity for stationary aircraft at all gates by 2025, and at all remote stands by 2030.

The goal of the Regulation is to ensure there is enough infrastructure for recharging or refuelling with alternative fuels across the EU to avoid range anxiety. The Regulation will not directly lead to the uptake of alternatively fuelled vehicles and consequently a reduction in greenhouse gas emissions, but it does ensure that there is no barrier for the increasing number of vehicles[196].

The Eurovignette Directive[197] on the charging of heavy goods vehicles for the use of certain infrastructures lays down rules the Member States must follow. It covers all heavy and light vehicles. By applying the polluter pays principle, it aims to gradually move away from a time-based model of charging (vignettes) to distance-based charges (tolls). Member States can set up a charging system that incorporates a vehicle's environmental performance (introduce reduced rates or an external cost charge related to the cost of CO_2 emissions, or both).

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[194] 2023 Report from the European Commission on CO_2 emissions from maritime transport, https://climate.ec.europa.eu/document/download/60bf9f7c-6c59-4521-8171-4ce9ddd29bfb_en?filename=swd_2024_87_en_0.pdf.

[195] Regulation (EU) 2023/1804 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1804.

[196] Impact Assessment Accompanying the Proposal for a Regulation on the deployment of alternative fuels infrastructure, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021SC0631.

[197] Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures, http://data.europa.eu/eli/dir/1999/62/oj.

2.4.4.8 Other relevant policies and measures

- Batteries and end-of-life of vehicles: see Section 2.4.8.5.

- Trans-European Transport Network (TEN-T): The TEN-T policy aims to develop an EU-wide network of rail, inland waterways and short sea shipping routes. The revised TEN-T Regulation[198], which entered into force in July 2024, aims to make the EU's transport network safer, more sustainable and more convenient for users. It introduces new mandatory targets, including enabling speeds of 160 km/h or higher on major TEN-T passenger rail lines by 2040. In addition, transport links between neighbouring countries will also be improved.

- Intelligent Transport Systems (ITS): The ITS Directive[199] sets a legal framework for the coordinated deployment of ITS in the EU. It aims to improve the functioning of the road transport system, including its interfaces with other modes, and by doing so to reduce the negative external effects of road transport. Adopted in 2023, the revision of the Directive aims to adapt it to new road mobility options, mobility apps and connected and automated mobility, leading to a potential annual greenhouse gas emission reduction of 0.6-2.7 Mt CO_2eq in 2030 and 0.5-1.9 Mt CO_2eq in 2040 compared to a baseline scenario[200].

- Greening Freight package: In 2023, the Commission proposed four initiatives to make freight more efficient and sustainable. The proposed regulation on the use of railway infrastructure capacity in the single European railway area[201] will optimise the use of the rail network and improve cross-border coordination. Potential greenhouse gas emission savings are estimated at 1.5 Mt CO_2eq by 2030 and a further 0.9 Mt CO_2eq by 2050[202] compared to the baseline scenario. The second initiative proposes new rules to support the uptake of zero-emission lorries and encourage intermodal operation by allowing heavier and longer vehicles and providing clarity on their use in cross-border traffic[203]. Annual greenhouse gas emission reductions are assessed to be 1.6 Mt CO_2 in 2030 and 0.05 Mt CO_2 in 2050[204]. The third

[198] Regulation (EU) 2024/1679 on Union guidelines for the development of the trans-European transport network, https://eur-lex.europa.eu/eli/reg/2024/1679/oj.
[199] Directive (EU) 2023/2661 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, http://data.europa.eu/eli/dir/2023/2661/oj.
[200] Impact Assessment Report Accompanying the document Proposal for a Directive on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021SC0474.
[201] Proposal for a regulation on the use of railway infrastructure capacity in the single European railway area, amending Directive 2012/34/EU and repealing Regulation (EU) No 913/2010, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2023:443:FIN.
[202] Impact Assessment Report Accompanying the document Proposal for a Regulation on the use of railway infrastructure capacity in the single European railway area, amending Directive 2012/34/EU and repealing Regulation (EU) No 913/2010, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52023SC0443.
[203] Proposal for a directive amending Council Directive 96/53/EC laying down for certain road vehicles circulating within the Community the maximum authorised dimensions in national and international traffic and the maximum authorised weights in international traffic, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023PC0445.
[204] Impact Assessment Report Accompanying the document Proposal for a Directive of the European Parliament and of the Council amending Council Directive 96/53/EC laying down for certain road vehicles circulating within the Community the maximum authorised dimensions in national and international traffic and the maximum authorised weights in international traffic, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52023SC0445.

initiative, on the accounting of the greenhouse gas emissions of transport services[205], aims to harmonise the framework for companies to calculate greenhouse gas emissions from transport services. Finally, the proposal to amend the Combined Transport Directive aims to make freight transport more sustainable by improving the competitiveness of intermodal freight transport through financial and regulatory support measures.

- Fisheries and aquaculture: the Commission communication on "On the Energy Transition of the EU Fisheries and Aquaculture sector"[206] adopted as part of the Fisheries and Oceans package in February 2023, proposes to guide and support the fisheries and aquaculture sector in this transition, breaking away from the dependency from fossil fuel. The initiative comprises actions to close the gaps in the transfer of technology from research and innovation to application; to promote the development of skills among the workforce; and to improve the business environment, including in financing opportunities and awareness.

- The 2021-2027 European Maritime, Fisheries and Aquaculture Fund (EMFAF) supports the fisheries and aquaculture sectors in the transition towards climate resilience, adaptation and mitigation, in addition to helping to protect and restore marine biodiversity and ecosystems to achieve a good environmental status of marine waters. 55% of Member State EMFAF allocations are programmed to contribute to climate change objectives. Allocations by Member State range from 41% to 77% of their national envelope, depending on the priorities of the Member State. For biodiversity objectives, the corresponding expected contribution of Member State programmes is 28%. Allocations from the national envelope range from 14% to 56%, depending on the priorities of the Member State.

2.4.5 Policies and measures in industrial processes and product use

This section covers policies related to industrial emissions and to reducing fluorinated gas emissions. Greenhouse gas emissions arising from industrial processes in the mineral, chemical and metal industries are covered by the EU Emissions Trading System (see 2.4.2.1 for more details). Industrial installations are also subject to other sectoral policies and measures, in particular energy-related policies and measures (Section 2.4.3).

2.4.5.1 Green Deal Industrial Plan

With the Green Deal Industrial Plan[207], published in 2023, the Commission wants to promote the creation of a more supportive environment for developing the clean tech manufacturing capacity required for Europe to reach its green targets. The plan is based on four complementary pillars: (1) a predictable and simplified regulatory environment, (2) faster access to funding, (3) enhanced skills, and (4) open trade for resilient supply chains.

[205] Proposal on the accounting of greenhouse gas emissions of transport services, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52023PC0441.
[206] COM (2023) 100 final
[207] A Green Deal Industrial Plan for the Net-Zero Age, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023DC0062.

The first pillar is composed of three key legislative initiatives, all of which were adopted in 2024. The Net-Zero Industry Act[208] aims to provide less restrictive conditions and more certainty for investors and promoters of net-zero technology manufacturing projects with the aim to achieve that a 40% share across net zero technologies is providing predictability. The Critical Raw Materials Act[209] is the basis for building up the capacity of the EU's critical raw material supply chain. It includes measures to strengthen domestic supply chains and international engagement. The electricity market design reform[210] aims to make electricity prices less dependent on volatile fossil fuel prices.

2.4.5.2 Industrial and Livestock Rearing Emissions Directive

The Industrial and Livestock Rearing Emissions Directive (IED)[211] is the main EU instrument for preventing and reducing pollution from industrial installations, including intensive livestock farms. In August 2024 the revised IED entered into force, extending the scope of the existing directive. More large-scale livestock pig and poultry farms (Section 2.4.6.3), mining activities and the large-scale manufacture of batteries have been added. The new directive requires Member States to implement electronic permitting procedures by 2035 and to introduce effective penalties in the case of non-compliance.

The IED operates using a 'best available techniques' (BAT) permitting system, including the development of BAT reference documents (BREFs). It is relevant for greenhouse gas emissions abatement as it regulates: (1) industrial greenhouse gas emissions not covered by the EU ETS; (2) CH_4 from livestock installations, and (3) indirect greenhouse gases such as nitrogen oxides (NO_X) and short-lived climate forcers such as sulphur oxides (SO_X) and black carbon.

BREFs exist for specific agro-industrial activities (sectoral BREFs) and for cross-cutting issues such as energy efficiency, industrial cooling systems and emissions from storage with relevance for industrial manufacturing in general (horizontal BREFs).

Since the last biennial report was completed, the following new BREFs have been adopted: (1) slaughterhouses, animal by-products and/or edible co-products industries, adopted in December 2023; (2) the textile industry, adopted in December 2022; (3) common waste gas management and treatment systems in the chemical sector, adopted in December 2022; (4) the ferrous metal processing industry, adopted in November 2022.

Even if these BREFs do not set emission limits values for greenhouse gases in the scope of the ETS they are likely to have an impact on GHG emission levels, for example through energy efficiency requirements and co-benefits of abatement technologies focused on other pollutants.

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[208] Regulation (EU) 2024/1735 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem, http://data.europa.eu/eli/reg/2024/1735/oj.

[209] Regulation (EU) 2024/1252 establishing a framework for ensuring a secure and sustainable supply of critical raw materials, http://data.europa.eu/eli/reg/2024/1252/oj.

[210] Directive (EU) 2024/1711 amending Directives (EU) 2018/2001 and (EU) 2019/944 as regards improving the Union's electricity market design, http://data.europa.eu/eli/dir/2024/1711/oj.

[211] Directive 2010/75/EU on industrial and livestock rearing emissions (integrated pollution prevention and control), as amended, https://eur-lex.europa.eu/eli/dir/2010/75/2024-08-04.

Innovative techniques entering the market are increasingly expected to reduce emissions of both greenhouse gases from installations in the scope of the IED and the EU ETS Directive[212]. A new Innovation Centre for Industrial Transformation and Emissions (INCITE) has been created by the revised IED and will gather information on innovative low-carbon, low-pollution and circular economy technologies, helping to speed up their development. This is coupled with permitting flexibilities for the testing and implementation of innovative techniques. Moreover, the Commission will review the implementation of the IED in 2028 and every 5 years after that. The Commission will also assess how to best address the emissions generated from cattle farming and from agricultural products placed on the EU market by 2026.

2.4.5.3 Emissions from fluorinated gases

In 2022, fluorinated gases (F-gases) accounted for 2% of total greenhouse gas emissions in the EU. To control emissions from F-gases, including HFCs, two legislative acts are in place: the Mobile Air Conditioning (MAC) Directive[213] on air conditioning systems used in small motor vehicles, and the F-gas Regulation[214], which covers all other key applications in which F-gases are used.

The MAC Directive introduced a gradual ban on emissions of F-gases from mobile air conditioning systems with a GWP higher than 150 in passenger cars. Since 1 January 2017, the use of fluorinated greenhouse gases with a GWP higher than 150 has been banned in all new passenger cars and certain lorries put on the EU market.

Following a review of the F-gas Regulation, a revision laying down more ambitious targets was adopted in 2024. The aim is to phase out HFCs placed on the EU market by 2050. A quota system was established in 2015 to control and reduce HFC emissions. Annual quantitative limits (quotas) on HFCs placed on the EU market by producers and importers are set every year and will gradually be reduced over time, ending at net zero in 2050. This revision is expected to cumulatively prevent greenhouse gas emissions of 310 Mt CO_2eq by 2050[215].

Further key measures of the new F-gas Regulation are:

- integrating HFCs used in metered dose inhalers into the quota system;
- stricter rules to prevent emissions where F-gases are produced or used;
- facilitating better enforcement and monitoring through more digitalisation and electronic automation;
- initiating a gradual reduction in the production of HFCs in the EU. Companies will be given production rights that will decrease over time (60% of their 2011 to 2013 average annual production in 2025, 15% in 2036).

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[212] Wider environmental impacts of industry decarbonisation, https://circulareconomy.europa.eu/platform/sites/default/files/final_report_decarbonisation_industry.pdf.

[213] Directive 2006/40/EC relating to emissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32006L0040.

[214] Regulation (EU) 2024/573 on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014, https://eur-lex.europa.eu/eli/reg/2024/573/oj.

[215] Fluorinated greenhouse gases, https://climate.ec.europa.eu/eu-action/fluorinated-greenhouse-gases_en.

The European Environment Agency monitors the EU's progress towards reaching the targets set in the F-gas Regulation[216]. In 2022, the amount of HFCs placed on the market was 3% below the overall market limit set by the quota system. Production of HFCs in the EU continues to decrease. Between 2014 and 2022, F-gas emissions dropped by 25% in the EU, leading to an emission reduction of nearly 100 Mt CO_2eq[217].

The action taken by the EU and its Member States under the F-gas Regulation will enable the EU to comply with the Kigali amendment to the Montreal Protocol on a global phaseout of HFCs. The EU has ratified the Kigali amendment, which entered into force on 1 January 2019. EU consumption of HFCs in 2022 amounted to 45% of the maximum imposed by the Montreal Protocol.

2.4.6 Agriculture policies and measures

The key EU policies and measures to reduce emissions from agriculture target the three greenhouse gases (CO_2, CH_4 and N_2O) related to livestock, manure management and soil fertilisation. Some cross-cutting policies and measures also affect CO_2 emissions and removals in the land use, land-use change and forestry (LULUCF) sector, i.e. related to carbon sequestration in biomass and soils due to land management.

Agricultural policy has a long tradition in the EU, and, with the European Green Deal, the Commission has gone further in its environmental ambitions in agriculture. Some policies and measures are closely related and overlap with the LULUCF sector. This implies that the impact of the related agricultural practices is seen in the LULUCF sector, for example policies and measures that aim to enhance carbon sequestration in agricultural soils or biomass.

2.4.6.1 Common agricultural policy

The common agricultural policy (CAP) is the main EU policy in the agriculture sector. It is managed and funded at European level, with approximately one third of the total EU budget allocated to it. This totals EUR 386.6 billion for 2021-2027. It is sourced from two main funds: the European Agricultural Guarantee Fund (EAGF), which provides direct support and funds market measures, and the European Agricultural Fund for Rural Development (EAFRD). The CAP was created in 1962 and has undergone several reforms since then. For each CAP period, specific programmes and priorities are set out, including the budget from the related funds. Of the CAP budget, 40% has to be for climate measures.

To receive CAP payments, farmers have to follow a set of mandatory rules (conditionality). Statutory management requirements are general EU rules and are mandatory for all farmers, whether they receive CAP support or not. Good agricultural and environmental conditions (GAECs) apply only to farmers who receive CAP support. Existing GAEC requirements have been increased compared to the previous CAP period, for example on crop rotation/diversification.

The core component of the current CAP period (2023-2027) is the new CAP strategic plans (CSPs), which have to be prepared by each Member State for each CAP period. With the introduction of these plans, CAP implementation is shifting from a compliance-based to a more performance-based system.

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[216] Fluorinated greenhouse gases 2023, https://www.eionet.europa.eu/etcs/etc-cm/products/etc-cm-report-2023-04/.
[217] Achievements, https://climate.ec.europa.eu/eu-action/fluorinated-greenhouse-gases/achievements_en.

Countries also have more flexibility to design their support schemes according to their specific needs. Climate and environmental objectives should become progressively more ambitious in each period (no back-sliding). The CSPs provide information on the planned measures under the CAP and on the 10 CAP objectives, with the related indicators for the whole period. Member States are required to monitor progress against the targets set in the CSP.

With the new 'eco-schemes,' Member States are required to spend at least 25% of the direct payments budget on practices that are established at EU level, for example practices related to better nutrient management, agro-ecology, agroforestry, carbon farming or animal welfare. It is mandatory to include eco-schemes in the CSPs, but they are voluntary for farmers.

In a report to the European Parliament and the Council[218], the Commission summarised the Member States' CSPs for 2023-2027 and assessed their collective ambition. On climate action, the report points out that the new legal framework will create more space for nature and certain beneficial activities, e.g. paludiculture and agri-photovoltaics. Higher standards for farming practices (enhanced conditionality) also now apply to 89% of EU farmland, while 32% of the CSPs' public expenditure is allocated to rewarding farmers who voluntarily implement more ambitious practices. Multiple actions in the Member States' CSPs focus on carbon sinks and emission sources. Voluntary carbon sequestration and N_2O emission reduction measures should be implemented on 35% of the EU's farmland. The plans will also support extensive livestock systems, thereby helping to maintain carbon stocks, and recognise the need to reduce livestock-related emissions, especially methane from ruminants. It is difficult to assess the combined effects of these tools. Member States are expected to assess whether the mitigation potential of their strategic plans should be reviewed in the light of the new, higher targets in the LULUCF and Effort-Sharing Regulations.

2.4.6.2 Nitrates Directive

The primary objective of EU nitrates policy is to improve water quality by reducing nitrate losses from agriculture, the Nitrates Directive is also an important policy for reducing N_2O emissions caused by nitrogen fertilisers and livestock manure applied to agricultural soils.

A 2021 report[219] by the European Commission concluded that, in the 30 years since implementation of the Directive began, nutrient losses from agriculture have been reduced and most farmers and Member States have designed and applied measures to reduce nitrate losses. However, implementation and enforcement has not been sufficient to achieve the objectives of the Directive.

In October 2023, the Commission announced the evaluation of the Nitrates Directive with the publication of the Commission Work Programme 2024. In December 2023, the Commission launched a public consultation for the evaluation, inviting interested parties such as farmers, industries, NGOs, citizens and others to share their views. The consultation was closed in March 2024 and is followed up by further targeted consultation activities.

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[218] Summary of CAP strategic plans for 2023-2027, COM(2023) 707 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023DC0707.

[219] Report from the Commission on the implementation of Council Directive 91/676/EEC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A1000%3AFIN.

The evaluation should assess if the Nitrates Directive remains fit for purpose, if it is in line with the EU environmental and climate ambitions and contributes to a sustainable and resilient agriculture and food security.

In early 2024, the Commission launched a public consultation on the evaluation of the Nitrates Directive, inviting interested parties such as farmers, industries, NGOs and the general public to share their views.

2.4.6.3 Other climate-related policies

- Farm to fork strategy[220]: Published in 2020, the strategy aims to accelerate the transition to a sustainable food system that has a neutral or positive impact on the environment, helps to mitigate climate change and biodiversity loss, and ensures food security and fair prices for producers and consumers. Closely linked to the Green Deal, the strategy has the following targets:
    - reducing the use and risk of chemical pesticides by 50% by 2030;
    - reducing nutrient losses by 50% and fertiliser application by 20% by 2030;
    - at least 25% of the EU's agricultural land under organic farming by 2030;
    - halving per capita food waste at retail and consumer levels by 2030.
- Revised Industrial Emissions Directive: The revised Industrial Emissions Directive (IED), also covered in Section 2.4.5.2, extends its scope to smaller intensive pig and poultry farms. It now covers pig farms with more than 350 livestock units (LSUs) and poultry farms with more than 300 LSUs. Previously, the Directive only applied to pig farms with more than 2 000 pigs (600 LSUs) or 750 sows (1 000 LSUs) and farms with more than 40 000 places for poultry (LSUs differentiate between poultry for meat or egg production and species). In the original proposal, cattle farms were also included, but no political agreement could be reached on this. Therefore, by 31 December 2026, the Commission will assess whether there is a need for further action on emissions from rearing livestock, including from cattle.

According to the impact assessment of the Commission's proposal for the IED revision[221], the rearing of cattle, pigs and poultry emits 6 100 kilotons (kt) of methane each year (171 Mt CO_2eq). Previously, only 3% of those emissions were covered by the IED. That amount will significantly increase with the new revision and – if cattle are included in the future – is expected to cover 42-77% of all methane emissions from the rearing of cattle, pigs and poultry.

2.4.7 Policies and measures in the LULUCF sector

The LULUCF sector has become increasingly important for EU-wide climate policy in recent years. Taking climate action in this sector is hard because it is so interconnected with many other policy areas, such as agriculture, forestry, spatial and urban planning, biodiversity and energy. The sector is also not only affected by human intervention but also subject to natural disturbances and climate change. The European Green Deal and European Climate Law emphasise the role of the LULUCF

[220] A farm to fork strategy for a fair, healthy and environmentally-friendly food system, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0381.
[221] Impact assessment report accompanying the proposal for a directive amending Directive 2010/75/EU […], SWD/2022/11 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022SC0111.

sector as a net sink to help achieve the objective of a climate-neutral EU by 2050 and, as appropriate, achieve net negative emissions after that. A wide range of policies and measures have been put in place to shape the sector in future decades. Current and future policies and measures aim to increase CO_2 removals and reduce CO_2, CH_4 and N_2O emissions.

2.4.7.1 LULUCF Regulation

The LULUCF Regulation[222], originally published in 2018, was amended in 2023 to introduce an EU-wide net carbon removal target of 310 million tonnes of CO_2 equivalent by 2030. From 2021 to 2025, countries have to adhere to the 'no debit' rule, meaning that accounted emissions from specific managed land categories must be entirely compensated by corresponding accounted CO_2 removals. In contrast, from 2026 to 2030, Member States will have to reach binding national LULUCF targets to contribute to the EU-wide target for 2030. The Member States' targets for 2030 are defined as the average of net emissions/removals in 2016-2018 plus an individual binding target, which collectively corresponds to 42 MtCO2e, to be able to reach the EU target. The scope of the revised regulation has also been extended to cover all managed land from 2026 onwards.

The revised LULUCF Regulation will improve the quality of monitoring, reporting and verification and promote strong synergies between climate mitigation and environmental protection measures to ensure more cohesive national and EU policymaking and implementation.

2.4.7.2 Link to agricultural policies

The LULUCF and agriculture sectors are so closely linked that many policies and measures contribute to climate action in both sectors. For example, measures relating to the forest sector or carbon sequestration in agricultural soils are supported under the CAP.

2.4.7.3 Other relevant climate-related policies

- Forest Monitoring Regulation[223]: on 22 November 2023, the Commission put forward a proposal for a regulation on a monitoring framework for resilient European forests. The proposal aims to build a common knowledge base on forests to speed up action and ensure forest resilience. It will also offer better data and knowledge for policymaking and implementation and provide timely information on natural disturbances and forest disasters. This will be achieved by establishing a forest data collection framework, using a combination of ground surveys and Earth observation, and a forest data sharing framework, which requires the Commission and Member States to make forest data publicly available.
  The Forest Monitoring Regulation can contribute significantly to the EU's monitoring of carbon removal targets in the LULUCF sector. Having up-to-date and accurate information available will enable more targeted, cost-effective implementation of mitigation measures. It may lead to policies and decisions better suited to maintaining and improving the forest carbon sink.

[222] Regulation (EU) 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land-use change and forestry in the 2030 climate and energy framework, as amended, https://eur-lex.europa.eu/eli/reg/2018/841/2023-05-11.

[223] Proposal for a Regulation on a monitoring framework for resilient European forests, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2023:728:FIN.

- Soil Monitoring Law[224]: as announced in the EU soil strategy for 2030[225], the Commission tabled a proposal for a directive on soil monitoring and resilience on 5 July 2023. The Soil Monitoring Law should help protect and restore soils and ensure that they are used sustainably. Currently, over 60% of EU soils are unhealthy and in danger of further degradation[226]. The proposed law aims to address key threats such as erosion, floods, landslides, loss of organic matter and sealing.
- Soil health is especially relevant for climate change mitigation as it directly affects a soil's capacity to store organic carbon. The 27 EU Member States plus the UK are estimated to have lost 4.2 million tonnes of carbon sequestration potential through sealing between 2012 and 2018[227]. Maintaining and improving soil health is therefore crucial for reaching the EU's mitigation targets.
- Nature Restoration Law[228]: the Nature Restoration Regulation provides for a general objective to put in place effective and area-based restoration measures that cover at least 20% of the EU's land and sea areas by 2030 and all ecosystems in need of restoration by 2050. The Regulation includes in its general objectives to contribute to achieving the EU's overarching objectives on climate change mitigation, climate change adaptation, land degradation neutrality and food security as well as meeting EU's international commitments. The Nature Restoration Law includes specific targets for terrestrial/coastal/freshwater ecosystems, marine ecosystems, urban ecosystems, rivers and floodplains, pollinators, agricultural ecosystems and forest ecosystems. Member States will be required to develop national restoration plans, which have to include the quantification of areas to be restored to reach restoration targets and indicative maps of potential areas to be restored. In doing so, Member States will identify synergies with climate change mitigation, climate change adaptation, land degradation neutrality and disaster prevention and prioritise restoration measures accordingly. They will also identify synergies with agriculture and forestry.

  Regulation on Deforestation-Free Products or EU Deforestation Regulation (EUDR): The EU, through its consumption, is responsible of between 10% and 20% of deforestation and forest degradation worldwide. The purpose of the EUDR is to tackle the main driver of deforestation, the expansion of agricultural land that is linked to the production of commodities like cattle, wood, cocoa, soy, palm oil, coffee, rubber, and some of their derived products, such as leather, chocolate, tyres, or furniture.

  Under the Regulation, any operator or trader who places these commodities on the EU market, or exports from it, must be able to prove that the products do not originate from recently deforested land or have contributed to forest degradation. The impact assessment of the EUDR

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[224] Proposal for a Directive on Soil Monitoring and Resilience (Soil Monitoring Law), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0416&amp%3Bqid=1706624227744.

[225] Communication from the Commission to the European Parliament, the Council, the European Social and Economic Committee and the Committee of the Regions: EU Soil Strategy for 2030, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0699.

[226] EU mission: a soil for Europe, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/soil-deal-europe_en.

[227] Impact Assessment Report accompanying the proposal for a Directive of the European Parliament and of the Council on Soil Monitoring and Resilience (Soil Monitoring Law), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023SC0417&amp%3Bqid=1706625936410.

[228] Nature restoration: https://www.europarl.europa.eu/doceo/document/TA-9-2024-0089_EN.pdf.

estimated will reduce at least 31.9 million metric tons of carbon emissions to the atmosphere every year due to EU consumption and production of the relevant commodities, which could be translated into economic savings of at least 3.2 billion EUR annually, while addressing biodiversity loss.

- EU taxonomy for sustainable activities: this taxonomy (Section 2.4.2.7) is a classification system with criteria for investments in financially sustainable projects and activities. It also includes forestry-related activities such as afforestation and forest conservation, management, rehabilitation and restoration. The taxonomy can therefore have a positive impact on the LULUCF sector (mainly the forest land category) when such activities are promoted.
- Carbon removal and carbon farming (CRCF): the CRCF (Section 2.4.2.6) is the first EU-wide voluntary framework for certifying carbon removals, carbon farming and carbon storage in products made in Europe. It will directly affect emissions and removals in the LULUCF sector by increasing soil organic carbon, reducing emissions from drained organic soils, increasing removals in forest land, and increasing the stock of harvested wood products (HWP). This will contribute to an expected increase of 42 Mt CO2eq in the land carbon sink, helping to achieve the objective of 310 Mt CO2eq net removals by 2030.

2.4.8 Policies and measures in the circular economy sector

The history of EU waste policy goes back to 1975 when the first piece of legislation was published. Since then, waste policy has been continuously extended to different sources of waste and key waste streams. The primary focus of EU waste policy is on management, with the reduction and prevention of waste gaining ground. It does not specifically address climate action. However, in most cases, these policies and measures also lead to direct or indirect emission reductions (CO_2, CH_4, N_2O) from waste and waste management.

As a key part of the Green Deal, in 2021 the Commission adopted the zero-pollution action plan[229]. The plan provides the overall policy framework for reducing air, water and soil pollution and is therefore closely connected to waste policy. It sets specific targets for 2030 of reducing residual municipal waste by 50% and significantly reducing total waste generation in the EU.

In 2020, the European Commission adopted the new circular economy action plan[230] as one of the main building blocks of the Green Deal. It lists 35 actions to be implemented by the Commission, targeting the entire life cycle of products. The main areas with an expected impact on climate change mitigation are described in the following sections. The circular economy monitoring framework[231] enables the EU to assess the effectiveness of policies. The Commission revised the framework in 2023 and added new indicators.

[229] Pathway to a Healthy Planet for All EU Action Plan: Towards Zero Pollution for Air, Water and Soil, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400.

[230] A new circular economy action plan for a cleaner and more competitive Europe, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN.

[231] Circular Economy Monitoring Framework, https://ec.europa.eu/eurostat/web/circular-economy/monitoring-framework.

2.4.8.1 Waste and recycling

The Waste Framework Directive[232] is the key legal framework for treating and managing waste in the EU. It establishes an order of preference for managing and disposing of waste, referred to as the waste hierarchy: prevention, preparing for re-use, recycling, recovery and disposal. The Directive sets three main targets:

- by 2020, the preparation for re-using and recycling waste materials (such as paper, metal, plastic and glass) from households is to be increased overall to a minimum of 50% by weight;
- the preparation for the re-use and recycling of municipal waste is to be increased to a minimum of 55% by 2025 60% by 2030 and 65% by 2035;
- by 2020, the preparation for the re-use, recycling and other material recovery, including backfilling operations that use waste to substitute other materials, of non-hazardous construction and demolition waste is to be increased to a minimum of 70% by weight;
- Based on a report published by the Commission in 2023, 9 Member States were on track to reach the 2025 targets, while 18 Member States were at risk of missing one or more[233]. In 2023, the Commission proposed a targeted revision of the Waste Framework Directive, with a focus on textile waste and food waste[234].

The proposed revision will support the separate collection of textile waste, which will become mandatory in the EU in 2025. It also introduces mandatory and harmonised extended producer responsibility schemes for textiles across all Member States. Producers will have to cover the costs of managing textile waste, which will give them incentives to increase the circularity of products and boost circular economy business models. It proposes rules to manage textile waste in line with the waste hierarchy (used clothes to be identified as a priority to re-use, more textile waste to be recycled). The proposal also addresses the issue of illegal exports of textile waste, clarifying what is defined as waste and what as reusable textiles. This complements measures under the new Regulation on shipments of waste[235] adopted in April 2024, which establishes stricter rules on the export of waste to ensure that the EU does not export its waste challenges and that it is managed in an environmentally sound manner.

To accelerate the EU's progress towards reaching sustainability development goal target 12.3, 'By 2030, halve per capita global food waste', the revision also proposes legally binding food waste targets to be reached by Member States by 2030 compared to the 2020 baseline: a 10% reduction in processing and manufacturing and a 30% per capita reduction jointly in retail and consumption (restaurants, food services and households). According to the associated impact assessment, potential

[232] Directive 2008/98/EC on waste and repealing certain Directives, http://data.europa.eu/eli/dir/2008/98/2024-02-18.
[233] Waste Early Warning Report 2023, https://environment.ec.europa.eu/publications/waste-early-warning-report_en.
[234] Proposal for a directive amending Directive 2008/98/EC on waste, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52015PC0595.
[235] Regulation (EU) 2024/1157 on shipments of waste, http://data.europa.eu/eli/reg/2024/1157/oj.

greenhouse gas emission savings range between 8 and 108 Mt CO_2eq[236]. The legislative proposal on food waste provides for Member States to formally review progress by the end of 2027.

2.4.8.2 Sustainable products

The cornerstone of the EU's approach to more environmentally sustainable and circular products is the new Ecodesign for Sustainable Products Regulation (ESPR)[237], which entered into force in July 2024 and replaces the Ecodesign Directive (Directive 2009/125/EC). The ESPR allows performance and information requirements to be progressively set for key products placed on the EU market, including product durability, recycled content, reparability, recyclability and carbon and environmental footprint performance and information requirements. To make more product-specific information available for consumers and businesses, a digital product passport has been introduced. The ESPR contains measures to prevent the practice of destroying unsold consumer products. The impact assessment concludes that doing so will result in global annual greenhouse gas emission reductions of 117-471 Mt CO_2eq from all measures[238].

The new circular economy action plan and the new consumer agenda promote a new 'right to repair'.. The Directive on common rules promoting the repair of goods[239], which entered into force in July 2024, promotes after-sales repair (around 18 Mt CO_2eq savings within 15 years[240]). The Directive on empowering consumers for the green transition[241], which entered into force in March 2024, enables consumers to make informed purchasing decisions at the point of sale. The proposal for a Directive on green claims[242] also aims to stop companies from making misleading claims about the environmental merits of their products and services.

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[236] Impact Assessment Report Accompanying the document Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023SC0421.

[237] Regulation (EU) 2024/1781 establishing a framework for the setting of ecodesign requirements for sustainable products, http://data.europa.eu/eli/reg/2024/1781/oj.

[238] Commission Staff Working Document Impact Assessment Report accompanying the document Proposal for a Regulation of the European Parliament and of the Council establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022SC0082https://eur-lex.europa.eu/resource.html?uri=cellar:ccd71fda-b1b5-11ec-9d96-01aa75ed71a1.0001.02/DOC_1&format=PDF.

[239] Directive (EU) 2024/1799 on common rules promoting the repair of goods, http://data.europa.eu/eli/dir/2024/1799/oj.

[240] Commission Staff Working Document Impact Assessment Report accompanying the document Proposal for a Directive of the European Parliament and of the Council on common rules promoting the repair of goods and amending Regulation (EU) 2017/2394, Directives (EU) 2019/771 and (EU) 2020/1828, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023SC0059https://commission.europa.eu/document/download/512cb8de-3dc0-49ca-a711-b2beb768e531_en?filename=SWD_2023_59_1_EN_impact_assessment_part1_v5.pdf.

[241] Directive (EU) 2024/825 amending Directives 2005/29/EC and 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and through better information, http://data.europa.eu/eli/dir/2024/825/oj.

