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EU Climate Action Progress Report 2025

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1 Overview of EU climate targets

Table 1: Overview of EU climate targets

	International commitments	EU domestic targets				
	Paris Agreement	2030 Climate and Energy Framework				2050
		EU ETS 1	EU ETS 2 [1]	Effort Sharing Regulation (ESR)	LULUCF	
Target year	2030	2030				2050
Overall emission reduction target	at least -55% net emissions	at least -55% net domestic reduction vs 1990				climate neutrality (balance between emissions and removals)
Emission reduction target		-62%	-42%	-40% Annual binding targets by MS ranging from -10% to -50%.	First phase 2021-2025 'no-debit' commitment to maintain current carbon sink levels. In a second phase 2026-2030: EU-wide target of -42 Mt by 2030 compared to the LULUCF category's inventory average	

[1] Surrendering of allowances under the new ETS 2 will start in 2027.

						for the years 2016-18, each MS will have nationally binding 2030 targets	
Base year	1990	2005			2005	Subject to accounting rules	N/A
		1990 for overall emission reduction target					
Carry-over of units from preceding periods [2]	No	Indefinite validity of allowances not limited to trading periods. No need to carry over.			No	No	No
Gases covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6		CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3	CO_2, CH_4, N_2O	CO_2, CH_4, N_2O, SF_6, NF_3, HFCs, PFCs
Sectors included	Energy, industry, agriculture, waste, LULUCF	Electricity & heat generation, energy-intensive industry, aviation [3], maritime [4]	Buildings, road transport and small-emitting sectors (i.e. emissions from fuel combustion in these sectors)		Domestic transport (except aviation), buildings, non-ETS industry, agriculture and waste	Land use, land use change and forestry	All sectors
Global Warming Potentials used	IPCC AR5	IPCC AR5					IPCC AR5

[2] For the CP2 it refers to carry over from CP1. For the ETS it refers to carry-over from previous trading period under the scheme itself. For the effort sharing legislation it refers to carry over from ESD to ESR. For LULUCF it refers to carry-over from Kyoto Protocol period.

[3] Emissions from flights between EEA airports as well as flights departing to airports in Switzerland and in the UK.

[4] Emissions from all large ships entering EU ports in respect of 50% of emissions from voyages starting or ending outside of the EU and 100% of emissions that occur between two EU ports and when ships are within EU ports.

2 EU climate targets and scope estimates

According to the **European Climate Law** [5] the scope of the EU's climate target goes beyond domestic GHG emissions and removals in national GHG inventory; it also includes specific emissions from international aviation and navigation.

The 2024 Climate Action Progress Report provided a first estimate of GHG emissions falling within this scope. This refers to the estimation of the emissions from international aviation and maritime transport currently covered by the EU law, notably in the EU Emission Trading System (ETS). This is because the scope of the EU ETS has evolved since it was created in 2005, with the inclusion of new countries, activities and gases. It was therefore necessary to produce estimates of historical emissions, back to 1990, for aviation and maritime transport in line with the scope of the European Climate Law and consistently with the current scope of the EU ETS. The estimation was based on a methodology developed by the European Commission Joint Research Centre and publicly available [6]. Those estimates have been extended and updated, based on the new GHG inventory and data available from the ETS emissions monitoring system.

This chapter first describes the 'perimeter' of the 2050 climate-neutrality objective and the 2030 climate target as set in the European Climate Law. It then sets out a definition of aggregates that more closely reflects their legal scope and the methodology that the Commission recommends for the estimation of the emissions since 1990.

2.1 EU climate targets as defined in the European Climate Law

Article 2(1) of the European Climate Law provides that: '*Union-wide greenhouse gas emissions and removals regulated in Union law shall be balanced within the Union at the latest by 2050, thus reducing emissions to net zero by that date, and the Union shall aim to achieve negative emissions thereafter.*'

The 2050 objective is set at EU level and is economy wide. It is to be achieved domestically, without the use of international credits. The following GHG are covered:

- carbon dioxide (CO_2),
- methane (CH_4),
- nitrous oxide (N_2O),
- sulphur hexafluoride (SF_6),
- nitrogen trifluoride (NF_3),
- hydrofluorocarbons (HFCs) [7],

[5] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), OJ L 243, 9.7.2021, p. 1.

[6] https://publications.jrc.ec.europa.eu/repository/handle/JRC139028

[7] See list HFCs in Part 2 of Annex V to Regulation (EU) 2018/1999.

- perfluorocarbons (PFCs) [8].

The emissions and removals regulated in EU law can change over time. There should be a territorial link with the EU, and the exact territorial scope is set by the acts that regulate the GHG emissions and removals.

Article 4(1) on intermediate EU climate targets provides that: '*In order to reach the climate-neutrality objective set out in Article 2(1), the binding Union 2030 climate target shall be a domestic reduction of net greenhouse gas emissions (emissions after deduction of removals) by at least 55% compared with 1990 levels by 2030.*'

Therefore, the 2030 climate target is a step on the way to achieving the 2050 climate-neutrality objective, and the scopes should be consistent. It is a domestic reduction, meaning without using international credits, economy-wide, net, and covers the same greenhouse gases as the 2050 climate-neutrality objective (listed in Part 2 of Annex V to Regulation (EU) 2018/1999).

2.2 The EU target scope

Based on the above, the scope that best represent the EU's climate mitigation target can be obtained by adding to the EU total domestic GHG emission, including LULUCF, the EU emissions from international aviation and maritime transport regulated in EU Law.

Aviation

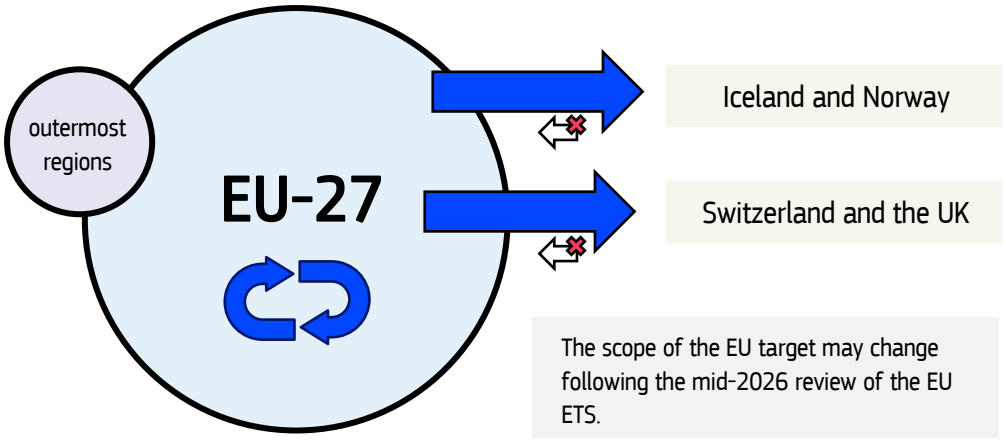
In particular, and for the purpose of tracking the progress towards the EU climate target, EU emissions cover CO_2 emissions from flights between the EU Member States and departing flights to Iceland, Norway [9], Switzerland and the United Kingdom. International aviation also covers CO_2 emissions from non-domestic flights between EU Member States and the outermost regions [10]. It should be noted that the EU target scope differs from that of the EU ETS.

[8] See list PFCs in Part 2 of Annex V to Regulation (EU) 2018/1999

[9] These are flights to countries of the European Economic Area, which also encompasses Liechtenstein. Currently Iceland and Norway have commercial airports, Liechtenstein does not, therefore it is not listed here.

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

Figure 1: Illustration of emissions from aviation covered by the EU target scope



By July 2026, the European Commission will make a legislative proposal to review the EU ETS including scope for aviation. This will follow a Commission assessment of the ambition of and participation in carbon offsetting and reduction scheme for international aviation (CORSIA), in line with the revised EU ETS Directive [11]. Consequently, the target scope may be adjusted accordingly.

Table 2: Aviation emissions covered by the EU climate target

Flights		Example	EU 2030 target scope	
Domestic aviation	Domestic flights in EU countries	Palermo-Rome	**Yes**	
	Domestic flights in Iceland and Norway	Oslo-Bergen	**No**	
	Domestic flights to/from outermost regions	Canary Islands-Madrid	**Yes** (covered by ESR)	
Intra-EEA aviation	Flights between Iceland and Norway	Oslo-Reykjavik	**No**	
	Flights from Iceland and Norway to the EU	Oslo-Brussels	**No**	
	Flights from the EU to Iceland and Norway	Brussels-Oslo	**Yes**	
	Flights between the EU and outermost regions	Paris-Canary Islands	**Yes** (since 01/ 2024)	
Extra-EEA aviation	Departing flights from EU to the UK and Switzerland	Prague-London	**Yes**	
	Flights from the UK and Switzerland to the EU	London-Prague	**No**	

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32023L0958

	Flights between the EU and other countries	Rome-New York	**No**	

Maritime

Emissions from international maritime transport includes GHG emissions (i.e. CO_2 and from 2026 also CH_4, N_2O) from cargo and passenger ships of or above 5 000 GT as follows:

- 50% of emissions from voyages departing from a port outside the jurisdiction of an EU Member State and arriving at a port under the jurisdiction of an EU Member State;
- 50% of emissions from voyages departing from a port under the jurisdiction of an EU Member State and arriving at a port outside the jurisdiction of an EU Member State;
- 100% of emissions from voyages departing from a port under the jurisdiction of an EU Member State and arriving at a port under the jurisdiction of another EU Member State;
- 100% of emissions within a port under the jurisdiction of an EU Member State.

Figure 2: Illustration of maritime transport covered by the EU target scope

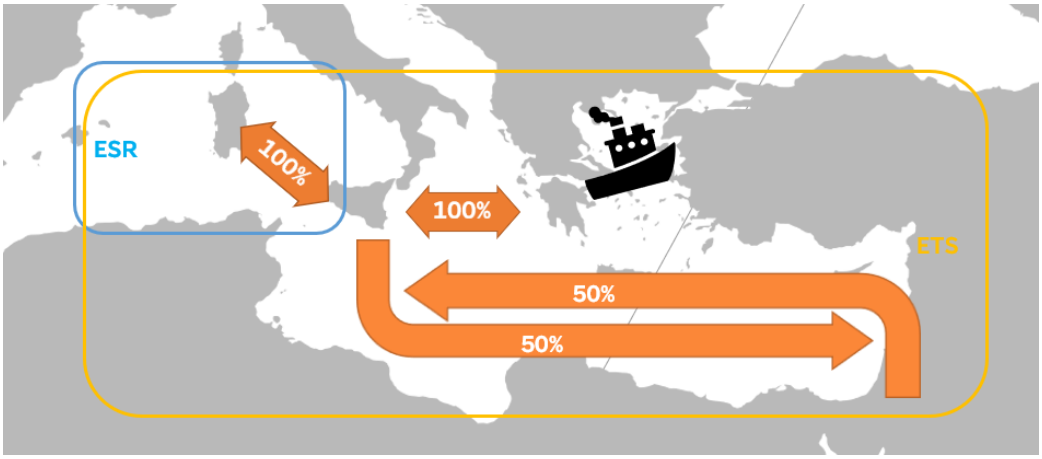


Table 3: Maritime emissions covered by the EU climate target

Voyages		Example	EU 2030 target scope	
Domestic maritime transport	Voyages in EU countries	Valencia-Barcelona	**Yes**	
	Voyages in Norway/Iceland	Oslo-Bergen	**No**	
International maritime transport	Voyages between two EU countries	Valencia-Rotterdam	**Yes**	
	Voyages between an EU country and Norway/Iceland	Rotterdam-Oslo	**Yes (50%)**	

	Voyages between an EU country and other country	Rotterdam-Houston	**Yes (50%)**	
	Voyages between Norway/Iceland and other country (or Iceland/Norway)	Oslo-Houston	**No**	
Within port	'Within port' emissions in an EU port		**Yes**	
	'Within port' emissions in a port in Norway / Iceland / other country		**No**	

2.3 Methodology

International aviation and maritime emissions covered by the EU targets, as defined in the European Climate Law, are estimated by using the Joint Research Centre's Integrated Database of the European Energy System (JRC-IDEES) [12]. It allows to split the international transport CO_2 emissions into intra-EU/extra-EU and intra-EEA/extra-EEA categories backwards in time (i.e. 1990) [13].

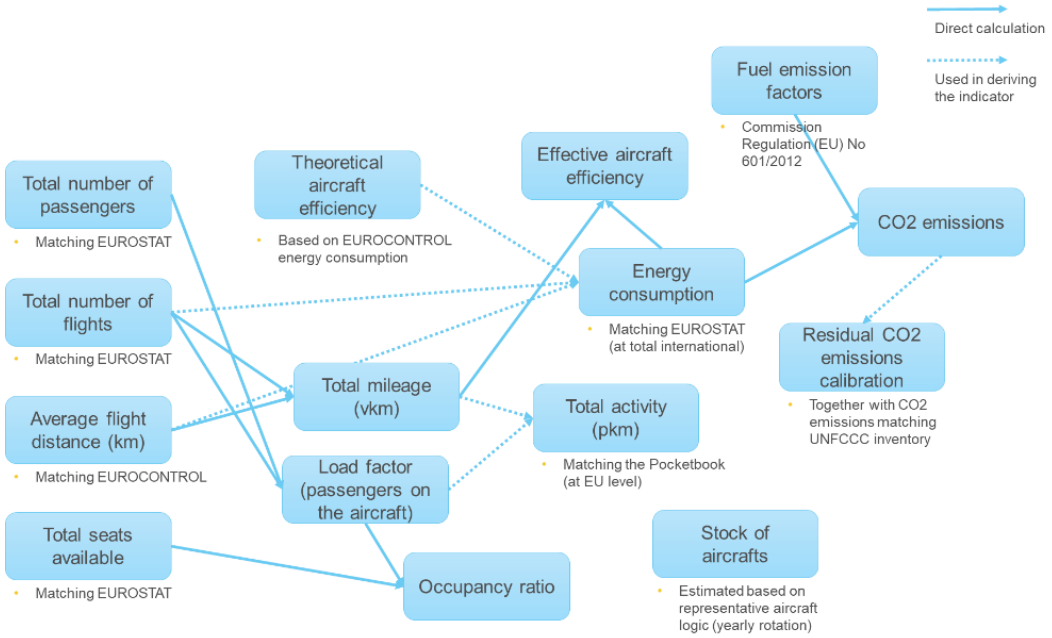
For international transport, JRC-IDEES applies a decomposition methodology that reconciles the scopes of available primary statistics and harmonises historical data on international aviation and maritime emissions, energy use, and transport activity. The resulting annual dataset covers 1990-2023 and distinguishes between domestic, intraEU/intraEEA, and extraEU/extraEEA activity for each EU Member State, Iceland and Norway.

In aviation, JRC-IDEES distinguishes between passenger and freight modes, with three geographical categories of flight origin/destinations for each mode: domestic, intra-EEA+UK, and extra-EEA+UK (Figure 3).

[12] European Commission, Joint Research Centre, Jaxa-Rozen, M., Rozsai, M. and Neuwahl, F., Aligning historical international aviation and maritime transport data to the scope of EU climate policies, Publications Office of the European Union, Luxembourg, JRC139028. https://publications.jrc.ec.europa.eu/repository/handle/JRC139028

[13] The JRC-IDEES analytical database is designed to support energy modelling and policy analysis, by combining primary statistics with technical assumptions to compile detailed energy-economy-emissions historical data for each key energy sector. For aviation, EEA emissions include those related to the UK but not to Switzerland, where total CO_2 emissions for the scope are additionally estimated from EUROCONTROL data.

Figure 3: Aviation emissions - overview of the methodology



Intra-EU, UK, and EEA categories are also used internally during calibration but aggregated for reporting. For each mode/category combination, JRC-IDEES estimates activity (as passenger-km or tonne-km), energy use and CO_2 emissions, aircraft stock (expressed as representative aircraft), load factors, and aircraft efficiencies. As country-specific activity statistics are not available, the decomposition first allocates EU-level activity data from the DG MOVE Transport Pocketbook to each country and flight category.

For passenger modes, this allocation calculates average load factors using Eurostat data on total passengers and flights. These load factors and total flight numbers are combined with average flight distances from EUROCONTROL to yield an initial estimate for passenger transport activity. For intra-EU activity, a uniform scaling factor is then applied across Member States to match total EU-level Transport Pocketbook data. Freight activity follows a similar process, using a “representative flight” concept with a common load factor across all Member States to account for mixed passenger-freight flights.

Next, the decomposition estimates fuel use from EUROCONTROL data, by deriving a distance-dependent average aircraft efficiency then applying it to the country-specific ensemble of flights and routes. The final step scales the estimates to meet Eurostat energy balances for total domestic and international consumption back to 1990 values, maintaining intra-EEA/extra-EEA fuel use ratios derived from EUROCONTROL. JRC-IDEES additionally reports resulting differences with UNFCCC country submissions. The above process is followed throughout the entire decomposition period (1990-2023). Data gaps are estimated from the existing indicators as follows:

- The process iterates backwards towards 1990, starting from the oldest years in which data is available in each Member State.
- Average flight distance is kept constant for early years without EUROCONTROL data (generally before 2004).
- If the load factor (passengers per flight) cannot be calculated by lack of passenger and/or flight data, it is estimated from the trend of the existing time series.
- Missing numbers of flights are calculated from the load factor and the passengers carried.
- If no passenger data is available, the total mileage is estimated from the energy consumption and combined with average flight distance to estimate the number of flights. The number of flights is then combined with the load factor to estimate the total passengers carried.
- For early years without data, constant values are assumed for the factors used to i) scale intra-EU activity to the Transport Pocketbook, ii) adjust the estimated fuel use to EUROCONTROL data for specific routes, and iii) scale this adjusted fuel use to Eurostat energy balances (e.g. before 1995 for Transport Pocketbook data; before 2004 for EUROCONTROL data).

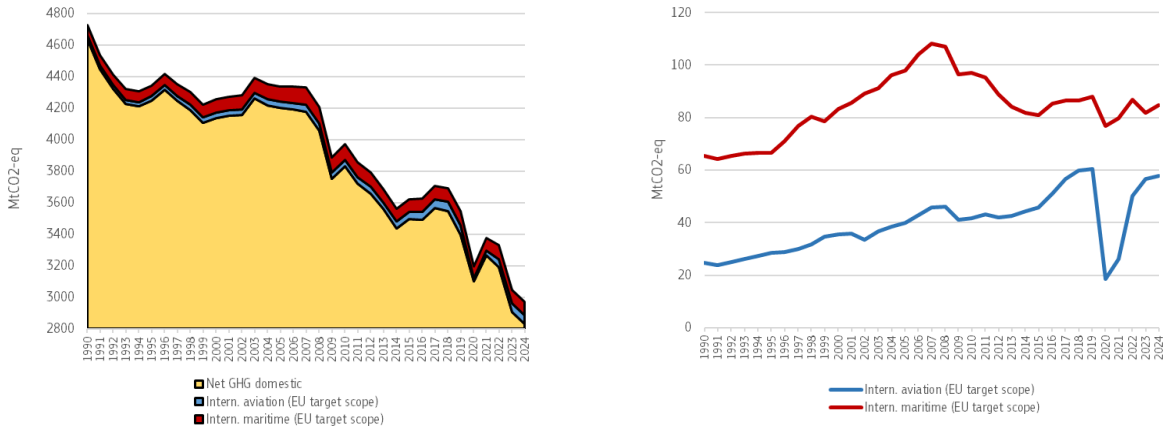
For international maritime bunkers, JRC-IDEES estimates data both for intraEU/extraEU and intraEEA/extraEEA geographical categories. For the present exercise, the emission estimates already include CO_2, CH_4, and N_2O gases. Transport activity (tonne-km) is estimated from Eurostat data on gross weight of transported goods, using port-level and country-level data for intra-EU and extra-EU categories, respectively. Intra-EU activities are then scaled to match the DG MOVE Transport Pocketbook totals, accounting for domestic coastal shipping (calibrated separately in JRC-IDEES). Next, transport activity is combined with THETIS MRV EU-level mileage data and country-specific vessel sizes to estimate load factors (tonne per movement). The load factors and resulting annual mileage (km) are calibrated to meet EU-level THETIS MRV mileage. The annual mileage is in turn combined with THETIS MRV average efficiency to yield a total technical energy consumption, with corresponding emissions derived from default emissions factors. This energy consumption is scaled to Eurostat energy balances to minimize discrepancy to total intra-EU THETIS MRV emissions. The scaling accounts for partial coverage of emissions reported to THETIS MRV under the scope of the MRV regulation prior to its 2023 revision (i.e. excluding ships below 5000 GT); the contributions of ships below 5000 GT to intra EU emissions is estimated from analysis supporting the review of the MRV regulation. As with aviation, JRC-IDEES reports corresponding differences to UNFCCC submissions. Early years with data gaps are estimated from existing indicators as follows:

- The process iterates backwards towards 1990, starting from the oldest years in which data is available in each Member State.

- Average distance of voyages is kept constant for early years without Eurostat activity data (generally before 1997-2000).
- If the load factor (tonnes per movement) cannot be estimated by lack of activity data, it is kept constant.
- If activity data is not available, it is estimated from Eurostat energy consumption.
- Missing mileage data is derived from the activity and load factor estimates.
- For early years without data, constant values are assumed for the factors used to i) scale intra-EU activity to the Transport Pocketbook, ii) scale estimated mileage to meet EU-level THETIS MRV mileage, and iii) scale domestic and intra-EU CO_2 emissions estimated from energy consumption to match total THETIS MRV CO_2 emissions.
- Finally, the ratios between the estimated MRV emissions and the CO_2 emissions for the reported transport activity (for intra-EU/EEA and extra-EU/EEA categories) between 2018 and 2023 are used to calculate the MRV compliant estimates back to 1990 levels.

2.4 Emission estimates

Figure 4: EU-27 GHG international aviation and maritime transport under the EU target scope (1990-2024), Commission's estimates



Notes: Target scope includes: (i) for International aviation, intra-EU flights, departing flights from EU27 to EEA (non-EU) countries, to UK and to CH; International aviation also covers CO_2 emissions from non-domestic flights between EU Member States and the outermost regions. (ii) For International maritime: emissions from voyages between two EU27 Member States, 50% of emissions from voyages between a EU27 Member State and NO/IS, 50% of emissions from voyages between an EU27 Member States and a third country.

Table 4: EU-27 GHG emissions under the EU target scope (1990-2024), Commission's estimates

EU-27	Source	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024 (proxy)
Total emissions (UNFCCC)	EEA GHG 2025	4873	4563	4455	4546	4177	3813	3297	3465	3376	3106	3039
4 - Land Use, Land-Use Change and Forestry	EEA GHG 2025	-237	-316	-318	-347	-346	-319	-194	-196	-183	-198	-212
Net GHG domestic emissions	EEA GHG 2025	4635	4248	4137	4199	3831	3495	3103	3269	3192	2907	2827
Intern. aviation under the EU climate target scope	JRC-IDEES-2025	25	28	36	40	42	46	19	26	50	57	58
ntern. navigation under the EU climate target scope	JRC-IDEES-2025	66	66	83	98	97	81	77	80	87	82	85
Intra-EU navigation (MRV compliant, NDC scope*)	JRC-IDEES-2025	29	30	38	40	42	35	32	34	38	37	39
Net GHG emissions (target scope)	own calculation	4726	4343	4256	4337	3970	3622	3199	3375	3329	3046	2970
Net GHG emissions (NDC scope)	own calculation	4689	4306	4211	4279	3914	3575	3154	3329	3281	3001	2923

Notes: Target scope includes: (i) for International aviation, intra-EU flights, departing flights from EU27 to EEA (non-EU) countries, to UK and to CH; International aviation also covers CO_2 emissions from non-domestic flights between EU Member States and the outermost regions (ii) for International maritime: emissions from voyages between two EU27 Member States, 50% of emissions from voyages between an EU27 Member State and NO/IS, 50% of emissions from voyages between an EU27 Member States and a third country. The NDC scope includes: (i) International aviation as for the target scope; (ii) International maritime, emissions from voyages within the EU27 Member States.

Table 5: Net GHG emissions in 1990, 2023 and 2024 ($MtCO_2$-eq)

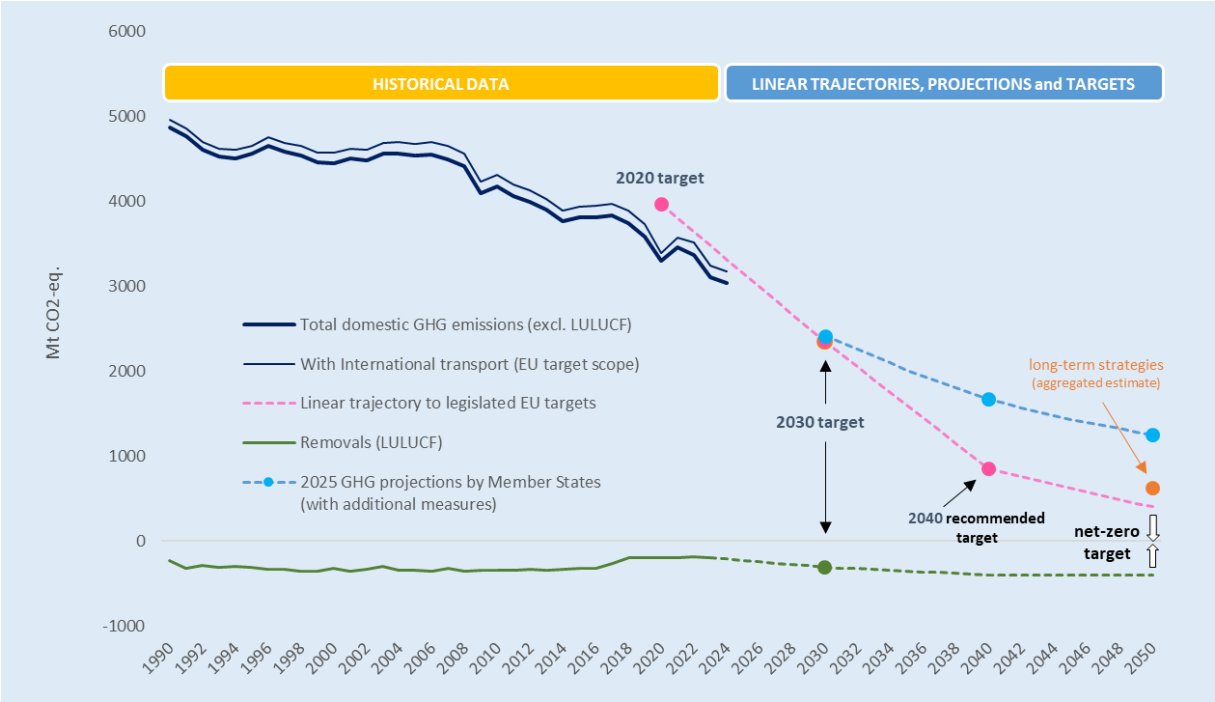
	1990	2023	2024	2024/2023	2024/1990
Domestic	4873	3106	**3039**	**-2.1%**	**-37.6%**
Net domestic	4635	2907	**2827**	**-2.8%**	**-39.0%**
Target scope	4726	3046	**2970**	**-2.5%**	**-37.2%**
NDC scope	4689	3001	**2923**	**-2.6%**	**-37.7%**

3 EU's greenhouse gas emissions: trends and projections

3.1 EU greenhouse gas emissions and removals: recent developments

After the 2023 largest drop ever in the EU greenhouse gases (GHG) net emissions, preliminary 2024 data show a reduction of 2.8% compared with 2023, or 2.5% when emissions from international transport under the EU target scope are included [14]. This translates into a reduction in GHG net emissions of 39% compared with the 1990 base year (or 37.2% when international transport under the EU target scope is included).

Figure 5: Total EU GHG emissions and removals (1990-2024), linear trajectories to EU targets, and Member States' latest GHG emissions projections (2030–2050)



Notes: (1) Historical GHG emissions and removals (1990-2024) are based on European Environment Agency's 2025 GHG Inventory and GHG approximated emissions and removals (2024). (2) Linear trajectories for GHG emissions and removals are based on the legislated (2020, 2030) or proposed (2040) EU targets, while emissions and removals by 2050 reflect estimates from the different model-based analyses supporting the 'Delivering the European Green Deal'. (3) The -55% 2030 target (EU Climate Law) considers a contribution of removals of -225 $MtCO_2$-eq.

With only five years left until the second interim target to climate neutrality, progress appears to be in line with the linear trajectory needed to achieve the EU's 2030 reduction target of a 55% decrease, although difference exists across sectors and policy instruments. Extrapolating the emission trends observed over the past five years forward to

[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 to the EU-27 total domestic GHG emission, including LULUCF net emissions or removals, the EU-27 emissions from international aviation and maritime transport regulated in the Union Law. For more details, see Chapter 2 of this staff working document.

2030 suggests that emissions will fall short of the established target by around 6 percentage points, or 280 $MtCO_2$-eq, stressing the need for slightly accelerating the pace of decarbonisation, from the annual average cut of about 120 $MtCO_2$-eq seen over 2018-2023 to an emission reduction of 140 $MtCO_2$-eq every year from now until 2030.

The latest Member State's projections from March 2025 show that this gap could be almost closed by 2030, but only if Member States fully implement all existing and additional measures (Table 6). Projections under the current policy scenario, still point to a significant gap of 8 percentage points to the EU 2030 reduction target of 55%. This highlights the critical importance of sustaining efforts and ensuring adequate investment to meet the 2030 target.

Table 6: Progress to the EU 2030 climate target, main emission aggregates

	$MtCO_2$-eq		*%*		***Expected emissions reduction by 2030***		
	Historical 1990	*Provisional 2024*	*change to 2023*	*change to 1990*	*5-years linear trend*	*projections WEM*	*projections WAM*
EU target scope	**4726**	**2970**	**-2.5%**	**-37.2%**	**-49%**	**-47%**	**-54%**
EU domestic GHG emissions	4873	3039	-2.1%	-37.6%	-49%	-48%	-53%
EU domestic GHG net emissions	4635	2827	-2.8%	-39.0%	-51%	-49%	-56%

Notes: (1) The EU target scope includes emissions from international aviation and maritime transport regulated in the EU Law. (2) Under the EU target scope, the contribution from LULUCF sink is limited to 225 $MtCO_2$-eq (European Climate Law).

However, there are differences across sectors and policies. Table 7 shows that emissions from international aviation and maritime are currently displaying the largest deviation from the 2030 target, although they contribute only for a small part of the overall emissions. If we assume a 62% reduction target, in line with the ETS sector, emissions in 2030 are expected to be between 83 and 95 $MtCO_2$-eq above the target, according to both trends and Member States projections (specific climate action to address GHG emission in this sector are described in Chapter 2 of the Climate Action Progress Report).

Emissions from the ESR sectors are another important source of potential deviation from the 2030 target. Emissions have been declining in the recent years, but the pace needs to accelerate to meet the 40% reduction target compared with 2005. According to the aggregated projections with existing and additional policies and measures, EU's emissions are expected to reduce by 38%, pointing to a gap of around 50 $MtCO_2$-eq. However, projections based on current policy scenario still point to a gap of 9 percentage points to the EU reduction target of 40% compared to ESR emissions in 2005. The gap widens when expected 2030 emissions are extrapolated from trends observed over the past five years (see Chapter 3 of the Climate Action Progress Report for a more detailed analysis of ESR emissions).

Conversely, emissions from power and industrial plants covered by the EU ETS system are on track to achieve the 62% reduction target compared with 2005. Based on the extrapolation of recent trends, ETS emissions are expected to even overachieve the reduction target, mainly thanks to the surge in renewables observed in recent years (see Chapter 2 of the report for a full assessment).

Table 7: Progress to the EU 2030 climate target, by main policy instruments

	Base-year		2030 targets		Expected emissions change by 2030 compared with the base-year		
			GHG reduction	Values			
	Ref. year (EU Reg.)	Values ($MtCO_2$-eq)	to base-year	($MtCO_2$-eq)	5-years linear trend	projections WEM	projections WAM
ETS emissions (Stationary)	2005	2059	-62%	782	**-65%**	**-62%**	**-66%**
ETS emissions[(1)]	2005	2197	-62%	835	**-61%**	**-58%**	**-61%**
ESR emissions[(2)]	2005	2517	-40%	1510	**-28%**	**-31%**	**-38%**
LULUCF net emissions[(3)]	n.a.	n.a.	*max contrib.*	*-225*	***-238***	***-183***	***-233***
Int. aviation and maritime[(4)]	2005	138	-62%	52	**-2%**	**7%**	**3%**
EU target scope	**1990**	**4726**	**-55%**	**2120**	**-49%**	**-47%**	**-54%**

Notes: (1) Target = -62% of 2005 ETS emissions. This include ETS1 emissions from stationary installations (i.e. power and industrial plants) and international aviation and maritime under EU Law. (2) Target = -40% of 2005 ESR emissions (Legal values from the ESR Regulation), ESR GHG projections as submitted by Member States in 2025; (3) Target = -225 $MtCO_2$-eq. Max contribution to the -55% EU climate target (European Climate Law), expected net emissions in 2030; (4) Target=-62% of 2005 estimated GHG values (JRC/IDEES).

The role of LULUCF sector merits specific considerations. The European Climate Law limits the contribution of the LULUCF sink in the EU 2030 target to 225 $MtCO_2$-eq. For that reason, table 7 shows that according to Member States aggregated projections, this limit can likely be achieved. However, in recent years we observed a declining trend of the land and forest sink, and Member States' projections are still falling short of the EU land-based net-removal 2030 target of an additional -42 $MtCO_2$-eq [15] (see Chapter 4 of the report for more details).

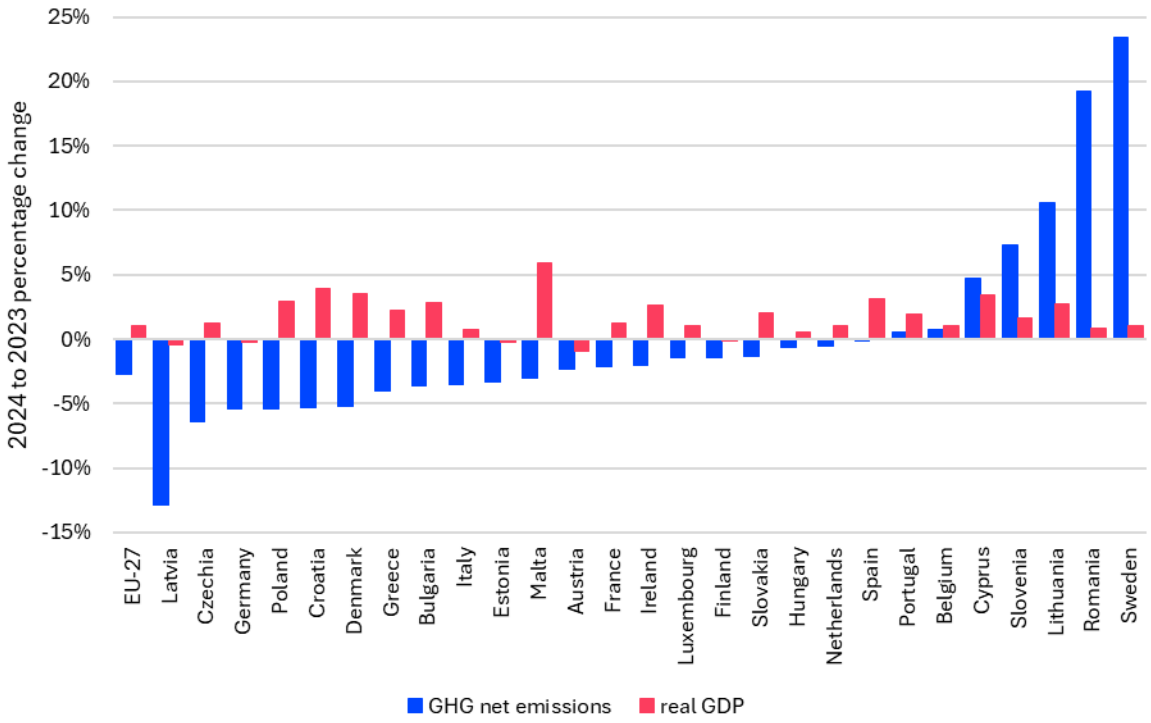
In 2024, according to preliminary data, GHG net emissions (i.e. including LULUCF) fell compared with 2023 in almost all Member States, with very large emission reductions in some (see Figure 6). They went down by more than 5% in 6 Member States (-12.9% in Latvia, -6.4% in Czechia and -5.4% in Poland and Germany, -5.3% in Croatia, -5.2% in Denmark) and between 1% and 5% in 11 other Member States (-4.1% in Greece, -3.6% in Bulgaria, -3.5% in Italy, -3.3% in Estonia, -3.1% in Malta, -2.3% in Austria, -2.1% in France, -2.0% in Ireland, -1.5% in Luxembourg, -1.4% in Finland and -1.3% in Slovakia), with most of them also showing an increase of GDP. These falls in emissions were mainly driven by the power sector with less electricity generated by fossil fuels in almost all Member States and more electricity generated by renewables, mainly solar, hydroelectricity, and nuclear energy. Other sectors contributed to the decrease of emissions, although to a lesser

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

extent. The increase in LULUCF net removals was an important driver in Germany, Latvia and Czechia.

Conversely, in 2024, GHG emissions increased in a few Member States, especially in Sweden (+23.5%), Romania (+19.3%), Lithuania (+10.6%), Slovenia (+7.3%) and Cyprus (+4.7%). The main reason for the increase in emission in these countries is the combustion of fuels for transport in Sweden, Romania and Slovenia, LULUCF with less CO_2 removals in Lithuania and the waste sector in Cyprus.

Figure 6: 2023-2024 annual changes of net greenhouse gas emissions and GDP in EU Member States



Notes: (1) EU GHG net emissions based on 2025 EU GHG inventory (EEA) for 2023 and approximated EU GHG inventory for 2024 (EEA), Eurostat for the GDP at constant price (2015, [nama_10_gdp]). (2) Bulgaria did not report approximated GHG inventory in 2025; emissions were gap-filled using publicly available data sets.

The 2025 greenhouse gas (GHG) inventory: revisions and impact

EU GHG emissions fell by 2.5% between 2023 and 2024. So why does the figure for the overall change in emission relative to the 1990 baseline for 2024 emissions in this report appear very similar to the figure in last year's CAPR? **The answer lies in the 2025 revision of the EU GHG inventory data**.

Each year, the CAPR relies on the most recent GHG inventories (GHGI) (submitted by Member States to the UNFCCC) available at the time of publication of the report: the 2025 CAPR relies on the 2025 GHGI, and the 2024 CAPR relied on the 2024 GHGI.

The GHG inventories can undergo revisions from one year to the next when Member States improve their methodologies. **The 2025 GHGI has undergone substantial changes compared to the 2024 GHGI**.

The changes in the 2025 GHGI result in lower net GHG emission in 1990 (down by close to 15 MtCO2-eq) and higher emissions for recent years (up by around 60 $MtCO_2$-eq) when compared to the 2024 GHGI. This is due mainly to a significant adjustment of the historical LULUCF data in the 2025 GHGI to reflect notably the latest understanding of forest developments [16]. It translates 'mechanically' for a given recent year into a lower reduction number compared to 1990 in the 2025 GHGI than in the 2024 GHGI.

Table 8 shows the change in GHG emissions compared to 1990 levels using the 2024 GHGI (as in CAPR 2024) and using the 2025 GHGI (as in CAPR 2025) for the most recent years. While both GHGIs show continuity and comparability for the domestic GHGs excluding LULUCF, the change in the LULUCF data affects the comparability of the net GHGs *including* LULUCF between the 2024 CAPR and the 2025 CAPR.

Table 8. Evolution of GHGs compared to 1990 in the 2024 GHG inventory and in the 2025 inventory

	GHGI 2024 (used in CAPR 2024)			GHGI 2025 (used in CAPR 2025)			
MtCO2-eq	1990	2022	*2023**	1990	2022	2023	*2024***
GHG emissions excluding LULUCF (domestic)	4867	3375	*3125*	4873	3376	3106	*3039*
Total net GHG emissions (domestic)	4650	3138	*2869*	4635	3192	2907	*2827*
Total net GHG emissions (inc. international target scope***)	4736	3257	*2987*	4726	3329	3046	*2970*
Compared to 1990		2022	*2023*		2022	2023	*2024*
GHG emissions excluding LULUCF (domestic)		-30.7%	*-35.8%*		-30.7%	-36.3%	*-37.6%*
Total net GHG emissions (domestic)		-32.5%	*-38.3%*		-31.1%	-37.3%	*-39.0%*
Total net GHG emissions (inc. international target scope***)		-31.2%	*-36.9%*		-29.5%	-35.6%	***-37.2%***

**proxy data building on GHGI 2024; **proxy data building on GHGI 2025; ***international target scope estimate as described in the CAPR*

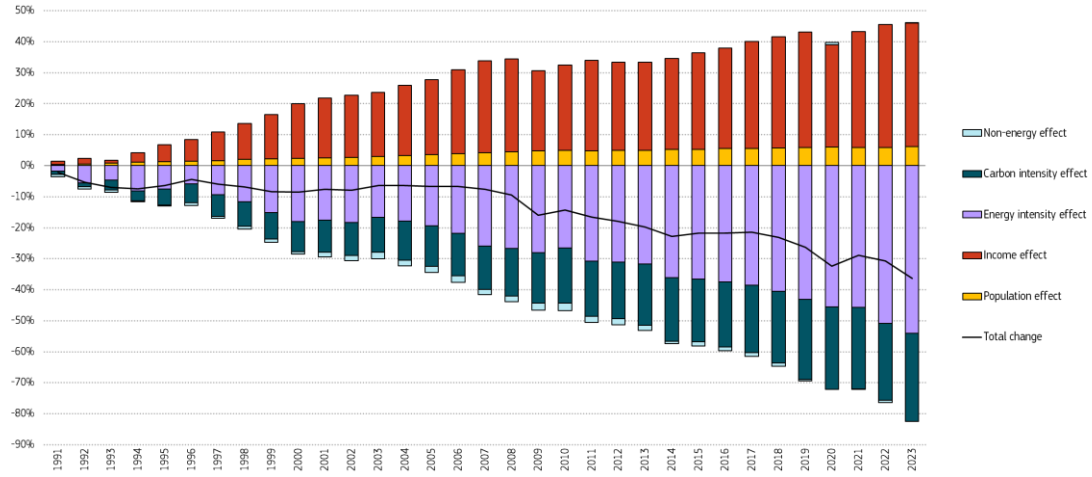
[16] This is mainly the result of more accurate and updated national forest inventories, which showed that carbon stocks in forests are not increasing at the same pace as previously assumed, resulting in a downward revision to estimated carbon sink. https://www.eea.europa.eu/en/newsroom/news/greenhouse-gas-emissions-in-2023

3.2 Drivers of greenhouse gas emission reduction since 1990

A combination of factors has helped the EU to reduce total domestic greenhouse gas emissions (excluding the LULUCF sector) by 37.6% since 1990. Figure 7 shows an annual breakdown of this trend into factors using a decomposition analysis with an extended Kaya identity distinguishing five drivers [17]. The underlying methodology follows that of earlier studies, e.g. by the European Environment Agency [18]. As with all methods of this style, the effects should not be understood as an actual causality but rather a useful indication of the drivers' contribution.

