



Brussels, 1.3.2023
COM(2022) 514 final/2

CORRIGENDUM

This document corrects document COM(2022) 514 final of 26.10.2022

Concerns all language versions.

The text shall read as follows:

**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE
COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE
COMMITTEE OF THE REGIONS**

Accelerating the transition to climate neutrality for Europe's security and prosperity

EU Climate Action Progress Report 2022

{SWD(2022) 343 final/2}

1 EMISSION TRENDS, POLICIES AND ACHIEVEMENTS

GREENHOUSE GAS EMISSIONS AND THE EU'S INTERNATIONAL COMMITMENTS

The latest Intergovernmental Panel on Climate Change (IPCC) reports¹ confirm that transformative global action must be taken if we are to meet the goals of the Paris Agreement, including limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. Global greenhouse gas (GHG) emissions need to peak in the 2020-25 period and then fall by around 43% below 2019 levels by 2030 in order to keep the increase in average global temperature to 1.5°C by the end of this century. Under current policies,² the world is not on a path to meet the temperature goal of the Paris Agreement. Meeting all new pledges made by countries before COP26 in Glasgow would improve our prospect, but still be insufficient.³

In 2021, global emissions rebounded to pre-pandemic levels. Preliminary JRC data⁴ show that global GHG emissions rose by 4.2% in 2021 to 52.9 billion tonnes of CO₂ equivalent (CO₂-eq), a level slightly above 2019 emissions, as the global economy rebounded from the pandemic. Power sector emissions and other industrial combustion emissions rose above pre-pandemic levels (+1.3% and +2.1% respectively, compared to 2019), also due to increased use of coal,⁵ while emissions from transport and buildings remained lower (-5.2% and -3.7%, respectively). The last year saw further devastating impacts associated with a warming climate, reinforcing the warning from scientists.

Limiting global warming requires unprecedented action by all countries and all sectors. To achieve net-zero emissions by 2050,⁶ we must cut GHG emissions in a rapid, deep, and sustained way, while enhancing the planet's capacity to absorb carbon through nature-based solutions and carbon removal technologies. The IPCC findings strengthen the EU's determination to become climate neutral by 2050 and climate resilient, key objectives now set in the European Climate Law.

Under the UNFCCC, the EU and its Member States committed to a joint, economy-wide target to reduce GHGs by 20% compared to 1990 levels by 2020 ('the Cancun pledge'). As set out in the EU's 2022 GHG inventory submission,⁷ the EU has substantially overachieved this target, so that its Member States and the United Kingdom have also fulfilled their emission reduction obligations under the Convention.⁸ Total GHG emissions, excluding land use, land use change and forestry (LULUCF) and including international aviation, fell by 34% in the EU-27 + UK compared to 1990 (or 32%

¹ In 2021 and 2022, the IPCC released reports produced by three working groups for its Sixth Assessment Report-the Physical Science Basis report (Working Group I) in August 2021, the report on impacts, adaptation and vulnerability (Working Group II) in February 2022 and the report on climate change mitigation (The Working Group 3) in April 2022.

² IPCC Working Group 3: Mitigation of Climate Change (2022), for mitigation efforts consistent with national policies implemented by the end of 2020.

³ Latest scientific analyses suggest temperatures across European land areas will continue to increase throughout this century at a higher rate than the global average (EEA: [Global and European temperatures](#))

⁴ https://edgar.jrc.ec.europa.eu/dataset_ghg70

⁵ <https://www.iea.org/news/global-co2-emissions-rebounded-to-their-highest-level-in-history-in-2021>

⁶ Net zero emissions means achieving a balance between anthropogenic emissions by sources of greenhouse gases and removals by sinks, so all residual greenhouse gas emissions going into the atmosphere are offset by human-induced removals from the atmosphere, resulting in net zero emissions.

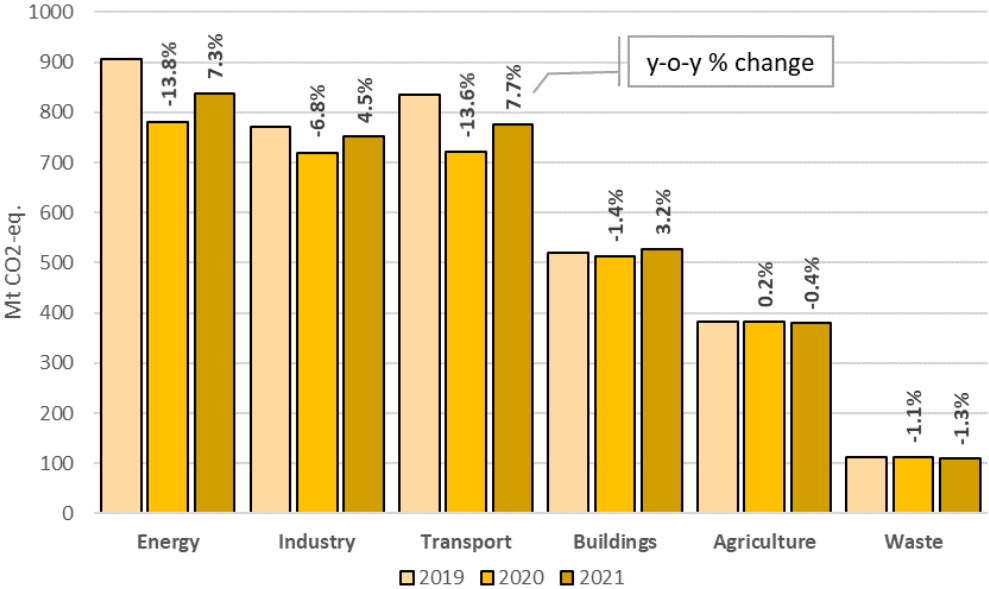
⁷ https://unfccc.int/sites/default/files/resource/European%20Union-BR4_C_2019_8832_and_SWD_2019_432_2.pdf

⁸ The UK was part of the joint EU 2020 target together with the 27 EU Member States.

without UK). This is a reduction of 1.94 billion tonnes of CO₂-eq by 2020 (or 1.55 GtCO₂-eq without UK).⁹ The EU and its Member States jointly met their target by implementing the 2020 EU Climate and Energy Package.

However, provisional data show that the EU’s domestic GHG emissions, excluding international aviation, rose by 4.8% in 2021 from their exceptionally low 2020 pandemic level, though they remained below 2019 level (i.e. -4.0%).¹⁰ Emissions from stationary installations covered by the EU Emissions Trading System (ETS) increased by 6.6% and non-ETS emissions by 3.5%, driven by the recovery from the pandemic. For all main sectors and gases, except buildings, emissions are expected to remain below pre-pandemic levels, continuing the overall downward trend of the past 30 years (Figure 1). Provisional 2021 data for the emission removals from LULUCF, however, do not show a reversal of its recent, concerning, declining trend. The unprecedented surge in gas prices from the second half of 2021 had a clear impact on emissions from electricity generation due to a temporary switch from gas to coal fuel (Box 1).

Figure 1: EU-27 domestic GHG emissions by sector (2019-2021)¹¹



The GHG emission intensity of the economy – the ratio between emissions and GDP – fell by 7 gCO₂-eq/EUR compared to 2019. Overall, EU net domestic emissions in 2021, including LULUCF, were 30% lower than 1990 levels, broadly consistent with the trajectory to achieve the EU 55% reduction target by 2030. However, the speed of reduction needs to increase significantly (Figure 2). In 2021 the

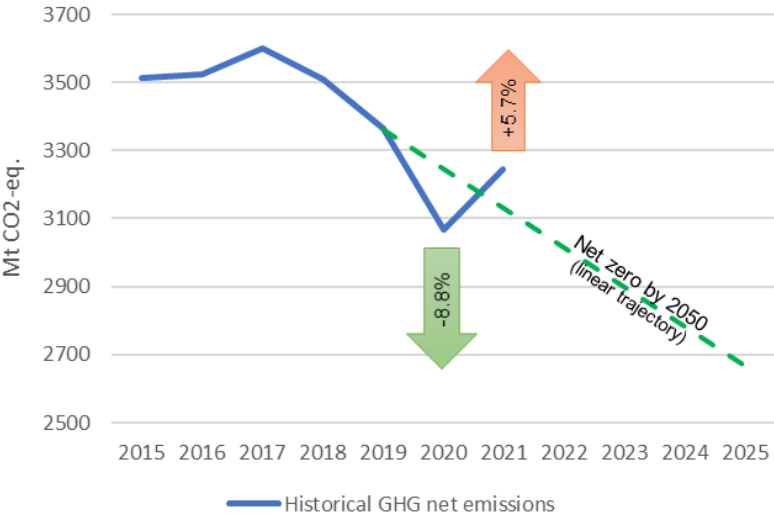
⁹ GHG emissions and removals for 1990-2020 are based on CRF tables submitted by EU Member States to the UNFCCC by 27 May 2022 in their inventory submissions under Regulation (EU) No 525/2013. Figures may change following resubmissions resulting from later reviews.

¹⁰ GHG net emissions figures for 2021 are based on approximated GHG inventories submitted under Regulation (EU) 2018/1999.

¹¹ European Environment Agency (EEA): 2022 GHG inventory and approximated EU GHG inventory for 2021 based on Member States’ submissions. Notes: (1) Energy sector refers to electricity and heat production and petroleum refining. (2) Industry includes fuel combustion in manufacturing and construction 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.

European Commission put forward a package of proposals to adjust policies so they can meet the EU's updated climate objectives.