[242] Proposal for a Directive on substantiation and communication of explicit environmental claims (Green Claims Directive), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2023%3A0166%3AFIN.

2.4.8.3 Wastewater/urban wastewater

The Urban Wastewater Treatment Directive (UWWTD)[243] aims to ensure that domestic and industrial wastewater is effectively collected, treated and discharged. According to the European Environment Agency 98% of EU wastewater is adequately collected and 92% is adequately treated[244].

In line with the zero-pollution action plan[245], in January 2024 the Council and the European Parliament reached a provisional agreement on the new Urban Wastewater Treatment Directive. The agreed text is due to final adoption by the Council in November 2024, following this it will be published in the Official Journal of the European Union and consequently it will enter into force. New measures include extending the scope to smaller municipalities and new obligations and timelines to apply secondary, tertiary and quaternary treatment to urban wastewater. The revision includes requirements related to reductions in energy use and greenhouse gas emissions. In particular, it introduces an energy neutrality target at national level by 2045 for urban wastewater treatment plants of 10 000 population equivalent and above; meaning that operators of these plants will have to produce energy from renewable sources in order to meet this target. These measures to reach energy neutrality will lead to an emission reduction of around 3.4 Mt CO2eq in 2045. The Directive also includes an Extended Producer Responsibility scheme for the treatment of micropollutants, improved circularity regarding water reuse and the recovery of phosphorus, access to sanitation and wastewater surveillance, and improved monitoring and transparency.

2.4.8.4 Landfill waste

The EU's waste hierarchy establishes landfilling as the least preferable option for waste disposal. It should be kept to an absolute minimum. The Landfill Directive[246] sets stringent operational and technical requirements for landfill sites with the goal of minimising any negative effects on human health and the environment (including methane emissions). Key measures of the Directive are:

- introducing restrictions on the landfilling of all waste that is suitable for recycling or other material or energy recovery from 2030;
- limiting the share of municipal waste landfilled to 10% by 2035 (by weight).

By 31 December 2024, the Commission will review the target of limiting landfilled municipal waste to 10% by 2035. In 2020, 19% of municipal waste was landfilled in the EU; the total has steadily decreased since 2010 (27% in 2010, 23% in 2016)[247].

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[243] Council Directive 91/271/EEC of 21 May 1991 concerning urban wastewater treatment, https://eur-lex.europa.eu/eli/dir/1991/271/oj.

[244] Evaluation of Council Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019SC0700.

[245] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Pathway to a Healthy Planet for All EU Action Plan: Towards Zero Pollution for Air, Water and Soil, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0400.

[246] Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste, http://data.europa.eu/eli/dir/1999/31/oj.

[247] Landfill rate of waste excluding major mineral wastes, https://ec.europa.eu/eurostat/databrowser/view/ten00138/default/table?lang=en&category=t_env.t_env_was.t_env_wasst.

2.4.8.5 Other EU waste policies targeting specific waste streams

- Packaging waste: The Directive on Packaging and Packaging Waste sets recycling targets for various packaging materials for 2025 and 2030.

- Biodegradable waste: The Waste Framework Directive introduces an obligation to collect biodegradable waste separately as of 2024. The separate collection of biodegradable waste is a prerequisite for its recovery and thereby reduce the amount that is landfilled.

- Plastics: The EU plastics strategy[248], as part of the circular economy action plan, aims to transform the way plastic products are designed, produced, used and recycled in the EU. Specific policies apply to certain areas, including the Directive on single-use plastics[249], the Directive on plastic bags[250] and the proposal for a regulation on preventing pellet losses[251].

- Textiles: The revision of the Waste Framework Directive targets textile waste (Section 2.4.8.1 for more details). According to the Waste Framework Directive, the separate collection of textiles must be implemented by 1 January 2025.

- Batteries: The first piece of EU legislation on batteries is the new Battery Regulation[252], which entered into force on 17 August 2023 and takes a life-cycle approach. Targets for recycling efficiency, material recovery and recycled content will be introduced gradually from 2025 onwards. All collected batteries will have to be recycled and targets for recycling efficiency and material recovery will become stricter over time. To extend the life of electronic products, consumers must be able to remove and replace portable batteries at any point in their life cycle, starting in 2027. A digital battery passport will increase transparency for consumers and professionals along the value chain.

- Vehicles: The Commission proposed a new regulation on end-of-life vehicles (ELV)[253] in July 2023. The proposed set of rules covers the entire life cycle from design to end-of-life treatment. It sets out rules for improved circular design to facilitate the removal of materials, parts and components for re-use and recycling. It proposes that 25% of the plastic used to build a new vehicle be recycled and includes measures to recover more and better quality raw materials from recycling. The scope of the rules should gradually be extended to cover more vehicles such as motorcycles, lorries and buses. Implementation of the new legislation would result in

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[248] A European Strategy for Plastics in a Circular Economy, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN.

[249] Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment, http://data.europa.eu/eli/dir/2019/904/oj.

[250] Directive (EU) 2015/720 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags, http://data.europa.eu/eli/dir/2015/720/oj.

[251] Proposal for a Regulation on preventing pellet losses to reduce microplastic pollution, https://environment.ec.europa.eu/publications/proposal-regulation-preventing-pellet-losses_en.

[252] Regulation (EU) 2023/1542 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC, https://eur-lex.europa.eu/eli/reg/2023/1542/oj.

[253] Proposal for a Regulation on circularity requirements for vehicle design and on management of end-of-life vehicles, https://environment.ec.europa.eu/publications/proposal-regulation-circularity-requirements-vehicle-design-and-management-end-life-vehicles_en.

annual emission reductions of 12.3 Mt CO_2eq by 2035, 10.8 Mt CO_2eq by 2030 and 14 Mt CO_2eq by 2040[254].

- Waste electrical and electronic equipment (WEEE): The WEEE Directive requires Member States to encourage producers to design and produce electrical and electronic equipment which takes into account and facilitates dismantling and recovery. It also sets targets for the collection, recovery and recycling of WEEE. In 2023, the Commission adopted policy recommendations[255] for national authorities to increase the return of used and waste mobile phones, tablets and laptops. The Commission is evaluating the WEEE Directive.

2.4.9 Methodologies and assumptions

To describe the impact of policies and measures to reduce or remove greenhouse gas emissions, data were taken from impact assessments for the policies in question, from data providers such as Eurostat or from assessment or data collection work done by the European Environment Agency (EEA).

An example of information taken from EEA analysis is verified emissions in the EU Member States.

Section 2.4.2.1 has more information on impact assessments related to the EU ETS.

2.4.10 Other information

2.4.10.1 Policies and measures no longer in place

The European Union's climate change mitigation policies and measures are revised and updated regularly, which is imperative in the light of the urgent need to step up climate action in all sectors of the economy. Typically, the updates are to increase the scope and ambition of current policies and measures and to adopt new policies and measures. There are no climate change mitigation policies or measures which have been abandoned, hence there are no 'policies and measures no longer in place'.

2.4.10.2 Policies and measures in international transport

The following policies and measures on GHG emissions from international transport are currently in place:

- The EU Emissions Trading System, which covers emissions from international aviation and international maritime transport: see Section 2.4.2.1.
- ReFuel EU Aviation, which aims to increase both demand and supply of sustainable aviation fuels: see Section 2.4.4.5.
- CORSIA: see Section 2.4.4.5.

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[254] Impact Assessment Report Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on circularity requirements for vehicle design and on management of end-of-life vehicles, amending Regulations (EU) 2018/858 and 2019/1020 and repealing Directives 2000/53/EC and 2005/64/EC, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=SWD%3A2023%3A256%3AFIN.

[255] Commission Recommendation (EU) 2023/2585 of 6 October 2023 on improving the rate of return of used and waste mobile phones, tablets and laptops, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AL_202302585.

- The FuelEU Maritime Regulation, which tackles the GHG intensity of energy used by vessels calling at European ports: see Section 2.4.4.6.

2.4.10.3 Impact on longer-term trends

The policies and measures introduced in this chapter help reduce greenhouse gas emissions and remove greenhouse gases by carbon sinks. While some measures mainly produce results in the short term, others are effective in the medium to long term. As an example, vehicle emission standards help reduce greenhouse gas emissions from new vehicles. As they only affect new vehicles entering the market, they become more effective over time as old vehicles are increasingly replaced by new vehicles that meet the new standard. Similarly, research programmes can contribute to long-term rather than short-term climate change mitigation.

The European Union has observed that GHG emissions have been trending downward over the past decade, as shown in Chapter 1. This trend can be attributed to policies such as the EU ETS and the Effort-Sharing Regulation. Both set mandatory and decreasing emission limits over time and can be considered the key drivers behind emission reductions in the EU in recent years.

Both the ETS and the effort-sharing system have been extended to 2030, with more stringent emission limits. They will, therefore, contribute to reducing emissions further and keeping GHG emissions on their downward trajectory. The results of GHG emission projections also suggest that emissions will continue to decrease in the EU in the years ahead (see section 2.6).

EU policies and measures will continue to push emissions downward, especially given that new and more ambitious policies and measures have been recently adopted.

2.4.10.4 Assessment of economic and social impacts

Policies and measures to mitigate climate change (also known as 'response measures') often have multiple effects on countries' societies and economies. For example, a shift from fossil to renewable electricity generation can improve air quality and create new jobs, but it also jeopardises existing jobs in sectors and in countries that focus on the production of fossil fuels. Hence it is crucial for policies and measures to be designed in such a way that they produce co-benefits, while supporting a just transition and minimising adverse economic and social consequences. The Council Recommendation of 16 June 2022[256] on ensuring a fair transition towards climate neutrality provides an EU framework for developing and implementing policy measures designed to leave no-one behind in the green transition.

The assessment of the environmental, economic and social consequences of policies and measures is a key component of the European Union's policymaking process. Impact assessments are carried out on all initiatives expected to have significant environmental, economic or social impacts[257]. The findings of the impact assessment process are summarised in an impact assessment report, which lays out the environmental, social and economic impacts, the stakeholders affected by the initiative and

[256] Council Recommendation of 16 June 2022 on ensuring a fair transition towards climate neutrality, 2022/C 243/04, https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32022H0627%2804%29.
[257] Impact assessments, https://commission.europa.eu/law/law-making-process/planning-and-proposing-law/impact-assessments_en.

the ways in which they are affected. The impact assessment report also provides information on the consultation strategy and the results. Impact assessment reports are published with the proposals or with acts adopted by the European Commission.

The economic and social consequences of new policies and measures are not only assessed within the EU, but also in relation to developing countries that may be affected by them. The EU and its Member States have committed to policy coherence for development (PCD). This means that they seek to take account of development objectives in policies that are likely to have an impact in developing countries. The aim of PCD is to minimise contradictions and build synergies between different EU policies[258]. The 'better regulation' toolbox, which is used by the European Commission when preparing new initiatives, includes specific guidance for analysing the potential impact of EU policy initiatives on developing countries. This helps ensure that impacts on developing countries are taken into account in the early stages of preparing an initiative[259].

2.5 Summary of greenhouse gas emissions and removals

For a summary of greenhouse gas emissions and removals, see Chapter 1 of this BTR.

2.6 Projections of greenhouse gas emissions and removals

2.6.1 Introduction

This chapter presents EU projections of greenhouse gas emissions for the 'with existing measures' (WEM) and the 'with additional measures' (WAM) scenarios. Included under both projections is a breakdown of emissions by sector and by type of greenhouse gas. The EU data were compiled by aggregating EU Member States' greenhouse gas emission projections reported under the Governance Regulation; the detailed methodology is documented in Section 2.6.5. Projections are presented for 2025, 2030, 2035, 2040, 2045 and 2050. Data are displayed as CO_2 equivalent. Projections of emissions related to fuel used in international maritime transport are not included in the totals reported in this section, while indirect CO_2 emissions are included.

EU Member States were required to submit their emission projections before March 2023. With 2024 being a non-compulsory reporting year, only Member States with substantial changes in their projections submitted updated reports. These were Belgium, Denmark, Germany, Estonia, Ireland, Italy, Latvia, Lithuania, Luxembourg, Austria and Sweden.

The projection data to be reported in tabular format is available in CTF Tables 7-11, according to the reporting guidelines.

2.6.2 Total greenhouse gas emission projections

Figure 27 shows historical and projected net total GHG emissions at EU level. The data are presented under different scopes with projections including international bunkers and excluding international

[258] Policy coherence for development, https://ec.europa.eu/international-partnerships/policy-coherence-development_en.
[259] 'Better regulation' toolbox, Tool 34, https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en.

bunkers both visualised. Inventories under the UNFCCC and under the EU's NDCs differ in their scope, with emissions from international aviation and maritime transport being included in the latter.

By 2022, the EU had reduced its net greenhouse gas emissions including international bunkers by 29.7% compared to 1990 levels; excluding international bunkers, this reduction was 32.5%. The substantive emission reductions between 2019 and 2020 seen in the figure are largely attributable to the COVID-19 pandemic. Projected emissions start in 2025 and are displayed for mandatory projection years under the Governance Regulation (in five-year periods)[260]. EU-wide projections with existing measures (excluding international bunkers) indicate reductions in net greenhouse gas emissions of 45% by 2030, as compared to 1990 levels[261]. The corresponding figure including international bunkers is 41%. When additional measures are taken into account ('with additional measures' (WAM) scenario in Figure 27), the reduction in net emissions by 2030 compared to 1990 is projected to be 51% excluding international bunkers, and 47% including international bunkers[262]. Like all emission projections, the EU projections come with considerable uncertainties. Changes in energy prices or disruptions in supply chains could substantially alter the economic context and hence the level of GHG emissions in the years ahead.

Under the European Climate Law, the EU's economy-wide climate goal of reducing EU emissions by at least 55% by 2030 is a legal obligation. Major new EU legislation was adopted in 2023, as described in Section 2.4. The adoption of several important pieces of this legislation – for example the updated Renewable Energy Directive – took place after the 2023 deadline for Member States to report their GHG emission projections, and only a few EU Member States submitted updated projections in 2024. Thus, the full impact of the most recent EU legislation will be reflected in the upcoming projections due in March 2025 for all Member States under the Governance Regulation.

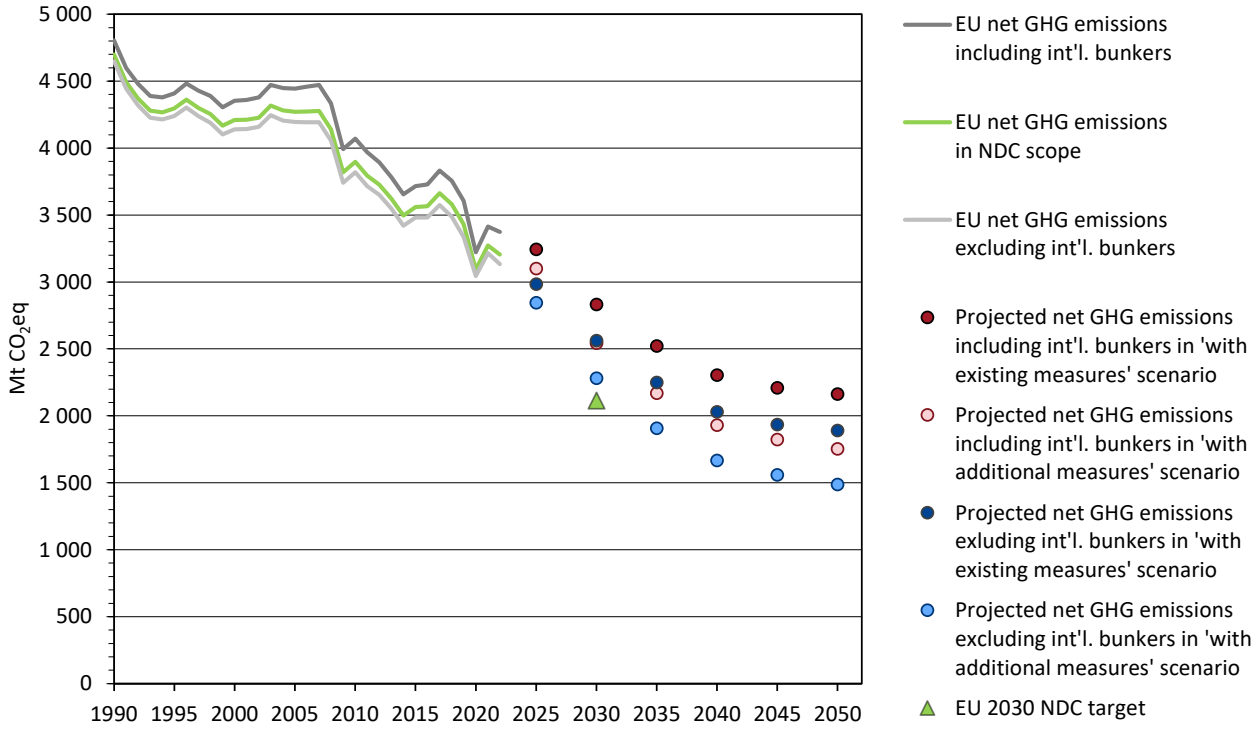
Figure 27 shows historical and projected GHG emissions from the EU, based on the most recent projection data available from all Member States. As the target of the EU NDC is expressed as net GHG emissions, the projections of net GHG emissions (i.e. including LULUCF removals) are shown in this figure as key indicators. As explained in Section 2.2, the scope of the EU NDC includes some but not all emissions from international aviation and navigation. Hence, the projections both with and without international bunkers are shown as key indicators in this figure. For comparison, historical emissions in the NDC scope (see Section 2.2 and annex) are also shown.

[260] The latest mandatory reporting deadline for projections under the EU Governance Regulation was March 2023. In 2024, a non-mandatory reporting year, five EU Member States (Belgium, Germany, Ireland, Estonia and Italy) provided updated projections, and these are included in the data provided throughout this chapter.

[261] This total includes indirect CO_2 emissions.

[262] This total includes indirect CO_2 emissions.

Figure 27: Historical and projected total net GHG emissions in the EU



Note: WEM is 'with existing measures'; WAM is 'with additional measures'.

Sources: Annual European Union GHG inventory 1990-2022, EU Member States' GHG emission projections submitted in 2023 and 2024 under the Governance Regulation, NDC scope emissions as calculated in the annex to this BTR.

The projection results above show that more ambitious measures are needed to meet the 2030 target than those considered in the 'with existing measures' and 'with additional measures' scenarios. As discussed above, the scenarios shown here represent a snapshot and do not yet include all policies and measures adopted at EU level in 2023 and 2024. Future projection results will provide an updated picture of the EU's progress towards its NDC target.

2.6.3 Projections by sector

Absolute historical and projected greenhouse gas emissions by sector in the EU are represented in Figure 28. The upper part of the figure shows historical data and projections from the 'with existing measures' scenario; the lower part combines historical data and projections from the 'with additional measures' scenario. Figure 29 provides insights into the current and projected share of GHG emissions by sector. Figure 30 shows historical 2022 and projected 2030 GHG emission levels compared to 1990 for each sector.

Energy emissions (without transport) are projected to fall by 56% in 2030 compared to 1990, taking into account existing measures, and by 61% with additional measures. Short and steep decreases took place during the financial crisis (2008-2009) and during the COVID-19 pandemic (2020). The general decreases in energy emissions are mainly due to the increased use of renewables, the switch from

solid fuels to gas, increased energy and technical efficiency and decreases in fuel combustion in manufacturing industries. Policies and measures related to energy (see Section 2.4.3 for more details) have driven historical changes and will propel future projected changes.

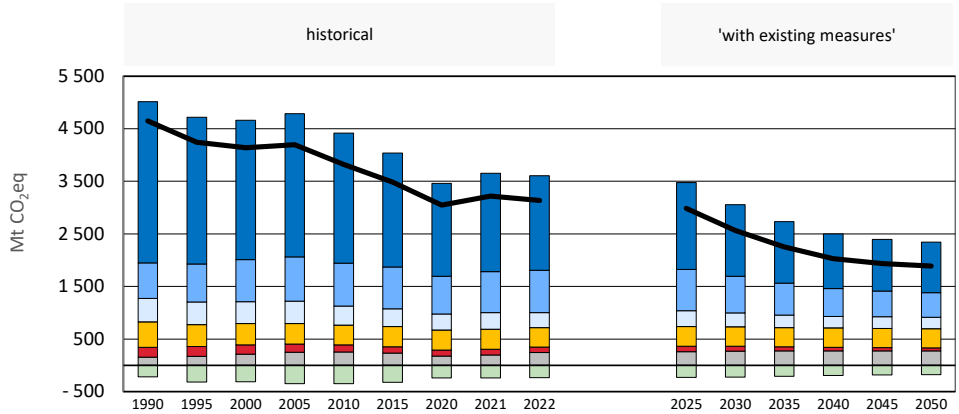
Transport is the only sector projected to have higher GHG emissions in 2030 than in 1990. After 2007, domestic transport emissions fell slowly but steadily up to 2013, with emissions increasing slightly again up to 2016. The COVID-19 pandemic in 2020 temporarily reduced the mobility of people and goods. Domestic transport emissions are projected to follow a modest downward trend. Relevant measures likely to influence the projected emissions are discussed in Section 2.4.4. Under existing measures, GHG emissions from the domestic transport sector in 2030 are projected to be 4% higher than 1990 levels. If additional measures are taken into account, projected values for 2030 fall to 8% below 1990 levels. Emissions from international bunkers are projected to continue increasing and to reach 73% above 1990 levels by 2030 with existing measures and 68% with additional measures. These projections do not yet take into account the full effects of the recently revised ETS Directive, which covers both international aviation and maritime transport.

Compared with 1990 levels, the GHG emissions of industrial processes and product use are projected to decrease by approximately 41% in 2030 in the 'with existing measures' scenario and by 44% in the 'with additional measures' scenario. Measures driving this decrease include the cross-cutting EU Emissions Trading System and the F-gas Regulation (see Sections 2.4.2.1 and 2.4.5.3). Compared to 1990, agricultural GHG emissions in 2030 are projected to decrease by 23% with existing measures and by 26% with additional measures. Changes in agricultural policy and increased productivity contributed to reduced livestock numbers, reduced nitrogen fertiliser production and use, and improved manure management, resulting in reduced emissions from agricultural soils and livestock (Section 2.4.6 elaborates on agricultural policies and measures).

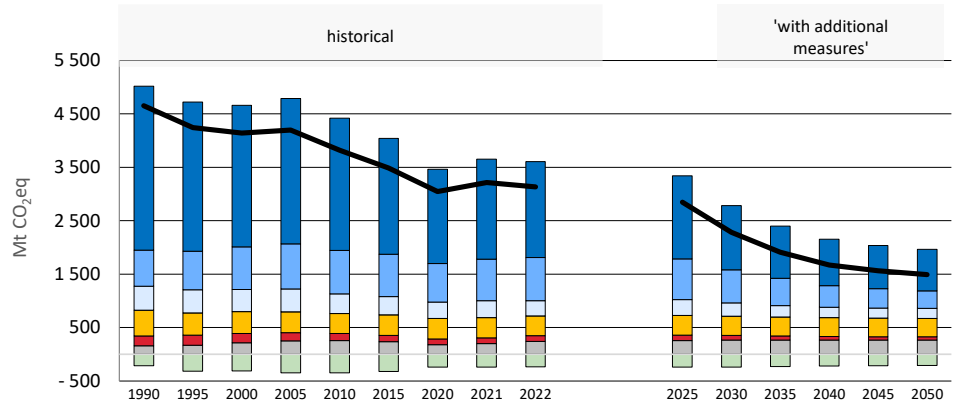
GHG emissions are projected to steadily decrease in the waste sector. Compared to 1990, emissions in 2030 are projected to decrease by 51% under both with existing measures scenario and the with additional measures scenario. Past and future emission decreases in this sector can largely be attributed to successful waste legislation (see Section 2.4.8 for waste policies and measures).

In the land use, land-use change and forestry (LULUCF) sector, net removals in the 'with existing measures' scenario in 2030 are projected to be 1% above 1990 levels. However, they show a decrease of 7% between the most recent historical level (2022) and 2030. This is in part due to the decline of the forest sink, which is caused by a combination of several factors including higher harvest rates (partly due to natural disturbances) and lower increment due to droughts and age-related effects. Considering additional measures, removals will remain roughly at the same level until 2030.

Figure 28: Historical and projected GHG emissions and removals by sector – 'with existing measures' and 'with additional measures'



	1990	1995	2000	2005	2010	2015	2020	2021	2022	2025	2030	2035	2040	2045	2050
Energy (excluding transport)	3 069	2 791	2 651	2 723	2 475	2 168	1 764	1 870	1 798	1 650	1 361	1 167	1 038	981	961
Domestic transport	672	725	798	843	815	793	721	779	804	786	696	611	532	492	466
Industrial processes	450	430	414	429	364	342	306	318	289	299	266	236	217	219	220
Agriculture	483	417	408	387	375	383	380	376	366	375	371	366	366	364	362
Waste	184	187	174	155	136	117	111	110	109	104	91	79	69	64	59
LULUCF	-217	-317	-311	-348	-351	-325	-241	-241	-236	-231	-224	-210	-195	-186	-180
International bunkers	157	169	214	250	252	235	177	197	240	260	270	272	275	275	274
Total net GHG emissions exluding international bunkers (including indirect CO2)	4 649	4 240	4 141	4 194	3 819	3 482	3 045	3 216	3 133	2 984	2 563	2 250	2 030	1 935	1 890



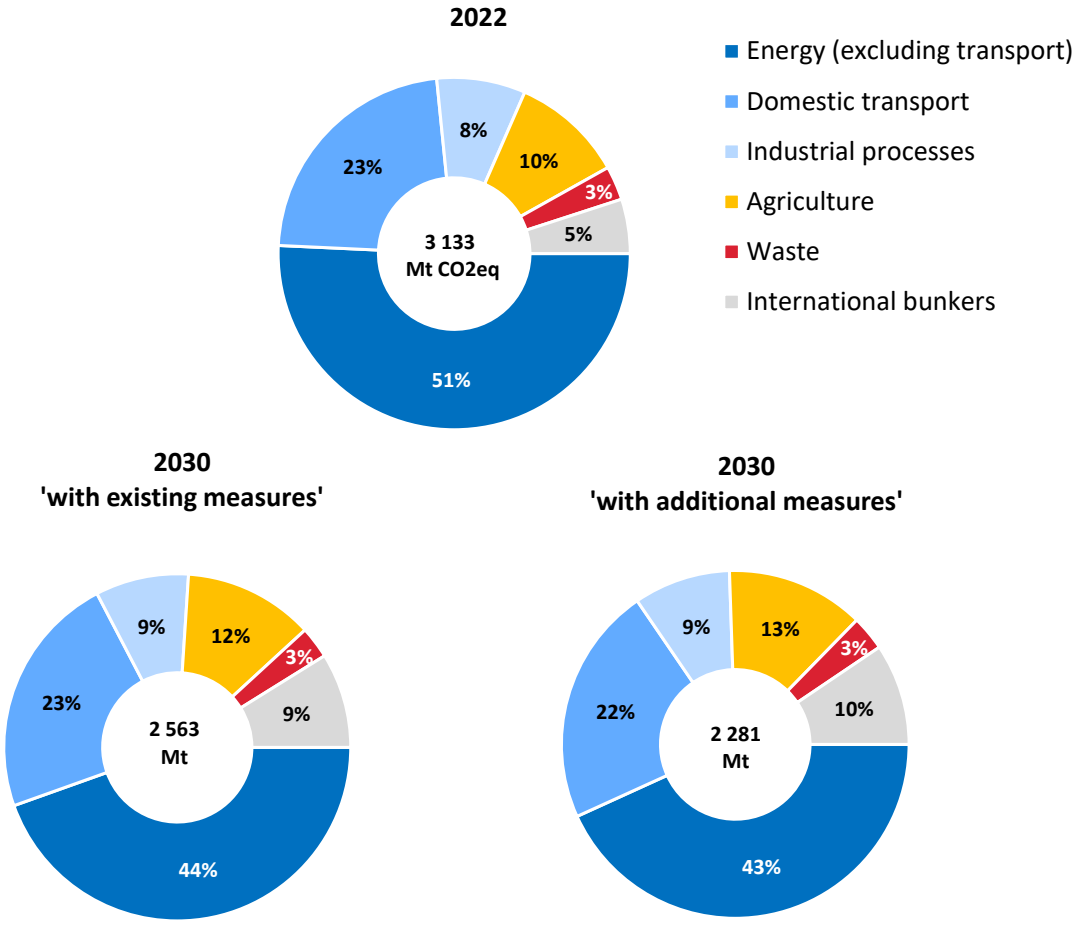
	1990	1995	2000	2005	2010	2015	2020	2021	2022	2025	2030	2035	2040	2045	2050
Energy (excluding transport)	3 069	2 791	2 651	2 723	2 475	2 168	1 764	1 870	1 798	1 557	1 202	978	867	808	777
Domestic transport	672	725	798	843	815	793	721	779	804	761	619	513	407	363	329
Industrial processes	450	430	414	429	364	342	306	318	289	296	251	216	193	191	190
Agriculture	483	417	408	387	375	383	380	376	366	369	358	353	351	347	343
Waste	184	187	174	155	136	117	111	110	109	103	90	78	68	63	58
LULUCF	-217	-317	-311	-348	-351	-325	-241	-241	-236	-243	-240	-231	-220	-215	-211
International bunkers	157	169	214	250	252	235	177	197	240	254	263	263	264	264	267
Total net GHG emissions exluding international bunkers (including indirect CO2)	4 649	4 240	4 141	4 194	3 819	3 482	3 045	3 216	3 133	2 846	2 281	1 907	1 668	1 560	1 488

Note: See CTF Tables 7-8 for the data reported in kilotons of CO_2eq.

Sources: Annual European Union GHG inventory 1990-2022, EU Member States' GHG emission projections submitted in 2023 and 2024 under the Governance Regulation.

The energy sector was responsible for the largest share of total GHG emissions in 2022. The transport sector had the second largest share, followed by agriculture, industrial processes and product use, and waste. The balance between the sectors is projected to remain the same, for both the 'with existing measures' and the 'with additional measures' scenarios, as shown in Figure 29 for 2030.

Figure 29: Historical and projected share of total GHG emissions by sector, including international bunkers and excluding LULUCF

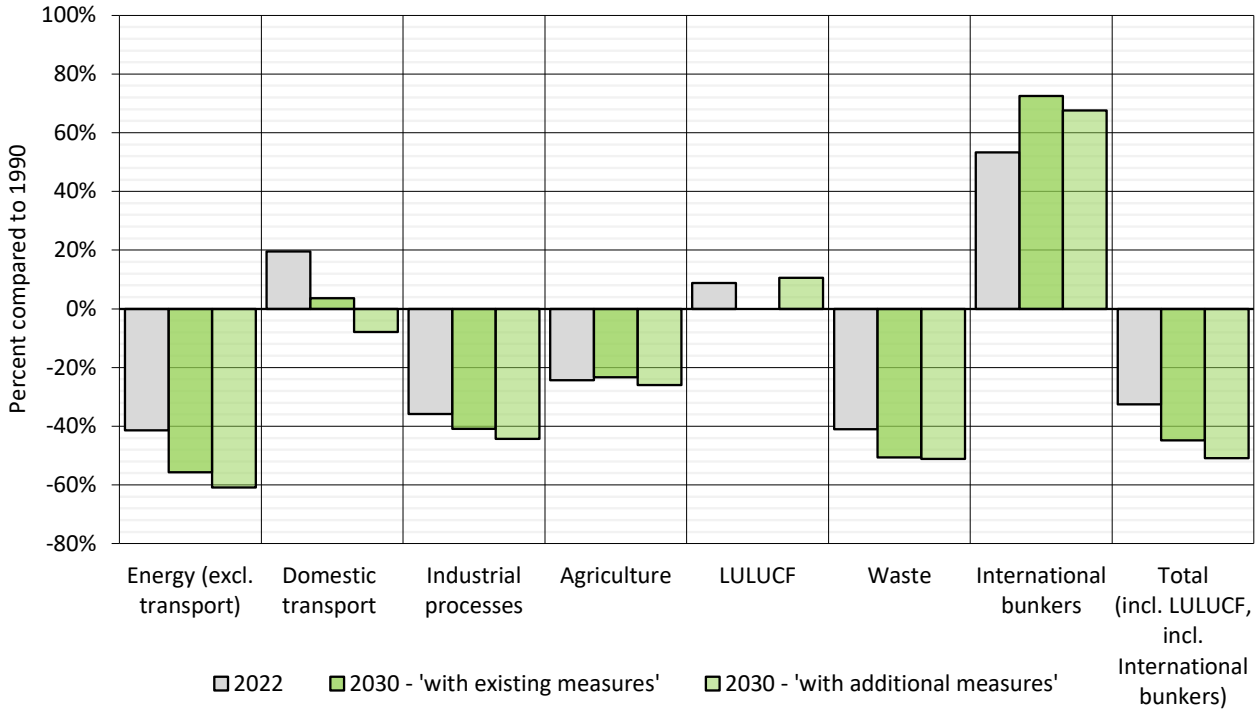


Note: See CTF Tables 7-8 for the data reported in kilotons of CO_2eq.

Sources: Annual European Union GHG inventory 1990-2022, EU Member States' GHG emission projections submitted in 2023 and 2024 under the Governance Regulation.

The energy and waste sectors are projected to achieve the largest reduction in GHG emissions in 2030 as compared to 1990, as shown in Figure 30.

Figure 30: Historical and projected emission changes by sector in 2022 and 2030 compared to 1990 in the 'with existing measures' and 'with additional measures' scenarios



Note: Given the net removals reported for 1990 in the LULUCF sector, a positive percentage for LULUCF in this figure means that net removals are expected to increase and a negative percentage means that net removals are expected to fall. See CTF Tables 7-8 for the detailed data reported in kilotons of CO_2eq.

