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REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

EU Climate Action Progress Report 2024

{SWD(2024) 249 final}

CONTENTS

1 EMISSION TRENDS AND PROGRESS IN CLIMATE ACTION

1.1 CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS: RECENT TRENDS

The pace of anthropogenic global warming continues to accelerate and is impacting all regions of the world, with Europe warming twice as fast as the global average [1]. To limit warming to the 1.5 °C Paris Agreement temperature target, secure a liveable future for all, and avoid the worst impacts of climate change, global greenhouse gas emissions should fall by 43% below 2019 levels by 2030 and by 84% by 2050 [2]. Climate change makes extreme events, including deadly heatwaves, extreme rainfall, hurricanes, forest fires and droughts more frequent and intense [3]. After 60 000 – 70 000 heat-related deaths in Europe in 2022 [4,5], heatwaves in 2023 killed nearly 50 000 Europeans [6].

More catastrophic events took place in 2024 and projections show a strong net increase in temperature-related mortality rates already for mid-century [7]. The deadly floods in Afghanistan, which killed at least 300 people in May 2024, were followed by dangerous, intense and extended summer heatwaves that affected hundreds of millions of people globally. At least 10 countries recorded daily temperatures of more than 50 °C [8]. Temperatures of over 40 °C were recorded in many places in Europe, with Greece, Spain, France, Italy and Portugal experiencing extreme heat that caused fatalities, fuelled wildfires, and required emergency measures to protect the population from heat stress [9]. In September, storm Boris caused catastrophic flooding in several European countries, while wildfires in Portugal caused fatalities. Urgent and decisive climate action is needed to save lives and livelihoods, avoid economic losses and safeguard natural systems.

Despite years of warnings from the scientific community that greenhouse gas emissions need to decline rapidly to net-zero if we are to halt global warming, preliminary Joint Research Centre (JRC) data [10] show that global greenhouse gas (GHG) emissions (excluding the net removals from land use, land use change and forestry, LULUCF) have reached 53 billion tonnes of CO_2 equivalent (CO_2-eq) in 2023. This is 1.9% above the 2022 level and 3.3% above pre-pandemic (i.e. 2019) emissions (Figure 1.1.a). In 2023, transport was the main driver of increased global emissions (+3.7%, or 301 $MtCO_2$-eq) and now surpasses the pre-pandemic level. It was followed by the power industry (+1.6%, or 234 $MtCO_2$-eq) and industrial combustion (+2.9%, or 184 $MtCO_2$-eq). Among the larger emitters (Figure 1.1.b), the most significant increases were in China (+5.2%, or 784 $MtCO_2$-eq) and India (+6.1%, or

[1] Copernicus, European State of the Climate: Summary 2023, 2024. https://climate.copernicus.eu/sites/default/files/custom-uploads/ESOTC%202023/Summary_ESOTC2023.pdf

[2] IPCC, Climate Change 2023: Synthesis Report - Summary for Policymakers, IPCC, Geneva, 2023.

[3] European Climate Risk Assessment (EUCRA) report. https://www.eea.europa.eu/publications/european-climate-risk-assessment

[4] Ballester J. et al., 'Heat-related mortality in Europe during the summer of 2022' Nature Medicine, No 29, 1857-1866, 2023.

[5] Commission Communication on managing climate risks, March 2024

[6] Gallo et al., Heat-related mortality in Europe during 2023 and the role of adaptation in protecting health. Nature Medicine, 2024. https://www.nature.com/articles/s41591-024-03186-1

[7] https://www.exhaustion.eu/

[8] World Meteorological Organisation (WMO). *Extreme heat continues throughout July with devastating impacts*. 8 August 2024. https://wmo.int/media/news/extreme-heat-continues-throughout-july-devastating-impacts

[9] https://www.worldweatherattribution.org/deadly-mediterranean-heatwave-would-not-have-occurred-without-human-induced-climate-change/

[10] Crippa, M. et al., GHG emissions of all world countries, Publications Office of the European Union, Luxembourg, 2024. https://edgar.jrc.ec.europa.eu/report_2024

236 $MtCO_2$-eq). Compared with 1990 levels, the EU's GHG emissions have decreased more significantly than those of all the other top emitting economies. The decades-long decreasing trend in the EU's GHG emissions means that they now represent 6.1% of global emissions, which is a sharp decrease from 14.9% in 1990 [11].

Figure 1.1: Global GHG emissions by main emitters (and rest of the world, RoW, 1990-2023) and annual changes [12] (2019-2023)

Figure 1.1.a

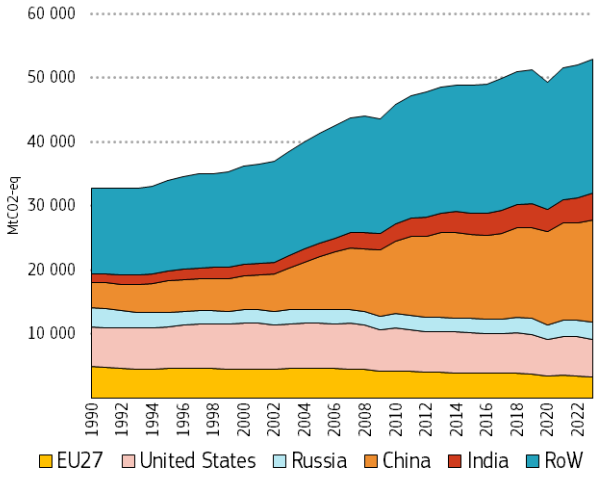
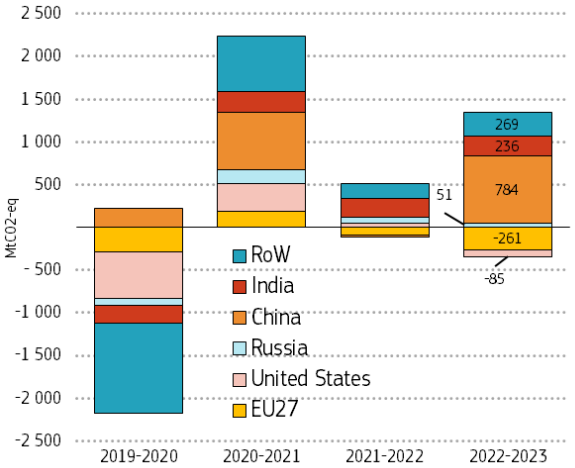


Figure 1.1.b



In the EU, provisional data [13] for 2023 show that total net GHG emissions, reflecting the EU target scope [14], decreased by 8.3% compared with 2022 [15]. In the same year, economic activity in the EU broadly stagnated, with GDP growing by 0.5% in real terms. In absolute terms, the fall in GHG emissions in 2023 was the largest annual cut in several decades, excluding the COVID-19 pandemic year of 2020 (Figure 1.2.a). Consequently, in 2023 total net GHG emissions were 37% below their 1990 level, with GDP growing by 68% over the same period, showing the continued decoupling between emissions and economic growth [16].

[11] Including LULUCF it will be 5.6% in 2023 and 14.5% in 1990.

[12] EDGAR (Emissions Database for Global Atmospheric Research) Community GHG Database (a collaboration between the European Commission, Joint Research Centre (JRC), the International Energy Agency (IEA), and comprising IEA-EDGAR CO_2, EDGAR CH_4, EDGAR N_2O, EDGAR F-GASES version EDGAR_2024_GHG, European Commission, 2024.

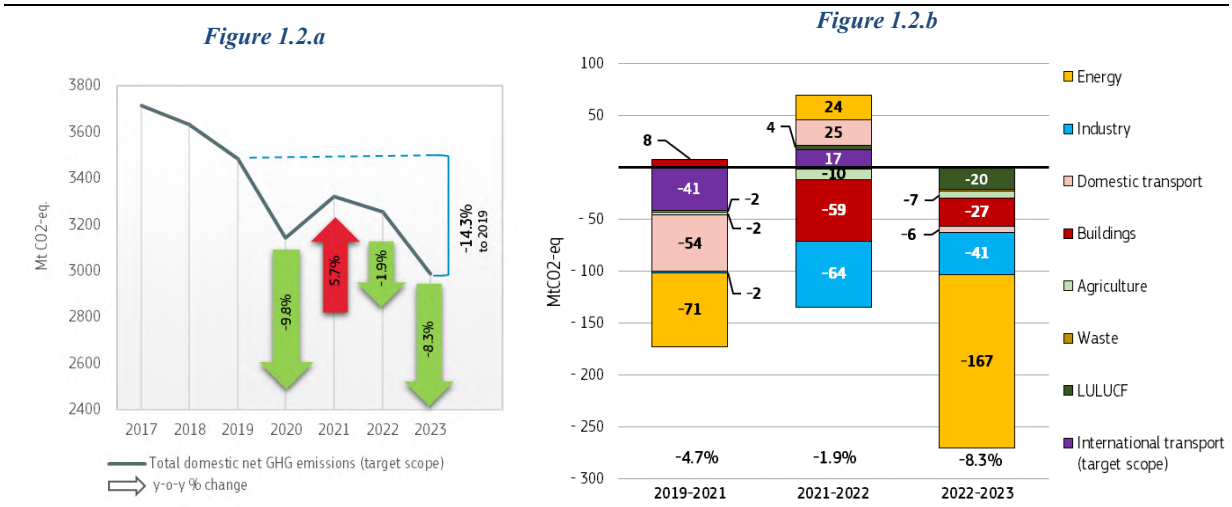
[13] The Governance Regulation (Regulation (EU) 2018/1999) requires Member States to report approximated GHG inventories annually by 31 July. The EEA compiles an approximated EU GHG inventory based on that reported data or on the EEA's own estimates if a Member State has not communicated its approximated GHG emissions by that date. This provides an early estimate of GHG emissions ahead of the full GHG inventory.

[14] The EU GHG emission aggregate, which better reflects the exact legal scope as provided by the European Climate Law, can be obtained by adding the EU-27 emissions from international aviation and maritime transport regulated under EU law to the EU-27's total domestic GHG emissions (including LULUCF net emissions or removals). For more details, see Chapter 2 of the accompanying staff working document.

[15] GHG emissions and removals for 1990-2022 are based on the 2024 GHG inventories as submitted by EU Member States to the Commission by 15 March 2024. In 2024, however, the inventory reporting timeline has been exceptionally extended until the second half of the year due to the delivery of the UNFCCC Enhanced Transparency Framework (ETF) reporting tool. Member Staes will be able to submit an updated final GHG inventories to EEA by 15 September. The figures may therefore change following possible resubmissions resulting from later reviews. Together with the aggregated EU-level emission data, the GHG inventory will be submitted to the UNFCCC under Regulation (EU) No 525/2013 by the 15 December 2024.

[16] The EU GDP growth rate (1990-2023) at constant price is based on our calculation using EUROSTAT (1995-2023, chain-linked volumes, 2015, National accounts) and by applying the World Bank real GDP growth rates (constant 2015 US$), back to 1990.

Figure 1.2: EU GHG net emissions (EU target scope) and by sector [17]



The sectoral composition of the year-on-year emission changes (Figure 1.2.b) is still shaped by the dramatic events of the past four years. The emission reductions in 2021 were still the result of the COVID-19 lockdowns and restrictions, especially in sectors such as international and domestic transport, which only recovered in 2022. Russia's full-scale invasion of Ukraine in 2022 prolonged and exacerbated the energy crisis that had already started in 2021, driving energy prices, particularly for natural gas, to record highs. Coming at a time of lower level of nuclear and low hydro power production, this meant that the use of coal and lignite use in power generation, was greater in 2022 than in 2021 and this in turn boosted emissions in the energy sector. However, the reduced demand for both industrial and household energy in response to high energy prices more than compensated for the increase.

The emission reductions in 2023 is clearly linked to the acceleration of the energy transition, providing a solid basis for the future and increasing confidence that the EU can meet its climate targets, in a fair and competitive manner. The energy sector was the most significant driver of the record decrease in emissions, with emissions from the energy industry [18] decreasing by a remarkable 18% (167 $MtCO_2$-eq) compared with 2022. This drop was due to a substantial increase in renewable electricity production (primarily wind and solar), at the expense of both coal and gas and, to a lesser extent, a decrease in both electricity and heat supply (-3.1% and -2.3% respectively) compared with 2022 [19], and to the recovery of hydro and nuclear power. Preliminary data for 2023 [20] show that renewable energy sources were, for the first time by such a clear margin, the leading source for electricity generation (44.7% versus 32.5% from fossil fuel and 22.8% from nuclear power). The increase in renewable

[17] These values are based on 2024 GHG inventory and the approximated EU GHG inventory for 2023. These are based on Member States' submissions, with estimated values for international aviation and maritime emissions regulated in EU law (see Chapter 2 of the accompanying staff working document). Notes: (1) Energy sector refers to electricity and heat production and petroleum refining (1.A.1 GHG inventory code). It also includes indirect CO2 emissions, emissions from other sectors (1.A.5 GHG inventory code), and fugitive emissions (1.B GHG inventory code) (2) Industry includes fuel combustion in manufacturing and construction (1.A.2) and emissions in industrial processes and product use. (3) Buildings include emissions from energy use in residential and tertiary buildings, and energy use in agriculture and fishery sectors (1.A.4 GHG inventory code). (4) Negative values for the LULUCF sector indicate an increase of GHG removals.

[18] Including fugitive emissions and indirect CO_2 emissions.

[19] Eurostat (nrg_ind_pehcf) and (nrg_ind_pehnf). This refers only to heat that was sold – auto consumed heat is not reflected in these figures.

[20] https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240627-1

energy is primarily the result of the considerable amount of new solar and wind capacity installed in the last 2 years, with new records for the installation of solar PV[21].

Emissions in the industry sector[22] were also 6% down on 2022, especially for energy intensive industry (e.g. -8.4% and -7.8% in the mineral and metal industries, respectively). The emission reductions in industry are the result of a combination of reduced output and continued efficiency gains. The physical volume of EU industrial production fell by 2% in 2023 but is still higher than in 2019 and 2021[23]. However, above-average reductions were seen in the sectors that are most energy-intensive or use fossil fuels as feedstocks (e.g. pulp and paper, basic metals and chemicals). Efficiency gains in EU industry have been recorded over several years. These gains can be shown as the volume of emissions needed for one unit of production (e.g. emission intensity, GHG per unit of Gross Value Added). The most recent trend shows a steady decline in emission intensity for the energy-intensive industries (from 10% to 13% depending on the specific sector in 2017-2021).

Of relevance is the -5.6% (or 27 $MtCO_2$-eq) expected decline in emissions from buildings[24]. This was notably driven by a relatively milder winter[25]. The Energy Performance of Buildings Directive, which was adopted in April 2024, will inject additional momentum in decarbonising the EU building stock[26].

Emissions from domestic transport activities decreased only marginally in 2023 (-0.8%), despite a noticeable reduction in road freight transport (-3.2%, in terms of tonne/kilometres)[27] and the continued increase in the adoption of electric vehicles (48.5% year-on-year increase on 2022, up to a total number of 4.5 million electric vehicles)[28].

Overall, 2023 emissions covered by the EU Emissions Trading System (EU ETS) saw a record decrease of 15.6% compared with 2022 (where emissions reductions in the energy sector due to the uptake in renewable sources have most impact). In the Effort Sharing sectors, emissions also decreased, although less markedly, by 1.6%, compared with 2022.

Provisional 2023 data for GHG emissions and removals from the Land Use, Land-use Change and Forestry (LULUCF) sector show an increase in net carbon sinks of 8.5% (or 20 $MtCO_2$-eq) compared to 2022, although approximated emissions remain subject to large revisions.

In the EU, verified emissions from aircraft operators increased compared to 2022 by around 9.5% as the industry continued to rebound from the very low levels of activity during the COVID-19 pandemic.

[21] In 2023, 55.9 GW of solar capacity and 16.2 GW of wind capacity was installed in the EU – on top of the 41.3 GW of solar capacity and 15.6 GW of wind capacity that had already been installed in 2022. This translates into a 36% cumulative increase of installed solar and wind capacity between 2021 and 2023, saving approximately 35 billion cubic meters (bcm) of gas over 2 years.

[22] Industry includes fuel combustion in manufacturing and construction and emissions in industrial processes and product use.

[23] This refers to the volume in the physical units – kilograms, square and cubic metres, numbers of items etc. Eurostat. Sold production, exports and imports (ds-056120).

[24] Buildings include emissions from energy use in residential and tertiary buildings, and energy use in agriculture and fishery sectors.

[25] As one of the most commonly used real-time indicator for progress in energy efficiency, the number of heat pumps sold in 2023 was similar to 2022 (around 3 million), according to the European Heat Pump Association (EHPA). If annual sales remain at this level, around 45 million heat pumps would be installed by 2030 – about 25% short of the EU's aims.

[26] Directive (EU) 2024/1275. http://data.europa.eu/eli/dir/2024/1275/oj

[27] Eurostat (road_go_tq_tott)

[28] Eurostat (road_eqs_carpda).

1.2 TOWARDS THE CLIMATE-NEUTRALITY OBJECTIVE

Overall, provisional data for 2023 show that the EU's GHG net emissions are currently in line with the hypothetical linear reduction path to the EU's 2030 target of reducing GHG emissions by at least 55% compared with 1990 levels (see Figure 1.3.a). Going forward, an emission reduction of 134 $MtCO_2$-eq needs to be achieved every year from now until 2030, on average. This is a slightly larger reduction compared with the annual average cut of about 120 $MtCO_2$-eq seen over 2017-2023. This will require the full implementation of the legal framework for 2030 and the supporting investment flows. Beyond 2030, the pace of reductions must be at least maintained to allow the EU to reap the benefits of the transition. Efforts will have to focus increasingly on the 'harder-to-abate' sectors and on enhancing removals in the post-2040 period, to ensure the EU achieves its climate-neutrality objective by 2050 (see Figure 1.3.a).