Figure 2: EU-27 net domestic GHG emissions (including LULUCF)¹²



In the EU, verified emissions from aircraft operators generated 26.87 million tonnes of CO₂ in 2021, 8.7% higher than the 24.71 million tonnes reported in 2020, but still 61% lower than the 68.2 million tonnes of CO₂ in 2019, before the pandemic. Since 2021, the EU ETS no longer covers flights from the UK. Without these, ETS emissions from aviation increased by about 30% compared with 2020 and decreased by 50% compared with 2019.¹³

Maritime transport is a substantial CO₂ emitter, generating around 3-4% of total EU CO₂ emissions. In 2021, shipping companies reported a fall in emissions from transport activities related to the EU since pre-pandemic years due to the UK withdrawal from the EU.

Box 1: Impact of 2021 surge in gas prices on GHG emissions

In 2021, average wholesale gas prices reached a record EUR 49/MWh (Megawatt per hour), with daily peaks as high as EUR 183/MWh. By comparison, gas prices oscillated between EUR 15 and 25/MWh between 2010 and 2019, and quickly recovered to similar levels from a historic low of EUR 3-4/MWh in May 2020. Several concurrent events caused the price surge including cold weather in the beginning of the year, EU storage level below the seasonal average, low wind and solar availability during the summer and increasing geopolitical tensions on the borders of the EU. The high gas price resulted in a substantial gas-to-coal and gas-to-lignite switch in the EU power system, with coal and lignite power plants increasing running hours at the expense of gas-fired plants. Compared to 2020, coal and lignite generation increased by +68 TWh, more than half of the total production increase (+118 TWh),^(a) while gas generation fell (-16 TWh). The rest of the additional production rise was generated by renewables and nuclear (+65 TWh), despite lower onshore wind production.

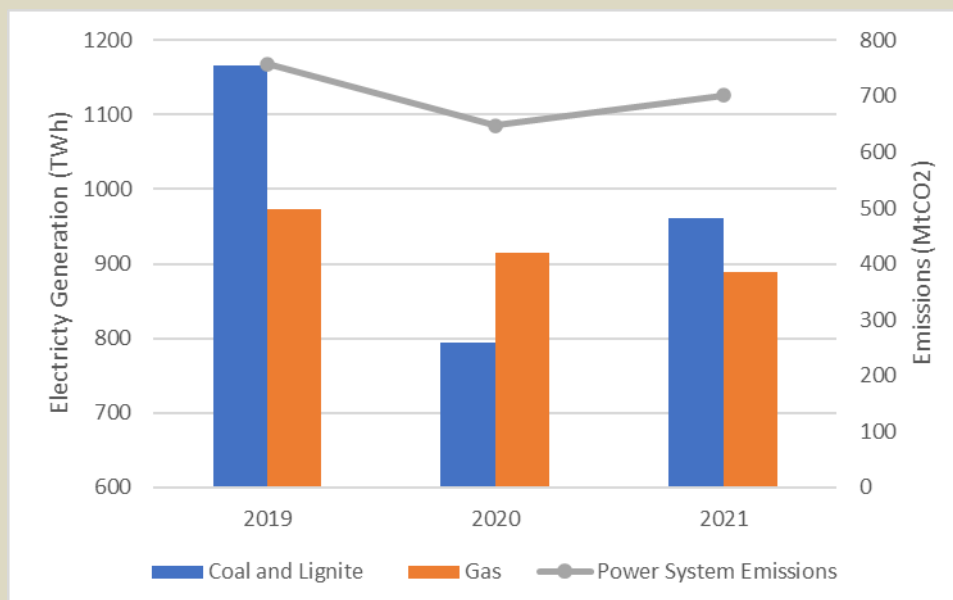
The switch from gas to coal and gas to lignite resulted in CO₂ emissions from the power system rising above 2020 levels in 2021 (+8.3%). Nevertheless, CO₂ emissions in the sector in 2021 were still 7.3% lower than in

¹² Based on the 2022 GHG inventory and approximated EU GHG inventory for 2021, based on Member States' submissions, excluding international bunkers. The net zero by 2050 linear trajectory is made consistent with the EU's target of -55% emission reduction by 2030.

¹³ Two thirds of the climate impact of aviation are non-CO₂ emissions., co-legislators started considering these in the 'Fit for 55' discussions, to monitor and mitigate these short-lived pollutants.

2019^(b) (Figure 3), following the long-term progressive decarbonisation of the EU power system.^(c)

Figure 3 - Electricity generated by coal, lignite and gas and CO₂ emissions of the power system, 2019-2021^(d).



In 2022, abnormally high gas prices persisted. The Russian invasion of Ukraine contributed to extremely high price uncertainty. At the time of writing, the market does not anticipate a return to past price levels in the short-term.

The 'Fit for 55' package along with the REPowerEU^(e) plan aim to reduce the EU's dependence on fossil fuel imports and to achieve the 2030 climate target by accelerating the rollout of renewable energy, diversifying supplies, and boosting energy efficiency significantly. Investment to diversify supplies should avoid future stranded assets.

^(a) European Commission, Quarterly report on electricity market, Volume 14 (covering fourth quarter of 2021). Figure 18.

^(b) https://ec.europa.eu/clima/news-your-voice/news/emissions-trading-greenhouse-gas-emissions-73-2021-compared-2020-2022-04-25_en

^(c) Emission trends in EU-27 for the IPCC sector 1.A.1.a – Public Electricity and Heat production at the EEA greenhouses gases – data viewer <https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer>.

^(d) For 2019-2020, CO₂ emissions values corresponds to IPCC sector 1.A.1.a. The value for 2021 is extrapolated assuming the same trend as for the emissions of the European Union Transaction Log for the corresponding sectors.

^(e) COM/2022/230.

PROGRESS ON CLIMATE ACTION IN THE EU

The EU has made substantial progress under the **European Green Deal**, the blueprint for a green and inclusive transition.

The **European Climate Law**,¹⁴ in force since July 2021, writes into law the EU's targets to become climate neutral by 2050 and to reduce GHG emissions by at least 55% by 2030 compared to 1990, the commitment the EU and its Member States made under the Paris Agreement.

In 2021, the Commission proposed a **package of climate and energy legislation** to ensure that the EU policy framework is fit to achieve the EU's higher climate target for 2030. The proposals are being

¹⁴ Regulation (EU) 2021/1119 ('European Climate Law'), OJ L 243, 9.7.2021, p. 1.

negotiated by the European Parliament and the Council. This year has seen progress on other provisions of the European Climate Law. The **European Scientific Advisory Board on Climate Change** was appointed in 2022, to provide independent scientific advice on EU measures and climate targets. The Commission adopted **climate proofing guidance**¹⁵ and updated its **better regulation instruments**¹⁶ to ensure it takes the same approach when assessing whether draft measures are consistent with climate-neutrality and progress on adaptation, as set out in the Climate Law.

The transition to climate neutrality and climate resilience requires substantial investments.

In 2021, the Member States submitted their **recovery and resilience plans (RRPs)** to rebuild their economies after the pandemic. For the 26 RRP adopted by mid September 2022, 40% of total planned expenditure is earmarked for climate investments, above the 37% obligation set by the RRF Regulation (see Chapter 6).¹⁷

In May 2022, the Commission proposed its **REPowerEU Plan**¹⁸ in response to the energy market disruption caused by Russia's invasion of Ukraine. The plan estimates that EUR 210 billion of additional investments in energy efficiency, energy infrastructure and renewable energy are required for the EU to reduce its fossil fuel use and cut Russian gas imports by two-thirds between now and 2027. It proposes measures to bring down emissions and energy costs for consumers and industry, including increasing the 2030 energy efficiency target to 13% and increasing the share of renewables in the EU's energy consumption from 22.1% in 2020 to 45% in 2030, above the 40% target in the 'Fit for 55' proposal.¹⁹ The EU could save nearly EUR 100 billion per year on Russian fossil fuel imports.

EUR 225 billion remaining in the Recovery and Resilience Facility (RRF) will be available for action under REPowerEU. The plan proposes a further EUR 20 billion in grants from the sale of allowances from the Market Stability Reserve of the EU ETS to increase financing under the RRF. Member States could also redirect certain EU funds towards REPowerEU objectives. More money than ever is being pumped into climate projects. At least 30% of the EU budget for 2021-2027 – the biggest share ever – and of Next Generation EU is allocated to climate action (up from 20% in 2014-2020) (see Chapter 6).

In July, the Commission adopted the save energy for a safe winter Communication,²⁰ including a gas demand reduction plan and a regulation proposal on coordinated demand reduction measures for gas.²¹ Member States are taking measures to reduce their energy consumption.

Under the Sustainable and Smart Mobility Strategy, the Commission this year proposed **a new EU Urban Mobility framework** and an action plan to increase long-distance and cross-border rail traffic, making rail travel more attractive for passengers.

¹⁵ Commission Notice giving technical guidance on the climate proofing of infrastructure in the period 2021-2027 (2021/C 373/01, OJ C 373, 16.9.2021, p. 1), implementing Article 5(5) of the European Climate Law.

¹⁶ Communication from the Commission – Better Regulation: Joining forces to make better laws, better regulation guidelines, and better regulation toolbox of November 2021.

¹⁷ In line with conditions in the annexes to the Council implementing decisions approving national RRP.

¹⁸ COM/2022/230 final; COM/2022/240 final.

¹⁹ Directive 2009/28/EC.

²⁰ COM(2022) 360 final.

²¹ COM(2022) 361 final.

INVESTING IN INNOVATION

The **ETS Innovation Fund**, continues to provide support to EU industry, to develop cutting-edge technologies and to scale up innovation in renewable hydrogen and other clean-tech solutions. Since the first round, funds available have increased by more than 50%, a big boost for the decarbonisation of industry in the EU, complementing instruments such as Horizon Europe (see Chapter 6).