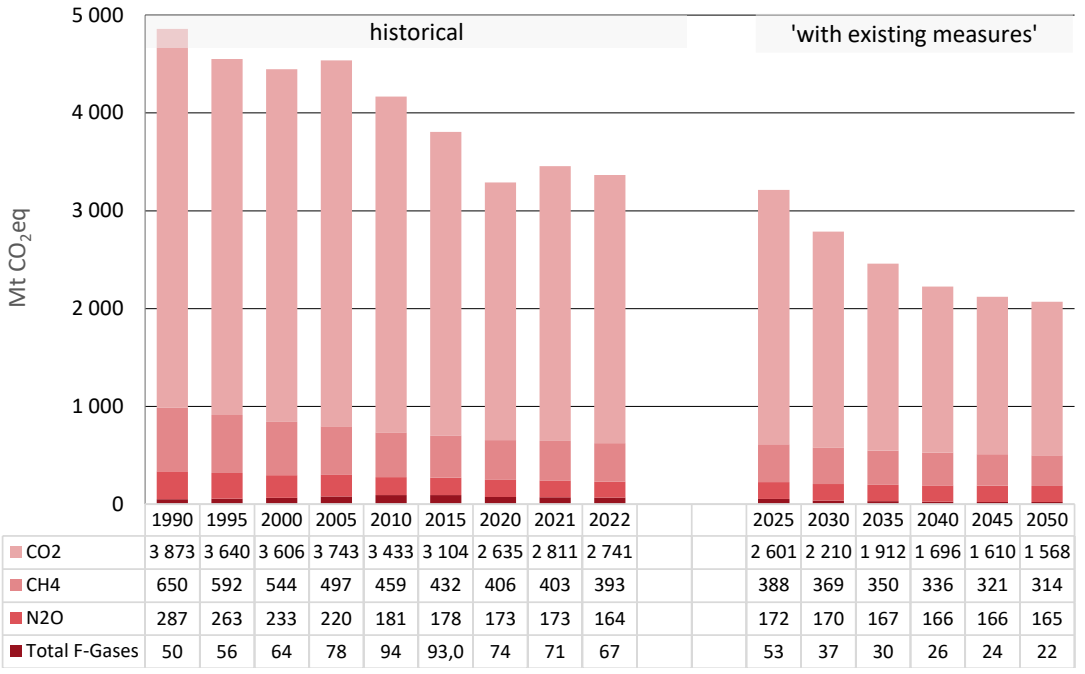
Sources: Annual European Union GHG inventory 1990-2022, EU Member States' GHG emission projections submitted in 2023 and 2024 under the Governance Regulation.

2.6.4 Projections by type of gas

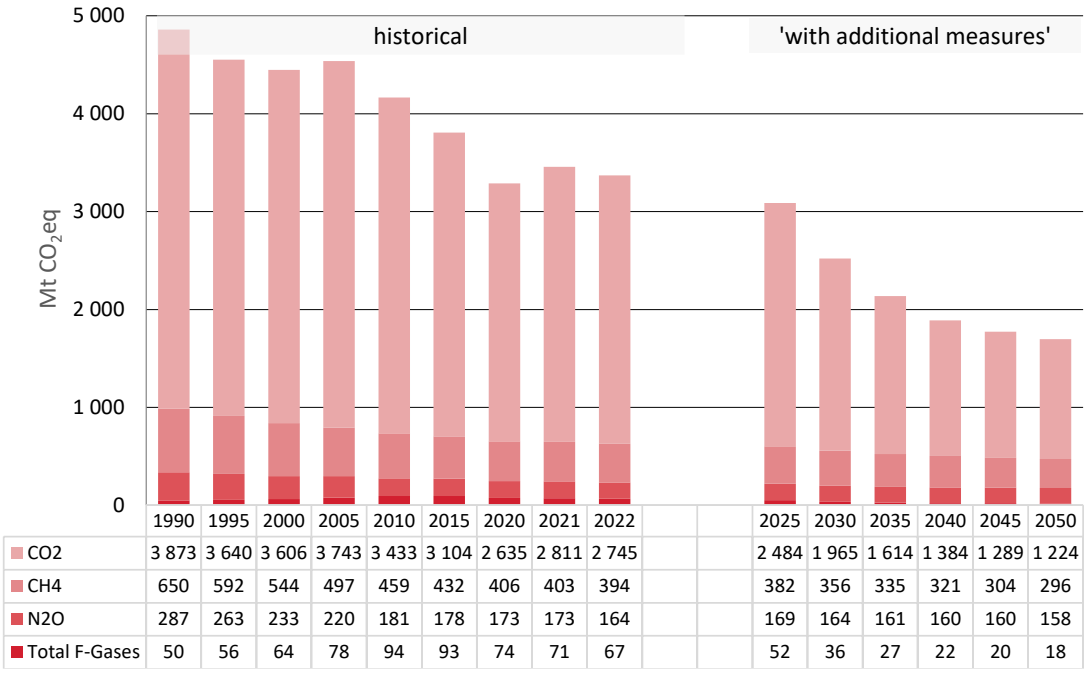
In 2030, CO_2 emissions are projected to decrease by approximately 43% compared to 1990 levels, with existing measures, excluding LULUCF and excluding international bunkers. With additional measures, the decrease is projected to be approximately 48% compared to 1990. Emissions of CH_4 have decreased steadily in the past and this decrease is projected to continue, albeit at a slower pace. In 2030, CH_4 emissions are projected to be 43% below 1990 levels under existing measures and 45% below 1990 levels with additional measures. N_2O emissions are projected to fall to 41% below 1990 levels in 2030 with existing measures only. With additional measures, N_2O emissions are projected to reach 43% below 1990 levels by 2030.

Total F-gas emissions in 2022 (the sum of HFCs, PFCs, SF_6, NF_3, unspecified mix of HFCs and PFCs) were substantially higher than they were in 1990. This can be explained by the introduction of HFCs after 1990 as a replacement for ozone-depleting substances. They began decreasing after 2016 following the introduction of legislation to regulate and reduce the use of these gases. This reduction is projected to continue, with a level of 25% below 1990 levels by 2030 with existing measures and 28% below 1990 levels with additional measures. The contribution of F-gases to total EU GHG emissions was and remains relatively small. The share of F-gas emissions is projected to decrease from 2% in 2022 to approximately 1% in 2030 under both scenarios.

Figure 31: Historical and projected GHG emissions by gas, excluding LULUCF, excluding international bunkers



	1990	1995	2000	2005	2010	2015	2020	2021	2022			2025	2030	2035	2040	2045	2050
CO2	3 873	3 640	3 606	3 743	3 433	3 104	2 635	2 811	2 741			2 601	2 210	1 912	1 696	1 610	1 568
CH4	650	592	544	497	459	432	406	403	393			388	369	350	336	321	314
N2O	287	263	233	220	181	178	173	173	164			172	170	167	166	166	165
Total F-Gases	50	56	64	78	94	93,0	74	71	67			53	37	30	26	24	22



	1990	1995	2000	2005	2010	2015	2020	2021	2022			2025	2030	2035	2040	2045	2050
CO2	3 873	3 640	3 606	3 743	3 433	3 104	2 635	2 811	2 745			2 484	1 965	1 614	1 384	1 289	1 224
CH4	650	592	544	497	459	432	406	403	394			382	356	335	321	304	296
N2O	287	263	233	220	181	178	173	173	164			169	164	161	160	160	158
Total F-Gases	50	56	64	78	94	93	74	71	67			52	36	27	22	20	18

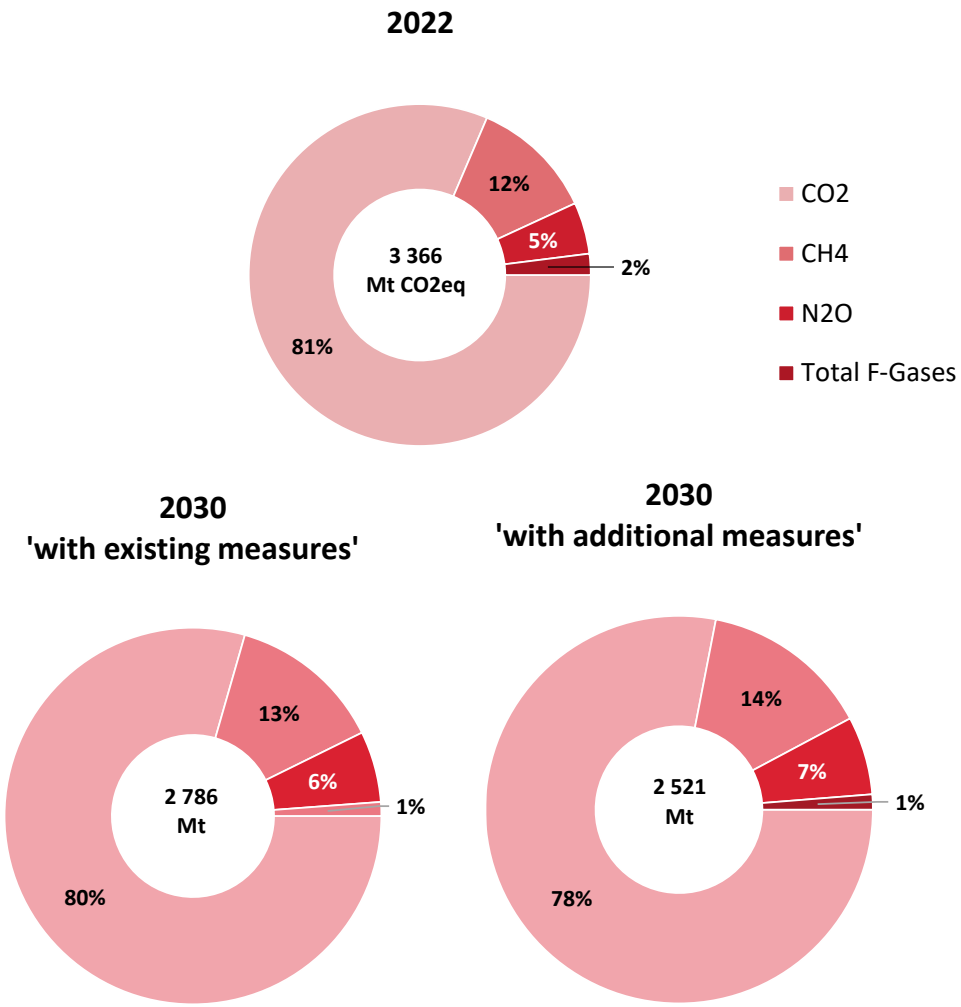
Note: Data excluding indirect CO_2. See CTF Tables 7-8 for the detailed data reported in kilotons of CO_2eq.

Sources: Annual European Union GHG inventory 1990-2022, EU Member States' GHG emission projections submitted in 2023 and 2024 under the Governance Regulation.

CO_2 emissions were responsible for the largest share of total GHG emissions in 2022 at 81%, followed by methane emissions (12%), nitrous oxide emissions (5%) and fluorinated gases (2%). Projections, both with existing measures and with additional measures, indicate that this breakdown will remain much the same in 2030 with only slight changes; the share of N_2O emissions is projected

to be 2 percentage points higher than in 2022. Absolute values of the volumes of these gases, as well as a visualisation of the trends, are provided in Figure 32.

Figure 32: Share of GHG emissions by gas in 2022 and projected share by gas for 2030, excluding LULUCF, excluding international bunkers

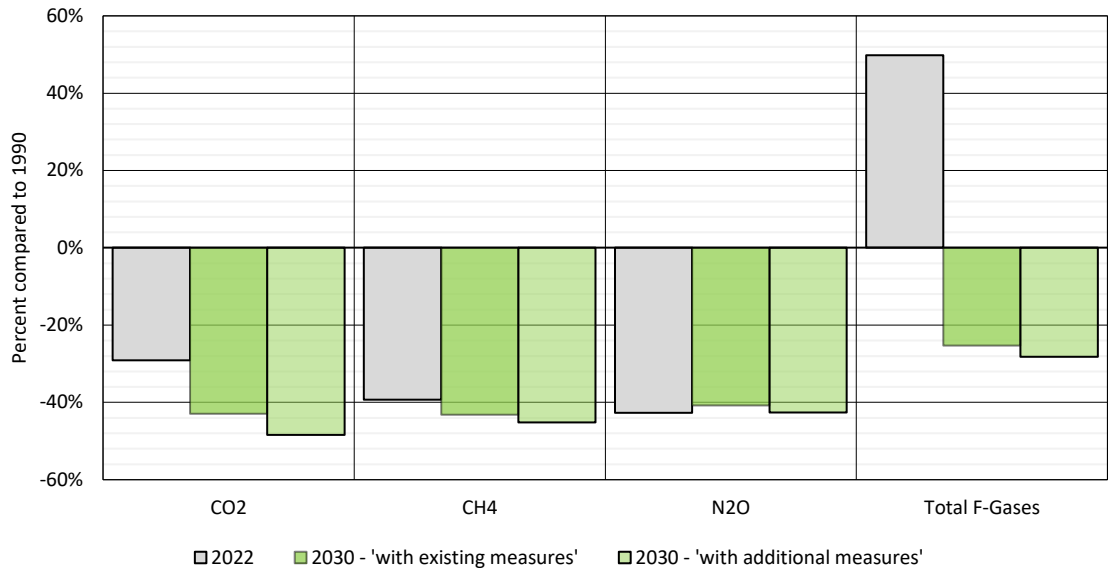


Note: Excluding indirect CO_2.

Sources: Annual European Union GHG inventory 1990-2022, EU Member States' GHG emission projections submitted in 2023 and 2024 under the Governance Regulation.

Figure 33 shows, by gas, the percentage change in GHG emissions since 1990 versus 2022, versus 2030 (with existing measures scenario, excl. LULUCF, excl. international bunkers) and versus 2030 (with additional measures scenario, excl. LULUCF, excl. international bunkers).

Figure 33: Historical and projected emission changes by gas in 2022 and 2030 compared to 1990 in the 'with existing measures' and 'with additional measures' scenarios, excluding LULUCF, excluding international bunkers



Note: See CTF Tables 7 for the detailed data reported in kilotons of CO_2eq.

Sources: Annual European Union GHG inventory 1990-2022, EU Member States' GHG emission projections submitted in 2023 and 2024 under the Governance Regulation.

2.6.5 Methodology

2.6.5.1 Models and approaches

General approach

The projection data are compiled as the sum of EU Member States' individual projection data, which undergo a comprehensive quality assurance and control procedure (see below). Detailed descriptions of the individual projection methodologies that EU Member States used to project their greenhouse gas emissions and further information on their sensitivity analyses, key parameters and assumptions are available in the reports provided alongside their submissions under Article 18 of the Governance Regulation to the 'Reportnet' platform hosted by the European Environment Agency[263] and in the Biennial Transparency Reports of individual Member States. The strengths and weaknesses of aggregating the EU's greenhouse gas projection from individual European Member States' projections are as follows:

Strengths:

- EU Member States have the best knowledge of their national circumstances, e.g. their national policies and measures, their exact specifications and expected future development. They are thus in the best position to set national projections that are best suited to their national

[263] 2023 projections by EU Member States: https://reportnet.europa.eu/public/dataflow/890, 2024 projections by EU -- Member States: https://reportnet.europa.eu/public/dataflow/1057.

circumstances. They are also best placed to show possible overlaps and synergies between national policies and measures in their projection methodology.

- EU Member States can apply tailor-made national tools and models that are best suited to presenting their individual contexts.

- The European Commission provides guidance to Member States on key parameters and assumptions. This approach helps harmonise elements that may be similar among Member States (such as fuel import prices). At the same time, for some Member States there may be reasons why these parameters may develop differently. Member States can thus choose to set different values for key parameters and assumptions to best represent their national circumstances.

Weaknesses:

- A potential weakness of the projection methodology is that the aggregation of the EU's projection becomes less robust if there are errors in the data of individual Member States. This risk is mitigated by the comprehensive quality assurance and control procedure applied[264].

Representation of data

The figures in the projections chapter represent historical GHG emissions up to 2022. From 2025 to 2050, the figures are projections. Detailed figures are shown for 2030, which is the final year of the current NDC period.

Historical and projected data in this chapter for total greenhouse gas emissions is presented for the EU. The projected data (starting in 2025) is an aggregation of individual EU Member State greenhouse gas emission projections submitted to the European Commission in 2023 and updated by five European Member States (Belgium, Estonia, Germany, Ireland and Italy) in 2024[265].

This compilation incorporates the most recent available data. The sector breakdown is as follows:

- energy (Common Reporting Tables - CRT 1, without transport);
- transport (CRT 1.A.3);
- industrial processes and product use (CRT 2);
- agriculture (CRT 3);
- land use, land-use change and forestry (LULUCF) (CRT 4);
- waste (CRT 5);
- memo items: international bunkers.

The gases covered are listed below:

- CO_2

[264] ETC-CM Report 2023/09, Quality assurance and quality control procedure for national and Union GHG projections 2023, https://www.eionet.europa.eu/etcs/etc-cm/products/etc-cm-report-2023-09.

[265] GovReg: National projections of anthropogenic greenhouse gas emissions [2024], https://reportnet.europa.eu/public/dataflow/1057.

- CH_4
- N_2O
- HFCs
- PFCs
- SF_6
- unspecified mix of HFCs and PFCs
- NF_3

Indirect CO_2 emissions are only included in the totals in this chapter. These emissions can be reported as a memo item under the Governance Regulation if available.

Changes in methodology

As this is the first Biennial Transparency Report submitted by the European Union, no changes to a previous report are reported.

2.6.5.2 Key parameters and assumptions

The key parameters that underpin individual Member States' projections are submitted under Article 18 of the Governance Regulation. They undergo the quality assurance and control process documented in a methodology report[266]. The information has been aggregated to create EU-wide information either by aggregating to the EU level (GDP, population) or by calculating the weighted average value (monetary data, except GDP). Based on this approach, the key parameters at EU level are reported in CTF Table 11, which is submitted together with this BTR.

The EU Reference Scenario 2020 is an additional source of parameters for an EU-wide scenario that is comparable to the WEM scenario. A summary of the EU Reference Scenario 2020 context is available on the European Commission's website[267]. The report[268] also contains projected data on final energy consumption by sector, electricity generation by technology and fuel type, and passenger transport activity by mode of transport. Sector-specific technology assumptions for energy[269] and transport[270] are also available.

2.6.5.3 Results of the sensitivity analysis

EU legislation (Annex XXV, Table 6 and 7, of the 'EU Governance Implementing Regulation'[271]) provides for structured reporting on EU Member States' sensitivity analyses, which they report along with their greenhouse gas emission projections. This provides the opportunity to highlight and to take

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[266] ETC-CM Report ETC CM Report 2023/09, Quality assurance and quality control procedure for national and Union GHG projections 2023, https://www.eionet.europa.eu/etcs/etc-cm/products/etc-cm-report-2023-09.

[267] EU Reference Scenario 2020: Main outputs, https://energy.ec.europa.eu/data-and-analysis/energy-modelling/eu-reference-scenario-2020_en.

[268] EU Reference Scenario 2020, https://op.europa.eu/en/publication-detail/-/publication/96c2ca82-e85e-11eb-93a8-01aa75ed71a1/language-en/format-PDF/source-219903975.

[269] REF2020_Technology Assumptions_Energy, https://energy.ec.europa.eu/document/download/7707ee71-0ba3-4ba2-bc54-d0ee49d657b5_en?filename=REF2020_Technology%20Assumptions_Energy.xlsx.

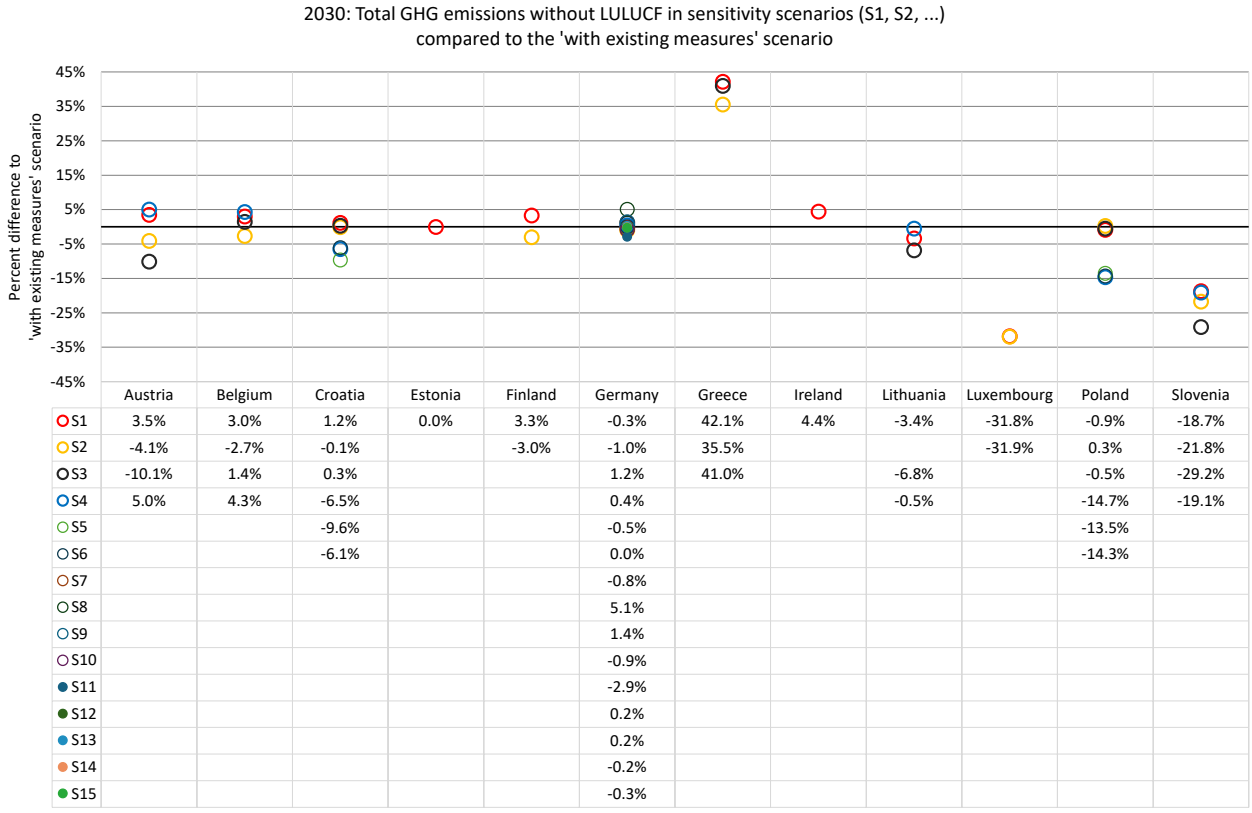
[270] REF2020_Technology Assumptions_Transport, https://energy.ec.europa.eu/document/download/a46ac067-e6d7-42c2-b836-2c1661916a88_en?filename=REF2020_Technology%20Assumptions_Transport.xlsx.

[271] Commission Implementing Regulation (EU) 2020/1208, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R1208

into account the effort that Member States make to explore how changes to the different parameters impact their individual greenhouse gas projections. 19 EU Member States submitted sensitivity scenarios along with their greenhouse gas emission projections. The number of sensitivity scenarios per Member State ranged from 1 to 15. On average, results for four sensitivity scenarios were reported. Member States used different parameters and parameter combinations compared to their 'with existing measures' scenario submitted under the Governance Regulation. Among the most varied parameters were international (wholesale) fuel import prices, gross value added, GDP, population and the EU ETS allowance price.

Due to the wide range of parameters, sensitivity analyses are not aggregated to EU level. Figure 34 provides sensitivity insights for 2030 and at Member State level. This figure considers the whole breadth of Member States' sensitivity analyses and compares them to their individual 'with existing measures' scenario. The data shown refers to sensitivity analyses provided for the variable 'total greenhouse gas emissions without LULUCF'. Results for this variable were reported by 12 Member States. Compared to the 'with existing measures' scenario, the results vary from -32% to +42%.

Figure 34: Differences in GHG emissions between 'with existing measures' and sensitivity scenarios



	Austria	Belgium	Croatia	Estonia	Finland	Germany	Greece	Ireland	Lithuania	Luxembourg	Poland	Slovenia
S1	3.5%	3.0%	1.2%	0.0%	3.3%	-0.3%	42.1%	4.4%	-3.4%	-31.8%	-0.9%	-18.7%
S2	-4.1%	-2.7%	-0.1%		-3.0%	-1.0%	35.5%			-31.9%	0.3%	-21.8%
S3	-10.1%	1.4%	0.3%			1.2%	41.0%		-6.8%		-0.5%	-29.2%
S4	5.0%	4.3%	-6.5%			0.4%			-0.5%		-14.7%	-19.1%
S5			-9.6%			-0.5%					-13.5%	
S6			-6.1%			0.0%					-14.3%	
S7						-0.8%						
S8						5.1%						
S9						1.4%						
S10						-0.9%						
S11						-2.9%						
S12						0.2%						
S13						0.2%						
S14						-0.2%						
S15						-0.3%						

Source: EU Member States' GHG emission projections submitted in 2023 and 2024 under the Governance Regulation.

3 CLIMATE CHANGE IMPACTS AND ADAPTATION

3.1 Introduction

Scientists have made it clear that climate change is one of the biggest threats to humanity and that it seriously affects people and nature[272]. A July 2023 Eurobarometer survey found that 77% of Europeans consider climate change to be a serious problem. More than 8 in 10 respondents think that it is important that their national government (86%) and the European Union (85%) act.[273]

Despite our collective efforts to reduce and halt all greenhouse gas emissions, climate change is happening. The frequency and severity of climate and weather extremes is increasing.[274]

The EU is stepping up to meet the climate challenge and has set the long-term vision "that in 2050, the EU will be a climate-resilient society, fully adapted to the unavoidable impacts of climate change."[275]

Therefore, climate change adaptation is an integral part of the European Green Deal and its external dimension, and firmly anchored in the European Climate Law[276]. The European Climate Law provides the foundation for setting the pathway to ensure that the EU and Member States continuously progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change. They are fully committed to the Paris Agreement, its long-term goals and associated ambition cycle, including on adaptation, in light of the latest available science and aim to ensure a just transition in accordance with Article 7 of the Paris Agreement.

Accordingly, the EU Strategy on Adaptation to Climate Change has equipped the EU for "Forging a climate-resilient Europe" (EU adaptation strategy) by paving the way for scaling up more ambitious actions, both domestically and internationally, to progress towards its 2050 adaptation and resilience vision by making adaptation actions smarter, more systemic, faster and global.

Hence, the EU's decision to integrate climate action across the entire EU budget to help achieve its climate goals. 30% of the EU funds is dedicated to fighting climate change, the highest share ever of the European budget.

It is worth noting, though, that while Member States are the EU's main implementation partners, the EU is engaging in dialogue with partner countries to increase cooperation on climate change

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[272] Feyen L., et al. (editors) (2020), Climate change impacts and adaptation in Europe. JRC PESETA IV final report. Publications Office of the European Union, Luxembourg, https://joint-research-centre.ec.europa.eu/system/files/2020-05/pesetaiv_summary_final_report.pdf.

[273] Eurobarometer survey - Climate change - July 2023, https://europa.eu/eurobarometer/surveys/detail/2954.

[274] The EU new strategy on adaptation to climate change, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:82:FIN#footnote3

[275] The new EU Strategy on Adaptation to Climate Change, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082

[276] REGULATION (EU) 2021/1119 of the European Parliament and of the Council of June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') ('European Climate Law'),https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1119

adaptation, achieve a better understanding of adaptation challenges in third countries and promote climate change adaptation action and good practices.

This chapter of the BTR does not provide an exhaustive description of all EU adaptation actions and measures. Instead, it gives a snapshot of progress made and underway for enhancing EU's climate adaptation and preparedness for and resilience to climate change impacts. It describes recent actions and progress towards enhancing the EU's adaptive capacity, strengthening resilience and reducing vulnerability to climate change impacts as required as required by the reporting guidelines (Decision 18/CMA.1).[277]

3.2 National circumstances, institutional arrangements and legal frameworks

The EU has legal personality and is a unique economic and political union of 27 European countries. Climate change is an area of shared competence between the EU and its Member States, therefore both may legislate and adopt legally binding acts in this regard. The EU is working across all sectors and policies to cut greenhouse gas emissions and make the transition to a clean, climate neutral and sustainable economy, as well as addressing unavoidable consequences of climate change. To contribute to keeping global rise of temperature well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, as established under the Paris Agreement, the EU has a range of policies and instruments in place for lowering emissions and driving the transition towards climate neutrality. Section 2.1 above describes the EU and Member States detailed national circumstances and institutional arrangement.

The European Commission is the institution responsible for adopting EU wide adaptation strategies, as well as for assessing EU and Member States' measures every five years to ensure that they are consistent with the aim to make progress on adaptation under the European Climate Law. Section 2.1.1.1 presents the detailed on the decision-making process of the EU with its Member States.

Each EU Member State has unique vulnerabilities to climate change, influenced by geographic, economic, and environmental factors. Climate change impacts such as rising temperatures, changing precipitation patterns, and extreme weather events affect sectors like agriculture, water resources, coastal zones, and infrastructure differently across countries. The EU outermost regions are also vulnerable to climate change due to rising atmospheric and marine temperatures, ocean acidification, sea-level rise and increased exposure to hurricanes. Despite this diversity, the EU emphasizes a coordinated approach to ensure that adaptation is effectively integrated into national and sectoral planning.

A key piece of legislation in the field of adaptation is the 2021 **European Climate Law**. It enshrines into law the EU's commitment to reaching climate neutrality by 2050. It requires the Union institutions and Member States to make continuous progress to enhance their adaptive capacity, strengthen resilience and reduce vulnerability to climate change, in accordance with Article 7 of the Paris Agreement.

[277] Decision 18/CMA.1, https://unfccc.int/resource/tet/0/00mpg.pdf

The EU adaptation strategy adopted in 2021, is the centrepiece of the EU cross-cutting efforts to adapt to the unavoidable impacts of climate change and become climate resilient by 2050. The strategy sets out an ambitious path across an exceptionally broad spectrum of policy areas. It is conceived around four main objectives: to make adaptation smarter, swifter and more systemic, and to step up international action on adaptation to climate change for enhancing resilience to the impacts of climate change and for managing the associated risks.

Progress in implementing adaptation action is primarily reported and monitored under the **Regulation on the Governance of the Energy Union and Climate Action** (see Section 2.4.1.1 and 3.7)[278]. Every two years, EU Member States report information on their national climate change adaptation planning and strategies to the Commission, outlining their implemented and planned actions to facilitate adaptation to climate change. The Governance Regulation builds on previous EU climate monitoring legislation and requires Member States to integrate adaptation goals into their national energy and climate plans (NECPs).

To promote steady implementation progress, the **European Environment Agency** (EEA)[279] is tasked with supporting Commission policy development and with providing support to key global processes. The EEA whose geographical coverage goes beyond the 27 EU MS, provides analytical expertise and an efficient reporting infrastructure to manage national and international data flows. In collaboration with its network, EIONET, the EEA informs decision-makers and the public about the state of Europe's environment, climate change and sustainability issues.

Several pieces of sector-specific legislation promote better climate preparedness and resilience. This includes the **EU Nature Restoration Law**[280] which has dedicated provisions on climate adaptation; it also includes targets for urban, coastal, wetland and riverine habitats that support disaster risk reduction and climate adaptation. At the same time, the new **EU forest strategy for 2030**[281] outlines specific goals and measures for adaptation, including afforestation/reforestation and climate-resilient forestry. The **Energy Performance of Buildings Directive**[282] (see Section 2.4.3.1) brought in risk and resilience related indicators as part of the Member States' national building renovation plans.

The **Floods Directive** stipulates that Member States must undertake a flood risk assessment and prepare flood hazard maps and flood risk maps which include the future impacts of climate change. Based on these assessments, Member States have developed flood risk management plans. The **Directive on the Resilience of Critical Entities,** which entered into force in January 2023, requires Member States to better protect entities and services that are essential for the maintenance of vital societal functions and economic activities from a wide range of hazards, including climate-related and other natural disasters.

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[278] Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action, http://data.europa.eu/eli/reg/2018/1999/oj.

[279] European Environment Agency, https://www.eea.europa.eu/en.

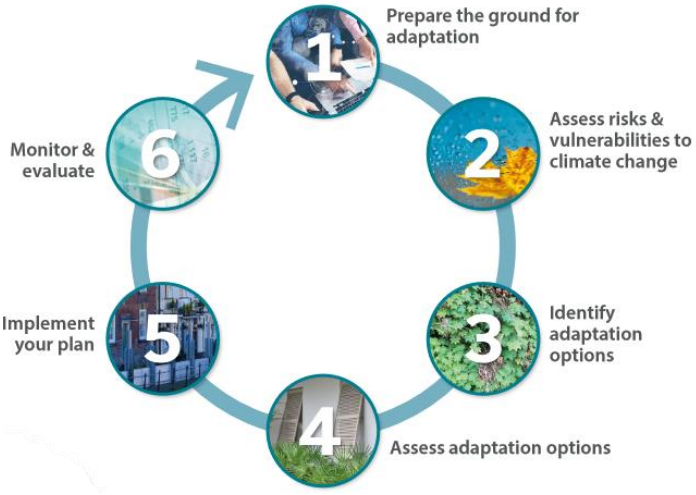
[280] Regulation (EU) 2024/1991 on nature restoration and amending Regulation (EU) 2022/869, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1991&qid=1722240349976.

[281] New EU forest strategy for 2030, https://environment.ec.europa.eu/strategy/forest-strategy_en.