EU Member States' GHG projections provide an indication of how EU GHG emissions are expected to develop. In 2024, 11 Member States updated their projections [29]. The aggregation at EU level of these national projections shows the same reduction level as analysed in the assessment of the draft NECP [30] (i.e., -51% for domestic GHG net emissions, when existing and additional measures are both considered) [31]. A preliminary analysis of the 14 final updated National Energy and Climate Plans (NECPs) submitted at the time of drafting this report points to a significant reduction of this identified gap to the EU's 2030 target of 55%.

At sectoral level, transport, buildings, and industry pose the greatest challenges to reducing emissions. Based on its modelling outcomes, the Commission expects sizeable emission reductions in those sectors in the next few years, but Member States' projections have so far shown little progress or have fallen significantly short of the required outcomes (Figure 1.3.b). The same sectors will also face significant decarbonisation challenges in the post-2030 period, but current Member States' projections fail to address these challenges. Agriculture seems likely to achieve the emissions cuts expected by 2030. However, the limited reduction of emissions in recent years and the efforts needed in the next decade, merit additional analysis and better measurement of the impact of policies and measures. It may call for targeted initiatives in the agri-food value chain, including outside the farm gate, providing further incentives for emission reductions [32].

Lastly, the LULUCF carbon sink has been decreasing over the period 2014-2022, although it is estimated to have increased in 2023 compared with 2022, back to 2018 level. It is very important to ensure that the carbon sink from the LULUCF sector can be enhanced and contribute to meeting our EU climate targets. Member States' projections are still falling short of the EU land-based net-removal 2030 target of an additional -42 million tonnes of CO_2 equivalent ($MtCO_2$ -eq) [33] by around 45-60 $MtCO_2$-eq.

[29] Member States submitted their emission projections by March 2023. In 2024, being a non-compulsory reporting year, only BE, DK, DE, EE, IE, IT, LV, LT, LU, AT and SE submitted updated projections due to substantial changes. The EEA gap-filled missing 'projections with additional measures' with 'projections with existing measures'. Since the publication of this report coincides with the update cycle of the NECPs – with final versions due by June 2024 – not all Member States have reported the most up-to-date projections.

[30] COM/2023/796 final.

[31] This translates into a reduction of GHG emissions of 49% compared to 1990 when international maritime and aviation emissions regulated under EU Law, reflecting the EU target scope, are included.

[32] See, for example, the Communication on the EU's climate target for 2040, p. 21.
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024DC0063

[33] As compared to the yearly average of net removals over the period 2016-2018.

Figure 1.3: EU GHG net emissions, projections and targets. Past and expected emission reductions by sectors [34]

Figure 1.3.a

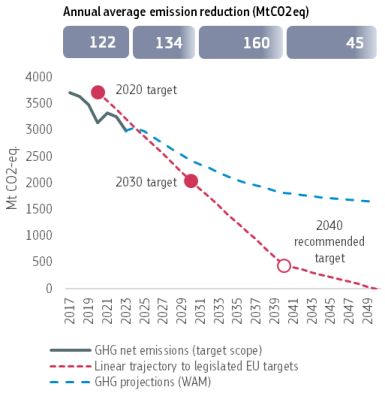
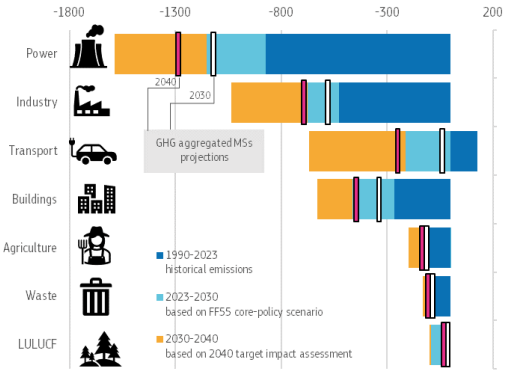


Figure 1.3.b



As required under the European Climate Law, the Commission assessed for the first time in its 2023 Climate Action Progress Report [35] the collective progress made by the Member States in achieving the EU climate-neutrality objective and the consistency of national measures with that objective. It concluded that although EU GHG emissions continue to fall and there are encouraging signs of action on the ground, it is still necessary to intensify implementation efforts and significantly accelerate emissions reduction to stay on track to reach climate neutrality by 2050.

In December 2023, and based on its assessment under the Climate Law [36], the Commission issued specific recommendations on climate neutrality to ten Member States [37]. It urged to step up their climate mitigation efforts, by making tangible progress on the existing and planned policies and to consider additional, urgent measures to align the expected GHG emission reductions and projections with the climate-neutrality objective. Where relevant, the Commission also called for Member States to update and increase the ambition and quality of their national long-term strategy.

All the concerned Member States have notified the Commission on how they intend to address the recommendations (see, for more details, Chapter 3.3 of the accompanying staff working document). In a year's time, the Commission will reassess the situation based on the information included in the 2025 NECP progress report.

Chapter 3 of the accompanying staff working document, provides an update of the assessment of progress towards the EU climate-neutrality objective, including an update of the Climate-Neutrality Dashboard, with additional indicators going beyond the headline GHG emission data (i.e. Share of renewable, Zero-Emission energy, Greening industry, Sustainable mobility, Waste prevention, Climate mitigation investment, Sustainable consumption). Overall, the climate-neutrality dashboard highlights that, compared to last year's report, around two third

[34] Expected emission reductions at sectoral level are based on the modelling outcomes of the core policy scenario supporting the Fit-for-55 initiatives and on the impact assessment analysis accompanying the 2040 target Communication. For data and sectoral aggregation, please refer to footnote 17.

[35] Report from the Commission to the European Parliament and the Council of 24 October 2023, *EU Climate Action Progress Report 2023*, COM(2023) 653.

[36] In accordance with Article 7(3) of the European Climate Law.

[37] Czechia, Estonia, Ireland, Croatia, Italy, Cyprus, Latvia, Malta, Austria, and Poland.

of the indicators have improved, mainly due to the strong reduction in GHG net emissions in 2023. Among the seven complementary indicators, the 'sustainable mobility' and the 'zero emissions energy' levers have improved in almost all Member States, but changes in 'sustainable consumption' have been mixed. Among the Member States that in 2023 received specific recommendations under the European Climate Law due to their insufficient progress towards the EU's climate-neutrality objective, the dashboard highlights progress for Estonia, Italy, Latvia and Austria.

1.3 PROGRESS ON CLIMATE ACTION IN THE EU

The co-legislators have now adopted all the proposals in the Fit-for-55 package, except the Revision of the Energy Taxation Directive[38], so that EU policies are now aligned with the updated 2030 target set in the European Climate Law (Regulation (EU) 2021/1119). The focus is currently on their implementation, which will enable the EU and its Member States to reduce by 2030 net GHG emissions by at least 55% compared with 1990 levels[39], and to make steady progress on adaptation to climate change (See Chapter 5).

The Commission has adopted secondary legislation to implement the strengthened EU ETS (which includes the maritime sector and the revised provisions for aviation), the new ETS for buildings, road transport, and small industry (Regulation (EU) 2023/957, Directive (EU) 2023/958, Directive (EU) 2023/959), and the Social Climate Fund (Regulation (EU) 2023/955). It has also adopted rules to implement the revised Effort Sharing Regulation (Regulation (EU) 2023/857), the revised LULUCF Regulation (Regulation (EU) 2023/839) and the revised regulation strengthening CO_2 emissions standards for new cars and vans (Regulation (EU) 2023/851).

The regulations that revise the rules on fluorinated gases and ozone-depleting substances, which will eliminate an additional 500 $MtCO_2$-eq of emissions by 2050, were also adopted by co-legislators and entered into force in March 2024.

The Commission has adopted around 39 delegated and implementing acts related to climate initiatives. The Member States have also started to implement the Fit-for-55 package, by integrating at national level the updated climate and energy targets as reflected in their NECPs (see below).

The co-legislators have adopted a number of other acts that will help to reach the climate targets: the regulation strengthening CO_2 emissions standards for new heavy-duty vehicles setting new ambitious CO_2 emissions reduction targets for 2030, 2035 and 2040 and the regulation on the EU-wide certification scheme for carbon removals, which sets out rules for the independent verification of carbon removals, as well as rules for the recognition of certification schemes that can be used to demonstrate compliance with the EU framework. In June 2024, the co-legislators adopted the Nature Restoration Law to restore ecosystems, habitats and species across the EU's land and sea areas to enable the long-term and sustained

[38] This includes the revised EU ETS Directive, a new ETS for buildings, road transport and fuels, the Market Stability Reserve, the Effort Sharing Regulation, CO_2 standards for cars and vans, the Land Use, Land Use Change and Forestry Regulation, the Carbon Border Adjustment Mechanism, the establishment of the Social Climate Fund, FuelEU Maritime, the Alternative Fuel Infrastructure Regulation (AFIR), ReFuel EU Aviation, the Energy Efficiency Directive and the Renewable Energy Directive. Only the proposed revised energy taxation directive is still pending agreement.

[39] The legislation as adopted is estimated to result in a net domestic reduction of GHG emissions of 57% by 2030 compared to 1990. An overview of targets is presented in Chapter 1 of the accompanying staff working document.

recovery of biodiverse and resilient nature, contribute to achieving the EU's climate mitigation, and climate adaptation objectives and to meet international commitments.

In February 2024, as required by the European Climate Law, the Commission published a Communication on the EU's climate target for 2040, which is an intermediate step on the path to climate neutrality in 2050. The Commission recommended reducing the EU's net greenhouse gas emissions by 90% by 2040 relative to 1990. Furthermore, in March 2024, the Commission published a Communication on Industrial Carbon Management, which provides details on how technologies that can capture CO_2 or remove it directly from the atmosphere and then store or utilise it could contribute to this 2040 target and to reaching climate neutrality by 2050.

In March 2024, the Commission published a Communication on managing climate risks which sets out how the EU can effectively get ahead of growing climate-related risks and build greater resilience to the impact of climate change. The Communication is a response to the European Climate Risk Assessment and is part of the implementation of the 2021 EU Adaptation Strategy (see Chapter 5 for more details).

In 2023 the Commission proposed a regulation on a forest monitoring framework, to set up a comprehensive and high-quality monitoring system covering all forests and other wooded land in the EU to better counter all pressures and hazards (see Chapter 4).

In September 2024, the Commission published a report on the functioning of the Regulation on the Governance of the Energy Union and Climate Action [40], along with an evaluation of the Regulation [41]. The Governance Regulation is a critical piece of legislation that sets common rules for planning, reporting and monitoring to ensure progress towards the EU's energy and climate targets. The evaluation concluded that the Regulation has achieved a significant part of its objectives by making planning and reporting more coherent, integrated, and streamlined, by helping to put the EU on track to meet its 2030 energy and climate goals. However, the evaluation identifies certain areas for improvement that could be considered in the event of a future revision of the Regulation, including the need to improve the future NECPs as true green transition investment plans, and enhancing the climate adaptation related provisions of the Regulation.

To strengthen the Commission's engagement with industry and social partners, President von der Leyen announced in the 2023 State of the Union a series of Clean Transition Dialogues. The Communication on the Clean Transition Dialogues published in April 2024 takes stock of these Dialogues and gives input for building blocks that can contribute to a reinforced industrial approach for a sustainable Europe.

The EU's Carbon Border Adjustment Mechanism (CBAM), which put a fair price on the carbon emitted during the production of carbon intensive goods that are entering the EU, will be implemented mirroring the phase out of free allocation in the EU ETS to prevent the risk of carbon leakage [42]. Since the start of the transitional phase of the CBAM, in October 2023, CBAM EU importers are subject to reporting obligations on a quarterly basis but without any financial obligations. In preparation for the definitive regime (1 January 2026), the Commission is developing the implementing and delegated acts as well as a review report (2025), necessary for the implementation of the measure.

[40] COM(2024) 550 final

[41] SWD(2024) 200 final

[42] EU sectors covered by the CBAM (i.e. steel, aluminium, fertilisers, cement, electricity, hydrogen) will have to phase out their free allowances completely by 2034.

By 30 June 2024, Member States were due to submit their final updated National Energy and Climate Plans (NECPs) in line with Article 14 of the Governance Regulation. The NECPs are 10-year strategic documents where Member States have the opportunity to set out policies and measures that will align their efforts with the EU's higher level of climate ambition under the European Green Deal. At the time of drafting this report, 14 Member States have submitted their final NECPs to the Commission [43]. As the draft NECPs fell short of achieving the climate target of at least -55% net GHG emissions by 2030 compared to 1990, the final NECPs need to demonstrate significant increase in efforts to reduce emissions. Member States also need to significantly step up their efforts on climate adaptation aspects of their NECPs.

1.4 CLIMATE ACTION FOR PEOPLE

Climate Change and the green transition are affecting the entire economy and leading to significant changes in our society, lifestyles, and job opportunities. The ongoing transformations affect skills, occupations, wages, working conditions and demand for labour. The number of workers moving from one sector to another is expected to increase as a result. The EU is acting to support a successful skills transition. The European Skills Agenda aims at backing skill partnerships that address labour market needs, support green and digital transitions, and promote local and regional growth strategies. In 2022 and 2023, its flagship initiative Pact for Skills provided training to more than 3.5 million workers through 2 500 organisations [44]. According to a recent study [45], the installation of additional wind turbines and solar panels to deliver the EU Green Deal targets will require about 130 000 to 145 000 additional skilled workers in the EU and associated investment in skills of EUR 1.1 to 1.4 billion by 2030 [46].

The EU has continued to inject resources to realise these opportunities. Almost 200 000 workers will gain new skills in projects financed by the Just Transition Fund. For example, between now and 2029 in Bulgaria, 3 000 unemployed people will be supported to get new green jobs, the inhabitants of more than 3 300 dwellings will benefit from improved energy performance, while 80 SMEs will be supported to invest in new skills for smart specialisation, industrial transition and entrepreneurship.

The sale of allowances in the EU Emission Trading System (ETS) continued to raise substantial revenues for Member States' budgets (see Chapter 2). For example, Greece reported to have allocated EUR 1.1 billion to its Greek Energy Transition Fund, supporting among others energy subsidies for low-income households, business support in transitioning areas, reskilling programmes and green infrastructure projects.

Under the ETS Modernisation Fund, disadvantaged carbon-dependent regions received support for a just transition in the energy sector, like in the case of Croatia where one scheme will support 80 MW of new renewable energy sources and 20 MW of energy storage capacity.

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[43] On 15 October 2024, the following Member States had submitted their final NECPs: Germany, Denmark, Finland, France, Ireland, Italy, Luxembourg, Latvia, Lithuania, Hungary, the Netherlands, Spain, Romania, Sweden.

[44] https://ec.europa.eu/commission/presscorner/detail/en/ip_24_1619

[45] European Commission, *Estimating labour market transition costs and social investment needs of the green transition – a new approach*, Fair Transitions Working Papers, 2024. The results of the Working Paper have been developed under two joint projects between Directorate-General Employment, Social Affairs and Inclusion (DG EMPL) and the Joint Research Centre (JRC) of the European Commission. https://ec.europa.eu/social/main.jsp?langId=en&catId=1588

[46] Job creation nonetheless differs across Member States, and those with relatively higher shares of renewable installed capacity today may present lower re-training costs per worker in 2030.

This will lead to energy consumption savings of 140 000 Megawatt hours (MWh) per year which roughly equal to the electricity consumption of 31 thousand Croatian households.

Under the Recovery and Resilience Facility, Romanian households receive at least 122 000 vouchers to invest in the energy efficiency renovations of at least 33 000 homes and the installation of PV panels and storage batteries to produce renewable energy for their own consumption, as part of the REPowerEU chapter. One-stop-shops at regional level inform households about the benefits, practicalities, and funding opportunities for energy efficiency renovations [47]. Slovakia will build more than 160 km of new cycling infrastructure by 2026 to support citizens to shift from individual road transport to cycling [48]. More than 9.8 million people across the EU are better protected against natural disasters thanks to the NextGenerationEU (see Chapter 6).

The EU Mission on Adaptation to Climate Change empowers European regions and local authorities to build resilience against climate change impacts. It aims to help at least 150 communities understand climate risks, develop pathways for preparation and implement innovative solutions by 2030 (see Chapter 5.4).

The transition also brings benefits in terms of health and well-being. For example, lower energy consumption and a shift to non-emitting renewable energy sources and to less polluting combustion fuels improve air quality. The analysis of the 2040 climate target impact assessment estimates that achieving the 90% target could reduce premature deaths due to air pollution from 466 000 per year in 2015 to 196 000 per year in 2040.

[47] Recovery and resilience scoreboard. Thematic analysis Energy efficiency in buildings. https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/assets/thematic_analysis/scoreboard_thematic_analysis_efficiency.pdf

[48] Recovery and resilience scoreboard. Thematic analysis Sustainable Mobility. https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/assets/thematic_analysis/scoreboard_thematic_analysis_sustainable_mobility.pdf

2 THE EU EMISSIONS TRADING SYSTEM

The EU Emissions Trading System (ETS) implements the polluter pays principle in the electricity and heat generation, industrial manufacturing, aviation and maritime transport sectors, which represent some 40% of EU's total emissions. It is a cornerstone of EU's climate action since 2005, with the system's scope having been expanded over time.

In the covered sectors, the EU ETS sets a cap on emissions, which decreases annually in line with the system's contribution to the EU's overarching climate target. The cap is expressed in allowances, which companies must surrender annually to cover their emissions. Companies primarily purchase allowances in auctions, which raise revenue for Member States to further support climate action and energy transformation. With the price of allowances determined by the market, the EU ETS incentivises emission reductions in a cost-effective and technology neutral way.

By 2023, the EU ETS had helped drive down emissions from the electricity and heat generation and industrial manufacturing by 47.6% compared to 2005 levels. This reduction has been achieved largely with a progressive decarbonisation of electricity and heat generation – a deployment of renewable energy sources and a gradual replacement of coal with gas use, as well as energy efficiency improvements. See Section 2.1 for further detail on emission trends in the EU ETS.