Without technological advances in energy efficiency and carbon intensity, i.e. holding all other factors at 1990 level, the growth in GDP (income effect) and population (population effect) would have led to a substantial increase in GHG emissions. Economic growth would have caused increase by 37% and population growth increase by 6%.

Figure 7: Drivers of total GHG emissions cumulated over 1990-2023



Decomposition factors:

$$GHG = POP * \frac{GDP}{POP} * \frac{PEC}{GDP} * \frac{GHG_E}{PEC} * \frac{GHG}{GHG_E}$$

POP – Population
GDP/POP – Income effect (GDP per capita)
PEC/GDP – Energy intensity effect
GHG_E/PEC – Carbon intensity effect
GHG/GHG_E – Non-energy effect

POP – Population
GDP – Gross Domestic Product
PEC – Primary Energy Consumption
FFC – Fossil Fuel Consumption
GHG_E – GHG emissions from energy combustion
GHG – Total GHG emissions (excl. LULUCF)

Data sources: EU inventories to the UNFCCC, Eurostat energy balances

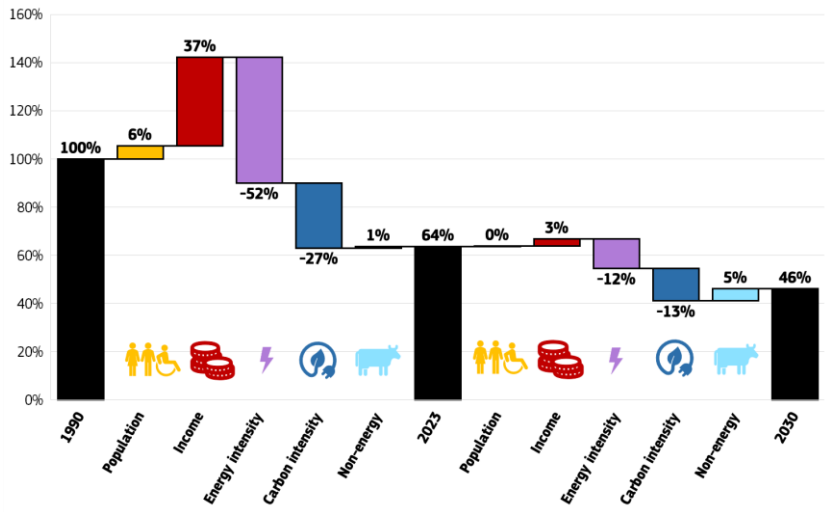
[17] The Kaya identity is a mathematical identity stating that, in its original version, the total GHG emission level can be expressed as the product of four factors: human population, GDP per capita, energy intensity (per unit of GDP), and carbon intensity (emissions per unit of energy consumed). In this section we further decomposed the identity to distinguish emissions from fuel combustion from other emissions (non-energy effect). Other identities are possible.
[18] The methodology of the Logarithm Mean Divisia Index (LMDI) method and the formula itself can be found in the EEA report No 03/2020 on trends and drivers of EU greenhouse gas emissions.

However, just the emission reduction from the decrease in primary energy use per unit of output generated (energy intensity effect) more than compensated this and reduced emissions by 52%. Compared with 1990, 48% less energy was needed to produce a unit of GDP in 2023. There are several drivers behind this efficiency gain. Better energy transformation processes, for example through electrification, have happened. There is also a general shift to the less energy-hungry sectors. For example, the share of whole industry in total gross value added decreased from 20% in 1995 to 16.3% in 2023, although the share of energy intensive industry in manufacturing gross value added remained stable over the same years.

The second important driver was the carbon intensity effect, i.e. the volume of emissions from one unit of produced energy, which taken individually, reduced emissions by 27%. The fuel switch plays a crucial role here. The share of fossil fuels in electricity and heat production decreased from 62% in 1990 to 34% in 2023, whereas the share of renewable and nuclear energy increased from 35% in 1990 to 61% in 2023.

To set these achievements into perspective, Figure 8 combines this assessment of past emission trends with a glance into the future. Based on the European Commission's central scenario supporting the Fit for 55 legislative package, a faster pace is needed in this decade to achieve the EU 2030 target. As in the last three decades, the modelling suggests the largest emission reductions will come from a substantially lower energy intensity (energy intensity should be lower by 22% in 2030) leading to decrease of total emissions by 13% and a less carbon-intense primary energy consumption (energy supply emissions should be lower by 21%) leading to a decrease of total emissions by 12%. Overall, energy-related emissions are expected to decrease faster than those from other sources as implied by the slightly positive non-energy effect.

Figure 8: Effects on total GHG emissions between 1990-2023 and 2023-2030 based on the modelling for the 2030 target (in % of 1990 emissions)



Notes: EU inventories submitted to the UNFCCC, Eurostat energy balances. A positive 'non-energy effect' means that the ratio between total GHG emissions and GHG emissions from fuel combustion is expected to reduce over time. The remaining total emissions excluding LULUCF as shown in the chart is in line with EU's net emissions target of 55% mitigation.

3.3 Progress towards climate neutrality

In 2023, the **Climate Action Progress Report** [19] provided, for the first time, an assessment of progress under the European Climate Law [20] including the collective progress made by Member States towards the EU's goal to achieve climate-neutrality by 2050 [21]. The assessment looked at progress on several aspects and from several sources, while considering the complexity inherent in the many possible paths to achieve a net-zero and resilient economy [22].

Overall, the report concluded that the level of progress by Member States in recent years fell significantly short of the effort required over the coming decades to meet both the medium and the long-term EU climate targets. However, the assessment did not reflect the more ambitious climate intentions that Member States were expected to include in their revised NECPs.

In December 2023, based on that assessment, the Commission issued country-specific recommendations [23] to ten Member States [24]. The Commission urged them to rapidly accelerate action by making tangible progress on planned policies and by taking additional measures. Several Member States also faced sectoral weaknesses that needed to be remedied without further delay.

Most of the concerned Member States (Austria, Cyprus, Czechia, Estonia, Ireland, Croatia, Latvia, Malta, Poland) received the recommendation to '*Step up climate mitigation efforts, by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective*'. Additionally, some Member States received sector specific recommendations (Czechia, Poland, Ireland, Estonia, Latvia) targeting, for example, emissions in transport, agriculture, or enhancing removals in the LULUCF sector.

[19] COM/2023/653 final.

[20] Articles 6 to 8 of the European Climate Law (EUR-Lex - 32021R1119 - EN - EUR-Lex (europa.eu)).

[21] The EU climate-neutrality objective, set out in Article 2(1) of Regulation (EU) 2021/1119, is achieved when EU-wide GHG emissions and removals regulated in EU law are balanced within the EU at the latest by 2050, reducing emissions to net zero. The EU shall aim to achieve negative emissions thereafter.

[22] The assessment was based on the detailed analysis provided in Chapter 5 of the staff working document – 'Technical information' (SWD(2023) 339 final).

[23] Article 7(2) of the European Climate Law.

[24] BE, BG, CY, CZ, EE, IE, IT, HR, AT, LV, MT, PL.

Some Member States (Czechia, Cyprus, Croatia, Malta), and including also Belgium and Bulgaria, received an additional recommendation to '*clarify the country's long-term neutrality goal*'.

Furthermore, Poland, which has still to submit its long-term strategy due on January 2020 as provided for in Article 15 of Regulation (EU) 2018/1999, was recommended to do so, with a view of an assessment of its consistency with the climate neutrality objective.

From the replies, it is evident that the Member States were updating their national energy and climate plans (NECPs) with additional measures to meet the 2030 emission reduction targets. Common areas of focus include the transport and waste sectors, aligning national targets with EU objectives, and developing legislative acts to enhance climate mitigation efforts. While some countries provided detailed plans and progress reports, others acknowledged the need for further work but did not provide specifics. A few countries are revising or updating their long-term strategies to ensure alignment with climate neutrality goals, aiming to reduce emissions across sectors. However, consensus on long-term strategies remains a challenge for some, and there is a variation in the level of detail and commitment shown in the updates. Overall, the efforts reflect a recognition of the need to strengthen policies to achieve climate goals by 2030 and beyond, with a mix of progress and ongoing challenges. For further detail, please see Table 9 below.

Table 9: Overview of country-specific recommendations

Country	Recommendation	Short summary of Member State's reply
Austria	Step up climate mitigation efforts, by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective.	Austria referred to earlier correspondence in which it stated that the Austrian government set the achievement of net climate neutrality by 2040 and listed various measures and initiatives to implement this target.
	Update and increase the ambition and quality on the national long-term strategy, including by substantiating Austria's emission reductions and enhancement of removals targets in individual sectors with credible policies and measures.	Austria has been updating the long-term strategy, but no consensus was reached yet. Austria has not provided any further timeline.
	Submit the draft update of its latest notified integrated national energy and climate plan as provided for in Article 14 of Regulation (EU) 2018/1999, with a view of an assessment of its consistency with the climate-neutrality objective.	Austria submitted its updated NECP by December 2024.
Bulgaria	Submit the draft update of its latest notified integrated national energy and	Bulgaria submitted its NECP in January 2025.

	climate plan as provided for in Article 14 of Regulation (EU) 2018/1999, with a view of an assessment of its consistency with the climate-neutrality objective.	
	Update and increase the ambition and quality on the national long-term strategy, by clarifying Bulgaria's long-term climate-neutrality goal, and by substantiating Bulgaria's emission reductions and enhancement of removals targets in individual sectors with credible policies and measures	Bulgaria plans to update its long-term strategy (LTS); however, it has not provided a concrete timeline.
Cyprus	Step up climate mitigation efforts by making tangible progress on the existing and planned policies and consider additional urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective.	Cyprus informed that it is ramping up its climate efforts to align with the EU's 2050 climate-neutrality goal by expanding renewable energy, particularly solar and wind, aiming for up to 95% renewable sources, and transforming the transport sector towards full electrification. Key projects like the EuroAsia Interconnector will facilitate a renewable shift, while industry, agriculture, and land use sectors will implement technologies and practices to reduce emissions. Streamlining renewable energy permits and boosting financial incentives are part of Cyprus's broader strategy to create a competitive, low-carbon economy in line with EU policies. By 2050 private transportation is expected to be fully electrified.
	Update and increase the ambition and quality of the national long-term strategy by clarifying Cyprus' long-term climate-neutrality goal and substantiating Cyprus' emission reductions and enhancement of removals targets in individual sectors with credible policies and measures	Cyprus is updating its long-term climate strategy to achieve carbon neutrality by 2050, concentrating on realistic plans, precise emissions targets, and sector-specific decarbonization pathways. Key measures include expanding renewable energy, implementing carbon capture technologies, fully electrifying private transport, and enhancing energy efficiency. The strategy's credibility is bolstered through improved monitoring, stakeholder engagement, and adaptation to new scientific and technological developments to ensure a cost-effective and equitable transition.
Latvia	Step up climate mitigation efforts, by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective.	Latvia is strengthening its climate change mitigation efforts to meet its 2030 climate goals by implementing additional policies and measures outlined in its Updated NECP.
	In particular, effort should be directed to reverse the recent trend in the LULUCF sector	Latvia introduced additional measures like bio-charcoal application, storage of carbon in wood products as a target scenario.
	Update and increase the ambition and quality on the national long-term	In 2025, it is planned to update Strategy of Latvia for the Achievement of Climate Neutrality by 2050 by

	strategy, including by substantiating Latvia's emission reductions and enhancement of removals targets in individual sectors with credible policies and measures	revising mid-term targets, considering the EU fit for 55 package, developing additional policies and measures in individual sectors and taking into account EU recommendations
Belgium	Update and increase the ambition and quality on the national long-term strategy, by clarifying Belgium's long-term climate-neutrality goal, and by substantiating Belgium's emission reductions and enhancement of removals targets in individual sectors with credible policies and measures.	The strategy, based on regional plans, aims for climate neutrality by 2050, with Wallonia targeting a 95% reduction in emissions from 1990 levels, Flanders aiming for an 85% reduction in non-ETS sectors from 2005 levels and aiming for climate-neutrality, and Brussels-Capital moving toward EU carbon neutrality goals. Though the federal level lacks its own reduction target, it supports regional efforts (thus 95-87% by 2050 compared with 2005; outside ETS). Political decisions are needed to finalise commitments, but Belgium plans to comply with governance regulations and will introduce a new long-term strategy by 2029, covering a minimum of 30 years, with regional strategies being reviewed as necessary.
Croatia	Step up climate mitigation efforts, by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective.	Croatia adopted additional measures in cooperation with relevant sectors.
	Update and increase the ambition and quality of the national long-term strategy, by clarifying Croatia's long-term climate-neutrality goal, and by substantiating Croatia's emission reductions and the enhancement of removals targets in individual sectors with credible policies and measures.	Croatian Low-carbon Development Strategy outlines a climate neutrality scenario up to 2050, with plans to update the strategy to include this long-term goal. The National Development Strategy aims for Croatia to lead in transforming climate challenges into opportunities by 2030, ensuring a fair transition. The new Act on Climate Change sets the national goal of climate neutrality by 2050, with sector-specific responsibilities determined from greenhouse gas emissions analysis.
Czechia	Step up climate mitigation efforts, by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective. In particular, effort should be directed towards reducing transport emissions and increasing removals in the LULUCF sector.	Czechia is advancing towards its energy and climate goals, with a significant 15% reduction in GHG emissions from 2022 to 2023, and even improvements in the LULUCF sector. Rapid decarbonisation in the energy sector is supported by the Modernisation Fund, aiming to phase out coal by 2033. Updated NECP projections suggest nearing climate neutrality by 2050 with additional measures. Recent policy developments include an updated Methane Strategy, a National Action Plan for Clean Mobility in 2024, and a CCUS Action Plan in 2025. A Forest Act amendment is underway to introduce payments for carbon sequestration.
	Update and increase the ambition and quality of the national long-term	So far, no consensus was reached on the adoption of an explicit target of climate neutrality.

	strategy, by clarifying Czechia's long-term climate neutrality goal, and substantiating Czechia's emission reductions and enhancement of removals targets in individual sectors with credible policies and measures.	
Ireland	Step up climate mitigation efforts, by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective.	Ireland commits to achieve climate neutrality by 2050, as aligned with EU goals and stipulated in its Climate Act, which also mandates a 51% reduction in greenhouse gas emissions by 2030 compared to 2018 levels. Recent policies include a national retrofitting programme and advancements in renewable energy and public transport, contributing to a year-on-year decrease in emissions over the past three years. Irish governance framework involves carbon budgeting and annual Climate Action Plans, aimed at maintaining progress towards these goals. An updated Climate Action Plan for 2025 and new carbon budgets are expected soon to further accelerate emissions reductions. NECP was submitted in July 2024 for period of 2021 to 2030. The long-term strategy was sent to the Commission in July 2024.
	In particular, effort should be directed towards reducing emissions in agriculture and enhancing removals in the LULUCF sector.	Agriculture is the largest contributor to emissions in Ireland, prompting a focus on reducing its impact as part of the Climate Act 2021. The Climate Action Plan 2024 and NECP outline strategies for emissions cuts in agriculture, including improved bovine genetics, sustainable fertilisers, and land use diversification. Key actions include expanding organic and tillage sectors and producing biomethane. Additional developments include grants for low-emission farming practices and a new National Organic Strategy. In the LULUCF sector, measures focus on increasing forest cover and rehabilitating peatlands to enhance carbon sequestration, with continued efforts to adopt new practices and respond to environmental disruptions like recent storms
Italy	Step up climate mitigation efforts by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective. In particular, effort should be directed towards decarbonising energy production.	The final updated NECP sets targets for renewable energy, and several national policies are already driving a profound decarbonisation of the energy industry. The sector is already undergoing a transformation, from permitting regulations to incentives for renewable energy generation.

	Update and increase the ambition and quality of the national long-term strategy, including by substantiating Italy's emission reductions and enhancement of removals targets in individual sectors with credible policies and measures.	Italy does not expect to update its long-term strategy. Italy's Long-Term Strategy was submitted in January 2021 and was already aligned with the 2050 climate neutrality objective. In particular, emissions removals, which play an important role in the strategy, are deemed to be on track to meet the EU-level target.
Estonia	Step up climate mitigation efforts, by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective. In particular, effort should be directed to reverse the recent trend in the LULUCF sector.	In September 2023, Estonia proposed the Climate Resilient Economy Act, aiming to integrate climate-friendly practices across all sectors and enhance Estonia's competitive edge. The Act will set cross-sectoral and sector-specific targets to achieve climate neutrality by 2050, covering energy, industry, buildings, transport, agriculture, waste, and land use. These targets align with the EU's 2030 and 2050 climate goals and consider emission reduction obligations under the Effort Sharing Regulation and LULUCF sectors, as well as the EU ETS. While still under development, the Act seeks to promote legal clarity and investment certainty. Act has not yet been approved by the government or the parliament
	Update and increase the ambition and quality of the national long-term strategy, by substantiating Estonia's emission reductions and enhancement of removals targets in individual sectors with credible policies and measures	Same reply as above.
Poland	Step up climate mitigation efforts, by making tangible progress on the existing and planned policies and consider additional, urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective. Submit the draft update of its latest notified integrated national energy and climate plan as provided for in Article 14 of Regulation (EU) 2018/1999, with a view of an assessment of its consistency with the climate-neutrality objective.	Poland's final NECP, incorporating these recommendations and focusing on accelerating emission reductions through a "With Additional Measures" (WAM) scenario, is in progress. The WAM scenario projects a 50.4% reduction in CO2 emissions by 2030. Emissions from the non-ETS sector will be reduced by 18,2% thus overdelivering on the EU reduction target of 17,1%. The transition is expected to lower energy costs, reduce energy poverty, and spur economic growth (GDP growth of +4,13% average year-on-year between 2025 and 2030). The final NECP will be submitted after public consultations starting in October.
	In particular, effort should be directed towards reducing transport emissions and enhancing removals in the LULUCF sector.	To reduce transport emissions, Poland emphasised energy efficiency and electrification, particularly in road and rail, and adopting low-carbon fuels for shipping and aviation. Efforts focus on promoting public transport and sustainable urban mobility, such as replacing combustion engine buses with zero-emission vehicles. In the LULUCF sector, Poland aims to increase forest cover to 33% by 2050 and is planning to modify forest management in 20 % of the forests by creating so called Social Forests. Agricultural measures under the common

		agricultural policy strategic plan aim to increase soil carbon stock and sequester carbon through practices like afforestation and agroforestry. These initiatives are expected to yield results over the coming years, aligning with LULUCF Regulation goals.
	Submit Poland's national long-term strategy as provided for in Article 15 of Regulation (EU) 2018/1999, with a view of an assessment of its consistency with the climate-neutrality objective.	Poland intends to submit its final long-term strategy by the end of 2024 as pledged in March 2024. The Ministry of Climate and Environment is developing the first draft, incorporating analyses from the updated National Energy and Climate Plan. Completion is expected by October, followed by interministerial and public consultations in November, before government adoption and submission to the European Commission.
Malta	Step up climate mitigation efforts by making tangible progress on the existing and planned policies and consider additional urgent measures to align the expected greenhouse gas emission reductions and projections with the climate-neutrality objective. In particular, efforts should be directed towards reducing emissions in the transport and waste sectors.	The updated NECP for Malta details various policies aimed at reducing emissions across key sectors, though meeting 2030 targets remains challenging, especially in transport and waste. The government plans further measures to promote low-carbon transition, focusing on transport through a national strategy to reduce private vehicle use and enhance public transport and cycling infrastructure. In the waste sector, efforts include a landfill gas capture program and improved fluorinated gas management. Malta is also exploring renewable energy integration across sectors to close the gap to 2030 targets, maintain competitiveness, and ensure a sustainable transition to a climate-neutral economy.
	Update and increase the ambition and quality of the national long-term strategy by clarifying how and by when Malta will become climate neutral, and by substantiating Malta's emission reductions and enhancement of removals targets in individual sectors with credible policies and measures.	Malta is actively aligning its energy and climate policies with the EU's goal of achieving climate neutrality by 2050, as outlined in its Low Carbon Development Strategy. The country is committed to periodically reviewing and updating its long-term strategy to support this collective EU objective.

In 2025, through **National Energy and Climate Reports** (**NECPR**), Member States have also reported on progress towards national objectives, targets and contributions. Almost all Member States, except Belgium, Croatia, Czechia, Poland and Sweden, defined the **objective to achieve climate neutrality by 2050 or earlier**. Bulgaria, Cyprus, Malta, the Netherlands, and Romania have formally indicated, for the first time in a reporting document, a target year to achieve climate neutrality. Romania, in particular, set an early target of 2045. In addition, in July 2025 Slovenia adopted a Climate Act, which sets a binding target of reaching climate neutrality by 2045. Member States have also updated their quantitative national GHG targets up to 2050, slightly increasing the overall climate

ambition compared with the 2023 NECPR (see the staff working document assessing the 2025 NECP progress reports).

The Commission has continued to monitor progress towards climate neutrality also through the **climate-neutrality dashboard**, a set of indicators used to examine historical developments and expected outcomes along multiple dimensions (Table 10). These include climate levers to track specific drivers behind decarbonisation in key sectors. The aim is to maintain continuity in tracking progress towards achieving our common net-zero emissions objective, particularly in this decisive decade for climate action. Overall, the climate-neutrality dashboard shows that, compared with the 2024 edition, approximately two thirds of the indicators have improved, while one third have deteriorated. The most notable advances are in the intensity indicators for final energy consumption and the share of gross final consumption of energy from renewable sources. Among the climate levers, sustainable mobility (measured by the average CO_2 emissions of new cars sold) improved in all Member States, while waste prevention and meat consumption show a weaker improvement.

Table 10: 2025 Climate-neutrality dashboard

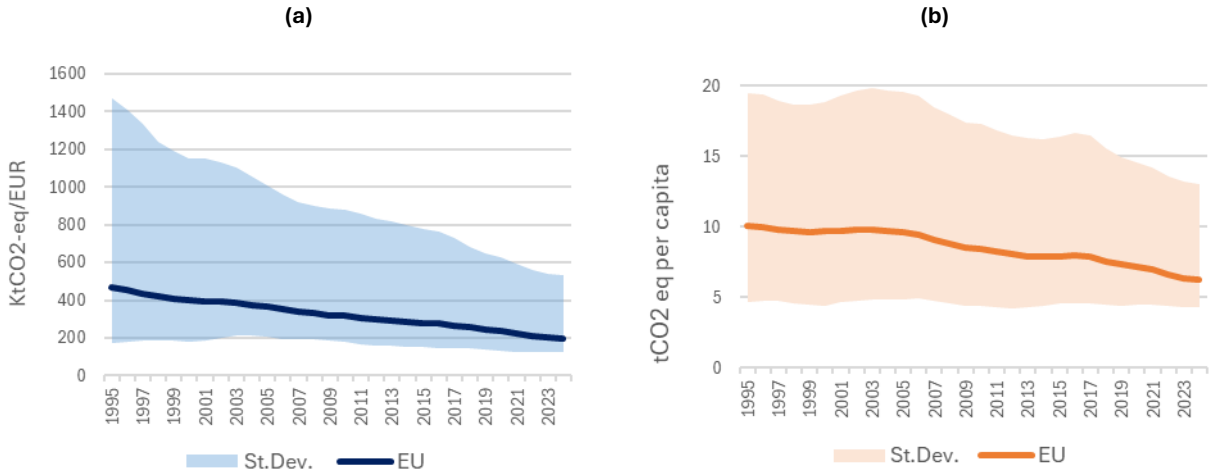
	Historic data[1]								GHG emission projections, levers, and future challenges[4]														
	Total net GHG emissions (% change)				GHG intensity and GDP per capita [3]				2030 objectives and projections				Climate-neutrality levers							Climate-neutrality objectives and projections[5]				
	2024-1990	2024-2023	2024-2019	2024-2015	GHG intensity of GDP (2024)	FEC per unit of GDP (2023)	GHG emissions per capita (2024)	FEC in households per capita (2023)	MS projected net GHG by 2030 (tonnes of CO2 eq. per capita)	ESR target vs MS projections (to 2005 level, ppt)	LULUCF target vs MS projections (tCO2eq/Km² of land)	Share of gross final consumption of energy from **renewable** sources	**Zero-Emission Energy** (share of RES and nuclear in gross electricity	**Greening Industry** (share of RES and electricity in FEC in manufacturing and construction)	**Sustainable mobility** (average CO2 emissions of new cars sold)	**Energy efficient buildings** (FEC in buildings, gOE per m²climatic correction)	**Waste prevention** (municipal waste generation per capita, kg)	**Climate investment** (climate change mitigation purposes, as share of GDP)	**Sustainable consumption** (bovine meet consumption per capita, kg)	MS projected net GHG by 2050 (tonnes of CO2 eq. per capita)	Overshoot vs. linear trajectory net GHG emissions 2024-2050	Overshoot vs. Benchmark Total GHG emissions 2024-2050	Target year for climate neutrality (NECPR, nLTS or other sources)	Legal Status of long term target (based on https://zerotracker.net/)
Austria	13%	-2%	-14%	-1%	197	63	8.1	721	5.6	-8	-26	41%	70%	49%	124	11	765	0.7%	15	2.5	19%	25%	2040	In law
Belgium	-31%	1%	-15%	-16%	206	66	8.3	591	6.8	-4	-4	15%	65%	38%	117	14	656	0.7%	13	3.1	64%	26%	2050	In policy document
Bulgaria	-57%	-4%	-21%	-33%	604	168	5.5	317	2.7	26	-2	23%	50%	39%	142	9	464	0.5%	4	-0.2	-32%	-5%	2050	Declaration / pledge
Croatia	-25%	-5%	-1%	-1%	307	120	4.8	577	4.0	5	-47	28%	58%	32%	132	15	460	0.7%	13	0.7	9%	37%	2050	In policy document
Cyprus	58%	5%	6%	7%	307	69	8.8	351	5.7	-6	0	20%	15%	39%	143	10	657	0.1%	11	3.0	18%	35%	2050	In policy document
Czechia	-50%	-6%	-27%	-21%	460	114	8.5	591	5.0	10	67	19%	39%	40%	143	17	538	0.5%	11	1.2	-19%	-8%	2030	In policy document
Denmark	-54%	-5%	-23%	-27%	112	42	6.1	698	3.7	1	151	44%	73%	44%	101	11	807	1.4%	24	1.6	-3%	-10%	2050	Declaration / pledge
Estonia	-64%	-3%	-29%	-33%	506	105	9.1	683	8.5	-6	-131	41%	51%	57%	145	9	379	0.8%	9	5.0	67%	49%	2050	Declaration / pledge
Finland	6%	-1%	-7%	20%	230	97	9.3	982	7.3	-5	-123	51%	72%	71%	101	7	559	0.7%	18	4.2	46%	8%	2035	In law
France	-37%	-2%	-17%	-21%	135	54	4.8	531	3.6	-1	-21	22%	86%	44%	114	17	544	0.9%	22	2.6	48%	37%	2050	In law
Germany	-46%	-5%	-20%	-23%	211	56	8.4	635	5.8	-13	-217	22%	46%	40%	125	13	622	0.5%	15	2.3	8%	4%	2045	In law
Greece	-36%	-4%	-20%	-30%	321	79	6.2	363	4.0	21	37	25%	40%	48%	124	11	513	0.2%	14	0.3	-11%	8%	2050	In law
Hungary	-47%	-1%	-19%	-15%	338	118	5.0	560	4.4	8	0	17%	52%	44%	138	19	410	1.2%	6	1.1	39%	27%	2050	In law
Ireland	-5%	-2%	-10%	-10%	125	27	10.7	479	9.3	-20	-36	15%	40%	35%	115	27	629	0.1%	16	6.4	74%	47%	2050	In law
Italy	-38%	-4%	-14%	-20%	175	60	5.4	468	4.1	-3	36	20%	37%	42%	127	15	493	0.3%	16	2.3	36%	48%	2050	In policy document
Latvia	-6%	-13%	42%	15%	447	136	6.8	572	7.4	1	-99	43%	62%	70%	142	14	461	1.3%	6	7.3	75%	10%	2050	In policy document
Lithuania	-68%	11%	-4%	14%	281	110	4.8	533	2.8	0	52	32%	61%	44%	142	14	468	1.5%	6	3.2	32%	40%	2050	In policy document
Luxembourg	-45%	-1%	-32%	-29%	110	55	10.3	686	7.0	6	12	14%	56%	47%	130	23	761	0.2%	30	0.8	0%	-2%	2050	In law
Malta	-17%	-3%	2%	1%	123	43	3.8	206	3.0	-49	-9	15%	12%	74%	110	31	635	0.4%	20	2.2	70%	49%	2050	In policy document
Netherlands	-36%	-1%	-21%	-27%	175	50	8.1	431	6.4	-1	-11	17%	33%	25%	96	17	499	0.3%	16	3.4	47%	23%	2050	In law
Poland	-33%	-5%	-18%	-14%	505	121	8.0	542	5.9	1	15	17%	16%	40%	142	16	357	0.6%	1	2.9	19%	28%	2030	In policy document
Portugal	-19%	1%	-15%	-21%	237	81	4.8	285	3.0	11	71	35%	55%	56%	110	14	508	0.4%	21	0.9	-8%	20%	2050	In law
Romania	-70%	19%	0%	0%	319	109	3.6	396	2.0	3	111	26%	51%	32%	130	19	294	0.7%	5	-0.6	-27%	25%	2045	In policy document
Slovakia	-57%	-1%	-19%	-21%	289	96	5.1	447	4.2	4	-25	17%	68%	39%	142	16	469	0.5%	6	1.9	36%	32%	2050	In law
Slovenia	-22%	7%	-11%	-35%	225	91	5.3	490	5.3	1	111	25%	64%	47%	135	16	501	0.5%	14	0.0	35%	6%	2045	In law
Spain	-13%	0%	-15%	-22%	170	65	4.5	287	3.0	8	7	25%	64%	43%	130	10	473	0.3%	13	1.5	22%	36%	2050	In law
Sweden	37%	23%	56%	87%	31	59	1.5	669	0.4	-5	-63	66%	91%	80%	95	9	417	1.2%	22	0.3	12%	30%	2045	In law
EU27	-39%	-3%	-17%	-19%	200	64	6.3	511	4.5	-2	-25	25%	57%	44%	122	12	517	0.6%	14	2.1	23%	24%	2050	In law

Notes: (1) Historical GHG emissions and removals (1990-2024) are based on EEA's 2025 GHG Inventory and Approximated emissions and removals. Emissions from international aviation and maritime transport activities are not included. The 2015-2024 % change for Sweden is based on 2024 emissions, being in 2015 close to zero. (2) GHG intensity of GDP (gCO2-eq/EUR2015) and GHG per capita (tCO2-eq) use net GHG emissions (i.e. including LULUCF and excluding international aviation). Real GDP and population data from Eurostat. (3) GHG emission projections submitted in 2025 by Member States under Art. 18 of the Governance Regulation considering additional measures (WAM). EU Population in 2050 is based on the latest Eurostat population projections. Agriculture and forest land are based on the Eurostat land use statistics. (4) The overshoot vs. a linear trajectory compares, for each Member State, the cumulative projected net GHG emissions (including LULUCF) between 2024 and 2050 with a linear trajectory starting from the 2024 emission level to zero by 2050. The overshoot against an indicative benchmark compares the cumulative projected GHG emissions (excluding LULUCF) with an indicative pathway to climate neutrality based on the scenarios proposed by the European Scientific Advisory Board on Climate Change and then distributed across Member States according to the country's share of EU emissions in the core policy scenario supporting the initiatives delivering the European Green Deal. Target dates to achieve climate neutrality as for the national long-term strategies, the NECP progress reports or, in grey, from other unofficial sources (Net Zero Tracker).

3.4 Additional greenhouse gases indicators

The GHG emission intensity of the economy, defined as the ratio between EU GHG net domestic emissions (i.e. including LULUCF net removals and excluding international maritime and aviation transport) and GDP, fell to 200 gCO_2eq/EUR in 2024, almost 60% below its value in 1995. (Figure 9.a). The steady decline in the GHG emission intensity was accompanied by a convergence among Member States. The similar pattern is shown by the GHG emissions per capita, reaching in 2024 a record low of 6.3 tCO_2-eq, although with a more gradual convergence among Member States (Figure 9.b) compared to the emission intensity of GDP.

Figure 9: (a) Average GHG emission intensity of GDP and (b) GHG emissions per capita (1995-2024)



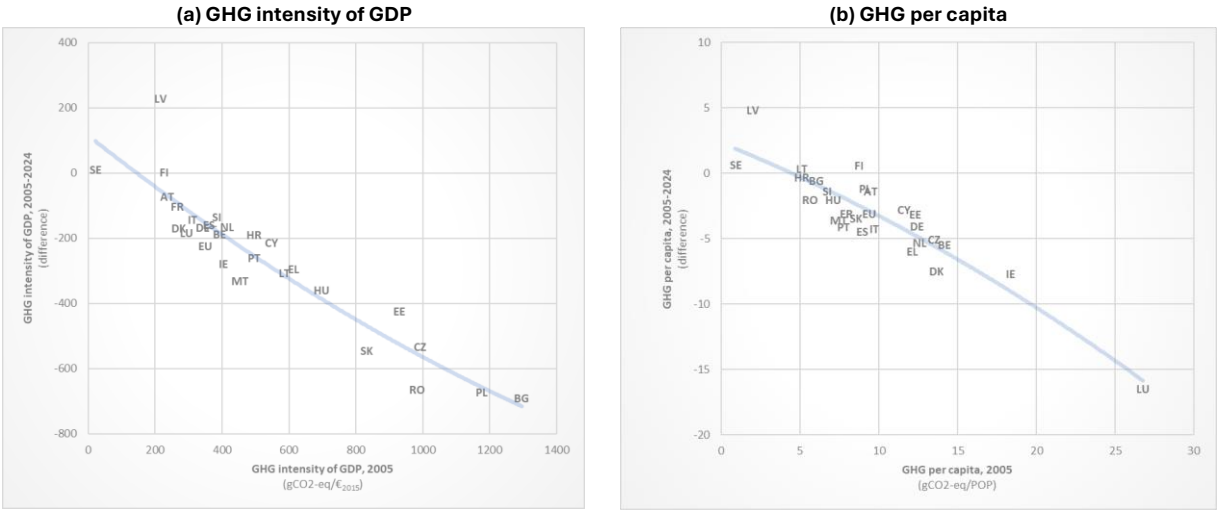
Notes: EU GHG net emissions based on 2025 EU GHG inventory (EEA) and approximated EU GHG inventory for 2024 (EEA), Eurostat for the population [nama_10_pe] and GDP at constant price (2015, [nama_10_gdp]). Shaded areas represent the standard deviation across the Member States. The GHG intensity in this report differs from the ones of the Air Emissions Accounts (AEA). The source of data used for the emissions is the GHG inventories, which are based on the 'territory principle' (i.e. emissions are assigned to the country where the emission takes place), whereas the emissions from the AEA follows the 'resident principle' (i.e. being the final result of the production activity of resident producer units), which is also used in national accounts (for the GDP). It has been preferred here to use GHG inventories to keep the same source of data for emissions throughout the report (in addition emissions from the AEA do not include the emissions from the LULUCF sector).

Since 2005, in all Member States except Latvia [25] GHG intensity of GDP clearly declined. The same is true for net GHG emissions per capita albeit at a slower pace (see Figure 10). Countries with higher emission intensity of GDP ratios in 2005 (e.g. Bulgaria, Poland, Czechia, Romania, Estonia, and Slovakia) experienced the most significant reductions, leading to a convergence towards the EU average. A similar pattern is observed for the emissions per capita rates, with a sizable group of countries with emissions above 10 tonnes of CO_2 equivalent per capita in 2005, moving closer to the EU average of 6 tCO_2-eq in 2023. Nonetheless, in 2023, Poland and Czechia ranked among the top five for the two

[25] Due to a declining LULUCF sink.

indicators, while Bulgaria showed the highest GHG intensity of GDP (at around 600 grammes of CO_2 equivalent per euro of GDP), and Ireland was the highest per capita emitter among the EU Member States (above 10 tonnes per capita).

Figure 10: Greenhouse gas emissions intensity (i.e. the ratio between GHG emissions and GDP, gCO2-eq./ EUR_{2015}) and greenhouse gas emissions per capita in the EU and its Member States in 2005 and changes to 2024

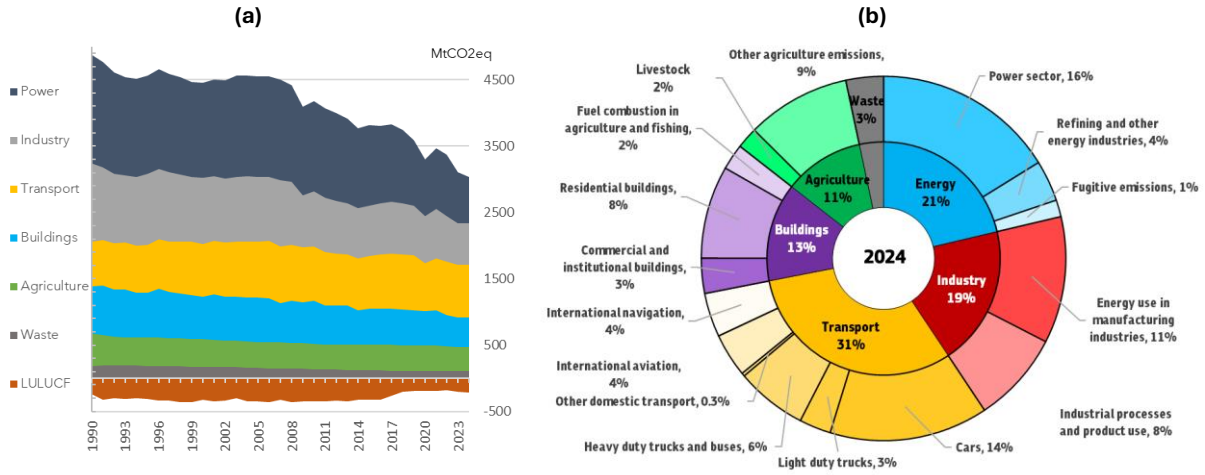


Note: Figures use net GHG emissions, including LULUCF and excluding international transport emissions.
Source: EU GHG net emissions based on 2025 EU GHG inventory (EEA) and approximated EU GHG inventory for 2024 (EEA), Eurostat for the population [nama_10_pe] and GDP at constant price (2015), [nama_10_gdp].

Already in 2023, domestic transport surpassed energy supply as the largest contributor to total EU GHG emissions. Preliminary data for 2024 indicate a strengthening of this trend with domestic transport now accounting for 23% of all GHG emissions (against 21% for the energy sector). Adding emissions from international aviation and maritime, bring the emissions from transport activities above a third of total EU emissions [26]. Transport and energy sector are closely followed by the industry sector (19%) when the energy use in manufacturing industries (11%) and emissions from industrial process and use (8%) are taken together (see Figure 11.b).

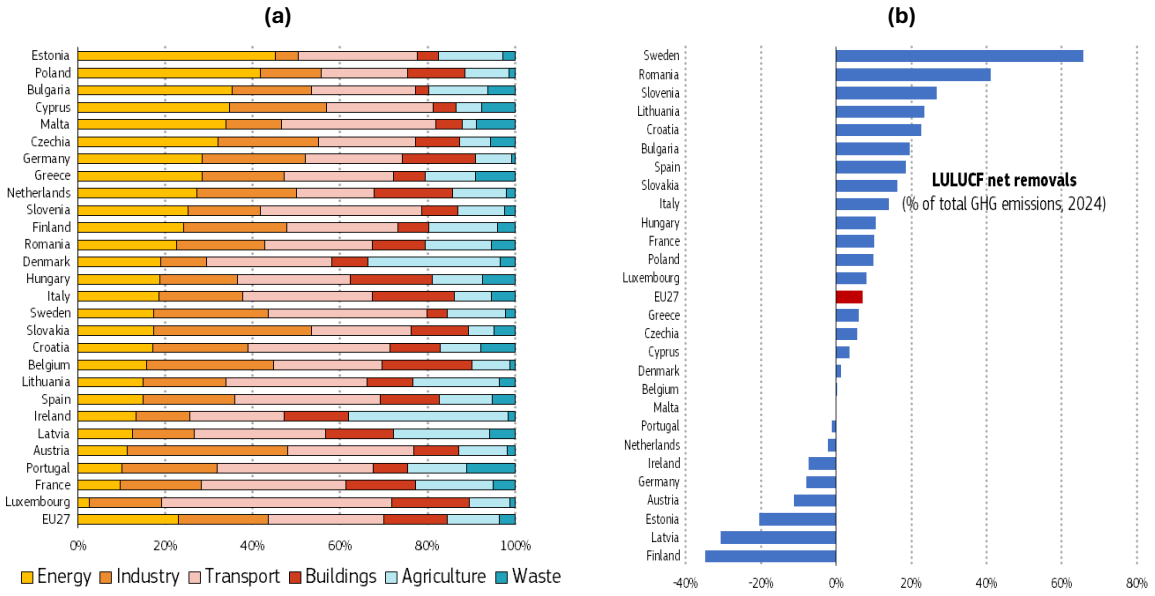
[26] Emissions from international aviation and navigation as reported by Member States according to the UNFCCC GHG inventory (i.e. bunker approach). However, only around 50% of those emissions are currently estimated to be covered by the EU target (see Chapter 2).