[282] Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings (recast), http://data.europa.eu/eli/dir/2024/1275/oj.

As EU governance is largely based on the subsidiarity principle, EU legislation can also promote the provision of support for national and local adaptation action. While Member States are responsible for implementation on the ground and the Commission can provide support and guidance to national and local action. The institutional arrangements and initiatives presented here cover several steps of the adaptation policy cycle (Figure 35). Under the United Arab Emirates Framework for Global Climate Resilience[283], specific targets in relation to the dimensions of the iterative adaptation cycle have been adopted, and the EU is committed to implementing the Global Goal on Adaptation and its framework.

Figure 35: The adaptation policy cycle



Source: Based on Climate-Adapt – The Adaptation Support Tool[284]

As climate change can unleash cascading risks and exacerbate environmental degradation and existing drivers of conflict, displacement and migration, it is important to mainstream adaptation considerations into **non-climate policy frameworks** such as the common agricultural policy, the European security strategy, the EU mobility strategy and others. Here, risk ownership can be identified, and existing responsibilities and resources can be utilised to support adaptation action.

3.3 Impacts, risks and vulnerabilities

The **European Climate Risk Assessment (**EUCRA)[290] an independent scientific report, which was published in March 2024 by the European Environment Agency (EEA), builds on and complements the existing knowledge base on climate impacts and risks for Europe. It provides a first assessment of the main climate risks with potentially severe consequences across Europe. This assessment is a crucial step in understanding and identifying the priorities to tackle and to strengthen Europe's resilience to climate change. The EUCRA storylines illustrate what an integrated climate risk assessment could be.

This chapter provides a summary of some of the key findings of the EUCRA report on current and observed trends and hazards and the approaches, methodologies and tools, and associated

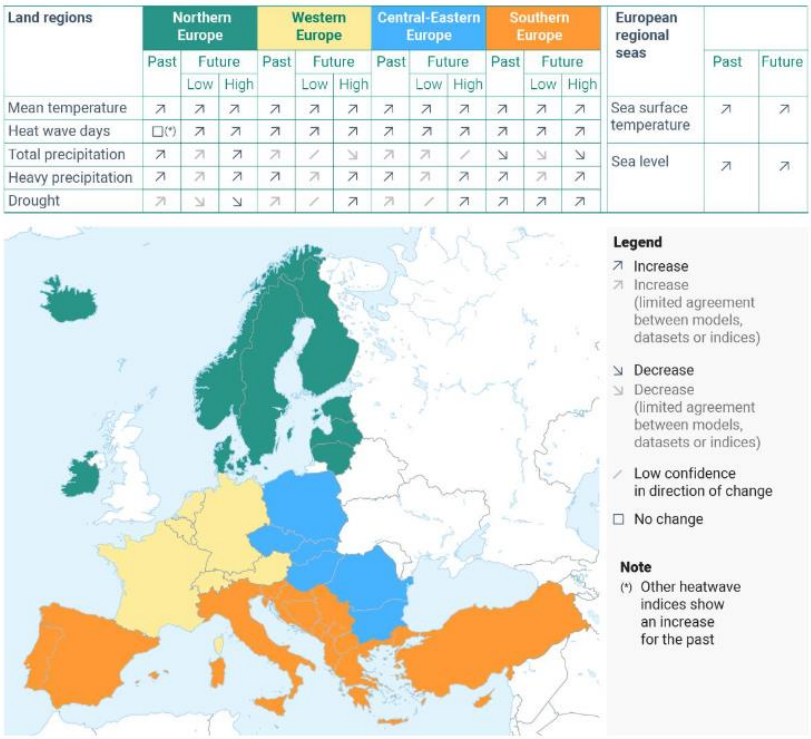
[283] Decision 2/CMA.5, Global goal on adaptation, https://unfccc.int/documents/637073.
[284] The Adaption Support Tool, https://climate-adapt.eea.europa.eu/en/knowledge/tools/adaptation-support-tool.

uncertainties and challenges to assessing climate events trends and impacts. The full report can be found on the EEA website.[285]

3.3.1 Current and projected climate trends and hazards

Europe is experiencing more and stronger climate hazards, including heatwaves and prolonged droughts, heavy precipitation leading to pluvial and fluvial floods, and sea level rise leading to coastal floods (See Figure 36).

Figure 36: Observed and projected trends in key climate-related hazards in different European regions



Notes: Underlying climate variables are: heatwaves (days with maximum temperatures above 35°C), heavy precipitation (maximum 1-day precipitation), and drought (using a standardised precipitation evapotranspiration index over 6 months (SPEI-6, Hargreaves' method)). Time periods and scenarios are past (1952-2021); future until the end of the century (2081-2100 relative to 1995-2014); low scenario (SSP1-2.6); and high scenario (SSP3-7.0).

Source: EUCRA

These climatic hazards will lead to more disasters such as droughts, floods, wildfires, diseases, crop failures, heat deaths, infrastructure damage, and structural changes to the environment. In practice, the societal preparedness, the financial and administrative capacity to recover, and physical location are the main factors determining how exposed and vulnerable we are as a society. Southern Europe will face stronger climatic pressures than the rest of Europe, as well the Arctic areas. The outermost regions have a distinct set of risks. This asymmetrical exposure to climate impacts exacerbates

[285] European Climate Risk Assessment, EEA Report No 1/2024

existing disparities between regions in terms of need for climate adaptation, risk prevention and preparedness, which can put pressure on tools for EU-wide cohesion.

3.3.2 Observed and potential impacts of climate change

EUCRA confirms the key findings of the chapter on Europe in the IPCC AR6, but it refines and extends the IPCC assessment in several ways.

The EUCRA systematic risk assessment process has identified and assessed 36 major climate risks for Europe, grouped into five broad clusters: ecosystems, food, health, infrastructure, and economy and finance (see Figure 39). Depending on their nature, each of these risks alone has the potential to cause significant environmental degradation, economic damage, social emergencies and political turbulences; however, their combined effects are even more impactful. In addition, the assessment found that all EU outermost regions (OMR) face critical risks to their marine ecosystems from ocean warming and marine heatwaves that require urgent action.

The report reveals that most EU's sectorial policies are exposed to climate risks, either directly or indirectly. Public health, environment, agriculture and energy are among those policy areas most directly affected by major climate risks in Europe that require urgent action. The EUCRA report points out that various other EU policy areas are also highly exposed, in particular, industry, trade and economic, social and territorial cohesion.

Climate risks and EU policies are interconnected in many ways. Most EU policies already include decision-making processes that can take climate risks into account. The wealth of evidence put forward in the EUCRA report feeds into these processes already.

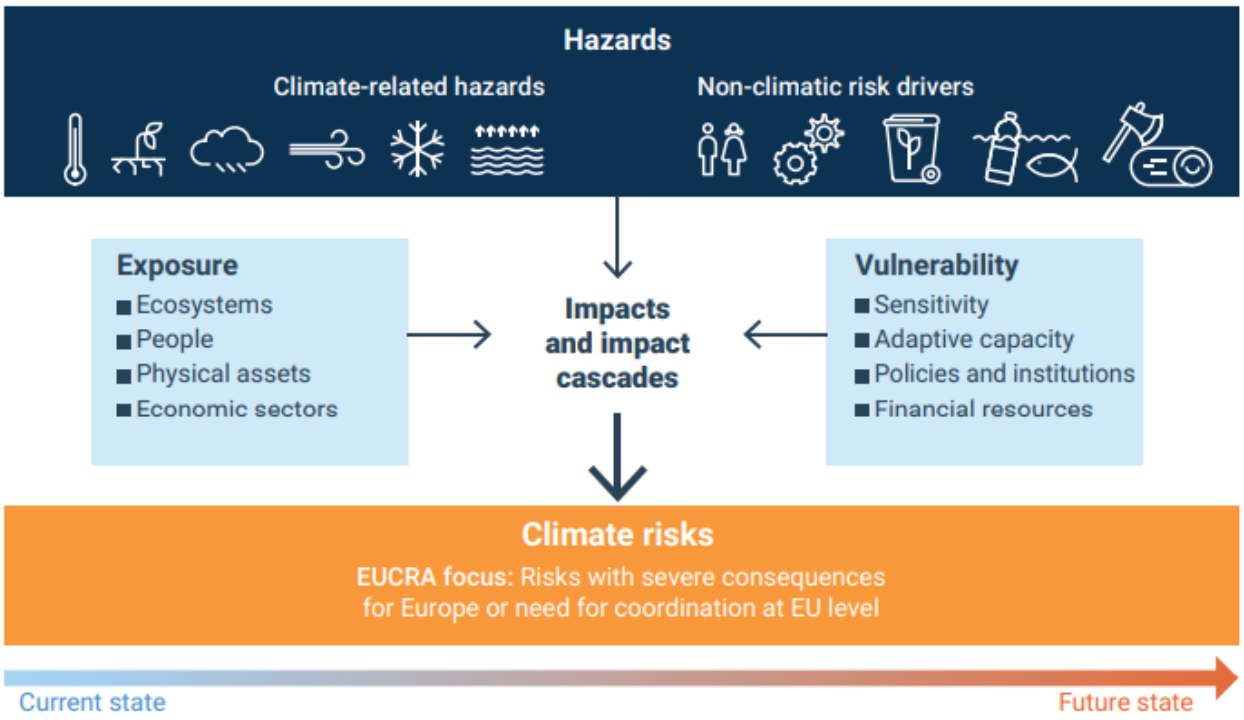
Example: of extreme climate events in 2021, 2022 and 2023 with severe societal consequence (EUCRA)

Extreme precipitation and large-scale floods took place in Germany and Belgium in 2021 (EUR 44 billion damage and more than 200 deaths), Slovenia in 2023 (damage estimated at around 16% of national GDP), and Greece in 2023 (submerging its breadbasket region). These events caused severe, direct impacts on settlements, infrastructure, agriculture and human health. They also led to wider economic impacts in the affected regions and major fiscal challenges at national levels and stretched the limits of the existing EU Solidarity Fund.

3.3.3 Approaches and methodologies

This section presents the EUCRA report′s knowledge context and analytical approach. The choices presented here take into account the fact that the first EUCRA is a fast-track assessment, conducted over about 18 months.

Figure 37: Methodological framework of EUCRA



Source: EUCRA.

3.3.3.1 European climate risk assessment methodologies

The report builds largely on available scientific knowledge, integrating various sources of evidence such as:

1. reports and data from Copernicus Climate Change Service (C3S),
2. the IPCC's Sixth Assessment Report (AR6),
3. publications from research projects funded under Horizon 2020 and Horizon Europe,
4. other relevant academic publications,
5. reports and knowledge sources produced by European institutions, including:
    a. the overview of natural and man-made disaster risks the European Union may face,
    b. the series of PESETA projects undertaken by the Joint Research Centre,
6. other products developed and managed by the EEA such as
    a. the Climate-ADAPT portal and
    b. the technical report 'Is Europe on track towards climate resilience?'.

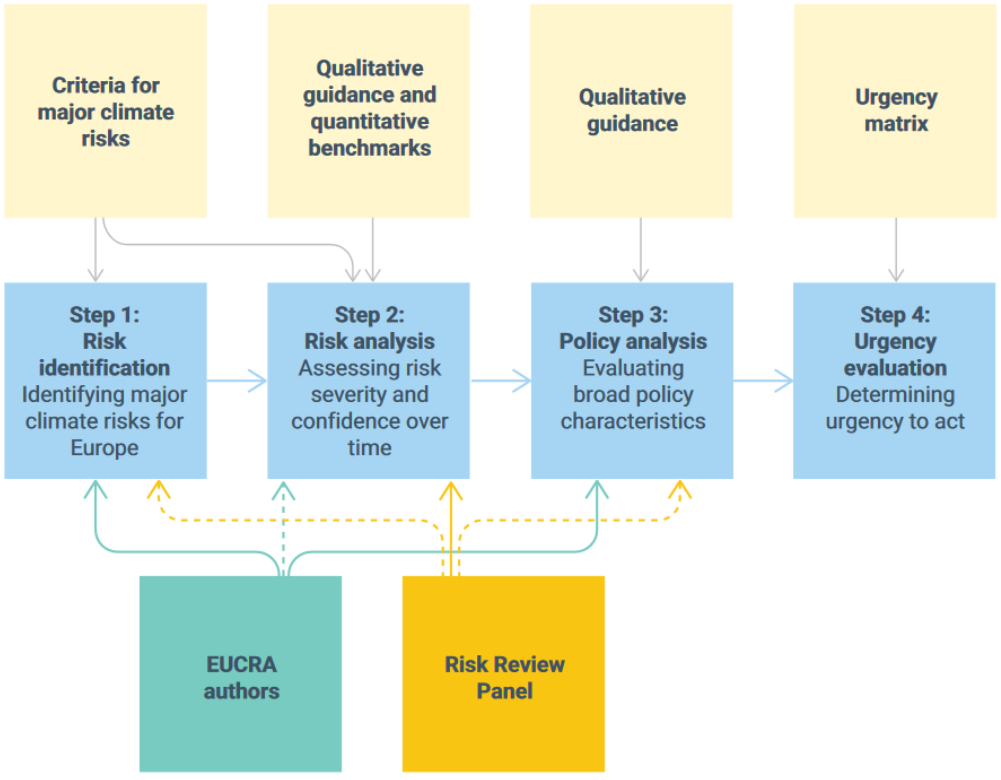
Building on this evidence, the EUCRA involved a wide range of stakeholders. It presents complex risks through risk storylines and identified 36 major climate risks for Europe. The EUCRA assesses those major climate risks according to their severity over time and confidence and determines their risk urgency in a structured way based on the outcomes of the risk and policy evaluation. The risk

evaluation phase assessed the urgency for EU action considering risk severity over time, confidence in the risk severity assessment and the temporal aspects of potential adaptation action jointly with risk ownership, policy readiness and the policy horizon.

In line with the IPCC AR6 definition, the EUCRA understands climate risk as the potential for adverse consequences for human or ecological systems. Two factors influence the severity of climate risks, namely (1) climatic hazards and (2) non-climatic risk drivers (i.e. environmental stressors, technical factors, socio-economic factors, policy aspects). Generally, the risk assessment approach in the EUCRA followed the ISO 31000 standard on risk management and ISO 14091 on adaptation to climate change with its phases of risk identification, risk analysis and risk evaluation.

Figure 38 shows the methodological framework that facilitated the structured risk assessment carried out in the EUCRA. Here, a consecutive four-step assessment process was conducted, involving a broad range of experts (European Environment Agency, European Topic Centre on Climate Change Adaptation, Joint Research Centre, Copernicus Climate Change Service), stakeholders representing the political level (Steering Group, Commission Working Group) and a community of practice (Expert Advisory Group, Risk Review Panel, European Environment Information and Observation Network).

Figure 38: Methodological Framework of the EUCRA



Source: EUCRA[286] based on EEA information.

[286] European climate risk assessment, full report, https://www.eea.europa.eu/publications/european-climate-risk-assessment.

3.3.3.2 Uncertainties and challenges

According to the EUCRA report climate uncertainty refers to the incomplete knowledge about future climate and related non-climatic conditions. It is a challenge for decision-making and adaptation planning because waiting for uncertainties to be resolved may leave little or no time for effective action. To assess risk, it is fundamental to consider how the key driving factors determining potential impacts (described in Section 2.2 of the EUCRA report) will evolve into the future.

In the EUCRA report, specific projections are presented using fixed periods in the future, which is relevant for understanding the rate of climate change and its impacts and hence the urgency for adaptation. Future changes are discussed for three periods: current/near term (2021-2040), mid-term (2041-2060) and long term (2081-2100). Using fixed periods, it is easier to identify the role of key risk drivers to explore, based on rates of historical developments and the range of future trends. Special attention is paid to the mid-term future, as this is the timeframe for guiding many adaptation policies to reduce risks associated with climate change. Scenario uncertainties grow as one proceeds into the long-term future.

Example of uncertainties and challenges (EUCRA)[287]

Projecting climate impact drivers and non-climatic impact drivers over time horizons of multiple decades into the future is a formidable challenge, especially at the fine temporal and spatial resolution commonly required for risk analysis.

For a few regions and climate drivers, recent studies revealed discrepancies that cannot be explained by either natural variability or known deficiencies of climate models that can easily be corrected. For Europe, this includes, among others, an underestimation of extreme hot days (Vautard et al., 2023) and an underestimation of drying over Europe (Douville and Willett, 2023) by CMIP6 models.

Wildcards are unpredictable and unexpected factors that may change an expected climate trajectory, pushing understanding out of the linear view offered by scenarios that do not dynamically account for interaction in the responses, learning and new experiences

3.4 Adaptation priorities and barriers

Each of the 36 major climate risks identified in the EUCRA report[288] can cause significant environmental degradation, economic damage, social emergencies and political turbulence. When combined, their impacts are even more significant. To follow up on the EU adaptation strategy, the EUCRA report proposes adaptation **priorities** for Europe, in line with their assessed risk severity.

[287] European Climate Risk Assessment, https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/key-eu-actions/climate_risk_assessment.
[288] ibid

Figure 39: Priorities identified in the EUCRA report for EU action on climate adaptation (EUCRA)



Climate risks by cluster

Ecosystems
- Coastal ecosystems
- Marine ecosystems
- Biodiversity/carbon sinks due to wildfires*
- Biodiversity/carbon sinks due to wildfires
- Species distribution shifts
- Ecosystems/society due to invasive species
- Soil health
- Aquatic and wetland ecosystems
- Biodiversity/carbon sinks due to droughts and pests
- Cascading impacts from forest disturbances

Food
- Crop production*
- Crop production
- Fisheries and aquaculture
- Food security due to higher food prices
- Food security due to climate impacts outside Europe
- Livestock production

Health
- Heat stress — general population
- Population/built enviromnent due to wildfires*
- Population/built enviromnent due to wildfires
- Wellbeing due to non-adapted buildings
- Heat stress — outdoor workers*
- Pathogens in coastal waters
- Health systems and infrastructure
- Infectious diseases
- Heat stress — outdoor workers

Infrastructure
- Pluvial and fluvial flooding
- Coastal flooding
- Damage to infrastructure and buildings
- Energy disruption due to heat and drought*
- Energy disruption due to heat and drought
- Energy disruption due to flooding
- Marine transport
- Land-based transport

Economy and finance
- European solidarity mechanisms
- Public finances
- Property and insurance markets
- Population/economy due to water scarcity*
- Population/economy due to water scarcity
- Pharmaceutical supply chains
- Supply chains for raw materials and components
- Financial markets
- Winter tourism

Note: *Hotspot region: southern Europe

Source: EUCRA[289] report

[289] European Climate Risk Assessment, Full Report, https://www.eea.europa.eu/publications/european-climate-risk-assessment.

According to the EUCRA report, the main **barriers** to tackling adaptation priorities include governance-related barriers such as departmental silos hampering effective coordination, limited administrative capacity and budgets, and the shortage of accessible tools. Public authorities do not always have coordinating bodies with sufficient political mandate. Holistic and integrated analyses that consider the socio-economic cost of climate impacts and the benefits of adaptation action and the risks of inaction are often missing.

For the five risk clusters identified by the EUCRA report, the Commission puts forward suggestions in its Communication on managing climate risks.[290]

[290] Commission Communication on managing climate risks: protecting people and prosperity, https://climate.ec.europa.eu/eu-action/adaptation-climate-change/managing-climate-risks-protecting-people-and-prosperity_en.

Barriers	Actions
Food	
The main barriers are related to established diets, rigid agricultural production methods, and a lack of the knowledge and skillsets needed for an efficient transformation to more climate-resilient agriculture.	**Food:** as part of the discussions for improving food security in the EU, the Commission will continue to work with the Member States on future-proofing EU food production. It will be necessary to create options for adaptation actions at the level of agricultural farms or fishing operations, with adequate support measures for the transition to resilient farming and fishing and sustainable incomes for farmers. Water: commission will take stock of water issues comprehensively, building upon the findings of the ongoing assessments of River Basin and Flood Risk Management Plans, as well as of the marine Programmes of Measures put in place by the Member States and on that basis consider the need for action.
Health	
Public health is under the jurisdiction of Member States, but climate change-induced health impacts are a pan-European issue and will need Europe-wide policies. Substantial institutional barriers complicate widespread implementation of health policy measures.	In the context of ongoing work, the Commission will strengthen the Climate and Health Observatory and consider further action to protect workers exposed to high heat.
Ecosystems	
Resources, stakeholder engagement	The Commission will continue to promote healthy ecosystems which support societal functions, including prevention of forest disturbances and protection of marine ecosystems. To maintain and restore the resilience of ecosystems and the services they provide, approximatively 30-50% of Earth's land, freshwater and oceans will need to be preserved. Together with the Member States, the Commission will work on guidance on developing climate resilient landscapes that can buffer the impacts of climate chance.
Infrastructure	
The lack of defined infrastructure stress tests and performance criteria poses significant barriers to progress	The Commission will seek to make building and infrastructure design standards better equipped to address climate risks, and to promote better incorporation of climate risks into transport and energy infrastructure planning, supported with relevant guidelines.
Economy and finance	
The main barriers to business-led adaptation include a lack of access to, and the limitations of, risk data, a lack of human resources and expertise, relatively short time frames for risk management, and the lack of incentives for actions in the current policy landscape (Cote & Mikaelsson, 2023; World Economic Forum, 2023).	The Commission will continue its work on helping EU companies, notably SMEs, to better manage climate risks, by making sure the evidence is reflected in various EU processes, including in assessing vulnerabilities in supply chains. Work is also underway to develop the projection of climate impacts on debt sustainability.

Based on this assessment, the Commission Communication on managing climate risks[291] notes that measures to build resilience to a given climate risk must be taken without transferring that risk to someone else in society or increasing the risk down the road (leading to maladaptation). Moreover, action must be taken systemically; solutions to address risks in one sector may need to come from another sector. Future EU adaptation policies must therefore be designed with transformational measures in mind, accompanied by appropriate support for affected communities so that no-one is left behind. To achieve that, the Communication suggests a) improving governance, b) providing tools for empowering risk owners, c) harnessing structural policies, and d) setting the right preconditions for financial resilience.

3.5 Adaptation strategies and policies

The **European Climate Law**[292] provides the foundation for increased ambition and policy coherence on adaptation.

The **EU Strategy on Adaptation** to climate change was adopted in March 2021. It sets out a blueprint for the EU to become a climate-resilient society that is fully adapted to the unavoidable impacts of climate change by 2050, through four high-level objectives: making adaptation smarter, faster, more systemic, and stepping up international action. The strategy outlines 49 actions at the EU level, to which the European Commission has committed, to deliver against the four objectives across a broader spectrum of policy areas and aligned with different time horizons: smarter adaptation, faster adaptation, more systemic adaptation and stepping up international action on adaptation to climate change.

[291] ibid

[292] 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.

Objective 1	Smarter adaptation: improving knowledge and managing uncertainty
The 2021 EU Adaptation Strategy champions the need for robust data and risk assessments to inform all sectors of society on the current and future impacts of climate change. The objective acknowledges and targets knowledge gaps and uncertainties that persist in our understanding the impacts of climate change on natural and human systems, and it aims to push these frontiers including through acquiring more and better climate-related data. It also recognises the increasing demand from society for user-friendly tools that condense complex climate information into actionable knowledge.	
Field of actions planned	1. Pushing the frontiers of knowledge on adaptation 2. More and better climate-related risk and losses data 3. Making Climate-ADAPT the authoritative European platform for adaptation
Objective 2	**More systemic adaptation: Support policy development at all levels and sectors**
This objective acknowledges that climate change impacts all societal levels and sectors and reflects the need for a correspondingly systemic response. This objective emphasises mainstreaming climate resilience considerations across all policy fields, going beyond the sectors traditionally receiving the most attention in adaptation such as agriculture and infrastructure. Encompassing 4 fields and 15 actions, it highlights three cross-cutting priorities: integrating climate adaptation into macro-fiscal policy, fostering nature-based solutions, and bolstering local adaptation action.	
Field of actions planned	4. Improving adaptation strategies and plans 5. Fostering local, individual, and just resilience 6. Integrating climate resilience in national fiscal frameworks 7. Promoting nature-based solutions for adaptation
Objective 3	**Faster adaptation: Speeding up adaptation across the board**
Physical climate has been outpacing the progress in the implementation of climate adaptation measures. To accelerate the implementation of adaptation action, resources are required that are commensurate with the challenge. Under the objective of faster adaptation 17 actions are presented, divided over four challenges: to develop and roll out solutions, to help reduce climate risk, to increase climate protection, and to safeguard freshwater access.	
Field of actions planned	8. Accelerating the rollout of adaptation solutions 9. Reducing climate-related risk 10. Closing the climate protection gap 11. Ensuring the availability and sustainability of freshwater

Objective 4	Stepping up international action for climate resilience
This objective expands the scope of EU Climate Adaptation Strategy and action to a global stage. Stronger international cooperation to achieve climate resilience is encouraged in the Adaptation Strategy through three fields and ten actions. Alignment with the adaptation-related requirements and objectives of the Paris Agreement is an important element. The Strategy further develops the EU's role in supporting international adaptation, alongside its global leadership in climate mitigation. It underscores the need for a collaborative, unified response, targeting particularly regions vulnerable to climate impacts. Encapsulating the spirit of global solidarity, the objective outlines the urgent need for additional international finance and innovation in financial mechanisms to support climate resilience worldwide. The EU will promote sub-national, national and regional approaches to adaptation, with a specific focus on adaptation in Africa, Small Island Developing States (SIDS), and Least Developed Countries (LDCs). The EU will implement the Green Agenda for the Western Balkans and strong partnerships with its neighbourhood, in particular the Mediterranean region[293]	
Field of actions planned	12. Increasing support for international climate resilience and preparedness 13. Scaling up international finance to build climate resilience 14. Strengthen global engagement and exchanges on adaptation

Member States adopt and implement national adaptation strategies and plans, taking into consideration the EU adaptation strategy as required under the European Climate Law.

The March 2024 **Commission Communication 'Managing climate risks – protecting people and property'** [306] builds on the EUCRA report and sets out key steps needed to ensure that, in the face of worsening climate risks, the public and businesses can rely on the EU and its Member States to maintain societal functions and continued access to basic services. It seeks to clarify who is responsible for making the difficult choices and taking action, informed by the best evidence. Furthermore, it shows how the EU can effectively get ahead of climate impacts in the coming years and how building resilience makes achieving other policy objectives cheaper and easier.

Moreover, strengthening preparedness for and resilience to climate impacts is a strong priority for the EU as reflected in the March 2024 **European Council conclusions**[307] which, among other things, propose the development of actions to strengthen preparedness and crisis response at EU level in an all-hazards and whole-of-society approach. These efforts are further developed in the **EU Strategic Agenda of 2024-2029** [309] and in the **Commission President-elect's Political Guidelines**[310] putting forward that the Commission will prepare a European Climate Adaptation Plan, to support Member States notably on preparedness and planning and ensure regular science-based risk assessments.

[293] The Mediterranean is a climate change hotspot, warming 20% faster than the global average – this shows the importance of supporting adaptation efforts in the Southern Neighbourhood.

3.6 Progress on implementation of adaptation

3.6.1 Implementation of adaptation within the EU and in Member States

As reported in Section 3.5, the 2021 **EU Adaptation Strategy**[294] is the centrepiece for implementation of adaptation within the EU. Its implementation and progress articulate around 49 actions and 4 central objectives.

Progress in the implementation of adaptation actions is primarily reported and monitored under the Regulation on the Governance of the Energy Union and Climate Action[295] (see section 3.7 monitoring and evaluation). EU Member States must submit to the Commission their national energy and climate plans (NECPs), which include national objectives for both mitigation and adaptation to climate change. Member States must every two years report information on their national climate change adaptation planning and strategies to the European Commission, outlining their implemented and planned actions to facilitate adaptation to climate change. Additionally, such reports include information on the national climate risk assessments, adaptation priorities, and how climate adaptation is being mainstreamed into national and sectoral policies.

3.6.1.1 EU level

In October 2023, the Commission published a **progress report on adaptation at EU level**. While the EU has made broad progress on adaptation to climate change, through the ongoing implementation of the EU Adaptation Strategy, progress has been uneven across policy areas. Moreover, due to the rapidly changing climate, especially in Europe, according to science and Member States' own reporting, there are significant and growing vulnerabilities, e.g. for agriculture, water management and the energy sector.

The 2023 Report on the implementation of the EU Strategy on Adaptation to Climate Change provides an update on the ongoing progress on the 49 EU Adaptation Strategy actions. Therefore, in this sub-section we will only report some key actions implemented or ongoing.

A. Progress under objective 1: Smarter adaptation: Improving knowledge and managing uncertainty

Mission Adaptation

To support faster adaptation, in 2021 the Commission launched the **Mission on Adaptation to Climate Change**[296]. It pursues three objectives: 1) providing general support to European regions and communities to better understand, prepare for and manage climate risks and opportunities, e.g. by preparing guidance for the development of comprehensive risk management plans; 2) accelerating transformations to climate resilience, e.g. by working with at least 150 regions and communities covering more than 40 % of the EU to accelerate their transformation to a climate-resilient future,

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294 Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change.

295 Governance regulation, article 19

296 Adaptation to climate change - European Commission, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/adaptation-climate-change_en

and 3) demonstrating systemic transformation to climate resilience, e.g. by delivering at least 75 large-scale demonstrations of systemic transformations to climate resilience across European regions and communities. The **Mission Implementation Platform**[297], operational since spring 2023, is disseminating knowledge on climate adaptation and providing a technical support facility, whereas the **Adaptation Community of Practice** offers multiple capacity-building and networking opportunities. The first Horizon Europe Mission-funded projects began in January 2023, helping regions and local authorities develop climate risk and vulnerability assessments and demonstrating transformative adaptation solutions.

Update and expand Climate-ADAPT

Substantial work and resources were assigned to expand the capabilities, content, user and contributor base, outreach, and impact of the Climate-ADAPT knowledge exchange platform hosted by the EEA. Since its launch more than 10 years ago, the European knowledge exchange platform Climate-ADAPT[298] has been supporting and driving EU adaptation policy and practice. It provides access to essential adaptation data and information, catalyses the uptake of proven adaptation solutions, and mobilises people and organisations across Europe to make adaptation happen. The Climate-ADAPT platform also hosts various other sites, such as the European Climate Data Explorer[299], and the web portals of the European Climate and Health Observatory[300] and the Mission on Adaptation to Climate Change[301].

B. Progress under objective 2: More systemic adaptation: Support policy development at all levels and sectors

Improving adaptation strategies and plans

The European Commission worked with Member States to develop a new set of guidelines for their national adaptation strategies and plans, which were published in 2023[302]. The Commission is helping Member States adopt a whole-of-government approach to climate adaptation policymaking by way of multilevel coordination and mainstreaming. The guidelines also include a comprehensive list of key features of adaptation policy, including a call for legal frameworks instead of soft policies, regularly updated adaptation strategies and plans, climate risk assessments, involvement of all relevant stakeholders and all levels of administration, and continuous monitoring and evaluation of all adaptation actions. The guidelines also put forward topics that need to be considered such as nature-based solutions and just resilience.

[297] EU mission on Adaptation to Climate Change Portal, https://climate-adapt.eea.europa.eu/en/mission
[298] Climate-ADAPT, https://climate-adapt.eea.europa.eu/en
[299] European Climate Data Explorer (europa.eu), https://climate-adapt.eea.europa.eu/en/knowledge/european-climate-data-explorer/
[300] European Climate and Health Observatory (europa.eu), https://climate-adapt.eea.europa.eu/en/observatory
[301] Adaptation to climate change - European Commission (europa.eu), https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/adaptation-climate-change_en
[302] Commission guidelines on Member States' adaptation strategies and plans, https://climate.ec.europa.eu/news-your-voice/news/building-climate-resilient-future-2023-07-26_en

Advancing towards climate resilience in Europe

The EEA published a report on advancing towards climate resilience in Europe[303] providing an overview of how all EU Member States were adapting to climate change at that time and were reporting on their adaptation actions in 2021.

Fostering local, individual, and just resilience.

In 2021, the Commission also launched as a pilot initiative, the Policy Support Facility (PSF)**, expanding the** EU Covenant of **Mayors**, to assist capacity building on climate action at subnational level, including adaptation. The **European Climate Pact** was launched the same year to provide information and tools to support grassroots mobilisation of climate action among people in the EU.

Within the EU Covenant of Mayors, as of June 2023, over 4500 of the 11.700 signatories – representing more than 230 million inhabitants – have made commitments to act on adaptation to climate change.

Update its 'Better regulation' guidelines

To support a systemic approach to policy development, the Commission has stepped up work to systematically integrate adaptation action in sectoral strategies and plans. It now also requires a **consistency check with adaptation objectives in its impact assessments**, as a result of the update to its Better Regulation instruments, to ensure that new EU policies are consistent with climate goals, in particular the climate-neutrality objective and the objective to ensure progress on adaptation.

C. Progress under objective 3: Faster adaptation: Speeding up adaptation across the board

Accelerating the rollout of adaptation solutions

The implementation of the Horizon Europe Mission on Adaptation to Climate Change is well underway, alongside other adaptation-relevant Missions on Soils, Oceans and Water, and Cities. The Mission Implementation Platform[304] disseminating knowledge on climate adaptation and providing a technical support facility, is operational since spring 2023.

Reducing climate-related risk

Furthermore, the Commission published **technical guidelines on climate-proofing infrastructure**[305] in 2021 and on enhancing the climate resilience of buildings in 2023. This guidance supports the mainstreaming of climate considerations in present and future investment and in the development of infrastructure projects. The guidance helps investors to make informed decisions on projects deemed compatible with the Paris Agreement and the EU's climate objectives. Section 3.8 presents the EU's measures for averting, minimising and addressing climate risk loss and damage.