MOBILISING MORE PRIVATE CAPITAL IN GREEN FINANCE

The Commission is working to align capital market rules with climate objectives, including to implement the renewed sustainable finance strategy²². The Commission has proposed a Corporate Sustainability Reporting Directive²³ for comparable climate-related information, a Corporate Sustainability Due Diligence Directive²⁴, and targeted amendments to the EU banking²⁵ and insurance rules²⁶ to ensure that they integrate climate risks in their management and operations.

The Commission has proposed specific treatment of certain energy activities under the Taxonomy Regulation.²⁷ It has collected evidence for possible legislative proposals on credit ratings and on environmental, social, and governance ratings,²⁸ as well as on the review of the macroprudential framework.²⁹

STRENGTHENING SOCIAL FAIRNESS AND ECONOMIC RESILIENCE

To be a success, the green transition must be fair and inclusive in line with the European Pillar of Social Rights, supporting those who face the greatest challenge. The geopolitical situation and developments in energy prices highlight the need to accelerate the transition while building social and economic resilience.

A Council recommendation on **ensuring a fair transition towards climate neutrality** was adopted in June 2022³⁰ to provide guidance for Member States designing and implementing policy packages on employment, skills, social and distributional aspects of the transition.³¹ Given rising energy prices, Member States are putting in place measures to provide people on low incomes with access to energy and transport. A range of EU funding instruments offer support for a fair and social transition (Chapter 6).³²

ENGAGING PEOPLE

Transition to a climate-neutral society is about people: how we produce, consume, move, heat and cool our homes, work and live together. Active public participation is paramount. The **European**

²² SWD (2021) 180 final.

²³ https://ec.europa.eu/info/publications/210421-sustainable-finance-communication_en#csrd

²⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0071>

²⁵ https://ec.europa.eu/info/publications/211027-banking-package_en

²⁶ https://ec.europa.eu/info/publications/210922-solvency-2-communication_en

²⁷ Regulation (EU) 2020/852 and Delegated Regulation (EU) 2022/1214.

²⁸ https://ec.europa.eu/info/consultations/finance-2022-esg-ratings_en

²⁹ https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13188-EU-banking-sector-review-of-macroprudential-rules-to-limit-systemic-risk_en

³⁰ Council Recommendation 2022/C 243/04

³¹ Implementation will be monitored through the NECPs.

³² COM(2021) 801 final.

Climate Pact³³ gives everyone a voice and a platform to design new climate actions, amplify activities, share information and knowledge, launch and connect grassroots activities and showcase solutions.

The pilot phase focused on translating climate science and policy into our daily lives. The Climate Pact Ambassadors are now almost 1 000 people from all walks of life, from scouts to Mayors, active in local communities, networking and exchanging knowledge across Europe. The Pact has created a system for individual and organisations' commitments. Individual pledges, collected in partnership with Count Us In,³⁴ have so far led to almost 54 000 Europeans taking more than 3 million CO₂ reducing 'steps'. Over 300 organisations (including the European Commission) or groups have made pledges (1 800 in total) to get on a path to climate neutrality. By showcasing initiatives, the Pact inspires others to act.

MOBILISING CITIES

The Mission on Climate Neutral and Smart cities has selected 100 diverse cities across Europe to become climate neutral by 2030 in a socially inclusive way. The cities benefit from tailored support from the NetZeroCities³⁵ platform and are co-creating 'Climate City Contracts' with action plans and investment strategies.

³³ https://europa.eu/climate-pact/index_en

³⁴ https://europa.eu/climate-pact/pledges/individual-pledging_en

³⁵ <https://netzerocities.eu/>

2 THE EU EMISSIONS TRADING SYSTEM

By 2021, the EU ETS had driven emissions from stationary installations down by 34.6%³⁶ against 2005 levels. In parallel, Member States have raised over EUR 100 billion in auction revenues since 2013, available for further climate action and energy transformation.

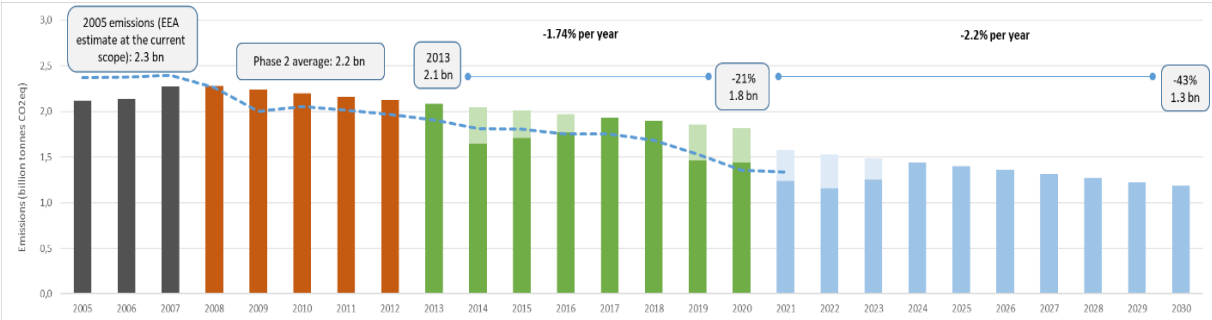
In 2021, EU ETS emissions increased slightly compared with 2020, reflecting both the economic recovery from COVID-19 and the developing energy crisis. While 2021 emissions remained on a downward trend compared with 2019 pre-pandemic emissions, more action is needed in ETS sectors to meet the 2030 climate target. This is the aim of the package proposed by the European Commission in 2021 to deliver the European Green Deal, currently being negotiated by the European Parliament and Council. This includes a reform of the ETS, strengthening the cap and extending the system to cover maritime emissions, and a parallel system to cover buildings and road transport.

EMISSIONS TRENDS

In 2021, stationary installations generated 1 335 million tonnes of CO₂-eq emissions. This is 6.6% higher than emissions in 2020, but still 5.6% lower than in 2019.³⁷ The power sector saw an 8.4% increase in 2021, mainly driven by a switch back from use of natural gas to coal linked to the rise in gas prices and higher demand for electricity to fuel the economic recovery after the pandemic. However, overall power sector emissions in 2021 were still 8.1% below 2019 levels, with very similar demand for electricity in these two years.

Emissions from industry under the ETS were also higher in 2021 (by 4.6%) than in 2020, but 2.6% lower than in 2019. High increases were observed in most sectors, including iron and steel and chemicals. Following a more than 60% drop in 2020, EU ETS aviation emissions rebounded in 2021 by 30% but remained 50% lower than in 2019.³⁸

Figure 4: Verified ETS emissions 2005-2021, Member State projections with existing measures 2021-2030, ETS cap phases 2, 3 and 4, and accumulated surplus of ETS allowances 2008-2021 including UK (Northern Ireland), Norway and Iceland NB: adjust for cap phase 4



³⁶ Update reflecting the departure of the UK from the EU and the ETS.

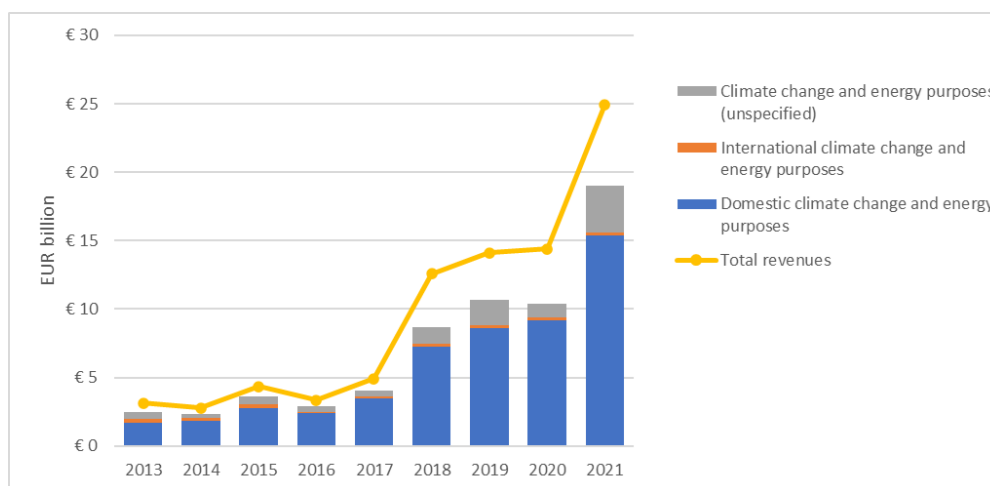
³⁷ As of 2021, the UK is no longer part of the EU ETS. Comparison with 2020 is adjusted accordingly.

³⁸ Comparison with adjusted 2020 and 2019 verified emissions, including only outgoing flights to the UK and 0.3 million tonnes CO₂-eq under the Swiss ETS.

RESOURCES GENERATED BY THE ETS

The EU ETS implements the polluter pays principle but also generates substantial resources for climate action (see Chapter 6).

Figure 5: Auctioning revenues and reported usage, 2013-2021 (€ bn), EU-27



As the carbon price increased during 2021, so did ETS auction revenue, amounting to some EUR 31 billion in total.³⁹ This means that revenue almost doubled from the EUR 16.5 billion raised in 2020. Of these EUR 31 billion, EUR 25 billion went directly to the 27 Member States. In 2021, they reported that an average of 76% of revenues was spent for climate and energy purposes,⁴⁰ in line with an average of 75% over the 2013-2020 period (Figure 5). About 24% of Member State revenues are earmarked for specific climate and energy actions, 25% went into dedicated environmental funds and 51% went to national budgets.

In 2021, several Member States also used their auction revenue to cushion the social impact of the energy price crisis.