Figure 11: EU-27 greenhouse gas emissions by sector (1990-2024) and in % of total emissions (2024)



Notes: The sectors used correspond to the following IPCC sectors: Energy: 1.A.1, 1.A.5, 1.B and 1.C; Energy use in manufacturing industries: 1.A.2: Industrial processes and product use: 2; Transport includes both domestic (1.A.3) and international (1.D.1, bunker approach); Buildings: 1.A.4, Agriculture: 3, Waste: 5. The sub-sectoral distribution within the Energy, Domestic Transport, Buildings and Agriculture sectors is based on the 2023 shares.

Figure 12: EU Member States greenhouse gas emissions by sector 2024 (a) and LULUCF net removals (b), in % of total emissions



Notes: Industry includes both the energy use in manufacturing industries (CFR 1.A.2) and Industrial processes and product use (CFR 2). The buildings sector includes emissions from residential and non-residential heating (CFR 1.A.4.a and 1.A.4.b). It also includes emissions of other sectors (1.A.4.c), like agriculture, but only for their combustion of fuels (tractors, pump fuel use).

Among all the EU Member States, in 2024, GHG emissions from the energy sector were highest in Estonia (45% as a percentage of total GHG emissions), followed closely by Bulgaria (43%) and Poland (42%) (Figure 12.a). Emissions from industry were relatively high in Austria (37%) and Slovakia (36%). The transport sector's contribution to GHG emissions

stood out in Luxembourg (53%), due to purchase of fuels from non-residents in transit. The share of emissions from buildings is very low in many Member States. For many of them (Baltic, Scandinavian Member States and some Eastern Member States), this is because the heating of buildings is done via district heating, for which the related emissions are registered under the energy sector (1.A.1.a. Public electricity and heat production). Ireland and Denmark had the highest shares of GHG emissions from agriculture among all Member States (36% and 30%, respectively), followed by Lithuania (22%) and Latvia (20%). For Sweden, and with some distance also for Romania, the LULUCF sink was significant in relation to the countries' respective GHG emissions, while for Finland, Latvia and Estonia the LULUCF sector became, in recent years, among the most important source of emissions.

Table 11: Total GHG emission per Member States ($MtCO_2$-eq)

	Total GHG emissions, excl. LULUCF, excl. international transport					Total net GHG emissions, incl. LULUCF, excl. international transport					Total net GHG emissions, incl. LULUCF, incl. international transport				
	1990	2005	2015	2024	2024-1990	1990	2005	2015	2024	2024-1990	1990	2005	2015	2024	2024-1990
Belgium	146	145	119	99	-32%	143	143	118	99	-31%	159	172	141	126	-21%
Bulgaria	99	62	60	44	-56%	82	47	53	35	-57%	83	48	54	35	-57%
Czechia	196	148	126	98	-50%	187	138	118	93	-50%	187	139	119	94	-50%
Denmark	72	69	51	37	-49%	79	74	51	37	-54%	84	79	56	43	-49%
Germany	1252	990	902	649	-48%	1288	1011	908	700	-46%	1308	1042	939	731	-44%
Estonia	40	19	18	10	-74%	35	17	19	13	-64%	36	17	20	13	-64%
Ireland	56	70	60	54	-4%	61	76	64	58	-5%	62	79	67	61	-1%
Greece	104	137	96	69	-33%	102	133	93	65	-36%	113	145	101	76	-32%
Spain	287	436	332	269	-6%	250	389	280	219	-13%	267	427	319	266	0%
France	547	555	460	369	-32%	524	500	420	332	-37%	540	524	443	353	-35%
Croatia	32	30	25	24	-23%	25	22	19	19	-25%	26	22	19	20	-24%
Italy	523	596	443	372	-29%	519	562	402	320	-38%	528	578	416	336	-36%
Cyprus	6	9	8	9	59%	5	9	8	9	58%	6	11	10	10	62%
Latvia	26	11	11	10	-63%	14	4	11	13	-6%	15	5	12	13	-14%
Lithuania	48	22	20	18	-62%	43	17	12	14	-68%	44	18	13	14	-67%
Luxembourg	13	13	10	8	-40%	13	12	10	7	-45%	13	14	11	9	-33%
Hungary	95	77	62	54	-43%	92	71	57	48	-47%	92	72	57	49	-46%
Malta	3	3	2	2	-17%	3	3	2	2	-17%	4	5	7	9	154%
Netherlands	223	215	195	143	-36%	228	220	200	146	-36%	267	282	250	192	-28%
Austria	80	93	79	67	-16%	66	78	75	74	13%	67	80	77	77	16%
Poland	476	401	383	332	-30%	443	348	348	299	-33%	445	350	351	303	-32%
Portugal	59	86	68	51	-14%	63	90	65	51	-19%	66	94	70	59	-12%
Romania	257	150	117	117	-55%	230	119	68	69	-70%	231	120	69	69	-70%
Slovenia	19	21	17	15	-18%	14	13	17	11	-22%	15	14	18	11	-22%
Slovakia	74	50	40	33	-55%	65	46	35	28	-57%	65	46	35	28	-57%
Finland	72	70	55	39	-46%	49	46	44	52	6%	52	49	47	55	6%
Sweden	71	66	53	47	-33%	12	8	-2	16	37%	16	17	6	24	51%
EU-27	**4873**	**4546**	**3813**	**3039**	**-38%**	**4635**	**4199**	**3495**	**2827**	**-39%**	**4791**	**4449**	**3729**	**3079**	**-36%**
EU-27 Net GHG emissions (EU target scope)											***4726***	***4337***	***3622***	***2970***	***-37%***
EU-27 Net GHG emissions (EU NDC scope)											***4689***	***4279***	***3575***	***2923***	***-38%***

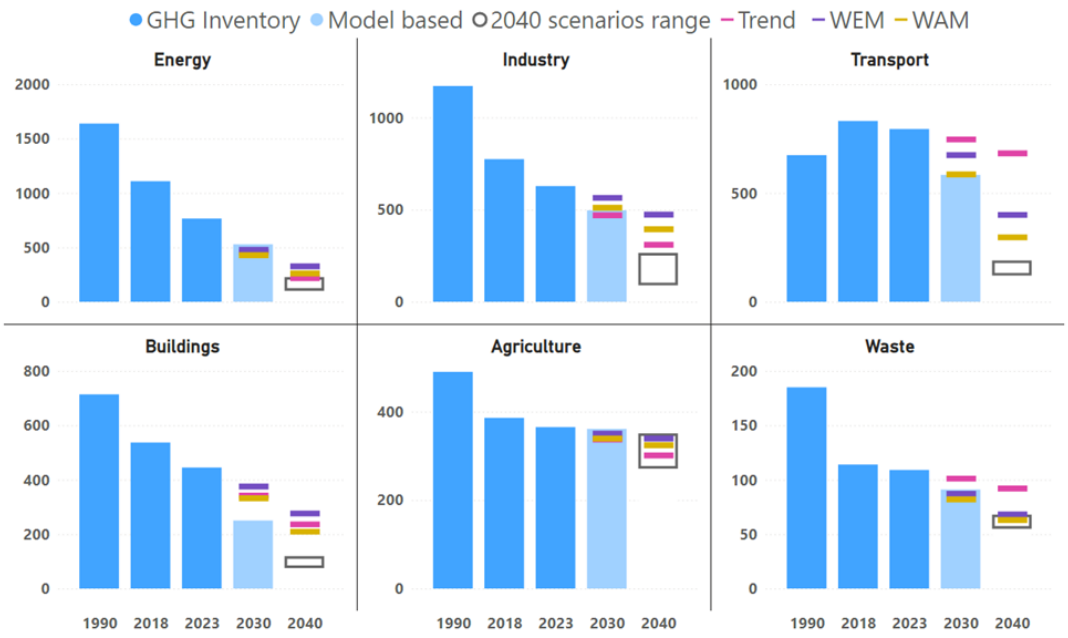
Note: The last two lines refer to the EU GHG emission aggregate which better reflects the exact legal scope as provided by the European Climate Law. For more details, see Chapter 2.

4 EU's greenhouse gas emissions by sectors

This chapter provides detailed information on greenhouse gas (GHG) emissions developments in the main sectors of the economy. It includes sub-sectoral analysis with the aim of better understanding the main drivers of past trends, and the challenges and the opportunities for further reducing emissions and greening the sectors. In addition, the chapter presents a decomposition analysis by sector, using a standard technique [27]. The land use, land use change and forest (LULUCF) sector is not analysed in this chapter, being already investigated in Chapter 4 of the Climate Action Progress Report.

Emission reductions since 1990 were significant in the energy supply sector [28] (-53%, or -26 $MtCO_2$-eq per year on average) and in industry, including both fuel combustion in manufacturing and emissions from industrial processes and product use (-46% or -16 $MtCO_2$-eq/y-avg). Emissions also fell in buildings (-38% or -8 $MtCO_2$-eq/y-avg). In the same period, emissions in the transport sector increased (+18%, or 4 $MtCO_2$-eq/y-avg), although they have been slightly decreasing in the last five years. Emissions reduction in the agriculture sector has visibly slowed in recent years. Emissions in the waste sector have shown a similar trend (see Figure 13).

Figure 13: Past and expected emission reductions by sectors



[27] Decomposition analysis is a mathematical method used in economics to quantify the impact of drivers to a change in value in a rigorous way. The method ensures that the sum of the drivers is equal to the total change of the GHG emissions. This work uses the Logarithmic Mean Divisia Index (LMDI) in the formulation of the drivers.

[28] It includes power electricity and heat production (CFR 1.A.1.a), petroleum refining (CFR 1.A.1.b), other energy emissions (CFR 1.A.5), fugitive emissions (CFR 1.B) and indirect CO2 emissions.

Note: Based on 2025 GHG inventories and 2025 GHG projections submitted by Member States. 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. The grey squares for 2040 show the range of expected emissions under the S1 and S3 scenarios.

Although the EU climate framework does not have sector-specific targets, the model-based results from the Commission's impact assessments [29] provide an indication of what modelling to inform intermediate targets to 2050 shows in terms of expected sectoral emissions in 2030 (for the agreed target) and 2040 (for the range of scenarios considered). Compared with the progress achieved in the past five years, in the years up to 2030, the annual rate of emission reductions must significantly accelerate in the transport and buildings sectors. Member States'projections are also falling short of the expected contribution for buildings, and, for transport and industry when only existing measures are considered. For agriculture (excluding the impacts of LULUCF), projected emissions reductions are less to 2040, though efforts are still required now to address the fact that emissions reductions have slowed in recent years. Climate neutrality in 2050 also requires all sectors to contribute.

As we approach 2030, attention must focus on emission trends and forecasts in different sectors. Efforts should increasingly be directed to the 'harder-to-abate' sectors to fully reap the benefits of the green transition.

4.1 Energy supply emissions

The energy industries, especially the power sector, play a crucial role in the transition to climate neutrality, not only because they are among the largest sources of greenhouse gas emissions, but because the transition relies heavily on the electrification across all sectors, making it essential to reduce dependence on gas and oil in electricity production.

In the EU, the energy sector is largely regulated under the EU Emissions Trading System (EU ETS), which has been instrumental in driving significant emission reductions – over 50% since 1990 – by putting a price on carbon and incentivising cleaner energy production. Careful attention to this sector is vital, as its transformation affects the entire economy and energy security.

Emissions from the energy sector are reported under three main categories in the greenhouse gas inventories:

- Public Electricity and Heat Production (1.A.1.a),
- Petroleum Refining (1.A.1.b),
- Manufacture of Solid Fuels and Other Energy Industries (1.A.1.c)

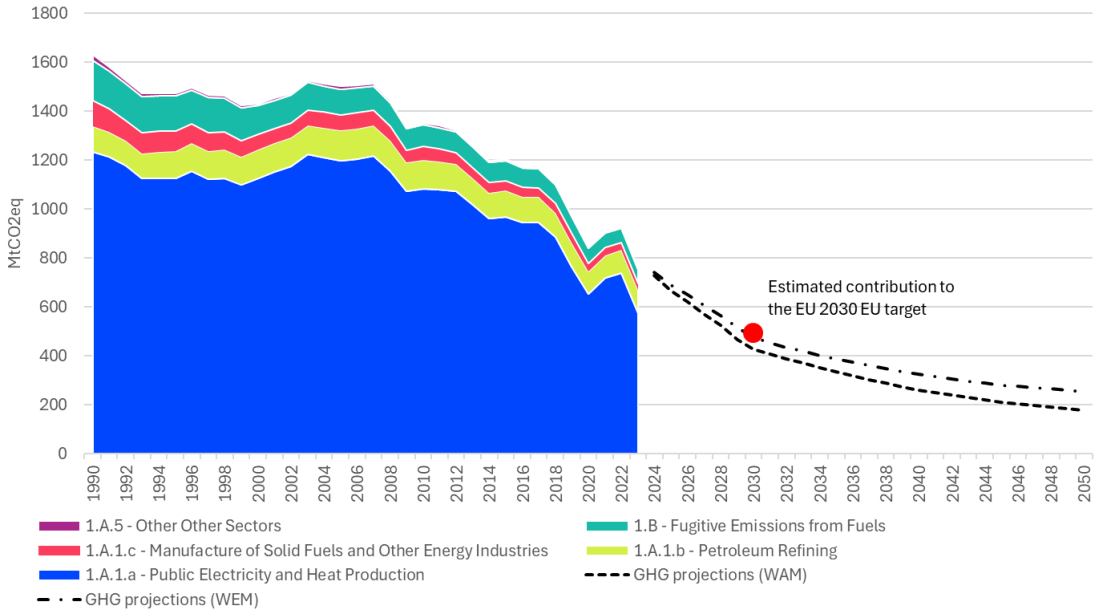
[29] Supporting the delivering the European Green Deal, as further refined in the Commission's impact assessment for the 2040 target proposal.

In order to facilitate comparison across countries and forecasted emissions, in this analysis the sector also includes Fugitive Emissions from Fuels [30] (1.B), Other Sectors (1.A.5), and indirect CO2 emissions [31].

Historical developments, trends and projections

In the EU, the energy supply sector presents the largest decrease in GHG emissions since 1990 (54%), which have nearly halved compared to 2005 levels, with a significant drop in 2023 (18%). While the sector accounted for more than a third of total GHG emissions, its share fell to below 25% in 2023, surpassed by the transport as the largest source of emissions in the EU.

Figure 14: Emissions in the Energy supply sector (1990-2023) and projections (2024-2050)



Note: Based on 2025 GHG inventories and 2025 GHG projections submitted by Member States. The estimated contribution to the EU 2030 EU target is based on the modelling outcomes of the core policy scenario supporting the Fit-for-55 initiatives.

Emissions fell significantly in all subsectors (i.e. largely above 50%), except for petroleum refining (falling by 13%). Emissions from electricity and heat production have decreased by 53%, over the past 33 years since 1990. The fall was driven by a significant decline in coal usage and growth in the use of renewable energy sources. In addition to improved energy

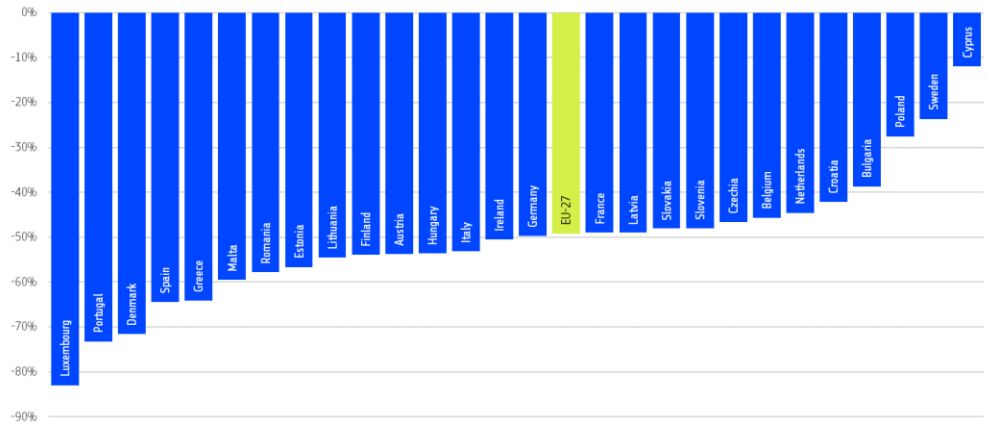
[30] The unintentional release of gases or vapours, primarily greenhouse gases, from industrial processes, equipment, or infrastructure involved in the extraction, production, processing, storage, transportation, and distribution of fossil fuels.
[31] Emissions that occur at sources owned or controlled by another entity but are a consequence of the reporting entity's activities. These typically include emissions from the generation of purchased electricity, heating, and cooling consumed by the reporting entity.

efficiency, there has been a move towards less carbon intensive fuels [32]. Coal consumption in 2023 was almost three times lower than in 1990. The use of renewable energy sources in electricity and heat generation has increased substantially in the EU since 1990. Improved energy efficiency and a less carbon intensive fuel mix have resulted in reduced CO_2 emissions per unit of fossil energy generated [33].

Based on the latest GHG projections – submitted by Member States and aggregated at EU level – emissions from the energy supply sector will align to the expected emissions from the model-based results supporting the delivery of the European Green Deal.

As illustrated in Figure 15, emissions from the energy supply sector declined in all Member States, although to different degrees. Luxembourg, Portugal, Denmark, Spain and Greece were able to cut more than two thirds of their emissions since 2005, while Cyprus has seen only a minimal reduction (12%). Among the countries starting with the highest share of energy emissions in total GHG emissions (i.e. higher than 40% in 2005), Poland and Bulgaria achieved the lowest reduction (28% and 39%, respectively).

Figure 15: Change in energy supply sector emissions by Member State (2005-2023, %)



Main drivers

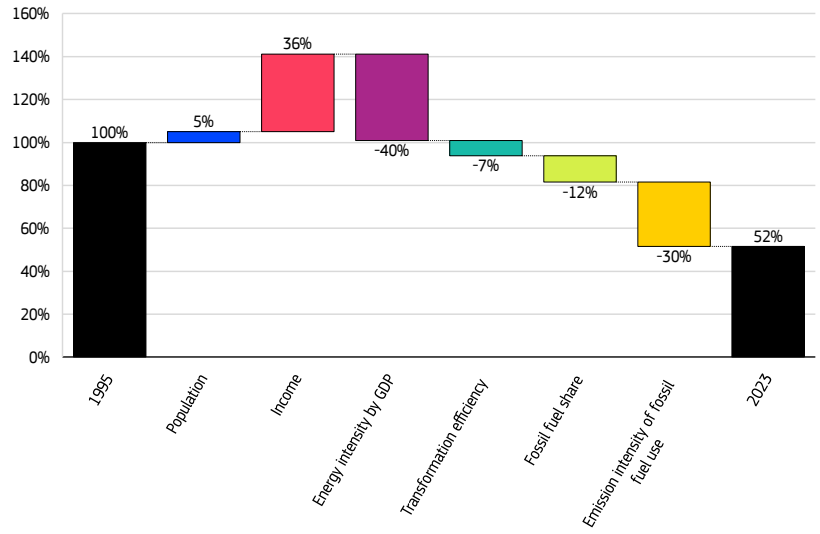
Due to data availability, this section focuses on the period 1995-2023. The emissions of the energy sector decreased by 46% between 1995 and 2023. If emissions followed population and GDP growth, we could have expected a 43% increase in GHG emissions. However, a reduced energy intensity per GDP and efficiency gains in fossil fuel combustion counterbalanced that increase. This likely reflects changes in the structure of the economy and technical improvements in emission control and combustion processes. Contribution

[32] Between 1990 and 2023, the use of solid and liquid fuels in thermal power stations decreased strongly (by 64 % and 85 %, respectively) whereas natural gas consumption developed in the opposite direction (increasing by 48 %).

[33] EU's energy sector leads the way in cuts to greenhouse gas emissions in 2023 | European Environment Agency's home page

to emission reductions also came from the energy transformation efficiency and lower fossil fuel share (and higher share of renewable energy) in the energy mix.

Figure 16: Decomposition of emission in energy consumption (1995-2023)



Decomposition factors:

$$GHG_E = POP * \frac{GDP}{POP} * \frac{FEC}{GDP} * \frac{PEC}{FEC} * \frac{FFC}{PEC} * \frac{GHG_E}{FFC}$$

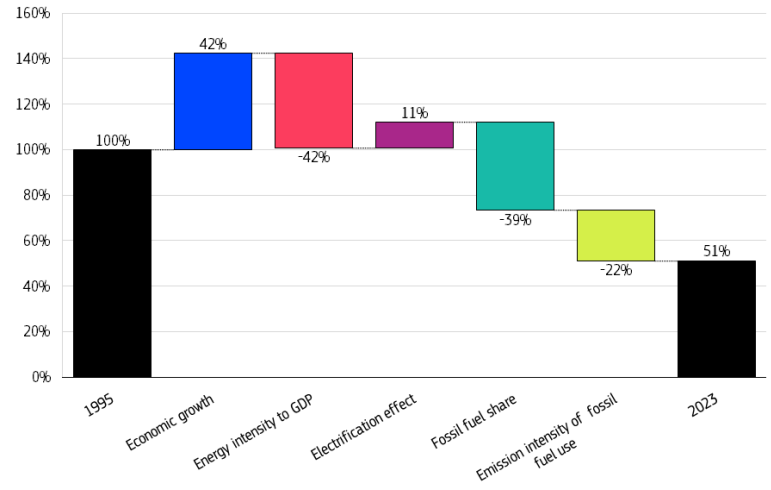
POP – Population
GDP/POP – Income (GDP per capita)
FEC/GDP – Final energy use per unit of GDP
PEC/FEC – Transformation efficiency
FFC/PEC – Fossil fuel share in energy
GHG_E/FFC – Emission intensity of fossil fuel combustion

POP – Population
GDP – Gross Domestic Product
FEC – Final Energy Consumption
PEC – Primary Energy Consumption
FFC – Fossil Fuel Consumption
GHG_E – GHG emissions related to the energy supply

The shift towards renewable energy sources and their replacement of fossil fuels in the production of energy, becomes particularly evident when examining emissions from electricity and heat generation (Figure 17). In this sub-sector, GHG emissions have nearly halved since 1995.

In addition to a significant reduction in energy intensity relative to GDP, the increased deployment of renewables in electricity and heat generation has accounted for nearly 40% of the emissions reduction. Improvements in efficiency and a transition to lower-carbon fuel sources contributed a further 22%. These positive effects have more than compensated for the rise in electricity's share of total energy demand (the electrification rate effect).

Figure 17: Decomposition of emission in electricity and heat production (1995-2023)



Decomposition factors:

$$GHG_{EL} = GDP * \frac{FEC}{GDP} * \frac{GEHP}{FEC} * \frac{FE}{GEHP} * \frac{GHG_{EL}}{FE}$$

GDP – Economic growth
FEC/GDP – Energy intensity of GDP
GEHP/FEC – Electrification effect
FFE/GEHP – Fossil fuel energy in the production of electricity and heat
GHG_EL/FFE – Emission intensity of fossil fuel energy

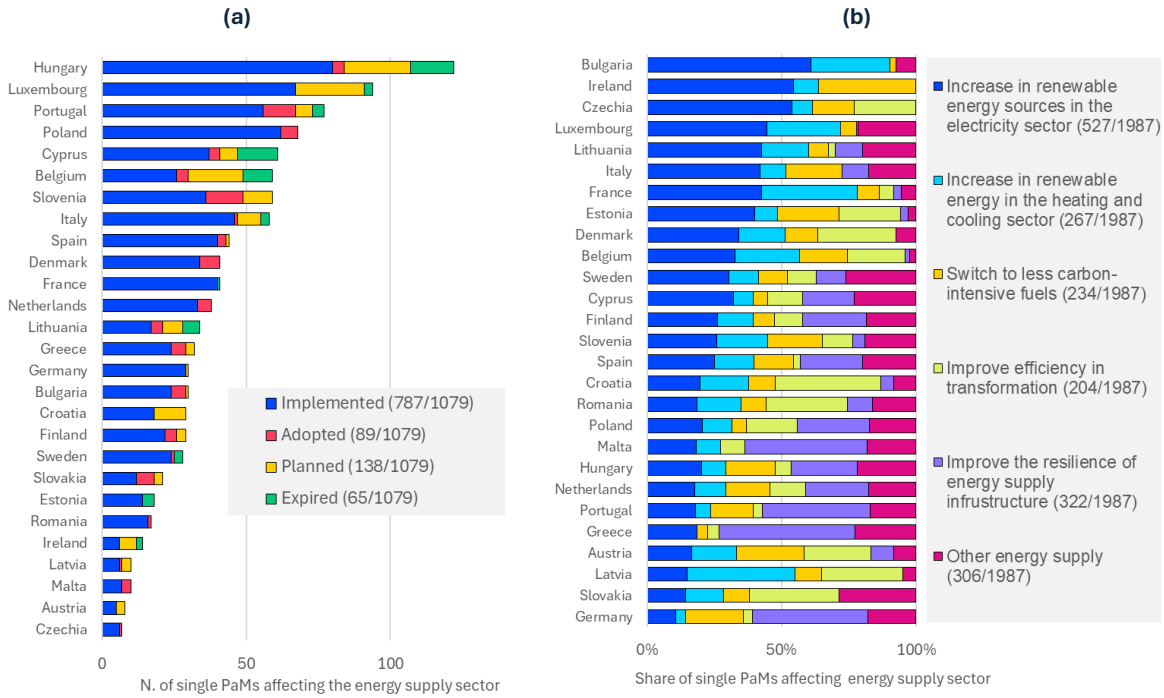
GDP – Gross Domestic Product
FEC – Final Energy Consumption
GEHP – Gross electricity and heat production
FFE – Fossil Fuel in electricity and heat production
GHG_EL – GHG emissions related to the electricity and heat production

Policies and measures

Effective climate policies are essential for reducing emissions in the energy supply sector, particularly in electricity and heat production and oil refineries, which are among the largest sources of greenhouse gases in the EU. Through instruments like the EU ETS, emissions from these sectors are capped and progressively reduced, creating market signals that encourage cleaner technologies. Complementary policies under the European Green Deal and the Fit-for-55 package further accelerate the transition by promoting energy efficiency, renewable integration, and decarbonization of industrial processes. **National measures**, including carbon pricing, fossil fuel subsidy reform, and targeted support for innovation, play a crucial role in aligning sectoral transformation with the EU's climate neutrality goals.

Every two years, EU Member States report on national policies and measures under the Governance Regulation. In 2025, they reported over one thousand policies and measures targeting energy supply (around a third of all single policies and measures), of which a fourth still to be implemented.

Figure 18: a) Number of single policies and measures the EU Member States reported as affecting energy sector emissions; by status of implementation (b) and by main objective.



Notes: data on policies and measures are based on a preliminary dataset of 2025 NECP progress reports (Annex IX). Due to a delay in the submission, data for Belgium refer to the 2023 NECP progress reports. Member States can indicate more than one objective for the same policy and measure. In brackets, the EU PaM's totals. Order of country is aligned to the share of policies and measures with an increase in renewable in the energy sector.

Most of these policies and measures aim to increase renewable energy sources in the electricity (27%) or in the heating and cooling (13%) sectors (e.g. feed-in tariff, financial support, installation grants, etc). Another 16% aim to improve the resilience of energy supply infrastructure, including ensuring energy supply in case of major disruptions to the network, or increasing the ability of the power network to absorb increased share of renewable generation. Several policies (12%) support the switch to less carbon-intensive fuels. Fewer policies and measures are directed to improve the efficiency in transformation (10%), including better control of fugitive emissions.

Data on policy impact on emission reductions by 2030 was available for only 8% of policies and measures targeting energy supply emissions. This highlights a major gap in how Member States evaluate the effectiveness of their climate policies. As a result, Table 12 presents only an illustrative list of measures with reported impacts. Policies lacking impact data cannot be meaningfully assessed.

Table 12: Illustrative list of polices and measures affecting energy supply emissions

Country	Name of policy or measure	Description	Start year	Type of instrument	Related EU policy	Emissions reductions in 2030 (KtCO2eq)	% of total energy emissions in 2005
Ireland	Renewables Electricity Generation	It aims for 70% of Ireland's electricity to come from renewable sources by 2030	2005	Economic; Regulatory	Renewable Energy Directive	6 640	42%
Greece	Improve conventional power system – Phasing out lignite	Gradual decommissioning of old inefficient and more pollutant thermal power units and interconnection of certain islands with the mainland grid.	1996	Economic; Regulatory	Electricity Market Directive; Renewable Energy Directive; ETS Directive	9 493	16.2%
Bulgaria	Promotion of carbon capture and storage projects	Support for innovative low-CO2 technologies in energy-intensive industries	2028	Regulatory	CCS Directive; ETS Directive	2 950	10.8%
Austria	Enhancement of renewable energy through green gas	Market uptake of renewable gases (mainly biomethane and hydrogen) both in the existing gas grid as well as in dedicated hydrogen grids.	2025	Planning; Regulatory	Renewable Energy Directive	1 000	6.2%
Czechia	Preferential feed-in tariffs for electricity produced from renewable energy sources	The law defines minimal feed-in tariffs for electricity produced from RES and guarantees its long-term validity and obligation of distributors to connect sources using RES and purchase the electricity from RES.	2004	Economic; Regulatory	Renewable Energy Directive	2 403	3.7%
Finland	Phasing out coal in energy production	Legislation prohibits use of coal in energy production from 1 May 2029.	2019	Economic; Regulatory	Non related	650	2.7%
Germany	GHG-Hydrogen power plants and power plant strategy	Planned tender for 7 GW of hydrogen-capable power plants (of which 5 GW are new installations and up to 2 GW are modernisations)	2025	Economic	Non related	9 040	2.4%
Slovakia	Decommissioning Thermal Power Plant	Decommissioning of the Vojany coal-fired power plant. Termination of electricity production.	2024	Economic, Fiscal	ETS Directive	243	2.0%

Challenges and opportunities

The decarbonisation of the energy supply sector presents significant opportunities for the EU, particularly through advances in renewable energy technologies and hydrogen production. The EU's industry has the potential to play a key role in providing these technologies, based on a still strong industrial basis and research and innovation (R&I)

performance [34]. Between 2021 and 2023, EU electricity consumers saved EUR 100 billion thanks to electricity generation from new solar PV and wind capacity, demonstrating the importance of unlocking renewable energy's potential to reduce fossil fuel reliance and lower costs[35]. The Clean Industrial Deal and the Net-Zero Industry Act (NZIA) emphasise the development of clean energy infrastructure, such as electrolysers for renewable hydrogen, which saw EU installed capacity grow from 228 MWe in 2023 to 663 MWe in 2024. Small modular reactors (SMRs) are also being promoted as a more dispatchable nuclear option.

Despite these opportunities, the EU faces challenges in decarbonising its energy supply. For instance, the EU still holds a strong position in the wind energy, heat pumps, solar thermal technology and biomethane, but the sectors need new momentum, also to cope with increasing external competition. The EU lags behind China in reactor construction capacity, with only 5.3% of global new nuclear reactor projects led by EU-based firms. Similarly, the hydrogen sector grapples with high production costs and dependencies on non-EU countries for critical materials like cobalt and vanadium used in renewable fuels. Geothermal energy, though a promising renewable source, faces hurdles in scaling up due to reliance on non-EU manufacturers for key components like steam turbines and expanders. Furthermore, skills shortages and an ageing workforce in nuclear and energy-intensive sectors threaten progress, necessitating targeted reskilling and training programs.

To address these challenges, the EU must prioritise innovation and streamline regulatory processes. The Competitiveness Compass and Strategic Energy Technology Plan highlight the need for coordinated research and development (R&D) to reduce dependencies on critical raw materials and improve energy efficiency. Accelerating permitting for energy projects, as outlined in the Electrification Action Plan, will also be critical to modernising grids and expanding renewable infrastructure. Meanwhile, financial instruments like the European Hydrogen Bank, allocating EUR 720 million in 2024 for hydrogen projects, can mitigate investment risks and support scaling. By leveraging its existing technological advantages, fostering domestic manufacturing, and addressing workforce gaps, the EU can strengthen its energy supply sector while advancing climate neutrality goals.

4.2 Industry emissions

The industry sector is central to the EU's transition towards climate neutrality. First, it represents almost a fourth of EU's current emissions, being an important element of the decarbonisation of the EU's energy system. Furthermore, it manufactures the climate solutions of the future, including innovative construction materials, sustainable transport

[34] 2025 Competitiveness Progress Report.

[35] How much money are European consumers saving thanks to renewables? – Renewable Energy Market Update - June 2023 – Analysis - IEA

solutions and new technologies that enable emissions reductions across the society. Beyond emissions, a competitive and resilient industrial base is vital to EU's strategic autonomy — scaling clean-tech manufacturing, diversifying and shortening supply chains, and improving resource and energy efficiency to reduce dependencies, create quality jobs and strengthen global competitiveness. An EU industry that can thrive in a global competitive environment is key.

Emissions from the industry are reported under two main categories in the greenhouse gas inventories:

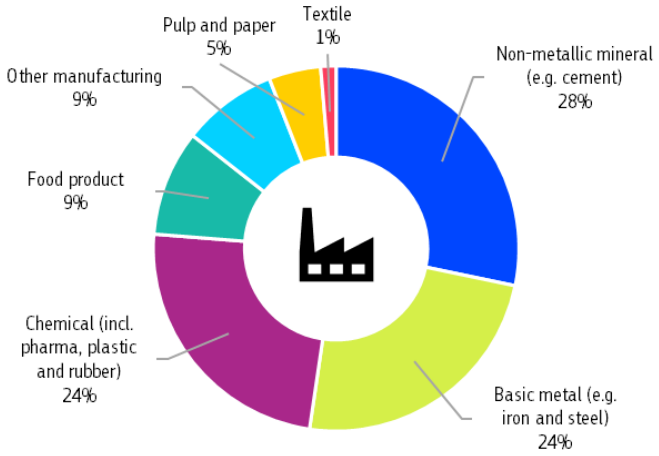
- Fuel combustion in industry (1.A.2 - Manufacturing industries and construction),
- Industrial processes and product use (2 - Industrial Processes and Product Use).

The first category covers emissions from fuel combustion in various industrial activities, such as iron and steel industry, glass, ceramics, cement production, and chemical manufacturing. The second category includes emissions directly emitted during industrial production.

Historical developments, trends and projections

In 2023, the industrial sector accounted for 22% of total EU greenhouse gas emissions, with 58% from fuel combustion and 42% from industrial processes. As shown in Figure 19, the non-metallic mineral industry, including cement, glass, and ceramics, was responsible for 28% of total industrial emissions, followed by the iron and steel and chemical industries (each contributing 24%).

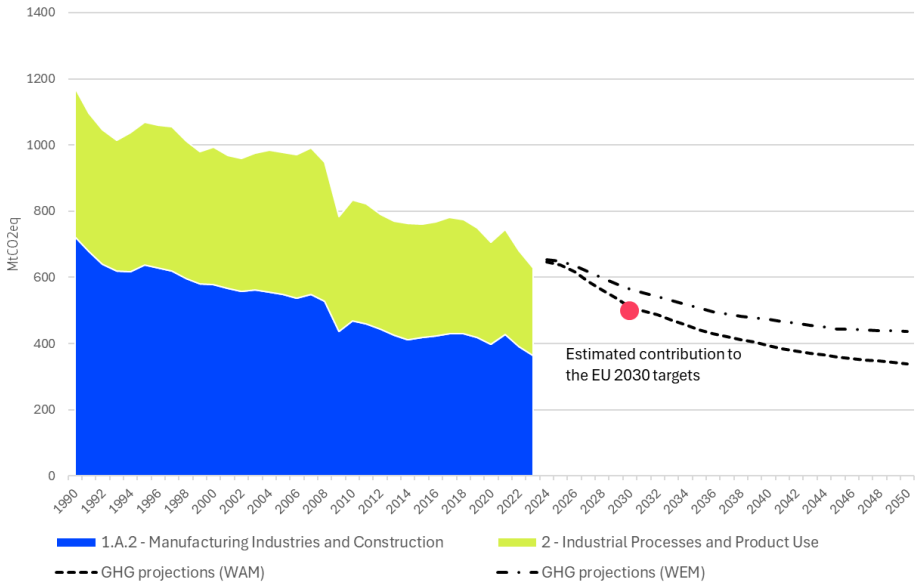
Figure 19: Industrial emissions by industry sub-sector (2023, %)



Between 2005 and 2023, total industrial emissions declined by 36%. Emissions from fuel combustion decreased by 34%, and process-related emissions by 38%, indicating a comparable pace of reduction in both categories.

The rate of emission reduction accelerated in recent years (see Figure 20). Over one-third of the total reduction since 2005 occurred between 2019 and 2023. If this trend continues, the emissions in the industrial sector are likely to align with its estimated contribution to the 2030 EU climate targets. Projected emissions, when additional measures – i.e. measures that have been planned but not yet adopted and implemented – are considered, converge to the expected contribution. This indicates that full and effective implementation of planned measures is necessary to close the gap.

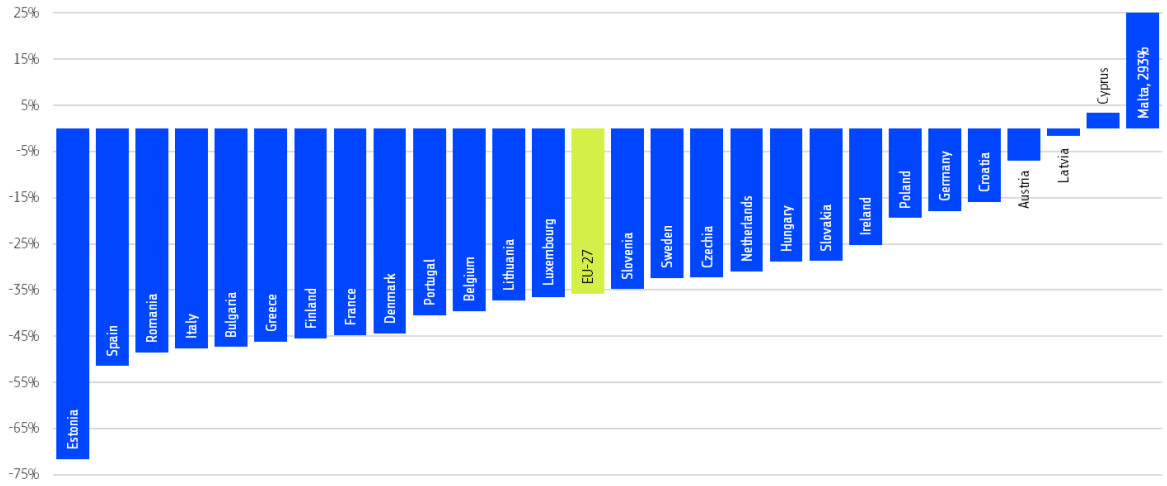
Figure 20: Emissions in industry (1990-2023) and projections (2024-2050)



Note: Based on 2025 GHG inventories and 2025 GHG projections submitted by Member States. The estimated contribution to the EU 2030 EU target is based on the modelling outcomes of the core policy scenario supporting the Fit-for-55 initiatives.

As illustrated in Figure 21 below, Malta and Cyprus are the only Member State where industrial emissions have increased since 2005. Malta's GHG emissions increased by 293% between 2005 and 2023, primarily due to a rise in emissions from refrigeration and air conditioning systems. Latvia has seen only a minimal reduction (-2%), and Austria also saw limited progress (-7%). By contrast, Estonia achieved the largest reduction (-72%), followed by Spain (-51%), Romania and Italy (each -48%).

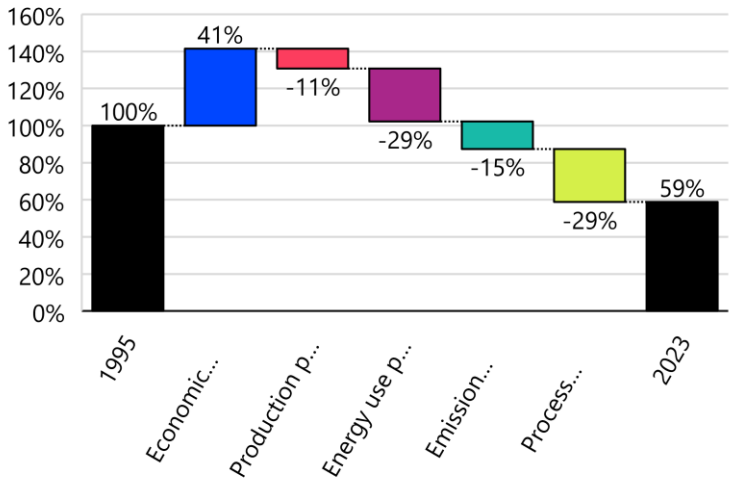
Figure 21: Change in industrial emissions by Member State (2005-2023, %)



Main drivers

Due to data availability, the analysis in this section focuses on 1995-2023. Figure 22 shows the decomposition analysis of the sector at EU level.

Figure 22: Decomposition of emission in industry (1995-2023)



Decomposition factors:

$$GHG_{ind} = GHG_E + GHG_P$$
$$= GVA_{ind} * \frac{PVI_{ind}}{GVA_{ind}} * \frac{FEC_{ind}}{PVI_{ind}} * \frac{GHG_E}{FEC_{ind}} + GVA_{ind} * \frac{PVI_{ind}}{GVA_{ind}} * \frac{GHG_P}{PVI_{ind}}$$

GVA – Economic activity
PVI/GVA – Production per unit of GVA
FEC/PVI – Energy use per unit of product
GHG_E/FEC – Emission intensity of energy used
GHG_P/PVI – Process emission per unit of product

GVA – Gross Value Added (constant price)
PVI – Production Volume Index
FEC – Final Energy Consumption
GHG_E – GHG emissions related to Energy use
GHG_P – GHG emissions related to industrial Processes

If emissions had followed the growth of the sectoral gross value added (GVA), they would have been 41% higher in 2023 compared to 1995. However, the decline in emission and energy intensity of industry has played a central role in reversing this trend. Today, less energy is required to produce one unit of output and the energy used is cleaner. In addition, direct process emissions have also decreased. Together, these developments represent key drivers of industrial decarbonisation.