D. Progress under objective 4: Stepping up international action for climate resilience will be further developed in

[303] EEA Report No 11/2022

[304] EU Mission on Adaptation to Climate Change Portal, see https://climate-adapt.eea.europa.eu/en/mission

[305] Commission Notice — Technical guidance on the climate proofing of infrastructure in the period 2021-2027. EUR-Lex - 52021XC0916(03) - EN - EUR-Lex (europa.eu)

The Commission supports EU Partner Countries as part of its bilateral and regional dialogues and financial programming exercises, including in their efforts to set up and implement their Nationally Determined Contributions, National Adaptation Plans, Disaster Risk Reduction Strategies, and reporting on the Sendai Framework indicators, which sets out the overall objective to substantially reduce disaster risk and losses, including those related to climate. An example of EU continued support to help increase climate resilience globally can be found in Section 4.6.3 below.

To improve knowledge and develop solutions for smarter adaptation, and to address knowledge gaps on climate impacts and resilience, the Commission has regularly published new calls for projects under different pillars and clusters of the Horizon Europe research programme.

3.6.1.2 Member States level

In December 2023, the Commission published a **progress report on adaptation in each individual EU Member State**[306]. It notes that further progress has been made in assessing climate-related hazards, vulnerabilities and risks, confirming that enhancement, expansion, and deepening of the knowledge base on climate risks is a continuous and ongoing process in many countries. It shows that **Member States need to take significantly more action to adapt to climate change** – for instance, on governance, funding, risk assessments, nature-based solutions, as well as on monitoring, reporting and evaluation in order to reduce their social and economic vulnerabilities to the intensifying climate-related risks. The number of countries with legal obligations to conduct climate risk assessments has increased. In several of those countries in which climate laws have been newly enacted or amended, preparation and periodic updates of climate risk assessments have been legally anchored in legislation and are usually coupled to revision cycles of the national adaptation strategy, the national adaptation plan, and sectoral and/or regional adaptation plans. However, countries with legal commitments are still in the minority. On the basis of this assessment, the Commission issued recommendations to Member States in December 2023.

The Commission is also assessing the **draft updated NECPs of the Member States** following the recommendation sent to Member States from December 2023 onwards.

Finally, in May 2024, the European Commission published a report[307] **on the operation of the European Climate Law and of the Effort Sharing Regulation and on the Emissions Trading System Directive in the context of the global stocktake**. It finds that the EU has successfully set the long-term directions for policies and investments. This goes hand in hand with the efforts to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, as demonstrated in the Communication on managing climate risks[308] and the EUCRA.

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306 Assessment of progress on climate adaptation in the individual Member States, https://climate.ec.europa.eu/document/download/398491c4-4c35-4d9d-a4ac-929c8edf8f44_en?filename=SWD_2023_932_1_EN.pdf

307 Commission Communication COM/2024/196 on the operation of the European Climate Law and of the Effort Sharing Regulation, and on the Emissions Trading System Directive in the context of the global stocktake, p.12, https://data.consilium.europa.eu/doc/document/ST-10053-2024-INIT/en/pdf

308 Commission Communication COM/2024/91 on managing climate risks, https://climate.ec.europa.eu/eu-action/adaptation-climate-change/managing-climate-risks-protecting-people-and-prosperity_en.

3.6.2 Findings of the IPCC Sixth Assessment Report (AR6)

Very much in line with the EUCRA, the 2022 IPCC AR6 Working Group II report concludes that, in recent years, the EU and its Member States have significantly increased (1) the knowledge on adaptation in public and private sectors, (2) the number of policy and legal frameworks, and (3) dedicated spending on adaptation[309]. While the range of available adaptation options has increased in most of Europe in recent years, information provision, technical measures and government policies are the most commonly implemented[310]. The IPCC found that transformative adaptation actions across Europe were limited to only a few local examples[311]; thus, many regions remained under-prepared. This assessment was confirmed by the EUCRA report and the IPCC statements that current adaptation implementation is not happening at the 'scale, depth and speed needed to avoid risks' and that 'existing and planned adaptation measures are not sufficient to avoid the residual risk, especially beyond 1.5 °C global warming level'[312].

3.6.3 EU contributions to international adaptation efforts

As part of the international component of the EU Adaptation Strategy, and other international commitments, the EU supports international climate resilience and preparedness by scaling up finance and encouraging stronger global engagement and exchanges on adaptation. The EU's international support for scaling up climate resilience beyond Europe fall under objective 4 of its Adaptation Strategy (see Section 4.5)

Detailed information on financial, technological and capacity-building support provided to developing countries can be found in Chapter 4 (support provided and mobilised).

Examples of the EU international engagement that are focussed on adaptation, or include adaptation components, are: the Team Europe Initiative (TEI) on Climate Change Adaptation and Resilience in Africa, introduced to strengthen the resilience of the most vulnerable populations against climate and natural hazard risks ; in Central Asia, the TEI on Water[313], Energy and Climate Change; in Latin America, the TEI in the Amazon Basin, including one on Tropical Forests in Brazil. The EU has also joined initiatives such as the Africa Adaptation Initiative, the International Coral Reef Initiative, and the All-Atlantic Ocean Research and innovation Alliance.

Another example of the EU's engagement is the support to partner countries in the design of policies and incentives to promote climate resilient investment, including in nature-based solutions through multilateral outreach, including through the High Ambition Coalition and the Leaders' Pledge for Nature, to ensure that the internationally agreed definition of a nature-based solution is ambitious in terms of climate and biodiversity and is accompanied by robust sustainability safeguards.

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309 IPCC WG II AR6 chapter 13.
310 Ibid.
311 Ibid.
312 Ibid.
313 EU Transboundary water cooperation, https://international-partnerships.ec.europa.eu/policies/climate-environment-and-energy/transboundary-water-cooperation_en

All these actions contribute to the thematic targets in paragraph 9 of the decision on the UAE Framework for Global Climate Resilience[314]. In addition, these activities support the dimensional targets contained in paragraph 10 of the same decision, namely impact, vulnerability and risk assessment; planning; implementation; and monitoring, evaluation and learning.

3.6.4 Funding climate change action

The EU has a number of **instruments in place to finance adaptation** to climate change in Europe. The 2021-2027 multiannual financial framework ensures that the contribution of the EU budget to achieve climate objectives overall (both mitigation and adaptation) is set at a minimum of 25% and will rise to at least 30% no later than 2027[315].

Within this, at least 30% of the European Regional Development Fund and 37% of the Cohesion Fund investments will contribute to climate objectives. The planned amount of EU investments under the Cohesion Policy 2021-2027 related to climate adaptation is EUR 12.9 billion, adding up to EUR 17.3 billion with national contributions also included. The Recovery and Resilience Facility (with about EUR 648 billion committed in the national recovery and resilience plans) includes a requirement to contribute to the green transition pillar, and measures attributed to the policy area dedicated amounts to about 2% of the funding linked to the green pillar.

Further important funding streams related to adaptation are, for example, the European Structural and Investment Funds[316] (including the European Regional Development Fund, which includes priorities for a smarter, greener Europe[317] and the Cohesion fund to support investments in environment and trans-European networks in transport infrastructure[318]), the Common Agricultural Policy[319], the LIFE Programme with a sub-programme for adaptation[320], the Horizon Europe programme, which funds research and innovation[321], and InvestEU. As one of the world's main financiers of climate action, the European Investment Bank (EIB) invests in a wide range of climate change adaptation projects[322]. Further EU funding of adaptation is summarised on the European Climate Adaptation Platform CLIMATE-ADAPT.[323]0

[314] Decision 2/CMA.5, Global goal on adaptation.
[315] Multiannual financial framework, 2nd Draft - closed for comments BTR1 - 20240830_Commented
[316] European Structural and Investment Funds, https://ec.europa.eu/info/funding-tenders/funding-opportunities/funding-programmes/overview-funding-programmes/european-structural-and-investment-funds_en
[317] European Regional Development Fund, https://ec.europa.eu/info/funding-tenders/funding-opportunities/funding-programmes/overview-funding-programmes/european-structural-and-investment-funds_en
[318] Cohesion Fund, https://ec.europa.eu/regional_policy/en/funding/cohesion-fund/
[319] Common agriculture policy, https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en
[320] LIFE Programme, https://cinea.ec.europa.eu/programmes/life_en
[321]Horizon 2020, https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en
[322] EIB climate action explained, https://www.eib.org/en/projects/topics/climate-action/explained
[323] EU funding of adaptation, https://climate-adapt.eea.europa.eu/eu-adaptation-policy/funding

3.7 Monitoring and evaluation

Monitoring progress on adaptation implementation is critical for assessing if and when further actions are needed and for evaluating whether adaptation is successful[324]. In the EU, monitoring, reporting and evaluation have therefore been planned or implemented at different levels for different purposes. The European Climate Law requires the European Commission to regularly assess progress in adapting to climate change based on the reports submitted by the Member States and other sources. These reports are due **every second year** under the **Governance Regulation**[325]. Article 19 of this Regulation requires Member States to report information on their national climate change adaptation planning and strategies, outlining their implemented and planned actions for adapting to climate change. The EEA has set up a platform to facilitate the fulfilment of these reporting requirements, called Reportnet[326].

In addition to the mandatory reporting by EU Member States, EEA member countries that are not EU Member States were invited to report on adaptation voluntarily. The analysis of the information reported from 2021 is in the 2022 EEA report 'Advancing towards climate resilience in Europe – Status of reported national adaptation actions in 2021'[327]. All information reported by countries under the Governance Regulation can be found in the country profiles on Climate-ADAPT[328], and adaptation-relevant information in Member States' NECPs is available on the Climate and Energy in the EU portal[329].

Article 17 of the Governance Regulation requires Member States to report through their national energy and climate plans (NECP) on how they are contributing to the achievement of the goals of the Energy Union and the Paris Agreement (see also Section 2.1.2). In 2023-2024, EU Member States submitted draft and final updated NECPs, and the European Commission assessed the information in them, in particular on national adaptation goals. The results of this assessment are available as an EU-wide report and individually for each Member State[330].

The country profiles present the latest information as updated by each country. The Technical Paper 'Is Europe on track with climate resilience? – Status of reported national adaptation actions in 2023' also summarises the available reported information on adaptation from Member States[331].

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[324] IPCC WG II AR6 chapter 13.

[325] Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action,

[326] https://reportnet.europa.eu/ and https://cdr.eionet.europa.eu/.

[327] Advancing towards climate resilience in Europe: status of reported national adaptation actions in 2021.

[328] Country profiles at Climate – ADAPT, https://www.eea.europa.eu/publications/advancing-towards-climate-resilience-in-europe

[329] Climate and Energy in the EU, https://climate-energy.eea.europa.eu/topics/climate-change-adaptation/adaptation-progress-to-targets/data

[330] National energy and climate plans, https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en

[331] Is Europe on track with climate resilience? – Status of reported national adaptation actions in 2023, https://www.eionet.europa.eu/etcs/etc-ca/products/etc-ca-technical-paper-2-23-is-europe-on-track-with-climate-resilience-2013-status-of-reported-national-adaptation-actions-in-2023

The implementation status of the EU Adaptation Strategy was summarised by the Commission in the Climate Action Progress Report in October 2023[332]. A detailed assessment of progress on climate adaptation in the individual Member States in accordance with the European Climate Law was published in December 2023[333]. A first detailed assessment of Member States' adaptation policies can be found in the 2020 EEA report 'Monitoring and evaluation of national adaptation policies throughout the policy cycle'[334].

An analysis of the information reported by Member States in March 2023 under the Governance Regulation included the following key findings[335]:

- Heat waves, droughts, floods and heavy precipitation are the most reported observed extreme weather events, while changing temperatures and hydrological variability are the most common chronic hazards. For most temperature- and water-related hazards most countries report an expected increase of frequency and/or intensity for the future.
- National climate risk assessments are increasingly used to inform adaptation policy development. Almost half of the reporting countries have delivered these new assessments since 2021, although countries with legal obligations for repeated climate risk assessments are still an exception and a minority of countries have yet to produce their first national overarching assessment.
- The adaptation policy landscape is gradually evolving, and climate laws are increasingly emerging as an instrument to give greater legal power to such policies. Nine new national adaptation strategies and/or plans have been approved and adopted by countries since 2021, while other countries are still in the process of revising and adopting them.
- Subnational adaptation policymaking is further progressing in all countries, mostly due to voluntary and bottom-up initiatives. Multilevel networks and collaborative mechanisms are reported to be crucial for advancing local adaptation and supporting subnational governments and stakeholders through capacity-building activities, information provision, guidance, and financing schemes.
- Governance-related challenges are a persistent barrier to the implementation of adaptation actions in many countries, even where well-developed governance frameworks are in place. These challenges include difficulties with coordination due to limitations in financial, technical and human capacities.

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[332] Report on the implementation of the EU strategy on adaptation to climate change, https://climate.ec.europa.eu/document/download/72286a42-61af-4e8a-a51a-29a58c90274e_en?filename=swd_2023_338_en.pdf

[333] Assessment of progress on climate adaptation in the individual Member States according to the European Climate Law, https://climate.ec.europa.eu/system/files/2023-12/SWD_2023_932_1_EN.pdf

[334] Monitoring and evaluation of national adaptation policies throughout the policy cycle, https://www.eea.europa.eu/publications/national-adaptation-policies

[335] Is Europe on track with climate resilience? – Status of reported national adaptation actions in 2023, https://www.eionet.europa.eu/etcs/etc-ca/products/etc-ca-technical-paper-2-23-is-europe-on-track-with-climate-resilience-2013-status-of-reported-national-adaptation-actions-in-2023

- EU funds play a major role in financing adaptation action for most Member States. Some Member States also reported having dedicated national adaptation funds in place to finance the implementation of national or sectoral adaptation actions.
- An indicator-based approach to monitoring, reporting and evaluation is often reported, although the indicator types and how they contribute to evaluation purposes are not always clear.

The 2024 report 'Preventing and managing disaster risk in Europe'[336] shows that climate-related risks are high on the disaster risk management agenda across Europe. However, it also shows that while climate risks are mostly acknowledged, civil protection risk assessments rarely consider climate scenarios and uncertainties.

The Member States' assessments of risks to critical infrastructure are due by January 2026 under the Critical Entities Resilience Directive. Current budgetary outlook assessments do not consider climate risks systematically. Overall, while the processes and requirements agreed upon in EU policy frameworks can address climate risks, implementation falls short of providing reasonable assurance. Progress is therefore uneven and is not keeping pace with accelerating climate change. The report found that both the EU and its Member States must become significantly better at preparing for and effectively addressing climate risks[337].

The Commission **report on the Review of the Regulation on the Governance of the Energy Union and Climate Action[338]**, published on 11 September 2024, acknowledges that the NECPR process under the Governance Regulation contributed to enhancing the completeness of information reported by Member States. However, the report identified several areas which could be improved. This specifically relates to the scope and quality of reported information on climate change adaptation measures (Article 19(1)).

The Commission is further improving user access to guidance documents, tools, information and data, including at local level, and will monitor the use of the guidance tools. It will also seek better qualitative and quantitative indicators on progress on resilience, including in conjunction with other interlinked and relevant indicators, to ensure a systemic approach (see Section 3.3.3). The EU and its Member States strongly support the work being done on indicators for measuring the Global Goal on Adaptation, also in the context of the UAE Framework for Global Climate Resilience.

3.8 Averting, minimising and addressing loss and damage

Extreme events around the world in 2023 had significant impacts on human health, ecosystems, nature and infrastructure. Among the most exceptional were flooding, wildfires, drought and extreme

[336] Preventing and managing disaster risk in Europe, https://civil-protection-knowledge-network.europa.eu/media/preventing-and-managing-disaster-risk-europe
[337] Commission Communication on protecting people and prosperity, https://climate.ec.europa.eu/eu-action/adaptation-climate-change/managing-climate-risks-protecting-people-and-prosperity_en
[338] COM(2024) 550 final, p. 12 to 14. EUR-Lex - 52024DC0550 - EN - EUR-Lex

heat[339]. „ Glaciers are melting and there are changes in the pattern of precipitation. An increase in extreme rainfall is leading to catastrophic events, such as the widespread flooding seen in Italy, Greece, Slovenia, Norway and Sweden in 2023. Meanwhile, southern Europe is seeing widespread droughts"[340]. Slow onset events, such as desertification, loss of biodiversity, land and ecosystem degradation, ocean acidification or sea level rise are equally destructive over the long term[341].

Such climate-related **hazards**, pose risks to human health, the environment, food production and supply, infrastructure and can lead to economic losses.

As mentioned above, the new EU strategy on adaptation to climate change is the cornerstone for scaling up ambitious EU domestic and international actions and measures for making adaptation actions smarter, more systemic, faster and global and building resilience and preparedness.

As a consistent understanding of **'loss' and 'damage'** has not yet been established – loss is sometimes understood to mean harm to (non-)human life and health and at other times economic loss, while damage is sometimes understood as damage to infrastructure and at other times metaphorically as climate damage[342] – this report cannot adhere to a consistent usage of these terms. Nevertheless, their impact can be diverse (drought, coastal erosion, flooding etc...) devastating and long-lasting affecting not only the environment but also human health, livelihoods, and well-being. Thus, the need to distinguish between economic and non-economic loss and damage. However, they all required proactive approach to adaptation and building resilience is needed.

Economic loss and d damage [343]	Non-economic loss and damage[344]
Can be understood as the loss of resources, goods and services that are commonly traded in markets (e.g. infrastructure, economic disturbance)	Can be understood as the remainder of items that are not commonly traded in markets (e.g. loss of life or health, loss of territory, cultural heritage and identity, indigenous knowledge, loss of biodiversity or loss of entire ecosystems).

Ample information on impacts, risks and vulnerabilities and the EU's institutional arrangement to implementation of EU's strategy on adaptation to climate change is provided above (see Sections 3.3, 3.5 and 3.6).

This section will focus on a sample of EU's measures and instruments in place to avert and minimise and address adverse effects of climate change loss and damage.

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[339] Copernicus climate highlights 2023, https://climate.copernicus.eu/global-climate-highlights-2023
[340] ibid
[341] Kees van der Geest, Romy van den Berg, Slow-onset events: a review of the evidence from the IPCC Special Reports on Land, Oceans and Cryosphere, Current Opinion in Environmental Sustainability, Volume 50, 2021, Pages 109-120,
[342] Understanding Loss and Damage, https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733598/EPRS_BRI(2022)733598_EN.pdf
[343] Loss and damage online guide, https://unfccc.int/sites/default/files/resource/Online_Guide_feb_2020.pdf
[344] ibid

The EU has several initiatives, programmes, sectorial legislations, strategies and projects in place to help avert, minimise and address loss and damage. These range from early warning systems to helping communities, livelihoods and ecosystems be resilient.

Type of initiatives	Initiatives
Civil protection[345] and disaster management	- the EU Civil Protection Mechanism; - the Emergency Response Coordination Centre; - the European Civil Protection Pool - Disaster Risk Management Knowledge Centre[346]
EU Mission in Europe: Adaptation to Climate Change	- EU Mission: Adaptation to Climate Change - Restore our Ocean and Waters - EU Mission: Climate-Neutral and Smart Cities - EU Mission: A Soil Deal for Europe
Example: **Preparing society for climate risks in Europe — lessons and inspiration from Climate-ADAPT case studies[347]** Climate -ADAPT: new EEA briefing shares lessons learnt from the analysis of more than one hundred Climate-ADAPT case studies. It shows that sharing examples of adaptation actions can boost learning across the EU, Member States as well as regional and local authorities to help societies better prepare for climate change.	
Nature and Biodiversity LIFE Programme	- the EU Nature Restoration Law[348] and the Marine Action Plan[349] - the Birds350 and Habitats Directives[351] - Natura 2000[352] - Biodiversity strategy for 2030353
Example: EU action plan for protecting and restoring marine ecosystems[354] In 2023 the EU action plan Protecting and restoring marine ecosystems for sustainable and resilient fisheries resents the outcome of the targeted consultation and call for evidence to support the "Action Plan to conserve fisheries resources and protect marine ecosystems",	

[345] EU Civil Protection Mechanism - European Commission
[346] EU disaster management centre
[347] Preparing society for climate risks in Europe — lessons and inspiration from Climate-ADAPT case studies
[348] EU Nature Restoration Law, https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-law_en
[349] EU Action plan: Protecting and restoring marine ecosystems for sustainable and resilient fisheries, https://oceans-and-fisheries.ec.europa.eu/policy/common-fisheries-policy-cfp/action-plan-protecting-and-restoring-marine-ecosystems-sustainable-and-resilient-fisheries_en
[350] Birds Directive, https://environment.ec.europa.eu/topics/nature-and-biodiversity/birds-directive_en
[351] Habitats Directive, https://environment.ec.europa.eu/topics/nature-and-biodiversity/habitats-directive_en
[352] Natura 2000, https://biodiversity.europa.eu/europes-biodiversity/protected-areas/explore-natura-2000
[353] Biodiversity strategy for 2030 - European Commission, https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en
[354] European Commission: Directorate-General for Maritime Affairs and Fisheries, EU action plan – Protecting and restoring marine ecosystems for sustainable and resilient fisheries – Synopsis of the open targeted consultation outcomes, Publications Office of the European Union, 2023, https://data.europa.eu/doi/10.2771/731784

announced in the EU Biodiversity Strategy for 2030, and renamed "EU Action plan: Protecting and restoring marine ecosystems for sustainable and resilient fisheries".	
European early warning and information[355]	- Global disaster alert and coordination system - The European flood awareness system and global flood awareness system - The European forest fire information system and global wildfire information system - The European and global drought observatories
Example: **MeteoAlarm[356],** an early warning dissemination system that visualises, aggregates and provides accessible awareness information from 38 European national meteorological and hydrological services.	
Earth observation Research and knowledge sharing	- Copernicus climate change service[357] - Copernicus Data Space Ecosystem[358] and WEkEO[359] - Galileo Emergency Warning Satellite Service is underway[360] - PESETA report[361]
Example: Destination Earth (DestinE)[362] The weather-Induced Extremes Digital Twin offers global information at kilometer-scale resolution for several days ahead, also creating a capability to 'zoom in' on severe events across Europe. It intends to support authorities to safeguard lives and properties and prepare for extreme events in a warming world.	

The following are related to risk insurance facilities, sustainable finance solutions:

Between 2022 and 2024, the **Climate Resilience Dialogue**[363] brought together policymakers, insurers, risk managers, consumers, municipal authorities and other stakeholders to discuss and identify possible actions, both on insurance and investment in adaptation, to help narrow the climate protection gap (the gulf between how much is lost and how much is insured).

The **EU sustainable finance strategy**[364] has a key role to play in delivering on the policy objectives under the European Green Deal as well as the EU's international commitments on climate and sustainability objectives. It does this by channelling private investment into the transition to a climate-

[355] European Early Warning and Information Systems - European Commission, https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/european-early-warning-and-information-systems_en

[356] MeteoAlarm, https://www.meteoalarm.org/en/live/page/about-meteoalarm#list

[357] Copernicus climate change service

[358] Copernicus Data Space Ecosystem, https://dataspace.copernicus.eu/

[359] ibid

[360] Galileo emergency warning satellite service, https://defence-industry-space.ec.europa.eu/galileo-emergency-warning-satellite-service-underway-2024-01-24_en

[361] JRC Peseta iv, https://joint-research-centre.ec.europa.eu/scientific-activities-z/peseta-climate-change-projects/jrc-peseta-iv_en

[362] Destination earth, https://digital-strategy.ec.europa.eu/en/policies/destination-earth

[363] EU Climate resilience dialogue, https://climate.ec.europa.eu/eu-action/adaptation-climate-change/climate-resilience-dialogue_en

[364] EU sustainable finance strategy, https://commission.europa.eu/business-economy-euro/banking-and-finance/sustainable-finance_en

neutral, climate-resilient, environmentally sustainable, resource-efficient and fair economy, as a complement to public money.

The new EU strategy for adaption to climate change the EU committed to '**support and promote partner countries in developing local**, national and regional adaptation and strategies for disaster risk reduction. It will continue working with African initiatives and institutions supporting regional adaptation and disaster risk management. These efforts will capitalise on the "Team Europe" approach and will pursue integration between adaptation, development and humanitarian aid.' Chapter 4 and Section 3.6.3 outline how the EU is increasing support **for international climate resilience and preparedness.**

3.9 Cooperation and good practices

The rapid rise in climate risks across Europe requires new ways of cooperating across governance levels to make tangible and measurable progress in reducing the most urgent climate risks. Such approaches are informed by experiences with the EU Mission on Adaptation to Climate Change and other relevant EU instruments and policies (see Sections 3.2 and 3.5).

The EU Mission on Adaptation to Climate Change supports a group of pioneering regions and local authorities with tools and innovative solutions to help them become climate-resilient by 2030, so they can serve as examples of best practice for all interested parties[365]. As of 2024, more than 100 regions are participating in Mission projects. A total of 311 regional and local authorities from 25 EU Member States have signed the Mission Charter, thereby committing themselves to becoming climate-resilient by 2030 by boosting regional and local adaptation efforts to reach their adaptation goals. In addition, 63 other organisations, including research institutions and businesses, have become Friends of the Mission, endorsing it and contributing to its 750-member Community of Practice[366].

The tools developed by the Mission on Adaptation to meet the needs of local and regional authorities include the Regional Adaptation Support Tool (RAST). It has been explicitly designed to help with their climate change adaptation strategies and plans – from development and implementation through to monitoring, evaluating and updates. RAST provides practical guidance in six steps aligned with the key features of climate adaptation policy processes. Each step includes an overview and a detailed support section, with practical and actionable guidance supplemented by resources (data providers, examples and tools) from the EU Mission on Adaptation, **Climate-ADAPT** (see below) and other partners helping local and regional authorities across the EU[367].

The **Mission on Adaptation** is also supporting cooperation to help regions and local authorities in their adaptation journey. This happens, for example, by sharing stories showcasing the successful implementation of effective climate adaptation solutions across Europe, and by sharing mission case studies, resources, and effective ways to get people engaged. This demonstrates the power of

[365] EU Mission: Adaptation to climate change, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/adaptation-climate-change_en

[366] EU Mission on adaptation : Regions and local authorities, https://climate-adapt.eea.europa.eu/en/mission/the-mission/regions-and-local-authorities

[367] EU Mission on Adaptation: RAST support tool, https://climate-adapt.eea.europa.eu/en/mission/knowledge-and-data/regional-adaptation-support-tool

collaborative action and innovative approaches in addressing climate challenges and creating a more resilient and sustainable future for Europe[368].

Other elements of European efforts to share information, good practices, experience and lessons learnt to improve adaptation action comprise, among others, the following initiatives.

(a) **Horizon Europe**. This is the EU's key funding programme for research and innovation with an overall budget of EUR 95.5 billion of which 35% is allocated to climate-related actions. It tackles climate change, helps to achieve the UN's Sustainable Development Goals and boosts the EU's competitiveness and growth. Through its design and participation rules, the programme facilitates collaboration across the EU and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges. It supports the creation and better dissemination of excellent knowledge and technologies across the EU[369].

(b) **Climate-ADAPT**. This is a partnership between the European Commission and the EEA, maintained by the EEA with the support of the European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation (ETC/CCA). Climate-ADAPT aims to support Europe in adapting to climate change by helping users to access and share data and information on expected climate change in Europe; the current and future vulnerability of regions and sectors; EU, national and transnational adaptation strategies and actions; adaptation case studies and potential adaptation options, and tools that support adaptation planning. The platform includes a database that contains quality-checked information that can be easily searched[370].

(c) **Interreg**. This is one of the key EU instruments for supporting cooperation across borders through project funding. It aims to jointly tackle common challenges and find shared solutions in areas such as health, the environment, research, education, transport, sustainable energy and more. The current period's EUR 10 billion budget features strengthened cooperation with partner countries and a dedicated strand for the EU's outermost regions and neighbouring countries.

(d) **LIFE programme**. This is the EU's funding instrument for the environment and climate action. It was launched in 1992 and has co-financed thousands of projects in environmental protection. While it has always had a strong focus on nature protection and biodiversity, the current programme period also includes funding projects on the circular economy and quality of life, climate change mitigation and adaptation, and clean energy transition[371].

Beyond these efforts to develop science, planning and policies relevant to adaptation, policy innovation and pilot and demonstration projects, the EU puts a specific focus on **strengthening scientific research.** For example, it supports research aimed at deepening understanding of climate change (including research, systematic observation and early warning systems), vulnerability and

[368] EU Mission on Adaptation: adaptation solutions, https://climate-adapt.eea.europa.eu/en/mission/solutions.
[369] Horizon Europe, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en
[370] Climate-ADAPT, https://climate-adapt.eea.europa.eu/en/about
[371] LIFE programme, https://cinea.ec.europa.eu/programmes/life_en

adaptation options, as well as monitoring and evaluation. This is done, among others, through the following.

(a) The **European Climate and Health Observatory**. This is a joint initiative of the Commission, the EEA and several other organisations. The Observatory covers the 38 EEA member and cooperating countries and aims to support Europe in preparing for and adapting to the impacts of climate change on human health by providing access to relevant information and tools. It also supports information exchange and cooperation between relevant international, European, national, subnational and non-governmental actors[372].

(b) **Copernicus climate change services**. This, the Earth observation component of the EU's space programme, offers information services that draw on satellite Earth observation and *in situ* (non-space) data. The Commission manages the programme, implemented in partnership with the Member States, the European Space Agency (ESA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the European Centre for Medium-Range Weather Forecasts (ECMWF), EU agencies, Mercator Ocean International, the EEA and the JRC. Vast amounts of global data from satellites and ground-based, airborne, and seaborne measurement systems provide information to help service providers, public authorities and other international organisations improve people's quality of life. The information services provided are free and openly accessible to users through the CDSE and WEkEO data access platforms [373].

(c) **Climate Digital Twin**. This is a new type of climate information system that focuses on assessing the impacts of climate change and different adaptation strategies locally and regionally over multiple decades. A virtual representation of products, people, processes and even spatial environments, Digital Twin uses a fusion of numerical simulations and observations to create a virtual replica of Earth. Built in close partnership with over 90 institutions across Europe, Digital Twin combines several cutting-edge Earth system models and observations with the most advanced digital technologies, machine learning and artificial intelligence, and is integrated into applications for the sectors most affected by climate change[374].

(d) **European Climate Data Explorer**. This provides interactive access to a growing selection of climate indices reflecting the priorities of the EEA. The underlying data are from the Climate Data Store of the Copernicus Climate Change Service[375].

The **European Climate Risk Assessment** report[376] makes a substantial contribution to the objective of closer European cooperation by: (1) providing a systematic assessment of the magnitude of current and future key climate risks; (2) addressing compound hazards, cross-border risks, cascading risks, and systemic risks; (3) involving Commission stakeholders throughout the assessment process; (4) assessing the European policy context, risk ownership, and urgency for action for each key risk; and

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[372] European Climate and Health Observatory, https://climate-adapt.eea.europa.eu/en/observatory/About.

[373] EU Copernicus DIAS reference service for environmental data, virtual processing environments and skilled user support (WEkEO), https://www.wekeo.eu/

[374] Climate Digital Twin, https://stories.ecmwf.int/explainer-digitaltwins/index.html

[375] European Climate Data Explorer, https://climate-adapt.eea.europa.eu/en/knowledge/european-climate-data-explorer/

[376] European Climate Risk Assessment, https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/key-eu-actions/climate_risk_assessment

(5) providing complementary interactive tools on climate hazards and risks. As explained previously, an assessment of the EUCRA findings can be found in the 2024 Commission Communication on managing climate risk[377].

The **EU Climate Resilience Dialogue** aims to narrow the climate protection gap (the gulf between how much is lost and how much is insured) and find ways to stimulate investment in good adaptation. Its primary task is to exchange views on how to address the losses incurred from climate-related disasters and to identify how the insurance industry can contribute more to climate adaptation, from actions that increase the penetration of climate risk insurance for industry and all of society to making the conditions right for more investment in good adaptation solutions[378].

The Reflection Group on mobilising Climate Resilience Financing is bringing together key industrial players and representatives of public and private financial institutions and draw on the knowledge of the European Insurance and Occupational Pensions Authority (EIOPA) and the European Investment Bank (EIB) of financing adaptation and resilience-building. The aim of the reflection group is to map best practices and identify obstacles and enabling conditions for the financing of climate resilience. The Commission will take the outcome of these discussions into account to bolster finance for climate resilience.

3.10 Any other information

Climate change risks and responses do not happen in a vacuum. There are historical contexts to consider, as well as other changes in society, including shifting resources, new dependencies, technological advancements and changing social structures and institutions. Climate risks are especially felt by the most vulnerable people due to a range of socio-economic factors, such as income, gender, age, disability, health, and social exclusion (migrants, ethnic minorities and indigenous peoples are particularly affected). Pre-existing disadvantages reduce the capacity to recover from climate-induced disasters and poorly designed adaptation solutions can further deepen inequalities in the following four intersecting dimensions[379].

(i) **Group-based vulnerabilities:** Immigrants, ethnic minorities and indigenous peoples are subject to structural and historically embedded inequalities, making them particularly vulnerable to climate risks and maladaptive interventions. However, few studies have examined ethnicity-based vulnerabilities in the European context. For example, the chronic exclusion of indigenous communities from decision-making processes tends to reinforce maladaptive pathways and existing vulnerabilities and inequalities.