In parallel, the EU ETS has raised over EUR 200 billion in auction revenue that Member States have largely used to support projects in renewable energy sources, energy efficiency improvement and low-emission transport development. Since June 2023, Member States are required to use all revenue from the EU ETS (or a financial equivalent) to support climate action and energy transformation, including measures to address the associated social aspects. The obligation is among the changes agreed in the 2023 revision of the ETS Directive. See the upcoming Carbon Market Report 2024 [49] for further detail about the revised EU ETS and the system's functioning in 2023.

2.1 EMISSION TRENDS

In 2023, total emissions under the EU ETS amounted to 1 149.1 $MtCO_2$-eq (down from 1 361.9 $MtCO_2$-eq in 2022). Emissions from power and industry installations accounted for 1 095.9 $MtCO_2$-eq, 16.5% less than in 2022 [50]. This is the highest reduction achieved to date.

The most important driver for the record decrease in EU ETS emissions has been the power sector, with emissions from electricity production having decreased by 24% compared to 2022. This decrease is due to a substantial increase in renewable electricity production (primarily wind and solar) and gas replacing coal. In 2023, renewable energy was the leading source of electricity in the EU, accounting for 44.7% of all electricity production [51]. At the same time, electricity generated from fossil fuels decreased by 19.7% compared with the 2022, contributing 32.5% of the total electricity production. With 16 GW capacity installed in

[49] At the time the current report is being finalised, the Carbon Market Report 2024 (the report on the functioning of the EU ETS in 2023) is expected to be adopted in early November. Once adopted, the Carbon Market Report 2024 will be available on the website of the Directorate General Climate Action 'What is the EU ETS'.

[50] Emissions in this section refer to verified emissions within the scope of EU ETS, reported by Member States. This is different from the sectoral scope of other sections. For example, small thermal installations are typically excluded from EU ETS.

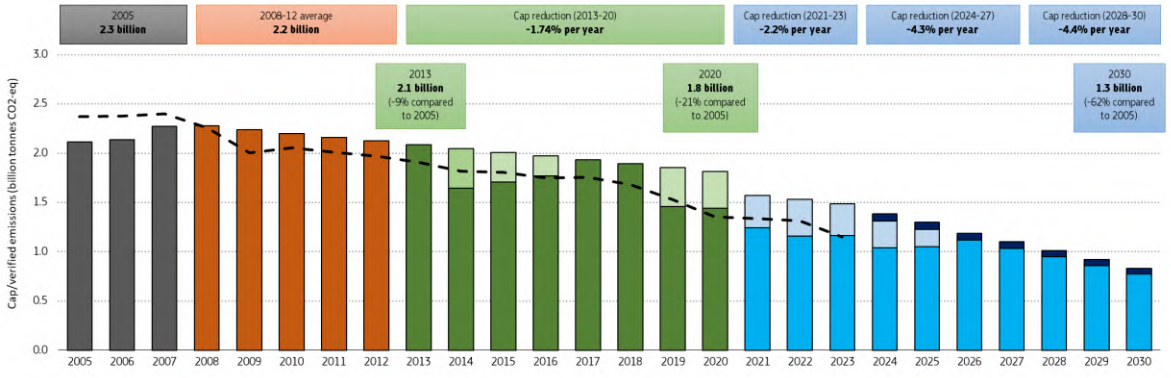
[51] https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240627-1.

2023, wind surpassed natural gas to become the EU's second largest source of electricity behind nuclear [52].

In the energy-intensive industry sectors, a reduction of emissions of 7.5% compared to 2022 was observed, due to a combination of a reduced output and efficiency gains. Output levels for installations within the scope of EU ETS are not available at time of publication. However, industrial production statistics from Eurostat show that overall industrial production fell slightly in 2023 but remains higher than in 2019 and 2021 (i.e., immediately before the COVID-19 pandemic and Russia's invasion of Ukraine).

In aviation, year-on-year emissions have continued to increase after dipping substantially in 2020 due to the COVID-19 travel lockdown and economic downturn (see Section 2.3 below). Emissions from maritime transport have only been included in the EU ETS since 1 January 2024 (see Section 2.3 below).

Figure 2.1: Emissions cap in the EU ETS compared with verified emissions (2005-2023) [53].



2.2 REVENUES RAISED BY THE EU ETS

The sale of allowances in the EU ETS auctions raises substantial revenues for Member States' budgets to support energy transformation and decarbonisation of ETS sectors. Overall, the ETS has raised over EUR 200 billion to date (EUR 113 billion in the 2021-2023 period). In 2023, the total ETS revenue amounted to EUR 43.6 billion. Of those, EUR 33 billion went directly to Member States. Of the remaining revenue, EUR 7.4 billion supplied the ETS Innovation Fund and the Modernisation Fund (See Chapter 6) and EUR 2.8 billion supplied the Resilience and Recovery Facility, which Member States use to advance the clean energy transition and boost energy security.

With the 2023 revision of the ETS Directive, the rules on the use of auction revenues have changed. Member States are obliged to use all ETS revenues for climate action and energy transformation (or an equivalent financial value), except for any revenue that Member States

[52] State of the Energy Union Report 2024, COM(2024) 404 final, 11.9.2024.

[53] The figure considers the 2023 revision of the ETS Directive, i.e. rebasing of the cap in 2024 and 2026, including the maritime transport sector in the EU ETS from 2024 and the linear reduction factor of 4.3% in 2024-2027 and 4.4% from 2028. Aviation is not included. Due to changes in scope, the 2005-2007 figures are not directly comparable with the latest ones. From 2021, the EU ETS no longer covers installations in the UK, only electricity generators in Northern Ireland. Legend: bars (cap), light shaded bars in 2014-2016 (allowances backloaded from auctions), light shaded bars from 2019 (feeds of allowances to the Market Stability Reserve), dark shaded bars from 2024 (maritime scope extension), dashed line (verified emissions).

spend in aid for indirect carbon costs [54]. Under the Governance Regulation, Member States report annually to the Commission on how they spend their ETS revenue. Reporting for 2023 is analysed in Chapter 7 of the accompanying staff working document.

Overall, of the 2023 revenues subject to the obligation mentioned above, 72% was already disbursed and another 3% committed to a specific action. Future reports will account for how Member States will have used the remainder. Member States reported having disbursed EUR 22.7 billion to support projects in energy supply, grids and storage (EUR 9.7 billion), in energy efficiency, heating and cooling of buildings (EUR 2.3 billion) and in public transport and mobility (EUR 5.1 billion) (see Figure 2.2 for the 2023 disbursement of ETS revenue split in categories). Examples of projects include installation of photovoltaics systems in Romania, grants for energy efficiency improvements for low-income households in France, and expansion of the metro networks in Lisbon and Porto in Portugal.

In addition, Member States reported having allocated EUR 0.7 billion to projects in industry decarbonisation (low-carbon technologies, CCUS and energy efficiency in industrial sectors), including financial and technical support to business in the Walloon region of Belgium in their transition to a net-zero economy. Member States also reported having allocated EUR 2.7 billion to actions in social support and just transition.

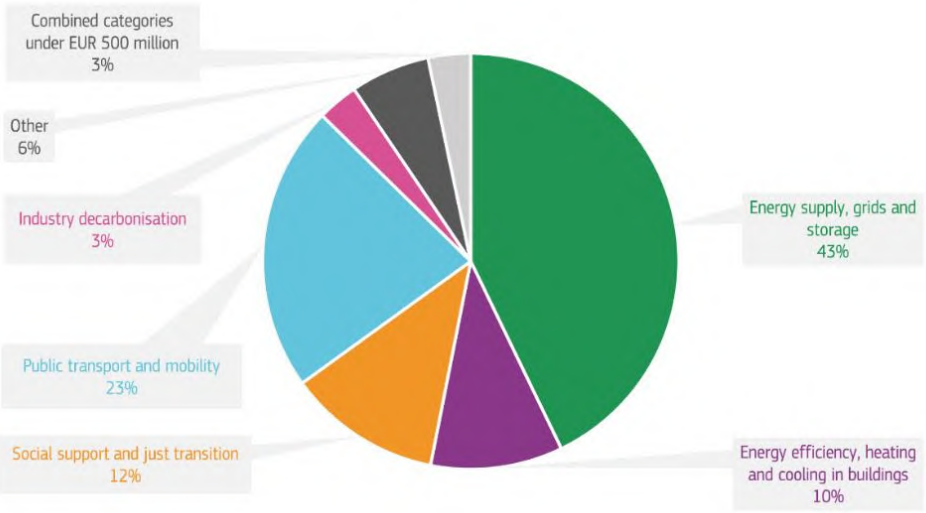
For EUR 1.4 billion in 2023 disbursements, Member States reported the 'Other' category, which includes actions that do not fit any other categories or fit multiple categories. Examples include the Swedish Climate Leap fund that supports various emission reduction, biogas, biodiversity and research projects.

The EU ETS auction revenue has been an essential contribution to these and to many other impactful projects in the Member States. The case-studies of thirteen projects (co-) financed from auctioning revenues, accessible on the European Environment Agency's website [55], showcase the positive effects that revenues have for the EU's climate transition. See Chapter 7 of the accompanying staff working document for more detailed data on the use of ETS revenue.

[54] For more information see Carbon Market Report 2024.

[55] https://climate-energy.eea.europa.eu/topics/climate-finance/use-of-ets-auctioning-revenues/good_practices. Other good practices have been highlighted by the Life ETX project, which received funding from the European Union's LIFE Programme under grant agreement no.LIFE20 GIC/BE/001662 (see https://etxtra.org/lifeetx-national-human-stories/)

Figure 2.2: Split per category of the EUR 22.7 billion reported as disbursed in the Member State reports on the year 2023 [56].



2.3 ACTION IN AVIATION AND MARITIME TRANSPORT

Maritime

Maritime transport contributes to around 3-4% of total EU CO_2 emissions. In 2023, emissions from the sector, as collected under the Monitoring, Reporting and Verification Regulation [57], amounted to 126.7 million tonnes CO_2 when considering all emissions from voyages to and from EEA ports. Following the revision of the ETS Directive, the EU ETS started covering the EU's fair share (50% in case of voyages starting or ending outside of the EEA) of CO_2 emissions from large ships calling at EU ports as of 1 January 2024. For a smooth phase-in of the sector, for the year 2024 shipping companies will have to surrender allowances to cover 40% of the emissions reported under the EU ETS. This will increase to 70% for 2025 and to 100% from 2026 onwards. Non-CO_2 emissions (methane and nitrous oxide) are already being reported in 2024 under the Monitoring and Reporting Regulation and will be included within the EU ETS scope as of 2026.

At international level, the EU successfully supported the revision of the International Maritime Organisation greenhouse gas reduction strategy, agreed in July 2023, now setting the goal of net-zero emissions from ships by or around, i.e. close to, 2050, including through indicative checkpoints for 2030 and 2040. To deliver on these reduction targets, the EU is supporting the adoption, by 2025, of a basket of mid-term measures, to cover both a marine fuel standard and a maritime GHG emissions pricing mechanism, including through a Comprehensive Impact Assessment in 2024 to support the decision-making process.

[56] The combined categories under EUR 500 million include (in EUR million): Road transport (309), Adaptation (155), International purposes and international climate finance (110), LULUCF, agriculture and land-based removals (59), Administrative expenses (54), Waste management (29), Maritime transport (17), Aviation (13), Permanent removals (3).

[57] Regulation (EU) 2015/757.

Aviation

In 2023, ETS aviation emissions continued to rise to a total of 53.2 million tonnes CO_2 . This is 9.5% higher than in 2022 [58]. Throughout 2024 and 2025, the Commission is adopting implementing legislation [59] following the revision of the ETS Directive, to strengthen the EU ETS for aviation and increase the sector's contribution, and to implement the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) for extra-European flights of EU-based airlines. The EU is among the first jurisdictions worldwide to implement CORSIA in law. The purpose of CORSIA is to offset aviation emissions from international flights above a certain level [60]. As of autumn 2024, this level has not been reached, and airlines have not had any offsetting obligations under CORSIA.

The overall climate impact of aviation is currently two to four times higher than the effect of its past CO_2 emissions alone [61], with non-CO_2 emissions accounting for 66% of the aviation's climate impact [62]. This analysis of the impact of non-CO_2 emissions is based on models. Both at European and international level, there are projects to measure non-CO_2 aviation emissions. There is no monitoring yet by Member States of non-CO_2 emissions from aviation. From 1 January 2025, the revised ETS Directive tasks aircraft operators to monitor and report the impacts of non-CO_2 emissions per flight annually [63]. By 31 December 2027, based on the results of the application of the monitoring framework of non-CO_2 aviation effects, the Commission will submit a report and, where appropriate, a legislative proposal to mitigate the non-CO_2 effects.

[58] Emissions figures for 2019 were a total of about 68,2 million tonnes CO_2, this included figures for the UK.

[59] For example, as of mid-October 2024, the following have been adopted: the implementing regulation on the list of states other than EEA countries, Switzerland the United Kingdom considered to be applying CORSIA for emissions of the year 2023 was adopted in February 2024 (Commission Implementing Regulation (EU) 2024/622); the list of aircraft operators for 2024 adopted in March 2024 (Commission Implementing Regulation (EU) 2024/1030); the aviation cap for 2024 (updated version) adopted in June 2024 (Commission Decision (EU) 2024/1797); the detailed rules for the calculation of offsetting requirements under CORSIA published on 9 July 2024 (Commission Implementing Regulation (EU) 2024/1879).

[60] The level above which airlines should start to offset emissions is set as 85% of 2019 CO_2 emissions for the years 2024-2035 (where 2019 was the year with the highest ever aviation emissions).

[61] Aviation and the Global Atmosphere, IPCC, 1999, https://www.ipcc.ch/site/assets/uploads/2018/03/av-en-1.pdf

[62] Updated analysis of the non-CO2 climate impacts of aviation and potential policy measures pursuant to the EU Emissions Trading System Directive Article 30(4), SWD(2020) 277 final.

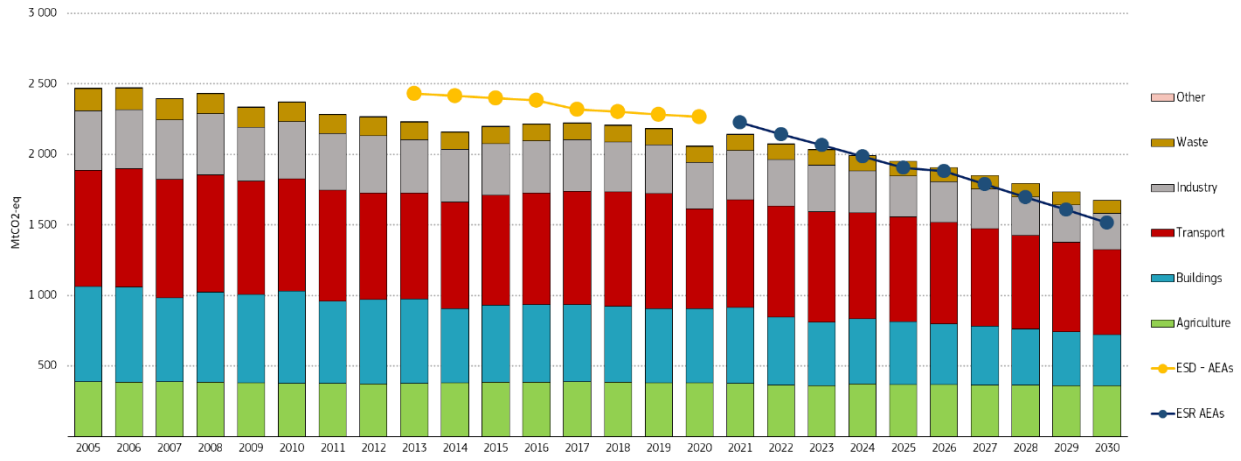
[63] The MRV system covers flights to, from and within Europe. To facilitate the start, reporting is mandatory for flights within Europe. This means in 2025 and 2026 voluntary reporting on all routes is encouraged. From 2027, the reporting obligation automatically applies to all flights. Consult the draft implementing legislation here: Emissions trading system (ETS) Monitoring and Reporting Regulation amendment in response to the ETS revision (europa.eu).

3 EFFORT SHARING EMISSIONS

The Effort Sharing Regulation (ESR) covers GHG emissions from domestic transport (excluding CO_2 emissions from aviation), buildings, agriculture, small industry, and waste [64]. These account for around 65% of the EU's domestic emissions. The ESR sets binding national targets to reduce emissions in those sectors compared to 2005 levels for the period 2021-2030.

Based on approximated data, emissions from the effort sharing sectors in 2023 were 2% lower than in 2022 or 19.2% lower than in 2005. The reduction in emissions resulted in particular from buildings, which decreased its emissions by 5.5% compared with 2022, followed by agriculture with a decrease of 2.0% compared with 2022. Emissions from the transport sector, which is the largest sector under the ESR and accounts for over one third of total effort sharing emissions, reduced by 0.8%.

Figure 3.1: Emissions in sectors covered by effort sharing legislation 2005-2030 and annual emission allocations, EU-27



3.1 PROGRESS IN OVERALL EFFORT SHARING EMISSIONS TOWARDS 2030

This section provides an indication of each Member State's progress in meeting its annual emissions allocations (particularly for 2022). This is based on the final GHG inventory data for 2022 [65] and for 2021, the approximated GHG emissions for 2023 and the 2024 GHG projections for 2024-2030. The 2021-2025 compliance cycle is due in 2027 (following a comprehensive review of the 2021-2025 emissions) and the compliance cycle 2026-2030 is due in 2032 (following a comprehensive review of the 2026-2030 emissions).

All Member States met their obligations under the Effort Sharing Decision (ESD) which set annual emission limits for each year in the period 2013-2020. The ESR, which was adopted in 2018 and amended in 2023, sets the EU-wide target to reduce emissions from the effort

[64] Regulation (EU) 2018/842 of 30 May 2018, as amended by Regulation (EU) 2023/857 of 19 April 2023.