A last important factor is the transformation of production chains. Over time, industries have shifted towards producing goods with higher value added, which generally results in lower emissions per euro of output. This shift may be driven by:

- a move towards more complex or technologically advanced products,
- changes in the composition of industrial subsectors, or
- lower costs of intermediate goods (e.g. due to cheaper feedstocks), which increase GVA by widening the gap between output and input values.

This effect is captured by the production per unit of GVA component of the decomposition identity, which is indeed negative over the observed period.

Analysing GHG emissions in the industrial sector presents several complexities. A key challenge, as seen above, is differentiating between energy-related emissions – arising from fuel combustion – and process-related emissions, which result from chemical or physical transformations during production. Furthermore, the industrial sector is highly diverse, with sub-sectors varying considerably in their emission intensities and technological capabilities. Therefore, a more detailed, sub-sector-specific analysis is required to develop effective and targeted strategies for emissions reduction, with particular focus on energy-intensive industries [36].

Table 13: Drivers behind emissions reductions in Energy Intensive Industries 1995-2023 (%)

	Industry	Chemicals	Metals	Minerals	Pulp and paper
Economic activity	42.1%	28.7%	-16.2%	6.6%	22.6%
Production per unit of GVA	-10.9%	-7.9%	20.0%	-15.0%	-4.3%
Energy use per unit of product	-28.2%	-13.1%	-21.0%	-3.9%	-8.6%
Emission intensity of energy used	-16.0%	-10.7%	-6.2%	-8.1%	-32.0%
Process emissions per unit of product	-23.9%	-56.6%	-19.8%	-6.7%	-16.2%
TOTAL CHANGE	**-36.8%**	**-59.5%**	**-43.2%**	**-27.0%**	**-38.6%**

Table 13 details the drivers behind emission reductions in the most energy intensive industries. All subsectors achieve between 27% (minerals including cement) and 60% (chemicals) emissions reduction between 1995 and 2023. The emissions reduction in the chemical industry is largely due to process efficiency improvements, and this is achieved in combination with an increase in economic activity. According to the EU's GHG inventory report 2024 [37], the most significant abatement of a GHG in the chemical sector is forN_2O, notably in ammonia, nitric acid and adipic acid production. This is due to several factors such as high natural gas prices and the inclusion in the EU ETS, which led to process improvements and the installation of abatement technologies. Other sectors have seen

[36] This includes basic-metal manufacturing (mainly iron and steel), non-metallic mineral (notably, cement and lime) chemical, and pulp and paper production.

[37] Annual European Union greenhouse gas inventory 1990–2022 and inventory document 2024 | European Environment Agency's home page

stagnating (minerals) or declining (metals) activity. The pulp and paper sector has reduced its energy consumption while increasing its output (primarily before 2005), improving its energy efficiency. Notably, the recycling rate of paper increased since the 2000s, which reduces primary raw material and energy use.

There are significant differences in emission intensity across EU Member States. We present two examples:

- basic metal industry (iron and steel production)
- non-metallic mineral industry (for example cement, glass, ceramics)

Basic metals

Between 2018 and 2023, the metal industry in Czechia emitted nearly 11 kg of CO_2eq for every euro of value added - almost four times the EU average (3.1 kg). Slovakia's production is also carbon-intensive, at about 7 kg of CO_2eq per euro. In contrast, some countries achieve much lower emission intensities. For example, Italy (1.8 kg) and Sweden (1.4 kg) both fall below the EU average, demonstrating that major steel-producing countries can operate with relatively low emissions.

Non-metallic mineral industry

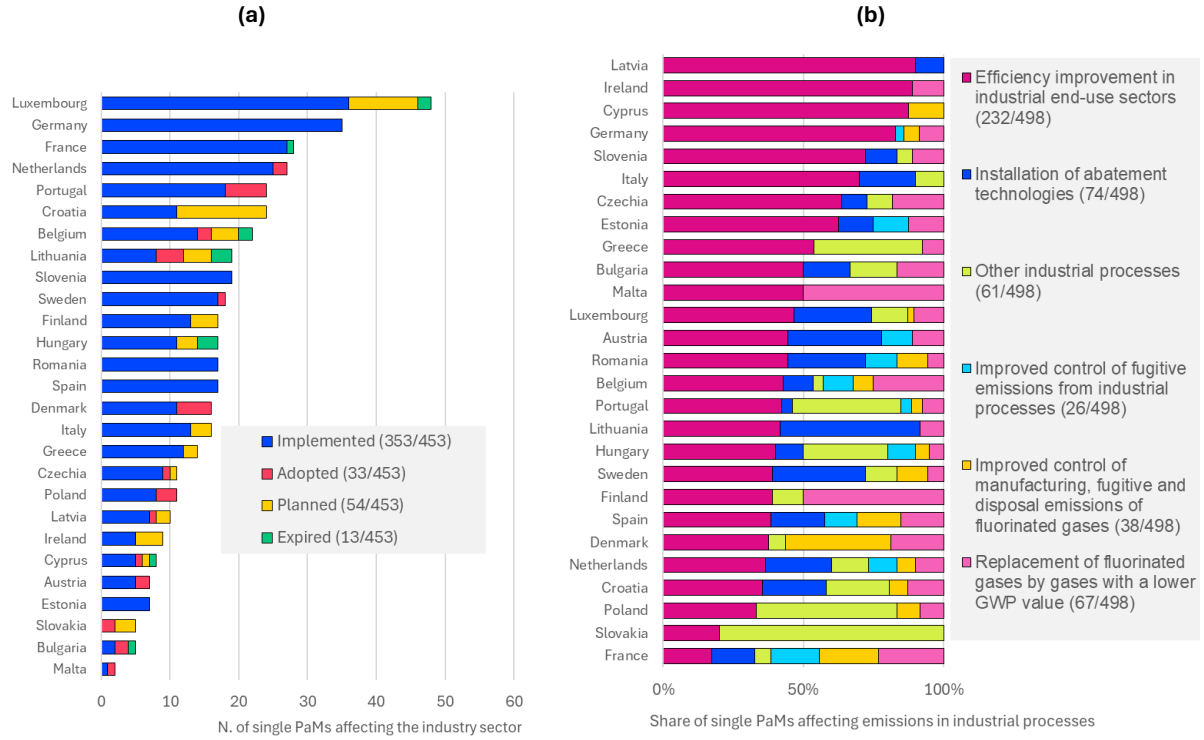
Similar disparities exist in cement, glass and ceramics production. In Cyprus, these industries emit 9.9 kg of CO_2eq for every euro of value added - four times the EU average of 2.4 kg. By contrast, the Netherlands and Finland emit just 0.6 kg and 1.1 kg, respectively. However, the non-metallic mineral sector is quite varied, and part of these differences reflects the industry's diverse structure and the different focus of each economy.

Policies and measures

Climate policies are key to reducing industrial greenhouse gas emissions by setting regulations, incentives, and targets that drive sustainable practices. The EU Emissions Trading System (ETS) creates a financial incentive by pricing carbon that generates revenues that can be reinvested in modernisation and innovation, while the Fit-for-55 package supports cleaner energy and industrial efficiency. Member States can also apply additional tools such as carbon taxes or incentives and support for renewable and low-carbon technologies like hydrogen and carbon capture.

In 2025, in reporting on progress of national climate and energy plans, EU Member States outlined over 221 policies and measures targeting industrial process emissions (6% of all single policies and measures) and around 232 policies and measures focused on industrial energy efficiency (7%).

Figure 23: a) Number of single policies and measures the EU Member States reported as affecting industrial emissions; by status of implementation (b) and by main objective.



Notes: Data on policies and measures are based on a preliminary dataset of 2025 NECP progress reports (Annex IX). The charts combine policies and measures affecting emissions in industrial process and energy consumption with the specific objective of improve efficiency in industrial end-use sectors. Due to a delay in the submission, data for Belgium refer to the 2023 NECP progress reports. Member States can indicate more than one objective for the same policy and measure. In brackets, the EU PaM's totals. Order of country is aligned to the share of policies and measures with an objective to improve efficiency in end-use sector.

About half of these policies and measures aim at improving the efficiency in industrial end-use sector (e.g. promotion, through financial mechanisms, of energy efficiency and RES in the industry, incentives for energy efficiency audits in industrial enterprises, etc). Another 15% supported the deployment of abatement technologies (e.g. end-of-pipe solutions, clinker substitution, waste recycling). A similar number of policies and measures addressed fluorinated gas replacement, including decarbonisation pilots such as integrating electrolysis in ammonia production. Policies and measures relating to 'Other industrial processes' cover measures like investment promotion, capacity-building, and monitoring.

Impact data on emission reductions was available for around a fifth of policies and measures targeting both industrial process emissions and efficiency in industrial end-use sector. This highlights a major gap in how Member States evaluate the effectiveness of their climate policies. As a result, Table 14 presents only an illustrative list of measures with reported impacts. Policies lacking impact data cannot be meaningfully assessed.

Table 14: Illustrative list of polices and measures affecting industrial process and efficiency in industrial end-use sectors

Country	Name of policy or measure	Description	Start year	Type of instrument	Related EU policy	Emissions reductions in 2030 (KtCO2eq)	% of total industrial emissions in 2005
Bulgaria	Promoting hydrogen, including by developing alternative fuels infrastructure	The 2023 National Roadmap improves the conditions for unleashing the development potential of hydrogen technologies.	2025	Regulatory	Alternative Fuels Infrastructure Directive, ETS Directive; JTF	1 480	10%
Greece	Reduction of emissions of fluorinated gases	Implementation of the 'MAC Directive' (2006/40/EC) on air conditioning systems used in small motor vehicles, and the 'F-gas Regulation' (No 517/2014).	2004	Regulatory; Information	F-gas Regulation;	1 700	6.8%
Czechia	Implementation of the EU Regulation on fluorinated greenhouse gases	Ban on introduction of fluorinated gases with high GWP for given purposes of use.	2015	Regulatory	F-gas Regulation (2014)	2029	6.0%
Ireland	Transposition of Mobile Air Conditioning Directive (Directive 2006/40/EC)	The directive aims to reduce greenhouse gas emissions from vehicle air conditioning systems by phasing out the use of certain fluorinated greenhouse gases with high global warming potential.	2011	Regulatory	Mobile Air-conditioning	240	2.6%
Slovakia	Decarbonising; Effort Sharing Regulation, Energy Savings	Change of fuel base in manufacture energy industry combustion. Transition from solid fossil fuels to natural gas, biomass and hydrogen.	2025	Economic	Effort Sharing Regulation	262	1.4%
Belgium	Reduce N20 emissions caprolactam production	Environmental permit. A first phase includes the installation of an end-of-pipe technique, and a second phase includes a feasibility study to investigate additional measures.	-	Other	Effort Sharing Regulation; Medium Combustion Plant Directive	373	0.8%
Slovenia	Financial incentives for research, innovation and	The measure addresses the need for increased investment in	2003	Economic; Research	Other: Eco-design Framework Directive	n.a.	n.a.

	market take-off for low-carbon products and service	research and innovation to support the transition to a climate-neutral economy.					

Challenges and opportunities

The industrial sector faces significant challenges and opportunities in its pursuit of reduced emissions. Traditionally, this sector has been a substantial contributor to greenhouse gas emissions due to its reliance on fossil fuels and resource-intensive processes. Cement, steel, aluminium and chemical plants often require process heat above 500 °C, which today is almost entirely produced from fossil fuels.

While the decomposition analysis shows that the past emission reduction is primarily due to gradually improved energy efficiency, the use of less emission-intensive energy sources and the reduction or specific process emissions, the coming decades require deep decarbonisation innovations across the industrial subsectors. However, retrofitting the industrial facilities with low-carbon alternatives, such as electric or hydrogen-based furnaces, faces barriers including high upfront costs, technology readiness levels that vary by application, and the need for upgraded grid and hydrogen infrastructure.

At the same time, adopting innovative strategies presents numerous opportunities for transformation and sustainable development.

The **Clean Industrial Deal** (CID) and the **Action Plan for Affordable Energy** (AEAP) presented in early 2025 outline actions to reduce energy bills, accelerate the energy transition and address structural challenges to complete the Energy Union. The Clean Industrial Deal represents such a step-change by embedding climate neutrality into industrial policy and supporting the large-scale deployment of clean technologies, thereby strengthening Europe's manufacturing base and reducing strategic dependencies. With initiatives such as the proposed Industrial Decarbonisation Bank and the creation of lead markets, the CID aims to build the business case for decarbonised products in the EU. At the same time, the Affordable Energy Action Plan introduces structural measures to deliver stable and predictable energy costs, enhance efficiency, and expand renewable generation, ensuring that businesses can remain competitive while consumers benefit from affordable energy. Together, these initiatives mark a new phase in the Energy Union, where industrial strength and energy affordability are mutually reinforcing drivers of Europe's long-term competitiveness and resilience.

One promising avenue is the circular economy model, which emphasizes resource efficiency and waste reduction (e.g. through the Ecodesign for Sustainable Products Regulation). By redesigning products and manufacturing processes to maximize reuse, repair, and recycling of materials, industries can significantly lower their carbon footprints,

reduce dependencies and enhance resilience. Extending the lifespan of products and minimizing raw material extraction are crucial steps toward achieving this model.

Moreover, advancements in clean technology offer significant potential for emission reductions. Investment in renewable energy sources, such as solar and wind, coupled with energy-efficient innovations in manufacturing, can drastically decrease reliance on carbon-intensive operations. The integration of digital technologies, like artificial intelligence, enhances process optimization, leading to further reductions in energy consumption and waste.

4.3 Transport emissions

Transport plays a crucial role in driving economic growth and enhancing quality of life across Europe by facilitating the efficient movement of goods, services, and people. Well-developed transport networks support trade, connectivity, and labour mobility, which in turn stimulate regional development and social inclusion. However, the current European transport system faces significant sustainability challenges, including high greenhouse gas emissions, air pollution, and congestion, which threaten environmental goals and public health.

More concretely, it is the only major economic sector in Europe where GHG emissions have increased since 1990 (+25%). It is also the largest contributor to nitrogen oxides emissions, which harm health and the environment and one of the main sources of environmental noise pollution in Europe.

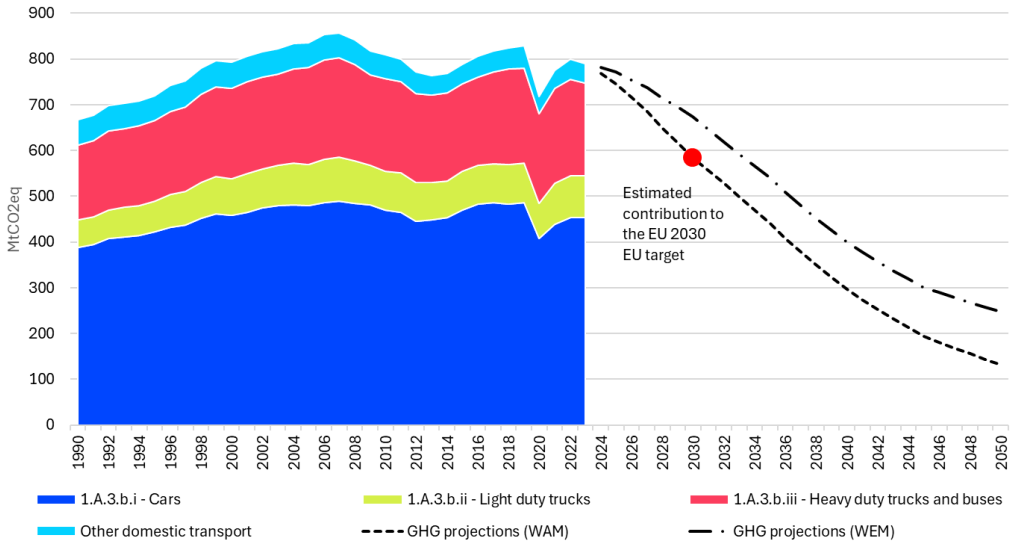
Recognising these issues, the European Union has adopted comprehensive policies such as CO_2 standards for light and heavy-duty vehicles, the renewable energy directive and the emission trading system (ETS1 covering aviation and maritime, ETS2 covering road transport, among other sectors).

Historical developments, trends and projections

In 2023, transport emissions represented more than a quarter of the EU's overall GHG emissions. They peaked in 2007, slowing down following the global financial and economic crisis, then rebounded and dropping significantly with the burst of the Covid-19 pandemic. As a result, in 2023 emissions decreased only slightly since 2005 (-5%). The road transport sector is responsible for most 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 2023, emissions from road transport decreased by only 4%. 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. Efforts to decarbonize the transport sector need to accelerate in order to meet the EU's 2030 and 2050 climate objectives.

With current and planned policy measures in the EU Member States, GHG emissions from domestic transport are projected to decrease by about 30% in 2030 compared with 2005 levels, bringing transport emissions to the estimated contribution to the 2030 EU climate target. However, considering only existing policies, projections still point to a gap of around 90 $MtCO_2$-eq (i.e. 13% of the estimated contribution). Full and effective implementation of planned policies and measures are therefore needed to align the emissions from domestic transport to the model-based results supporting the delivering of the European Green Deal.

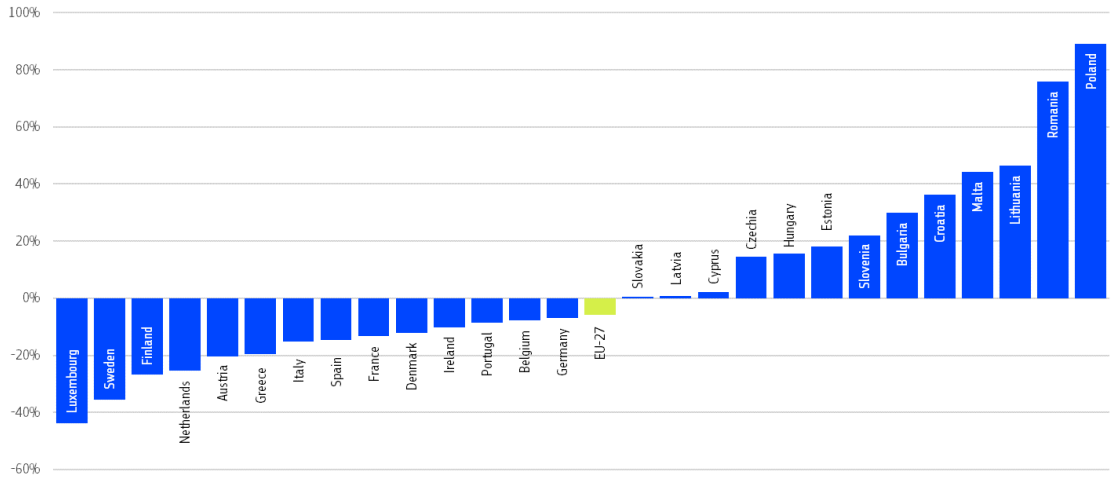
Figure 24: Emissions in domestic transport (1990-2023) and projections (2024-2050)



Note: Based on 2025 GHG inventories and 2025 GHG projections submitted by Member States. The estimated contribution to the EU 2030 EU target is based on the modelling outcomes of the core policy scenario supporting the Fit-for-55 initiatives.

Since 2005, domestic transport emissions significantly fell in Luxembourg, Sweden, Finland and the Netherlands (between 45% and 25%), but surged in Malta, Lithuania, Romania and Poland (between 45% and 90%). Poland also shows the highest increase in emissions from the international aviation (285%), compared to 2005 level, according to GHG emission inventory data.

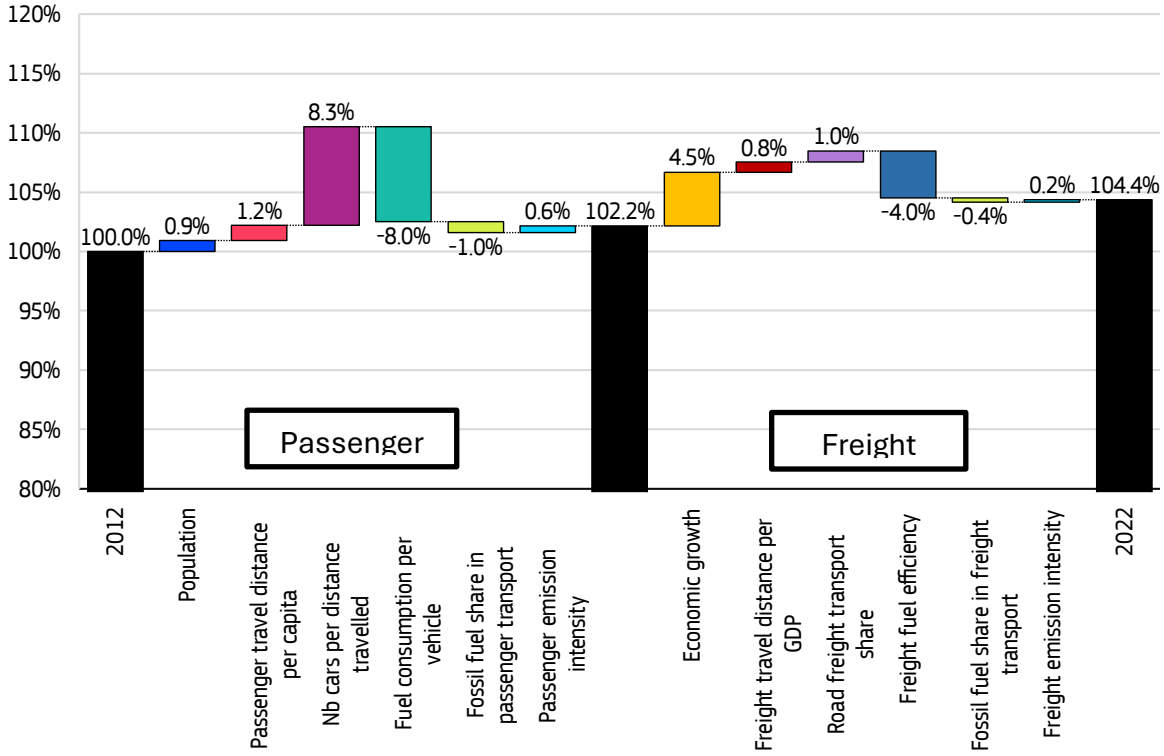
Figure 25: Change in domestic transport emissions by Member State (2005-2023, %)



Main drivers

Due to data availability, the decomposition analysis is carried out from 2012 onwards. In addition, it only focuses on road transport emissions from light (i.e. including cars) and heavy-duty vehicles, which cover nonetheless more than 90% of emissions from domestic transport, at EU level. The analysis separates passenger from freight transport emissions. When examining passenger emissions, the increase in the number of cars appears to be the primary driver behind the rise in passenger emissions, while both population growth and distance travelled per capita played a minor role. The increase in the number of cars (for the same number of passenger kilometres travelled) may reflect greater car usage at the expense of other modes of transport (e.g. trains, trams, buses) and/or a lower occupancy rate per vehicle. Improvements in combustion efficiency, together with a reduction in the share of fossil fuels used in passenger transport, have mitigated the increase in emissions that would otherwise have occurred. The emissions intensity of transport modes did not significantly contribute to reducing emissions in passenger transport. Regarding freight transport, economic activity was the main factor driving increased emissions, although this was offset by improvements in fuel efficiency. The share of road transport in freight has slightly increased, indicating no significant modal shift towards alternatives such as rail. The reduction in the fossil fuel share in freight transport has only marginally contributed to lowering emissions.

Figure 26: Decomposition of emissions in domestic road transport (2012-2022)



Decomposition factors

$$GHG_{transport} = GHG_{passenger} + GHG_{freight} = POP * \frac{PTD}{POP} * \frac{PC}{PTD} * \frac{TFC_{cars}}{PC} * \frac{FFC_{cars}}{TFC_{cars}} * \frac{GHG_{passengers}}{FFC_{cars}}$$
$$+GDP * \frac{FTD}{GDP} * \frac{RFT}{FTD} * \frac{TFC_{freight}}{RFT} * \frac{FFC_{freight}}{TFC_{freight}} * \frac{GHG_{freight}}{FFC_{freight}}$$

Passenger

POP – Population
PTD/POP – Passenger travel distance per capita
PC/PTD – Passenger cars per travel distance
TFC/PC – Fuel consumption per car
FFC/TFC – Share of fossil fuel in total fuel consumption
GHG_p/FFC – GHG emissions per fossil fuel consumed

POP – Population
PTD – Passenger Travel Distance
PC – Passenger Cars
TFC – Total Fuel Consumption
FFC – Fossil Fuel Consumption
GHG_p – GHG emissions related to passenger transport

Freight

GDP – Economic growth
FTD/GDP – Freight travel distance per GDP
RFT/FTD – Road freight travel distance over total freight travel distance
TFC/RFT – Total fuel consumption over road freight travel distance
FFC/TFC – Share of fossil fuel in total fuel consumption
GHG_p/FFC – GHG emissions per fossil fuel consumed

POP – Population
FTD –Freight Travel Distance
RFT – Road Freight Transport
TFC – Total Fuel Consumption
FFC – Fossil Fuel Consumption
GHG_f – GHG emissions related to freight transport

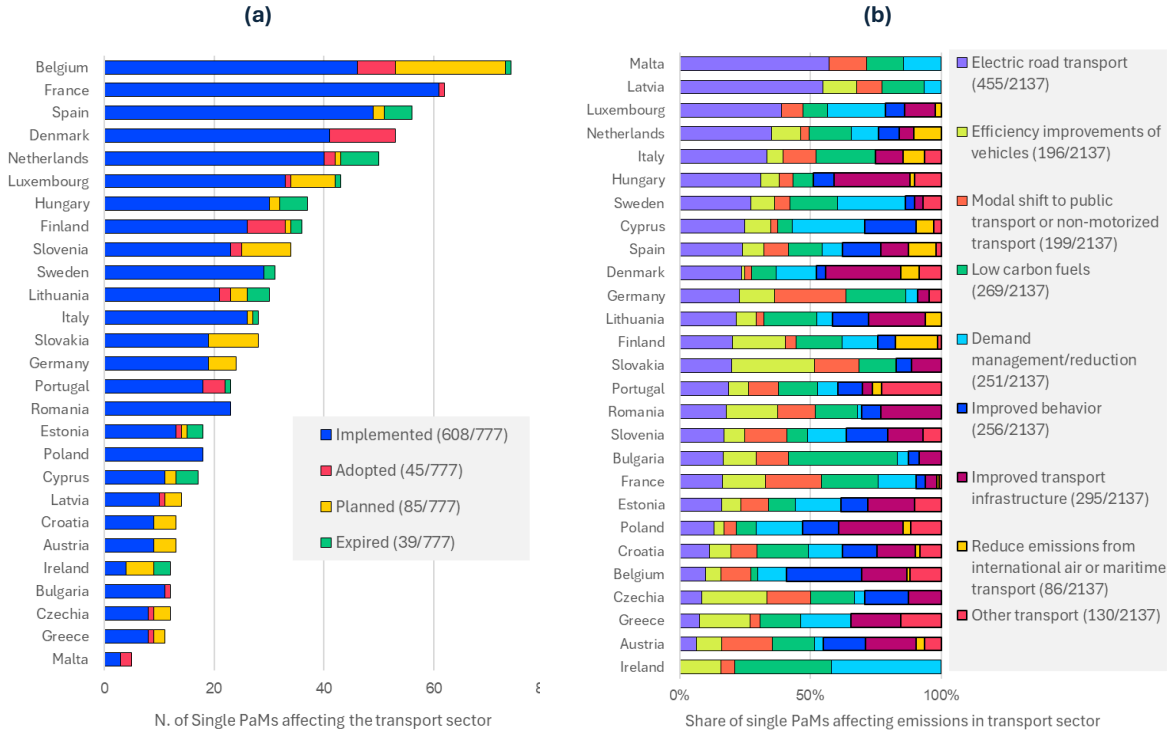
Policies and measures

Robust climate policies are vital for cutting emissions in the transport sector, with road transport being a major contributor to the EU's greenhouse gas footprint. The EU's

regulatory framework, including CO_2 emission standards for vehicles and the EU Emissions Trading System's gradual expansion, sets clear limits and incentives for cleaner mobility solutions. Initiatives under the European Green Deal and the Fit-for-55 package further support the shift to low- and zero-emission vehicles through investments in infrastructure, such as charging stations, and promotion of alternative fuels like hydrogen and bioenergy. Member States complement these efforts with policies like congestion charges, vehicle taxation reforms, and incentives for electric mobility, driving the sector's alignment with the EU's 2030 and 2050 climate targets.

In 2025, in reporting on progress of national climate and energy plans, EU Member States reported close to 800 policies and measures targeting transport emissions (22% of all single policies and measures).

Figure 27: a) Number of single policies and measures the EU Member States reported as affecting transport emissions; by status of implementation (b) and by main objective.



Notes: Data on policies and measures are based on a preliminary dataset of 2025 NECP progress reports (Annex IX). Due to a delay in the submission, data for Belgium refer to the 2023 NECP progress reports. Member States can indicate more than one objective for the same policy and measure. In brackets, the EU PaM's totals. Order of country in figure (b) is aligned to the share of policies and measures targeting electric road transport.

More than a fifth of these policies and measures aim at supporting the electrification of road transport, by, for example, supporting EV charging infrastructure, point operator, or subsidies for the purchase of public-transport vehicles running on clean energy. Another 14% aims at improving transport infrastructure or supports the switch to low carbon fuel (13%). Another group of policies tackle the demand side, such as modal-shift (9%),

demand reduction (12%) or improve behaviour (12%), such as information campaigns, or training of drivers and goods vehicles fleet managers, with the aim of raise awareness among citizens and professionals, but also fiscal measure, like the introduction of mileage-based toll for trucks. A fewer number of measures addresses emissions from international air or maritime transport (4%). These include measures such as the electrification of port berths to reduce ship emissions during port stays (so-called cold ironing), or the capacity restrictions on airports.

Data on policy impact on emission reductions by 2030 was available for around 16% of policies and measures targeting transport emissions. This highlights a major gap in how Member States evaluate the effectiveness of their climate policies. As a result, Table 15 presents only an illustrative list of measures with reported impacts. Policies lacking impact data cannot be meaningfully assessed.

Table 15: Illustrative list of polices and measures affecting transport emissions

Country	Name of policy or measure	Description	Start year	Type of instrument	Related EU policy	Emissions reductions in 2030 (KtCO2eq)	% of total transport emissions in 2005
Austria	Promotion of e-Mobility	Whereas national subsidies for EV cars and LDV are slowly fading out, the purchase of HDV and urban buses with electric engines is still supported by national subsidy programs (EBIN / ENIN).	2023	Economic; Fiscal; Regulatory	Regulation on CO2 standards; Clean Vehicles Directive	3 081	12%
Slovakia	Passenger Modal shift	The occupancy rate of passenger vehicles is expected to increase by 50% compared to 2020, reducing in particular the number of kilometres travelled by passenger vehicles up to 33% by 2050.	2024	Economic	Not related	828	11%
Greece	Transport measures	Key measures include the electrification of road transport, supported by incentives for electric vehicle adoption and disincentives for older combustion-engine vehicles, alongside efforts to decarbonize logistics.	2008	Fiscal; Regulatory	Effort Sharing Regulation; Energy Efficiency Directive	1550	7.1%
Bulgaria	Increasing the share of biofuels	In Bulgaria, ethanol and biodiesel production projects are the most promising. Biofuels will continue to be used in the coming years and the share of new biofuels will be gradually increased.	2012	Regulatory	Effort Sharing Regulation; Alternative Fuels Infrastructure Directive; Fuel Quality Directive	510	6.5%

Spain	Action plan international aviation	These actions are grouped according to their nature as follows: (i) new forms of propulsion to reduce emissions; (ii) sustainable aviation fuels (SAF) and operational improvements; (iii) improvement of air traffic management; and (iv) implementation of market-based measures.	2022	Planning	Non related	1 452	1.4%
Estonia	Road usage fees for heavy duty vehicles based on time	This measure includes the establishment of road user fees based on time, location, environmental aspects, etc.	2018	Fiscal	Effort Sharing Regulation; Eurovignette Directive	14	0.6%

Challenges and opportunities

Technological advancements offer promising avenues for decarbonisation in the transport sector. The adoption of electric vehicles (EVs) is accelerating, triggered by EU legislation and supported by national incentives and infrastructure investments. Additionally, the integration of digital technologies, such as smart logistics, multimodal transport systems, and digital demand management, can optimise mobility patterns, reduce congestion, and enhance energy efficiency [38]. EU and national policies that promote rail over road transport, invest in cleaner fuels, and encourage behavioural shifts towards sustainable modes of transport further bolster these technological opportunities.

However, several challenges remain. The transport sector remains the only major EU economic sector where greenhouse gas emissions have increased over the past three decades. This is primarily due to rising demand for travel and freight, which outpaces efficiency gains. In aviation and maritime transport, the long lifespan of vehicles and vessels, coupled with limited availability of sustainable fuels, hinders rapid decarbonisation.

The transition to a more sustainable transport system offers multiple benefits: it not only mitigates environmental impacts but also enhances public health and social equity. Reduced emissions lead to improved air quality, which can decrease health-related costs and increase life expectancy. Moreover, investments in sustainable transport infrastructure can promote social inclusion by improving access to mobility for underserved communities, thereby reducing transport poverty [39]. Therefore, efforts to decarbonise transport can yield substantial co-benefits, aligning environmental goals with broader societal well-being.

[38] Transport and Environment Report 2022 | European Environment Agency's home page

[39] In 2025, the European Commission's Joint Research Centre launched the Transport Poverty Hub to enhance regional connectivity across Europe.

4.4 Buildings emissions

The building sector plays a key role in the long-term strategy on the reduction of greenhouse gas emissions. In the EU, nearly 15% of total GHG emissions are from buildings (22% of the ESR sector) and account for approximately 40% of energy consumed in the EU. Buildings are therefore the single largest energy consumer in Europe. Residential and commercial buildings consume energy primarily for heating, which represents about 60% of the total energy demand in this sector, followed by cooling (around 10%), cooking (approximately 8%), and other uses such as lighting and appliances making up the remaining 22%. This significant energy demand still largely relies on fossil fuels, underscoring the sector's vital role in the EU's climate and energy transition goals. Enhancing energy efficiency in buildings and shifting to renewable energy sources are therefore key strategies to reduce emissions and achieve the EU's climate neutrality targets by 2050.

The main pathways to an EU decarbonised building stock are designed under the Energy Performance of Building Directive (EPBD) [40] and focus on setting cost-optimal minimum energy performance requirements, promoting high energy efficient buildings, strengthening the Energy Performance Certificate scheme and developing long-term renovation strategies with a view to mobilising energy efficiency investments in residential and commercial buildings. The Recovery and Resilience Facility and Cohesion Policy allocate a significant portion of funds to improve energy efficiency in buildings.

Emissions from buildings are reported under two main categories in the greenhouse gas inventories:

- Residential buildings (1.A.4.b);
- Non-residential buildings (Commercial/Institutional, 1.A.4.a).

In order to facilitate comparison across countries and forecasted emissions, in this analysis the buildings sector also includes emissions from fuel combustion in agriculture, forestry and fishing (1.A.4.c) [41].

Historical developments, trends and projections

In 2023, buildings emissions represented nearly 15% of the EU's overall GHG emissions, of which 60% from residential buildings, and 23% from non-residential buildings (commercial and institutional). The pace of emissions reduction visibly increased after 2005. Between 2005 and 2023, emissions from residential buildings dropped by 37%, non-residential building by 36%, while fuel combustion in farms and fishery installation by 13%. Emission

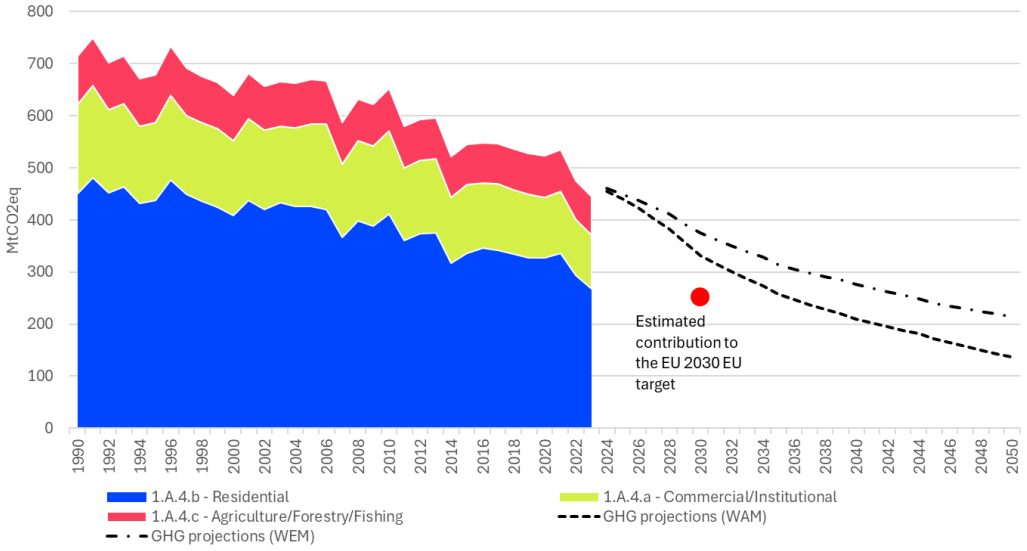
[40] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202401275

[41] This includes emissions from stationary sources like heating and machinery used on farms, forestry operations, and fish farms, as well as mobile sources like tractors, fishing boats, and other machinery used in these activities.

reductions were due to a combination of factors, including stricter energy efficiency standards for new buildings, improved energy efficiency in existing buildings, and a shift towards cleaner energy sources for heating and electricity. A general trend toward warmer winter temperatures, and therefore reduced winter heating needs, has also contributed to the emission reductions from buildings (see below).

With current and planned policy measures in the EU Member States, GHG emissions from buildings are projected to decrease by about 50% in 2030 compared with 2005 levels, to around 330 $MtCO_2$-eq. Still, projections point to a gap of around 80 $MtCO_2$-eq to the contributions from the model-based results supporting the delivering of the European Green Deal. Therefore, additional efforts are needed in the building sector.

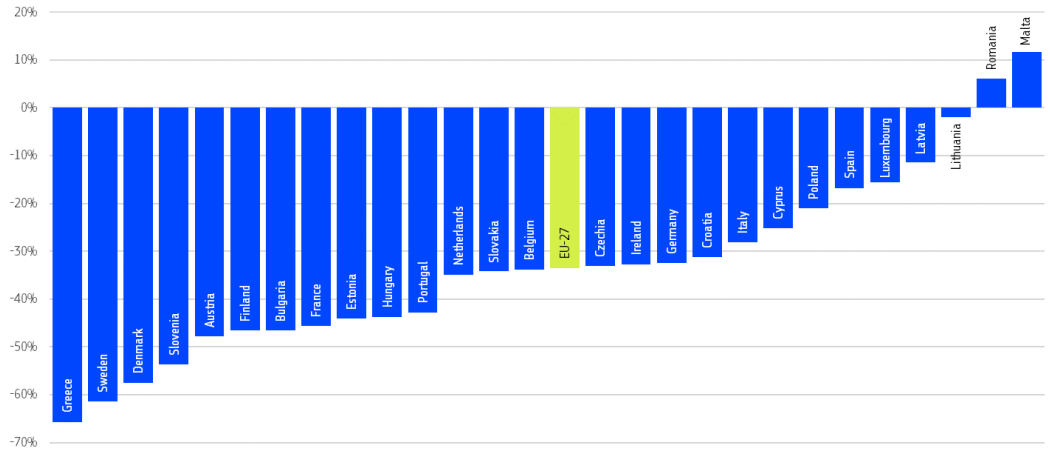
Figure 28: Emissions in residential and non-residential buildings (1990-2023) and projections (2024-2050)



Note: Based on 2025 GHG inventories and 2025 GHG projections submitted by Member States. The estimated contribution to the EU 2030 EU target is based on the modelling outcomes of the core policy scenario supporting the Fit-for-55 initiatives.

Since 2005, all EU Member States reduced emissions in buildings, with the exception of Malta (+12%) and Romania (+6%). As illustrated in Figure 29 below, the highest emission reductions were achieved by Greece, Sweden, Denmark and Slovenia, with cut above 50%. In several Member States with a high starting share of emissions in buildings relative to their total GHG emissions (above 10% in 2005), emission reduction was lower that the EU average. This was the case of Latvia, Luxembourg, Poland, and, to a lesser extent, Italy, Germany and Ireland.

Figure 29: Change in residential and non-residential emissions by Member State (2005-2023, %)



Main drivers

According to a recent report, about 35% of the EU's buildings are over 50 years old and almost 75% of the building stock is energy inefficient. At the same time, only about 1% of the building stock is renovated each year [42]. This contributes to high energy consumption, the main source of emissions for buildings.

Due to data availability, the decomposition analysis focuses on 2006-2023. Emissions for buildings can be distinguished between emissions from households and from non-residential or commercial buildings.