(ii) **Gender-based vulnerabilities:** Gender inequalities are one of the most widespread forms of group-based inequalities. For instance, gendered social norms often result in women's bearing a greater burden of family care-giving responsibilities, having their mobility restricted and

[377] Commission Communication on protecting people and prosperity, https://climate.ec.europa.eu/eu-action/adaptation-climate-change/climate-resilience-dialogue_en

[378] EU Climate Resilience Dialogue, https://climate.ec.europa.eu/eu-action/adaptation-climate-change/climate-resilience-dialogue_en

[379] European climate risk assessment, https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/key-eu-actions/european-climate-risk-assessment

having less access to resources, including training and educational opportunities, which can lead to disproportionate vulnerability to climate impacts. Gender norms may also result in men's greater involvement in certain forms of work that increase vulnerability, such as work outdoors exposed to the sun or indoors with machinery that generates heat.

(iii) **Socio-economic and occupation-based vulnerabilities:** Low-income households are likely to suffer more from climate change due to tighter financial constraints that limit their adaptive capacities. In many EU countries, more vulnerable communities tend to live in dense urban environments. They may therefore be exposed to higher temperatures than others due to urban heat island effects. Workers with some specific occupations are particularly exposed to climate risks, both from direct exposure to climate-related hazards (e.g. outdoor workers in agriculture, construction and emergency services, such as firefighters) and indirectly through impacts on their livelihoods (e.g. workers in tourism).

(iv) **Age- and health-based vulnerabilities:** Existing health conditions (e.g. cardiovascular, respiratory and kidney disease, obesity and diabetes), disability status and age are significant biological risk factors for several climate-related health impacts (e.g. heatwaves as associated health risks and vector-borne diseases). For instance, pregnant women, infants, young children and older people are more vulnerable to heat extremes due to biological factors, which may also interact with social factors such as discrimination.

Near-term adaptation responses shape future inequalities, poverty, livelihood security and overall well-being. When social justice dimensions are not adequately considered, adaptation actions can lead to maladaptation.

Avoiding such consequences requires concerted action at all levels and developing a clear pathway towards improving preparedness and resilience. Therefore, the Commission proactively includes relevant topics in bilateral dialogues, through green alliances and green partnerships as well as in relevant UN and other multilateral fora. Moreover, the Commission aims to organise an international symposium on managing global climate risks in 2025, bringing together government representatives, financiers and expert organisations from around the world. The Commission will continue to work with the Member States, the public, businesses and other EU institutions to increase the resilience of the EU's society and economy.

4 SUPPORT PROVIDED AND MOBILISED

4.1 Introduction

This chapter contains information on financial, technology development and transfer, and capacity-building support provided and mobilised under Articles 9, 10 and 11 of the Paris Agreement by EU institutions and the European Investment Bank (EIB in 2021 and 2022).

4.2 National circumstances and institutional arrangements

The EU and its Member States are the world's biggest contributor of development assistance. Since 2021, the EU's strategic response to foreign and development policy issues is the Global Gateway, implemented using a 'Team Europe' approach that underscores the importance of close coordination

between partner countries, EU institutions, Member States and EU development finance institutions for effective international cooperation[380].

Between 2021 and 2027, Team Europe will mobilise up to EUR 300 billion of investments for sustainable and high-quality projects, taking into account the needs of partner countries and ensuring lasting benefits for local communities. This will allow the EU's partners not only to develop their societies and economies, but also to create opportunities for the EU Member States' private sector to invest and remain competitive while ensuring the highest environmental and labour standards and sound financial management.

The Global Gateway is the EU's contribution to narrowing the global investment gap worldwide. It is in line with the commitment of the Group of Seven (G7) leaders from June 2021 to launch a values-driven, high-standard and transparent infrastructure partnership to meet global infrastructure development needs. The Global Gateway is also fully aligned with the UN's Agenda 2030 and its Sustainable Development Goals and with the Paris Agreement.

The inaugural milestone of the Global Gateway was the Africa-Europe Investment Package with approximately EUR 150 billion of investment dedicated to bolstering cooperation with African partners. Implementation of the Global Gateway has already begun in Asia and the Pacific and in Latin America and the Caribbean, where President Ursula von der Leyen announced an overall investment by the EU and its Member States of over EUR 45 billion.

The Global Gateway is underpinned by the following financial instruments:

- the Neighbourhood, Development and International Cooperation Instrument – Global Europe (NDICI-Global Europe);
- the Instrument for Pre-Accession Assistance (IPA) III;
- Interreg;
- InvestEU;
- Horizon Europe.

The most relevant for climate finance is NDICI-Global Europe, which has a budget of approximately EUR 79 billion for 2021-2027 and a spending target of 30% for climate. It consolidates previous development cooperation funds into one instrument and consists of three pillars:

- the geographical pillar supports dialogue and cooperation with third countries with a budget of approximately EUR 60 billion;
- the thematic pillar, with a budget of approximately EUR 6 billion, complements the geographic pillar by funding support for human rights and democracy, civil society, peace, stability and conflict prevention, and for global challenges;

[380] European Commission, Global Gateway.

- the rapid response pillar, with a budget of approximately EUR 3 billion, is reserved for non-programmable actions for foreign policy needs, crisis response and resilience;
- an additional EUR 10 billion of unallocated funds is available to react to emerging challenges and priorities.

IPA III has a spending target for climate change of 18%, with the objective of its being increased to 20% by 2027.

A central part of NDICI-Global Europe is the European Fund for Sustainable Development Plus (EFSD+), used for mobilising additional public and private investment for sustainable development.

The following chapters contain information on the support provided and mobilised by EU institutions and the EIB in 2021 and 2022. Information on support provided and mobilised by individual Member States can be found in their respective BTRs.

4.2.1 Systems and processes used to identify, track and report on support provided and mobilised

The EU tracks the provision of its support through a project-based monitoring and reporting system. The system uses the Rio markers set up by the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD) to categorise and track the extent to which a project is deemed to provide support for climate change mitigation and adaptation, alongside more than 50 additional project markers that allow for further support tracking, e.g. by geographical location, economic sector, financial instrument or funding source.

4.2.2 Challenges and limitations

In compiling the data and information for this section of the BTR, the following challenges were encountered.

- Existing reporting systems such as the OECD DAC's Creditor Reporting System (CRS) database do not enable the systematic tracking of the impacts related to capacity building and the technology transfer of funded projects. Many projects contribute to these objectives, but it is not possible to apply tracking metrics such as the Rio markers for these areas, which would provide more aggregated and quantitative information. In the absence of such systems, the information provided is largely of a qualitative nature, using examples where possible. For this reason, the information provided in common tabular format (CTF) tables III.4 and III.5 is non-exhaustive and not representative of the full scope of resources provided and mobilised.
- Some reporting requirements, such as reporting information on how projects support different stages of the technology cycle, are very in-depth. Significant staff resources would be required for systematic reporting across the full portfolio of projects. However, it was useful to reflect on the overall approach to the programming of resources by illustrating how projects support the technology cycle.

4.2.3 Experience and good practices

The European Climate Law makes it a legal obligation to fulfil the EU's target of reducing emissions by at least 55% by 2030. This sends a strong and durable signal to financial markets and private investors and reduces uncertainty about the direction of the EU economy in the decades ahead. The stability of this framework is further strengthened by the European Green Deal, which revises and updates corresponding EU legislation to develop a coherent framework for achieving the EU's climate objective.

The European Green Deal is underpinned by the European Green Deal Investment Plan (EGDIP), which is also referred to as the Sustainable Europe Investment Plan (SEIP). It has the following three objectives:

- to mobilise at least EUR 1 trillion to support sustainable investments over the next decade through the EU budget and associated instruments, in particular InvestEU;
- to create an enabling framework for private investors and the public sector to facilitate sustainable investments;
- to help public administrations and project promoters identify, structure and implement sustainable projects.

As part of the EGDIP, the Just Transition Mechanism, which aims to facilitate a fair and green transition, will mobilise at least EUR 100 billion over the 2021-2027 period.

With the adoption of the EU taxonomy for sustainable activities, the EU also created an EU-wide classification system for sustainable activities. This instrument aims to direct investments to the economic activities most needed for achieving the goals enshrined in the European Climate Law. It requires, among other things, that financial institutions and companies screen, assess and report the extent to which their investments are aligned with the taxonomy. As financial systems are a tightly interwoven network of often global actors, the EU taxonomy will also have an impact on investments in non-EU countries. In addition, the EU has cooperated with other countries such as South Africa, Colombia and China in the development of domestic taxonomies, creating opportunities for mutual learning and knowledge transfer.

4.2.4 Efforts taken to enhance the comparability and accuracy of information

Under the Enhanced Transparency Framework (ETF) of the Paris Agreement, the EU works to harmonise and align its reporting with other international standards, institutions, and systems. It bases its reporting on the OECD DAC Creditor Reporting System database, which uses the Rio marker system to identify flows with principal and significant climate adaptation and mitigation objectives. The Commission further reports its climate finance under Article 19 of the Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action and in the formats laid down in Implementing Regulation (EU) 2020/1208. The respective reporting tables in the Annex to this Implementing Regulation were developed with a view towards harmonisation with the draft CTFs discussed at the 2019 United Nations Climate Change Conference. Further updates to the Governance Regulation provide an opportunity to make additional alignments after assessing the lessons learnt from the first reporting cycle under the ETF.

The EIB works closely with multilateral development banks (MDBs) and European development finance institutions (EDFIs) to enhance the comparability and the accuracy of information reported on the financial support provided and mobilised through public interventions. In 2018, MDBs and EDFIs developed a reference guide for calculating and jointly reporting private investment mobilisation. The purpose of the methodology is to recognise and measure the private capital mobilised in MDB project activities. The reference guide includes key definitions used to ensure harmonisation across MDBs and EFDIs. In addition, guidelines for measurements of different financial instruments have been created and rules developed for attribution in cases in which several MDBs are involved in one project to avoid double counting. Efforts are ongoing to further refine and specify this methodology and accommodate new products, and to expand the scope to include the catalysation of private finance.

4.2.5 National circumstances and institutional arrangements for the provision of technology development and transfer and capacity-building support

Cooperation on technology development and capacity-building support is an integral part of the institutional arrangements for global cooperation. Both the NDICI-Global Europe instrument and the external component of the Horizon Europe programme mainstream capacity building across the supported programmes and initiatives. The external component of Horizon Europe introduces the ability of the EU to enter into bilateral science and technology agreements with individual non-EU countries and engage in research dialogues with non-EU institutions.

4.3 Assumptions, definitions and methodologies

This section gives an overview of the methodology used by the EU and the EIB for tracking the provision of finance, technology and capacity-building support. It describes the EU's approach to applying the Rio markers and the EIB's approach to tracking climate-relevant financial flows, followed by a brief description of how the EU completes the annual OECD survey on mobilised climate finance from the private sector. A list of definitions for important terms used in the EU's methodologies is provided in this section.

The Rio markers, which are used to categorise climate-specific support, are policy indicators and were not originally intended to accurately quantify climate finance. Therefore, an activity can have more than one principal or significant policy objective (i.e. it can be marked for several Rio markers; for mitigation, adaptation and for the other Rio Conventions on biodiversity and desertification). The EU has adopted the following approach to 'translate' the Rio-marked data into estimated flows of climate finance (Table 6):

Table 6: Rio marker approach

Markers	Mitigation (%)	Adaptation (%)	Cross-cutting (%)	Total (%)
2 M & 0 A	100	0	0	100
1 M & 0 A	40	0	0	40
0 M & 2 A	0	100	0	100
0 M & 1 A	0	40	0	40
2 M & 1 A	100	0	0	100
1 M & 2 A	0	100	0	100
2 M & 2 A	0	0	100	100
1 M & 1 A	0	0	40	40

2: 'Principal'; 1: 'Significant'; 0: 'Not targeted'. M: Mitigation; A: Adaptation.

Source: Own compilation

For example, if an EU commitment of EUR 1 million was made to a project going to a developing country Party that was marked as 'Principal' for mitigation ('2 M' in Table 4 above) and 'Significant' for adaptation ('1 A' in Table 4 above), 100% of that EUR 1 million would be categorised as mitigation and 0% as adaptation. Similarly, if the above project was not marked for mitigation but was marked as 'Significant' for adaptation, 40% of that EUR 1 million would be categorised as adaptation, and 0% as mitigation.

The EIB's climate-relevant financial flows are tracked using the joint approach developed by the MDBs, which does not use the Rio markers. In 2015, common principles for tracking mitigation finance were developed with the International Development Finance Club (IDFC) and other multilateral development banks. The Common Principles for Climate Mitigation Finance Tracking were updated in October 2021. In 2020, the EIB Board further approved the EIB Group Climate Bank Roadmap, which sets out how the Group will deliver on its new climate and environment ambitions. This includes a commitment to gradually implement the EU Taxonomy[381] criteria in relation to its tracking of climate action and environmental sustainability. The EIB started to apply the "substantial contribution" criteria of the first EU Taxonomy Delegated Act[382] covering climate change mitigation and adaptation from the start of 2022, while remaining within the overall framework of the Joint MDB/IDFC Common Principles. Further details on the EIB tracking methodology are available on the EIB website[383]. Also, the Joint Reports on MDB Climate Finance include climate co-financing

[381] EU taxonomy for sustainable activities, https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en.

[382] Commission Delegated Regulation (EU) 2021/2139 supplementing Regulation (EU) 2020/852 by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives, https://eur-lex.europa.eu/eli/reg_del/2021/2139/oj.

[383] European Investment Bank Climate Action and Environmental Sustainability, https://www.eib.org/en/publications/climate-action-lending-eligibility-list.

flows that are invested alongside the climate finance activities of MDBs, together with an explanation of how these are determined. Climate co-finance is defined as the volume of financial resources contributed by external public and private entities alongside climate finance invested by MDBs.

Table 7 provides a description of the underlying assumptions, definitions and methodologies. Unless otherwise noted, the same assumptions, definitions and methodologies are used to report on:

- financial support;
- technology development and transfers; and
- capacity-building support.

Table 7: Assumptions, definitions, and methodologies

Element	Description
Reporting years	2021 and 2022
Conversion between domestic currency and United States dollars	The currency exchange rates used throughout the climate finance chapter and its CTF tables are average annual conversion rates and were sourced from the OECD website (https://www.oecd.org/en/data/indicators/exchange-rates.html). 845 EUR; 2022: 1 USD to 0.95 EUR.
Status	The Commission categorises the status of its climate finance as 'committed' or 'provided' but reports on committed funding for a given calendar year, in this case 2021 and 2022. The status of the EIB's climate finance is 'committed' for 2021 and 'provided' for 2022.
Channel	The EU distinguishes between bilateral and multilateral channels, using the following OECD DAC definitions: Multilateral: Flows for which the governing boards of the multilateral organisations have the unqualified right to allocate funds as they see fit within the limits prescribed by the organisations' mandate. Bilateral: Direct bilateral funding, as well as funding via multilateral organisations earmarked for specific uses, are reported as bilateral flows.
Funding sources	The Commission categorises the funding source of its climate finance as official development assistance (ODA). The EIB categorises its funding sources as ODA, Other Official Flows (OOF) and Other.
Financial instruments	The Commission categorises the financial instrument used in its climate finance as grants. All EIB funds are reported here are provided in the form of loans alongside several grants and equity investments as well as guarantees.
Additional information on instruments and funding sources	All flows from the Commission are 100% grants.
Identification of the type of support	The EU defines the type of support as follows:

Element	Description
	• **Mitigation:** An activity should be considered as related to climate change mitigation if it contributes to the objective of stabilising GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system; the activity would do so by promoting efforts to reduce or limit GHG emissions or to enhance GHG sequestration (adapted from the operational definition and criteria for eligibility used in the OECD DAC (Policy Markers). • **Adaptation:** An activity should be regarded as adaptation-related if it intends to reduce the vulnerability of human or natural systems to the impacts of climate change and climate-related risks by maintaining or increasing adaptive capacity and resilience. This encompasses activities ranging from information and knowledge generation to capacity development, planning and implementing climate change adaptation actions (adapted from the operational definition and criteria for eligibility used in the OECD DAC Policy Markers).
Sectors and subsectors	The EU categorises the provision of climate finance into the following eight sectors: Energy, Transport, Industry, Agriculture, Forestry, Water and sanitation, Cross-cutting, Other. In order to reduce the number of DAC CRS codes allocated to the sector "Other," sector categories were integrated as follows: Code 313 “Fishing” was moved to Sector code 311 “Agriculture”. Codes 322 “Mineral resources and mining” and 323 “Construction” were moved to sector Code 321 “Industry”. Code 410 (General environmental protection) was added to "Cross-cutting".
Identification of capacity building and/or technology development objectives	The EU uses the following definitions to identify initiatives, programmes and projects that contribute to technology development and transfer as well as capacity building: • **Climate-relevant technology development and transfer:** A broad set of processes covering exchnages of know-how and experience, and providing equipment, for mitigating and adapting to climate change among various stakeholders such as governments, private sector entities, financial institutions, non-governmental organisations (NGOs) and research/education institutions. The broad and inclusive term ‘transfer’ comprises the process of learning to understand, use and replicate the technology, including the capacity to the most suitable technology and adapt it to local conditions and integrate it with indigenous technologies (adapted from the IPCC definition of climate-relevant technology transfer).

Element	Description
	• **Climate-relevant capacity building:** Capacity building is a process which seeks to build, develop, strengthen, enhance and improve existing scientific and technical skills, capabilities and institutions, particularly in developing countries, to enable them to assess, adapt, manage and develop technologies. Capacity building must be country-driven, addressing the specific needs and conditions of the countries concerned and reflecting their national sustainable development strategies, priorities and initiatives (adapted from the UNFCCC definition of capacity-building activities).
Climate-specific	The Commission categorises flows as climate-specific if they are labelled with a Rio marker under the OECD DAC Creditor Reporting System. The EIB identifies its adaptation and mitigation flows using the joint approach developed by the Multilateral Development Banks (MDBs)[384].
Avoiding double counting	The EU addresses double counting in its report as follows: • Double counting among multiple Parties: This report covers support from the Commission and the EIB. Support provided or mobilised by EU Member States is not reported here, but in the respective BTRs of the EU Member States. The EIB reports contributions on an outflow basis. If information included in this report is aggregated with other flows, e.g. reported by the MDBs, corresponding deductions must be made to prevent double counting. • Double counting among multiple Parties involved in the mobilisation of private finance through public interventions. • As part of their joint reporting, the MDBs net out potentially double-counted co-financing (including private finance mobilisation) by adjusting reported figures in cases where multiple MDBs provide co-financing for a project. • Double counting with resources used under Article 6: The EU does not use internationally transferred mitigation outcomes towards its NDC. The support provided and mobilised does not include resources used under Article 6. • Double counting of actions targeting both adaptation and mitigation: As a single action can target both mitigation and adaptation, the EU approach to using the Rio markers has been to introduce the cross-cutting category and to establish a system for attributing Rio marker scores when both adaptation and mitigation are targeted, avoiding double counting between adaptation and mitigation. Total contributions are thus the sum of adaptation, mitigation and cross-cutting. Attribution approach for projects with multiple recipient countries:

[384] See Annex C.2 (adaptation) and C.3 (mitigation) for a description of the methodological steps, https://thedocs.worldbank.org/en/doc/3258e1d4c1e84fd961b79fe54e7df85c-0020012023/original/2023-0128-MDB-Report-2022-NEW.pdf.

Element	Description
	The EU institutions and the EIB do not apply attribution in its reporting when flows target multiple recipient countries. In these cases, the category "regional" is used or the name of the region is specified.
Definition of public and private climate finance	The Commission reports grant-based ODA flows as public finance. The EIB reports its climate-specific outflows as public climate finance and its climate-specific private co-financing as private climate finance.
Approach to determining private finance as mobilised by public interventions	The EIB applies the methodological approach outlined in the MDBs and EDFIs reference guide for calculating and reporting private investment mobilisation[385]. Private co-financing is defined as the investment made by a private entity, meaning a legal entity that is carrying out or was established for business purposes and that is financially or managerially autonomous from national or local governments. The methodology distinguishes between two elements: a. private direct mobilisation: financing from a private entity on commercial terms due to the active and direct involvement of an MDB leading to the commitment of funds. Evidence of active and direct involvement include mandate letters, fees linked to a financial commitment or other validated or auditable evidence of an MDB's active and direct role leading to other private financiers committing funds; a. private indirect mobilisation: financing from private entities provided in connection with a specific activity for which an MDB is providing financing, where MDBs do not play an active or direct role that leads to the private entity committing funds. The EIB uses detailed financing data for each operation and counterparty data to determine public and private sources, and, in line with its methodology, attributes shares to the various institutions providing development finance.
Addresses the needs and priorities of developing country Parties	Many climate finance programmes and initiatives supported by the EU are the result of joint programming processes. In this approach to programming international support, the national authorities of the partner country develop a strategy together with the EU, its Member States, the EIB and the European Bank for Reconstruction and Development (EBRD) which is aligned with its national development plan. Such coordination ensures that EU partners are more responsive to the national needs and priorities of developing countries.

[385] Reference guide for calculating and reporting private investment mobilisation, https://documents1.worldbank.org/curated/en/495061492543870701/pdf/114403-REVISED-June25-DocumentsPrivInvestMob-Draft-Ref-Guide-Master-June2018-v4.pdf.

Element	Description
Alignment with the long-term goals of the Paris Agreement	The EIB was the first international finance institution to withdraw support for fossil fuels in the energy sector. In 2019 it adopted an energy lending policy phasing out the financing of 'unabated' fossil fuel energy projects, including natural gas. The policy applies to all EIB financing in the energy sector, covering operations both in Europe and around the world. In 2020 the EIB adopted a Paris Alignment framework outlining the eligibility criteria for all sectors receiving funding from the EIB[386]. The framework was updated in 2023[387].
Determination of new and additional	The financial resources reported in the EU's First Biennial Transparency Report are considered 'new and additional resources,' meaning that they were committed after and not included in the most recent Biennial Report under the UNFCCC (i.e. the new and additional resources were committed in either 2021 or 2022). As EU budgets are determined on an annual basis, each annual commitment cycle comprises new and additional resources.
Progression from previous levels in the provision and mobilisation of finance under the Paris Agreement	This is the first time that support under the Paris Agreement is reported. This support constitutes a progression from previous levels of support reported in Biennial Reports under the UNFCCC. Between 2014 and 2022, EU support from public sources to developing countries increased by 96.5%.
Approach to reporting multilateral finance	• Inflows/outflows: All multilateral finance is provided by the EIB, which reports based on outflows. • Climate-specific shares: The EIB identifies its adaptation and mitigation flows using the joint approach developed by the MDBs. For all programmes/projects, only the climate-specific components are aggregated into overall EU multilateral finance. • Core/general: The Commission does not report core/general support to multilateral institutions for 2021 and 2022. The EIB reports on an outflow basis; therefore, a distinction between core/general and climate-specific flows is not applicable as this is only relevant when reporting inflows to multilateral institutions. • Attribution to the reporting Party: As the EIB reports outflows, attribution does not apply as it is only relevant when reporting inflows to multilateral institutions. EU Member States do not report inflows to the EIB in line with EU regulations to avoid double counting.

Source: Own compilation

[386] Climate Bank Roadmap 2021-2025, https://www.eib.org/attachments/thematic/eib_group_climate_bank_roadmap_en.pdf.

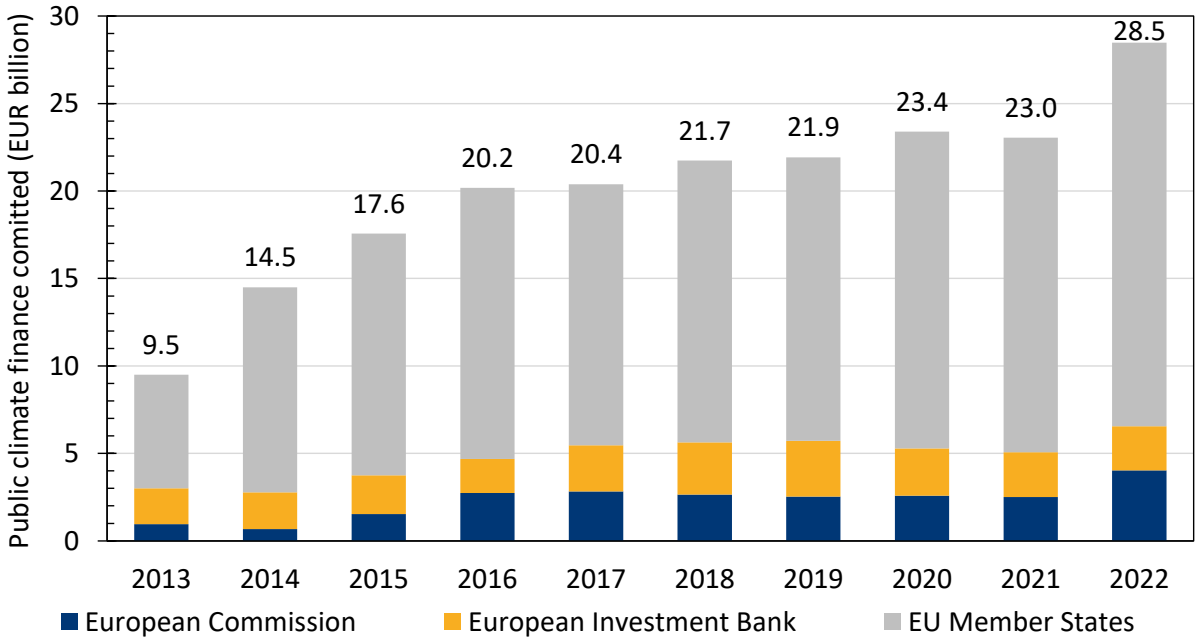
[387] Paris Alignment Framework – Low carbon, Version 1.1, https://www.eib.org/attachments/lucalli/20230342_paris_alignment_framework_low_carbon_v1_1_en.pdf.

4.4 Providing and mobilising financial support

This section provides information on the total public climate finance provided to developing countries through bilateral and multilateral channels in 2021 and 2022 as well as on additional private climate finance mobilised by the EIB in 2022[388]. Climate finance committed through bilateral channels is reported in Section 4.4.1, climate finance provided through multilateral channels is reported in Section 4.4.2, and additional climate finance is reported in Section 4.4.3.

Since 2013, the total public climate finance provided by the Commission, the EIB, and the EU Member States has tripled, from EUR 9.5 billion in 2013 to EUR 28.5 billion in 2022. EU institutions and the EIB contributed approximately 25% of the total finance each year (see Figure 38).

Figure 38: Public climate finance by the EU and its Member States, 2013-2022

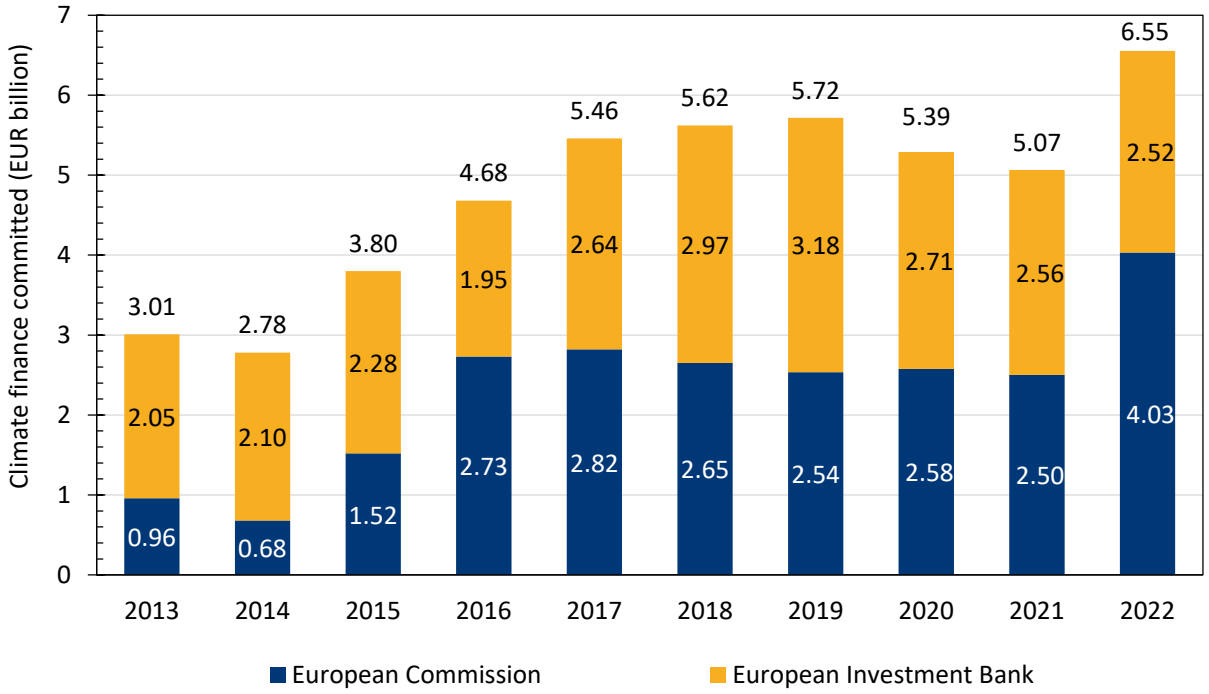


Source: Own illustration based on Commission and EIB data and submissions from the EU Member States

Over the past 10 years, the total climate finance contributed by the Commission and the EIB has increased by 118%, from approximately EUR 3 billion in 2013 to approximately EUR 6.6 billion in 2022 (see Figure 39).

[388] The EU reports in this BTR support provided to all countries eligible to receive official development assistance (ODA), as listed in the 'DAC List of ODA Recipients', https://www.oecd.org/en/topics/sub-issues/oda-eligibility-and-conditions/dac-list-of-oda-recipients.html.

Figure 39: Climate finance to developing countries provided by the Commission and the EIB, 2013 - 2022



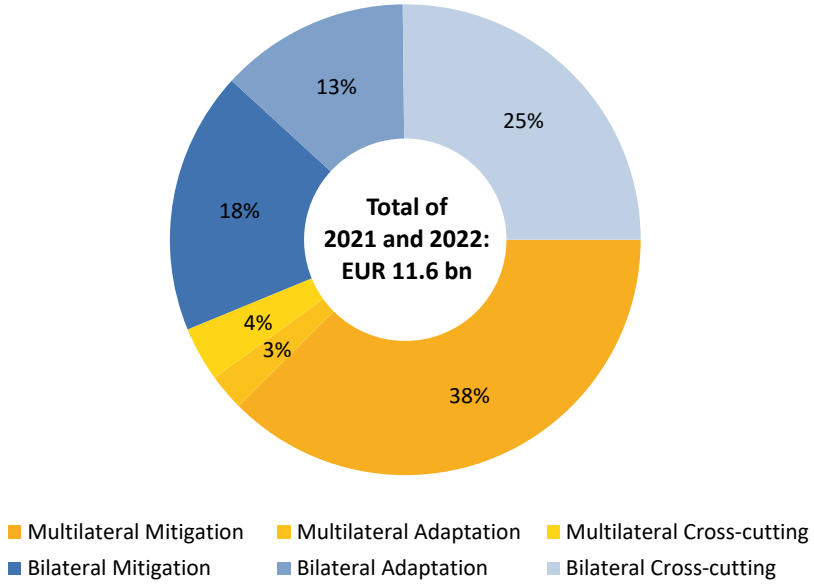
Note: Individual Commission and EIB funding in the graph may not add up to the total due to rounding.

Source: Own illustration based on Commission and EIB data

During 2021 and 2022, the total climate finance contributed by the Commission and the EIB amounted to EUR 11.6 billion, of which 56% was allocated to mitigation, 16% to adaptation and 29% to cross-cutting[389]. 44% of the finance was channelled multilaterally, i.e. by the EIB, and 56% bilaterally, i.e. by the Commission. The total bilateral and multilateral climate finance according to type of support is presented in Figure 40.

[389] Percentages do not add up to 100% due to rounding.

Figure 40: Total climate finance by channel and type of support, 2021-2022



Note: Percentages do not add up to 100% due to rounding.

Source: Own illustration based on Commission and EIB data

4.4.1 Financial support through bilateral channels

Bilateral climate finance reported in this BTR are funds committed by the Commission. All climate finance committed by the Commission to developing countries in 2021 and 2022 was in the form of grants. 99.9% of this total was classified as official development assistance (ODA) and only 0.1% was classified as Other Official Flows (OOF). This climate finance was marked by the Rio markers, as described in section 4.34.3, and is summarised below for the years 2021 and 2022. The summary highlights the amounts ear marked for mitigation, adaptation and cross-cutting activities, and how much of these funds went to Least Developed Countries (LDCs).

In 2021 and 2022, the Commission committed a total of EUR 6.53 billion in bilateral climate finance to developing countries. Of the total bilateral climate finance committed, EUR 2.09 billion was marked for mitigation, EUR 1.51 billion for adaptation, and EUR 2.92 billion for cross-cutting. Of the total climate finance provided by the Commission in 2021 and 2022, almost EUR 1.2 billion (18.4%) was committed to LDCs. The funding is marked by country and by region, but in some cases a regional marker is used as climate finance goes to a group of countries, making it impossible to assign specific amounts to individual countries in that group. Of the total climate finance committed to LDCs in 2021 and 2022, at least EUR 228 million (19%) was marked for mitigation, EUR 762 million (64%) for adaptation and EUR 210 million (18%) for cross-cutting.

Further disaggregation of the climate finance provided by the Commission in 2021 and 2022 is set out in Table 8 and Table 9 (by subsector), and in Table 10 and Table 11 (by region).