[65] GHG emissions and removals for 1990-2022 are based on 2024 GHG inventory as submitted by EU Member States to the Commission by 15 March 2024. In 2024, however, the inventory reporting timeline is exceptionally extended until the second half of the year due to the delivery of the UNFCCC Enhanced Transparency Framework (ETS) reporting tool. Member Staes will be able to submit an updated final GHG inventories to EEA by 15 September. Therefore, figures may change following possible resubmissions resulting from later reviews. Together with the aggregated EU-level emission data, the GHG inventory will be submitted to the UNFCCC under Regulation (EU) No 525/2013 by the 15 December 2024.

sharing sectors by 40% by 2030 compared with 2005 levels. The overall ESR target for the EU translates into national GHG emission reduction targets for 2030 and annual GHG emissions limits. Member States can also use flexibilities to comply with their annual emission limits and their 2030 targets. These flexibilities entail banking, borrowing, buying and selling, as well as accessing credits from the land use sector and for some Member States the possibility to access allowances from the EU ETS (for more details see Chapter 8 of the accompanying staff working document). Iceland and Norway also implement the ESR, but only the trends in (projected) emissions for the EU Member States are presented below.

In 2022, EU-wide emissions in the ESR sectors were 3.1% below the aggregated emissions limit, while emissions exceeded the annual emission allocations (AEAs) in eight Member States[66]. This was similar to the achievement in 2021[67]. The emission data for 2023 is still provisional; but it is expected that 10 Member States generated emissions that exceeded their AEAs[68]. The ESR emissions for 2021, 2022 and 2023 will be reviewed in 2027, when the compliance for each of the years 2021 to 2025 will be checked and determined. At that stage, Member States can use the flexibilities available under the ESR to comply with their annual emission limits. However, the emission projections that Member States submitted in March 2023 and March 2024 can already be used at this stage to gain insights into progress towards ESR targets.

By 30 June 2024, Member States were due to submit their final updated National Energy and Climate Plans (NECPs) in line with Article 14 of the Governance Regulation. Taking into account the 14 final NECPs that have been submitted to the Commission by the time of drafting this report[69] and the emission projections that Member States reported in March 2023 and March 2024, according to the most ambitious aggregated projections, emissions at EU level are expected to reduce by over 37% in 2030 compared with 2005 levels (see Figure 3.2). This is an improvement compared to the aggregated projections calculated based on draft updated NECPs, namely around 34% reduction of ESR emissions in 2030[70]. However, this still leaves a gap to the EU-wide ESR target of reducing emissions by 40% by 2030 compared with 2005 levels.

The Commission has also used Member States' latest emission projections to assess their progress towards their annual emission limits in 2021-2030, taking into account the potential use of the flexibilities available under the ESR[71]. If Member States used saved AEAs from previous years (banking) or use AEAs from future years (borrowing) and/or the existing ETS flexibility and/or the LULUCF flexibility 2021-2025 to cover excess ESR emissions, 11 Member States would still have excess emissions in at least one year in 2021-2030[72]. The fact that Cyprus, Croatia and Italy already had excess emissions in the first compliance period

[66] Croatia, Cyprus, Hungary, Italy, Ireland, Lithuania, Malta, Romania.

[67] In 2021, EU-wide emissions in the ESR sectors remained 3.3% below the aggregated emissions limit.

[68] Cyprus, Czechia, Denmark, Estonia, Ireland, Italy, Lithuania, Malta, Poland, Romania.

[69] 14 Member States (Germany, Denmark, Finland, France, Ireland, Italy, Luxembourg, Latvia, Lithuania, Hungary, the Netherlands, Spain, Romania, Sweden) have submitted their final updated NECPs to the Commission as of 15 October 2024.

[70] COM(2023) 796.

[71] Article 8 of the ESR provides that in case the Commission finds that there is not sufficient progress, Member States must prepare a corrective action plan. See table 8.2 in the accompanying staff working document for detailed data for each Member State.

[72] Bulgaria, Cyprus, Germany, Estonia, Croatia, Hungary, Ireland, Italy, Malta, Poland, Slovakia have excess emissions in at least one year in 2021-2030. Austria, Belgium, Denmark, Greece, Spain, Finland, Lithuania, Luxembourg, Latvia, Portugal, Sweden and Slovenia would have emissions below their AEAs each single year using banking and/or ETS flexibility. France and the Netherlands would expect a surplus of AEAs over the period 2021 to 2030 based on their final updated NECPs.

(2021-2025) increases the challenge because there is now less time available to develop additional policies to drive down emissions. [73]

Under Article 9(2) of the ESR, any net debit (i.e. excess emissions) under the LULUCF Regulation in 2021 - 2025 is automatically deducted from Member States' AEAs during the first ESR compliance period. Based on available estimated LULUCF emission data for 2021–2025, trends in Finland, France and Portugal give rise to concern (see Chapter 4). If these LULUCF trends are confirmed, those Member States may struggle to achieve their ESR targets each year in the first compliance period [74].

Under the ESR, nine Member States can use a limited amount of ETS allowances to offset emissions in the effort sharing sectors. The revision of the ESR allowed four of these Member States to increase their amounts of ETS flexibility [75]. Malta and Sweden have notified the Commission that they intend to use this flexibility. Moreover, Member States that perform well under the LULUCF Regulation can use such overachievement, up to a limit, to cover any excess ESR emissions. Member States can also transfer AEAs among themselves in order to match emissions with AEAs [76]. However, current projections suggest that there may only be a limited amount of AEAs available for purchase.

Currently available information indicates that the EU's ESR emissions are still below the aggregated emissions limits in the years 2021, 2022 and 2023. The expected GHG emissions reduction in the ESR for 2030 has also been improving with the draft updated NECPs and based on currently available information, final updated NECPs appear to result in better than expected GHG emissions reduction for 2030. In December 2023, the Commission made recommendations to Member States based on their draft updated NECPs to step up action in the effort sharing sectors to reduce GHG emissions. At the time of drafting this report only 14 Member States had notified their final NECP. It is important to have assessed the complete information from the final updated NECPs before concluding whether or not a Member State is making sufficient progress. Based on the currently available information, six Member States would have to use the flexibilities available under the ESR and acquire additional AEAs in order to comply with their annual emission limits already in the period 2021 to 2025 period and eight others in the period 2026 to 2030 [77]. As these Member States could be at risk of not making sufficient progress towards their obligations under the ESR, the Commission will already engage with them on their efforts to ensure compliance with the ESR obligations.

[73] Available historical and approximated data is used for Member States' ESR emissions in 2021, 2022 and 2023 and projections for other years; Final ESR emissions will only be established following a comprehensive review in 2027 (for 2021-2025) and 2032 (for 2026-2030). The AEAs for 2026-2030 are estimated as they will only be set after a comprehensive review in 2025. For more details, see Chapter 8 of the accompanying staff working document.

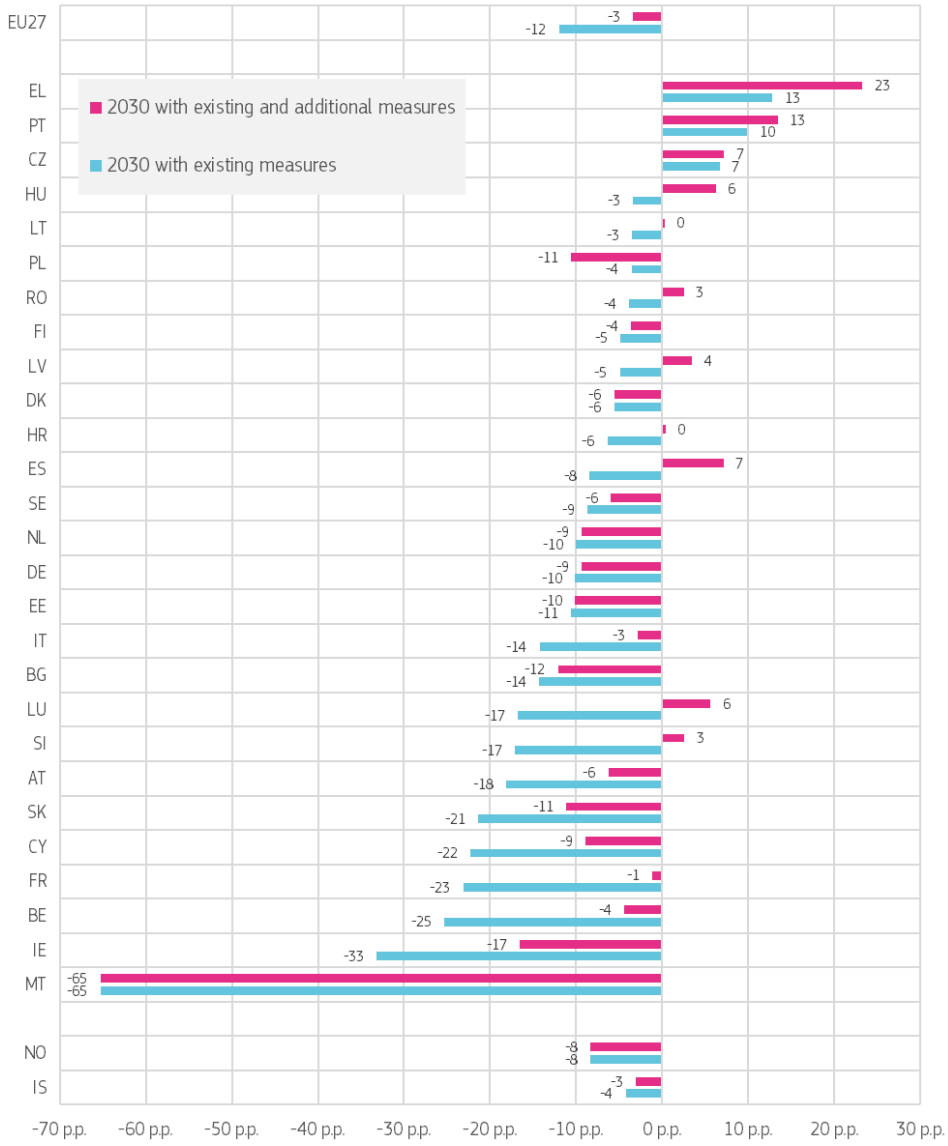
[74] For the purposes of this assessment, the excess emissions under LULUCF in the period 2021 – 2025 are equally distributed over the years 2021 to 2025 for calculating the reduction in AEAs under the ESR. Flexibilities under the LULUCF Regulation are not taken into account.

[75] Belgium, the Netherlands, Sweden, and Malta. ETS flexibility allows a Member State to notify to the Commission an amount of EU ETS allowances to be available for ESR compliance. The EU ETS allowances are deducted from the amounts that would normally be auctioned under the EU ETS.

[76] Iceland and Norway can also buy AEAs from and sell AEAs to Member States.

[77] Croatia, Cyprus, and Italy would be in such situation already in the period 2021-2025, and Finland, France and Portugal as well due to their LULUCF trends as explained above. Bulgaria, Germany, Estonia, Hungary, Ireland, Malta, Poland and Slovakia would be concerned for the period 2026-2030.

Figure 3.2: Gap between ESR 2030 targets and projected GHG emissions (in percentage points) [78]



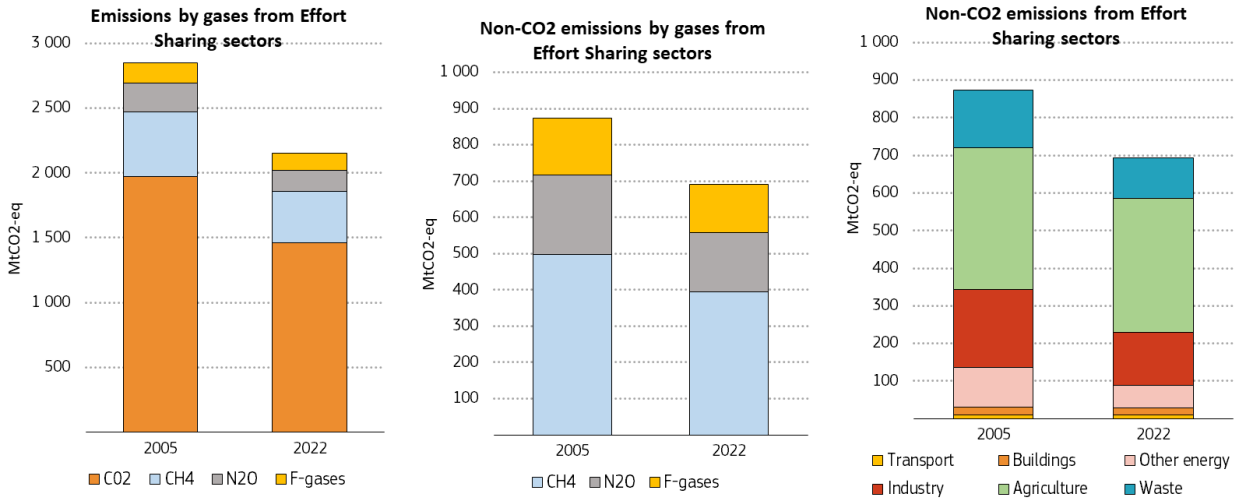
3.2 EMISSION TRENDS BY TYPE OF GAS UNDER THE EFFORT SHARING LEGISLATION

More than two thirds of total emissions from the effort sharing sectors are CO_2 emissions, the remaining third are non-CO_2 emissions. Non-CO_2 greenhouse gases include methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (NF_3, HFCs, PFCs, SF_6, HFCs). While most of the emissions in the energy sector are covered by the EU ETS, methane emissions in this sector fall under the ESR. These non-CO_2 gases are emitted from a range of sectors and processes, and all have much higher global warming potentials than CO_2 by degrees of tens to tens of thousands depending on the gas. As a result, non-CO_2 emissions

[78] The graph is based on the latest emission projections that Member States submitted, including from March 2023, March 2024, draft updated NECPs or final NECPs.

have an important impact on climate change and are key sources of potential emission reductions in several sectors. Mitigating non-CO_2 emissions can lessen global temperature increases rapidly. Reducing non-CO_2 emissions is also important to achieve our targets under the ESR. Around half of the non-CO_2 emissions come from the agriculture sector. All sectors have reduced non-CO_2 emissions from 2005 to 2022 but the most significant reductions were made in the non-ETS energy ('other energy'), small industry and the waste sector. Over the same period, non-CO_2 emissions from agriculture, transport and buildings have remained relatively stable. Most emission reductions were nitrous oxide emissions from non-ETS industry, and methane in the waste sector, while the level of F-gas emissions has reduced but to a lesser extent (Figure 3.3). The EU methane strategy aims to reduce methane emissions in the energy sector, as well as in the agriculture and waste sectors, and thus also supports the achievement of the ESR targets.

Figure 3.3: Non-CO_2 emissions under the ESR in 2005 and 2022, by sector and gas type



F-gases

Fluorinated greenhouse gases ('F-gases') have a global warming effect up to 24 000 times greater than CO_2 . F-gas emissions in the EU amount to 2.5% of the EU's total GHG emissions. Hydrofluorocarbons (HFCs) are the most important F-gases. Thanks to the implementation of the 2014 F-gas Regulation (Regulation (EU) No 517/2014), there has been a consistent and significant reduction in F-gas emissions across the EU. Since this regulation entered into force in 2015, total F-gas emissions have declined by 27.6% after having doubled between 1990 and 2014. The biggest improvements were seen in the cooling industries, like refrigeration and air conditioning that have been shifting to more climate-friendly alternatives. The regulation was also successful in terms of facilitating the global agreement reached in 2016 to phase down HFCs under the Montreal Protocol ("Kigali Amendment"), which is estimated to prevent up to 0.5 degrees Celsius of global warming by 2100. Since 11 March 2024, an even more ambitious F-gas Regulation (Regulation (EU) 2024/573) applies. Under the new rules, the amount of HFCs used must be reduced by around 95% in 2030 compared to 2015 and be phased out in 2050. These reduced F-gas emissions will continue to support Member States' efforts to reach their target under the Effort Sharing Regulation.

3.3 ROAD TRANSPORT

Domestic transport emissions represent a quarter of the EU's overall GHG emissions and have decreased only slightly since 2005. Efforts to decarbonize the transport sector need to accelerate in order to meet the EU's 2030 and 2050 climate objectives. Inventory data indicated an average annual increase of 4 $MtCO_2$ -eq between 1990 and 2022, a trend that is clearly not in line with meeting the EU 2030 domestic target[79]. The road transport sector is responsible for the great majority of transport emissions (around 95%, or 73% when international shipping and aviation are included), with more than 70% of road transport emissions originating from passenger cars and vans. Between 2005 and 2022, emissions from road transport decreased by only 4% and emissions from heavy-duty vehicles even increased by 1%. This shows that improved vehicle efficiency and the uptake of low-emission powertrains have hardly outweighed the effect of the continued increase in road transport activity.

The EU CO_2 emission standards for new cars and vans and for new heavy-duty vehicles are key policies for reducing road transport CO_2 emissions.

According to the provisional monitoring data for new **cars and vans** registered in the EU, Iceland, and Norway in 2023[80], the average CO_2 emissions[81] further decreased compared to 2022, from 108.1 gCO_2 /km to 106.6 gCO_2 /km for cars (-1.4%) and from 183.8 gCO_2/km to 180.9 gCO_2 /km (-1.5%) for vans. This is a continuation of the downward trend in CO_2 emissions observed since 2020, when stricter targets started applying. In 2023, average emissions were 28% (cars) and 11% (vans) below 2019 levels. This is mainly due to the surge in the share of zero-emission vehicle registrations. In 2023, 15.5% of new cars and 8% of new vans had no tailpipe emissions (up from 2.2% and 1.4% respectively in 2019). Progress has been made therefore in the past years, but significant further emission reductions are still needed to deliver on the future targets (Figure 3.4). By 2035, all new cars and vans should be zero-emission.