ACTION IN AVIATION AND MARITIME TRANSPORT

Emissions from extra-European aviation, from incoming flights to the European Economic Area and flights departing to countries outside the EEA, with the exception of flights departing to the UK and Switzerland, are currently not priced under the EU ETS under the ‘stop the clock’ provision in the EU ETS Directive.

The Commission’s proposal to extend the EU ETS to include emissions from maritime transport is now being negotiated by the European Parliament and the Council. The proposal builds on the Monitoring, Reporting and Verification Regulation,⁴¹ which tracks CO₂ emissions from large ships calling at EU ports since 2018. The EU continues to support development of ambitious measures under the International Maritime Organisation strategy on GHG emission reductions, such as potential fuel GHG intensity standards and market-based measures.

³⁹ EU-27 + EEA countries.

⁴⁰ The remaining 24% is not necessarily spent on other purposes. Part will be spent in later years or go to a general budget used for multiple purposes, including climate change and energy.

⁴¹ Regulation (EU) 2015/757.

EU CARBON MARKET

The EU carbon price has followed a consistent upward trend since 2018. In 2021, it continued to increase due to high gas prices and market anticipation of the increased 2030 climate ambition as well as related policy reforms. The higher carbon price contributed to higher electricity wholesale prices, but to a much smaller extent than the increase in gas prices. In the October 2021 Communication on energy prices, the Commission estimated the effect of the gas price increase on the electricity price to be nine times higher than the effect of the carbon price increase.⁴² Gas prices have since continued to increase sharply, whilst ETS prices have remained within a similar range. A report from the European Securities and Markets Authority, completed in March 2022, excluded a role for speculation in driving the carbon price increase⁴³ (see Carbon Market Report).⁴⁴

⁴² COM(2021) 660 final.

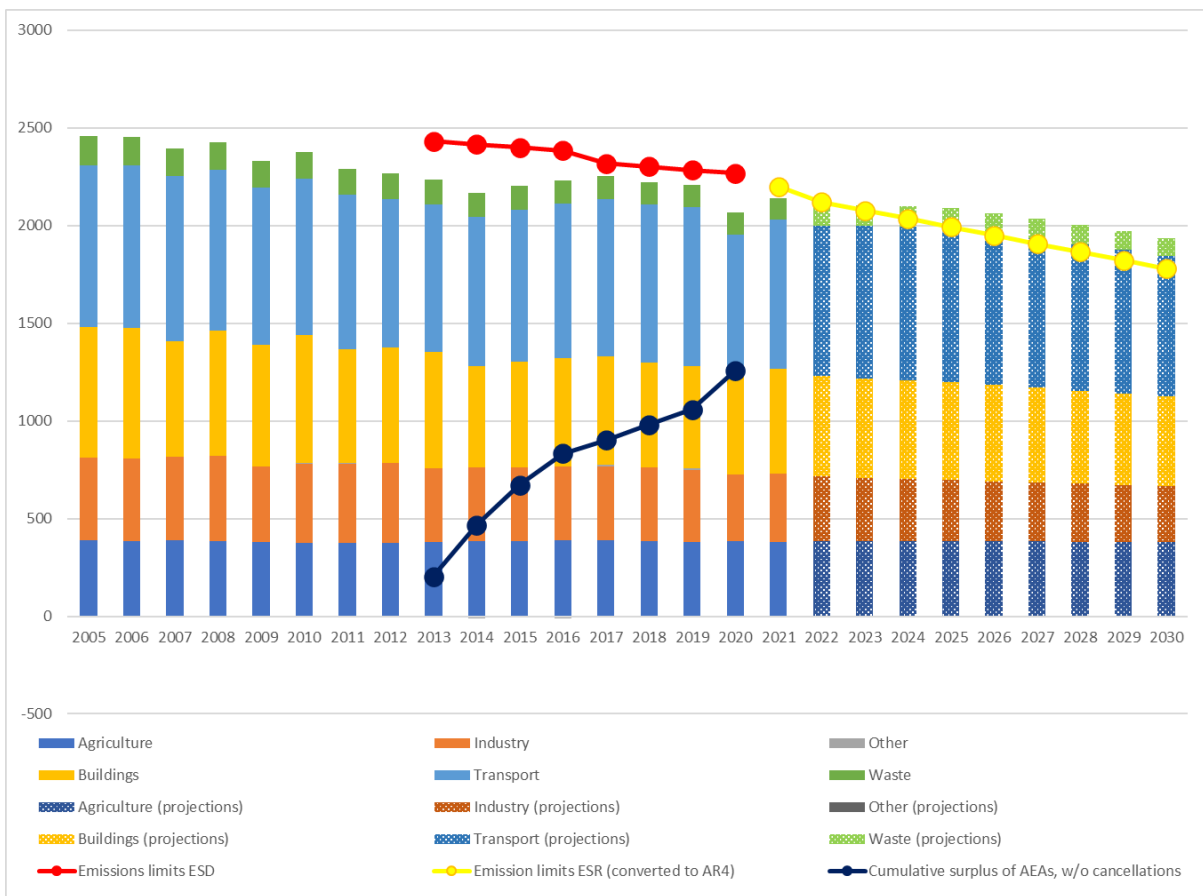
⁴³ <https://www.esma.europa.eu/press-news/esma-news/esma-publishes-its-final-report-eu-carbon-market>

⁴⁴ COM(2022) 516.

3 EFFORT SHARING EMISSIONS

Since 2013, EU-wide emissions in the effort sharing sectors have been below the annual limit, as shown in Figure 6. EU-27 emissions covered by the Effort Sharing Decision⁴⁵ (ESD) were 16.3% lower in 2020 than in 2005; the EU overachieved its 2020 target by six percentage points. After the pronounced fall in 2020 emissions due to the pandemic, emissions in the ESR sectors rebounded in 2021. Based on approximated data, effort sharing emissions in 2021 were 3.5% higher than in 2020. The increase was most pronounced for transport (with an increase in emission of more than 7% compared to 2020), followed by emissions from buildings (3.1% rise). The agriculture sector saw a slight decrease in emissions in 2021 compared to 2020 of above 0.3%, but overall the decrease has been small compared to 2005 (around 2%).

Figure 6: Emissions in sectors covered by effort sharing legislation 2005-2030 and annual emission allocations (AEAs), EU-27 (Mt CO₂-eq) (see details in the SWD).⁴⁶



RESULTS OF THE EFFORT SHARING DECISION 2013-2020

All Member States met their effort sharing obligations in all years between 2013 and 2019. Malta exceeded its annual emissions allocations (AEAs) every year, but covered the deficit by buying AEAs

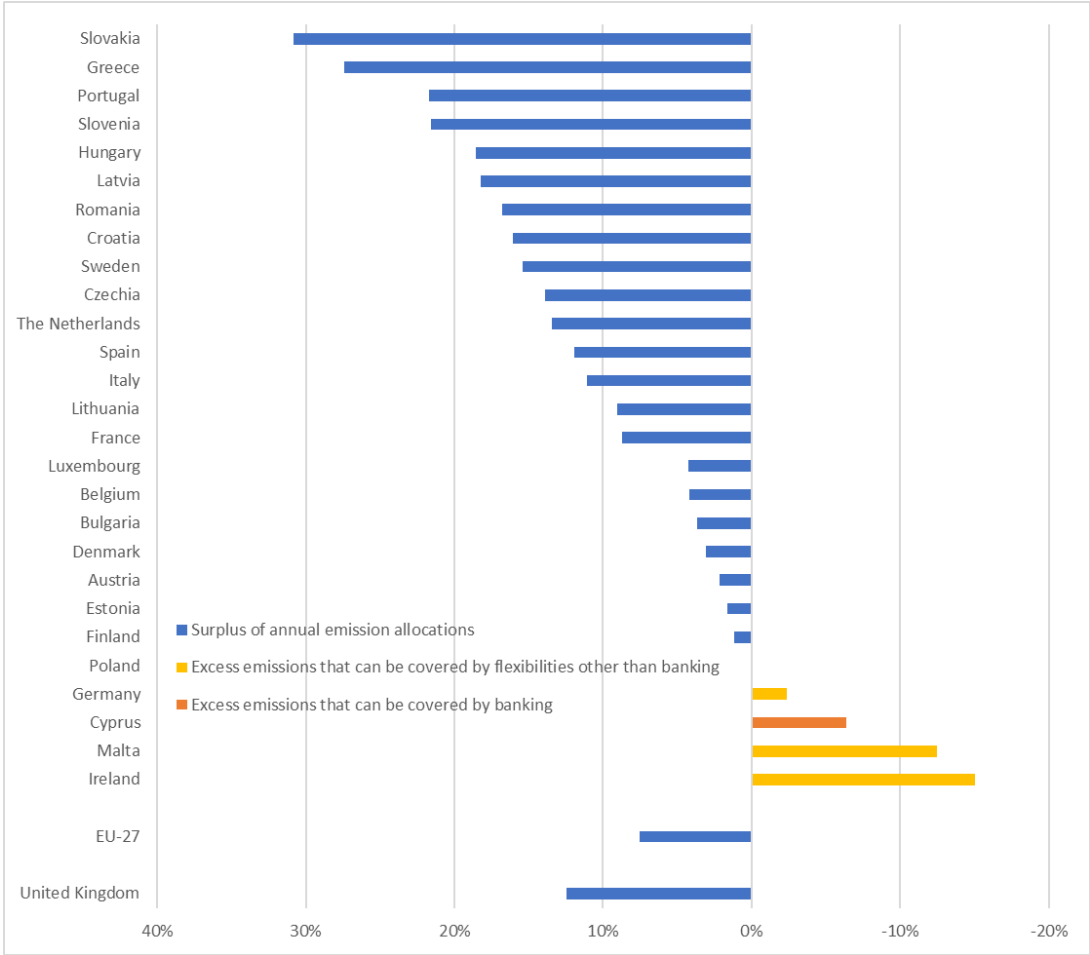
⁴⁵ Decision No 406/2009/EC.