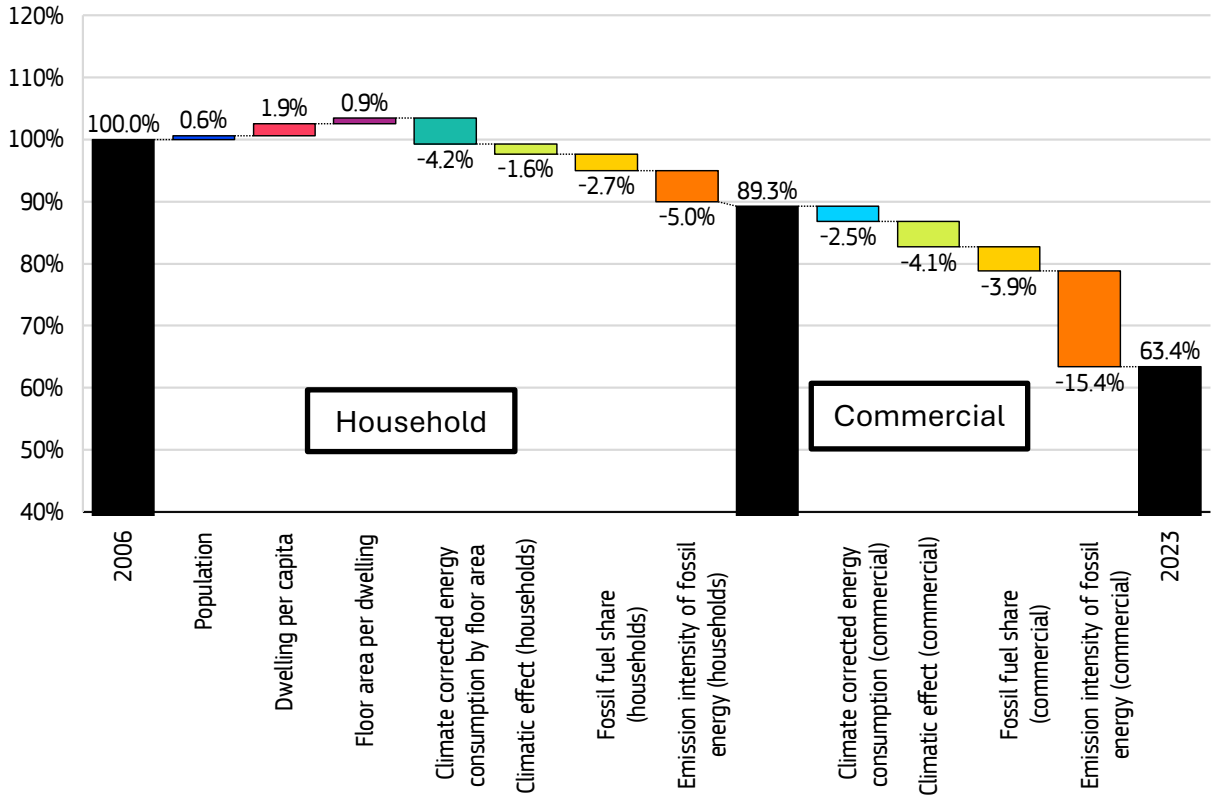
In the residential sector, factors such as population growth, decreasing household sizes, and a tendency to live in larger housing units would have resulted in increased emissions. However, these effects were more than offset by a reduction in energy consumption per unit of floor area, a shift towards lower fossil fuel use per unit of energy consumed, and a decline in GHG emissions from fossil fuel combustion. Additionally, climatic conditions—particularly milder winters—also contributed to the overall reduction in emissions [43].

The decline in emissions was even more pronounced in the non-residential, or commercial, building sector. In this sub-sector, the primary driver appears to be the reduced emission intensity associated with fossil fuel consumption. This may be attributed to fewer financial constraints, or the presence of stronger incentives, enabling more significant improvements in the efficiency of heating and cooling systems.

[42] Zangheri, P. et Al., Progress of the Member States in implementing the Energy Performance of Building Directive, Publications Office of the European Union, Luxembourg, 2021, EN, ISBN 978-92-76-25200-9, doi:10.2760/914310, JRC122347.

[43] The climate correction applied refers to dividing the energy consumption by the average of the sums of heating and cooling degree days for the EU over the whole period. The number of heating degree days are expected to decrease over time while the cooling degree days will increase over time due the effect of climate change. The correction allows to observe the difference in energy consumption due to climate change compared to the general trend in the EU.

Figure 30: Decomposition of emission in residential and non-residential buildings (2006-2023)



Decomposition factors

$$GHG_{buildings} = GHG_h + GHG_c$$

$$GHG_h = POP * \frac{HSH}{POP} * \frac{FA_h}{HSH} * \frac{FEC_{h,cc}}{FA_h} * \frac{FEC_h}{FEC_{h,cc}} * \frac{FFC_h}{FEC_h} * \frac{GHG_h}{FFC_h}$$

$$GHG_c = FEC_{c,cc} * \frac{FEC_c}{FEC_{c,cc}} ** \frac{FFC_c}{FEC_c} * \frac{GHG_c}{FFC_c}$$

Households (subscript h)

POP – Population
HSH/POP – Household per capita
FA/HSH – Floor area per dwelling
FEC_cc/FA – Climate corrected final energy consumption by floor area
FEC/FEC_cc – Real final energy consumption over the climate corrected one
FFC/FEC – Fossil fuel consumption in final energy consumption
GHG_h/FFC – GHG emissions over fossil fuel consumption

Commercial (subscript c)

FEC_cc – Climate corrected final energy consumption
FEC/FEC_cc – Real final energy consumption over the climate corrected one
FFC/FEC – Fossil fuel consumption in final energy consumption
GHG_h/FFC – GHG emissions over fossil fuel consumption

POP – Population
HSH – Households (dwellings)
FA – Floor Area
FEC – Final Energy Consumption
FEC_cc– Climate Corrected Final Energy Consumption
FFC – Fossiel Fuel Consumption
GHG_h – GHG emissions related to households
GHG_c – GHG emissions related to commercial buildings

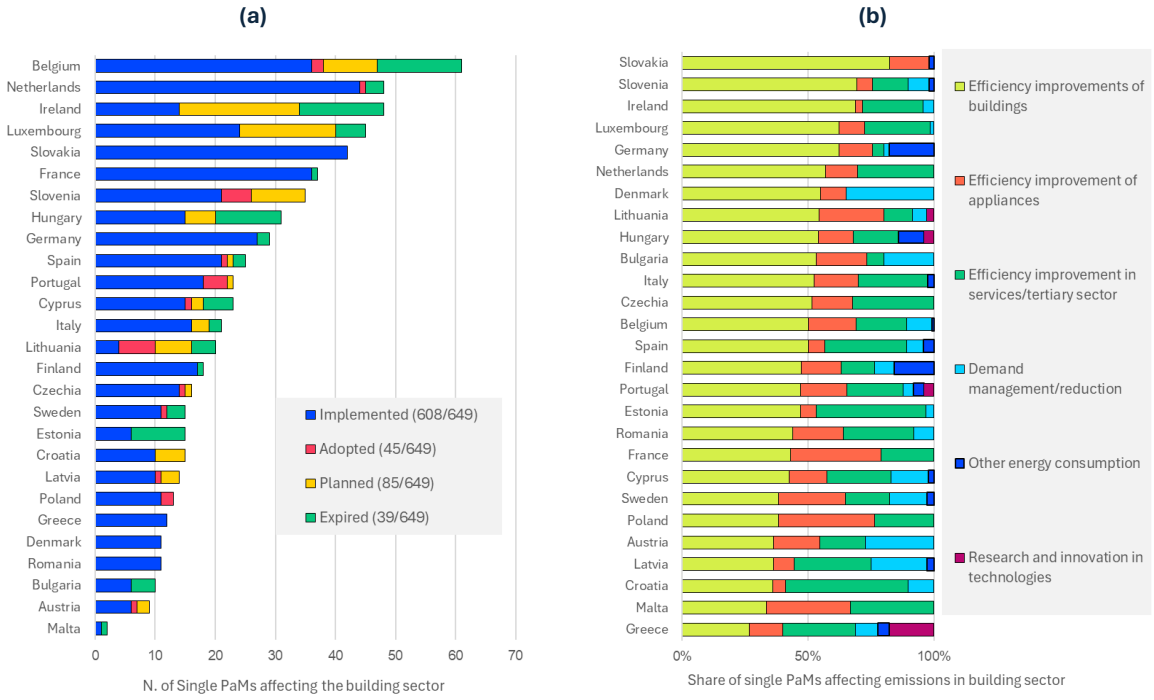
Policies and measures

Effective climate policies are crucial for reducing emissions in the buildings sector, which accounts for a significant share of the EU's energy consumption and greenhouse gas

emissions. The EU's policy framework, including the Energy Performance of Buildings Directive and the Renovation Wave strategy, drives improvements in energy efficiency and promotes the uptake of low-carbon heating and cooling technologies. The Fit-for-55 package further strengthens these efforts by setting ambitious targets for building renovations and clean energy integration. Member States enhance these initiatives with national renovation programs, financial incentives for energy-efficient upgrades, and regulations encouraging the use of renewable energy sources in buildings, thereby advancing the EU's climate neutrality ambitions by 2050.

In 2025, in reporting on progress of national climate and energy plans, EU Member States reported over 660 policies and measures aiming at reducing energy consumption in buildings (nearly 20% of all single policies and measures) [44].

Figure 31: a) Number of single policies and measures the EU Member States reported as affecting emissions in buildings; by status of implementation (b) and by main objective.



Notes: Data on policies and measures are based on a preliminary dataset of 2025 NECP progress reports (Annex IX). Due to a delay in the submission, data for Belgium refer to the 2023 NECP progress reports. Member States can indicate more than one objective for the same policy and measure. In brackets, the EU PaM's totals. Order of country in figure (b) is aligned to the share of policies and measures targeting efficiency improvement in buildings.

Most of these policies and measures aim at improving efficiency in residential buildings (52%), while 22% are targeting efficiency in service/tertiary units. Another 16% of reported

[44] This number is obtained by aggregating the policies and measures reported by the EU Member States affecting the 'Energy consumption' sector with the specific objective of improving the efficiency of buildings and appliances. It also considers other objectives in the 'Energy consumption', like demand management, research and innovation, or other initiatives, where the description of the policies and measures explicitly referred to buildings.

policies and measures are supporting energy efficiency of appliances. Other policies and measures are directed to reduce demand, such as progressive electricity tariff mechanism, measures to phasing out of incandescent lights, or obligation to integrate renewable energy sources in existing and newly constructed buildings.

Data on policy impact on emission reductions was available for around 17% of policies and measures targeting buildings emissions. This highlights a major gap in how Member States evaluate the effectiveness of their climate policies. As a result, Table 16 presents only an illustrative list of measures with reported impacts. Policies lacking impact data cannot be meaningfully assessed.

Table 16: Illustrative list of polices and measures affecting buildings emissions

Country	Name of policy or measure	Description	Start year	Type of instrument	Related EU policy	Emissions reductions in 2030 (KtCO2eq)	% of total building emissions in 2005
Greece	Energy efficiency measures in Residential and Tertiary Sectors	In the building sector, policies aim to decarbonize by 2050 through renovations, renewable energy integration, and electrification of heating. Public and private buildings benefit from financial incentives, simplified procedures, and energy management systems.	2008	Economic; Fiscal; Regulatory; Information	Effort Sharing Regulation; Energy Performance of Buildings Directive	6 347	43%
Finland	Subsidies for retrofitting in housing	The aim is to improve the energy performance of existing residential houses and increase the production and use of renewable energy in a building.	2020	Economic	Energy Performance of Buildings Directive	673	12%
Czechia	Energy efficiency measures in residential sector in the period 2021-2030	The aim is the improvement of energy performance of single and multi-family buildings (thermal insulation, replacement of old inefficient boilers by new boilers).	2021	Economic	Energy Efficiency Directive; Energy Performance of Buildings Directive	1110	7.6%
Germany	GHG-Building Energy Act (GEG)	The Building Energy Act was revised in September 2023 to include requirements for the installation of renewable heating systems ("Heating Act").	2020	Regulatory	Effort Sharing Regulation	12 200	7.5%
Ireland	Better Energy Homes	The Better Energy Homes scheme by SEAI provides homeowners in Ireland with both financial incentives and support for energy-efficient upgrades.	2011	Economic; Information; Education	Effort Sharing Decision	538	4.8%
Austria	Accelerated replacement of Fossil Fuels in Building Stock	Obligation for replacement of liquid and solid fossil fuel heating systems in existing buildings and the restriction of	2024	Regulatory; Economic; Information	Energy Efficiency Directive;	630	4.5%

		gaseous fossil fuel use for heating purposes apply.			Energy Performance of Buildings Directive		
Slovakia	Building Insulation	Improving of energy efficiency in building sector. Reducing energy demand of existing buildings to nearly zero energy levels by significantly improving their energy performance and decarbonising fuel supplies.	2025	Economic	Effort Sharing Regulation; Energy Efficiency Directive	286	4.3%
France	White certificate scheme	It is based on an obligation imposed by public authorities on energy sellers to achieve energy savings.	2006	Regulatory; Economic	Energy Efficiency Directive	3 500	3.2%

Challenges and opportunities

The reduction of emissions from the heating and cooling of buildings presents significant opportunities within the European Union's framework for energy efficiency. The **Energy Performance of Buildings Directive** (EPBD) focuses on enhancing building performance through cost-optimal energy performance requirements and promoting **Nearly Zero-Energy Buildings** (NZEBs). The integration of renewable energy sources and advanced technologies, such as heat pumps and district heating systems, offers substantial potential to reduce dependency on fossil fuels and improve energy efficiency. These technologies not only contribute to emissions reductions but also support the EU's goals for a sustainable energy transition.

However, the challenges in achieving these reductions are substantial. The renovation rate of the existing building stock remains low, far short of the rate needed to meet the EU's climate goals. Financial barriers, including high upfront costs and long payback periods, hinder the implementation of deep renovation measures. Overcoming these challenges requires comprehensive policy measures, financial incentives, and efforts to increase public awareness and trust in energy performance improvements.

4.5 Waste emissions

The waste sector accounts for a small part of total EU greenhouse gas (GHG) emissions (i.e. about 3% of total GHG emissions and around 5% of the emissions covered by the EU Effort Sharing Regulation). In some Member States the share is more substantial; for example, in Portugal it is around 10% of total emissions.

However, reducing GHG emissions from waste also has positive effects on our lives and a better use of waste as a resource (by substituting virgin raw materials) can help reduce emissions in other sectors. The way we produce, use, re-circulate and dispose of materials

is crucial, and we can track emissions from these actions under the **Waste management** sector in the officially reported GHG inventories [45].

The sector includes:

- solid waste disposal;
- biological treatment of solid waste;
- incineration and open burning of waste;
- wastewater treatment and discharge (further excluded from this text to keep focus on solid waste).

Emissions from energy recovery of waste, processing recycled materials and transporting waste are not reported in the waste sector but in the energy, manufacturing and transport sectors. Therefore, actual emissions generated by waste are in fact higher than reported waste emissions, which shows its cross-sectoral nature. This section focuses mainly on emissions from the waste sector, other aspects like environmental impacts (natural resources, pollution etc.) are not covered by this text.

Historical developments, trends and projections

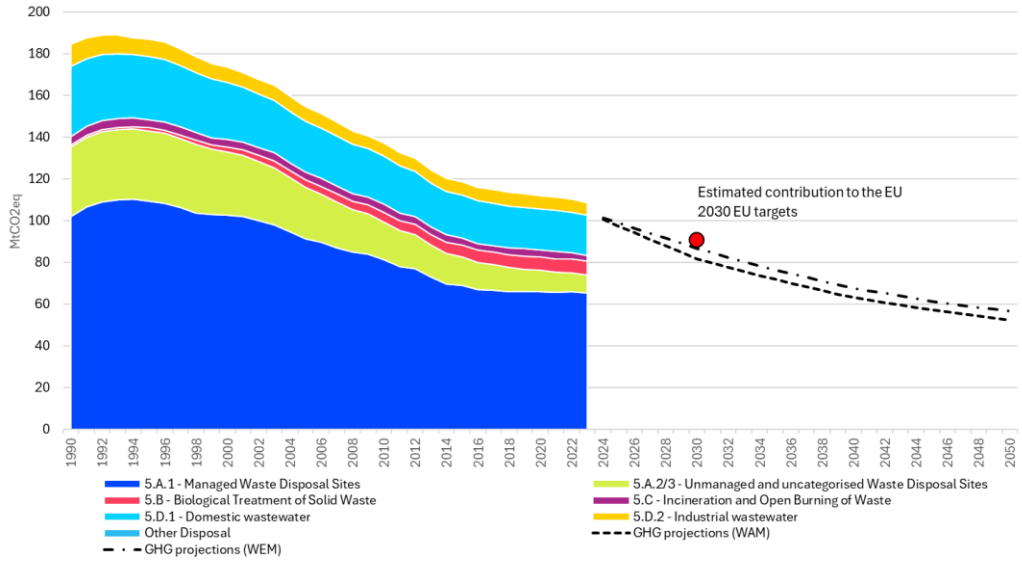
In 2023, waste management emissions were 41% and 30% below the level of 1990 and 2005, respectively.

Over the same period, emissions from solid waste disposal (currently representing more than 2/3 of waste emissions) declined by 35%, while wastewater treatment (close to a fifth of current waste emissions) were down by 23%, with a minor contribution from industrial wastewater (i.e. -5%). Conversely, the emissions from the biological treatment and from the open burning of solid waste have increased (i.e. by 86% and 32%, respectively), but these sources are relatively small within the overall waste management emissions.

Waste sector emissions could decrease further once all current EU waste policies are fully implemented. The speed of reduction is projected to slightly increase, from an average annual reduction of around 2.7 $MtCO_2$-eq to 2.9 $MtCO_2$-eq up to 2030 and further increase to 3.2 $MtCO_2$-eq between 2030 and 2040, according to the Commission analysis supporting the Communication on the 2040 target.

[45] Source sector CRF5 Waste management in IPCC 2006 Guidelines. Guidelines are available at Publications - IPCC-TFI (iges.or.jp).

Figure 32: Emissions in waste (1990-2023) and projections (2024-2050)

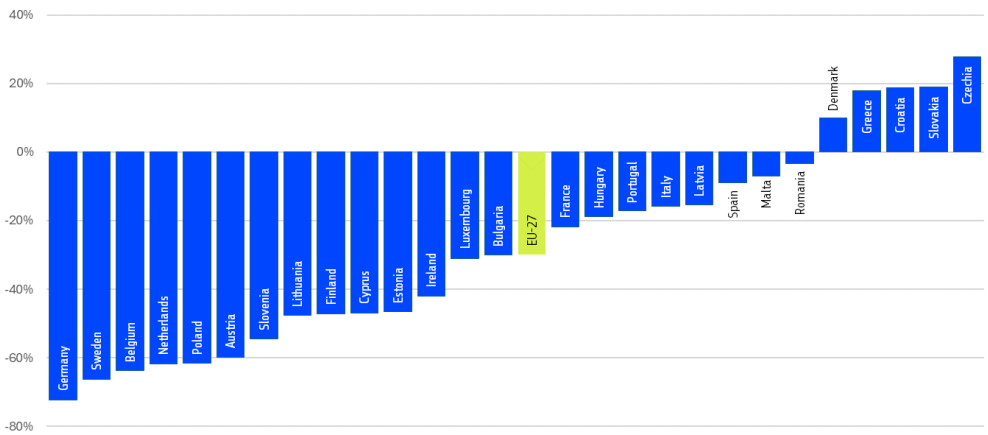


Note: Based on 2025 GHG inventories and 2025 GHG projections submitted by Member States. The estimated contribution to the EU 2030 EU target is based on the modelling outcomes of the core policy scenario supporting the Fit-for-55 initiatives.

With current and planned policy measures in the EU Member States, waste emissions are projected to decrease by about 47% in 2030 compared with 2005 levels, bringing waste emissions slightly below to the model-based estimated contribution to the 2030 EU climate target.

Compared to 2005 level, the highest reductions in 2023 were reported by Germany (72%), Sweden (66%), Belgium, (64%), the Netherland (62%), Poland (62%) and Austria (60%). On the other hand, five Member States increased its emissions, Czechia (28%), Slovakia (19%), Croatia (19%), Greece (18%), and Denmark (10%) and the reduction in Spain, Malta and Romania was limited (see Figure 33).

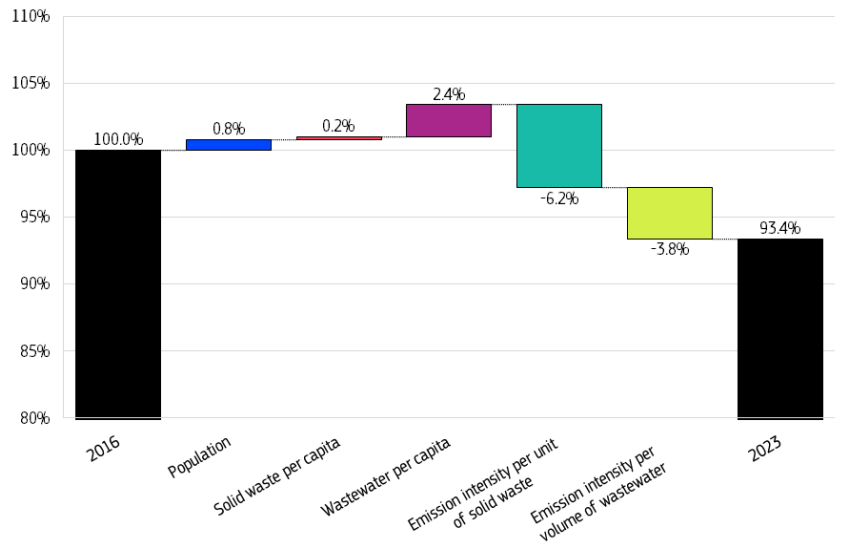
Figure 33: Changes in GHG emissions from the waste sector by Member State (2005-2023, %)



Main drivers

Emissions from waste are driven not only by waste generation but also by several other underlying factors ranging from the emission intensity and composition of the waste treatment methods.

Figure 34: Decomposition of emission in waste (2016-2023)



Decomposition factors:

$$GHG_{waste} = POP * \frac{WASTE_{sw}}{POP} * \frac{\frac{GHG_{sw}}{WASTE_{sw}}}{} + POP * \frac{WASTE_{ww}}{POP} * \frac{GHG_{ww}}{WASTE_{ww}}$$

POP – Affluence
WASTE$_{sw}$/POP – Solid waste generated per capita
WASTE$_{ww}$/POP – Wastewater generated per capita
GHG$_{sw}$/WASTE$_{sw}$ – Emission intensity per unit of solid waste
GHG$_{ww}$/WASTE$_{ww}$ – Emission intensity per unit wastewater

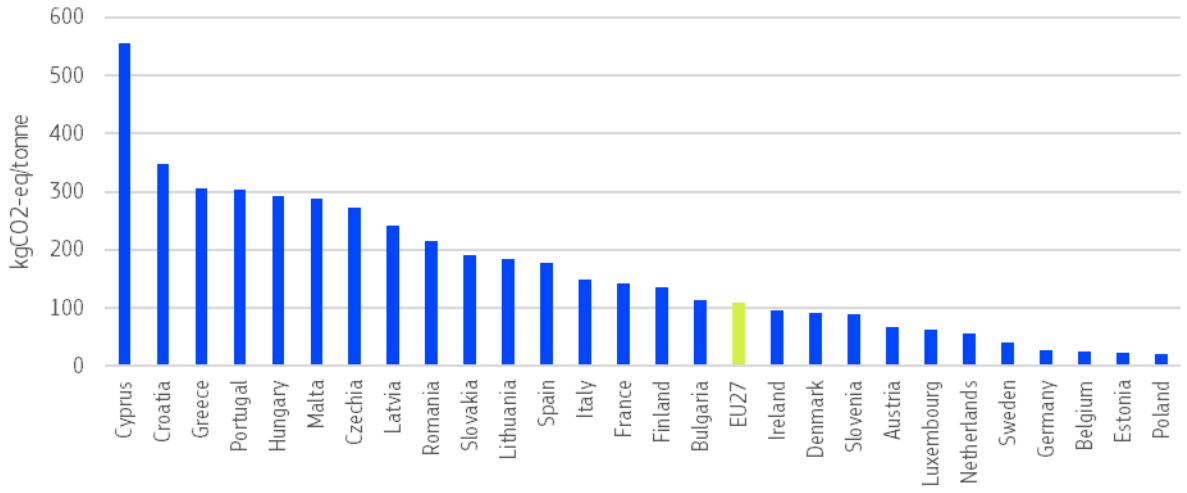
POP – Population
WASTE – Amount of waste generated
GHG – Greenhouse gas emissions related to waste
Subscript *sw* stand for solid waste, *ww* for wastewater

The drivers for emission reduction can be attributed to two categories of waste: solid waste and wastewater. Due to data availability, the decomposition analysis could only be performed between 2016-2023. Over this period, waste emissions have decreased by around 6.6%. Efficiency gain in the treatment of both solid and wastewater waste was the main driver in reducing emissions in the waste sector, amid a slightly increase in waste production per capita of 0.2% and 2.4% for solid waste and wastewater respectively.

Since there is a strong correlation between emission intensity and total emissions, Members States should focus on the reduction of emission intensity of their waste management systems, bearing in mind that waste prevention and reduction should always be prioritized according to the waste hierarchy [46]. The differences among Member States are substantial (see *Figure 35*). Croatia produces nearly seven times more GHG emissions per produced tonne of solid waste than the EU average. On the other hand, Estonia, Belgium, and Poland produce less than a quarter of the EU average.

[46] As shown in the Climate Action Progress Report 2024 (SWD, Box on Waste emissions), there is not a 1:1 relation between waste generation per capita and waste emissions per capita. Member States with the highest municipal waste production (Austria, Denmark) have below-average emissions. This indicates that despite the high volume of waste, their waste management is very effective in terms of GHG emissions. On the other hand, low volume of waste does not necessarily mean low emission. Romania could be a good example of this – it has the lowest municipal waste production, but emissions are above the EU average. Therefore, the focus should be on the emission intensity indicator.

Figure 35: Emission intensity of solid waste (kgCO_2-eq/tonne) (average 2018-2022)



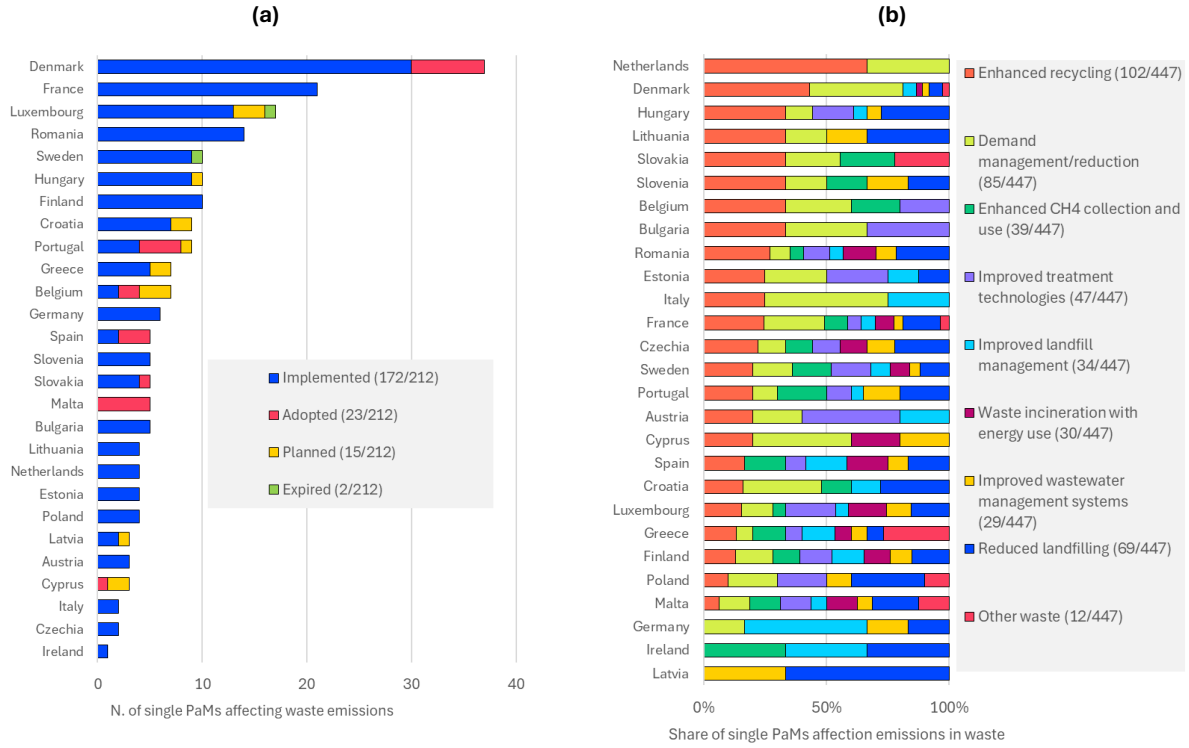
Similarly, emissions per capita show visible differences. Cyprus emits three times more GHG per capita than EU average and eleven times more than Germany, which has the lowest emissions. On this matter, the EEA concludes that waste sector GHG emissions would decrease by 53% from the 2021 level if all Member States reduce their emissions just to the average per-capita emissions of five best performing countries (Germany, Sweden, Belgium, Poland and Austria).

Policies and measures

In addition to and in implementation of relevant European directives such as the Waste Framework Directive, the Industrial Emissions Directive, and the Landfill Directive, EU Member States reported over 210 policies and measures related to the waste sector in 2025. Of this, around 23% are new measures that Member States are implementing or planning to implement in or after 2023. These measures focus on various parts of the waste chain. Around 23% aim at enhancing recycling, through measures on waste sorting, packaging waste, or, for example, by introducing separate waste fraction (e.g. textile). Another 19% focus on waste prevention, such as weight-and-volume-based taxes, awareness raising, information campaigns and educational activities. Measures to reduce landfilling and improve landfill management are also well represented (around 23% of total waste-related policies and measures).

Regulatory policies are the most reported by Member States and most are linked to EU policy – specially the Waste Framework Directive and Landfill Directive, reflecting substantial regulatory requirements in EU waste policy to be met by countries.

Figure 36: a) Number of single policies and measures related to waste by status of implementation b) and by main objective.



Notes: Data on policies and measures are based on a preliminary dataset of 2025 NECP progress reports (Annex IX). Due to a delay in the submission, data for Belgium refer to the 2023 NECP progress reports. Member States can indicate more than one objective for the same policy and measure. In brackets, the EU PaM's totals. Order of country in figure (b) is aligned to the share of policies and measures targeting recycling.

Data on policy impact on emission reductions was available for around 20% of policies and measures targeting waste emissions. This highlights gaps in how Member States evaluate the effectiveness of their climate policies. As a result, Table 17 presents only an illustrative list of measures with reported impacts. Policies lacking impact data cannot be meaningfully assessed.

Table 17: Illustrative list of polices and measures affecting waste emissions

Country	Name of policy or measure	Description	Start year	Type of instrument	Related EU policy	Emissions reductions in 2030 ($ktCO_2$-eq)	% of total waste emissions in 2005
Greece	Recovery of organic waste	Reduction of the quantities of biodegradable wastes landfilled through the installation of solid waste treatment facilities.	2002	Regulatory; Planning	Landfill Directive; Waste Management Framework Directive;	1 900	36%
France	Obligation to sort waste from economic activities	Since 1 July 2016, economic activities (businesses and administrations) have been obliged to sort their paper,	2016	Regulatory	Waste Management Framework Directive	4 000	17%

		cardboard, plastic, metal, wood, and glass waste for material or energy recovery. Since 17 July 2021, this obligation has been extended to include the mineral fraction and plaster in construction and demolition waste, and it will apply to textile waste from 1 January 2025					
Czechia	Waste management plan 2015-2024	This plan focuses on waste prevention, aims at a higher share of recycling (50% for paper, plastic, glass and metal wastes), compulsory separation of biologically degradable communal waste to reach the limit of maximal 35% going to landfill from the total biologically degradable communal waste.	2015	Economic; Fiscal; Regulatory; Planning	Waste Management Framework Directive	330	7.6%
Bulgaria	Construction of waste recycling plants	Programme for reaching preparing for re-use and recycling targets for municipal waste. Performance indicator: Number of waste recycling installations built. Responsible institutions:	2021	Regulatory	Effort Sharing Regulation; Waste Management Framework Directive	245	6.3%
Ireland	Landfill Directive (1999/31/EC)	The aims is to reduce the environmental impact of landfills by establishing stringent criteria for the operation, design, and aftercare of landfill sites.	1999	Regulatory; Planning	Landfill Directive	59	4.1%
Germany	GHG-Reduction of Food Waste	The National Strategy for Reducing Food Waste aims of halving food waste by 2030	2018	Information	Waste Management Framework Directive	91	0.5%
Latvia	Increase the processing of biodegradable waste till 206 500 tonns/year	Increase biological waste treatment. Operation of biological waste treatment plants. Implementation of separate collection of biological waste. Waste management plan period 2021-2028.	2021	Economic; Planning	Waste Management Framework Directive	2	0.3%
Malta	High bio-waste capture	The investment aims at diverting waste away from landfills. it treats organic waste mainly collected from household and commercial entities all over the Maltese Islands.	2028	Other	Waste Management Framework Directive	n.a.	n.a.

When comparing historical GHG emission data with implemented policies, there was a correlation between countries that had introduced landfill bans on landfilling biodegradable waste and achieving the largest waste sector emission reductions. Ireland is the only exception to this. It has a high landfill tax and targets specific waste streams

through a national waste prevention programme while also achieving high emission reduction.

Challenges and opportunities

The emissions reported under the waste sector focus on the direct reduction of emissions linked to less waste and better waste management. However, the emission reduction potential of a more circular economy – where the value of products and materials is retained for as long as possible – goes beyond just the waste sector.

The circular economy could reduce demand for virgin materials and thus reduce emissions of extraction and processing of these materials. However, emissions from these activities are reported under industry [47]. On the other hand, a higher share of renewable energy could reduce the impacts of energy-intensive parts of the circular economy such as material waste recovery. Total emissions can only be reduced through coordinated policies along the whole value chain from design, production, consumption, and waste reuse. The **circular economy** has a cross-cutting character and is therefore considered a prerequisite for climate neutrality in the Circular Economy Action Plan [48].

In August 2025, the European Commission launched public consultation for Circular Economy Act, which aims to establish a single market for secondary raw materials, increase the supply of high-quality recycled materials and stimulate demand for these materials in the EU.

The cross-cutting character has one significant difficulty. As indicated above, the potential emission reductions due to circular economy measures are usually unquantified, hidden, or poorly captured in the reporting of policies and measures for reducing GHG emissions (only 6% of reported policies are considered circular economy-related) [49]. For example, if glass waste is collected and processed into recyclables and used as secondary raw material in producing new glass, then the glass industry needs less energy than that used for producing the same glass from virgin materials. However, such processes are seldom reported as circular economy measures in the relevant manufacturing sector and their potential might be underestimated. Moreover, realising such potential requires collaboration along the whole value chain and across sectors.

[47] Source sector CRF2 Industrial processes and product use in IPCC 2006 Guidelines. Guidelines are available at Publications - IPCC-TFI (iges.or.jp).

[48] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A new Circular Economy Action Plan For a cleaner and more competitive Europe. COM/2020/98 final

[49] https://www.eea.europa.eu/en/analysis/publications/capturing-the-climate-change-mitigation-benefits-of-circular-economy-and-waste-sector-policies-and-measures

4.6 Agriculture emissions

Agriculture plays a vital role in the European Union's transition to a net-zero economy, deeply intertwined with people's lives, their connection to nature, and sustainable lifestyles. The sector accounts for nearly 13% of the EU's total emissions, primarily from methane and nitrous oxide. Beyond food production, agriculture provides biomass for feed, materials, and energy, and shapes rural landscapes and biodiversity, offering natural solutions like carbon sequestration in soils and forests.

The EU's commitment to reducing agricultural emissions is reflected in policies such as the Common Agricultural Policy (CAP) eco-schemes, the Industrial Emissions Directive, the Farm to Fork Strategy promoting sustainable food systems, and the EU Methane Strategy targeting reductions in livestock methane emissions, the EU Carbon Removals and Carbon Farming (CRCF) Regulation. Together, these initiatives encourage farmers and consumers to adopt climate-friendly practices, fostering a lifestyle that respects nature while steering Europe towards climate neutrality by 2050.

The key sources of agricultural emissions included in GHG inventories are:

methane and nitrous oxide (N2O) from livestock:

- Enteric Fermentation (3.A);
- Manure Management (3.B);
- N2O from agricultural soils (3.D).

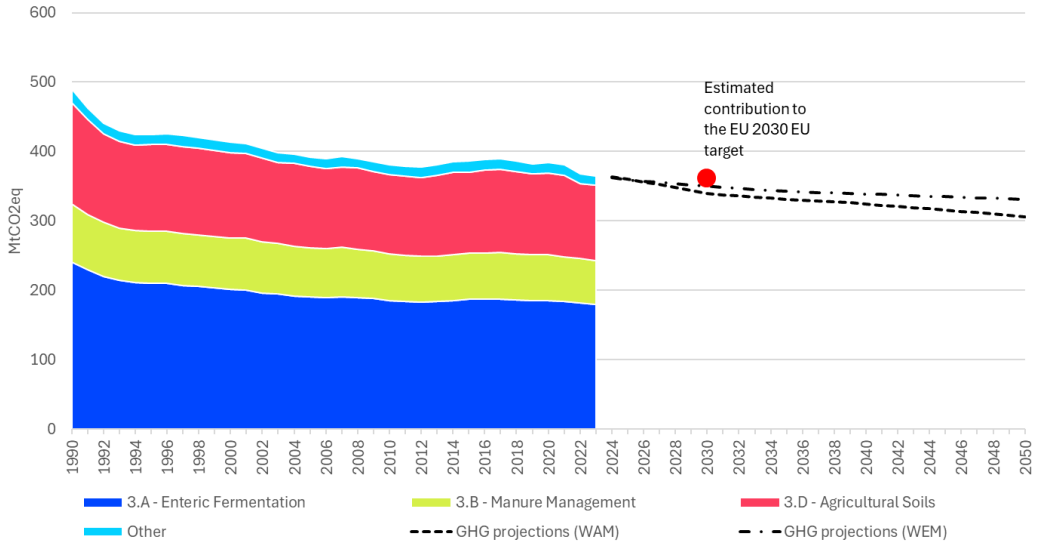
For the presentation of historical trends in emissions by subcategory, we have combined minor emissions categories into the single aggregate category 'Other': 'Rice cultivation' (CRF 3C), 'Prescribed burning of savannahs' (CRF 3E), 'Field burning of agricultural residues' (CRF 3F), 'Liming' (CRF 3G), 'Urea application' (CRF 3H), 'Other carbon containing fertilisers' (CRF 3I) and 'Other agricultural emissions' (CRF 3J).

Historical developments, trends and projections

In 2023, agriculture emissions represented nearly 13% of the EU's overall GHG emissions (18% of the ESR emissions), of which two third from livestock (50% enteric fermentation, 17% manure management) and the rest from land, including fertilizers. Since 2005, the pace of emissions reduction has visibly slowed down. Between 2005 and 2023, emissions from agriculture declined by 7%, with a higher decrease in manure management (12%). Improved efficiency and sustainability measures have been developed. However, a significant increase in agricultural production drove overall emission levels (see below). Nevertheless, emission intensity – that is, in the level of GHGs emitted per unit of product – continue to decline. Key drivers include the adoption of precision farming technologies, better manure and fertilizer management, and shifts in livestock feeding practices that reduce methane emissions. For instance, between 2000 and 2019, the level of enteric

fermentation per litre of milk produced declined by 17% due to changes in dairy cattle management practices [50]. However, increases in milk production have counterbalanced the positive effects that these practices have had on overall emission levels. Without the changes in dairy cattle management practices, emissions would have risen alongside production [51].

Figure 37: Emissions in agriculture (1990-2023) and projections (2024-2050)



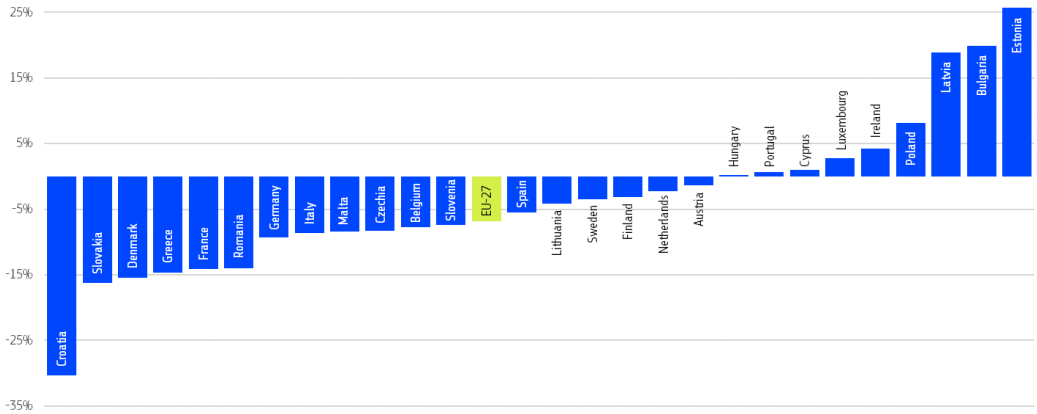
Note: Based on 2025 GHG inventories and 2025 GHG projections submitted by Member States. The estimated contribution to the EU 2030 EU target is based on the modelling outcomes of the core policy scenario supporting the Fit-for-55 initiatives.

The latest GHG projections from Member States indicate that when considering both existing and additional measures agriculture emissions are expected to be around 340 $MtCO_2$-eq by 2030 (-13% compared to 2005) in line with the expected emissions from the model-based results supporting the delivering of the European Green Deal. The difference between the two projection scenarios, i.e. with only existing and with additional measures, is minor (around 10 $MtCO_2$-eq). This could reflect fewer planned policy interventions in this area or a reduced impact of the planned additional policies on emissions. Looking forward, continued efforts are essential to maintain progress and ensure the sector contributes effectively to the climate-neutrality goal.

Compared to 2005 level, emissions in agriculture significantly fell in Croatia (30%), while sizeable increases were reported in Estonia (26%), Bulgaria (20%) and Latvia (19%). Over the same period, emissions have also increased in Ireland (4%), the country with the highest share of agriculture emissions on total GHG emissions.