Figure 3.4: Average CO_2 emissions (dots) and EU fleet-wide targets (lines) for new cars and vans since 2020

Figure 3.4.a New cars

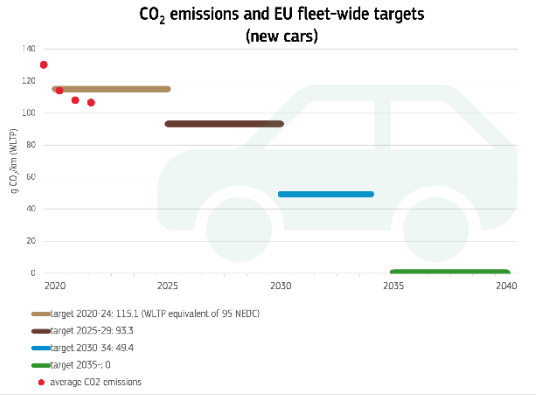
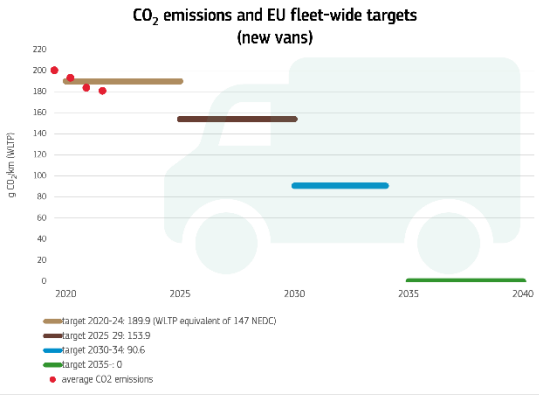


Figure 3.4.b New vans



[79] EEA greenhouse gases — data viewer — European Environment Agency (europa.eu)

[80] Monitoring of CO_2 emissions from passenger cars (europa.eu)

[81] Determined during type-approval using the Worldwide Harmonised Light Vehicles Test Procedure (WLTP).

Heavy-duty vehicles (HDVs), such as lorries, buses and coaches, generate 27% of all CO_2 emissions from road transport. The EU has recently adopted revised CO_2 standards for new HDVs to further tighten existing standards and extend the scope to smaller lorries, buses, coaches and trailers. Under the revised regime, CO_2 emissions must be reduced by 15% from 2025 (unchanged by the revision), by 45% from 2030, by 65% from 2035 and by 90% from 2040 onwards compared with the 2019 baseline. There is also a new 90% zero-emission target for new city buses from 2030 and a 100% target from 2035 onwards. The provisional data of the reporting year from July 2022 to June 2023 [82] show a fall in lorries' CO_2 emissions, a small increase in the number of new zero-emission lorries, and that about one quarter of new city buses are electric.

The **Fuel Quality Directive** also contributes to reducing transport emissions by setting quality requirements for road transport fuels. Compliance with fuel quality limits is high in the EU. Almost all key fuel parameters in the samples taken in 2022 were reported to be within the tolerance limits (including the maximum sulphur content), and Member States reported the actions taken when non-compliant samples were identified. This confirms that the fuel quality monitoring system currently in place ensures that high-quality fuels are sold in the EU according to the requirements of the Fuel Quality Directive. Until 2023, Member States were also required to report on the 6% life cycle GHG emission intensity target for road transport fuels compared with 2010 levels, whereafter this decarbonisation target was taken over by the new Renewable Energy Directive. The average GHG intensity of fuels supplied in 2022 was 5.6% lower than in 2010. For more information on fuel quality, please see Chapter 5 of the accompanying staff working document.

[82] To be published soon.

4 LAND USE, LAND USE CHANGE AND FORESTRY (LULUCF)

The land use, land-use change, and forestry (LULUCF) sector plays a significant role in achieving the EU's climate neutrality goal. In the EU, the LULUCF sector absorbs more GHGs than it emits, removing significant volumes of carbon from the atmosphere. The sector also provides biomaterials that substitute fossil or carbon intensive materials, which is equally important in the transition to a climate-neutral economy. However, carbon removals have and continue to decline at a worrying speed in recent years.

This negative trend is, to a large degree, due to a decrease in forest-related removals, mainly as a consequence of an increase in harvesting, combined with a stabilisation or slight reduction in forest growth, especially in ageing forests in certain Member States. The annual net gain in living biomass is determined by photosynthesis minus harvest, mortality, and respiration. Climate change itself is having an increasing impact too. The growing frequency and severity of disturbances such as forest fires, wind throw, droughts, and insect and fungus outbreaks, is undermining the role of forests as a carbon sink and has in some cases turned them temporarily into carbon sources. There are many indications that, because of climate change, the future robustness of EU forest removals is far from guaranteed. At the EU level, cropland, grassland, wetlands, and settlements are the main sources of LULUCF emissions, with managed organic soils generating particularly high emissions [83].

4.1 ASSESSMENT OF PROGRESS IN THE LULUCF SECTOR

A greater role for the LULUCF sector to support climate action.

The LULUCF target is to increase land-based net removals in the EU by an additional -42 million tonnes of CO_2 equivalent ($MtCO_2$ -eq) by 2030 [84]. This will result in total net removal at the EU level of -310 $MtCO_2$ -eq [85].

For the period 2021-2025, specific accounting rules apply for different land accounting categories, which take into account specific historical benchmarks (such as the forest reference level). Member States are to comply with the 'no-debit' rule, meaning that 'accounted' emissions must not exceed 'accounted' removals.

For the period 2026-2030, reporting is simplified, with the accounting rules and corresponding benchmarks abolished. The additional -42 $MtCO_2$ -eq target covers all LULUCF reporting categories and is distributed among Member States through individual targets, based on their share of total managed land area. The national 2030 targets require each Member State to increase its climate ambition and implement additional agriculture and forestry policies. (for more details, see Chapter 9 of the accompanying staff working document).

[83] On average, organic soils are reported to lose 7.9 tonnes of carbon per hectare per year (tC/ha/year).

[84] As compared to the yearly average of net removals over the reference period 2016-2018.

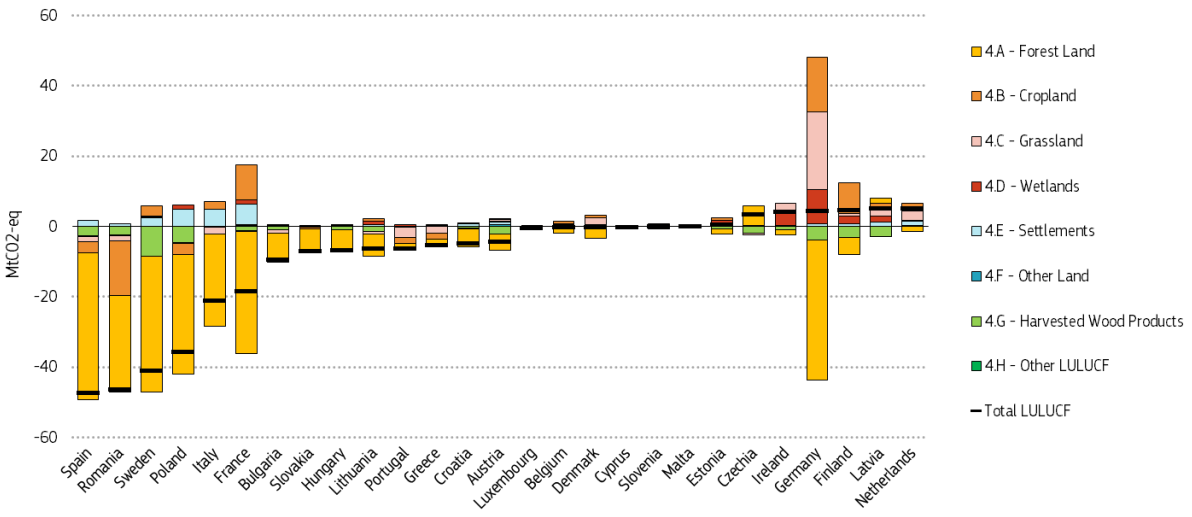
[85] The average yearly net removals for the years 2016, 2017 and 2018, as reported in the 2020 greenhouse gas inventory submission, plus the additional -42 $MtCO_2$-eq net removals result in total net removals of -310 $MtCO_2$ -eq at the EU level. Any methodological adjustments in the inventory data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

Assessment of progress in the LULUCF sector

The negative trend of shrinking removals observed in recent years persists. While the EU appears to be on track to meet the 'no-debit' commitment in 2025, it is not on track to meet its 2030 target, with the level of net removals having dropped significantly as compared to the reference period of 2016-2018.

Based on the 2024 GHG inventory submissions, the provisional 'accounted' balance for 2021 and 2022 shows for the EU a total accounted credits of -68 $MtCO_2$ -eq, exceeding the 'no-debit' commitment for the first two years of the compliance period from 2021 to 2025. However, due to further methodological improvements of the greenhouse gas inventories expected in the future, these figures are subject to change in the next years. An update of the reference levels used for accounting is also foreseen at the end of the compliance period 2021-2025, to adjust them to these methodological improvements since 2020.

Figure 4.1: Land sector emissions and removals in 2022 based on MS reported data by main land use category.



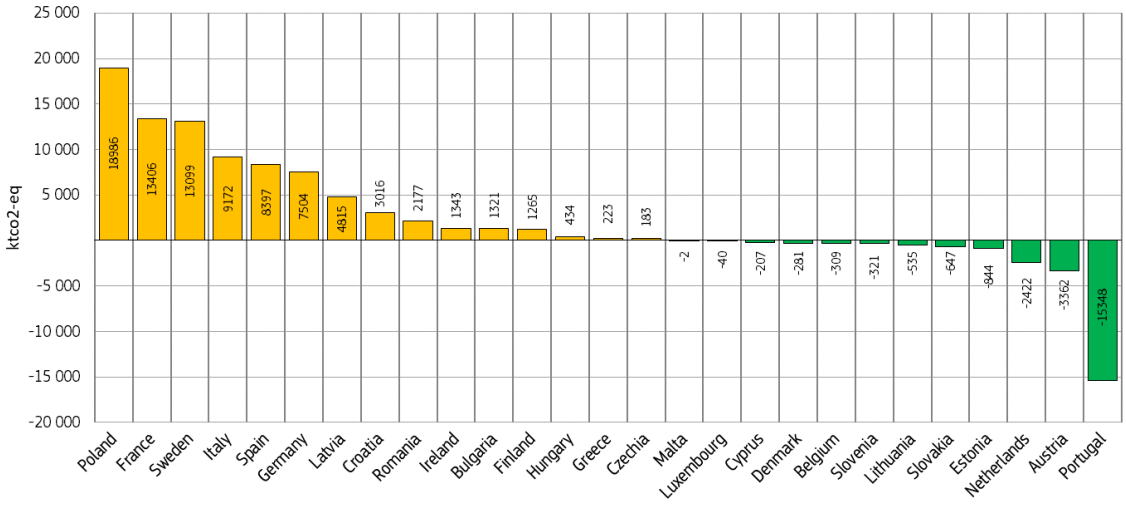
Based upon data for two years within the compliance period (2021 and 2022) and excluding flexibilities available to Member States at the end of the compliance period, eight Member States showed accounting debits, meaning they may face challenges meeting the commitment in 2025, with France, Finland and Czechia showing the biggest debit [86]. In 19 Member States, the accounted removals are higher than accounted emissions, meaning they are in line with the 'no-debit' commitment, with Romania, Spain and Germany having the largest net credit in the EU [87]. As above, the figures are subject to change due to further methodological improvements of the greenhouse gas inventories expected in the future.

Looking further ahead to reaching the 2030 net removal targets, Member States need to reflect on the role of the land sector when updating their National Energy and Climate Plans (NECPs) for the 2021-2030 period. As part of this process, they should provide projections of the climate performance of their policies and measures up to 2030 and beyond.

[86] Member States with debits in decreasing order of magnitude: France, Finland, Czechia, Portugal, Slovenia, Estonia, Belgium and Cyprus.
[87] Member States with credits in increasing order of magnitude: Malta, Luxembourg, Latvia, Netherlands, Slovakia, Croatia, Greece, Bulgaria, Poland, Lithuania, Italy, Austria, Ireland, Hungary, Sweden, Denmark, Germany, Spain, Romania.

Projections provided by Member States [88] show that the EU as a whole is not on track to meet its target of generating additional -42 $MtCO_2$-eq net removals by 2030, leaving a gap of around 45-60 $MtCO_2$-eq. In particular, Poland, France, Sweden, Italy, Spain and Germany project the biggest gap to their national 2030 targets, while Portugal, Austria and the Netherlands project to have the biggest surplus compared to the 2030 target (Figure 4.2).

Figure 4.2: Projected gap to the national 2030 targets, based on Member States' projections for 2030.



Most final updated NECPs do not set out sufficient ambition nor sufficient climate action related to the land sector. Very few Member States have proposed a clear pathway to reaching their national net removal targets for 2030. Moreover, at the time of drafting this report, only 14 Member States have submitted their final plan. It is paramount that Member States swiftly design and implement adequate policies to put them firmly on track to reaching their climate targets. This should include measures to assist farmers, foresters and other stakeholders in building sustainable business models in line with these targets.

4.2 ACTION TO STEP UP LAND MONITORING

The LULUCF Regulation requires that all Member States set up systems to monitor, inter alia, soil and biomass carbon stocks. Better data on land, soil and forests will help identify measures that unlock the highest climate benefits. The Commission's legislative proposal for soil monitoring, and for forest monitoring and resilience [89], as well as the revised LULUCF Regulation are mutually reinforcing. A resilient land sector, including soils and forests, sequesters and stores more carbon, while the LULUCF objectives promote the sustainable management of soils and forests.

Member States GHG inventories underpin climate action and are also continuously developing. Recalculations based on better data and improved methods can be seen in the inventories themselves. Further improvements are expected in response to new needs for

[88] The following sources of Member States' projections were used in the analysis in this report, based on the order of availability: final NECP submission (scenario with additional measures), final NECP submission (scenario with existing measures), projections reported biennially by Member States (scenario with additional measures), projections reported biennially by Member States (scenario with existing measures).

[89] Proposal for a Regulation on a Forest Monitoring Framework ; Proposal for a Directive on Soil Monitoring and Resilience.

targeted and efficient policy making in both agriculture and forestry at the national level. Such improvements are in line with the requirements on high-quality and geographically explicit statistics in the revised LULUCF Regulation. Improved greenhouse gas inventories, based on harmonised and refined activity data and removal/emissions factors will be critical to facilitate action. Enhanced, more timely and mapped data will assist Member States and the EU identify optimal policy solutions, putting us on track to reaching our climate objectives.

Advanced technologies, such as those available under EU programmes, provide digital maps updated with high resolution satellite and ground observations. New steps are being undertaken to integrate information from the Copernicus Earth Observation satellite data, products, applications and services with other data such as those used for the Common Agricultural Policy (CAP).

4.3 RELATED INITIATIVES IN AGRICULTURE AND FORESTRY

In addition to the Fit for 55-package, several other European Green Deal initiatives aim to increase the resilience of the LULUCF sector while protecting and promoting ecosystem services and the transition to a resource efficient circular economy and a sustainable bioeconomy.

The recently adopted EU framework for the certification of carbon removals [90] is designed to facilitate and speed up the deployment of high-quality carbon removals and emission reductions. It includes three distinct types of activities: carbon farming, carbon storage products, and permanent removals. The framework will not only provide land managers with new business opportunities, but also support growth of the sustainable circular bioeconomy by certifying carbon storage products, such as wood-based construction. Ultimately, this can assist Member States in attaining their LULUCF targets. To boost the industrial capture of carbon and its utilisation in bio-based products or storing it permanently.

Healthy ecosystems contribute to carbon sequestration and climate resilience and improve the wellbeing of populations. Activities such as the rewetting of peatlands can have a significantly positive impact on biodiversity. The Nature Restoration Regulation, a key element of the EU biodiversity strategy, calls for binding targets to restore degraded ecosystems, in particular those with the most potential to capture and store carbon and to prevent and reduce the impact of climate change [91].

4.4 INCENTIVES FOR REMOVALS AND SUSTAINABLE PRACTICES

Many funding mechanisms and incentives are available or being developed to encourage carbon removals, through public or private sector sources. The EU provides funding under the CAP, other EU programmes such as LIFE, Horizon Europe (in particular the Mission Soil), and the Cohesion Policy funds. In 2023, the Commission adopted guidance on EU funding opportunities for healthy soils [92]. Member States can also support the uptake of sustainable management practices under State aid rules, which have been revised and allow for the provision of forest ecosystem services such as climate regulation and biodiversity restoration. The Commission guidance on payment schemes for forest ecosystem services provides further information for actors. The CAP and State aid cover funding for investments and measures

[90] EUR-Lex - 52022PC0672 - EN - EUR-Lex (europa.eu)
[91] Regulation (EU) 2024/1991
[92] Commission Staff Working Document on the Guidance on EU funding opportunities for healthy soils.

such as training, advice or cooperation, that help maximise effects. Private initiatives linked to voluntary carbon markets, or a combination of different funding options can supplement and further promote large-scale deployment of carbon farming.

The carbon removal certification framework will help ensure the transparent identification, through standardised methodologies, of carbon farming and industrial solutions that remove CO_2 from the atmosphere and store it long-term. Carbon removal certificates can also help organisations back credible carbon removal claims and meet stakeholders' expectations that carbon removals should not be used for greenwashing, in line with the Corporate Sustainability Reporting directive [93] and the proposed directive on green claims [94]. To facilitate future implementation, the Commission has set up an Expert Group on carbon removals [95].

[93] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022L2464
[94] Proposal for a Directive on green claims - European Commission (europa.eu)
[95] Register of Commission expert groups and other similar entities (europa.eu)

5 PREPAREDNESS FOR AND RESILIENCE TO CLIMATE CHANGE IMPACTS

In 2023, Europe witnessed its largest wildfires ever recorded, one of the wettest years, major marine heatwaves, widespread devastating flooding, and a continuing increase of temperatures. The Commission's adaptation progress assessments of the end of 2023 show that the need for climate adaptation and preparedness is increasingly understood and its importance rising on the political agenda.