⁴⁶ From projections reported by Member States under Regulation (EU) 2018/1999, compiled and checked by the EEA. Figures include EU-27 only.

from Bulgaria. In 2019, Austria, Belgium, Cyprus, Estonia, Finland, and Luxembourg also exceeded their AEAs but used saved surpluses from previous years to cover the deficit. Germany and Ireland did not have enough saved surplus to cover their deficit. Germany carried forward AEAs from 2020 to meet its obligation for 2019, while Ireland used international credits from the Clean Development Mechanism to meet its obligations. All Member States except Hungary, Sweden and the UK banked surplus AEAs for possible use in 2020.

The compliance cycle for 2020, the final year under the Effort Sharing Decision, is ongoing. Based on the annual inventory review under the ESD, emissions in four Member States exceeded their AEAs (Figure 7). Cyprus’ emissions exceeded its AEAs by 6%; it has sufficient surplus of AEAs from previous years to comply in 2020. As Germany carried forward part of its 2020 AEAs for compliance in 2019, its 2020 emissions exceed the remaining 2020 AEAs by 2%. Malta and Ireland’s emissions exceeded their AEAs by 12% and 15% respectively and, with Germany, they will need to buy AEAs from other Member States and/or use international credits to comply in 2020 as they do not have enough banked AEA surplus.

Figure 7: Difference between Member States’ 2020 target under the ESD and emissions in the effort sharing sectors in 2020 (in percentage of 2005 emissions).⁴⁷



⁴⁷ Pursuant to Commission Implementing Decision (EU) 2022/1953.

PROGRESS ON 2030 TARGETS UNDER THE EFFORT SHARING REGULATION

As of 2021, the Effort Sharing Regulation⁴⁸ (ESR) sets national emissions targets for 2030 and AEAs for each year between 2021-2030, including for Iceland and Norway.⁴⁹

Member States are planning and implementing policies and measures to achieve their current 2030 effort sharing targets under the ESR. In aggregate for the EU-27, current national policies would reduce emissions by 22% by 2030 compared with 2005 (Figure 8), well below the current 29% overall effort sharing emissions reduction target. If Member States implement all additional policies they have reported, the EU would only just meet the 29% reduction target under the existing ESR. The Commission has proposed to amend the ESR to deliver the higher ambition for 2030 of at least 55% GHG domestic emission reduction, with a proposed increase of the 2030 target for effort sharing sectors to 40% emission reduction compared to 2005. This is in negotiation between the European Parliament and the Council.

This highlights the strong, imminent need for Member States to plan and implement additional climate action in effort sharing sectors in their updated integrated national energy and climate plans. As Member States must submit draft updated plans by 30 June 2023,⁵⁰ the Commission is preparing guidance to assist their preparations.

Approximated inventory data for 2021 shows that four Member States are expected to exceed their current AEAs for that year, by 1 percentage point for Czechia, by 2 percentage points for Italy, by 5 percentage points for Ireland and 14 for Cyprus. As 2021 is the first year under the ESR, any remaining surplus under the ESD is not carried over. However, Member States will be able to use other flexible options under the ESR.

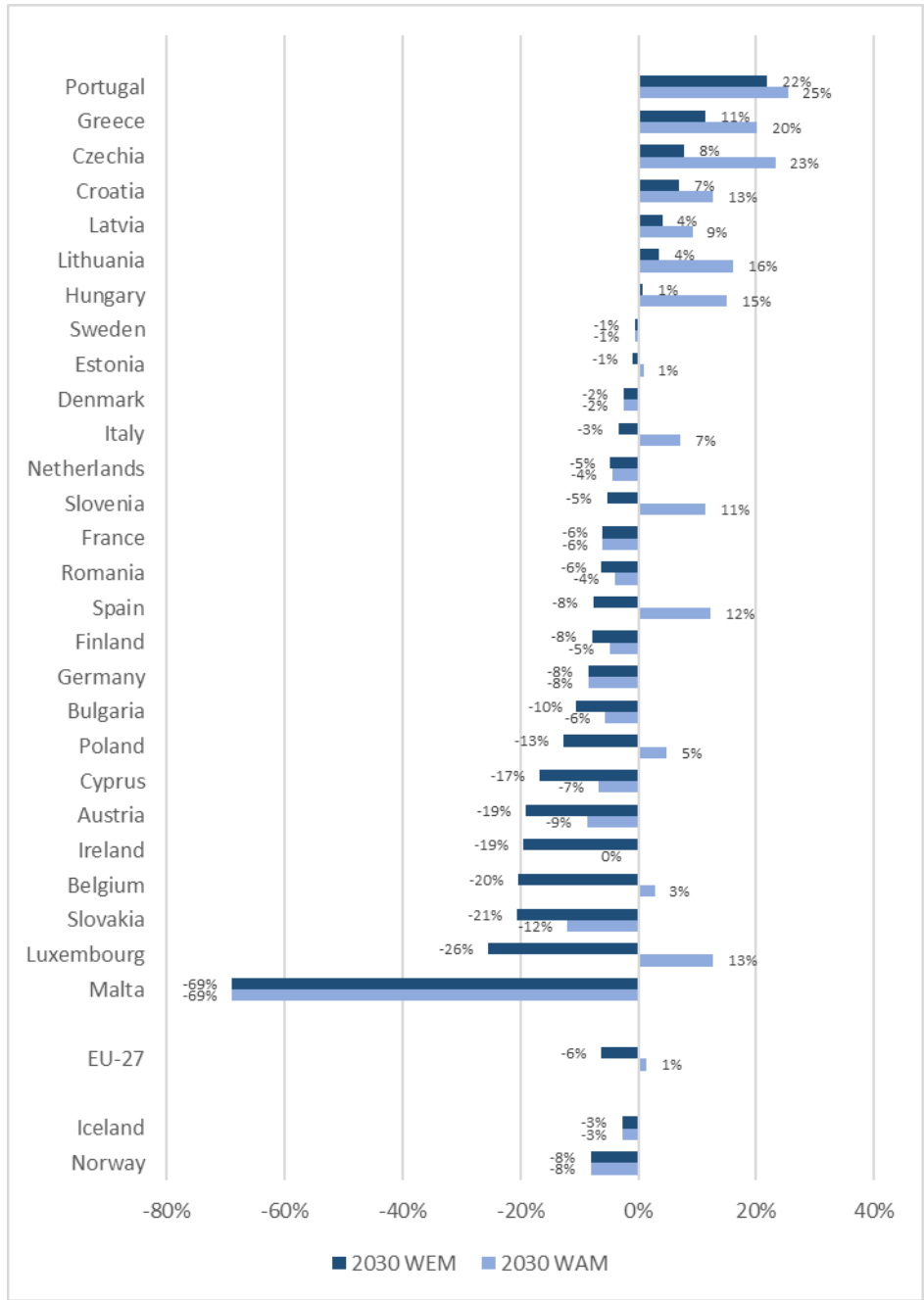
Figure 8: Gap between 2030 ESR targets and projected emissions⁵¹ with existing measures and additional measures, as a percentage of 2005 emissions for EU-27, Iceland and Norway. Positive values indicate targets forecast to be exceeded; negative values indicate that they are not going to be met.

⁴⁸ Regulation (EU) 2018/842.

⁴⁹ The ESR no longer allows Member States to use international credits to reach their targets, but they can offset part of their GHG emissions in effort sharing sectors with net removals in the LULUCF sector and, for some Member States, by cancelling allowances in the existing EU ETS.

⁵⁰ Article 14 of Regulation (EU) 2018/1999.

⁵¹ Member States submitted their emission projections by March 2021. Denmark, Ireland, Latvia, and Iceland submitted updated reports in 2022 due to substantial changes. The EEA gap-filled missing 'projections with additional measures' with 'projections with existing measures'. The original data have different metrics, which a conversion approximately corrects. The gaps are provided here for illustrative purposes only. See the annex for more details.