[50] Progress and prospects for decarbonisation in the agriculture sector and beyond — European Environment Agency
[51] ETC_CME_Eionet report 2021_Agriculture_PaMs analysis 20220510.pdf

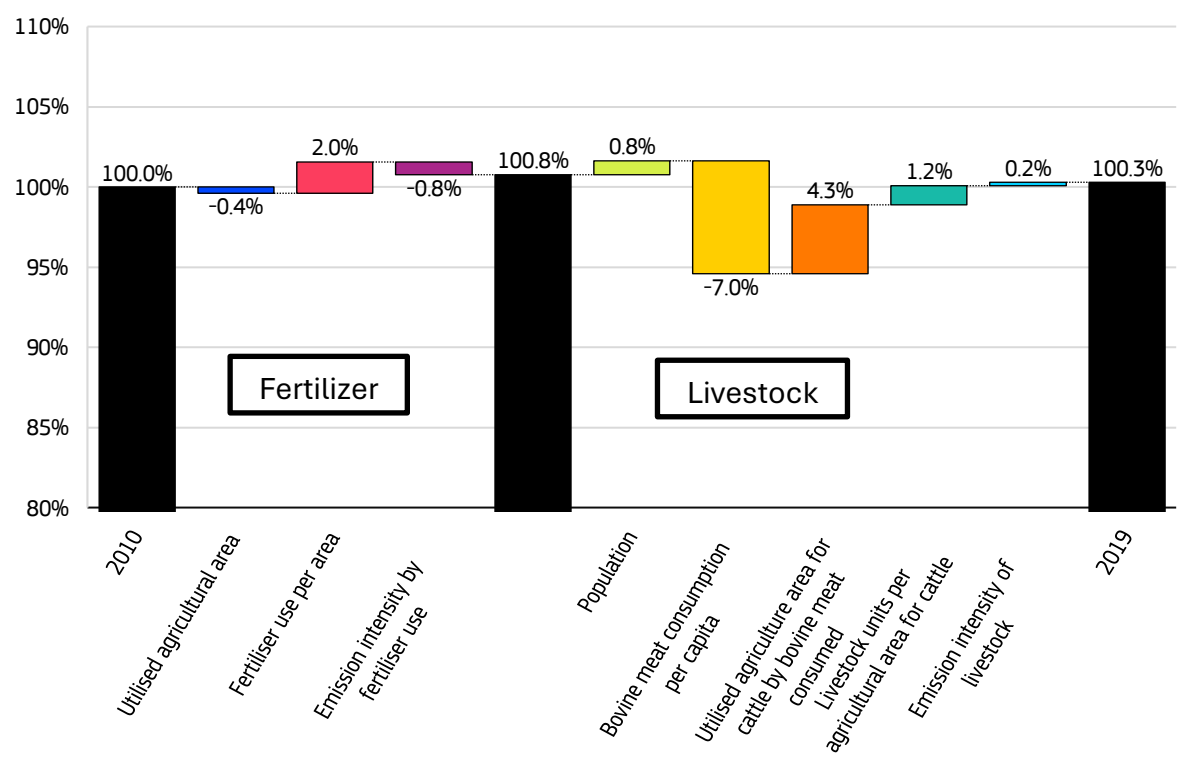
Figure 38: Changes in GHG emissions from the agriculture sector by Member State (2005-2023)



Main drivers

Due to limitations in data availability, the decomposition analysis was performed between 2010-2019. Over this period, GHG emissions in agricultural have remained rather stable. An increased use of fertilizer contributed to higher emissions despite a slight improvement in the emission intensity of the used fertiliser, due to a shift in the chemical composition used. In the livestock sector, the expansion of agricultural area for cattle as well as the increased density of cattle by utilised area, went hand in hand with a sizeable reduction of bovine meat consumption per capita. It could signal both a change in the Europeans' diet (e.g. less red meat) and a change in the trade patterns, with more European meat going to external market. The overall land used for agriculture has slightly decreased despite the expansion of land for cattle. This can be interpreted as a structural shift in agriculture as food markets globalise and regions specialise.

Figure 39: Decomposition of emission in agriculture (2010-2019)



Decomposition factors

$$GHG_{agri} = GHG_{fertilizer} + GHG_{livestock}$$

$$GHG_{fertilizer} = UAA * \frac{FUT}{UAA} * \frac{GHG_{fertilizer}}{FUT}$$

$$GHG_{livestock} = GHG_{entericfermentation} + GHG_{manure} = POP * \frac{BMC}{POP} * \frac{UAA_b}{BMC} * \frac{LSU}{UAA_b} * \frac{GHG_{livestock}}{LSU}$$

Fertilizer

UAA – Total utilized agricultural area
FUT/UAA – Nitrogen fertiliser use per area
GHG_fert/FUT – Emission intensity of fertilizer use

UAA – Total utilized agricultural area
FUT – Fertilizer Use Total
GHG_fert – GHG emissions related to fertilizer use

Livestock

POP – Population
BMC/POP – Bovine meat consumed per capita
UAA_b/BMC – Utilized agricultural area for cattle per bovine meat consumed
LSU/UAA_b – Livestock units per utilized agricultural area for cattle
GHG_b/LSU – Emission intensity of livestock

POP – Population
BMC – Bovine Meat Consumption
UAA_b – Utilised Agricultural Area for bovines (cattle)
LSU – Livestock Units
GHG_livestock – GHG emissions related to livestock (enteric fermentation and manure)

Policies and measures

While EU-wide frameworks – such as the Common Agricultural Policy (CAP) and the Effort Sharing Regulation – provide essential direction and coordination, the role of national policies is pivotal in translating climate goals into tailored, context-specific actions. As

such, national strategies must not only align with EU-level commitments but also reflect domestic agricultural structures, practices, and environmental conditions to effectively and fairly reduce emissions while sustaining the sector's vitality.

A recent study by the European Evaluation Helpdesk [52] establishes, for the first time, a link between CAP Strategic Plans (CSP) instruments, such as good agricultural and environmental conditions (GAECs) and CAP interventions and their climate change mitigation potential, across the EU Member States. Its methodology relies on data from the CSPs of the 2023-2027 CAP programming period, estimates of expected uptake levels, and on average emission and removal coefficients for farming practices, enhancing carbon removals and conserving existing carbon stocks.

The study finds that the CSPs have the potential to contribute positively to GHG emission reduction and enhanced removals, with an estimated 35 $MtCO_2$-eq per year on average over the 2023-2027 period. In terms of farming practices, crop rotation or diversification, expansion of cover crops, and conversion to organic farming account for 74% of the estimated mitigation potential.

In 2025, in reporting on progress of national climate and energy plans, EU Member States reported more than 380 policies and measures targeting emissions in agriculture (around 11% of all single policies and measures), 18% more than 2023 reporting cycle.

Around 30% of agriculture policies and measures are directed to livestock, by supporting targeted breeding and using feed additives to reduce enteric methane emissions (14%) but also improving manure management systems and promoting anaerobic digestion 'biogas' (16%). Another 18% of policies and measures aim at reducing fertilizer and manure use on cropland, such as measures to reduced or ban the use of mineral fertilisers, to promote the use of slurry additives to reduce methane emissions, to use of low emission-spreading equipment, or introducing organic fertilisers. Relatively few Member States reported measures to reduce livestock number, support permanent conversion of arable land to grassland or wetland, or encourage dietary change.

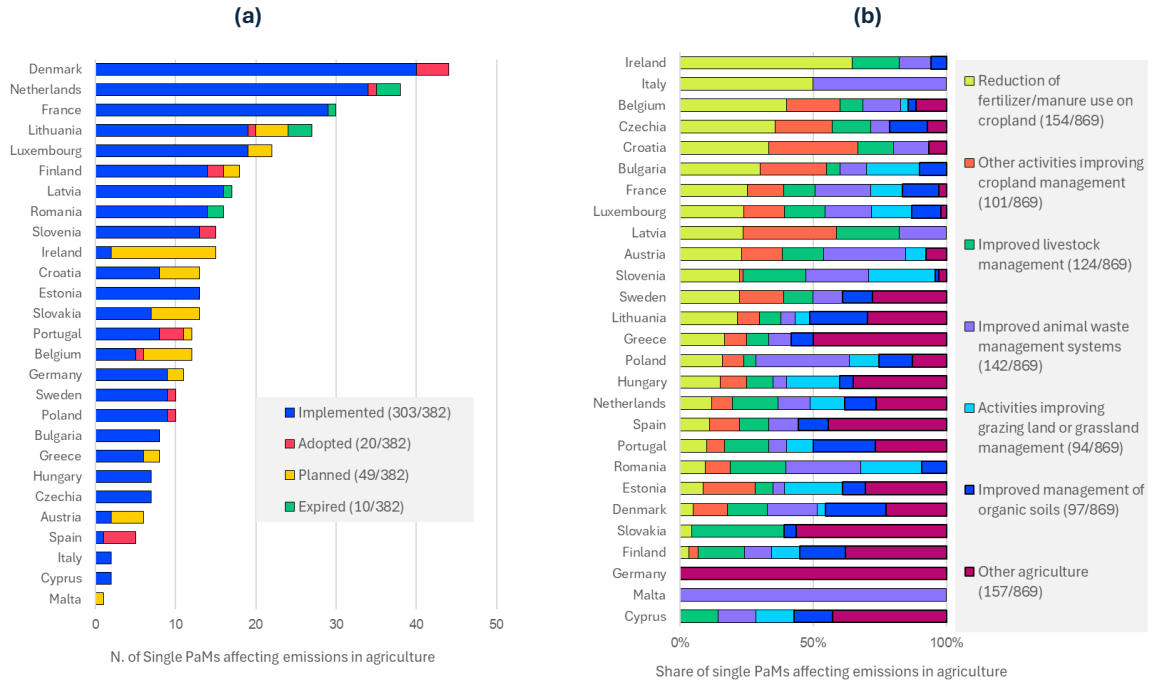
The EU Carbon Removals and Carbon Farming (CRCF) [53] Regulation creates the first EU-wide voluntary framework for certifying carbon removals, carbon farming and carbon storage in products across Europe. It aims to support farmers' adoption of more sustainable agricultural practices, providing them with additional complementary income. Carbon farming involves practices that enhance carbon sequestration and storage in forests and soils, or that reduce greenhouse gas emissions from soils, such as rewetting and restoring peatlands and wetlands, agroforestry, soil protection measures like catch

[52] Rough estimate of the climate change mitigation potential of the CAP Strategic Plans (EU-27) over the 2023-2027 period

[53] https://eur-lex.europa.eu/eli/reg/2024/3012/oj/eng

crops, cover crops, conservation tillage, and hedgerows, reforestation and improving fertiliser use efficiency.

Figure 40: a) Number of single policies and measures related to agriculture by status of implementation b) and by main objective



Notes: Data on policies and measures are based on a preliminary dataset of 2025 NECP progress reports (Annex IX). Due to a delay in the submission, data for Belgium refer to the 2023 NECP progress reports. Member States can indicate more than one objective for the same policy and measure. In brackets, the EU PaM's totals. Order of country in figure (b) is aligned to the share of policies and measures targeting reduction in the use of chemical fertilizers. Some of policies and measures have an impact also on LULUCF emissions rather than on agricultural emissions.

Data on policy impact on emission reductions was available for around 22% of policies and measures targeting agriculture-related emissions. This highlights a major gap in how Member States evaluate the effectiveness of their climate policies. As a result, Table 18 presents only an illustrative list of measures with reported impacts. Policies lacking impact data cannot be meaningfully assessed.

Table 18: Illustrative list of polices and measures affecting agriculture emissions

Country	Name of policy or measure	Description	Start year	Type of instrument	Related EU policy	Emissions reductions in 2030 (KtCO2eq)	% of total agriculture emissions in 2005
Slovakia	Feed Additives	This measure entails complementing the diet of cattle and sheep with 3-Nitrooxypropanol as a feed additive.	2035	Economic; Regulatory	Common Agricultural Policy	743	29%

Finland	Mineral soil carbon increase activities	The target is to increase the amount of carbon in mineral soils. Measures are implemented through CAP.	2014	Economic; Information; Research	Common Agricultural Policy	737	12%
Greece	Establishing common rules for direct support schemes	The reduction of the rate of intensity of agricultural land use and the adoption of rules for the obligatory observance of cross compliance system relating to manure management contribute to the reduction of GHGs.	2007	Planning; Regulatory; Economic	Effort Sharing Decision; Common Agricultural Policy	800	9%
Bulgaria	Crop rotations	The introduction of sustainable crop rotation that includes vegetation cover in winter and leguminous crops (legumes, soya, lucerne, clover) will protect soils from erosion and maintain organic carbon sequestration, which is a potential means of reducing greenhouse gas emissions.	2013	Information; Planning; Regulatory	Effort Sharing Regulation	394	8%
Slovakia	Switch to organic fertilisers	This measure focuses on switching from inorganic to organic fertilisers (compost, manure, sewage sludge)	2024	Economic; Regulatory	Common Agricultural Policy	186	7%
Ireland	Feed additives	To promote the incorporation of feed additives in cattle diets as a measure to reduce methane emissions.	2024	Voluntary. Education	Common Agricultural Policy	1190	6%
Estonia	Eco-scheme for organic farming	The support is granted to farmers who start conversion to organic farming and engage in organic farming, and support is granted on the basis of the area of their agricultural land under organic farming	2023	Economic; Regulatory	Effort Sharing Regulation; Common Agricultural Policy	27	2%
Latvia	Promote inclusion of leguminous plants in crop rotation for nitrogen fixation	The main aim of the measure is to expand arable land and increase number of farms were leguminous plants are included in crop rotation thus contributing to atmospheric nitrogen fixation and reduction of application of inorganic nitrogen fertilizers.	2023	Economic; Voluntary	Not related	40	2%
Austria	Livestock and feeding management	Optimized feeding with respect to enteric emissions and emissions from manure by using methane-reducing feed additives for cattle as well as the implementation of N-reduced feeding strategies for cattle and swine.	2024	Economic; Education; Information; Voluntary	Common Agricultural Policy	90	1%

Challenges and opportunities

The agricultural sector presents both opportunities and challenges for reducing greenhouse gas (GHG) emissions. One significant opportunity lies in the adoption of technical mitigation measures. These include enhancing nitrogen efficiency, optimising livestock practices such as feeding and breeding, and investing in infrastructure like low-emission stables and biogas plants for manure digestion. Additionally, the use of additives to reduce methane and nitrous oxide emissions is seen as a promising option. By embracing these innovative approaches, farmers can not only contribute to a more sustainable future but also improve their bottom line through increased efficiency and reduced energy costs [54].

However, there are also significant challenges to be addressed in reducing emissions from agriculture. One major hurdle is the need for significant investment in new technologies and infrastructure, which can be a barrier for smaller-scale farmers. Moreover, the complexity of agricultural systems and the variability of local conditions mean that there is no one-size-fits-all solution, and approaches will need to be tailored to specific farm types and regions. Despite these challenges, many farmers are already taking steps to reduce their environmental impact, and with the right support and incentives, it is possible to unlock the full potential of the agriculture sector to contribute to a low-carbon future.

To overcome these challenges and realise the opportunities for emissions reduction, it will be essential to provide farmers with the necessary support and resources. Additionally, research and development will be crucial to identify and scale up the most effective solutions, and to address the specific challenges faced by different types of farms and farming systems.

[54] Progress and prospects for decarbonisation in the agriculture sector and beyond. EEA Briefing no. 17/2022.

5 The EU's 2030 NDC under the UNFCCC

The European Union released its first Biennial Transparency Report (BTR) at COP29, ahead of the 31 December 2024 deadline. This first BTR shows that the EU is making good progress towards its NDC target with net greenhouse gas emissions in the EU in 2022 down by 31.8% since 1990.

This first BTR is the first report under the EU's nationally determined contribution under the Paris Agreement which was updated in 2023 and raised the EU and its Member States ambition to a greenhouse gas emissions reduction target of at least 55% by 2030 compared with 1990 levels.

As mentioned above the European Union has established legally binding climate objectives through two primary instruments: the European Climate Law (Regulation (EU) 2021/1119) and its Nationally Determined Contribution (NDC) under the Paris Agreement. While both aim for climate neutrality, their legal scopes differ significantly and defines their respective emissions scope in slightly different ways - particularly for aviation and maritime transport. These differences matter when we track progress. As the EU climate target, this target is to be achieved domestically (i.e. within the EU), without the use of international credits.

The submission of BTRs is a significant milestone in the implementation of the Paris Agreement, which marks the beginning of a new era of accountability and collaboration in the global fight against climate change, as outlined under the Enhanced Transparency Framework of the Paris Agreement.

The Enhanced Transparency Framework (ETF), adopted under the Paris Agreement, aims at building mutual trust and confidence and at promoting the effective implementation of the Agreement. It builds on the transparency arrangements under the United Nations Convention on Climate Change (UNFCCC), and its purpose is to provide a clear understanding of climate change action and of support provided and received. Information reported under the Enhanced Transparency Framework is of particular importance for the Global Stocktake, which periodically takes stock of the implementation of the Paris Agreement. The modalities, procedures and guidelines (MPGs) for the Enhanced Transparency Framework, adopted in decision 18/CMA.1 in 2018, specify the information which is to be provided by Parties in their Biennial Transparency Reports (BTRs). They also provide the rules for the technical expert review of this information and for the Facilitative, Multilateral Consideration of Progress (FMCP). Further details on the reporting of this information, including the outline of the BTR and tables for electronic reporting, were adopted in decision 5/CMA.3 in 2021. Tables for electronic reporting include Common Reporting Tables (CRT) for greenhouse gas inventory information and Common Tabular Formats (CTF). The latter are used for the reporting of information necessary to track progress in implementing and achieving Nationally Determined Contributions (NDCs), and

information on support to developing countries. The first Biennial Transparency Report, including CRT and CTF tables was submitted using the new UNFCCC ETF report tools.

The Governance Regulation article 29 paragraph 5(a) lays down the provisions to track progress and policy response to ensure Union targets achievement. This includes monitoring whether the Union and its Member States have made sufficient progress towards meeting their commitment taken under the Paris Agreement, towards their NDC.

This BTR provides essential information on the progress made in implementing the EU legislation, and an assessment of the effects of the major EU policies and measures, projected emissions and the need for further policy development. The BTR also details the support and capacity building that the EU provides to developing countries, and in addition, it describes the EU's work to assess climate risks and our preparedness for climate impacts.

The National Inventory Report is a key component of the BTR, as it is the EU's indicator for tracking progress towards the NDC. The MPGs specify that this report may be submitted as a stand-alone report or as a component of the BTR. They also specify that the National Inventory Report (NIR) consists of a National Inventory Document (NID) and of the CRT. The outline for the National Inventory Documents is defined in decision 5/CMA.3, and it is similar to the outline for National Inventory Reports which are submitted by Parties listed in Annex I to the Convention. The EU will continue submitting its National Inventory Document as a standalone report, thus producing separate reports. The EU's first NID under the Paris Agreement was submitted as a standalone document in December 2024 and reported a 32.6% fall compared to 1990.

In February 2025 a team of independent technical expert reviewers (TERT) conducted a technical review of the EU BTR and NID.

The TERT conducted a technical expert review of the information reported in the EU first BTR as per the scope of the review defined in paragraph 146 of the MPGs. Their aim was to assess:

- the accuracy and transparency of the information reported;
- whether it aligned with the UNFCCC modalities, procedures and guidelines (MPGs);
- progress made toward the EU's NDC;
- and the support provided.

The TERT considered that based on the 2023 inventory data, around an 18 per cent reduction from the 2023 level is needed to achieve its 2030 NDC target in seven years. The TERT concluded that the EU is currently on track to achieving its 2030 NDC target by implementing mitigation actions but may face challenges keeping on track given the uncertainty as to whether the current pace of emission reductions can be maintained.

The EU has also agreed to submit its NDC, ahead of COP30, with an indicative 2035 target between 66.25%. and 72.5% reduction in net GHG emissions compared to 1990 levels. The EU is looking towards the submission of its second BTR in 2026.

6 Report on the quality of petrol and diesel fuel used for road transport in the EU (reporting year 2023)

6.1 Introduction

Pursuant to Article 7a of Directive 98/70/EC [55] relating to the quality of petrol and diesel fuels (the 'Fuel Quality Directive') and Article 5 of Council Directive (EU) 2015/652 laying down calculation methods and reporting requirements pursuant to Directive 98/70/EC [56], Member States are required to report annually on the GHG intensity of fuels and energy supplied in their territories. This reporting obligation applied for the first time for the 2017 reporting year, following the application and transposition of Council Directive (EU) 2015/652. The recent amendment of the Renewable Energy Directive [57], deleted Article 7a of the Fuel Quality Directive as from 20 November 2023 and repealed Council Directive (EU) 2015/652 as of 1 January 2025. However, pursuant to Article 4 of the amending directive, which sets out transitional provisions, Member States were still required to collect and report the data in accordance with Article 7a of the Fuel Quality Directive for the year 2023, which is reflected by this annual report.

Furthermore and, pursuant to Article 8(3) of the Fuel Quality Directive, Member States are required to report on national fuel quality data for the preceding calendar year.

This annual report summarises the information provided by Member States in relation to the above-mentioned reporting requirements. It is based on the data submitted by Member States to the European Environment Agency (EEA) for the year 2023.

6.2 Volumes and life cycle greenhouse gas intensity of fuel and energy types

Article 7a of the Fuel Quality Directive, in conjunction with Council Directive (EU) 2015/652, set out reporting requirements concerning the following:

- the total volume of each type of fuel or energy supplied for road transport and non-road mobile machinery (including inland waterway vessels when not at sea), agricultural and forestry tractors, and recreational craft when not at sea;

[55] Directive 98/70/EC of the European Parliament and of the Council relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC, OJ L 350 of 28.12.1998, p. 58.
[56] Council Directive (EU) 2015/652 of 20 April 2015 laying down calculation methods and reporting requirements pursuant to Directive 98/70/EC of the European Parliament and of the Council relating to the quality of petrol and diesel fuels, OJ L 107 of 25.4.2015, p. 26.
[57] Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652.

- the life-cycle GHG emissions per unit of energy, including the provisional mean values of the estimated indirect land use change (ILUC) emissions from biofuels [58];
- the feedstock and the biofuel production pathway used for each of the biofuels supplied on the territories of Member States.

Until the relevant articles are removed, the Fuel Quality Directive obliges Member States to require fuel suppliers to reduce the life-cycle GHG intensity of transport fuels, i.e., the life-cycle GHG emissions per unit of energy from fuel and energy supplied, by a minimum of 6% compared with the fuel baseline standard for 2010 of 94.1 gCO2eq/MJ. ILUC GHG emissions are not taken into account when assessing compliance with the minimum 6% reduction target. The Renewable Energy Directive (EU) 2018/2001 [59] sets out several measures to address ILUC including a cap on food- and feed-based biofuels. Its delegated act [60] sets out detailed criteria for determining high ILUC-risk feedstock for biofuels that are to be gradually phased out by 2030 and the criteria for certifying low ILUC-risk biofuels, bioliquids and biomass fuels.

In 2023, all 27 Member States, UK (in respect of Northern Ireland [61]), Iceland and Norway provided data on GHG emission reductions in the appropriate format. The comparisons between aggregated figures refer to the EU-27 for all reference years.

Greenhouse gas emissions and distance to 2020 target

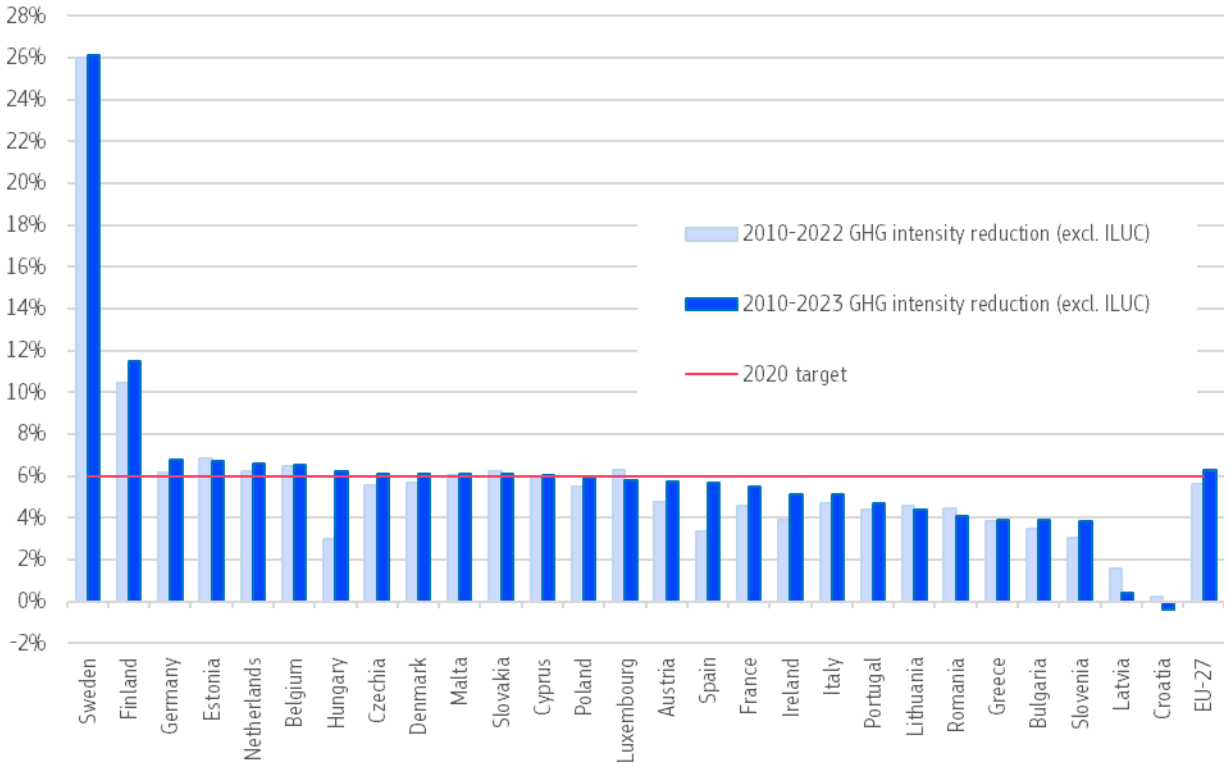
According to the data provided, the average GHG intensity of the fuels and energy supplied in the 27 reporting Member States in 2023 was 88 gCO_2eq/MJ, which translates into a saving of 69 $MtCO_2$-eq during the year 2023. This is 6.3% lower than the 2010 baseline of 94.1 gCO2eq/MJ reaching on average the 2020 target of 6% for the first time.

Reported data for 2023 shows that the progress achieved by EU fuel suppliers varies greatly across the EU Member States. 12 Member States (Sweden, Finland, Germany, Estonia, Netherlands, Belgium, Hungary, Czechia, Denmark, Slovakia, Malta and Cyprus) have achieved their objective of reducing the GHG intensity of transport fuels by 6% compared with 2010 (see Figure 41). The largest progress within a year was achieved by

[58] Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources, OJ L239 of 15.9.2015, p. 8.
[59] Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, OJ L 328, 21.12.2018, p. 82–209
[60] Commission Delegated Regulation (EU) 2019/807 of 13 March 2019 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council as regards the determination of high indirect land-use change-risk feedstock for which a significant expansion of the production area into land with high carbon stock is observed and the certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels, OJ L 133, 21.5.2019, p. 1–7
[61] Following the end of the transition period, Council Directive (EU) 2015/652 setting out relevant reporting obligations no longer applies to the UK as whole. However, pursuant to Article 5(4) read in conjunction with Annex 2, point 47 of the Protocol on Ireland/Northern Ireland to the Withdrawal Agreement, Council Directive (EU) 2015/652 continues to apply to and in the UK in respect of Northern Ireland (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12020W/TXT).

Hungary with 3.3 percentage points increases between 2022 and 2023, against the 2010 baseline, followed by Spain with 2.4 percentage point. Further information can be found in the EEA report on GHG intensities of transport fuels in the EU in 2023 [62].

Figure 41: Reductions in GHG intensity of fuels achieved by EU fuel suppliers in Member States in 2010-2022 and 2010-2023



Source: EEA

Furthermore, in 2023, upstream emission reductions (UERs) [63] were reported by 14 Member States (Austria, Cyprus, Czechia, Denmark, Estonia, Germany, Hungary, Italy, Luxembourg, Malta, Poland, Romania, Slovakia and Slovenia), which contributed between 0.2 and 3.1 percentage points to the overall GHG emission reduction achievement. Consequently, the total reported UERs were 5 889 kt CO2eq in 2023, resulting in an additional reduction in the fuel GHG intensity by 0.6 percentage points from 5.7% to 6.3%. UERs claimed by suppliers have to be quantified and reported in accordance with the requirements set out in Council Directive (EU) 2015/652.

When ILUC emissions are taken into account [64], the average GHG intensity of the fuels in the EU in 2023 was 4.8% lower than in 2010. According to Article 7d of the Fuel Quality

[62] Technical Report No 2025/02: https://www.eionet.europa.eu/etcs/etc-cm/products/etc-cm-report-2025-02
[63] 'Upstream emissions' means all greenhouse gas emissions occurring prior to the raw material entering a refinery or a processing plant where the fuel is produced.
[64] For this calculation, the provisional estimated indirect land-use change emissions from biofuels were taken into account as listed in Annex V of the Fuel Quality Directive.

Directive, which lays down the method of calculation of life cycle GHG emissions from biofuels, ILUC emissions are not to be taken into account when assessing compliance with the minimum 6% reduction target.

Further action will be necessary in order to decarbonise the fuel used in transport and to contribute to the increased climate ambition, as set out in the European Green Deal and the legislative proposals adopted as part of the 'Fit-For-55' legislative package of 14 July 2021. The amended Renewable Energy Directive substantially increases the overall ambition of decarbonising transport fuels and energy carriers. Member States will have to reduce their GHG intensity by at least 14.5% compared with the 2010 baseline or will need at least a 29% share of renewable energy within the final consumption of energy in the transport sector by 2030. In addition, the ReFuelEU Aviation and FuelEU Maritime Regulations will boost the production and uptake of sustainable alternative fuels in the aviation and maritime sectors.

Fuel supply

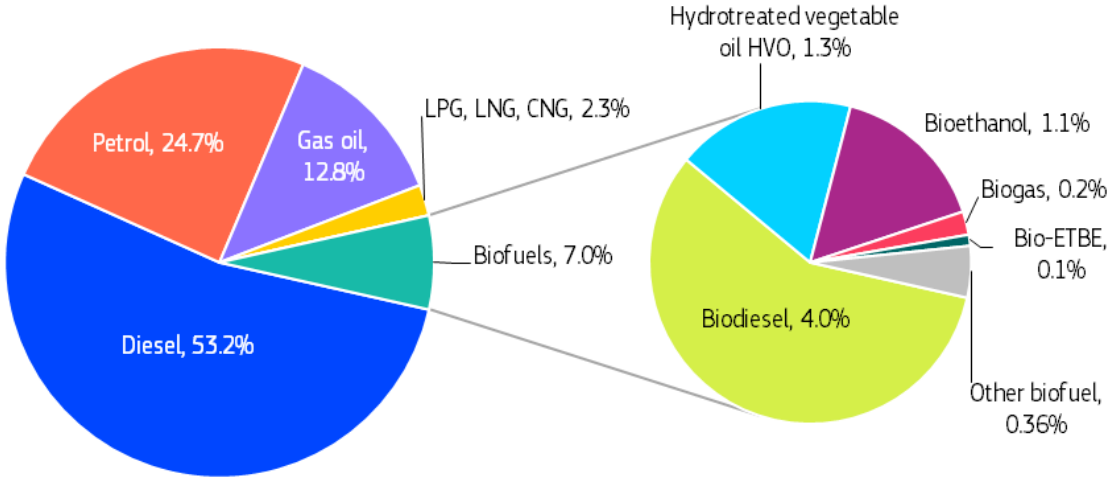
This section summarises the data submitted by Member States on all fossil fuels, biofuels and fuels of non-biological origin within the scope of the Fuel Quality Directive for road transport and non-road mobile machinery.

Total fuel supply reported by the 27 Member States in 2023 was 11 726 petajoules (PJ), representing a slight increase of 5% compared with 2022. The fuel supply remained dominated by fossil fuels (93%) followed by biofuels (7%) and a very minor share (0.1%) of electricity (see *Section 5.2.4*). No renewable fuels of non-biological origin were reported in 2023.

Fossil fuel supply remained dominated in 2023 by diesel (53.2%; 6 239PJ), followed by petrol (24.7%; 2 892 PJ) and gas oil [65] (12.8%; 1 497 PJ). Liquefied petroleum gas and natural gas had a combined share of 2.3 % (273 PJ) (Figure 42)

[65] 'Gas oil' denotes fuel as per definitions in Article 2 (2) and (3) of the Fuel Quality Directive.

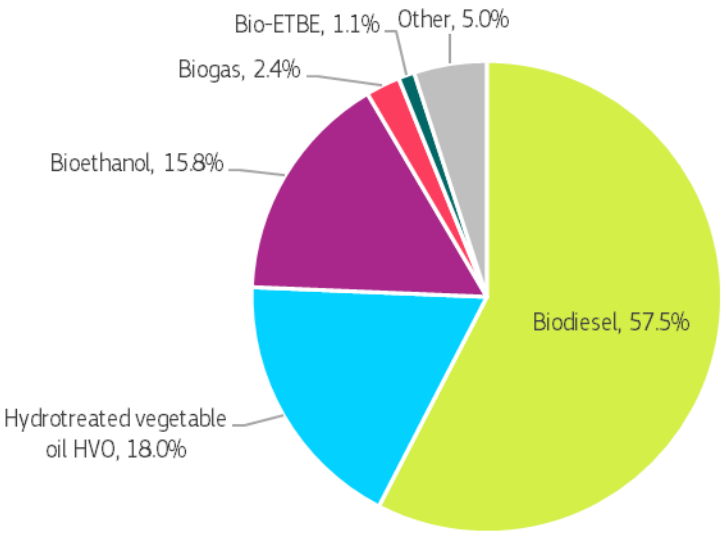
Figure 42: Fuel energy supply shares per fuel type in 2023 (Source: EEA)



Biofuel consumption

Total biofuel consumption increased slightly from 742 PJ to 824 PJ between 2022 and 2023 in the 27 Member States. It remains dominated by biodiesel (fatty acid methyl ester, FAME), which accounts for 57.5% of total biofuel consumption (474 PJ), followed by hydrotreated vegetable oil (HVO) (18.0%; 149 PJ), and bioethanol (15.8% ; 131 PJ). Bio-ethyl tert-butyl ether (bio-ETBE) accounted for 1.1% (9 PJ) and biogas for 2.4% (19 PJ) of the total biofuel consumption. The other biofuels collectively accounted for 5.0% (42 PJ) (see Figure 43). This means that almost 80% of all biofuels are blended into diesel fuel. Detailed information for all biofuels and pathways can be found in the EEA Technical Report No 2024/04.

Figure 43: Biofuel energy supply shares per fuel type in 2023 (Source: EEA)



Electricity consumption

The reporting of electricity consumption by fuel suppliers is voluntary. 21 Member States (compared to 19 in 2022) reported data on electricity consumed by electric vehicles, including motorcycles (see Table 19). The total reported quantity of electricity consumed by electric vehicles increased by approximatelly 60% from 10 829 451 GJ in 2022 to 17 691 407 (excluding powertrain efficiency adjustment). The actual electricity consumption of electric vehicles in the different Member States may be greater because reporting of electricity was compulsory under Article 7a and some Member States did not report it, even thogh it would help them achieve the 6% target.

Table 19: Electricity consumed by electric vehicles and motorcycles in 2023 as a reported contribution by fuel suppliers to their GHG reduction target

Member State	Quantity of energy		GHG intensity	
	excluding powertrain efficiency (GJ)	including powertrain efficiency (GJ)	reported by Member State (g CO2e/MJ)	reported by Member State (g CO2e/kWh)
Belgium	58 517	23 407	74	266.4
Bulgaria	163 256	65 302	142.3	512.1
Czechia	20 793	8 317	177	637.2
Denmark	69 776	27 910	45	162
Germany	9 320	3 728	135	486
Estonia	187 601	75 040	114.5	412
Ireland	822 040	328 816	100.3	361.1

Greece	9 669	3 867	116.7	420
Spain	345 438	138 175	82	295.2
France	8 170 963	3 268 385	16.1	58
Italy	511 453	204 581	110.3	397
Luxembourg	4 733	1 893	50	180
Hungary	49 083	19 633	61	219.6
Netherlands	5 900 000	2 360 000	93.5	336.6
Austria	897 831	359 132	18.9	68
Poland	7	3	182.1	655.6
Portugal	323 972	129 589	56.4	203
Romania	5 451	2 180	58.2	209.6
Slovenia	11 005	4 402	0	0
Slovakia	42 673	17 069	46.4	167
Sweden	87 828	35 131	7.2	26
Total	**17 691 407**	**7 076 563**	**-**	**-**

Note: Croatia, Cyprus, Latvia, Lithuania, Malta and Finland do not report data
Source: EEA

6.3 Overview of the EU's 2023 fuel quality data

In accordance withe Article 8 of the Fuel Quality Directive, all 27 Member States, Iceland; Norway and the United Kingdom (in respect of Northern Ireland) submitted reports on national fuel quality data for 2023.

This section provides the data for petrol and diesel sales, and the biocomponents included therein, for road transport reported by the 27 EU Member States. It excludes other fossil fuels, other biofuels and fuels of non-biological origin, and fuels used for non-road mobile machinery. More detailed information on fuel quality can be found in EEA Technical Report No 2024/02 on Fuel quality monitoring in the EU in 2023 [66].

Petrol and diesel

The share of diesel remained stable between 2017 and 2023, representing 69.8% of total sales in 2023. The total amount of diesel sold in 2023 decreased by 3.9 percentage points when compared with 2022. In parallel, petrol sales in 2023 increased by 4.2 percentage points when compared with 2022 (see Table 20).

[66] Technical Report No 2025/01: https://www.eionet.europa.eu/etcs/etc-cm/products/etc-cm-report-2025-01

Table 20: Diesel and petrol fuel sales for the EU-27 (in ml litres and their respective shares) in 2017/2023

Fuel	2017	2018	2019	2020	2021	2022	2023
Diesel fuel sales	235 388 (73.3%)	241 653 (73.3%)	246 865 (73.0%)	217 395 (73.2%)	231 224 (72.6%)	233 348 (71.5%)	224 313 (69.8%)
Petrol fuel sales	85 911 (26.7%)	87 994 (26.7%)	90 917 (27.0%)	79 659 (26.8%)	87 385 (27.4%)	92 921 (28.5%)	96 832 (30.2%)
Total (diesel and petrol)	321 299	329 629	337 782	297 054	318 609	326 269	321 145

Diesel fuel consumption is dominant in all EU Member States, except in the Netherlands, Greece and Cyprus where the proportion of petrol use is between 47% and 55%. Those Member States have therefore a relatively high petrol consumption (45% to 53%). By contrast, the corresponding petrol shares in Lithuania, Bulgaria, and Latvia, range from 20%, 19%, to 15% respectively.

There were no significant changes in the distribution of petrol sales in terms of petrol grade research octane numbers (RON) between 2022 and 2023. Most petrol sales in 2023 involved fuels with a petrol grade of RON 95 while the share of RON ≥ 98 sales slightly increased. Small changes were made in the reporting template where category 95 < RON < 98 was removed to harmonise reporting and remove some potential inconsistencies (see Table 21).

Table 21: Share of petrol sales in the EU-27 according to RON numbers

Petrol grade	2017	2018	2019	2020	2021	2022	2023
RON 95	84.30%	80.00%	77.80%	79.30%	80.50%	95.10%	94.98%
95 < RON < 98	8.50%	14.90%	16.70%	14.30%	13.10%	-	-
RON ≥ 98	6.90%	4.90%	5.40%	6.40%	6.40%	4.90%	5.01%
RON = 91	0.20%	0.20%	0.10%	0.01%	0.03%	0.01%	0.01%

Biocomponents content

In 2023, almost all petrol and diesel sold in the EU was marketed as containing biocomponents. 58.8% of all petrol sold, contained up to 5% ethanol content by volume

(E5), while 40.3% contained up to 10% ethanol content (E10); 0.9% of petrol contained more than 10% ethanol (E+ [67]).

Almost all diesel fuel sold in 2023 contained biocomponents. 99.8% of diesel fuel contained up to 7% FAME (B7) and 0.2% contained more than 7% (B+) [68] (See Table 22).

Table 22: Use of biocomponents in petrol and diesel fuels sold in the EU-27 in 2017-2023

Fuel type		2017	2018	2019	2020	2021	2022	2023
Petrol	E0	14.50%	4.90%	0.70%	0.00%	0.00%	0.00%	0.00%
	E5	66.70%	81.50%	73.30%	65.70%	65.40%	61.50%	58.80%
	E10	18.60%	13.40%	25.70%	33.30%	34.20%	37.60%	40.30%
	E+	0.10%	0.20%	0.40%	1.00%	0.40%	0.90%	0.90%
Diesel	B0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	B7	81.80%	99.20%	99.10%	86.20%	99.80%	99.80%	99.80%
	B+	16.20%	0.80%	0.80%	13.80%	0.20%	0.20%	0.20%

Note: The sales of E0 and B0 are insignificant and were included into E5 and B7 respectively from 2020.

Compliance of sold fuels with quality limits

A high compliance with the fuel quality limits is observed in the EU as a whole. A very large majority of key fuel parameters in the samples taken in 2023 were reported as being within the tolerance limits.

10 Member States (Croatia, Hungary, Ireland, Lithuania, Luxembourg, Malta, Netherlands, Romania, Slovenia and Sweden) verified and reported full compliance for both petrol and diesel fuels. 11 Member States verified and reported full compliance for petrol (Bulgaria, Croatia, Hungary, Ireland, Lithuania, Luxembourg, Malta, Netherlands, Romania, Slovenia and Sweden), and 22 for diesel (all except Belgium, Bulgaria, Cyprus, France and Italy).

Member States reported a total of 240 cases of non-compliance for petrol and 62 cases for diesel in 2023. For petrol, the most common parameters falling outside the specifications were exceedances of the summer vapour pressure (in 13 Member States), RON in 7 Member States and MON in 5 Member States,. For diesel, the most common parameters falling outside the specifications were the sulphur content. the distillation point of 95% and the FAME content (in 3 Member States for all parameters).