However, the EU's and the Member States' climate adaptation policies and measures are not keeping pace with the rapidly growing risks and impacts. The first-ever European Climate Risk Assessment (EUCRA) report of March 2024[96] identified 36 major climate risks for Europe. Eight of them require urgent action today, and without further action all of them will become critical or even catastrophic in the future. Bolder policies and more significant measures are urgently needed, and the Commission put forward proposals during the reporting year. This marks a turning point for the EU's climate adaptation action.

5.1 CONTEXT: EU ADAPTATION ACTION

The European Climate Law requires the EU's institutions and the Member States to ensure continuous progress on adaptive capacity, strengthening resilience and reducing vulnerability, in line with the Paris Agreement. Implementation of the 2021 **EU Adaptation Strategy** is in full swing. Cohesion policy and other key budgetary programmes have embraced the 'do no significant harm' principle and prepared climate proofing practice to reduce the climate risk exposure of EU-funded investments. A range of sectoral policies are being updated for climate risks. The Member States are improving adaptation action.

The findings of recent Commission assessments are nevertheless mixed[97]. Steady progress has been made at EU level with implementing the EU Adaptation Strategy, but the Member States need to do much more on governance aspects, awareness-raising, fair and just resilience, financing, and nature-based solutions, in line with the Commission recommendations on adaptation progress in individual Member States.

The European Court of Auditors (ECA) adopted a special report on EU climate adaptation in October 2024 in which it concluded that while the overall EU framework for adaptation policy was sound, there were weaknesses and gaps in its implementation[98]. Besides others, the ECA recommended to improve reporting on climate adaptation, better develop and promote EU tools for climate adaptation, and ensure that all relevant EU-funded projects are adapted to the current and future climate conditions.

The latest Commission assessments of the draft updated NECPs noted that the NECPs and the Member States' planned and implemented adaptation policies and measures were not synchronised. The Commission has issued recommendations to address this concern.

The first years of the implementation of the European Climate Law were analysed by the Commission in spring 2024[99]. Providing for continuous progress on adaptation, the European

[96] European Climate Risk Assessment — European Environment Agency (europa.eu)

[97] 60a04592-cf1f-4e31-865b-2b5b51b9d09f_en (europa.eu), SWD(2023) 338 final, COM(2023) 796 final and 31 linked recommendation documents, SWD(2023) 932 final

[98] https://www.eca.europa.eu/en/publications/SR-2024-15

[99] COM(2024)196 final

Climate Law together with the EU Adaptation Strategy have set the long-term direction of travel and increased investment predictability by providing for continuous progress on adaptation (See Chapter 1.3).

5.2 FURTHER DEVELOPING EU ADAPTATION ACTION

The EEA published the first **EUCRA** report in March 2024 to help identify policy priorities for climate change adaptation and for climate sensitive sectors. This innovative assessment mobilised over 100 scientists across Europe and classified the 36 major climate risks for Europe in five clusters: food, health, ecosystems, infrastructure, and the economy and finance. Eight of these are urgent and more than half require more action now, primarily to conserve ecosystems, protect people from heat, protect people and infrastructure from floods and wildfires, and to secure the viability of EU solidarity mechanisms. The assessment shows that the EU's policies and adaptation measures are not keeping pace with the rapidly growing risks. Incremental adaptation will often not be sufficient and urgent action is likely to be needed even on risks that are not yet critical, because many measures which improve climate resilience take effect slowly over prolonged periods.

In response to the findings of the EUCRA report, the March 2024 Commission Communication on managing climate risks - protecting people and prosperity demonstrates the Commission's resolve to take the risks and concerns seriously and tackle them head-on. The policy document sets out how the EU can effectively get ahead of the growing climate-related risks and build systematically greater resilience to climate change impacts. It identifies measures to be implemented by stakeholders in order to meet their responsibilities (at the EU, national and subnational levels), and measures for both policymakers and the private sector. It underscores the point that action to improve climate resilience is essential for maintaining societal functions and protecting people, economic competitiveness and the health of the EU economies and companies. It identifies four horizontal areas where progress can systemically improve EU climate resilience:

- improved governance (in particular clarity on risk ownership implementation at national level);
- better tools for empowering risk owners (especially tools that provide clarity on climate data and scenarios);
- harnessing structural policies (spatial planning and the protection of critical infrastructure in the Member States); and
- setting the right preconditions for financing climate resilience.

The Communication is the start of a dialogue and of further work to promote societal preparedness, sound risk management, climate adaptation and resilience through legislative and non-legislative activities.

See also Section 7 for the UAE Framework for Global Climate Resilience and the UAE-Belém work programme on indicators, as important drivers for EU adaptation action.

5.3 ADAPTATION IN EU SECTOR POLICIES

a) Ecosystems

Climate change is a key driver of biodiversity loss and ecosystem degradation in the EU. Of the five major climate risk clusters identified in the EUCRA report, the ecosystems cluster had most risks requiring urgent or more action. Climate impacts on land, freshwater and ocean ecosystems can cascade into food production and security, human and animal health,

infrastructure, land use and the wider economy. Risks to marine and coastal ecosystems are particularly severe and require most urgent action.

In line with the findings of the International Panel on Climate Change [100] and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [101], the Commission's Communication on managing climate risks states that, to maintain and restore the resilience of ecosystems and the services they provide, some 30 - 50% of the Earth's land, freshwater and oceans will need to be effectively and equitably preserved. In addition, in its climate adaptation progress assessments for the individual Member States the Commission recommended ensuring greater promotion of, and more investment in, nature-based solutions [102].

Recent key EU policy initiatives include legislative proposals on forest monitoring [103], forest reproductive material [104], and soil monitoring and resilience [105]. The EU's Nature Restoration Law came into force in August 2024 [106]. Its legally binding obligations for nature restoration will help the EU climate adaptation objectives be achieved. It requires Member States to develop national restoration plans that take climate scenarios into consideration and work in synergy with national adaptation strategies and plans.

b) Water

Water resources are under pressure in many parts of the EU. Climate change is exacerbating those pressures and increasing water-related risks in the form of more frequent and prolonged droughts or extreme precipitation. These are set to worsen in the future with more of the EU affected by water stress, a growing risk of mega-drought, wildfires, increasing floods, and rising sea levels that heighten the risk of coastal floods and storm surges, coastal erosion, and salt-water intrusion. Water stress and scarcity are challenges to the provision of critical resources, like food or energy.

The EUCRA report emphasised that water-related risks cut across all major sectors and that severe floods, droughts and wildfires are becoming a health threat and a recurrent cause of social, environmental, and economic losses.

In 2023 the European Drought Risk Atlas [107] was published. It provides a comprehensive assessment and mapping of present and future drought risks and impacts in the EU for different systems, such as agriculture, water supply, energy, river transport, and ecosystems.

In June 2024, the Water Directors of the Member States and the Commission working on the Common Implementation Strategy, adopted the updated Guidance on Water Management in a Changing Climate, to help water managers incorporate climate mitigation and adaptation in their activities.

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[100] IPCC: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, 2003.

[101] Pörtner, H.O. et. al., Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change; IPBES secretariat, Bonn, Germany, 2021.

[102] SWD(2023) 932 final

[103] COM(2023) 728 final

[104] COM(2023) 415 final

[105] COM(2023) 416 final

[106] https://www.consilium.europa.eu/en/press/press-releases/2024/06/17/nature-restoration-law-council-gives-final-green-light/

[107] https://publications.jrc.ec.europa.eu/repository/handle/JRC135215

c) Public health

The climate crisis is a major public health threat. It affects the health of individuals and the functioning of health systems. For instance, the summer heatwave of 2022 killed more than 60 000 people. Locally acquired tropical infectious diseases (e.g. dengue fever and West Nile virus) are on the rise. In Portugal, heat waves were shown to have caused a 19% increase in hospitalisations across all age groups and major disease diagnostic categories [108].

The EU not only supported the Budapest Declaration in 2023 [109], but also joined the United Arab Emirates Declaration on Climate and Health [110] in December 2023, which breaks new ground in international policymaking on climate and health.

At EU level, the Commission is working to protect people and health systems against the growing effects and risks of climate change by, for instance:

- boosting the remit and resources of the European Climate and Health Observatory [111];
- enhancing surveillance and medical countermeasures against climate-sensitive infectious diseases;
- publishing a Communication on a comprehensive approach to mental health [112]; and
- planning the publication in early 2025 of a new strategic research and innovation agenda on climate and health.

d) Agriculture and food

The agricultural sector is one of the sectors most vulnerable to climate change. It is endangered by a lack of precipitation leading to droughts, by too much precipitation resulting in erosion, landslides and floods, and by hail and frost. The food sector and the whole food value chain are vulnerable. Future climatic conditions need to be considered in sectors such as agroforestry.

The new 2023 EU CAP has three main objectives (climate change, environment and landscapes), reinforced conditionality (good agricultural environmental conditions), eco-schemes (e.g. organic farming or carbon farming), and other instruments to increase the use of measures related, inter alia, to climate change adaptation. All Member States have recognised the need to address climate adaptation and have programmed support based on their needs assessment[113]. Their uptake nevertheless depends on how Member States prioritise them in their CAP strategic plans.

The Strategic Dialogue on the Future of EU Agriculture [114] recognises that a fundamental step to make the European agrifood sector more resilient consists in proactively preventing and reducing risks, in particular those arising from climate change and environmental degradation. The report touches upon topics under the theme of adaptation, specifically water resilience in agriculture and innovative plant breeding approaches. As explained in Section 4, it also recommends that the European Commission and the Members States work on a coherent mix

[108] https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(24)00046-9/fulltext
[109] https://www.who.int/europe/publications/i/item/EURO-Budapest2023-6
[110] https://www.cop28.com/en/cop28-uae-declaration-on-climate-and-health
[111] https://climate-adapt.eea.europa.eu/en/observatory
[112] https://health.ec.europa.eu/publications/comprehensive-approach-mental-health_en
[113] Report from the Commission to the European Parliament and the Council, Summary of CAP Strategic Plans for 2023-2027: joint effort and collective ambition. COM(2023)707 final
[114] https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/main-initiatives-strategic-dialogue-future-eu-agriculture_en

of policies combining incentives and regulatory measures, including rewarding and incentivizing farmers to establish and to continue providing ecosystem services. In light of growing environmental, climate, geopolitical and economic risks, the report recommends strengthening risk management tools and crisis management. Along with the other elements of the report, this will be further looked at in the Vision for Agriculture and Food planned for early 2025.

e) Infrastructure and the built environment

Climate change poses significant risks to infrastructure and the built environment, including threats to cultural heritage [115]. Assets need to be designed today to withstand the climate and weather of tomorrow. Risks are manageable if they are properly addressed, and it is essential to work on several aspects in parallel. Spatial planning for land and water needs to include resilience considerations for infrastructure and the built environment. Further efforts to green the infrastructure will help, because green elements (e.g. green roofs, rain gardens and permeable pavements) can help to manage storm waters and reduce the impact of floods.

At EU level, the Commission is progressing with the climate proofing of the European standards that are most relevant to infrastructure. International and European standards provide guidance on the design of infrastructure and buildings. Having standards that require future climatic conditions to be taken into consideration is a powerful lever. In December 2023 the Commission presented a draft standardisation request to integrate climate change into infrastructure and buildings standards, which is expected to be adopted by the end of 2024.

The exposure of infrastructure and the built environment needs to be considered when planning for and implementing the energy transition. The EUCRA report highlights the risk of energy disruptions, due to climate hazards such as heat and drought, especially in Southern Europe. Even so, limited progress has been made at EU level on the resilience of energy systems. The Commission has in its assessments of the draft updated NECPs recommended that Member States need to better plan for resilient energy systems and promote the mainstreaming of adaptation. Significant further work remains.

f) The economy

Each climate change-related disaster puts a strain on the economy, due to loss of life and productivity, direct damage, reduced growth potential and greater pressure on public budgets. Redirecting investment towards rebuilding after damage reduces the funds available for productive investments. Climate risks can push existing vulnerabilities in the financial systems over critical thresholds. Government budgets are the main source of coverage for risks, but they are strained.

The insurance coverage of climate exposed assets and property is low in the EU and varies significantly between Member States and different climate hazards. This coverage is expected to shrink even further due to increases in premiums as climate-related events occur more often. The Climate Resilience Dialogue brought together insurers, businesses, consumers, and other stakeholders to exchange views on how to address the low proportion of insured losses incurred because of climate disasters. It published its final report in July 2024[116].

[115] https://op.europa.eu/en/publication-detail/-/publication/4bfcf605-2741-11ed-8fa0-01aa75ed71a1/language-en
[116] https://climate.ec.europa.eu/eu-action/adaptation-climate-change/climate-resilience-dialogue_en#final-report

The Commission has announced the establishment of the temporary Reflection Group on mobilising Climate Resilience Financing to address the climate resilience investment gap and help facilitate climate resilience financing by sharing knowledge and tools, mapping best practices and identifying obstacles and enabling conditions for EU climate resilience financing. The Group will conclude its work in December 2025.

5.4 THE EU MISSION ON ADAPTATION TO CLIMATE CHANGE

The EU Mission on Adaptation to Climate Change supports European regions, cities and local authorities in building resilience against climate change impacts. It is fully operational and has a continuously expanding portfolio of supporting and enabling tools.

Currently, 311 signatory regions and local authorities have committed to working within the Mission framework. Local and regional decision-makers in Europe are supported with knowledge and tools brought to them through the Mission Portal.

The Mission Implementation Platform provides support and technical assistance to local actors in their resilience building efforts and facilitates exchanges of best practices between those involved in climate adaptation.

Thanks to the Mission's support, about 100 regions and local authorities are receiving technical support to develop plans to address their local climate vulnerabilities and to secure funding for the measures identified. In addition, more than 40 Mission-funded projects, that carry out research and develop innovative climate adaptation and resilience approaches, are underway with the direct involvement of regional and local actors. They go beyond theory by delivering practical and tangible outcomes through guidance, tailor-made tools, context-specific data, on-the-ground testing, and piloting the most promising solutions identified in the Mission case studies (See separate accompanying staff working document for more information).

6 ALIGNING INVESTMENTS WITH CLIMATE NEUTRALITY

6.1 INVESTMENT TRENDS IN THE EU

Becoming climate neutral by 2050 calls for substantial amounts of public and private investments. Energy system investment needs [117] are estimated at around EUR 565 billion per annum (equivalent to 3.3% of GDP) in 2021-2030 and EUR 660 billion per annum (equivalent to 3.2% of GDP) on average over 2031-2050 (against EUR 250 billion over 2011-2020, or 1.7% of GDP, a decade with relatively low investments in the energy system), and yearly spending for transport [118] to about EUR 785 billion in 2021-2030 and EUR 870 billion in 2031-2050 (equivalent to 4.2% of GDP, a similar proportion of GDP as in 2011-2020) [119]. These figures do not include investments on nature preservation and restoration, also key to reach climate neutrality. This highlights the importance of further aligning climate finance with the climate neutrality and resilience objective of the EU, as also called for in the Paris Agreement.

Given the scale of investment needed, the involvement of the private sector in financing the climate transition will be substantial. This is why the EU has over the last 5 years, in addition to the economic incentives for private investment provided by ETS carbon pricing, put together a framework aimed at facilitating private investments in sustainable activities. This Sustainable Finance Framework provides investors with robust definitions of green activities (EU Green Taxonomy [120]) as well as requiring companies and banks to disclose their impact on the environment and climate (Corporate Sustainability Reporting Directive [121], Sustainable Finance Disclosure Regulation [122]).

The latest two additions to this framework are the regulation establishing the European Green Bond Standard [123] (October 2023) and the regulation on sustainability ratings (April 2024). The latter is going to require agencies that rate companies against sustainability criteria, to be more transparent about their methodologies and eliminate potential conflicts of interests. The former requires bond issuers to demonstrate that proceeds from their 'green' bonds predominantly go to Taxonomy-aligned activities.

The impact of the Sustainable Finance Framework in mobilising green investments in the EU is significant and gaining momentum. For instance, the share of green bonds in total bond issuance rose sharply from 12% in 2021 to its 2022 peak at 16%. Even though this share

[117] It should be noted that the term 'investment' is in this context more broadly defined than gross fixed capital formation in national accounts and includes elements of final consumption expenditure. Investment in the energy system includes capital expenditure by firms on the energy supply side (power generation and the grid, as well as hydrogen or e-fuel production) and capital expenditure for decarbonisation in industrial sectors. On the energy demand side, it includes investment in the energy efficiency of buildings (gross capital formation) and expenditure to decarbonise heating and cooling or improve the energy efficiency of appliances (consumption of durables goods by households).

[118] Investments in the transport sector reflect the expenditures on vehicles, rolling stock, aircraft and vessels plus recharging and refueling infrastructure. They do not cover investments in infrastructure to support multimodal mobility and sustainable urban transport. In particular, the acquisition costs of private vehicles represent about 60% of the total.

[119] For more details, see COM(2024) 63 final and associated SWD(2024) 63 final.

[120] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0852

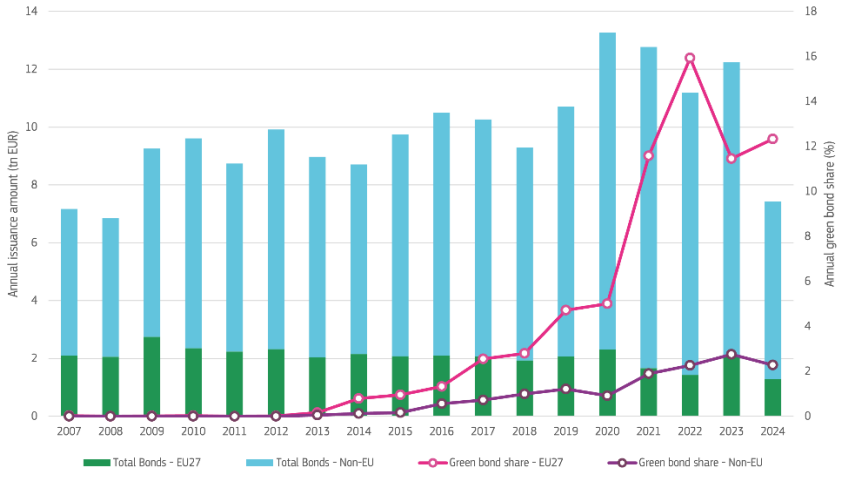
[121] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022L2464

[122] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R2088

[123] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302631

retreated in 2023 (11%), as of 30 June 2024, green bonds are on an upward trend towards 13% of total bond issuance (see Figure 6.1).