Table 8: Bilateral climate finance committed by the Commission for mitigation, adaptation and cross-cutting by subsector, 2021

Subsector	Mitigation		Adaptation		Cross-cutting		Total		%
	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	
Education	0.04	0.05	0.00	0.00	-	-	0.04	0.05	2%
Health	-	-	0.06	0.07	-	-	0.06	0.07	2%
Water and sanitation	0.11	0.13	0.03	0.04	0.14	0.17	0.29	0.34	11%
Government and civil society	0.04	0.04	0.08	0.10	0.02	0.02	0.14	0.16	6%
Other social infrastructure and services	-	-	0.00	0.00	0.01	0.01	0.01	0.01	0%
Transport and storage	0.45	0.53	0.01	0.02	0.00	0.00	0.46	0.55	19%
Communications	-	-	-	-	-	-	-	-	0%
Energy generation, distribution and efficiency	0.08	0.10	-	-	0.57	0.68	0.66	0.78	26%
Banking and financial services	-	-	-	-	-	-	-	-	0%
Business and other services	0.01	0.01	-	-	-	-	0.01	0.01	0%
Agriculture	0.01	0.02	0.08	0.10	0.06	0.08	0.16	0.19	6%
Forestry	0.04	0.05	-	-	-	-	0.04	0.05	2%
Fishing	-	-	-	-	-	-	-	-	0%
Industry	0.03	0.04	0.00	0.00	0.03	0.03	0.06	0.07	2%
Mineral resources and mining	-	-	-	-	-	-	-	-	0%
Trade policy and regulations and trade-related adjustment	-	-	-	-	-	-	-	-	0%
Tourism	-	-	-	-	-	-	-	-	0%
General environmental protection	0.14	0.17	-	-	0.30	0.35	0.44	0.52	18%
Other multisector	0.00	0.00	0.04	0.05	0.09	0.10	0.13	0.15	5%
Developmental food aid/Food security assistance	-	-	0.00	0.00	-	-	0.00	0.00	0%
Emergency response	-	-	-	-	-	-	-	-	0%
Reconstruction relief and rehabilitation	-	-	-	-	-	-	-	-	0%
Disaster prevention and preparedness	-	-	-	-	-	-	-	-	0%
Unallocated/ Unspecified	-	-	-	-	0.00	0.00	0.00	0.00	0%
Total	**0.96**	**1.14**	**0.32**	**0.38**	**1.22**	**1.45**	**2.50**	**2.96**	**100%**

Note: Figures for individual sectors may not add up to the total due to rounding. Percentages may not add up to 100% due to rounding.

Source: European Commission

Table 9: Bilateral climate finance committed by the Commission for mitigation, adaptation and cross-cutting by subsector, 2022

Subsector	Mitigation		Adaptation		Cross-cutting		Total		%
	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	
Education	0.08	0.08	0.02	0.02	0.07	0.07	0.16	0.17	4%
Health	-	-	0.01	0.01	-	-	0.01	0.01	0%
Water and sanitation	0.26	0.27	0.07	0.07	0.06	0.07	0.39	0.41	10%
Government and civil society	0.03	0.03	0.11	0.11	0.03	0.03	0.17	0.18	4%
Other social infrastructure and services	0.00	0.00	0.00	0.00	-	-	0.01	0.01	0%
Transport and storage	0.17	0.18	0.01	0.01	0.00	0.00	0.18	0.19	4%
Communications	0.02	0.02	-	-	0.00	0.00	0.02	0.02	1%
Energy generation, distribution and efficiency	0.31	0.33	0.04	0.04	0.05	0.05	0.40	0.42	10%
Banking and financial services	-	-	-	-	0.56	0.59	0.56	0.59	14%
Business and other services	0.04	0.04	0.13	0.14	0.08	0.08	0.25	0.27	6%
Agriculture	0.00	0.00	0.44	0.46	0.10	0.11	0.54	0.57	13%
Forestry	0.03	0.03	0.00	0.00	0.11	0.12	0.14	0.15	3%
Fishing	-	-	-	-	-	-	-	-	0%
Industry	0.03	0.03	0.01	0.01	0.04	0.04	0.08	0.09	2%
Mineral resources and mining	-	-	-	-	-	-	-	-	0%
Trade policy and regulations and trade-related adjustment	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0%
Tourism	-	-	0.01	0.01	-	-	0.01	0.01	0%
General environmental protection	0.08	0.08	0.17	0.18	0.21	0.22	0.46	0.49	11%
Other multisector	0.08	0.08	0.15	0.16	0.36	0.38	0.59	0.62	15%
General budget support	-	-	-	-	0.02	0.02	0.02	0.02	0%
Developmental food aid/Food security assistance	-	-	0.00	0.00	-	-	0.00	0.00	0%
Emergency response	-	-	0.02	0.02	-	-	0.02	0.02	0%
Reconstruction relief and rehabilitation	0.01	0.01	-	-	-	-	0.01	0.01	0%
Disaster prevention and preparedness	-	-	-	-	-	-	-	-	0%
Unallocated/ Unspecified	-	-	-	-	-	-	-	-	0%
Total	**1.13**	**1.19**	**1.20**	**1.26**	**1.70**	**1.79**	**4.03**	**4.25**	**100%**

Note: Figures for individual sectors may not add up to the total due to rounding. Percentages may not add up to 100% due to rounding.

Source: European Commission

Table 10: Bilateral climate finance committed by the Commission for mitigation, adaptation and cross-cutting by region, 2021

Region	Mitigation		Adaptation		Cross-cutting		Total		%
	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	
Europe	**0.32**	**0.38**	-	-	**0.15**	**0.18**	**0.47**	**0.56**	**19%**
Eastern Europe	0.03	0.03	-	-	-	-	0.03	0.03	
Southern Europe	0.15	0.18	-	-	0.01	0.02	0.16	0.19	
Europe, multiple	0.14	0.17	-	-	0.14	0.16	0.28	0.33	
Africa	**0.41**	**0.48**	**0.23**	**0.27**	**0.76**	**0.90**	**1.40**	**1.65**	**56%**
Norhtern Africa	0.01	0.02	0.00	0.00	0.05	0.06	0.07	0.08	
Eastern Africa	0.04	0.05	0.09	0.11	0.03	0.04	0.16	0.19	
Middle Africa	0.02	0.02	-	-	0.04	0.05	0.06	0.07	
Western Africa	0.03	0.04	0.11	0.13	0.10	0.12	0.24	0.28	
Southern Africa	-	-	-	-	-	-	-	-	
Africa, multiple	0.30	0.35	0.03	0.04	0.54	0.64	0.87	1.03	
America	**0.14**	**0.16**	**0.02**	**0.03**	**0.12**	**0.14**	**0.27**	**0.32**	**11%**
Central America	-	-	0.01	0.02	0.01	0.01	0.02	0.03	
South America	0.02	0.02	0.00	0.00	-	-	0.02	0.02	
Carribean	-	-	0.01	0.01	0.11	0.13	0.12	0.14	
America, multiple	0.12	0.14	-	-	0.00	0.00	0.12	0.14	
Asia	**0.07**	**0.09**	**0.05**	**0.06**	**0.13**	**0.15**	**0.26**	**0.31**	**10%**
Central Asia	0.02	0.02	-	-	-	-	0.02	0.02	
Eastern Asia	-	-	-	-	-	-	-	-	
South-eastern Asia	0.01	0.01	0.01	0.01	-	-	0.01	0.02	
Southern Asia	0.04	0.05	0.05	0.06	0.09	0.11	0.18	0.21	
Western Asia	-	-	-	-	-	-	-	-	
Asia, multiple	0.01	0.01	-	-	0.04	0.05	0.05	0.06	
Oceania	**0.03**	**0.03**	**0.01**	**0.02**	**0.00**	**0.01**	**0.05**	**0.05**	**2%**
Melanesia	-	-	-	-	-	-	-	-	
Micronesia	-	-	0.00	0.00	-	-	0.00	0.00	
Polynesia	-	-	0.01	0.02	-	-	0.01	0.02	
Oceania, multiple	-	-	-	-	0.00	0.01	0.00	0.01	
Unspecified	**0.03**	**0.03**	-	-	**0.06**	**0.07**	**0.08**	**0.10**	**3%**
Total	**0.96**	**1.14**	**0.32**	**0.38**	**1.22**	**1.45**	**2.50**	**2.96**	**100%**

Note: Figures for individual sub-regions may not add up to the total due to rounding. Percentages may not add up to 100% due to rounding. Countries are classified into regions according to the UN region classification.

Source: European Commission

Table 11: Bilateral climate finance committed by the Commission for mitigation, adaptation and cross-cutting by region, 2022

Region	Mitigation		Adaptation		Cross-cutting		Total		%
	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	
Europe	**0.34**	**0.36**	**0.02**	**0.02**	**0.08**	**0.08**	**0.45**	**0.47**	**11%**
Eastern Europe	0.03	0.03	-	-	-	-	0.03	0.03	
Southern Europe	0.03	0.04	0.00	0.00	0.06	0.07	0.10	0.11	
Europe, multiple	0.28	0.30	0.02	0.02	0.01	0.02	0.32	0.33	
Africa	**0.34**	**0.36**	**0.91**	**0.96**	**0.28**	**0.29**	**1.53**	**1.62**	**38%**
Norhtern Africa	0.05	0.05	0.18	0.19	0.01	0.01	0.24	0.25	
Eastern Africa	0.13	0.13	0.40	0.43	0.04	0.05	0.57	0.61	
Middle Africa	0.01	0.01	0.11	0.12	0.00	0.01	0.12	0.13	
Western Africa	0.12	0.12	0.05	0.06	0.04	0.05	0.21	0.23	
Southern Africa	0.03	0.03	-	-	0.01	0.01	0.04	0.04	
Africa, multiple	0.02	0.02	0.16	0.17	0.16	0.17	0.34	0.36	
America	**0.05**	**0.06**	**0.04**	**0.04**	**0.06**	**0.06**	**0.15**	**0.16**	**4%**
Central America	0.03	0.03	0.01	0.01	0.04	0.04	0.08	0.08	
South America	0.01	0.02	0.00	0.00	0.02	0.02	0.03	0.04	
Carribean	0.01	0.01	0.02	0.02	-	-	0.03	0.03	
America, multiple	0.01	0.01	-	-	-	-	0.01	0.01	
Asia	**0.21**	**0.22**	**0.13**	**0.14**	**0.16**	**0.16**	**0.50**	**0.53**	**12%**
Central Asia	0.00	0.00	0.02	0.02	0.01	0.01	0.02	0.03	
Eastern Asia	-	-	-	-	0.00	0.00	0.00	0.00	
South-eastern Asia	0.08	0.09	-	-	0.00	0.00	0.09	0.09	
Southern Asia	0.11	0.12	0.06	0.07	0.13	0.14	0.30	0.32	
Western Asia	0.01	0.01	0.02	0.02	0.01	0.01	0.04	0.04	
Asia, multiple	-	-	0.04	0.04	0.00	0.00	0.04	0.04	
Oceania	**0.18**	**0.19**	**0.01**	**0.02**	**0.05**	**0.06**	**0.25**	**0.26**	**6%**
Melanesia	-	-	0.01	0.01	0.05	0.06	0.06	0.07	
Micronesia	-	-	-	-	-	-	-	-	
Polynesia	-	-	0.00	0.00	-	-	0.00	0.00	
Oceania, multiple	-	-	0.00	0.00	-	-	0.00	0.00	
Unspecified	**0.18**	**0.19**	**0.08**	**0.08**	**1.08**	**1.14**	**1.33**	**1.40**	**33%**
Total	**1.13**	**1.19**	**1.20**	**1.26**	**1.70**	**1.79**	**4.03**	**4.25**	**100%**

Note: Figures for individual sub-regions may not add up to the total due to rounding. Percentages may not add up to 100% due to rounding. Countries are classified into regions according to the UN region classification.

Source: European Commission

Detailed information on bilateral climate finance can be found in CTF Table III.1 which is submitted with this BTR.

4.4.2 Financial support through multilateral channels

The EU and its Member States support a variety of global programmes and trust funds managed by multilateral organisations, including the United Nations Development Programme (UNDP), the UN Environment, the Food and Agriculture Organization and the World Bank.

For example, in 2022 the Commission committed EUR 100 million to the Adaptation Fund and EUR 10 million to the International Maritime Organization's Global Maritime Technology Cooperation Centre and Network. The Commission's statistical system categorises most of its climate finance support as bilateral with multiple recipients, even when the funds are delivered through a multilateral organisation. Contributions to multilateral institutions operating in the field of climate change that are not earmarked for specific purposes are reported as climate-specific multilateral

support. All other finance earmarked for a specific climate-related purpose and provided through a multilateral organisation is reported as bilateral support.

The EIB channels significant volumes of climate finance to developing countries. The EIB funds reported here take the form of loans, equity investments, grants and other financial instruments. Due to changes in reporting from 2021 to 2022, multilateral climate finance refers to finance *committed* by the EIB in reporting year 2021 and finance *provided* by the EIB in reporting year 2022.

EIB financial support is categorised as multilateral as the EIB is considered a multilateral development bank. Only the EIB's climate-specific outflows are reported here.

Detailed information on bilateral climate finance can be found in CTF Table III.2 submitted with this BTR.

The EIB contributed climate finance amounting to EUR 2.6 billion and EUR 2.5 billion, respectively. Total multilateral climate finance by type of support is provided in Table 12, which is based on the EIB's established procedure for tracking its climate finance.

Table 12: Multilateral financial support by the EIB in 2021 and 2022

Year	Mitigation		Adaptation		Cross-cutting		Total	
	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn	EUR bn	USD bn
2021	2.18	2.58	0.25	0.29	0.14	0.17	2.56	3.03
2022	2.18	2.30	0.05	0.05	0.30	0.31	2.52	2.66

Source: EIB. 2021 data are based on commitments and 2022 data are based on disbursements.

Of total climate finance committed by the EIB in 2021, EUR 241 million was channelled as ODA, while 211 million was channelled as OOF. Of total climate finance provided by the EIB in 2022, EUR 2.26 billion was channelled as ODA, while EUR 195 million was channelled as OOF. For the remaining amounts in both 2021 and 2022, this information is not available because at the time of signature, the interest rate of the loan is not known as it is set at first disbursement. It is therefore not possible to establish whether a given loan is concessional or not at the time of signature, and therefore whether it is classified as ODA or OOF; as a result, they are classified as 'other' in CTF Table III.2.

4.4.3 Mobilising financial support

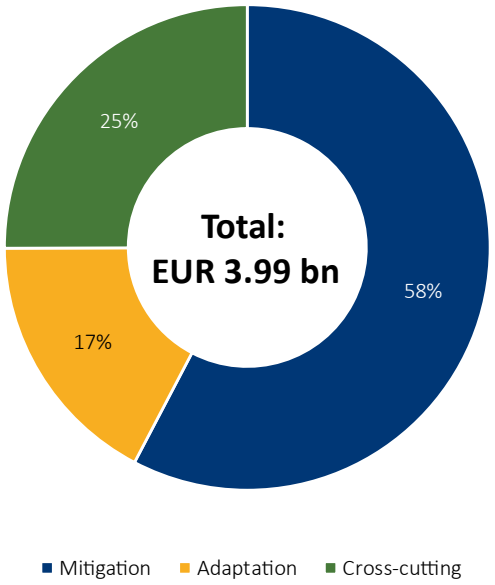
The EU is using innovative ways of engaging the private sector in **adaptation** and **mitigation** activities in developing countries. Private investment, alongside public investment, is seen as crucial to scaling up climate finance and closing current finance gaps. Although private investors show increasing interest in funding low-carbon investment, this potentially significant source of capital remains relatively untapped. Therefore, attracting private investment in recipient countries is essential.

The EU is developing public initiatives to mobilise private climate finance directly and supports the creation of appropriate enabling environments, also as part of implementing its Global Gateway strategy. In addition to the EFSD+ (see Section 4.2 national circumstances), the Commission has helped increase the provision of risk capital for sustainable energy investments and has thus made a significant contribution to securing additional funds and therefore boosting the total volume of funds available for financing (e.g. through the Electrification Financing Initiative (ElectriFI), Climate

Investor One, the African Renewable Energy Scale-Up Facility, the Digital Energy Facility, the Transferability & Convertibility Facility and the Facility for Energy Inclusion).

The amount of financial support mobilised at EU level in 2021 is not known, but in 2022 the EU started to report private financial support mobilised for climate through the EIB. Private financial support mobilised by the EIB in 2022 amounted to EUR 3.99 billion, as shown in Figure 41.

Figure 41: Climate finance mobilised by the EIB in 2022



Source: EIB

4.5 Support for technology development and transfer

Technology development and transfer is a key component of many development cooperation activities supported by the EU. Often support for technology development and transfer is one component of multi-purpose projects that target both mitigation and adaptation objectives. Disaggregating the portion of a financial flow that specifically supports technology development and transfer is therefore not always possible. Section 4.5.1 provides textual information on the EU's overarching strategic approach. Quantitative information on measures and activities related to support for technology development and transfer is provided in CTF Table III.4, which accompanies this BTR.

4.5.1 Strategies employed to support technology development and transfers

The EU acknowledges the institutional framework for technology transfer created under the UNFCCC and is committed to supporting its implementation. The Commission is the largest contributor to the operations of the United Nations Climate Technology Centre and Network (CTCN), with total voluntary contributions of USD 19.6 million[390] since 2014. This funding supports the

[390] As of 15 October 2023, see page 63 of the UN CTCN (2023) 2022-2023 CTCN Progress Report https://www.ctc-n.org/file-download/download/public/38659.

CTCN's mandate to provide technical assistance to step up technology transfers to developing countries. In 2022 and 2023, the Commission announced two grants to the CTCN of a total value of EUR 5 million, linked to the implementation of 17 CTCN technical assistance requests for ten projects[391]in communities at risk of conflict.[392], [393]

The EU and the CTCN also cooperate on the programme 'Climate Change and Security: Innovative Community-based Climate Technology for Communities at Risks of Conflicts Due to Climate Impact'. This programme aims to strengthen the resilience of communities in conflict due to climate impacts by promoting conflict-sensitive, community-based technological solutions to climate change. To receive support under the programme, projects must meet the following eligibility criteria:

- they must support a new, existing, or improved technology;
- eligible technologies can be of two types: hard or soft technology – i.e. hardware or software;
- they should be scalable (e.g. supported by suppliers, by private entrepreneurs, by financially viable and scalable business models); and
- they should empower women and girls.

The types of technology whose market growth can be supported via the programme include:

1. technologies in which the domestic private sector is currently involved, but there is a need to scale up the existing market;
2. technologies that are not financially viable because they are supplied by the government or by the non-profit sector (often for free or at a modest price, only covering the costs of running the technology and the providing organisation); and
3. technologies for which there is currently not enough demand, meaning efforts should be focused on informing potential final users and removing policy or market barriers to market development.

The programme has a budget of EUR 3 million over 3 years and will be managed by the CTCN. Resources will be made available on request for assistance from National Determined Entities in countries at risk of conflict.

In 2021, the Commission committed a further EUR 10 million to the Adaptation Fund Climate Innovation Accelerator (AFCIA) Programme administrated by UNDP. The programme aims at developing and disseminating innovative adaptation practices, tools and technologies.[394]

The EU further supports technology transfers and related capacity building through Just Energy Transition Partnerships (JETPs). The EU contribution to the JETP with South Africa, for example,

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[392] Climate Change and Security: a Joint EU-CTCN programme for Innovative Community-based Climate Technology for Communities at Risks of Conflicts, https://www.ctc-n.org/news/climate-change-and-security-joint-eu-ctcn-programme.

[393] Walking the talk: EU's Latest EUR 2 Million Grant Bolsters Technology for Climate Action via CTCN, https://www.ctc-n.org/EuropeanUnion_Latest_Grant_Bolsters_Technology_for_Climate_Action.

[394] Adaption Fund Climate Innovation Accelerator, https://www.adaptation-undp.org/sites/default/files/resources/afcia-undp_grant_window_2nd_call_for_proposals.pdf.

includes a component on technology incubation and workforce skills that provides research and development funding for public and private innovation to help South Africa gain a competitive advantage.

4.5.2 Support provided at different stages of the technology cycle

EU programmes and initiatives target different stages of the technology cycle. These stages are described below.

Research and development stage

The EU's key funding programme for research and innovation is Horizon Europe, with a budget of EUR 95.5 billion over the 2021-2027 period. The programme has a 35% allocation target for climate expenditure, representing a total investment of EUR 33.4 billion. Though it is focused on the EU, international cooperation is a key pillar of the programme, through bilateral science and technology agreements with individual countries. These agreements aim to increase cooperation in research and innovation. In addition, the EU maintains regional science and technology cooperation dialogues with many regions around the world. The African Union – European Union High Level Policy Dialogue (HLPD) on Science, Technology and Innovation, for example, sets long-term research and innovation policy priorities to strengthen cooperation between Africa and Europe.

Growth stage

Development of Smart Innovation through Research in Agriculture (DeSIRA) is an initiative aimed at contributing to a climate-relevant, productive and sustainable transformation of agriculture and food systems in low- and middle-income countries. Alongside a research component, the initiative also supports projects that test and scale up innovative technologies for sustainable development and resilient production in crop and livestock farming. An example is the 'climate-smart agriculture and value chains project' in Costa Rica. It supports on-farm pilot projects implemented by producers in cooperation with research institutes, helps farmers to access financing mechanisms to scale up projects, and supports measures for better promoting low-carbon agricultural products on national and international markets. The project takes a multi-stakeholder approach and is led by a project steering committee composed of the Costa Rican Ministries of Environment and Energy and of Agriculture and Livestock, the EU and the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV). The project runs from 2021 to 2025 and is a multi-donor action supported by the EU with EUR 4.2 million and the BMUV with EUR 1.6 million[395].

Another example of an EU-supported initiative that focuses on supporting the growth phase of adaptation technologies is the Climate Resilience and Adaptation Finance and Technology Transfer Facility (CRAFT). The facility, implemented by The Lightsmith Group, will make growth equity investments in selected private companies proposing climate resilience solutions. This includes companies offering services and products related to weather analytics, agricultural analytics, catastrophe risk modelling and distributed water solutions. At least two thirds of CRAFT investments

[395] Climate-smart agriculture and value chains in Costa Rica, https://capacity4dev.europa.eu/media/125744/download/7c0f5220-c44d-4895-aeb7-975e08caf767_en.

will go to developing countries. The EIB will contribute funding of around EUR 24 million over several years.

Maturity stage

The EU supports many projects that focus on making widely used and increasingly standardised technologies, such as photovoltaics, more efficient by supporting measures that reduce the cost of deploying them. While the deployment of wind and solar needs to grow rapidly in order to meet the temperature target of the Paris Agreement, the technologies are mature, and interventions now need to focus on deploying them more efficiently instead of investing in new innovations.

An example of a project that focuses on cost reduction is the AFRIGREEN Debt Impact Fund. This fund offers long-term debt solutions for financing solar infrastructure projects in Central and West Africa through direct loans and asset-based credit facilities. It takes a two-pronged approach which focuses on helping African SMEs reduce their energy costs and on expanding the use of photovoltaics in Africa. Projects funded by AFRIGREEN include a USD 15 million senior debt facility for building photovoltaic plants in Nigeria[396]. The EIB will contribute funding to AFRIGREEN of some EUR 25 million over several years.

Decline stage

In the decline stage, technologies become obsolete or are replaced by other, more innovative technologies. In line with current policies there are no projects to support technologies at the decline stage.

4.5.3 Support for development and enhancement of endogenous capacities and technologies

According to the CTCN, endogenous technologies refer to 'new technologies developed within (or based on the initiative of) a country through research, development and demonstration'. It further refers to technologies acquired through understanding, adapting, utilising and replicating already existing technologies[397].

Several EU-funded projects focus on supporting country-driven innovation and solutions that enhance endogenous capacities and technologies of developing countries. An example of such a project is the Pacific Solutions to Save Our Ocean – Integrated Ocean Management Programme, which aims to capture science and knowledge, including traditional knowledge, for the purposes of integrated ocean management. One of the project's objectives is to improve decision support systems by integrating Pacific traditional knowledge, culture and wisdom in inclusive, consultative decision-making on national ocean policies [398] The project is implemented by the Pacific Community Centre for Ocean Science, and the Commission committed EUR 600 000 to the project in 2022.

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[396] Invest Afrigreen debt impact fund – our projects, https://www.rgreeninvest.com/en/afrigreen/afrigreen-debt-impact-fund-portfolio/.

[397] See the CTCN definition here: https://www.ctc-n.org/technology-sectors/endogenous-technologies?page=33.

[398] Pacific Community Centre for Ocean Science, https://pccos.spc.int/work-areas/projects/pacific-solutions-save-our-ocean-integrated-ocean-management-programme.

4.5.4 Efforts to encourage private sector activities related to technology development and transfers

Many projects supported by EU institutions attract additional private-sector investment in technologies such as renewable energy or climate-smart agriculture. For example, in connection with the Global Gateway initiative 'Solar Development in Brazil,' the EIB is providing a EUR 200 million intermediated framework loan to Sicredi, a cooperative financial institution with more than 6.5 million members and 2 500 branches across all regions of Brazil. Sicredi will use the funding to finance the installation of photovoltaic panels on homes, SMEs and rural properties. It will help to further develop the deployment of photovoltaic technology in Brazil through private sector investment in renewable energy[399].

4.5.5 Efforts to step up, encourage and boost innovation

Collaboration and multi-stakeholder approaches are an important part of many projects supported by the EU. On an overarching level, these approaches are guided by the 2021 Commission Communication on the Global Approach to Research and Innovation[400], which commits the EU to promoting rules-based multilateralism, pursuing reciprocal openness in research and innovation cooperation to facilitate global responses to global challenges, and exchanging best practices.

Several projects supported by the EU include specific components that focus on engagement with stakeholders, co-creation of knowledge and building partnerships on a local, regional, national and international level to step up and enable innovation and collaborative approaches to research and development. The DeSIRA initiative, described in detail in Section 4.5.6, is one example.

4.5.6 Generating knowledge

Many projects supported by the EU contain specific objectives or specify outputs that focus on synthesising knowledge generated during project implementation and making it available to other stakeholders to help disseminate lessons learnt and allow the scaling-up and replication of successful approaches. Again, the DeSIRA initiative is an example of this; it includes a specific strand for capturing and making accessible knowledge and evidence generated during the implementation of DeSIRA projects. This strand, called DeSIRA-LIFT, focuses on knowledge co-production and strengthening of innovation capacity. It uses a three-pronged approach that focuses on the local, institutional and policy levels, as described below [401]:

- providing services on demand for DeSIRA grant holders that support capacity strengthening, knowledge sharing and mutual learning, partnership building, making synergies between different projects, synthesis studies and other knowledge products;

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[399] Brazil: EIB grants €200 million to Sicredi for SMEs and solar energy investment by households, https://www.eib.org/en/press/all/2023-215-brazil-eib-grants-eur200-million-to-sicredi-for-smes-and-households-solar-energy-investments.

[400] Communication from the Commission on the Global Approach to Research and Innovation, COM(2021) 252 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A252%3AFIN.

[401] Leveraging the DeSIRA initiative for agri-food systems transformation, https://capacity4dev.europa.eu/library/communication-global-monitoring-and-evaluation-framework-desira_en.

- supporting a policy dialogue and regional and international partnerships to take up knowledge and experience generated in DeSIRA projects; and
- providing support for deriving evidence-based knowledge to develop an international policy environment for research and innovation in food systems, focusing on the African Union-EU relationship.

The EU is supporting DeSIRA-LIFT with a total contribution of EUR 6.5 million from 2021 to 2024. The knowledge brief and updates are provided through a dedicated website, supporting accessibility and sharing knowledge and experience[402].

4.6 Capacity-building support

4.6.1 Strategies employed to provide capacity-building support

The EU has mainstreamed capacity-building activities into all development assistance, in line with the Paris Declaration on Aid Effectiveness and the Accra Agenda for Action. The EU's development activities in the field of climate change are based on the principles of national ownership, stakeholder participation, country-driven demand, cooperation between donors and across programmes, and impact assessment and monitoring.

The following case studies are examples of capacity-building support provided by the EU.

The Commission's Green Deal Knowledge Hub, a group of technical assistance facilities in the areas of environment and climate, also provide support to various bodies, organisations and partner countries to ensure that climate and climate-resilient development is integrated into the EU's external action. Facilities under this Hub include the EU Global Support Facility for Nationally Determined Contributions, Euroclima and the Greening Facility for international cooperation.

EU Global Support Facility for Nationally Determined Contributions

The EU Global Support Facility for Nationally Determined Contributions (NDC Facility) is a facility under the EU Green Deal Knowledge Hub. It helps partner countries speed up their transition towards low-carbon, resource-efficient and resilient economies by delivering high-level technical assistance and policy advice at country, regional and global level. Services include: (i) helping to design, upgrade and implement NDCs and long-term strategies to reduce greenhouse gas emissions and improve sustainability; (ii) assisting in the development of climate mitigation and adaptation measures; (iii) offering technical support, advice, training and knowledge sharing on a variety of topics; and (iv) contributing to the design of economic policies that help achieve climate change mitigation and adaptation objectives[403].

The NDC Facility is designed according to a results-oriented and demand-driven approach, responding to the needs of EU Delegations and their partner countries. For example, it helped EU Delegations to draw up actions that contribute to fighting climate change while also providing ad hoc

[402] DeSIRA Lift – Resources, https://www.desiralift.org/resources/.
[403] EU Global NDC Facility Brochure 2023, https://capacity4dev.europa.eu/library/eu-global-ndc-facility-brochure-2023_en?refpage=search.

technical assistance, support, training and advice on how these actions should be designed and implemented in beneficiary countries. In this context, the NDC Facility has also helped partner countries enhance their capacity to mobilise and access climate finance. This capacity-building effort helps countries scale up investments in renewable energy, sustainable agriculture, and other climate-related sectors.

Euroclima

The Euroclima programme seeks to contribute to the green and just transition of the Latin America and Caribbean (LAC) region. Euroclima has been the EU's flagship regional programme on climate action in Latin America since 2010. In 2023 it expanded to the Caribbean and it is now being implemented in all 33 LAC countries.

The programme aims at reducing the impact of climate change in the 33 LAC countries by promoting mitigation of and adaptation to climate change and promoting resilience, investment and conservation of biological diversity. It will assist the transition of Latin American and Caribbean countries to a decarbonised, environmentally friendly and inclusive economy, helping to ensure a socially just and green recovery in line with the EU Green Deal[404].

Between 2010 and 2022, 206 capacity-building processes have been carried out with the support of the programme. Moreover, 248 Latin American public or private organisations have been involved in developing and implementing plans, strategies and policies; and more than 66 000 individuals have been trained in the many areas linked to climate change[405].

The Commission's Greening Facility for Neighbourhood, Development and International Cooperation

The Greening Facility for Neighbourhood, Development and International Cooperation managed by the Commission helps build knowledge and skills in integrating the environment and climate change in external actions. It provides guidance on how to identify and maximise opportunities for programmes and projects to contribute to climate and environment objectives and ensure compliance with the 'do no significant harm' principle. Furthermore, it offers remote and on-site assistance to EU staff and national partners to develop skills and knowledge among all stakeholders[544]. The Greening Facility also provides quality control of the Rio markers for EU international cooperation actions to ensure the eligibility criteria, rules and guidance established by the OECD DAC are applied correctly and consistently. The new Greening Toolbox, which comprises all relevant green tools and guidance, will be available as an online resource.

EU4Climate

The EU4Climate project supported the governments of Eastern European partner countries (Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine) in their implementation of the Paris Agreement through mitigating climate change and transitioning towards a low-emissions and climate-resilient economy. The project was funded by the EU and was implemented by the UNDP

[404] See https://www.euroclima.org/en/.
[405] EUROCLIMA+ Annual Report 2022, https://www.euroclima.org/en/knowledge-portal/library/annual-report-euroclima-2022-english-version.

from 2019 to 2023. The four key objectives were to: (i) boost countries' capacity to develop and implement climate policies aligned with their Paris Agreement commitments; (ii) improve transparency on emissions and climate action; (iii) mainstream climate aspects in sector-specific policies; and (iv) advance the implementation of climate-related provisions of bilateral agreements with the EU and in the Energy Community Treaty framework.

Four partner NDCs have been updated and two NDC implementation plans developed with support from the project. Furthermore, three partner countries developed a long-term development strategy for reducing greenhouse gas emissions by mid-century, and four countries developed a robust MRV framework. In addition, countries were supported in the development of sectoral policies or recommendations on climate mainstreaming. The project also assisted in mobilising new climate finance for financial frameworks and in developing the National Adaptation Strategy for Ukraine[406].

Twinning and TAIEX

The Twinning and TAIEX (Technical Assistance and Information Exchange) instruments[546] facilitate institutional capacity building in a 'Team Europe' approach that involves sharing EU best practices through peer-to-peer exchanges to support reforms in partner countries. These short and medium-term projects typically involve workshops, training sessions, expert missions and study visits, all of which are designed to foster long-term reform processes. Based on experience gained over more than 20 years in neighbourhood countries and countries preparing to join the EU, Twinning and TAIEX were also made available to countries in Sub-Saharan Africa, the Middle East, Asia and the Pacific, the Americas and the Caribbean and to Overseas Countries and Territories from 2020. The tools contribute to strengthening the partner countries' national and regional policies, supports the implementation of the Sustainable Development Goals, and contributes to the Global Gateway strategy.

4.6.2 Responding to existing and emerging capacity-building needs

The EU's capacity-building support is grounded in the principle of national ownership[407]. This means that the beneficiaries have ownership over their capacity building, as they independently assess their capacity needs, priorities and gaps, design the process of change and manage it, while external partners like the EU only provide support. Consequently, capacity-building activities are demand-driven, typically arising from donor cooperation and cross-programme collaboration, and always involve stakeholder participation.