POLICIES IN KEY SECTORS

- Transport

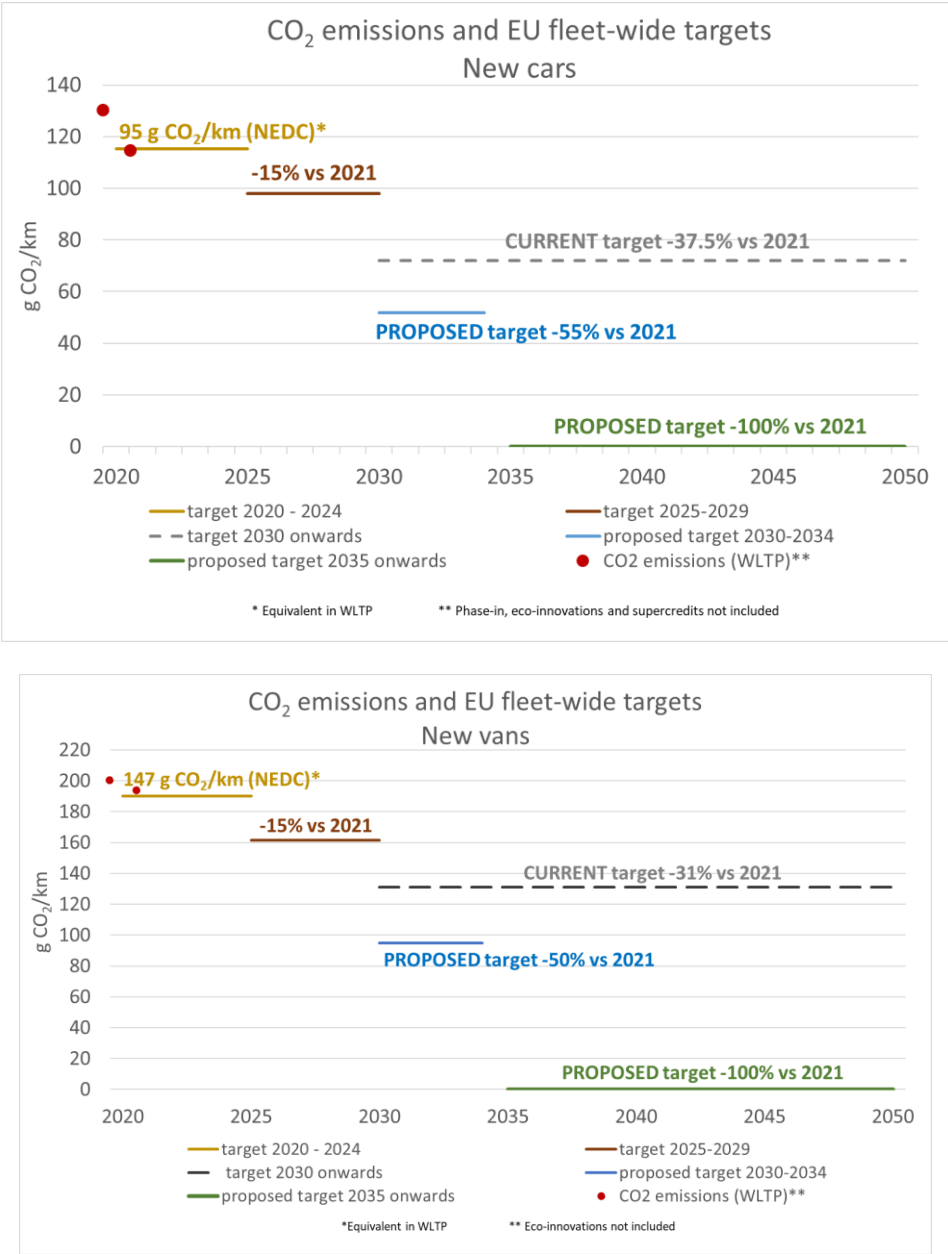
CO₂ emission standards for new cars and vans and for heavy-duty vehicles are key drivers for road transport emissions reduction. Average emissions from new cars fell from 130.3 g CO₂/km WLTP⁵² (i.e. 107.5 g CO₂/km NEDC⁵³) in 2020 to 114.7 g CO₂/km in 2021, according to provisional

⁵² Worldwide Harmonised Light Vehicles Test procedure.

⁵³ New European Driving Cycle Test procedure.

monitoring data for 2021.⁵⁴ This continues the steep downward trend seen since 2019 in CO₂ emissions of new cars registered in the EU, thanks to stricter EU fleet-wide CO₂ targets that have applied since 2020. Moreover, the share of battery electric cars has increased spectacularly. In 2021, 10% of newly registered cars in the EU was battery electric (up from 2% in 2019 and 6% in 2020). Provisional data shows that, in 2021, the average emissions for vans also decreased to 193.8 g CO₂/km WLTP, from 200.3 g CO₂/km WLTP (i.e. 155.0 g CO₂/km NEDC) in 2020, also thanks to stricter targets applying since 2020 (Figure 9).

Figure 9: CO₂ emissions and EU fleet-wide targets, cars and vans



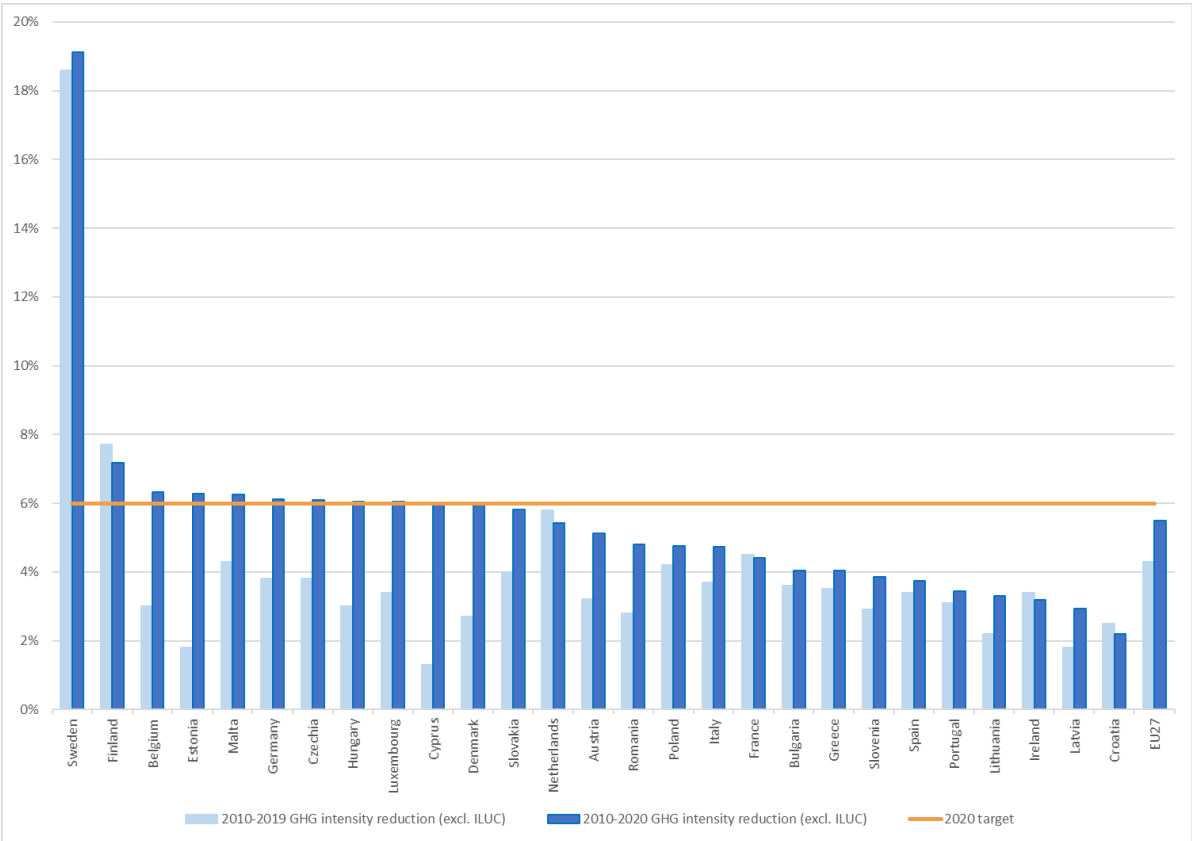
Heavy-duty vehicles (HDV), such as lorries, heavy vans and buses, generate about 30% of all CO₂ emissions from road transport. Existing legislation requires the average CO₂ emissions of a manufacturer’s fleet of new heavy lorries to be reduced by 15% by 2025 and 30% by 2030 from 2019

⁵⁴ Monitoring of CO₂ emissions from passenger cars and vans – Regulation (EU) 2019/631; published by the EEA.

levels. A legislative proposal by the Commission due at the end of 2022 is expected to tighten existing standards and extend the scope to most remaining HDV vehicle groups.

The **Fuel Quality Directive** also reduced transport emissions; it stipulates that the life-cycle GHG emission intensity of fuels must be reduced by 6% by 2020 compared to 2010 levels. The average GHG intensity of fuels supplied in 2020 was 5.5% lower than in 2010. The progress by EU fuel suppliers varies greatly across Member States (Figure 10).

Figure 10: Reductions in GHG intensity of fuels achieved by EU fuel suppliers in EU-27, 2010-2019 and 2010-2020 (Source: EEA)



- F-gases

Fluorinated gases (‘F-gases’) have a global warming effect up to 25 000 times greater than CO₂. After 2014, a decade-long trend of rising emissions of F-gases was reversed due to the current F-gas Regulation (Regulation (EU) No 517/2014). EU-27 emissions fell by 20% from 2014 to 2020 and the supply of hydrofluorocarbon (HFC) gas to the market fell by 47% in CO₂-eq between 2015 and 2019, notably due to refrigeration shifting to more climate-friendly alternatives. In April 2022, the Commission proposed a new F-gas Regulation for additional emission savings by 2050.

- ODS

Ozone-depleting substances (ODS) are also very strong greenhouse gases. Their use and production in the EU has fallen by 99% over past decades, as part of global action to protect the ozone layer under the Montreal Protocol. The largest remaining EU sources of ODS are legacy foams for insulation in buildings over 20 years old, emitted when buildings are renovated or demolished. A new proposal for ODS Regulation, adopted by the Commission in April 2022, aims to avoid emissions by requiring the collection and destruction or reuse of these pollutants.