Figure 6.1: Issued volumes – All bond types [124]



In the second quarter of 2024**,** green financial assets represented 58.6% of total assets under management by financial actors. Figure 6.2 presents the value and proportion of financial assets as categorised by the Sustainable Finance Disclosure Regulation.

Figure 6.2: Assets under management by SFDR classification [125]

The number of companies reporting how green they are in accordance with the EU Green Taxonomy is still limited, amounting to 1 769 in 2023 according to Bloomberg data. This

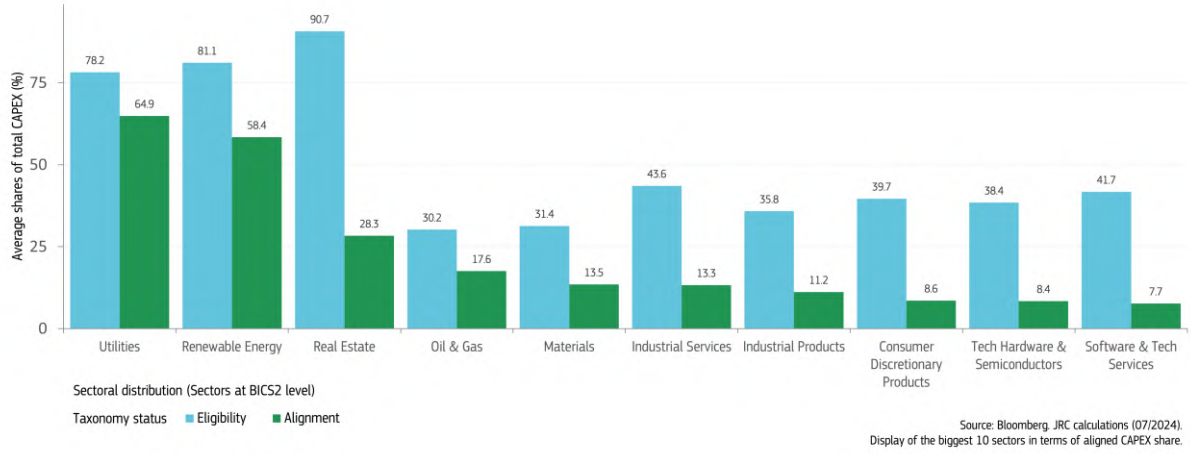
[124] Data as of 30 June 2024.

[125] Light green assets: assets that promote environmental or social characteristics (Art. 8 of the Sustainable Finance Disclosure Regulation); Dark green assets: assets that have sustainable investment as their objective (Art. 9 of the Sustainable Finance Disclosure Regulation); Light blue assets: assets without environmental or social features (Art. 6 of the Sustainable Finance Disclosure Regulation). Data as of 30 June 2024.

number is set to increase over the coming years as more entities progressively fall within the scope of the Taxonomy Regulation.

Figure 6.3 ranks economic sectors following two metrics: Taxonomy-eligibility, which is the average proportion of capital expenditure by reporting firms in each sector on activities covered by the Taxonomy (regardless of their compliance); and Taxonomy-alignment, the average proportion of capital expenditure by reporting firms in each sector on activities that (actually) comply with relevant Taxonomy criteria. The below figures are however affected by the fact that the Taxonomy does not incorporate all economic activities yet.

Figure 6.3: Taxonomy – Average share of eligible and aligned CAPEX in 2023 [126]



6.2 EU FUNDING FROM THE EU EMISSION TRADING SYSTEM

The revenue from the auctioning of allowances in the EU ETS accrues mostly to Member States' budgets. Member States are obligated to use all ETS revenue (or an equivalent financial value) to fund climate action and energy transformation. ETS revenue is also distributed through financial instruments – the Innovation Fund and the Modernisation Fund. In 2023, the total ETS revenue amounted to EUR 43.6 billion. Of this revenue, EUR 7.4 billion was raised for these funds.

The **Innovation Fund** is the EU fund for innovative climate actions, with a focus on energy and industry. It aims to bring to the market solutions to decarbonise European industry and support its transition to climate neutrality while fostering its competitiveness. With EUR 40 billion estimated budget available (based on a carbon price of EUR 75/tCO_2), the Innovation Fund has launched eight calls for proposals, including one for auctions under the European Hydrogen Bank.

The Innovation Fund portfolio of ongoing projects counts around 120 large and small-scale projects under implementation, with grants amounting to around EUR 7.2 billion. The results of the 2023 Innovation Fund Call were published in the second half of October 2024. This Call had a record budget of EUR 4 billion and received 337 applications. The first-ever Innovation Fund Auction in 2023 attracted 132 bids from 17 countries across Europe, requesting funds that 15 times greater than the available budget. The results of the evaluation

[126] Data as of 30 June 2024.

were published at the end of April 2024, with 7 bids selected for grant agreement preparation requesting EUR 720 million of EU contribution. The selected projects submitted bids between EUR 0.37 and EUR 0.48 per kilogram of renewable hydrogen produced and, based on the pay-as-bid design of the pilot auction, they will receive Innovation Fund grants ranging from EUR 8 million to EUR 245 million. Payments will only be provided upon presenting certified and verified volumes of renewable hydrogen. The grant agreements were signed in October 2024.

EU Member States (as well as EEA countries) also have the possibility to participate in Innovation Fund auctions with their own budget, benefitting from faster state aid clearance. This allows countries to use the auction to allocate additional national funds to national projects that could not be supported from the Innovation Fund auction budget. Germany has contributed EUR 350 million to a national funding window in the pilot auction. Similarly, the Commission is working to set up a similar feature for the regular calls for proposals, called 'Grants-as-a-Service'. Both features allow Member States to make use of the well-established Innovation Fund evaluation procedures and avoid unnecessary administrative burdens to develop and run new support schemes for the same technologies.

The **Modernisation Fund** supports lower-income Member States with financial assistance, generated through the ETS, to modernise their energy systems and improve energy efficiency. Up to 2030, over 750 million allowances will be auctioned to support these Member States, an increase by 110 million allowances (representing around EUR 60 billion), thanks to the revision of the ETS Directive. Three more Member States, Slovenia, Portugal and Greece became eligible for the Fund following the revision of the ETS Directive [127], bringing the total number of beneficiaries to 13.

The total disbursements from the Modernisation Fund since January 2021 amount to around EUR 12.7 billion. In June 2024, the Commission adopted the seventh disbursement decision under the Fund. On this basis, the EIB made payments for a total of EUR 3 billion to ten beneficiary Member States (see Table 6.1).

Table 6.1: Payments from Modernisation fund in June 2024

Member State	Payments (EUR million)
Romania	1 095.0
Czechia	835.2
Poland	697.5
Hungary	76.8
Bulgaria	65.2
Lithuania	59.0
Croatia	52.0
Slovakia	35.0
Latvia	26.8
Estonia	24.1

[127] By Directive (EU) 2023/959.

As a next step, the beneficiaries will have to transfer the money from the Modernisation Fund to the project proponents or the schemes' managing authorities. The next deadline for beneficiary Member States to submit investment proposals for potential support by the Modernisation Fund was 13 August 2024 for non-priority proposals, and 10 September 2024 for priority proposals.

6.3 MAINSTREAMING CLIMATE POLICIES IN THE EU BUDGET

The EU budget 2021-2027 – both the 'multiannual financial framework' and the NextGenerationEU instrument – is an important enabler of the green transition. It is currently projected that in the period up to 2027 it will contribute EUR 658 billion to climate action. This represents 34.3% of the EU's total budget [128] and exceeds its 30% climate spending target. This target is underpinned by programme-specific spending targets, for instance in the European Regional Development Fund (30%), the Neighbourhood, Development and International Cooperation Instrument (30%), Horizon Europe (35%), the Cohesion Fund (37%), the Common Agricultural Policy (40%), the Connecting Europe Facility (60%), and the LIFE programme (61%).

The EU's Recovery and Resilience Facility – the centrepiece of NextGenerationEU, the EU's recovery instrument – has a value of up to EUR 648 billion [129] and enables Member States to significantly increase climate investments. To qualify for the Facility's grants (EUR 357 billion) and loans (EUR 291 billion), Member States have prepared recovery and resilience plans setting out investments and policy reforms that contribute to the Facility's six policy objectives including the green transition. Each national plan must spend a minimum of 37% of its total allocation on measures contributing to climate objectives (such as initiatives promote energy efficiency, sustainable mobility, and renewable energy). Every measure must also comply with the 'do-no-significant-harm' principle [130]. All 27 Member State plans exceed the 37% benchmark, with some Member States projected to spend well over half of their allocation to fund climate policy. Collectively Member States are projected to dedicate 43% of their allocations to climate objectives (EUR 275 billion) [131].

In addition, in 2023 and 2024, Member States were complementing their recovery and resilience plans with new chapters on REPowerEU in response to the energy crisis caused by Russia's invasion of Ukraine. New or scaled-up reforms and investments in Members States to help phase out the EU's dependence on Russian fossil fuels and accelerate the clean energy transition are supported by additional financial power (EUR 20 billion of new grants, transfers from other funds and use of remaining NGEU loans).

At the same time, the 2021-2027 EU budget is enhancing its focus on the results of the measures that it finances. For example:

- Annual energy consumption so far have been reduced by more than 34 terawatt thanks to the Recovery and Resilience Facility;
- According to Cohesion Policy programmes 30 157 211 square metres of public buildings will see their energy performance improve;

[128] Climate mainstreaming - European Commission (europa.eu).
[129] In 2022 prices.
[130] Commission Notice – Technical guidance on the application of do no significant harm under the Recovery and Resilience Facility Regulation (europa.eu)
[131] Climate mainstreaming - European Commission (europa.eu)..

- Similarly, 9 504 gigawatts of additional renewable energy will be financed by the Cohesion Policy funds.

Strategic Technologies for Europe Platform

The Strategic Technologies for Europe Platform (STEP) is a new EU initiative launched on 1 March 2024 [132]. It aims to strengthen the EU's industrial competitiveness and reduce external dependencies by funding the development and manufacturing of critical technologies in the EU, reinforcing their value chains, and reducing shortages of essential labour and skills. The STEP supports investments in three key technology fields:

- clean and resource-efficient technologies, which are of key importance to the climate transition,
- digital and deep tech innovation, and
- biotechnologies.

Clean and resource-efficient technologies include net-zero technologies defined in the Net-Zero industry Act [133] such as technologies based on solar energy, battery and energy storage, hydrogen, carbon capture and storage, nuclear-related technologies, including nuclear fuel cycle technologies, renewable fuels of non-biological origin. STEP also addresses shortages of labour and skills critical to jobs connected to these technologies.

STEP is not a new funding instrument, but it leverages and synergises resources from various EU funding programmes such as Innovation fund, Horizon Europe, and Cohesion Policy funds.

In the Cohesion Policy, STEP introduced new possibilities and flexibilities such as 100% co-financing rate or one-off 30% prefinancing of STEP dedicated priorities, and thus it can boost investments in clean and resource-efficient technologies. 29 programmes have formally submitted STEP related amendments or are in the stage of informal discussion.

InvestEU

At least 30% of the InvestEU programme's target of EUR 372 billion for mobilising additional investment over the period 2021-27 should contribute to meet the EU climate objectives. Under the Sustainable Infrastructure Window, 60% of the funding must be spent on climate and environment. Investments above EUR 10 million are subject to sustainability proofing (identify, assess and mitigate climate, environment or social risks). All InvestEU supported investment will be climate and environmentally tracked against the methodology issued by the Commission. Implementing partners have been so far selected through two calls for expressions of interest and respective signing of guarantee agreements (in 2022 and in 2023) [134]. Financial products foreseen will help address market failures in providing access to finance projects in a broad area of policy priorities from transport, smart mobility, clean energy, digital connectivity, as well as energy efficiency, decarbonisation of industry, renewable energy, circular economy and other fields. By mid-2024, the Investment

[132] Regulation (EU) 2024/795 of the European Parliament and of the Council of 29 February 2024 establishing the Strategic Technologies for Europe Platform (STEP), and amending Directive 2003/87/EC and Regulations (EU) 2021/1058, (EU) 2021/1056, (EU) 2021/1057, (EU) No 1303/2013, (EU) No 223/2014, (EU) 2021/1060, (EU) 2021/523, (EU) 2021/695, (EU) 2021/697 and (EU) 2021/241

[133] Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem and amending Regulation (EU) 2018/1724

[134] Besides the EIB (which covers 75% of the EU guarantee), 16 institutions have signed guarantee agreements, including the European Bank for Reconstruction and Development (EBRD), Council of Europe Development Bank (CEB), Nordic Investment Bank (NIB), CDP Equity (CDPE), Caisse des Dépôts (CDC) in 2022.

Committee had approved 216 InvestEU operations for EUR 21.9 billion in guarantees (including Member State Compartment). As of end 2023, InvestEU reported to have helped mobilise EUR 217.5 billion in investments (58.4% of the target). Both climate/environmental targets have been overachieved, the climate contribution amounted to 53% (as compared to the expected 30%) and the climate and environmental contribution of the Sustainable Infrastructure Window amounted to 86% (as compared to the expected 60%).

Horizon Europe

Horizon Europe[135] is the EU's key funding programme for research and innovation. Research and innovation enable the green transition by testing and demonstrating solutions, developing breakthrough innovations and knowledge for policies based on the latest scientific evidence. Horizon Europe will devote in the 2021-2027 timeframe at least 35% of its EUR 95.5 billion budget to support climate action objectives. Horizon Europe invested over EUR 14.7 billion in climate action by the end of 2023. This covers projects in the thematic areas of climate science, energy supply, storage and systems, clean transportation, industry decarbonisation, climate adaptation, carbon removals, and agriculture. The June 2023 report 'Scaling up innovative technologies for climate neutrality' provides a view of more than 180 demonstrators of technologies funded mostly by Horizon Europe and the Innovation Fund that enable climate neutrality[136].

LIFE programme

The LIFE Programme is the EU's funding instrument for the environment, energy and climate action. Its general objective is to facilitate the transition towards a sustainable, circular, energy-efficient, renewable energy-driven, climate-neutral, and resilient economy. Within its four subprogrammes, the LIFE subprogramme on Climate Change Mitigation and Adaptation supports the implementation of the Green Deal by contributing to the objectives and targets set out in the EU Climate Law.

In 2023, the LIFE Programme approved 34 projects under the LIFE Climate Change Mitigation and Adaptation subprogramme, with an estimated funding of EUR 65 million. These projects focus on key areas of the climate transition, such as carbon removals in agricultural and forest lands, climate adaptation in urban and rural areas and greater preparedness for extreme weather events. Additionally, in 2023, the Programme financed three strategic projects aimed at implementing EU climate legislation in Member States, with a contribution of EUR 33.5 million.

Technical Support Instrument

In 2023, the Commission supported Member States through the Technical Support Instrument [137], providing tailor made technical expertise to design and implement reforms. This included several projects on climate change adaptation, the implementation of the do-no-significant-harm principle, faster permitting, industrial eco-systems and skills, renovation of buildings and capacity building. In particular, the Commission helped Member States to identify reforms and investments to phase out fossil fuel imports from Russia in preparation for the REPowerEU chapters. In 2024, the Commission is supporting Member States to

[135] And its predecessor Horizon 2020 in the 2014-2020 period.

[136] https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/2f1ec1d2-1173-11ee-b12e-01aa75ed71a1

[137] The Technical Support Instrument (TSI) is the EU programme that provides tailor-made technical expertise to EU Member States to design and implement reforms. Additional information is available here: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/technical-support-instrument/technical-support-instrument-tsi_en

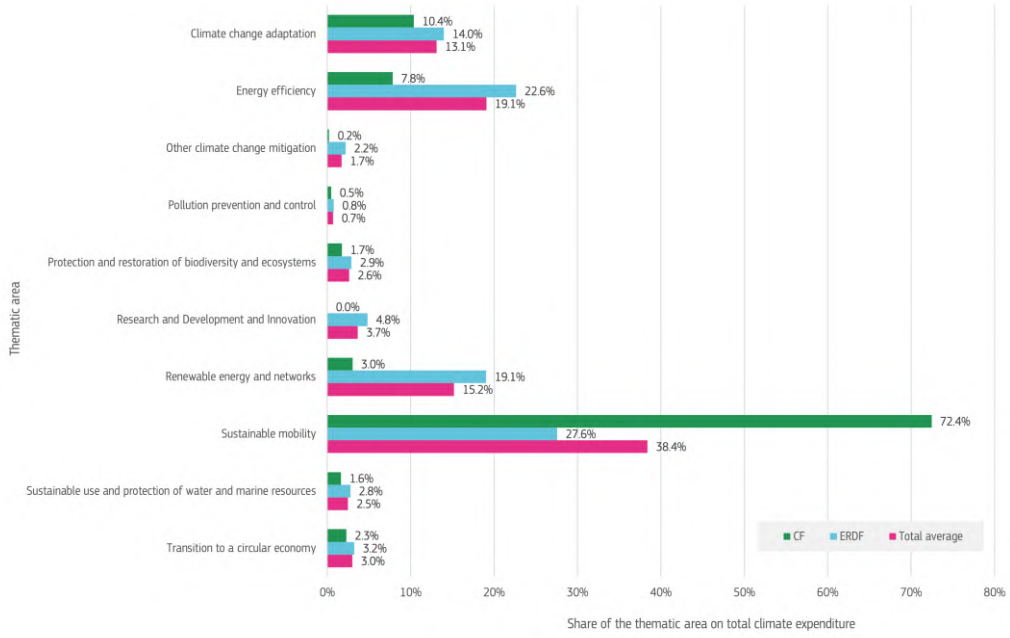
enhance the greening of public administrations, make energy systems fit for the green and digital transition, and support the resilience of natural resources. The Commission is also helping Member States implement the revised EU Emissions Trading System and the Carbon Border Adjustment Mechanism, as well as prepare national Social Climate Plans under the Social Climate Fund.