[67] E+ is petrol fuel with > 10% (% v/v) ethanol content.

[68] B+ is diesel fuel with > 7 % (% v/v) biodiesel content.

All Member States described the actions taken when non-compliant samples were identified. These actions included informing the competent authorities, initiating investigations, imposing penalties and fines, and resampling. In a small number of cases, no action was taken when the non-compliant parameters were found to be very close to the tolerance limits.

There was therefore no need for the Commission to launch any investigation in this area. It can be concluded that the fuel quality monitoring system in place ensures that high-quality fuels are sold in the EU in accordance with the requirements of the Fuel Quality Directive.

7 EU ETS emissions

The EU ETS applies in all 27 EU Member States plus Iceland, Liechtenstein and Norway, as well as to electricity generation plants in Northern Ireland [69]. Since January 2020, the EU ETS is linked with Switzerland's emissions trading system (Swiss ETS).

As of 2024, the sectoral scope of the EU ETS covers GHG emissions from over 12.000 entities from:

- Electricity and heat generation plants and manufacturing installations in Europe.
- Aircraft operators flying between airports in the European Economic Area (EEA) and from the EEA to Switzerland and to the United Kingdom.
- Maritime transport occurring between two EEA ports and when ships are in EEA ports, as well as half of emissions from voyages to or from EEA ports that start or end outside the EEA.

Table 23: Verified emissions data from the EU Emissions Trading System (EU ETS) – from power and industry installations (broken down by electricity and heat generation and industrial production) and from aircraft operators

Year	2019	2020	2021	2022	2023	2024
Installations	1 530	1 356 (1 253 UK excl.)	1 337	1 313	1 096	1 033
Year-on-year change	-9.1%	-11.4%	-1.4% (6.6% UK excl.)	-1.8%	-16.5%	-5.7%
Installations - electricity and heat generation	822	696 (653 UK excl.)	708	725	552	493
Change year-on-year	-14.7%	-15.3%	1.6% (8.5% UK excl.)	2.4%	-23.9%	-10.7%
Installations - industrial production	708	660 (601 UK excl.)	629	589	544	540
Change year-on-year	-1.6%	-6.9%	-4.7% (4.7% UK excl.)	-6.4%	-7.5%	-0.8%
Aircraft operators	68.2	25.2	27.9	49.5	54.4	62.6
Year-on-year change	+1.0%	-63.0%	+30.0%	+77.0%	+9.5%	+15%

Note: Data extracted from the Union Registry (for installations and aircraft operators) and the Swiss Registry (for aircraft operators administered by Switzerland).

[69] Under the Protocol on Ireland/Northern Ireland of the EU-UK Withdrawal Agreement.

8 Use of revenues from auctioning of ETS allowances

Table 24 summarises information from Member States' annual reports on the use of the EU Emission Trading System (ETS) auction revenue. Member States report on the use of ETS revenue under the Governance Regulation (Regulation 2018/1999) [70]. These reports are based on templates and submitted via the e-platform (i.e. Reportnet 3) managed by the European Environment Agency [71]. In 2025, Member States submitted reports for 2024.

Under Article 10(3) of the ETS Directive (Directive 2003/87/EC) [72], Member States are obliged to use 100% of the revenue collected (or an equivalent financial value) to support climate action and energy transformation, except for any revenue that Member States spend in aid for electricity-intensive industries for indirect carbon costs. The specific purposes are listed in Article 10(3) and include industrial decarbonisation, energy transformation, clean tech technologies, adaptation to climate change, decarbonisation of the transport sector and actions for just transition. The Commission closely monitors compliance with this new obligation to ensure all ETS revenue is truly spent on these purposes.

Where Member States reported having spent revenue in aid for indirect carbon costs, this value was deducted from the total revenue to obtain the value of the revenue subject to the obligation under the Article 10(3). For details, see Carbon Market Report 2025.

These reports include a list of details for each funded project or measure, together with its description, the amount, the revenue year and the disbursement status. Progress against 100% target is calculated based on amounts disbursed and the year when the disbursed revenues were generated. Revenues can also be reported as committed when the spending purpose has been decided but the money has not yet been disbursed. The table lists the purposes with the largest amounts disbursed or committed in 2024 (this may concern revenues generated in previous years).

The Commission reporting on the Member States' use of ETS revenues does not prejudge the compliance of the expenditures with Article 10(3).

[70] Regulation (EU) 2018/1999 of 11 December 2018, OJ L 328, 21.12.2018 (consolidated text).
[71] Use of ETS auctioning revenues - Reporting year 2025 – GovReg, Reportnet3, European Environment Agency
[72] Directive 2003/87/EC of 13 October 2003, OJ L 275 25.10.2003 (consolidated text).

Table 24: Revenue generated by EU Member States from the auctioning of ETS allowances in 2023 and 2024 to be spent on climate and energy-related purposes (EUR million), the share reported as disbursed (%) and a summary of revenue usage and purpuses, per country.

Austria		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	435.4	100%	100% previously
2024	313.1		100%
Revenue usage: All of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed. Revenue is not earmarked. The reported equivalent financial value spending on climate action and energy transformation is higher than the auction revenue.			
Purpose(s) with the largest use of ETS revenue in 2024: • The improvement/extension of the railway infrastructure, including Brenner base tunnel, was funded with annuity subsidies as per the Bundesbahngesetz (Federal Railway Act) for EUR 1,264.1 million.			
Belgium		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	541.2	41%	41%
2024	539.1		38%
Revenue usage: 38% of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed and 62% was reported as carried over for future spending and reporting. Additionally, EUR 116.3 million of pre-2023 revenue was reported as disbursed in 2024 and EUR 11.9 million of pre-2023 revenue was reported as committed in 2024. Since 2023, the direct spending of auction revenue is on hold pending a legal decision on the division between the regions and the federal government. The amount reported as disbursed in 2023 and 2024 comes temporarily from the regional general budgets and is to be compensated when the revenue currently on hold becomes available.			
Purpose(s) with the largest use of ETS revenue in 2024: • Support for the reduction of fluorinated greenhouse gases, financed via the Walloon Air and Climate Agency (AWAC) for EUR 57.2 million. • Within Rénopack, which supports households for energy-efficient, safe, and climate-friendly renovations, Fonds du Logement de Wallonie (FLW) provided EUR 55.0 million in zero-interest loans.			

- Société Wallonne du Crédit Social (SWCS) financed the component of Rénopack that, when climate-related renovation works were completed, converted part of the loan into a grant, with EUR 41.6 million.

Bulgaria		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	1,172.2	100%	100% previously
2024	826.3		100%

Revenue usage: All of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed. Almost all 2023 and 2024 revenue is disbursed to the Ministry of Energy's Fund for Security of the Electric Power System (FSES) fund that compensates non-domestic end-users for the rise in electricity prices.

Purpose(s) with the largest use of ETS revenue in 2024:

- The (FSES) received EUR 822.2 million. From 2024, the FSES also pays for the difference between actual and regulated maximum electricity prices and network access fees.
- The National Trust Eco Fund (EcoFund) received EUR 4.1 million. In 2024, it funded nationwide initiatives to curb air pollution, protect biodiversity, manage water, improve public building efficiency, support EV adoption, and boost climate resilience.

Croatia		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	158.9	0%	24%
2024	118.3		0%

Revenue usage: Of the 2024 revenue to be spent, all revenue is carried over, indicated to be spent by the end of 2025. EUR 38.0 million of 2023 revenue was reported as disbursed in 2024 and EUR 41.7 million of 2023 revenue was reported as committed in 2024. Additionally, EUR 155.9 million of pre-2023 revenue was reported as disbursed in 2024 and EUR 136.3 million of pre-2023 revenue was reported as committed in 2024. According to national law, 100% of the auctioning revenues are spent on climate and energy purposes via the Environmental Protection and Energy Efficiency Fund (EPEEF).

Purpose(s) with the largest use of ETS revenue in 2024:

- Subsidies on final consumer gas prices were funded by EPEEF with EUR 172.0 million.

- Buildings energy renovation was financed by EPEEF with EUR 76.8 million.
- Adaptation activities were supported by EPEEF with EUR 33.3 million.

Cyprus		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	113.6	91%	91%
2024	95.5		99%

Revenue usage: 99% of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed and 1% was reported as carried over for future spending and reporting.

Purpose(s) with the largest use of ETS revenue in 2024:

- The Administration of the Ministry of Energy, Commerce and Industry granted EUR 42.0 million in emergency income support to citizens to offset electricity tariff increases.
- The Department of Road Transport, Ministry of Transport, Communications and Works provided EUR 19.4 million for public passenger transport.
- The Department of Forestry of the Ministry of Agriculture, Rural Development & Environment provided EUR 10.2 million to hire of aircraft and maritime means of transport for firefighting support and coordination.

Czechia		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	777.2	26%	30%
2024	605.0		96%

Revenue usage: Czechia reported spending EUR 58.0 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Czechia's total revenue to calculate the amount to be spent on the purposes of Article 10(3). Of the 2024 Article 10(3) amount, 96% was reported as disbursed and the remaining 4% is indicated to be disbursed in the next years within the New Green Savings Programme. Regarding revenue generated in 2023, EUR 29.6 million of 2023 revenue was reported as disbursed in 2024. Czechia mentioned the legislative process to enshrine additional spending for the purpose of Art. 10(3) in national law was completed in 2024.

Purpose(s) with the largest use of ETS revenue in 2024:

- The Ministry of Transportation provided EUR 131.9 million for the modernisation of railway junctions and stations.
- EUR 128.8 million was provided by the Ministry of Transportation for the modernisation and optimisation of railways.
- The Ministry of Agriculture provided EUR 76.9 million for water management, specifically for peatland protection and restoration, and ecosystem protection and restoration.

Denmark		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	416.1	100%	100% previously
2024	298.8		100%

Revenue usage: All of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed. Revenues are not earmarked. Projects for Art. 10(3) purposes with equivalent financial value have been reported.

Purpose(s) with the largest use of ETS revenue in 2024:

- The Danish Energy Agency funded offshore wind grants worth EUR 120.3 million.
- The Energy Technology Development and Demonstration Programme (EUDP) funded green energy technology demonstrations, for EUR 80.6 million.
- The Danish Energy Agency provided EUR 73.1 million for grants aimed at upgrading and purifying biogas.

Estonia		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	360.0	2%	9%
2024	254.6		8%

Revenue usage: 8% of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed and 92% as committed. Regarding revenue generated in 2023, EUR 24.2 million of 2023 revenue was reported as disbursed in 2024. Additionally, EUR 74.0 million of pre-2023 revenue was reported as disbursed in 2024. Up to 2023, 50% of the auctioning revenue was earmarked and directed through the four-year State Budget Strategy and spent on Art. 10(3) purposes, which may take multiple years. Unspent revenues are carried over to later years and always used for

climate and energy projects. The remaining 50% went to the general budget. From 2024 onwards, 100% of revenues are earmarked for Art 10(3) purposes.

Purpose(s) with the largest use of ETS revenue in 2024:

- The Ministry of Climate co-financed the Rail Baltic project (new high-speed rail network) to promote sustainable transport, with a budget of EUR 136.4 million.
- The Ministry of Finance and Ministry of Regional Affairs granted EUR 61.8 million for works to increase energy efficiency, emission reduction, maintenance cost and renewable energy use in public sector buildings.
- The Ministry of Regional Affairs and Agriculture and Ministry of Climate invested EUR 22.4 million to support public transport investments: local government low-emission public transport investments (for example: school busses, trains, electric barges) by open calls.

Finland		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	463.9	100%	100% previously
2024	417.9		100%

Revenue usage: All of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed. Revenues are not earmarked. Equivalent spending on slightly more than the revenues to be spent on the purposes of Art. 10(3) were reported for 2024.

Purpose(s) with the largest use of ETS revenue in 2024:

- Aid for production of renewable energy was funded with EUR 123.6 million.
- Energy Aid was allocated EUR 87.4 million for the development of renewable energies to meet the EU's commitment.
- Development of Public Transport received EUR 86.4 million for the development and purchase of public transportation services.

France		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	2,100.2	100%	100% previously
2024	700.0		100%

Revenue usage: France reported spending EUR 833.8 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from France's total revenue to calculate the amount to be spent on the purposes of Article 10(3). This whole amount was reported as disbursed. The auctioning revenues co-

fund energy efficiency improvements of low-income housing, up to a ceiling of EUR 700 million per year. This year, the remainder was reported as aid to compensate for indirect carbon costs.

Purpose(s) with the largest use of ETS revenue in 2024:

- The ANAH (Agence Nationale pour l'Amélioration de l'Habitat) implemented MaPrimeRénov, providing EUR 700.0 million in grants for energy efficiency improvements in low-income housing units.

Germany		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	7,645.5	100%	100% previously
2024	5,205.0		100%

Revenue usage: Germany reported total amounts spent on different purposes, that were partly funded form auction revenue. Assuming all purposes have the same share of revenue funding, Germany spent EUR 323.7 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Germany's total revenue to calculate the amount to be spent on the purposes of Article 10(3). This whole amount was reported as disbursed.

Purpose(s) with the largest use of ETS revenue in 2024:

- The "Zuschüsse zur Entlastung beim Strompreis" are electricity price relief subsidies costing EUR 18,488.9 million, designed to offset grid fees, levies, and taxes and thus lower electricity bills for households, businesses, and network operators.
- The "Förderung von Maßnahmen der Energieeffizienz und erneuerbarer Energien im Gebäudebereich" action funded measures for energy efficiency and renewable energies in the building sector, costing EUR 14,116.8 million.
- The "Wasserstoffeinsatz in der Industrieproduktion" action funded hydrogen projects for decarbonizing industrial production, particularly steel and chemistry, as part of the "IPCEI Wasserstoff" initiative, costing EUR 921.3 million.

Greece		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	1,208.9	99%	99%
2024	820.2		100%

Revenue usage: Greece reported spending EUR 272.4 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Greece's total revenue to calculate the amount to be spent on the purposes of Article 10(3). This whole amount was reported as disbursed.

Purpose(s) with the largest use of ETS revenue in 2024:

- The Energy Transition Fund (ETF) provided a state subsidy to lower electricity costs, funded via DAPEEP (Operator of Electricity Market) with EUR 455.6 million.
- The Special Account for RES (Renewable Energy Sources) supported renewable energy feed-in schemes, managed by DAPEEP with EUR 103.6 million.
- The Green Fund financed projects for the natural environment and forests with EUR 66.2 million.

Hungary		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	438.9	30%	39%
2024	584.6		20%

Revenue usage: 20% of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed, 6% as committed and the remaining 74% of 2024 revenues has been indicated to be spent in the following years. EUR 36.7 million of 2023 revenue was reported as disbursed in 2024 and EUR 3.9 million of 2023 revenue was reported as committed in 2024. Additionally, EUR 4.7 million of pre-2023 revenue was reported as disbursed in 2024 and EUR 12.4 million of pre-2023 revenue was reported as committed in 2024. Revenues are earmarked for Art. 10(3) purposes. Any revenues not spent are carried over to future years.

Purpose(s) with the largest use of ETS revenue in 2024:

- Funded with EUR 75.9 million, the Napenergia Plusz Programme's residential photovoltaic and battery storage grants were implemented by the International Development and Resource Coordination Agency (NFFKÜ).
- Installation of District Heating Smart Meters programme, funded with EUR 30.9 million and implemented by the Independent Energy Data Centre (FEAK).
- EUR 22.8 million in support was provided to MÁV Hungarian State Railways to offset the increased cost of rail freight transportation resulting from high energy prices.

Ireland	**Total percentage disbursed up to the year indicated**

Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	158.3	100%	100% previously
2024	138.8		100%

Revenue usage: All of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed. Revenues are not earmarked for specific purposes. The amounts reported are equivalent to 100% of these revenues and are allocated to emission reduction activities in line with the purposes specified in Art 10(3).

Purpose(s) with the largest use of ETS revenue in 2024:

- The Department of Transport invested EUR 102.3 million in public transport.
- The Department of Foreign Affairs allocated EUR 34.1 million for international climate funding.
- The Environmental Protection Agency (EPA) used EUR 2.4 million for EU ETS administration costs.

Italy		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	3,396.8	0%	0%
2024	2,403.5		0%

Revenue usage: Italy reported spending EUR 600.0 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Italy's total revenue for the purpose of calculating the amount it must spend on the purposes of Article 10(3). All 2024 revenue was reported as carried over for future spending and reporting. Additionally, EUR 42.4 million of pre-2023 revenue was reported as disbursed in 2024 and EUR 52.0 million of pre-2023 revenue was reported as committed in 2024. Following the Italian financial rules, committing or disbursing 2024 auction revenues will start in 2025.

Purpose(s) with the largest use of ETS revenue in 2024:

- EUR 37.2 million for the development of hydrogen production projects in abandoned industrial areas in Basilicata, Piemonte, Puglia, Umbria and Friuli Venezia Giulia, implemented by the Ministry for the Environment and Regional Authorities.
- EUR 24.7 million for energy efficiency in public administration buildings: Energy Requalification Programme of the Central Public Administration. This programme promotes energy efficiency to meet energy-saving targets under Article 8 of EU Directive 2023/1791 (EED III).

- Agreement between Ministry of Environment and Carabinieri provided EUR 6.9 million for purchasing low environmental impact vehicles.

Latvia		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	90.8	30%	56%
2024	64.5		6%

Revenue usage: 6% of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed and 94% as committed. EUR 23.5 million of 2023 revenue was reported as disbursed in 2024. 100% of revenues go to the Emission Allowances Auctioning Instrument (EAAI), a national green investment scheme aimed at tackling global climate change.

Purpose(s) with the largest use of ETS revenue in 2024:

- Open tender to support the reduction of emissions in households through renewable energy, funded under the EAAI, with EUR 60.4 million.
- The EAAI funded an open tender to reduce greenhouse gas emissions and improve energy efficiency in buildings of the Ministry of the Interior's system institutions and municipal police institutions (EUR 20.0 million).
- An open tender funded by the EAAI promoted the reduction of greenhouse gas emissions through the introduction of electric and plug-in vehicles in Latvia (EUR 9.0 million).

Lithuania		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	113.7	61%	61%
2024	87.0		12%

Revenue usage: 12% of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed and 88% as committed. Additionally, EUR 3.5 million of pre-2023 revenue was reported as disbursed in 2024. Revenues fund the four-year (2022-2025) Climate Change Programme. Funds are committed when funding applications are accepted, payments are made after the projects are implemented.

Purpose(s) with the largest use of ETS revenue in 2024:

- The EPMA (European Project Management Agency) funded the modernisation of internal heating and hot water systems in apartment buildings with EUR 22.0 million.

- The EPMA allocated EUR 20.1 million for the modernisation of single-family or two-apartment residential buildings to achieve energy performance class B and reduce heat consumption by 40%.
- The EPMA disbursed EUR 14.7 million for the use of Renewable Energy Sources (solar/wind for electricity generation) in public buildings.

Luxembourg		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	9.3	100%	100% previously
2024	5.1		100%

Revenue usage: All of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed. Auction revenues, together with the climate contribution on road fuels and 40% of the annual motor vehicle tax, fund the Climate and Energy Fund. An equivalent amount of Article 10(3) actions from this fund are reported.

Purpose(s) with the largest use of ETS revenue in 2024:

- The EUR 5.1 million is allocated to Climate and Energy Fund, without further description of its activities. The fund's 2024 activities included grants for energy-efficient building renovations, eco-driving training incentives, and bicycle and electric-vehicle purchase support.

Malta		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	44.6	100%	100% previously
2024	44.2		100%

Revenue usage: All of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed. Revenues are not earmarked.

Purpose(s) with the largest use of ETS revenue in 2024:

- The Ministry for Transport, Infrastructure and Public Works funded Malta Transport Incentive Programme Electric Vehicle Grants (MTIP EV Grants) with EUR 22.0 million, providing purchase and scrappage subsidies to accelerate electric vehicle adoption.
- EUR 20.3 million for Malta's scheme administered by the Regulator for Energy and Water Services (ARMS), offering guaranteed fixed rates to small-scale renewable electricity producers—such as solar, biogas, and hydro, for grid injection.

- ARMS Malta also funded the Eco-reduction scheme which provides electricity tariff discounts to incentivize energy efficiency and reward the lowest-emitting consumers, with EUR 7.8 million.

Netherlands		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	1,281.4	100%	100% previously
2024	927.8		100%

Revenue usage: All of the 2024 revenue to be spent for the purposes of Article 10(3) was reported as disbursed. Revenues are not earmarked. Equivalent spending has been reported as part of the spending several large climate policies.

Purpose(s) with the largest use of ETS revenue in 2024:

- The Netherlands Enterprise Agency (RVO) funded the "incentive for sustainable energy production" (SDE) with EUR 865.8 million.
- Funded with EUR 648.0 million by the RVO, the SDE+ action explicitly supports CO_2-reducing technologies, such as CCUS and hydrogen, rewarding greater emissions savings per euro.
- Allocated EUR 460.5 million by the RVO, the Investeringssubsidie Duurzame Energie (ISDE) provides investment grants to households and businesses for installing sustainable energy technologies such as heat pumps, biomass boilers, and solar panels.

Poland		Total percentage disbursed up to the year indicated	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	4,988.1	92%	92%
2024	3,192.6		94%

Revenue usage: Poland reported spending EUR 614.7 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Poland's total revenue to calculate the amount to be spent on the purposes of Article 10(3). Of the 2024 Article 10(3) amount, 94% was reported as disbursed and the remaining 6% was indicated that it will be included in next year's report. Revenues are not earmarked. The equivalent financial value of actions for the purposes in Art. 10(3) haven been reported.

Purpose(s) with the largest use of ETS revenue in 2024:

- The government Programme for supporting railway infrastructure management, maintenance and repairs until 2028, funded by the Ministry of Infrastructure (Ministerstwo Infrastruktury), received EUR 893.9 million.
- The co-financing of interregional and international railway passenger transport in the form of state budget subsidies, managed by the Ministry of Finance (Ministerstwo Finansów), was allocated EUR 437.8 million.
- The support by applying a reduced VAT rate for bus and train tickets, also managed by the Ministry of Finance, was funded with EUR 373.9 million.

Portugal		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	720.0	96%	97%
2024	510.2		100%

Revenue usage: Portugal reported spending EUR 25.0 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Portugal's total revenue to calculate the amount to be spent on the purposes of Article 10(3). This whole amount was reported as disbursed. EUR 0.9 million of 2023 revenue was reported as disbursed in 2024. All revenue is channelled to the Environment Fund (alongside other revenues) which finances environmental projects, a portion of which support climate objectives. The amounts reported as spent represent climate and energy projects funded by the Environmental Fund.

Purpose(s) with the largest use of ETS revenue in 2024:

- The National Energy System (SEN) programme prepares the network, introduces competitive tenders, and supports renewable energy integration with EUR 311.1 million in funding.
- The expansion of the Oporto metro network was funded with EUR 66.6 million.
- The transition to a circular economy was promoted through the collection of biowaste, funded with EUR 27.0 million.

Romania		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	435.9	100%	100% previously
2024	519.0		100%

Revenue usage: Romania reported spending EUR 116.8 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Romania's total revenue to calculate the amount to be spent on the purposes of

Article 10(3). This whole amount was reported as disbursed. Distribution of auction revenues to different purposes is regulated by law GEO 115/2011.

Purpose(s) with the largest use of ETS revenue in 2024:

- EUR 276.1 million was allocated for the installation of photovoltaic panels for electricity production and storage.
- EUR 161.9 million was invested in the promotion of non-polluting and energy-efficient road transport vehicles, specifically new electric or hybrid vehicles.
- EUR 102.2 million was invested in high efficiency LED (Light Emitting Diode) lighting sources in public street lighting.

Slovakia		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	298.0	31%	31%
2024	233.5		37%

Revenue usage: Slovakia reported spending EUR 58.3 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Slovakia's total revenue to calculate the amount to be spent on the purposes of Article 10(3). Of the 2024 Article 10(3) amount, 37% was reported as disbursed, 61% as committed and 2% was reported as carried over for future spending and reporting.

Purpose(s) with the largest use of ETS revenue in 2024:

- Programme for water pipes and sewers, including the construction of water retention measures (EUR 102.4 million).
- Programme to increase of energy efficiency in existing public buildings including insulation (EUR 51.9 million).
- Programme to support increased carbon sequestration efforts in forest soil and biomass, alongside the protection of designated natural areas (EUR 37.6 million).

Slovenia		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	161.1	79%	100%
2024	108.0		87%

Revenue usage: Slovenia reported spending EUR 25.4 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Slovenia's total revenue to calculate the amount to be spent on the purposes of Article 10(3). Of the 2024 Article 10(3) amount, 87% was reported as disbursed and

13% as committed. EUR 33.1 million of 2023 revenue was reported as disbursed in 2024. All of the auctioning revenues are used for purposes in Article 10(3), coordinated through the Climate Change Fund.

Purpose(s) with the largest use of ETS revenue in 2024:

- Investments in thermal insulation of buildings and replacement of boilers (EUR 48.5 million).
- Construction of solar and hydroelectric power plants to promote renewable energy sources (EUR 36.4 million).
- Investments in rail transport and cycle paths to promote alternative sources of transport (EUR 24.6 million).

Spain		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024
2023	3,355.5	33%	33%
2024	2,331.4		48%

Revenue usage: Spain reported spending EUR 244.0 million from its 2024 auction revenue to compensate for indirect carbon costs. This amount was deducted from Spain's total revenue to calculate the amount to be spent on the purposes of Article 10(3). Of the 2024 Article 10(3) amount, 48% was reported as disbursed and 52% was reported as carried over for future spending and reporting. Estimated revenues are earmarked for climate and energy purposes ahead of each year, so actual revenues may differ from the allocated estimate. All estimated revenues that do not go to indirect cost compensation (excluded in the values above) are used for climate and energy purposes.

Purpose(s) with the largest use of ETS revenue in 2024:

- Funding of EUR 1,100.0 million was allocated as per the Electricity Sector Law for feed-in tariffs for renewable energy.
- The Policy for adaptation to the adverse effects of climate change focused on awareness-raising and training for vulnerable populations received EUR 7.5 million.
- A contribution of EUR 5.0 million was made to the 'Fund for responding to Loss and Damage' (FRLD), the international financial mechanism of the UN Framework Convention on Climate Change.

Sweden		**Total percentage disbursed up to the year indicated**	
Year of generation of revenues	Revenues to be spent on the purposes of Art. 10(3) (EUR million)	2023	2024

2023	323.2	0%	0%
2024	236.5		100%
Revenue usage: All of the 2024 revenue to be spent on the purposes of Article 10(3) was reported as disbursed. Revenues are not earmarked; example projects have been reported for at least the minimum required for Article 10(3).			
Purpose(s) with the largest use of ETS revenue in 2024: • The Swedish Transport Agency administered a climate bonus for low-emission vehicles, rewarding first-time licenses, with EUR 106.1 million. • The Swedish EPA (Environmental Protection Agency) introduced The Climate Leap, a programme for local and regional investments to cut greenhouse gas emissions, valued at EUR 83.9 million. • The Swedish Energy Agency administered the Industrial Leap, a programme for financing research and investments to reduce industry's greenhouse gas emissions, valued at EUR 46.5 million.			

Note: the data in this table reflect Member States's annual reports on the use of the ETS revenues submitted under the Governance Regulation. It has been processed to ensure consistency across all Member States and over the reporting period. The harmonisation, methodology and analysis were conducted by SQ Consult in a study for the European Commission.

9 Emissions covered by the effort sharing legislation

Annual emission allocations

In 2024, based on approximated data, emissions from sectors covered by the ESR were above the aggregated EU emissions limit by 1.6%. 17 Member States exceeded their 2024 ESR emission limits based on the approximated data: Austria, Belgium, Bulgaria, Cyprus, Germany, Denmark, Estonia, Spain, Finland, France, Croatia, Ireland, Italy, Lithuania, Malta, Romania, Sweden.

The Commission will, as provided in the ESR, set the annual emission limits, expressed in annual emission allocations, for the period 2026-2030 based on the comprehensive review of the ESR emissions for the years 2021-2023. The comprehensive review includes checks of Member States' national inventory data verifying that Member States' inventory data are transparent, accurate, consistent, comparable and complete, and to make corrections where necessary. In 2027 the ESR emissions will be comprehensively reviewed again for each of the years 2021 to 2025 for the compliance check starting in 2027.

The Commission will check whether Member States respected and complied with their emission limits in two rounds – first in 2027 (for the years 2021 to 2025) and then in 2032 (for the years 2026 to 2030). During the compliance check Member States can make use of the different flexibilities available under the ESR [73].

[73] https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en

Table 25: Member States targets, historical and projected emissions under the effort-sharing legislation and distance to targets in percentage change from 2005 base year emissions

The 2021-2023 ESR emissions were established in 2025 after a comprehensive review, the 2024 ESR emissions are based on approximated inventory reports, and 2030 ESR emissions are based on 2025 reporting. Positive values indicate projected overachievement while negative values indicate projected underachievement. WEM = with existing measures, WAM = with additional measures. The 2005 emissions used for the calculation are set out in Annex I of Commission Implementing Decision (EU) 2020/2126.

The targets, ESR emissions and distance to targets are rounded to the percentage targets which may result in the numbers not adding up visually. The targets in the table reflect Member State's emission limits, compared to their 2005 emissions, which takes into account adjustments made to the annual emission allocations for some Member States based on Article 10 ESR.

Member State	Target and emissions	2021	2022	2023	2024	2030 (projections WEM)	2030 (projections WAM)
Belgium	Target	-13%	-15%	-19%	-23%	-47%	-47%
	Emissions	-16%	-22%	-23%	-23%	-22%	-43%
	Distance to target (percentage points)	3	7	4	-1	-25	-4
Bulgaria	Target	21%	13%	10%	7%	-10%	-10%
	Emissions	13%	11%	7%	12%	-36%	-36%
	Distance to target (pp)	8	2	3	-5	26	26
Czechia	Target	2%	-6%	-9%	-11%	-26%	-26%
	Emissions	-9%	-12%	-15%	-11%	-28%	-36%
	Distance to target (pp)	11	5	6	0	2	10
Denmark	Target	-20%	-22%	-26%	-29%	-50%	-50%
	Emissions	-19%	-22%	-26%	-29%	-51%	-51%
	Distance to target (pp)	-1	0	0	-1	1	1
Germany	Target	-12%	-15%	-19%	-24%	-50%	-50%
	Emissions	-16%	-19%	-21%	-23%	-36%	-37%
	Distance to target (pp)	5	4	2	-1	-14	-13
Estonia	Target	0%	-3%	-6%	-8%	-24%	-24%
	Emissions	-8%	-7%	-10%	-4%	-18%	-18%
	Distance to target (pp)	8	4	4	-4	-6	-6
Ireland	Target	-9%	-11%	-15%	-19%	-42%	-42%

Member State	Target and emissions	2021	2022	2023	2024	2030 (projections WEM)	2030 (projections WAM)
	Emissions	-6%	-7%	-10%	-11%	-9%	-22%
	Distance to target (pp)	-3	-4	-5	-8	-33	-20
Greece	Target	-27%	-25%	-25%	-25%	-23%	-23%
	Emissions	-29%	-27%	-27%	-33%	-43%	-43%
	Distance to target (pp)	3	2	2	8	21	21
Spain	Target	-17%	-18%	-20%	-23%	-37%	-37%
	Emissions	-20%	-20%	-23%	-22%	-35%	-45%
	Distance to target (pp)	3	2	2	-1	-2	8
France	Target	-16%	-19%	-22%	-26%	-47%	-47%
	Emissions	-18%	-22%	-25%	-25%	-37%	-46%
	Distance to target (pp)	2	3	3	-1	-10	-1
Croatia	Target	-2%	-8%	-9%	-10%	-17%	-17%
	Emissions	-4%	0%	4%	4%	-8%	-21%
	Distance to target (pp)	2	-8	-13	-15	-8	5
Italy	Target	-20%	-22%	-24%	-27%	-43%	-43%
	Emissions	-18%	-19%	-21%	-22%	-30%	-41%
	Distance to target (pp)	-2	-2	-3	-5	-13	-3
Cyprus	Target	-5%	-7%	-10%	-13%	-32%	-32%
	Emissions	-7%	-6%	-4%	6%	-4%	-26%
	Distance to target (pp)	2	-1	-5	-19	-28	-6
Latvia	Target	24%	3%	0%	-2%	-17%	-17%
	Emissions	1%	-2%	-4%	-5%	-15%	-18%
	Distance to target (pp)	23	5	4	3	-2	1
Lithuania	Target	23%	5%	2%	-1%	-21%	-21%
	Emissions	5%	2%	1%	2%	-18%	-21%
	Distance to target (pp)	18	3	1	-3	-3	0

Member State	Target and emissions	2021	2022	2023	2024	2030 (projections WEM)	2030 (projections WAM)
Luxembourg	Target	-17%	-19%	-23%	-27%	-50%	-50%
	Emissions	-20%	-30%	-32%	-33%	-33%	-56%
	Distance to target (pp)	3	11	9	6	-17	6
Hungary	Target	4%	-9%	-11%	-12%	-19%	-19%
	Emissions	-4%	-8%	-15%	-14%	-15%	-26%
	Distance to target (pp)	8	-1	4	2	-3	8
Malta	Target	102%	21%	16%	11%	-19%	-19%
	Emissions	30%	43%	42%	41%	42%	30%
	Distance to target (pp)	73	-22	-25	-30	-61	-49
Netherlands	Target	-23%	-25%	-27%	-30%	-48%	-48%
	Emissions	-27%	-34%	-35%	-36%	-44%	-47%
	Distance to target (pp)	4	9	7	6	-4	-1
Austria	Target	-14%	-17%	-21%	-25%	-48%	-48%
	Emissions	-13%	-18%	-22%	-25%	-32%	-40%
	Distance to target (pp)	-1	1	2	0	-16	-8
Poland	Target	12%	6%	3%	0%	-18%	-18%
	Emissions	7%	2%	2%	-5%	-14%	-18%
	Distance to target (pp)	4	4	2	5	-3	1
Portugal	Target	-13%	-16%	-18%	-19%	-29%	-29%
	Emissions	-19%	-19%	-18%	-20%	-30%	-40%
	Distance to target (pp)	6	3	0	0	1	11
Romania	Target	12%	-2%	-3%	-4%	-13%	-13%
	Emissions	-2%	-5%	-5%	20%	-9%	-15%
	Distance to target (pp)	15	3	2	-24	-4	3
Slovenia	Target	-4%	-6%	-9%	-11%	-26%	-26%
	Emissions	-12%	-9%	-13%	-12%	-9%	-28%

Member State	Target and emissions	2021	2022	2023	2024	2030 (projections WEM)	2030 (projections WAM)
	Distance to target (pp)	9	3	5	1	-17	2
Slovakia	Target	1%	-9%	-10%	-12%	-23%	-23%
	Emissions	-12%	-15%	-17%	-22%	-14%	-26%
	Distance to target (pp)	13	6	6	10	-8	4
Finland	Target	-16%	-19%	-23%	-27%	-50%	-50%
	Emissions	-20%	-23%	-26%	-26%	-45%	-45%
	Distance to target (pp)	4	4	3	0	-5	-5
Sweden	Target	-28%	-29%	-32%	-34%	-50%	-50%
	Emissions	-33%	-37%	-38%	-29%	-45%	-45%
	Distance to target (pp)	5	8	6	-5	-5	-5
EU-27	Target	-12%	-15%	-18%	-21%	-40%	-40%
	Emissions	-15%	-18%	-20%	-20%	-31%	-38%
	Distance to target (pp)	3	3	2	-1	-8	-2
Iceland	Target	-7%	-10%	-12%	-15%	-29%	-29%
	Emissions	-7%	-7%	-10%	-8%	-20%	-27%
	Distance to target (pp)	0	-3	-3	-7	-9	-2
Norway	Target	-13%	-16%	-19%	-22%	-40%	-40%
	Emissions	-12%	-12%	-16%	-18%	-32%	-49%
	Distance to target (pp)	-1	-4	-3	-4	-8	9

Table 26: Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement

Belgium	Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.									
	2021	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Estimated AEAs	71.1	69.1	65.9	62.7	59.4	57.1	53.6	50.2	46.7	43.3
Emissions	68.3	63.2	62.9	63.1	62.7	59.6	56.4	53.2	50.0	46.8
Distance to target	2.8	5.9	3.0	-0.4	-3.3	-2.5	-2.8	-3.0	-3.3	-3.6
Cumulative balance of AEAs	2.8	8.7	11.7	11.3	8.0	5.5	2.7	-0.3	-3.6	-7.2

Baseline emissions		81.6 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	15.4 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	3.8 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Note: AEAs for the years 2021-2025 are established in Implementing Decision (EU) 2020/2126. AEAs for the years 2026 - 2030 are estimated based on the trajectory defined in Article 4 ESR and adjusted as provided for under Article 10(1)c ESR. To estimate the trajectory for 2026-2030, the estimated ESR emissions for the years 2021 to 2023 are used, after a reduction by the Article 10(1)c ESR adjustment included in the AEAs for 2021-2023. The trajectory values are adjusted based on Article 10(1)c on the basis of the assumption that the methodology applied to the AEAs for 2021 to 2025 is continued unchanged for the years 2026-2030, and no further adjustments for changes to EU ETS are required. The final AEAs for these years will be established after the comprehensive review in 2025 pursuant to Article 38(1a) of Regulation (EU) 2018/1999. The values of 'cumulative surplus of AEAs' are the cumulative annual distances to target and do not take into account cancellations and transfers. 2021 and 2022 emissions are based on 2024 final GHG inventory reports, 2023 emissions are based on 2024 approximated inventory reports. 2024 - 2030 emissions are based on the most recent WAM emissions projections reports, or in the absence of WAM projections the WEM projections. First compliance check will take place in 2027.