4 LAND USE, LAND USE CHANGE AND FORESTRY

Land use, land use change and forestry (LULUCF) will play a crucial role in achieving the EU's climate neutrality goal, as land can both release GHG emissions to the atmosphere and remove CO₂ from it, depending on the use made of the land. In the EU, LULUCF emits less GHG into the atmosphere than the CO₂ it removes through biogenic processes, but recent years have seen a decline of this natural carbon sink. For 2013 to 2020, Member States committed to accounting for additional action in LULUCF, in reported GHG emissions and CO₂ removals, to assess the target under the Kyoto Protocol.⁵⁵

Figure 11: Reported (R) and preliminary accounted (A) emissions and removals under the Kyoto Protocol, second commitment period, EU-27⁵⁶

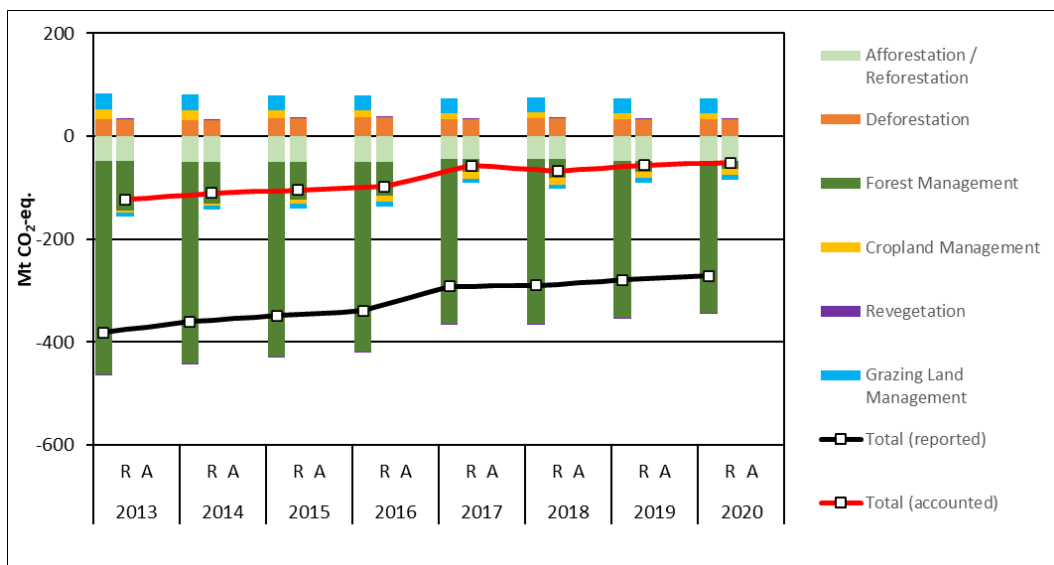


Figure 11 shows a decreasing sink of 'reported' emissions and removals by activity for the EU for the second commitment period of the Kyoto Protocol (2013-2020). Average net removals were 320.2 Mt CO₂-eq over the period. With Kyoto Protocol accounting rules, the 'accounted' balance produced an average carbon sink (or credit) of 83.4 Mt CO₂-eq, with net credits decreasing from -123.2 in 2013 to -51.3 Mt CO₂-eq in 2020.⁵⁷ This includes both 'elected' and 'mandatory' activities (afforestation/reforestation, deforestation and forest management).⁵⁸

The main cause of this sink decline is the decrease in reported net removals and accounted net credits from forest management for 2013-2020.⁵⁹ The decline in carbon removals is due to a mix of factors, including higher demand for wood (e.g. 2018 in Finland), an increasing share of forests reaching

⁵⁵ What matters to meet the Kyoto targets is not the absolute quantities of removals or emissions, but the changes in removals and emissions compared to a benchmark and a particular reference year, as set out in the accounting rules.

⁵⁶ Reported emissions and removals from LULUCF under the Kyoto Protocol are based on specific activities and are not the same as land-based emissions and removals from LULUCF under the UNFCCC Convention inventory

⁵⁷ The pattern in the time series of reported emissions and removals for the EU is similar between accounting and reporting, with the differences due to the application of accounting rules.

⁵⁸ DK, DE, IE, ES, IT and PT elected to include cropland management. DE, DK, IE, IT and PT also elected to include grazing land management and RO to include revegetation.

harvest maturity (Estonia, Latvia) and an increase in natural disturbances such as insect infestations (Czechia since 2015), storms (2019 in Poland), droughts and forest fires (e.g. 2017 in Italy and Portugal). According to preliminary estimates, using accounting rules for the Kyoto Protocol second commitment period, Belgium, Bulgaria, Czechia, France, Croatia, Cyprus, Slovenia and Finland have average net LULUCF debits.⁶⁰

The current LULUCF Regulation⁶¹ and secondary legislation⁶² require that, as of 2021, each Member State offset their GHG emissions from the sector by at least an equivalent amount of CO₂ removed from the atmosphere, under the ‘no-debit rule’.

For the first time under the ‘Fit for 55’ package, the Commission proposed – an EU net removals target of 310 million tonnes of CO₂-eq in 2030 for the LULUCF sector. This EU-wide target is to be implemented through binding national targets. Looking further ahead, the Commission has proposed a land sector focus, combining emissions from agriculture (mainly livestock and fertiliser) and net removals from LULUCF. The aim is to reach climate neutrality in the land sector by 2035 and net negative emissions thereafter.

The Commission Communication on Sustainable Carbon Cycles⁶³ of December 2021 sets goals and action plans to achieve carbon removals through nature-based solutions⁶⁴ and industrial technologies. The Commission is developing a regulatory framework for EU certification of carbon removals to reward land managers for carbon sequestration, in full respect of ecological principles (‘carbon farming’). It will also help create an EU internal market for the capture, use, storage and transport of CO₂, using innovative technologies, such as Earth Observation (Copernicus programme).⁶⁵

⁶⁰ Grassi, G., et al., Brief on the role of the forest-based bioeconomy in mitigating climate change through carbon storage and material substitution, Sanchez Lopez, J., Jasinevičius, G. and Avraamides, M. editor(s), European Commission, 2021, JRC124374.

⁶¹ Regulation (EU) 2018/841.

⁶² Delegated Regulation (EU) 2021/268 and SWD/2020/0236 final.

⁶³ COM(2021) 800 final.

⁶⁴ https://research-and-innovation.ec.europa.eu/research-area/environment/nature-based-solutions_en

⁶⁵ [Certification of carbon removals – EU rules \(europa.eu\)](#).

5 ADAPTING TO CLIMATE CHANGE

Implementing the EU's 2021 strategy on adaptation to climate change is a multi-year project, with important achievements this year.

The Commission published **technical guidance on climate proofing of infrastructure** for 2021-2027, as required under the European Climate Law.⁶⁶ These enable investors to make informed decisions on projects compatible with the Paris Agreement and the EU's climate targets.

The **European Climate and Health Observatory**, launched in March 2021 by the Commission and the EEA, already plays a key role,⁶⁷ closing an important knowledge gap, helping overcome barriers that prevent us from tackling fast-growing and negative health impacts of climate change. The observatory provides information and tools to assess climate change and health. It also provides effective solutions and interventions to integrate and improve climate adaptation strategies in national and sub-national health policies. The new **sustainable finance and forest strategies** bridge the climate protection gap and to boost forest resilience. The first ever EU Adaptation Communication was submitted to the UNFCCC in October 2021.⁶⁸

The **Mission on Adaptation to Climate Change** has made good progress in fostering a step-change in adaptation action at sub-national level. It supports at least 150 EU regions and communities in accelerating their transformation to achieve climate resilience by 2030. 118 regions and local authorities from 18 Member States have signed the Mission Charter to join a community of practice and it has issued 12 calls for funding amounting to EUR 240 million.

The EEA plans a full **report on the status of national adaptation action** in late 2022. The report will be based on reporting by national authorities from March 2021 under the Energy Union Governance Regulation⁶⁹ and other sources.

⁶⁶ <https://op.europa.eu/en/publication-detail/-/publication/23a24b21-16d0-11ec-b4fe-01aa75ed71a1/language-en>

⁶⁷ <https://climate-adapt.eea.europa.eu/observatory>

⁶⁸ COM(2021) 572 final.

⁶⁹ Article 19 of Regulation (EU) 2018/1999.

6 FINANCING CLIMATE ACTION

The transition to climate neutrality and climate resilience requires substantial investment. At EU level funding is available from various sources.

FUNDING FROM THE EU EMISSIONS TRADING SYSTEM

The **Innovation Fund** is one of the world's largest public funding programmes for rollout of innovative low-carbon technologies. It is financed by auctioning 450 million allowances from the EU ETS over this decade, representing some EUR 38 billion.⁷⁰ Since its start in 2020, about EUR 3 billion have been invested in 54 projects. In 2021, two calls for projects were completed: one for large-scale investments⁷¹ of EUR 1.146 billion and one for small-scale investments⁷² of EUR 109 million.

Under the first call for large-scale projects, seven grants were awarded, with successful bids in ETS sectors, including chemicals, steel, cement, refineries, and power and heat. For the first call for small-scale projects, 32 were awarded grants in a broader range of ETS sectors including green hydrogen, energy storage, glass, heat and carbon capture.

In July 2022, 17 projects were pre-selected under the second large-scale call for projects in cement, hydrogen, chemicals, and others for a total of EUR 1.8 billion in Bulgaria, Finland, France, Germany, Iceland, the Netherlands, Norway, Poland and Sweden. These projects aim to save up to 136 million tonnes of CO₂-eq in their first 10 years of operation.

The next large-scale call, to be launched in autumn 2022, has an unprecedented budget of EUR 3 billion, with sections for projects to implement the REPowerEU plan, on hydrogen and electrification, clean-tech manufacturing and pilots.

The **Modernisation Fund**, also from the EU ETS, supports lower-income Member States to modernise their energy systems and improve energy efficiency. Until 2030, over 640 million allowances (representing some EUR 51 billion)⁷³ will be auctioned to support these Member States. Since 2021, EUR 3.3 billion have been transferred to Croatia, Czechia, Estonia, Hungary, Lithuania, Poland, Romania and Slovakia funding 71 investments for transition in areas such as photovoltaics and power grids for electric car charging.