6.3.1 Cohesion Policy

European Regional Development Fund, Cohesion Fund, and Interreg

Member States' have allocated respectively 56.9% (EUR 22.2 billion) of their Cohesion Fund (CF) and 32.6% (EUR 69.9 billion) of their European Regional Development Fund (ERDF) allocations to climate action. In addition, about 24.4% of the EUR 10.7 billion of Interreg funds [138] financed by the EU are expected to fund climate relevant measures. Figure 6.4 shows the funding allocated to climate relevant policy areas as a share of total ERDF, CF, and Interreg climate expenditure.

Figure 6.4: Distribution of cohesion policy funds climate allocation by thematic area



Just Transition Fund

The Just Transition Fund (JTF) programmes mobilises EUR 19.2 billion of EU investments to help the people and places that suffer the most from the transition to climate neutrality. In addition to JTF, the other 2 pillars [139] of the Just Transition Mechanism will mobilise EUR 28 billion from public and private investments to address the social and economic effects of the transition. The Commission has approved all 70 Territorial Just Transition Plans, covering a total of 96 coal regions and carbon intensive regions. Where just transition regions need

[138] Programmes focused on European territorial cooperation. Additional information is available here: https://interreg.eu/.

[139] InvestEU "Just Transition" scheme and Public Sector Loan Facility.

support, the Commission provides technical and advisory support through the Just Transition Platform (JTP) launched in February 2023.

Almost half of JTF investments will support diversification of the local economy, so that they do not depend on a single polluting sector, and help people acquire new skills. Moreover, the JTF will invest EUR 8.2 billion in skills and economic diversification. Up to 120 000 unemployed people will benefit from the measure and almost 200 000 people will gain new skills.

As a part of the STEP framework, the one-off pre-financing (30%) was applied to all JTF resources thus providing higher liquidity for project implementation. As a result the Commissionalready paid EUR 5.9 billion in JTF pre-financing to accelerate the support to regions most affected by the transition towards climate neutrality.

JTF implementation has seen an upward trend as the EU-level selection rate reached 6.1% of the total allocation (compared to 3.2% as of December 2023). There are notable differences in progress Malta has taken lead in the project selection, followed by Luxembourg and Netherlands. The Netherlands continue to be the best performer in absolute terms, securing ca. half a billion euros for selected projects.

European Social Fund (ESF+)

For the period 2021-2027, Member States programmed almost EUR 6 billion or about 6% of total ESF+ allocations [140] for green skills and green jobs, considerably more than in the previous programming period. Finland, Italy, Belgium, Luxembourg, and Denmark allocated the highest shares to green jobs and skills (between 12% and 31%) while in several individual programmes from Belgium, Denmark, Italy, France, Germany, Portugal and Spanish programmes this share is 20% and above. In terms of actual investments, three individual programmes from Italy, Portugal and Greece alone contribute to some 30% of total EU climate expenditure for green jobs and skills. Overall, a third of climate expenditure has been allocated to access to employment and activation measures.

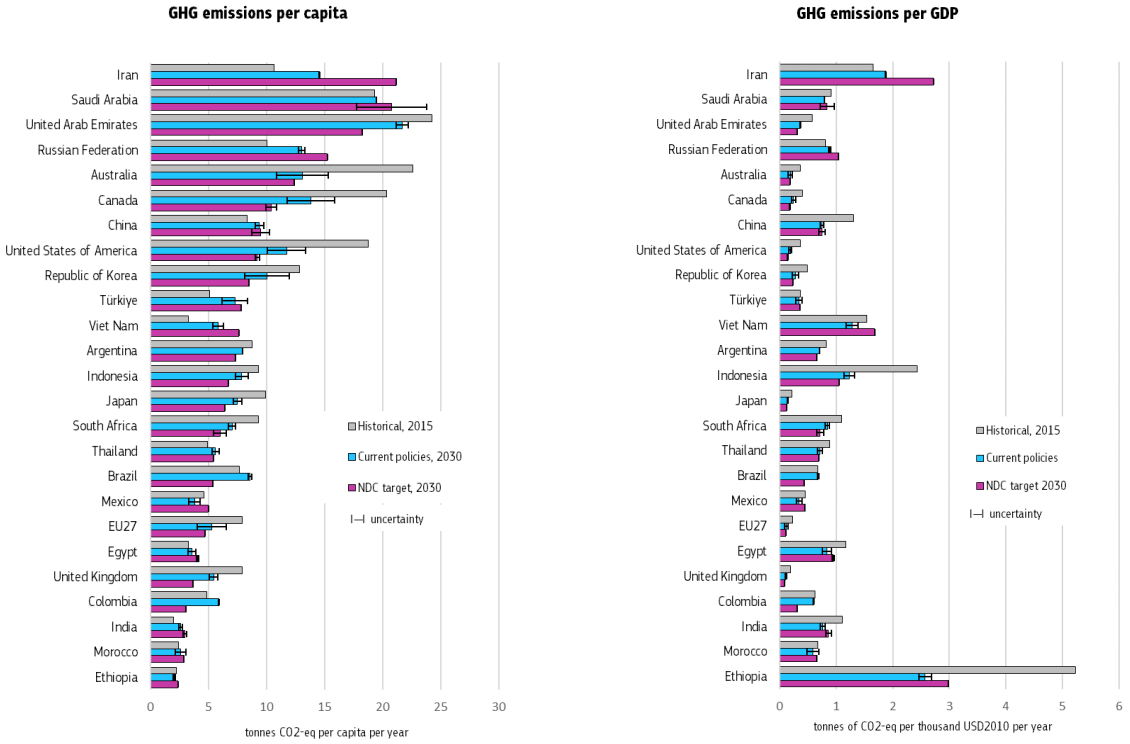
[140] Open Data Portal for the European Structural Investment Funds - European Commission | Data | European Structural and Investment Funds (europa.eu).

7 INTERNATIONAL CLIMATE ACTION

7.1 OVERVIEW AND DEVELOPMENTS

No significant changes in Nationally Determined Contributions (NDCs) of G20 members and other major emitters were presented in 2023, but several countries have made progress in implementing policies to achieve their greenhouse gas (GHG) emissions reduction target for 2030. About half of the countries analysed in Figure 7.1 are on track to meet their targets. They include the EU, which is projected to meet its Paris-aligned NDC target through the implementation of policies adopted at the EU level, under the Fit for 55 legislative legislation and the REPowerEU plan.

Figure 7.1: Impact of current policies on greenhouse gas emissions in major emitting countries [141]



The past year has seen productive, high-level international exchanges including the Copenhagen Climate Ministerial, the Petersberg Climate Dialogue, the Ministerial on Climate Action, the 28th Conference of the Parties (COP28) in Dubai, United Arab Emirates and the

[141] Source: PBL FAIR/TIMER Model; New Climate Institute calculations; IIASA GLOBIOM/G4M Model (2003); published in Greenhouse gas mitigation scenarios for major emitters; L Nascimento, T Kuramochi, S Woollands, M Moisio, A Missirliu, J Wong, H Fekete…2023, pbl.nl. Greenhouse gas emissions intensity per capita and per GDP in 2030 under current policies (adopted up until July 2023), NDC scenarios and historical 2015 levels. Targets are set by the respective country and are not necessarily aligned with the temperature goal of the Paris Agreement. The NDC target figures refer to unconditional target, except for Egypt. The sectoral emissions coverage of the scenarios for each country is aligned with the scope of the NDC. Figure sorted by NDC per capita values. https://newclimate.org/sites/default/files/2023-11/NewClimate_PBL2023_CurrentPolicies.pdf

intersessional subsidiary bodies sessions hosted by the United Nations Framework Convention on Climate Change (UNFCCC) in Bonn (SB60).

At COP28, the Parties concluded the first Global Stocktake under the Paris Agreement, with decisions on accelerating action by 2030 and beyond, including the transition away from fossil fuels, tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030.

On adaptation, the Parties agreed upon the UAE Framework for Global Climate Resilience. They also made progress on the modalities to deliver on the UAE-Belém work programme on indicators relating to the adaptation policy cycle and a set of thematic targets (e.g. water, food and agriculture and health).

For the mitigation work programme, the EU shared its own experience on energy transition, highlighting the role of renewable energy. It also emphasised its engagement to supporting the just energy transition outside of the EU. It was also active in the operationalisation of the just transition work programme, which includes a strong focus on the workforce and labour rights recognition.

The United Arab Emirates (UAE) Framework for Global Climate Resilience, which was also adopted at COP28, was a first in making climate adaptation a top priority for all nations. Stemming from the Global Goal on Adaptation established in the Paris Agreement in2015, it identifies global adaptation targets and launches the 2-year UAE-Belém work programme, to establish indicators for measuring progress towards these targets. The targets and future indicators will drive further developments in EU climate adaptation policy and action. The EU and its Member States are actively contributing to the UAE Framework and the UAE-Belém work programme on indicators.

On loss and damage, COP28 achieved a successful operationalisation of the funding arrangements including a Fund for assisting developing countries particularly vulnerable to the adverse effects of climate change. The EU and its Member States contributed more than EUR 400 million, over two thirds of the initial funding pledges.

The EU is engaged in the ad hoc work programme for the New Collective Quantified Goal on climate finance, that is expected to be decided at COP29. The goal is meant to support action to tackle the climate emergency and contribute to making all financial flows consistent with the Paris Agreement.

In October 2023, the EU submitted an updated NDC to the UNFCCC that provides more clarity, transparency and understanding on the policies put in place to achieve its target of reducing emissions by at least 55% compared with 1990 levels by 2030, as submitted in December 2020 [142].

Meanwhile, the EU is calling for all Parties to be as ambitious as possible in their new NDCs, which they will submit ahead of COP30. The EU is also calling for submission of the first Biennial Transparency Reports by the end of 2024.

The EU launched and promoted the Global Renewables and Energy Efficiency Pledge [143]. As a result, at COP28, Parties to the Paris Agreement agreed to contribute to tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030. The EU has also endorsed other plurilateral initiatives such as the

[142] https://unfccc.int/sites/default/files/NDC/2023-10/ES-2023-10-17 EU submission NDC update.pdf

[143] https://energy.ec.europa.eu/system/files/2023-12/Global_Renewables_and_Energy_Efficiency_Pledge.pdf

COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action [144], the Climate Recovery and Peace Declaration on Climate Finance [145], Getting ahead of Disasters: a Charter for a Better Future [146], the COP28 Declaration on Climate and Health [147] and the Climate Club [148] to speed up the decarbonisation of hard-to-abate industrial sectors.

On 7 May 2024, as a domestic contribution to the Global Methane Pledge [149] launched in 2022, the EU adopted, the first EU-wide legislation to reduce methane emissions in the energy sector. Similarly, in the waste sector, the EU contributed to the launch of the Lowering Organic Waste Methane (LOW-Methane) [150] initiative at COP28, under the Global Methane Pledge umbrella.

Lastly, to achieve a coordinated approach in tackling climate change, land degradation, desertification and biodiversity loss, the EU is working on enhanced collaboration between the different Conventions, including the Kunming-Montreal Global Biodiversity Framework adopted in 2023, to halt and reverse biodiversity loss.

7.2 MULTILATERAL AND BILATERAL ENGAGEMENT

Significant progress is being made with multilateral and bilateral partners to convince and support other countries, in particular major emitters, to increase their climate ambition, and accelerate their clean energy transition.

The EU has worked with multilateral platforms, such as the United Nations (where it participated in the UN General Assembly in September 2024), the G7/G20 and the OECD, as well as in the WTO, to generate transparency on efforts, mobilise resources and share knowledge on climate action. In 2023, the EU worked with NATO and the Organisation for Security and Co-operation in Europe to increase engagement with the impact of environmental degradation and climate change on peace, security and defence.

Regular bilateral exchanges took place with international partners at both political (e.g. in the form of High-Level Dialogues) and technical level, in particular with major emitters, such as the United States, China, Japan and the Association of Southeast Asian Nations (ASEAN) countries.

To intensify its carbon market diplomacy, the Commission set up a dedicated **Task Force on carbon markets**, to amplify efforts to replicate the success of the EU ETS by encouraging and supporting other jurisdictions to introduce or improve their own carbon pricing mechanisms. The task force will also enable the EU's engagement with stakeholders to ensure the climate integrity of international carbon markets and their alignment with Paris Agreement objective.

Progress was also made in implementing existing Green Alliances (Japan and Norway) and Green Partnerships (Morocco and the Republic of South Korea) with strengthened dialogue and cooperation in areas of relevance to the green transition. A new Green Alliance with

[144] https://www.cop28.com/en/food-and-agriculture
[145] https://www.cop28.com/en/cop28-declaration-on-climate-relief-recovery-and-peace
[146] https://www.early-action-reap.org/our-vision-getting-ahead-disasters-charter
[147] https://www.cop28.com/en/cop28-uae-declaration-on-climate-and-health
[148] https://climate-club.org/
[149] https://www.globalmethanepledge.org/
[150] https://energy.ec.europa.eu/news/2023-global-methane-pledge-ministerial-decisive-action-curb-emissions-2023-12-04_en

Canada was concluded in November 2023 and negotiations are ongoing on the establishment of a Green Partnership with Kenya.

The EU together with other members of the International Partners Group continued to work on the Just Energy Transition Investment Partnerships **(**JETP) providing EUR 2.5 billion in new public and private financing.

At COP28 in December 2023, South Africa unveiled the Implementation Plan of its JETP (signed in 2021), which includes the new areas of renewable energy manufacturing and energy efficiency, thereby expanding the range decarbonisation investments by JET Partners.

The Comprehensive Investment and Policy Plan, which was launched in November 2023 with Indonesia, sets out the details of the USD 20 billion finance package of public and private funds and outlines policy reforms for energy sector decarbonisation. In February 2024, the EIB signed a memorandum of understanding with the goal of finalising a framework loan of up to EUR 500 million to support the JETP (signed 2022).

At COP28, together with the International Partners Group, Vietnam launched its Resources Mobilisation Plan for the JETP (signed 2022). The plan includes an assessment of priority investments which supports progress on the pathway to net-zero emissions and the identification of a set of priority policy actions and regulatory reforms to develop an enabling environment.

The new Political Declaration establishing a JETP with Senegal includes Senegal's commitment to increase the share of renewable energies in installed capacity to 40% of its electricity mix by 2030, and to develop a long-term low GHG emission development strategy (LTS).

The EU is also engaging with the Contracting Parties of the Energy Community on the way forward with carbon pricing in the Western Balkans, Georgia, Moldova and Ukraine[151]. An impact assessment was launched by the European Commission to analyse different carbon pricing options.

Policy dialogues and cooperation activities were supported inter alia, through the EU Climate Dialogues programme, which fosters exchanges and collaboration among national and sub-national administrations, business communities, academia and civil society stakeholders with a view to making progress toward the Paris Agreement goals.

7.3 CLIMATE FINANCE AND INTERNATIONAL COOPERATION

Together with climate finance from private sources, international public climate finance plays an important role in helping developing countries to implement the Paris Agreement.

The Commission continues to support partner countries through its financing instruments. Under the Neighbourhood, Development and International Cooperation Instrument (NDICI – Global Europe), with at least 35% dedicated to climate action. This includes actions in fragile and conflict affected settings in recognition of the complex interdependencies between climate change, environmental degradation, fragility and conflict.

The Instrument for Pre-Accession Assistance (IPA III) also sets a climate change spending target of 18%, rising to 20% by 2027. The Commission has committed an additional EUR 4

[151] 21st Energy Community Ministerial Council focuses on Treaty Extension, TEN-E Regulation, and carbon pricing - Energy Community Homepage (energy-community.org)

billion to climate finance by 2027 on top of these climate change spending targets, which equates to a 35% climate finance target. This is an unprecedented investment by the EU in reducing emissions and in helping developing countries build resilience to the effects of climate change.

The EU, its Member States and financial institutions, (collectively known as Team Europe), are the leading contributor of development assistance and the world's biggest climate finance contributor, accounting for about a third of global public climate finance. Over 54% of Team Europe finance has been allocated either to climate adaptation or to measures involving both mitigation and adaptation. Almost half of the total funding has been allocated via grants.

In 2022, the developed countries achieved the goal of providing USD 100 billion in climate finance goal to developing countries, which reflects the collective push for bold action. The EU and all its 27 Member States have moved the needle with a 24% year-on-year increase in public finance, which reached EUR 28.5 billion (roughly USD 30 billion) [152].

Efforts are also underway to promote the involvement of the private sector in climate action through the European Fund for Sustainable Development Plus (EFSD+) guarantees and blending. The EFSD+ provides a comprehensive set of tools, including guarantees, grants, technical assistance, and other support, to mobilise private sector investments for sustainable development in partner countries. It contributes, among others, to climate change adaptation and environmental protection and management. Offering a variety of risk-sharing instruments of up to EUR 40 billion, the EFSD+ aims to mobilise up to EUR 135 billion of public and private financing to help partner countries achieve the Sustainable Development Goals. Together with the private sector and the leverage effect, the EFSD+ is expected to mobilise more than half a trillion euros in investments for 2021-2027.

[152] The final amount of the EU and all its MS contributions in 2023 to the USD 100 billion climate finance goal will be published closer to COP29. https://www.consilium.europa.eu/en/press/press-releases/2024/10/08/climate-finance-council-approves-conclusions-ahead-of-cop29/