Bulgaria

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	27.1	25.2	24.5	23.9	23.3	23.0	22.3	21.6	20.8	20.1
Emissions	25.3	24.7	24.0	25.0	19.7	18.6	17.5	16.5	15.4	14.4
Distance to target	1.8	0.5	0.6	-1.1	3.6	4.4	4.7	5.1	5.4	5.7
Cumulative balance of AEAs	1.8	2.3	2.8	1.7	5.3	9.7	14.5	19.5	24.9	30.6

Baseline emissions		22.3 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	4.1 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Czechia

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	66.0	60.9	59.3	57.7	56.1	54.0	52.5	51.0	49.6	48.1
Emissions	59.1	57.5	55.5	57.5	51.3	49.3	47.3	45.3	43.3	41.3
Distance to target	6.9	3.4	3.8	0.2	4.7	4.7	5.2	5.7	6.3	6.8
Cumulative balance of AEAs	6.9	10.3	14.1	14.3	19.0	23.7	28.9	34.7	40.9	47.7

Baseline emissions		65.0 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	2.6 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Denmark

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	32.1	31.3	29.9	28.5	27.1	27.3	25.6	23.8	22.0	20.2
Emissions	32.7	31.4	29.9	28.8	26.7	25.7	24.0	22.4	21.1	19.8
Distance to target	-0.6	-0.2	0.0	-0.2	0.5	1.7	1.6	1.4	0.8	0.4
Cumulative balance of AEAs	-0.6	-0.7	-0.8	-1.0	-0.5	1.1	2.7	4.1	5.0	5.3

Baseline emissions		40.4 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	4.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	14.6 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Germany

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	427.3	413.2	391.9	370.5	349.2	338.8	314.7	290.6	266.5	242.4
Emissions	404.9	393.1	380.8	375.3	377.6	363.3	353.6	338.0	318.9	306.5
Distance to target	22.4	20.2	11.1	-4.8	-28.4	-24.5	-38.9	-47.4	-52.4	-64.0
Cumulative balance of AEAs	22.4	42.6	53.7	48.9	20.5	-4.0	-42.9	-90.4	-142.7	-206.8

Baseline emissions		484.7 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	22.3 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Estonia

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation (MtCO2-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	6.2	6.0	5.8	5.7	5.5	5.3	5.2	5.0	4.9	4.7
Emissions	5.7	5.7	5.6	5.9	5.4	5.3	5.3	5.2	5.2	5.1
Distance to target	0.5	0.3	0.2	-0.3	0.1	0.0	-0.1	-0.2	-0.3	-0.4
Cumulative balance of AEAs	0.5	0.8	1.0	0.8	0.9	0.9	0.8	0.6	0.3	-0.1

Baseline emissions		6.2 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	6.9 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	4.5 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Ireland

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	43.5	42.4	40.5	38.7	36.8	38.1	35.5	32.9	30.3	27.7
Emissions	44.9	44.3	42.7	42.4	42.2	41.3	40.6	39.6	38.5	37.3
Distance to target	-1.4	-1.9	-2.2	-3.7	-5.4	-3.2	-5.1	-6.7	-8.2	-9.7
Cumulative balance of AEAs	-1.4	-3.3	-5.5	-9.3	-14.6	-17.8	-22.9	-29.6	-37.8	-47.5

Baseline emissions		47.7 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	19.1 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	26.8 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Greece

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	46.2	47.0	47.2	47.4	47.6	46.6	47.1	47.6	48.2	48.7
Emissions	44.4	45.8	46.1	42.3	42.7	41.3	39.9	38.5	37.1	35.7
Distance to target	1.8	1.2	1.1	5.1	4.9	5.3	7.2	9.1	11.0	12.9
Cumulative balance of AEAs	1.8	3.0	4.1	9.3	14.2	19.5	26.7	35.8	46.8	59.8

Baseline emissions		63.0 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	6.7 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Spain

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	201.0	198.7	192.8	186.9	181.0	178.4	171.7	165.0	158.3	151.7
Emissions	194.7	194.2	186.9	188.1	167.4	160.3	153.3	146.2	139.2	132.3
Distance to target	6.3	4.5	5.9	-1.2	13.6	18.0	18.4	18.8	19.1	19.4
Cumulative balance of AEAs	6.3	10.8	16.7	15.4	29.1	47.1	65.5	84.3	103.4	122.9

Baseline emissions		242.0 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	4.9 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

France

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	335.7	326.5	312.0	297.5	283.0	277.1	260.5	243.9	227.2	210.6
Emissions	328.4	313.9	301.1	301.4	277.0	264.7	252.4	240.1	227.7	215.4
Distance to target	7.3	12.6	10.9	-3.9	6.0	12.4	8.1	3.8	-0.5	-4.8
Cumulative balance of AEAs	7.3	19.9	30.8	26.9	33.0	45.4	53.5	57.3	56.8	52.0

Baseline emissions		401.1 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	58.2 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Croatia

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	17.7	16.5	16.4	16.2	16.0	17.0	16.5	16.0	15.5	15.0
Emissions	17.3	18.0	18.8	18.8	16.5	16.0	15.6	15.1	14.7	14.2
Distance to target	0.3	-1.4	-2.4	-2.7	-0.5	0.9	0.9	0.9	0.9	0.8
Cumulative balance of AEAs	0.3	-1.1	-3.5	-6.2	-6.7	-5.7	-4.8	-4.0	-3.1	-2.3

Baseline emissions		18.1 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	0.9 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Italy

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	273.5	268.8	259.4	250.1	240.7	247.2	233.8	220.5	207.2	193.9
Emissions	281.7	276.4	269.9	267.8	253.8	248.2	236.2	224.9	214.4	204.1
Distance to target	-8.2	-7.6	-10.5	-17.7	-13.1	-1.0	-2.3	-4.4	-7.2	-10.2
Cumulative balance of AEAs	-8.2	-15.8	-26.3	-44.0	-57.1	-58.1	-60.5	-64.8	-72.1	-82.3

Baseline emissions		343.1 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	11.5 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Cyprus

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	4.1	4.0	3.8	3.7	3.6	3.6	3.4	3.3	3.1	2.9
Emissions	4.0	4.0	4.1	4.5	3.8	3.8	3.7	3.5	3.3	3.2
Distance to target	0.1	0.0	-0.2	-0.8	-0.2	-0.1	-0.2	-0.2	-0.2	-0.3
Cumulative balance of AEAs	0.1	0.1	-0.2	-1.0	-1.2	-1.4	-1.6	-1.8	-2.1	-2.3

Baseline emissions		4.3 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	0.6 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Latvia

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	10.6	8.9	8.6	8.4	8.2	8.0	7.8	7.6	7.3	7.1
Emissions	8.7	8.4	8.3	8.1	7.5	7.4	7.3	7.2	7.1	7.0
Distance to target	2.0	0.4	0.4	0.3	0.7	0.6	0.5	0.3	0.2	0.1
Cumulative balance of AEAs	2.0	2.4	2.8	3.1	3.8	4.4	4.8	5.2	5.4	5.5

Baseline emissions		8.6 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	3.1 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Lithuania

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	16.1	13.7	13.3	12.9	12.4	12.3	11.8	11.3	10.8	10.3
Emissions	13.7	13.3	13.1	13.3	13.2	12.7	12.1	11.5	10.9	10.3
Distance to target	2.4	0.4	0.2	-0.4	-0.7	-0.4	-0.3	-0.2	-0.1	0.0
Cumulative balance of AEAs	2.4	2.8	2.9	2.5	1.7	1.4	1.1	0.9	0.7	0.8

Baseline emissions		13.1 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	6.5 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Luxembourg

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	8.4	8.1	7.8	7.4	7.0	6.5	6.2	5.8	5.4	5.1
Emissions	8.1	7.1	6.9	6.8	6.4	6.0	5.7	5.3	4.9	4.5
Distance to target	0.3	1.1	0.9	0.6	0.5	0.5	0.5	0.5	0.5	0.6
Cumulative balance of AEAs	0.3	1.4	2.3	2.9	3.4	3.9	4.4	4.9	5.4	6.0

Baseline emissions		10.1 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	2.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	0.3 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Hungary

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	49.9	43.3	42.8	42.2	41.7	41.9	41.2	40.4	39.6	38.9
Emissions	46.1	44.0	40.7	41.2	40.6	39.5	38.4	37.3	36.2	35.2
Distance to target	3.8	-0.6	2.0	1.0	1.1	2.4	2.7	3.1	3.4	3.7
Cumulative balance of AEAs	3.8	3.2	5.2	6.2	7.3	9.7	12.5	15.5	18.9	22.6

Baseline emissions		47.8 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	2.1 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Malta

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	2.1	1.2	1.2	1.1	1.1	1.2	1.1	1.0	0.9	0.8
Emissions	1.3	1.5	1.4	1.4	1.5	1.4	1.3	1.3	1.3	1.3
Distance to target	0.7	-0.2	-0.3	-0.3	-0.4	-0.2	-0.2	-0.3	-0.4	-0.5
Cumulative balance of AEAs	0.7	0.5	0.3	0.0	-0.4	-0.7	-0.9	-1.2	-1.6	-2.1

Baseline emissions	1.0 $MtCO_2$-eq	2005 base year emissions
Flexibility **ETS flexibility**	0.5 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
Flexibility **Maximum LULUCF flexibility**	0.0 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)	Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Netherlands

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	98.5	96.7	92.9	89.2	85.4	79.8	76.5	73.2	69.9	66.6
Emissions	93.1	85.0	83.7	82.0	82.3	80.1	77.4	73.8	71.5	68.3
Distance to target	5.5	11.7	9.2	7.1	3.2	-0.3	-0.9	-0.6	-1.6	-1.7
Cumulative balance of AEAs	5.5	17.1	26.3	33.4	36.6	36.3	35.4	34.8	33.2	31.5

Baseline emissions	128.1 $MtCO_2$-eq	2005 base year emissions
Flexibility **ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
Flexibility **Maximum LULUCF flexibility**	13.4 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)	Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Austria

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	48.8	47.4	45.2	43.0	40.7	40.6	37.9	35.1	32.4	29.6
Emissions	49.3	46.9	44.3	43.0	43.2	41.8	40.3	38.3	36.4	34.2
Distance to target	-0.6	0.5	0.9	0.0	-2.4	-1.2	-2.4	-3.1	-4.0	-4.6
Cumulative balance of AEAs	-0.6	0.0	0.9	0.9	-1.6	-2.7	-5.1	-8.2	-12.2	-16.8

Baseline emissions		57.0 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	11.4 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	2.5 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Poland

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	215.0	204.4	198.6	192.9	187.1	184.8	178.2	171.6	165.0	158.4
Emissions	206.9	196.4	195.7	182.5	184.4	179.0	173.6	168.2	162.8	157.4
Distance to target	8.1	8.0	2.9	10.4	2.8	5.8	4.6	3.4	2.2	1.0
Cumulative balance of AEAs	8.1	16.2	19.1	29.5	32.2	38.0	42.6	46.0	48.2	49.2

Baseline emissions		192.5 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	21.7 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Portugal

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	42.5	40.8	40.1	39.3	38.5	37.9	37.1	36.3	35.5	34.7
Emissions	39.6	39.5	39.9	39.1	32.5	31.8	31.1	30.5	29.8	29.1
Distance to target	2.9	1.3	0.2	0.2	6.1	6.1	6.0	5.8	5.7	5.6
Cumulative balance of AEAs	2.9	4.3	4.4	4.6	10.6	16.7	22.7	28.6	34.3	39.9

Baseline emissions		48.6 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	5.2 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Romania

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	87.9	76.9	75.8	74.8	73.7	72.6	71.5	70.4	69.4	68.3
Emissions	76.5	74.5	73.9	93.6	75.1	74.6	73.4	71.8	69.8	66.3
Distance to target	11.4	2.4	1.9	-18.8	-1.4	-2.0	-1.9	-1.3	-0.4	2.0
Cumulative balance of AEAs	11.4	13.8	15.7	-3.1	-4.5	-6.5	-8.5	-9.8	-10.2	-8.1

Baseline emissions		78.2 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	13.2 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Slovenia

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	11.4	11.1	10.8	10.5	10.2	9.9	9.6	9.3	9.0	8.7
Emissions	10.4	10.7	10.2	10.4	10.5	10.1	9.7	9.3	8.9	8.5
Distance to target	1.0	0.4	0.6	0.1	-0.3	-0.2	-0.1	0.0	0.1	0.2
Cumulative balance of AEAs	1.0	1.4	2.0	2.1	1.8	1.6	1.5	1.6	1.7	1.9

Baseline emissions		11.8 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	1.3 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Slovakia

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	23.4	21.2	20.7	20.3	19.9	19.1	18.8	18.5	18.2	17.9
Emissions	20.4	19.7	19.3	18.1	19.0	18.6	18.2	17.8	17.4	17.0
Distance to target	3.0	1.4	1.5	2.2	0.9	0.5	0.6	0.7	0.8	0.9
Cumulative balance of AEAs	3.0	4.5	5.9	8.1	9.0	9.5	10.1	10.8	11.6	12.4

Baseline emissions		23.1 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	0.0 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	1.2 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Finland

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	28.8	28.0	26.6	25.3	23.9	23.2	21.7	20.2	18.7	17.2
Emissions	27.4	26.6	25.6	25.4	23.9	23.0	22.3	20.4	19.6	18.9
Distance to target	1.4	1.4	1.0	-0.1	0.0	0.2	-0.6	-0.2	-0.9	-1.7
Cumulative balance of AEAs	1.4	2.8	3.8	3.7	3.7	3.9	3.2	3.1	2.2	0.5

Baseline emissions		34.4 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	6.9 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	4.5 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

Sweden

Annual emissions allocations, historical and projected emissions, and distance to targets under the Effort Sharing Regulation ($MtCO_2$-eq) covering the period 2021 - 2030. Positive values indicate overachievement, negative values indicate underachievement.

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Estimated AEAs	31.3	30.7	29.6	28.5	27.3	25.5	24.5	23.6	22.6	21.6
Emissions	29.0	27.2	26.8	30.5	28.8	27.8	27.1	25.9	24.8	23.8
Distance to target	2.3	3.5	2.8	-2.1	-1.4	-2.3	-2.5	-2.3	-2.2	-2.2
Cumulative balance of AEAs	2.3	5.8	8.6	6.5	5.1	2.8	0.3	-2.0	-4.3	-6.5

Baseline emissions		43.2 $MtCO_2$-eq	2005 base year emissions
Flexibility	**ETS flexibility**	5.2 $MtCO_2$-eq	Amount of ETS flexibility as per Commission Implementing Decision 2020/2126 and available over the 10-year period 2021-2030.
	Maximum LULUCF flexibility	4.9 $MtCO_2$-eq	The availability of LULUCF flexibility depends on the amount of LULUCF credits generated under the LULUCF Regulation. The use of the available LULUCF flexibility is limited to 50% of the maximum amount of LULUCF flexibility in the period 2021-2025 and 50% of the maximum amount of LULUCF flexibility in the period 2026-2030.
LULUCF debit (2021-2025)		Pursuant to Art 9(2) ESR, AEAs are reduced by the debit generated under the LULUCF Regulation in the period 2021-2025. See Chapter 4 of the main report.	

10 LULUCF

The revised **LULUCF regulation** sets two compliance periods.

From 2021 to 2025: the assessment of Member States' progress is based on 'accounted' emissions and removals in the land sector, taking into account historical benchmarks for land use activities, such as the Forest Reference Level for sustainable forest management. Across all land categories, a Member State has to fulfil the 'no-debit' rule, meaning that the 'accounted' emissions do not exceed 'accounted' removals. If a Member State shows more accounted emissions than accounted removals, it has a 'debit' and is therefore not in line with the 'no-debit' rule. Conversely, if a Member State shows more accounted removals than accounted emissions, it has a 'credit' and therefore meets the 'no-debit' rule requirement. If the 'no-debit' rule is not met in a Member State, it will be able to use a number of flexibilities to compensate for the net debit (e.g. by purchasing credits from other Member States). If a net debit remains from the first compliance period, even after using all flexibilities, this debit will be moved to the ESR account of the Member State.

From 2026 to 2030: the reporting rules are simplified and are based on the sum of reported emissions and removals in all land categories, with the historical benchmarks completely abolished. The revised EU target requires that the EU increases its land-based net removals by additional -42 $MtCO_2$-eq by 2030 as compared to the yearly average of the period 2016-2018. This target is then distributed among Member States by means of binding national targets for 2030 in a way that requires each Member State to increase their ambition in national agriculture and forestry policies [74].

There are several **flexibilities** Member States can make use of under the LULUCF Regulation. The **general flexibilities** include the flexibility with the ESR, as well as transfers of LULUCF surpluses among Member States. If a Member State fails to meet its LULUCF target or budget, it can deduct annual emission allocations under ESR and transfer them to LULUCF, up to the amount required to meet its target. If a Member State outperforms its LULUCF target and budget, it can transfer its LULUCF surplus to another Member State.

For the period 2021 to 2025, specifically, Member States have access to the **managed forest land flexibility mechanism**, subject to the EU as a whole meeting the 'no-debit' commitment. Member States can compensate excess accounted emissions from forest land provided they include measures to ensure conservation or the increase in forest sinks in their long-term strategies under the Governance Regulation, or they provide evidence of natural disturbances and plan measures to prevent or mitigate similar events in the future.

For the period 2026 to 2030, in addition to the general flexibilities, the **land use mechanism** can be used by Member States that do not meet their target, subject to the

[74] Handbook on the updated LULUCF Regulation EU 2018/841 - Guidance and orientation for the implementation of the updated regulation - Version 2 (europa.eu)

EU, as a whole, meeting its 2030 target. This includes compensation for natural disturbances as well as a flexibility due to the negative effects of long-term effects of climate change or the negative effects of an exceptionally high proportion of organic soils on land removals.

Table 27: LULUCF accounted net removals for 2021-23 (2025 submission per Member State), in $MtCO_2$-eq

Country	Preliminary cumulative debit for 2021-2023
Austria	13.2
Belgium	0.7
Bulgaria	-8.3
Cyprus	0.0
Czechia	21.1
Germany	138.0
Denmark	-19.7
Spain	-52.5
Estonia	4.9
Finland	97.2
France	29.9
Greece	-5.5
Croatia	-6.0
Hungary	-18.3
Ireland	-12.1
Italy	-74.8
Lithuania	-2.8
Luxembourg	-1.0
Latvia	4.0
Malta	-0.0
Netherlands	-5.3
Poland	-14.3
Portugal	31.4
Romania	-65.9
Slovakia	-6.0
Slovenia	-2.1
Sweden	6.3
EU total	**52.0**

Note: Computation of the accounting status for each Member State and the EU. The method continued the approach applied under the Kyoto Protocol period (2013 to 2020). However, the accounting approach for the period 2021 to 2025 is new and differs from the Kyoto exercise. The accounting follows the specifications laid out in Regulation 2018/841: Article 2, 4, 5, 6, 7 8 and 9. The input data for this analysis has been extracted from the EU Greenhouse Gas Inventory Report 2025 for 1990-2023 based on final Member States' inventory submissions under the EU Governance Regulation (GHGI). The computation of accounting results combines the relevant data from the final GHGI in accordance with the rules laid out in the above articles (Reported data for the years 2005 to 2009 and 2021-2023, from Section 4 of the GHGI). This analysis provides an approximate estimate of the status of a Member State's trend towards compliance with its article 4(1) commitment. It also provides a collective status of achievement of the article 4 commitment, an element that is needed to determine if the flexibility through article 13 of the regulation is available (See Regulation 2018/841 Art 13(2)(b)). Numbers in table rounded up. Calculations cover emissions and removals of the greenhouse gases listed in Section A of Annex I to Regulation 2018/841.

11 Climate resilience and adaptation

11.1 Progress by Member States

Under the European Climate Law, the Commission has the mandate to assess the consistency of relevant national measures with the EU climate adaptation objectives [75]. In its assessment, conducted in September 2023, the Commission found that Member States' measures were often in need for improvements to become more consistent with the EU's and the international agreements' objectives to ensure continuous progress in enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change.

Following the assessment, the Commission issued recommendations to 26 Member States [76], addressing a broad range of aspects across the policy cycle. The following list provides an assessment of Member States replies of Spring 2025 to the Commission recommendations:

- Although most Member States had an **appropriate mandatory framework for climate resilience and adaptation policies and action** in place, some had been recommended to complete or reinforce legal bases. Concerned Member States reported being in the process of reviewing and revising their national adaptation strategies and plans, many of them with a perspective by 2030. Other long-term documents, such as national adaptation laws or climate laws containing adaptation provisions, were also developed. Sub-national adaptation plans and strategies are being prepared at regional, urban and local levels.

- Acknowledging efforts to better inform national adaptation strategies and plans, the Commission had recommended Member States to update their **assessments of risks and vulnerabilities.** To address the recommendations, several Member States conducted interim or outsourced risk assessments and studies which informed their national adaptation strategies and allowed adjustments of the national adaptation plans and subnational measures. While many Member States opted for a multi-risk approach, others conducted assessments for specific risks, such as coastal or floods, or focused on the subnational levels. For properly assessing the risks they faced, some Member States used the latest climate scenarios, warming trajectories or long-term projections.

- The Commission had encouraged Member States to ensure that proper mechanisms are in place to **prepare and regularly review and update sub-national policies**. To address this, concerned Member States referred to their national policy frameworks, which increasingly contained obligations for regional and local authorities to develop and review adaptation plans. However, in some

[75] (Article 7(1)(b)) and article 5(4) ECL.

[76] As set out in art 7.2. *See:* *Commission Staff Working Document: Assessment of progress on climate adaptation in the individual Member States according to the European Climate Law, SWD (2023) 932*

cases, the obligation to periodically review these plans is not robust or binding. Many also set obligations on the submission of information to central designated authorities, mainly national ministries. To support sub-national efforts, central administrations provide information, voluntary guidelines, guidebooks, and technical support.

- The Commission had also found room for **improvement in vertical coordination between different levels of governance**. To ensure coordinated interventions and alignment of planning tools, concerned Member States have now specified clearer roles, mandates, and responsibilities for planning and implementation. Some Member States have designated national competent authorities to coordinate efforts and provide support. Others have appointed ad hoc authorities to assess and improve policy frameworks and present proposals for legislative changes.

- To **empower sub-national authorities**, Member States are carrying out initiatives, including workshops, to raise awareness, enhance engagement, and build institutional capacity. A wide range of fora, ranging from municipal networks and associations to platforms and advisory bodies, have been established to facilitate exchange of information and best practices and provide support for implementation at the local level.

- Since the whole-of-society approach requires the **engagement of all relevant stakeholders** in the design, planning and implementation, the Commission had recommended that Member States ensure the involvement of social partners and private sector stakeholders in policy-making. Special attention needs to be paid to stakeholder groups that are particularly vulnerable to the impacts of climate change.

- Some Member States in process to review their policy frameworks took the opportunity to incorporate measures to **enhance stakeholder engagement**. Other Member States with already stronger binding frameworks opted for a wider range of specific mechanisms. These included mechanisms oriented to the wider public, such as hearings, public consultations, and surveys or questionnaires, and targeted instruments such as dedicated meetings with private actors, sectoral discussions, clarification and debating sessions and working groups. More educational-oriented activities were conducted, such as workshops and seminars, outreach, awareness-raising and communication activities. To **ensure transparency and accountability**, documentation of these processes and their outputs was maintained through reports and published on online portals.

- With regard to funding, the Commission had recommended to **prioritise climate resilience in the use of the EU funding programmes**, ensuring that such funds are spent in a way that they increase climate resilience while avoiding maladaptation. Concerned Member States took this into account through

different ways, including integration of climate-proofing requirements into environmental impact assessments and procedures for approvals of operations. Similarly, other governments ensured - through regulatory provisions, guidelines or managing bodies - that the 'Do No Significant Harm' (DNSH) requirements are incorporated in the selection criteria for planned projects under the national adaptation strategy, Common Agricultural Policy funding schemes and other financial and programming frameworks.

- In their replies, Member States referred to support projects for sustainable land and water uses, urban infrastructure modernisation, and implementation of adaptation measures. In parallel, some Member States are investing in capacity-building, investing in education projects and training on climate verification for people involved in the financing and contracting of EU financed projects.
- On **nature and ecosystem-based solutions**, the Commission had recommended Member States to prioritise their promotion in the national strategies, policies and plans, and allocate sufficient investments for their deployment. In their replies, several Member States referred to the incorporation or reinforcement of specific provisions into their adaptation strategies or plans. Some Member States have developed manuals or guidelines on the use of nature-based solutions. Among the highlighted measures, special focus was put on the deployment of blue and green infrastructure, as sustainable alternatives to grey infrastructure in cities and urban landscapes. Sector-specific nature-based solutions projects are advancing, particularly in wetlands and forest restoration, water retention and management, flood risks reduction, and sustainable coastal zone management. Some strategies and plans encourage sustainable land-use practices that integrate nature-based solution, such as agroforestry and soil conservation. Funding for nature-based solutions is increasingly mobilized through EU funds. Incentives to mobilise public and private funding and specific subsidies for projects incorporating nature-based solutions are being allocated to support implementation.

11.2 Just resilience and inclusion of vulnerable groups

Climate risks are not felt equally, and they impact disproportionately the most vulnerable people due to a range of socio-economic and demographic factors such as income, gender, age, disability, health, and as well as people and communities facing social exclusion and marginalisation (particularly affecting migrants, ethnic minorities, and indigenous peoples).

Just resilience is a concept to help address the uneven impacts of climate change and ensure that vulnerable individuals or social groups benefit fairly from adaptation responses and are not disproportionately burdened, including **tackling systemic inequalities**, **ensuring fair access to resources** and decision-making and **ensuring**

recognition of diverse perspectives and values [77]. The European Climate Risk Assessment [78], the European Commission's communication on managing climate risks [79], and the EU preparedness union strategy [80] already stress the need for adaptation strategies that prioritise and include vulnerable populations into planning and decision making. Member States and subnational governments are increasingly incorporating justice into their adaptation policymaking and planning. Similarly, at the sub-national level, justice has increasingly been taken into consideration in urban adaptation planning. With many examples around Europe, participatory processes are being used to inform policy [81]. Nevertheless, inclusion of vulnerable groups and justice still need attention [82]. Below, three examples of national efforts in involving stakeholders, vulnerable groups and integrating justice to national adaptation policy are presented.

Indigenous peoples' perspectives to climate change: The Saami Climate Council of Finland [83]

The Saami Climate Council is a globally unique scientific panel established under the Climate Act of Finland. The task of the Saami Climate Council is to provide knowledge on climate change from the perspective of Saami traditional knowledge [84] and research. The knowledge is used by the authorities of Finland and the indigenous Saami community for decision-making, to raise awareness of the impacts of climate change on Saami culture and support adaptation and mitigation in Saami culture. The Saami Climate Council promotes interaction between science and Saami traditional knowledge. The Climate Council's activities are based on scientific knowledge and Saami traditional knowledge and both scientist and traditional knowledge holders are represented in the Council.

Participatory process for including stakeholders in national adaptation planning: National adaptation strategy of Germany [85]

Germany's 2024 climate adaptation strategy was developed through an extensive participation process involving various stakeholders and citizens. During this process, events, such as the "Dialogue on climate adaptation - mastering life in a changing

[77] Social fairness in preparing for climate change: how resilience can benefit communities across Europe | European Environment Agency's home page
[78] European Climate Risk Assessment | European Environment Agency's home page
[79] Managing climate risks: protecting people and prosperity - European Commission
[80] Preparedness - European Commission
[81] Urban adaptation in Europe: what works? | European Environment Agency's home page
[82] Social fairness in preparing for climate change: how resilience can benefit communities across Europe | European Environment Agency's home page
[83] Saamelainen ilmastoneuvosto - Saamelainen ilmastoneuvosto - Etusivu
[84] Traditional knowledge is knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, forestry and environmental management in general. Source: Convention on Biological Diversity Introduction.
[85] Deutsche Anpassungsstrategie an den Klimawandel 2024 (DAS 2024)

climate together" and online consultations were held to gather input, focusing on seven clusters of climate goals and measures. Notably, efforts in late 2023 and throughout 2024 involved discussion and collaboration with regional representatives and citizens from diverse regions in Germany. The process aimed to incorporate comprehensive feedback and suggestions from stakeholders and the public, especially youth, to the adaptation strategy regarding climate impacts, personal precautions and future expectations.

The inclusion of 'just resilience' as a guiding principle: The NAF of Ireland

Ireland's new National Adaptation Framework (NAF) [86], developed in line with the requirements of Ireland's Climate Action and Low Carbon Development Acts, identifies **community and public engagement** and **just resilience" as new NAF guiding principles**. The aim is to ensure that adaptation is not just effective but also just, ethical, and sustainable. The principles-based approach serves to guide decision-makers, communities, and organisations in adapting effectively and equitably to a changing climate.

Under the new NAF, all sectoral adaptation plans must undertake statutory public consultation processes. At local authority level, the development of all Local Authority Climate Action Plans (LACAPs) under the Climate Act also required consultation processes with adjoining local authorities. A statutory public consultation was undertaken as each LACAP was developed and these plans were put to the local authority's elected members for approval. Public Participation Networks (PPNs) were established in 2014 in each local authority following the enactment of the Local Government Reform Act 2014.

Ireland's new NAF also contains an action to drive community outreach, educating the public on risks, opportunities and impacts of climate change. The National Dialogue on Climate Action (NDCA) helps individuals and communities to take part in climate action through community engagement, capacity building and networking. Extensive stakeholder engagement, the funding of impactful climate actions and public surveys are some of the ways the NDCA achieves this.

[86] Ireland's National Adaptation Framework (NAF)

12 Examples of funding of climate related projects

12.1 Example of project funded by the Innovation Fund

The **Innovation Fund (IF)** is one of the world's largest funding programmes for the deployment of net-zero and innovative technologies in EEA countries. Financed by revenues from the EU Emissions Trading System (EU ETS), the Innovation Fund is one of the EU's funds for climate policy, focusing on energy, industry and mobility and fostering competitiveness.

The IF aims to create financial incentives for companies and public authorities to invest in cutting-edge, low-carbon technologies and support the EU's transition to climate neutrality. Thanks to the EU ETS and assuming a carbon price of EUR 75/tCO2, it is estimated that the Innovation Fund will have around EUR 40 billion available between 2020 and 2030. The IF has already awarded around EUR 6.5 billion to more than **115 innovative projects** through its previous calls for proposals.

Small-Scale, PIONEER

Rome, Italy

EUR 3.1 million

The Innovation Fund has awarded a EUR 3.1 million grant to the Small-scale project, Pioneer in the 2022 Small-scale call for proposals. This globally one-of-a-kind project is repurposing over 750 second-life electric vehicle (EV) batteries into a single, safe, energy storage unit to support the electricity demands of Rome's Fiumicino International Airport.

These EV batteries are connected to a 55 0000 solar panel plant that's spread across 340 000 m^2 of airport land that will generate more than 30 gigawatt-hours (GWh) each year to power airport operations and support the broader airport grid. The project became operational in June 2025, already integrating renewable energy and reducing the reliance on a power plant fuelled by natural gas. Over its first 10 years of operation, the system is expected to avoid emitting more than 16 000 tonnes of CO_2 equivalent.

The exclusive use of second-life batteries stands out as an example of European Innovation as there are no other projects of this size that use second-life batteries from multiple Original Equipment Manufacturers (OEMs). This project not only follows the European strategic action plan for batteries but implements key principles set in the Clean Industrial Deal regarding circularity and recycling capacity, electrification, and decarbonisation.

Volta Large-Scale Pilot

Dubí, Czechia

EUR 12.2 million

With a EUR 12.2 million grant secured in the 2022 Innovation Fund Lage-Scale call, the Pilot project, Volta, will significantly reduce carbon emissions and decrease the dependency on fossil fuels in one of Europe's' key energy-intensive industries, flat glass manufacturing.

Crucial to Europe's economy, flat glass manufacturing serves construction, furniture, transportation, technology, and other products and services. Located in Dubí, Czechia, the project houses a cutting-edge hybrid furnace functioning on electric melting and oxy-gas combustion technology. The project became operational in 2025 and once fully implemented, the project will cut over 192 500 tonnes of CO_2 over a 10-year period and while reducing Europe's natural gas consumption by more than 10 terawatt-hours (TWh).

In line with the REPower EU plan, this highly scalable project can further increase decarbonisation and the clean energy transition for critical sectors like construction and automotive. Consistent with the Clean Industrial Deal, this project promotes competitiveness and sets the tone for sustainable glass manufacturing.

CO2LLECT

Rüdersdorf, Germany

EUR 157 million

The German-based CO2LLECT project has been awarded a EUR 157 million grant from the Innovation Fund in the 2023 call for Net-zero Technologies (IF23 Call). This large-scale carbon capture and storage (CCS) project aims to achieve negative emissions at Germany's largest cement plant in Rüdersdorf.

By deploying innovative adsorptive-cryogenic separation technology, captured CO_2 will be liquified and transported by rail to a CO_2 hub in Northern Germany. It will then be shipped to an offshore storage site off the coast of Denmark and stored beneath the seabed of the North Sea. To further reduce the greenhouse gas emissions in the combustion process, the project will inject green hydrogen that will be produced by an electrolyser on site. Located in the water-scarce area of Brandenburg, the project has included an onsite water treatment plant to enhance water circularity and lower electricity consumption. Over the first ten years of operation, the project is expected to cut around 12.6 million tonnes of CO_2 equivalent.

Decarbonising a hard-to-abate sector like cement production aligns the project with several key policy priorities of the EU, such as the Net-Zero Industry Act (NZIA), the Carbon Border Adjustment Mechanism (CBAM) and the Clean Industrial Deal (CID). The project is expected to support the region by creating skilled job opportunities. Furthermore, it aims strengthen Germany's CO_2 infrastructure, thereby fostering

replication and boosting the growth of value chains across various industrial sectors in Europe.

12.2 Example of project funded by the Modernisation Fund

The **Modernisation Fund** [87] supports the modernisation of the energy systems and the improvement of energy efficiency in 13 lower-income EU Member States (Bulgaria, Croatia, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Portugal, Romania, Slovenia and Slovakia). Established in 2018 for the 2021-2030 period, the fund aims to help the beneficiary Member States achieve their climate and energy targets and the objectives of the European Green Deal.

Financed by the EU Emissions Trading System (EU ETS), the fund primarily focuses on six priority areas: renewable energy generation and use, renewable heating and cooling, energy efficiency across sectors, energy storage and network modernisation, low-income household support, and just transition in carbon-dependent regions. A maximum of 20% can be allocated toward non-priority investments that reduce greenhouse gas emissions but do not fall in the priority areas.

The Modernisation Fund operates under the responsibility of the beneficiary Member States, who work in close cooperation with the European Investment Bank (EIB) and the Commission. Together, the Commission, the EIB and 16 EU Member States compose the Investment Committee for the Modernisation Fund (Investment Committee) that approves the investments, while the EIB examines Member State proposals.

Smart energy infrastructure scheme

Poland

EUR 222 million

The Modernisation Fund has disbursed EUR 222 million to Poland to implement a scheme dedicated to the roll-out of smart meters.

The scheme benefits Distribution System Operators and supports the development of intelligent energy infrastructure.

Activities supported include the purchase and installation of smart meters, the modernisation and adaptation of the energy network infrastructure allowing for the service and management to ensure the proper use of the meters. The investment also allows for the creation of software for conducting network efficiency analyses, reports on savings, statistics, losses and to enable the adaptation of the system to the central energy market information system.

Initially confirmed in the Spring of 2021 for an amount of EUR 44 million, the investment was subject to a subsequent disbursement decision amounting to an

[87] https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/modernisation-fund_en

additional EUR 178 million at the end of 2022. A total of 77% of the support has been contracted to the final beneficiaries and 26% of the funds have been paid out. Three calls for proposals were launched and 9 agreements were concluded with final beneficiaries.

Energy-efficient production of technologies in EU-ETS manufacturing companies

Lithuania

EUR 22 million

In the beginning of 2022, Lithuania received 22 million for a scheme to support the optimisation, digitalisation and automation of manufacturing processes within industrial installations covered by the EU ETS. The aim is to reduce electricity consumption and material use. Projects will receive equipment upgrades, improvements in controls and sensors, and software upgrades, which will in turn, improve process efficiency, heat recovery and modernisation of the systems.

For this scheme, two calls for proposals in 2022 and 2023 respectively were held. Currently, 53% of the funds been contracted to end beneficiaries, and the awarded projects are currently under construction.

12.3 Examples of projects funded by the Recovery and Resilience Facility

The **Recovery and Resilience Facility (RRF)**, established as the centrepiece of NextGenerationEU, is a major source of EU-level climate-related financing. By requiring Member States to dedicate at least 37% of their national recovery plans to climate investments and reforms, the RRF mobilises substantial resources for clean energy, sustainable mobility, energy efficiency, and climate adaptation. Overall, Member States have committed over 42% of total estimated costs (or around EUR 275 billion) to support the climate objective. Beyond its direct financial contribution, the national Recovery and Resilience Plans (RRPs) introduce structural reforms that foster an enabling environment for private investment and increase its impact. This combination of grants, loans, and reforms makes the RRF a pivotal instrument in advancing the EU's green transition.

Although the Recovery and Resilience Facility is a temporary instrument set to conclude by end-2026, it has already generated significant momentum in advancing the EU's climate agenda. Progress in implementing measures related to the green transition has been good overall, with nearly 50% of green milestones and targets assessed as satisfactorily fulfilled or reported as completed by 1 September 2025.

'Rail – efficient network' of the Federal State

Belgium

EUR 259 million

The Recovery and Resilience Facility supports the upgrade of 32 rail sections, modernisation of 18 dedicated rail freight infrastructures, removal of 9 infrastructure bottlenecks in Brussels and on the line Brussels-Luxembourg, and development of an IT module for traffic management.
More than 50 interventions to upgrade rail infrastructure have already been completed and the investment is expected to be fully completed by June 2026.

Energy renovation on residential buildings

Greece

EUR 1 138 million

The investment aims to renovate more than 100 000 residences and provide for targeted support to energy-poor residences.

The investment aims to improve isolation and install more energy efficient heating systems, while also contributing towards the digitalisation of final energy consumption through energy management systems. The investment also covers multi-storey buildings, including apartments as well as common areas of the building accessible to all residents. The renovations will yield significant primary energy savings (on average 30%), thereby reducing the electricity and heating bills of the households.

For this scheme, two calls for proposals in 2022 and 2023 respectively were held and the completion of the energy efficiency renovations is ongoing.

Modernisation of electricity transmission and distribution networks

Latvia

EUR 80 million

The general objective of this measure is to contribute to reaching climate neutrality objectives by creating a sustainable grid infrastructure in which green technologies notably wind may be more easily deployed. It is also expected to contribute to the synchronisation of the Baltic electricity systems with continental European networks and the objectives and activities of the Baltic Electricity Market Integration Plan.

The measure consists of direct investment in upgrading the electricity grid, developing IT solutions to increase the flexibility and security of the transmission system and distribution system and creating among others a national electricity market data exchange and storage platform and an automated smart metering system. The measure shall also improve the regulatory framework and the enabling

conditions to facilitate the deployment of onshore wind energy on state forest land and to reduce legal uncertainty for investments in wind power.

12.4 Examples of project on land and nature

Bird Park Střimická výsypka

Most, Czechia

EUR 1.2 million

Just Transition Fund

Střimická výsypka is the largest NGO-managed bird park in Czechia. It aims to transform 251 hectares of coal spoil heap into biodiversity hotspot and flagship example of 'new nature' on post-mining land. The project was co-financed by citizen fundraising. More than 2 thousand donors raised almost EUR 240 000 and strengthen public support for transformation of coal regions.

NBS4Drought

Denmark, Germany, Poland, Spain

EUR 7.9 million

Horizon Europe

The NBS4Drought project aims to demonstrate the cost-effectiveness of wetland-based nature-based solutions (NbS) for sustainable water management, particularly in alleviating the impacts of extreme droughts, and to expedite their widespread adoption across Europe. 7 different wetland showcases from 5 distinct bioclimatic zones in Europe have been selected in rural, peri-urban (including an island), and urban environments. Each intervention is tailored to enhance the area's resilience against droughts by increasing water retention capacity, improving biodiversity and ecosystem services, and enhancing water treatment efficiency for safe water reuse.

LILAS4SOILS

Italy, Spain, Greece, Portugal, France, Israel

EUR 11.5 million

Horizon Europe

LILAS4SOILS will put in place 5 Living Labs (LLs) in 6 countries to co-create Carbon Farming solutions within farmers, agri-food businesses, researchers and local authorities, (peatland management, agroforestry, livestock and manure management, and nutrient management, maintaining soil organic carbon) to be implemented in 85-100 demo-sites. The impact on soil carbon sequestration and environmental co-benefits will be assessed through homogeneous Monitoring, Reporting and Verification (MRV) technologies.

Soria Forest Adapt

Soria, Spain

EUR 0.9 million

LIFE

The LIFE SORIA FORESTADAPT project strengthens the resilience of southern European forests to climate change by integrating adaptation into forest management and afforestation plans. The project will update planning for 200 thousand hectares of public forest in the long term and will also influence afforestation programmes on private lands, especially agricultural land.
The project updated forest plans, creates a practical handbook, included adaptation criteria in forest certification standards, and built a business platform to work on adaptation measures associated with carbon compensation projects. The aim is to expand the model to the rest of the Castile and León region, and then to the rest of Spain and Southern Europe.

AdaptCalaMillor

Spain

EUR 1.4 million

LIFE

Objective of the project is to promote a long-term adaptation strategy for the beach system and urban environment of Cala Millor Bay in Maiorca, which bridges both governance gaps and identifies concrete solutions to shoreline erosion and the loss of beach environmental services.

12.5 Examples of project on preparedness and resilience

Archiclima

Poland

EUR 1.3 million

LIFE

Objective of the project: to climate-proof different large-scale commercial buildings across Poland (shopping centres, concert halls, airports etc.) by design. Great replication potential: it will develop a replicable methodology as well as a catalogue of adaptation examples and detailed solutions to climate-proof a broader range of buildings.

RESIST

Portugal, Spain, Finland, Denmark

EUR 25 million

Horizon Europe

RESIST project, part of the EU Adaptation Mission, will increase resilience and accelerate the transformation of climate-vulnerable EU regions. It will engage 12 European regions with different socioeconomic profiles that will test adaptation solutions to 5 key climate challenges: floods, droughts, heatwaves, wildfires, and soil erosion. For example, in Portugal, the project is testing new approaches to landscape management that enhance forest fire resilience, strengthens natural capital, and supports rural economies. By leveraging quintuple helix partnerships that involve academia-business-government-public collaboration, the project will promote a participative approach to resilience. RESIST actively demonstrates 100 innovative solutions across governance, social frameworks, Nature-based solution, engineering and digital technologies, to accelerate adaptation efforts. It pioneers the

development of digital twins tailored to all the demonstration areas to empower informed decision-making and long-term planning.

12.6 Examples of project on society and communities

Archiclima

Leuven, Belgium

EUR 1.3 million

LIFE

Objective: to deploy nature-based solutions to urban climate change adaptation and test an integrated approach to urban CCA that draws on the efforts of multiple stakeholders, including local government, citizens, universities, and private actors. In pursuing these objectives, LIFE PACT aims to bring to life the European Climate Pact which calls on stakeholder's empowerment.

ASCEND

France (Lyon) & Germany (Munich)

EUR 20 million

Horizon Europe

The ASCEND project, part of EU Mission on Climate Neutral and Smart Cities, will accelerate the implementation of positive, clean energy districts (PCEDs). Specifically, it will deliver two inclusive, affordable PCEDs in Lyon and Munich and scale up their replication in eight partnering cities. In the City of Lyon by 2028, the PCED area will host more than 19 000m^2 of retrofitted buildings and 170 000m^2 of new buildings with different uses: housing (including 55% of social or affordable housing), offices, shops, restaurants, and bars, etc.

JUSTNature

Greece, Malta, Belgium, Italy, Germany, Hungary

EUR 9.65 million

Horizon 2020

The JUSTNature project aims to ensure a just transition to low-carbon cities through nature-based solutions. It builds on the recognition of disparities driven by income and wealth inequalities and considers the right of all citizens to ecological space - including clean air, thermal comfort and biodiversity. To address these issues, the project co-designs new approaches which conserve natural ecosystem values and functions to provide benefits to people.

Nature-based solutions are activated in 7 European cities, with a specific focus on social cohesion of various groups of income and age. Examples of measures include preservation and expansion of green spaces, urban green corridors and parks, an increase of permeable surfaces, green roofs and community gardens, addressing climate-related issues of air pollution, urban heat island, rainwater infiltration and human well-being. Citizen engagement including vulnerable groups and multi-stakeholder co-creation and design processes are enabled throughout the project to ensure inclusive governance.

12.7 Examples of projects on international initiatives

Green Blue Alliance for the Pacific and Timor-Leste

Pacific islands

EUR 500 million

Dual-purpose project EU's contribution projected to amount to EUR 500 million for the period 2021-2027. The initiative builds on the shared ambition of the two regions for a low carbon and resilient global economy by 2050. The initiative includes:

- protecting climate change resilience of Pacific Islands' ecosystems.
- Timor-Leste: planting 4 million trees with a sustainability strategy and including carbon credits certification to provide income for communities.
- Solomon and Papua New Guinea: Global Gateway projects for the development of water and wastewater infrastructure.
- Papua New Guinea: upgrading rural roads, contributing to safer and more environmentally friendly transport.
- Pacific Solutions: an integrated ocean management project to sustain livelihoods today and into the future.

SAFE4ALL, ALBATROSS, and ACACIA

Sub-Saharan Africa

EUR 15 million

Horizon Europe

The projects are jointly strengthening climate resilience across Ghana, Kenya, Tanzania, Zimbabwe, Madagascar, and South Africa by generating locally relevant knowledge, tools, and services to support climate adaptation. The activities includes:

- **Climate services and decision support**: developing atlases, localized forecasts, and digital platforms to anticipate droughts, floods, and cyclones, while tailoring information to the needs of local communities, farmers and policymakers.
- **Nature-based solutions**: integrating socio-economic, ecosystem, and climate data to design adaptation strategies that harness natural processes for resilient agriculture, water, and land management.
- **Local action and empowerment** : co-creating solutions with local actors, ensuring that climate services translate into effective policies from migration strategies to livelihood security.