MAINSTREAMING CLIMATE POLICIES IN THE EU BUDGET

At EU level, investment for the transition will flow from two main sources: the EU's EUR 1.2 trillion 'multiannual financial framework' for 2021-2027 and the EUR 806.9 billion NextGenerationEU, supporting the EU's recovery. At least 30% of these two sources combined (potentially over EUR 670 billion in current prices) will be spent on fighting climate change.⁷⁴

⁷⁰ Estimate based on current ETS prices.

⁷¹ Large-scale projects have a total capital expenditure higher than EUR 7.5 million.

⁷² Small-scale projects have a total capital expenditure not exceeding EUR 7.5 million.

⁷³ Estimate based on current ETS prices.

⁷⁴ The draft budget 2023 estimates that EUR 557 billion or 31.5% of the EU budget NGEU will contribute to climate objectives. These reflect loans currently requested in the RRF and exclude the Innovation and Modernisation Funds.

Spending programmes under the EU's 2021-2027 budget also have climate spending targets of at least 30%. These include the European Regional Development Fund (ERDF) (30%), Horizon Europe (35%), the Cohesion Fund (37%), the Connecting Europe Facility (60%), and LIFE (61%).

PROGRAMMES AND FUNDS

The EU's **Recovery and Resilience Facility** – centrepiece of *NextGenerationEU* with a value of up to EUR 723.8 billion – enables Member States to significantly increase climate investments. To qualify for the Facility's grants (EUR 338 billion) and loans (EUR 385.8 billion), Member States must prepare recovery and resilience plans setting out investments and policy reforms that create added value for the EU from green transition. Each national plan must allocate a minimum of 37% of planned expenditure to climate action and every measure must comply with the 'do no significant harm' principle.

All 26 plans adopted by mid September exceed the 37% benchmark; 40% of their collective financial means is dedicated to climate objectives, though some Member States have used more than half of their allocation to fund climate policy. About 44% of the funding allocated to climate is expected to target renewable energy and energy efficiency, and 34% sustainable mobility.⁷⁵ Subject to the adoption of the **REPowerEU** proposals of May 2022 to address the energy implications of Russia's invasion of Ukraine, Member States will have the option to update their plans and increase support for energy efficiency and renewable energy.

At least 30% of the **InvestEU** programme's target budget of EUR 372 billion in additional investment over the period 2021-27 will be allocated to climate objectives. Under the Sustainable Infrastructure Window, 60% of the funding must be spent on climate and environment.⁷⁶ The EIB, the EIF and other implementing partner banks will use InvestEU guarantees for private-sector investments in line with climate and environmental tracking and the sustainability proofing guidance developed by the Commission.

Research and innovation enable the green transition by testing and demonstrating solutions, developing breakthrough innovations and knowledge for policies based on latest scientific evidence. The **Horizon Europe programme** will devote at least 35% of its EUR 95.5 billion budget to research and innovation to support a just transition, empowering citizens to actively participate in the green transition. New partnerships are developing, scaling up technologies necessary for climate neutrality. Horizon Europe invested almost EUR 4.2 billion in climate action by end 2021.⁷⁷

The **European Regional Development Fund and Cohesion Fund**⁷⁸ support Member States in promoting economic, social and territorial cohesion, while advancing the transition to climate neutrality and other EU priorities. Each Member State has prepared a Partnership Agreement, outlining an investment strategy for their cohesion policy funding for 2021-2027. The funds will deliver at least EUR 78 billion in investment in climate action in t 2021-2027 (30% of the total ERDF and 37% of the total Cohesion Fund budget allocation). Preliminary data from draft and adopted programmes suggest that funds allocated to climate will exceed the target.

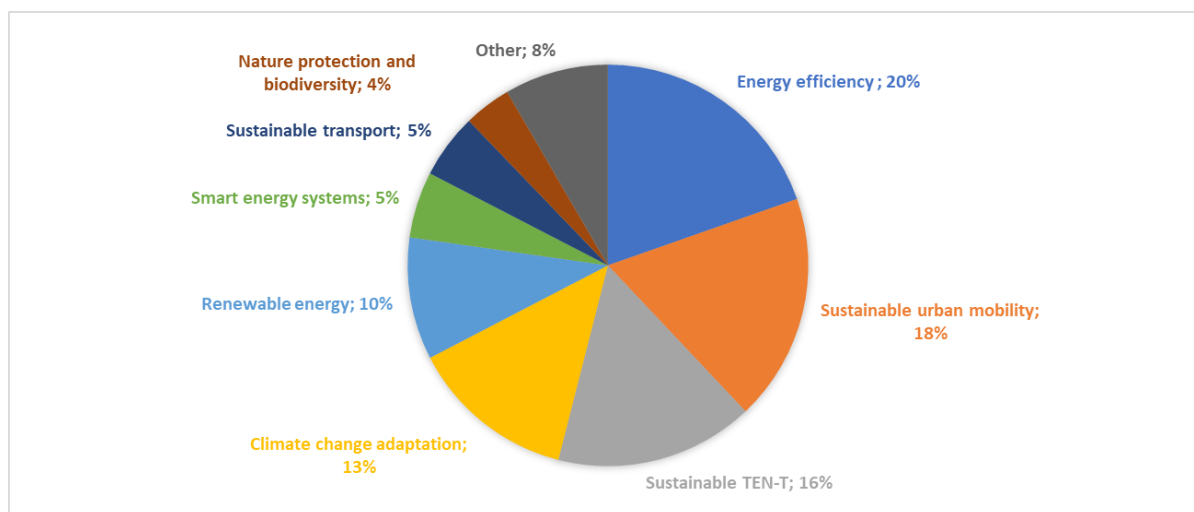
⁷⁵ Source: Recovery and Resilience Scoreboard, [Green transition pillar](#).

⁷⁶ https://investeu.europa.eu/what-investeu-programme_en

⁷⁷ Preliminary figures.

⁷⁸ [Cohesion Policy 2021-2027 - Regional Policy - European Commission \(europa.eu\)](#)

Figure 12: Distribution of cohesion policy Funds climate allocation by thematic area (preliminary data)



The **Just Transition Fund** has an EU contribution of EUR 19.2 billion for investment over 2021-2027 in regions across Europe that will be most affected by the transition to climate neutrality in terms of impact on their economic structure and social effects. Following the creation of the Fund, Member States are now preparing territorial just transition plans (TJTPs), to be adopted by the Commission as part of cohesion policy programmes. The Greek, Cypriot, Austrian, North Rhine Westphalia and Swedish plans have been approved.

The **European Social Fund, ESF+**, supports employment and investments in human capital. By mid-September roughly a third of ESF+ programmes were adopted for the period 2021-2027. Negotiations are still ongoing; all ESF+ programmes are expected to be adopted by the end of the year. To support the creation of green job and the adaptation of skills and qualifications to the transition to a climate-neutral economy, Member States plan to develop new types of training, curricula, apprenticeship and business model such as social entrepreneurship.

The **Technical Support Instrument** continued tailored technical support to Member States to design and implement reforms for European Green Deal priorities. 17 Member States⁷⁹ received support via the additional dedicated REPowerEU call to identify suitable reforms and investments to phase out dependency on Russian fossil fuels.

The **LIFE Programme** is the EU's funding instrument for the environment and climate action. In 2021, more than EUR 290 million were awarded to 132 projects, including projects in areas like climate neutral farming, peatland restoration, heat recovery in iron and steel manufacturing and adaptation of forests and infrastructures to climate. There will be around EUR 755 million for climate and environment projects in 2022, including for clean energy transition. In June, Ukraine joined the LIFE programme and could benefit from LIFE support to help restore its environment after the destruction brought from the Russian invasion.

⁷⁹ BE, CZ, EE, IE, EL, ES, FI, HR, IT, CY, HU, PL, PT, SI and SK.

7 INTERNATIONAL CLIMATE ACTION

As we completed the first five-year cycle of the Paris Agreement, the past year has seen intense, productive international exchanges, particularly at the Ministerial meetings on Climate Action co-convened by the EU, China and Canada, the Petersberg Climate Dialogue, the Rome G20 Summit, and the UN climate change conference in Glasgow (COP26).

Following the EU's lead, almost all major economies have committed to achieve net-zero greenhouse emissions by or around mid-century. Many have increased their 2030 emission targets (nationally determined contributions) significantly, proving that the Paris Agreement works, and that the EU is inspiring others to accelerate action. Nonetheless, under current national policies and measures, the world is not on track to achieve the Paris Agreement temperature goal. If countries fulfil all their new pledges, the world may be avoiding some severe climate impacts, however the warming will still exceed 1.5°C by the end of the century.

The EU and its Member States keep raising awareness of the opportunities from green transition and the consequences from delayed action. The EU is encouraging and assisting international partners to deliver more robust and sustained responses to our common threat of climate change.

The EU and its Member States are the largest provider of public climate finance in the world, with EUR 23.4 billion committed in 2020 to reduce emissions and build resilience to the effects of climate change in developing countries, including EUR 5.2 billion committed at EU level (EU budget, European Development Fund and European Investment Bank). Public funding and regulatory reforms are contributing to mobilising capital and scaling up private investment needed to make the transition. EU research and innovation framework programmes make an important contribution to global climate assessments and action, with the EU among the top funders of the evidence base underpinning reports of the Intergovernmental Panel on Climate Change.⁸⁰

New initiatives spearheaded by the EU over the last year include the USD 8.5 billion Just Energy Transition Partnership between South Africa and a group of donors, the Global Methane Pledge launched by Presidents von der Leyen and Biden and joined by over 100 countries so far, a Green Alliance between the EU and Japan, and the G20 Leaders' decision to end international public finance for unabated coal power generation.

⁸⁰ Informing global climate action: Contribution of the Framework Programmes (FP7 and H2020) to the knowledge base of recent IPCC reports based on openly available data.