To achieve a better understanding of the challenges faced by third countries, the EU uses its external policy instruments, including high-level dialogues, green alliances and green partnerships, policy and political dialogues, Just Energy Transition Partnerships and climate dialogues[408]. This work is carried

[406] Towards Low Emission and Climate Resilient Economy, https://www.undp.org/eurasia/projects/eu4climate.

[407] Addressing capacity development in planning/programming, monitoring and evaluation, https://neighbourhood-enlargement.ec.europa.eu/system/files/2018-10/dg_near_guidance_note_-_addressing_capacity_development_in_programming_me.pdf.

[408] Cooperation on climate action with non-EU countries, https://climate.ec.europa.eu/eu-action/international-action-climate-change/eu-engagement-climate-action-non-eu-countries/cooperation-climate-action-non-eu-countries_en.

out by or in collaboration with the EU Delegations and Offices representing the EU in 144 non-EU countries, which help implement climate programmes around the world.

Since EU support is provided in response to partner countries, information from the partner countries (e.g. through their national communications) is important to be able to assess their capacity-building needs and the effectiveness of ongoing activities.

4.6.3 Policies promoting capacity-building support

The EU supports capacity building in partner countries through regulations, strategies, policies and programmes. Some key examples are presented below.

Neighbourhood, Development and International Cooperation Instrument – Global Europe

The Regulation establishing the Neighbourhood, Development and International Cooperation Instrument – Global Europe (NDICI-Global Europe Regulation)[409] aims to foster dialogue and cooperation with third countries and regions in the European Neighbourhood (Eastern Europe and Northern Africa), Sub-Saharan Africa, Asia and the Pacific and the Americas and the Caribbean.

The Regulation explicitly mentions capacity building relating to environment and climate change as areas of cooperation across all geographic regions. Specific areas for cooperation under NDICI-Global Challenges priority area 'Planet' include:

- strengthening scientific, technical, human and institutional capacity for climate and environmental management, mainstreaming, and monitoring. This includes enhancing regional, national and local climate and environmental governance and facilitating access to public and private resources for disaster risk reduction, ecosystem and biodiversity conservation, climate finance and insurance;

- integrating environmental sustainability and climate change objectives into national and local development strategies, also in terms of including sustainability criteria in public procurement.

NDICI – Global Europe also emphasises the importance of empowering civil society organisations and local communities, in particular women's and youth organisations.

EU Global Gateway strategy

The EU Global Gateway[410] is the EU's main strategy for boosting investments in partner countries. It encourages smart, clean and secure investments in physical sustainable infrastructure and promotes capacity building through investments in education and research in partner countries. 'Green and Clean' is one of the six guiding principles of the Global Gateway, which define it as a climate-neutral strategy for investing in infrastructure that is clean, climate-resilient and aligned with pathways towards net-zero emissions. Multiple initiatives are being rolled out across the world, mainly through

[409] Regulation (EU) 2021/establishing the Neighbourhood, Development and International Cooperation Instrument – Global Europe, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0947.

[410] Global Gateway, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/stronger-europe-world/global-gateway_en.

Team Europe Initiatives, which are funded both by the EU and its Member States and by European development banks.

These policies and programmes demonstrate the EU's commitment to building capacities in partner countries across various sectors, with a particular focus on climate change, while at the same time promoting stability, development and mutual cooperation.

Samoa Agreement

The Samoa agreement[411] is the overarching framework for EU relations with African, Caribbean and Pacific countries. The aim of the agreement is to strengthen the capacity of the EU and ACP countries to address global challenges together. The agreement succeeds the Cotonou agreement and serves as the legal framework for EU relations with 79 countries over the next twenty years. The agreement highlights the importance of capacity building across several areas of collaboration, including the environment, climate change and water and sanitation.

European Fund for Sustainable Development Plus (EFSD+)

The EFSD+ aims to mobilise EUR 135 of public and private financing to help partner countries to achieve the Sustainable Development Goals (SDGs). Support provided through the ESDF+ will include technical assistance and support for institutional capacity building. In addition guarantees extended through the EFSD+ will support programmes that include capacity building components. An example is the "Guarantee Facility for Sustainable Cities" managed by the UN Capital Development Fund (UNCDF) that will include a component of capacity building at the local level to build a transformative pipeline if sustainable urban development projects, implemented through UN Habitat.[412]

The new EU Adaptation to Climate Change strategy (2021)

The new EU Adaptation to Climate Change strategy[413] (see Section 3.6) aims to turn the vision of a climate-resilient EU into reality by 2050, by making adaptation smarter, more systemic and swifter and stepping up international action. This means improved knowledge and data throughout the policy cycle, support for policy development and climate risk management at all levels and swifter adaptation. As part of its external action, the EU promotes national, sub-national and regional approaches to adaptation, focusing in particular on adaptation in Africa, Small Island Developing States (SIDS) and Least Developed Countries (LDCs).

An important new component of the new Adaptation Strategy is its external dimension, entitled 'Stepping Up International Action for Climate Resilience'. It aims to increase support for international climate resilience and preparedness and supports capacity-building activities in partner countries. The EU's activities in this area are considered a significant contribution to the United Arab

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411 European Council – Council of the European Union: Samoa agreement: https://www.consilium.europa.eu/en/policies/samoa-agreement/

412 UNDCF Becomes First Entity to Access the European Union's EFSD+ Guarantee Program: https://www.uncdf.org/article/8078/european-union-greenlights-uncdf-guarantee-facility-for-cities-amounting-to-eur-154-million

413 Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082.

Emirates Framework for Global Climate Resilience[414], whose purpose is to enhance adaptation support.

Capacity building in EU candidate countries

It is worth mentioning that institutional capacity building is a crucial part of the Commission's actions to support candidate and potential candidate countries in their efforts to modernise their public administration in preparation for joining the EU. Consequently, a guidance has been published on better addressing capacity building in interventions at the planning/programming, monitoring and evaluation stages. These interventions target both public institutions and non-state operators, including the private sector and civil society organisations[415].

4.6.4 Involving stakeholders

The Regulation establishing the Neighbourhood, Development and International Cooperation Instrument – Global Europe (NDICI - Global Europe)[416] lays out the general principles for projects implemented under the instrument. This includes the principle of inclusive partnership and transparency, which requires the Commission to ensure that relevant stakeholders of partner countries, including civil society organisations and local authorities, are duly consulted and have timely access to relevant information. The aim is to actively involve them and to play a meaningful role in the design, implementation and monitoring of programmes funded through the instrument. It further provides that, in line with the principle of ownership, the Commission should favour the use of partner countries' institutions and systems for the implementation of programmes.

These general principles are further applied through regular and inclusive multi-stakeholder dialogues with other donors and other players, including local authorities, representatives of civil society, foundations and the private sector.

The following project is an example of how stakeholders are involved in EU-funded projects.

Transition towards a low-emission and climate-resilient economy in the Western Balkans and Türkiye (TRATOLOW)

The TRATOLOW project is an example of how stakeholders are involved in EU-funded projects. The project's objective is to contribute to climate change mitigation and adaptation in the Western Balkan region and Türkyie and to help those countries move towards resource-efficient, low-emission and climate-resilient economies. The project focuses on strengthening institutional capacities and cooperation and on involving stakeholders, in line with the principle of stakeholder ownership[417].

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[414] Decision 2/CMA.5, Global goal on adaptation, https://unfccc.int/documents/637073.

[415] Addressing capacity development in planning/programming, monitoring and evaluation, https://neighbourhood-enlargement.ec.europa.eu/system/files/2018-10/dg_near_guidance_note_-_addressing_capacity_development_in_programming_me.pdf.

[416] Regulation (EU) 2021/947 establishing the Neighbourhood, Development and International Cooperation Instrument – Global Europe, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0947.

[417] EU Support for Climate Action in IPA II Beneficiaries Transition towards the low emissions and climate-resilient economy in the Western Balkans and Türkiye (TRATOLOW), https://www.tratolownetwork.eu/fileadmin/inhalte/tratolow/eu_support_for_climate_action_imagebrochure.pdf.

4.6.5 Sharing lessons learnt and best practices

The Commission's Directorate-General for International Partnerships (DG INTPA) is responsible for formulating the EU's international partnership and development policy, with the ultimate goal of reducing poverty, ensuring sustainable development, and promoting democracy, human rights and the rule of law across the world. DG INTPA strives to be a learning organisation taking advantage of knowledge and expertise and has developed tools supporting the sharing of best practices and lessons learnt[418].

DG INTPA created Capacity4dev[419], the Commission's online knowledge-sharing platform which connects international cooperation professionals and allows them to learn, share, and collaborate with other colleagues and stakeholders. Users include staff of the EU institutions and international cooperation professionals from EU Member States, partner governments, civil society, NGOs, international organisations and the private sector.

The platform aims to facilitate collaboration and engagement among peers by enabling cross-learning among practitioners from EU institutions and other organisations, allowing them to share lessons learnt and exchange innovative approaches. It also aims to consolidate knowledge-sharing tools and to bring together communities of practitioners in a common environment to improve the efficiency, effectiveness and quality of EU development cooperation.

In addition, DG INTPA has developed a comprehensive Greening toolbox to support environment and climate-change mainstreaming in EU international cooperation and partnerships[420]. The toolbox includes a guidance document highlighting greening opportunities across the intervention cycle, notes on the integration of environment and climate change in specific sectors, an environment and climate risk screening tool and various impact assessment and validation tools.

All programmes managed by DG INTPA include lessons learnt from previous projects. The following are recent examples of projects with a particular focus on sharing lessons learnt.

Global Climate Change Alliance Plus Scaling up Pacific Adaptation (GCCA+ SUPA)

The GCCA+ SUPA project, which fell under the GCCA+ flagship initiative, aimed to enhance climate change adaptation and resilience in 10 Pacific island countries. The 2019-2023 project specifically focused on strengthening the implementation of sector-based, but integrated, climate change and disaster risk management strategies and plans[421].

The project led to the development of a methodology for impact analysis, and a trial of the methodology has been conducted in four countries. The purpose of the methodology was to inform target groups about best practices and to promote more effective and sustainable interventions in the future. Results of the trials were shared in an online learning series in 2022 (233 participants). The

[418] DG INTPA's Knowledge Management strategy 2020 – 2024, https://international-partnerships.ec.europa.eu/document/download/2dc364c5-a538-47c1-93d1-56fc91f8087b_en?filename=intpa-km-strategy-2020-2024_en.pdf.

[419] See https://capacity4dev.europa.eu/_en.

[420] The European Union Greening Facility – tools, https://www.switchtogreen.eu/mainstreaming-facility/.

[421] Project fiche GCCA+ scaling up Pacific Adaptation (GCCA+ SUPA), https://capacity4dev.europa.eu/library/project-fiche-gcca-scaling-pacific-adaptation-gcca-supa_en.

project involved developing and testing criteria for scaling up climate change adaptation in development sectors, such as the coastal protection sector, the health sector, the marine resource sector, and the water security sector. The criteria were: (i) identification and analysis of past measures; (ii) alignment with national development priorities; (iii) application of a people-centred approach; and (iv) existence of a framework for maintenance and sustainability.

Moreover, a people-centred approach has been applied to all project activities involving the strands human rights, gender and social inclusion, Pacific culture and environmental sustainability. Fact sheets, web stories, videos and further project documentation are available online on the relevant regional and country pages[422].

Advancing climate adaptation in the southern Mediterranean (ACA-MED)

The overall objective of the programme, launched at the 2022 United Nations Climate Change Conference, is to promote the green transition and strengthen the environmental and climate resilience of economies and communities in the Southern Mediterranean region. This includes improving knowledge, climate governance, policies and action plans at national/central level to ensure the successful implementation of NDCs and NAPs and facilitate access to climate finance for adaptation purposes, as well as to give local authorities better access to climate finance with a view to investing in climate change adaptation.

The programme will include two separate but closely coordinated actions that build on the achievements of current and previous regional and bilateral projects:

- the AdaptAction programme run by the French Development Agency (AFD), already being implemented with good results in other countries, will be extended to the Southern Neighbourhood where it will promote climate integration and planning across Ministries and prepare the ground for large-scale investments using a tested methodology;

- the Local Climate Adaptive Living Facility (LoCAL), designed and hosted by the United Nation's Capital Development Fund and supported by the EU, helps local governments in developing and least developed countries access the climate finance, capacity building and technical support they need to respond and adapt to climate change. The facility is already being successfully implemented in other countries and will be extended to the Southern Neighbourhood. Actions will use the tried-and-tested 'LoCAL mechanism' to integrate climate change into local governments' planning and budgeting systems to increase awareness of and thus improve the response to climate change at local level. It will thereby promote climate integration in a vertical approach from central governments to local authorities.

The programme complements other ongoing and planned bilateral and regional interventions, notably the EU for Climate Action in the Southern Neighbourhood (Clima MED) project, which is still ongoing, and six Climate for Cities projects launched in early 2022. Clima MED has provided a solid basis on which the programme will build. In particular, the programme will make use of the National

[422] Global Climate Change Alliance Plus Scaling up Pacific Adaptation, Final Report, Learning from the past and scaling up climate change adaptation measures for the future, https://library.sprep.org/sites/default/files/2023-12/GCCA-SUPA-report.pdf.

Coordination Groups established in each participating country and will use the Climate Action Strategies developed by Clima MED that provide guidance on effective climate mainstreaming.

Clima MED has also promoted local-level climate action by helping cities develop Sustainable Energy Access and Climate Action Plans (SEACAPs) and join the Global Covenant of Mayors initiative for climate and energy (CoM) via CoM MED, a regional branch for Northern Africa and the Middle East. The programme will build on these achievements and interact with the SEACAP Support Mechanisms established in each country to raise funding for the financing of existing SEACAPs[423].

[423] Action Document for Advancing Climate Adaptation in the Southern Mediterranean (ACA-MED), https://neighbourhood-enlargement.ec.europa.eu/document/download/9fab0c56-18cd-416d-b546-22aacc703410_en?filename=C_2022_8009_F1_ANNEX_EN_V2_P1_2322952.PDF.

5 MAKING FINANCE FLOWS CONSISTENT WITH A PATHWAY TOWARDS LOW GHG EMISSIONS AND CLIMATE-RESILIENT DEVELOPMENT

Article 2 of the Paris Agreement lays down three goals; a temperature goal in Article 2.1(a); an adaptability goal in Article 2.1(b); and a 'finance flows' goal in Article 2.1(c), worded as 'Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.'

The EU views this 'finance flows' goal not only as a goal in itself, but also as a critical enabler for achieving the Paris Agreement's other goals. It has the double objective of scaling down flows that are detrimental to achieving climate neutrality and resilience, and mobilising finance flows at the scale needed to address climate change worldwide.

The EU is taking the following steps to implement Article 2.1(c) of the Paris Agreement. The EU Staff Working Document 'Consistency of finance flows with the Paris Agreement objectives – the EU navigating the transition towards climate neutrality and resilience' of July 2024[424] provides an overview of the current international context, as well as the policies and measures already in place in the EU to align finance flows with the Paris Agreement. The EU is also working with its international partners to better align finance flows with global climate objectives and improve the mobilisation of climate finance. For instance, it has partnered up with Argentina, Canada, Chile, China, India, Kenya and Morocco to launch the International Platform on Sustainable Finance (which more countries have since joined). This platform aims to scale up the mobilisation of private capital for environmentally sustainable investment. The European Commission has also set up a high-level expert group on scaling up sustainable finance in low- and middle-income countries in 2022 to identify challenges and opportunities related to sustainable finance in those countries. In April 2024, the group sent the Commission a report with its recommendations on this topic.

The EU's Sustainable Finance Framework also supports the alignment of finance flows with the ambitious climate policies of the European Green Deal and the European Climate Law's objectives. The EU has also done a lot to make sure a significant part of the EU budget contributes to climate action.

At EU level, investment for the green transition comes from three main sources: the EU multiannual financial framework (MFF) for 2021-2027 and the 'NextGenerationEU' instrument – the cornerstone of which is the EU's Recovery and Resilience Facility – that supports the EU's recovery from the economic downturn caused by COVID-19, and financial instruments financed by the EU Emissions Trading System - the Innovation fund, the Modernization fund and the upcoming Social Climate fund. To help achieve climate goals set out in the European Climate Law and the European Green Deal, the EU has decided to integrate climate action into the entire EU budget. According to the 'Annual Management and Performance Report for the EU Budget – 2023 financial year' (COM/2024/401

[424] European Commission, Directorate-General for Climate Action, *Consistency of financial flows with the Paris Agreement objectives – The EU navigating the transition towards climate neutrality and resilience*, Publications Office of the European Union, 2024, https://data.europa.eu/doi/10.2834/637101.

final) published on 19 June 2024, the EU budget – including NextGenerationEU – is projected to contribute EUR 658 billion to climate spending, representing 34.3% of the budget. The 'do no significant harm' principle is also being applied (in different ways) across the different instruments. An amendment of the Financial Regulation has been agreed for the next MFF to further integrate the 'do no significant harm' principle.

5.1 Budgeting and spending programmes

The European Commission is committed to integrating climate change mitigation and adaptation into all major EU spending programmes. Of the EU's 2021-2027 budget, 30% will be spent on combating climate change[425].

Under the EU Emissions Trading System (see Section 2.4.2.1), at least 50% of revenues from the auctioning of emission allowances should be used for climate and energy-related purposes. Between 2013 and 2022, EU Member States spent 76% of total auctioning revenues on climate and renewable energy and energy efficiency-related purposes[426].

The EU and its Member States are committed to providing financial, technological and capacity-building support for developing countries. Climate finance by EU institutions more than doubled between 2013 and 2023 (see Chapter 4 support provided).

5.2 Tools and standards

The EU taxonomy enables financial and non-financial companies to share a definition of economic activities that can be considered environmentally sustainable (see Section 2.4.2.7). It plays an important role in helping the EU scale up sustainable investment by creating security for investors, protecting private investors from greenwashing, helping companies become more climate-friendly and mitigating market fragmentation[427].

With the European Green Bond Standard[428], the EU is aiming to set a clear gold standard for green bonds, which play an important role in financing assets needed for the low-carbon transition. This voluntary standard uses the detailed criteria of the EU taxonomy to define green economic activities, ensures levels of transparency in line with market best practice, and establishes a supervision process for companies that carry out pre- and post-issuance reviews[429].

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[425] The 2021-2027 EU budget – What's new?, https://commission.europa.eu/strategy-and-policy/eu-budget/long-term-eu-budget/2021-2027/whats-new_en#a-modernised-eu-long-term-budget-powered-by-nextgenerationeu.

[426] Use of auctioning revenues generated under the EU Emissions Trading System, https://www.eea.europa.eu/en/analysis/indicators/use-of-auctioning-revenues-generated?activeAccordion=309c5ef9-de09-4759-bc02-802370dfa366.

[427] EU taxonomy for sustainable activities, https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en.

[428] Regulation (EU) 2023/2631 on European Green Bonds and optional disclosures for bonds marketed as environmentally sustainable and for sustainability-linked bonds, https://eur-lex.europa.eu/eli/reg/2023/2631/oj.

[429] The European green bond standard – Supporting the transition, https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/european-green-bond-standard-supporting-transition_en.

5.3 Disclosures

The Corporate Sustainability Reporting Directive[430] requires companies to disclose information on how external sustainability factors (such as climate change) influence their activities and how their activities affect people and the environment, including the climate. This helps investors, consumers and other stakeholders to evaluate the sustainability performance of companies (see Section 2.4.2.8)[431].

The Sustainable Finance Disclosure Regulation[432] sets out the way in which financial market participants must disclose sustainability information. It helps investors make informed choices about investing in companies and projects supporting sustainability objectives. It is also designed to enable investors to properly assess how sustainability risks are integrated into the investment decision process. It thus contributes to the objective of attracting private funding to help Europe make the transition to a net-zero economy[433].

5.4 International Platform on Sustainable Finance

The International Platform on Sustainable Finance is a forum for dialogue between policymakers with the overall aim of increasing the amount of private capital being invested in sustainable investments. The platform offers a multilateral forum of dialogue between policymakers who are in charge of developing sustainable finance regulatory measures to help investors identify and seize sustainable investment opportunities. Platform members can exchange and disseminate information to promote best practices, compare their different initiatives, and identify sustainable finance barriers and opportunities, taking national and regional contexts into account[434].

5.5 Activities of the European Investment Bank

In 2019 the EIB Group committed itself to the following for climate and the environment:

- All new financing should be aligned with the principles and goals of the Paris Agreement by the end of 2020 and, as part of the revised energy lending policy, support for fossil fuel energy projects should end by the end of 2021[435].
- The share of EIB financing for climate action and environmental sustainability should increase to more than 50% of its financing by 2025 and afterwards[436].

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[430] Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting, http://data.europa.eu/eli/dir/2022/2464/oj.

[431] Corporate sustainability reporting, https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en.

[432] Regulation (EU) on sustainability-related disclosures on the financial services sector, https://eur-lex.europa.eu/eli/reg/2019/2088/oj.

[433] Sustainability-related disclosure in the financial services sector, https://finance.ec.europa.eu/sustainable-finance/disclosures/sustainability-related-disclosure-financial-services-sector_en.

[434] International Platform on Sustainable Finance, https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/international-platform-sustainable-finance_en.

[435] EIB energy lending policy, https://www.eib.org/attachments/strategies/eib_energy_lending_policy_en.pdf.

[436] EIB Group Climate Bank Roadmap, https://www.eib.org/en/about/priorities/climate-action/cbr/index.htm.

- EUR 1 trillion of investments in climate action and environmental sustainability should be supported from 2021 to 2030.

These commitments cover the EIB's activities inside and outside the EU. In 2020 the EIB Group published a Climate Bank Roadmap[437] setting out how it would follow through on these new commitments. This included presenting specific approaches to ensure projects were aligned with the Paris Agreement from both a low-carbon and climate resilience perspective. In 2021 the group went a step further by publishing a framework to support the alignment of counterparties with the Paris Agreement (the 'PATH framework'[438]). EIB corporate clients now need to develop and disclose their decarbonisation and resilience plans. In general, the EIB will no longer finance standard low-carbon projects of high-emitting corporations if they continue to operate or invest in activities that are not aligned with the Paris Agreement's objectives. Counterparts that are large financial institutions are asked to increase their climate-related disclosures. The EIB Group is offering technical support to clients to help them prepare credible and robust climate plans.

The EIB is one of the largest multilateral providers of climate finance worldwide. It is on course to reach its target of exceeding 50% of climate funding by 2025, having already reached 51% in 2021, 58% in 2022 and 60% in 2023[439]. Between 2021 and 2023, the EIB invested over EUR 103 billion in climate action (over EUR 108 billion including environmental sustainability projects that do not also contribute to climate action) worldwide, most of which was invested in the EU.[440]

EIB financing is a catalyst for mobilising finance for climate action by encouraging others to co-finance with its long-term lending. In this respect, the EIB Group is on track to reach its target of supporting EUR 1 trillion in climate action and environmental sustainability investments between now and 2030, with total investments supported by the EIB Group reaching EUR 354 billion between 2021 and 2023[441].

The EIB contributes to the achievement of the EU's climate and energy objectives by supporting a range of climate change mitigation projects (e.g. in renewable energy, energy efficiency and low-carbon transport) and investing in climate change adaptation measures. All EIB-financed projects, regardless of sector, must comply with EIB environmental and social standards that reflect EU climate objectives.

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[437] EIB Group Climate Bank Roadmap 2021-2025, https://www.eib.org/attachments/strategies/eib_group_climate_bank_roadmap_en.pdf.

[438] The EIB Group PATH Framework, https://www.eib.org/en/publications/the-eib-group-path-framework.

[439] Mid-term review of the EIB Group Climate Bank Roadmap, https://www.eib.org/attachments/lucalli/20230176_mid_term_review_of_the_eib_group_climate_bank_roadmap_en.pdf.

[440] Sustainability Report 2021, https://www.eib.org/attachments/publications/sustainability_report_2021_en.pdf. Sustainability Report 2022, https://www.eib.org/attachments/lucalli/20230023_sustainability_report_2022_en.pdf.

[441] EIB Group 2023 Climate Bank Roadmap Progress Report, https://www.eib.org/en/publications/20240145-eib-group-climate-bank-roadmap-progress-report-2023.

6 IMPROVEMENTS IN REPORTING

As per the modalities, procedure and guidelines, each Party should, to the extent possible, identify, regularly update and include as part of its biennial transparency report information on areas of improvement in relation to its reporting. The EU will strive to improve its biennial transparency report continuously.

Improving reporting over time is crucial for increasing and further promoting transparency. This Biennial Transparency Report (BTR) is the first such report under the Paris Agreement, but the EU has learnt from earlier reporting cycles under the United Nations Framework Convention on Climate Change, and it provided additional information on aspects such as the following:

- the impact of migration policies and measures on GHG emissions;
- climate change impacts, adaptation, risk and vulnerability;
- case studies for capacity-building support.

The EU is planning to further improve its reporting in subsequent BTRs. It is awaiting the technical expert review of this BTR to be able to engage in an open dialogue with the Parties to the Paris Agreement during the Facilitative Multilateral Consideration of Progress (FMCP). It will then use the technical expert review team's recommendations, and the lessons learnt during the FMCP to decide what its priorities are for further improving its reporting on climate action and support.

7 LIST OF ABBREVIATIONS

Abbreviation	Description
ACA-MED	Advancing Climate Adaptation in the Southern Mediterranean
AFCIA	Adaptation Fund Climate Innovation Accelerator
AFD	French Development Agency
AR6	Sixth assessment report
ATJ	Alcohol-to-jet
BECCS	Bioenergy with carbon capture and storage
BMUV	German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
BTR	Biennial transparency report
C3S	Copernicus Climate Change Service
CAP	Common agricultural policy
CBAM	Carbon Border Adjustment Mechanism
CCS	Carbon capture and storage
CCU	Carbon capture and utilisation
CEMS	Copernicus Emergency Management Service
CH_4	Methane
Clima MED	Climate Action in the Southern Neighbourhood project
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CO_2	Carbon dioxide
CO_2eq	Carbon dioxide equivalent
CoM	Covenant of Mayors initiative for climate and energy
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
COVID-19	Coronavirus disease
CRAFT	Climate Resilience and Adaptation Finance and Technology Transfer Facility
CRCF	Carbon removals and carbon farming
CRM	Climate risk management
CRT	Common reporting tables
CRS	Creditor Reporting System

CSRD	Corporate Sustainability Reporting Directive
CTCN	Climate Technology Centre and Network
CTF	Common tabular format
DAC	Development Assistance Committee
DACCS	Direct air carbon capture with storage
DeSIRA	Development of Smart Innovation through Research in Agriculture
DG	Directorate-General
DG INTPA	European Commission's Directorate-General for International Partnerships
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EC	European Commission
ECMWF	European Centre for Medium-Range Weather Forecasts
EDFIs	European Development Finance Institutions
EEA	European Environment Agency
EED	Energy Efficiency Directive
EGDIP	European Green Deal Investment Plan
EIB	European Investment Bank
ElectriFI	Electrification Financing Initiative
EPBD	Energy Performance of Buildings Directive
EPR	Extended producer responsibility
ERDF	European Regional Development Fund
ESA	European Space Agency
ESD	Effort-Sharing Decision
EFSD+	European Fund for Sustainable Development Plus
ESR	Effort-Sharing Regulation
ESRS	European Sustainability Reporting Standards
ESPR	Ecodesign for Sustainable Products Regulation
ETF	Enhanced Transparency Framework
ETC/CCA	European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation

ETC/CM	European Topic Centre on Climate Change Mitigation
EU	European Union
EU-27	27 Member States of the European Union
EUCRA	European climate risk assessment
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EUR	Euro
EU ETS	European Union Emissions Trading System
EU ETS2	European Union Emissions Trading System for fuel distribution for road transport and buildings
EU OMR	European Union territories in the Outermost Regions
EWSS	Galileo Emergency Warning Satellite Service
FMCP	Facilitative multilateral consideration of progress
G7	Group of Seven
GCCA+	Global Climate Change Alliance Plus Initiative
GCCA+ SUPA	Global Climate Change Alliance Plus Scaling up Pacific Adaptation
GCF	Green Climate Fund
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gas
GJ	Gigajoule
GVA	Gross value added
GWL	Global warming level
HDV	Heavy-duty vehicle
HFCs	Hydrofluorocarbons
HLPD	European Union High Level Policy Dialogue
HWP	Harvested wood products
IDFC	International Development Finance Club
IED	Industrial and Livestock Rearing Emissions Directive
IPA	Instrument for Pre-Accession Assistance
IPCC	Intergovernmental Panel on Climate Change

IPPU	Industrial processes and product use
IPSF	International Platform on Sustainable Finance
JRC	Joint Research Centre
km^2	Square kilometre
kt	Kilotonne
LAC	Latin America and the Caribbean
LDCs	Least developed countries
LIFE	*L'instrument financier pour l'environnement* – the EU financial instrument for the environment
LoCAL	Local Climate Adaptive Living Facility
LULUCF	Land use, land-use change and forestry
Mt	Megatonne
MDBs	Multilateral Development Banks
MFF	Multiannual financial framework
MPGs	Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement
MRV	Measuring, reporting and verification
MS	Member State(s)
N_2O	Nitrous oxide
NA	Not applicable
NDC	Nationally determined contribution
NDICI-Global Europe	Neighbourhood, Development and International Cooperation Instrument-Global Europe
NECP	National energy and climate plan
NEDC	New European Driving Cycle
NGOs	Non-governmental organisations
NF_3	Nitrogen trifluoride
NFRD	Non-Financial Reporting Directive
NID	National Inventory Document
NUTS	Nomenclature of Territorial Units for Statistics
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development

OOF	Other official flows
PCD	Policy coherence for development
PFCs	Perfluorinated compounds
pkm	Passenger-kilometre
PRIMES	Price-Induced Market Equilibrium System
RAST	Regional Adaptation Support Tool
RED	Renewable Energy Directive
RFF	Recovery and Resilience Facility
RFNBO	Renewable fuels of non-biological origin
SAF	Sustainable aviation fuels
SCF	Social Climate Fund
SF_6	Sulphur hexafluoride
SEIP	Sustainable Europe Investment Plan
SEACAPs	Sustainable energy access and climate action plans
SFDR	Sustainable Finance Disclosure Regulation
SIDS	Small island developing states
SMEs	Small and medium-sized enterprises
STEP	Strategic Technologies for Europe Platform
SWD	Staff working document
TEN-E	Trans-European Networks for Energy
TEN-T	Trans-European Transport Network
tkm	Tonne-kilometre
TRACE	Territorial Risk Assessment of Climate in Europe
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UWWTD	Urban Wastewater Treatment Directive
WAM	With additional measures
WEEE	Waste of electrical and electronic equipment

WEM	With existing measures
WG	Working group
WLTP	Worldwide harmonised light vehicles test procedure
ZEVs	Zero-emission vehicles

8 ANNEX TO THE BIENNIAL TRANSPARENCY REPORT

The following annexes are available as separate submissions on the UNFCCC website:

- Common reporting tables for GHG emissions and removals
- Common tabular formats for information necessary to track progress
- Common tabular formats for information on support provided and mobilised

The National Inventory document is submitted as a stand-alone document.

This BTR contains an annex on the Methodology applied for the identification of GHG emissions from international aviation and navigation in the scope of the EU NDC.

8.1 Annex: Methodology used to identify GHG emissions from international aviation and navigation in the scope of the EU's NDC

The scope of the EU's 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 using the Joint Research Centre's Integrated Database of the European Energy System (JRC-IDEES)[442]. It allows to split the international transport CO2 emissions into intraEU/extraEU and intraEEA/extraEEA categories backwards in time (i.e. 1990)[443]. EEA stands for the European Economic Area, comprising the 27 EU Member States, Iceland, Liechtenstein and Norway.

For international transport, JRC-IDEES uses 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 between domestic, intra-EU/intra-EEA and extra-EU/extra-EEA activity for each EU Member State, Norway and Iceland.

In aviation, JRC-IDEES distinguishes between passenger and freight modes, with three geographical categories of flight origin/destination for each mode: domestic, intra-EEA plus the UK, and extra-EEA plus the 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

[442] 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.

[443] 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 include emissions related to the UK but not to Switzerland, where total CO_2 emissions for the scope are additionally estimated using EUROCONTROL data.

representative aircraft), load factors, and aircraft efficiencies. As country-specific activity statistics are not available, the breakdown first allocates EU-level activity data from the Transport Pocketbook[444] of the European Commission's Directorate-General for Mobility and Transport to each country and flight category.

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 are 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 are 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

[444] Statistical pocketbook 2023, https://transport.ec.europa.eu/facts-funding/studies-data/eu-transport-figures-statistical-pocketbook/statistical-pocketbook-2023_en.

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'[445]), 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 are 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 are not available, it is estimated from Eurostat energy consumption.
- Missing mileage data are derived from the activity and load factor estimates.
- 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.

Table 13 provides an overview of the resulting net GHG emissions in the scope of the NDC.

[445] THETIS MRV, https://mrv.emsa.europa.eu/#public/eumrv.

Table 13:Summary of GHG emissions in the scope of the NDC

Scope	Unit	1990	2021	2022
Net GHG emissions from the national GHG inventory of the EU	kt CO_2eq	4 649 007	3 215 997	3 132 670
GHG emissions from international aviation in the scope of the NDC	kt CO_2eq	23 906	26 326	41 405
GHG emissions from international navigation in the scope of the NDC	kt CO_2eq	26 492	30 327	31 149
Net GHG emissions in the scope of the NDC (used for tracking progress and presented in CTF Table 4)	kt CO_2eq	4 699 405	3 272 650	3 205 223

Source: GHG inventory of the EU; calculations based on JRC-IDEES, EUROCONTROL and THETIS MRV as described above.