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Annual European Union greenhouse gas inventory 1990-2024 and inventory document 2026

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Annex I: Key categories analysis

Annex II: Assessment of uncertainty (The assessment is included in the NID, section 1.6)

Annex III: Summary description of the methodologies used by each Member State for the EU key categories

Annex IV: Improvement plan

ES-1 BACKGROUND INFORMATION ON GREENHOUSE GAS INVENTORIES AND CLIMATE CHANGE

This report is the official inventory submission of the European Union (EU) for 2026 under the United Nations Framework Convention on Climate Change (UNFCCC) and follows the modalities, procedures and guidelines (MPGs) under the Enhanced Transparency Framework (ETF) of the Paris Agreement (Decisions 18/CMA.1 and 5/CMA.3).

The EU, as a party to the Paris Agreement and to the UNFCCC, reports annually on greenhouse gas (GHG) inventories of anthropogenic emissions and removals within its Member States (i.e. emissions taking place within the EU territory). The report covers the period from 1990 to the current calendar year (t) minus two (t−2). Thus, this report describes years between 1990 and 2024.

The legal basis for the compilation of the EU inventory is the Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action (Governance Regulation)[1], the Commission Implementing Regulation (EU) 2020/1208 of 7 August 2020 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council and repealing Commission Implementing Regulation (EU) No 749/2014[2], and the Commission Delegated Regulation (EU) 2020/1044 of 8 May 2020 supplementing Regulation (EU) 2018/1999 of the European Parliament and of the Council with regard to values for global warming potentials and the inventory guidelines and with regard to the Union inventory system and repealing Commission Delegated Regulation (EU) No 666/2014.

These regulations establish a mechanism for:

a) ensuring the timeliness, transparency, accuracy, consistency, comparability and completeness of reporting by the EU and its Member States to the UNFCCC Secretariat;
b) reporting and verifying information relating to commitments of the EU and its Member States pursuant to the UNFCCC and the Paris Agreement and evaluating progress towards meeting those commitments;
c) monitoring and reporting all anthropogenic emissions by sources, and removals by sinks, of GHGs not controlled by the Montreal Protocol on substances that deplete the ozone layer in Member States;
d) monitoring, reporting, reviewing and verifying GHG emissions and other information under the Effort Sharing Regulation[3].

The EU GHG inventory results from the compilation of the direct sum of emissions and removals from the national inventories of the EU Member States. Energy data from Eurostat are used for the reference approach for CO_2 emissions from fossil fuels, developed by the Intergovernmental Panel on Climate Change (IPCC).

The main institutions involved in the compilation of the EU GHG inventory are the Member States, the European Commission Directorate-General for Climate Action (DG CLIMA), the European Environment Agency (EEA) and its European Topic Centre on Climate Change Mitigation (ETC/CM), and Eurostat.

[1] OJ L 328, 21.12.2018, p. 1–77 .

[2] OJ L 278, 26.8.2020, pp. 1–132

[3] Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (OJ L 156, 19.6.2018, p. 26–42.

The annual process of compiling the EU GHG inventory is described below:

1. Member States submit their annual GHG inventories by 15 January each year to the European Commission (DG CLIMA), with a copy to the EEA.
2. The EEA and its ETC/CM then perform 'initial checks' on the data submitted. Specific findings from the initial quality assurance/quality control (QA/QC) checks are communicated to Member States by 28 February. In addition, the draft EU GHG inventory and inventory report are circulated to Member States for review and comments by 28 February.
3. Member States check their national data and the information presented in the EU GHG inventory report, respond to specific findings from the initial QA/QC checks by the EU inventory team, which may lead to improved emissions and removals by Member States, send updates if necessary and review the EU inventory report by 15 March.
4. The EEA and its ETC/CM review final inventory submissions from Member States and their responses to the initial checks and prepare the final EU GHG inventory and inventory report by 15 April so that they can be submitted to the UNFCCC[4].

ES-2 SUMMARY OF TRENDS RELATED TO EMISSIONS AND REMOVALS IN THE EU

Total net GHG emissions - including Land Use, Land Use Change and Forestry (LULUCF) and indirect CO_2 emissions[5] - in the EU amounted to 2 786 million tonnes CO_2 equivalent ($MtCO_2$-eq) in 2024. All GHG emission totals provided in this report include indirect CO_2 emissions[6].

[4] The EU, as Party to the Paris Agreement and the UNFCCC, reports its GHG inventory according to the modalities, procedures and guidelines (MPGs) under the Enhanced Transparency Framework (ETF) of the Paris Agreement (Decisions 18/CMA.1 and 5/CMA.3).

Due to remaining technical shortcomings in the UNFCCC ETF tools, there have been substantial difficulties in preparing and finalizing the complete EU GHG inventory tables, which are based on the aggregation of emissions and removals from Member States' GHG inventories.

The EU CRT tables submitted as part of its 15 April 2026 inventory under the Convention and the Paris Agreement are based on the aggregation of standard variables reported in the inventories of its Member States. Country-specific variables cannot be imported due to outstanding issues with the ETF tool.

It is important to highlight that no emissions or removals are missing from the CRT tables, but that the level of disaggregation has been affected. The EU has all the information reported by Member States from the GHG inventories submitted to the EU, which have been used for the production of the EU's NID. All emissions and removals are also available from the GHG data viewers and databases published on the EEA website.

There are regular discussions between the EEA and the UNFCCC secretariat's technical support aiming to resolve the issues with the EU aggregation as quickly as possible. The complete CRT tables and JSON file will be submitted as soon as the EU aggregation, including all standard and country-specific variables, checks out and is fully consistent with the sum of emissions and removals from Member States' inventories.

In addition, because of the ongoing improvements and several releases of the ETF tools by the UNFCCC secretariat, reported data may differ from actual inventory data in some cases. When known, outstanding issues affecting the aggregation of emissions and removals as well as any errors linked to the use of confidential data, will be mentioned in the different sectoral chapters.

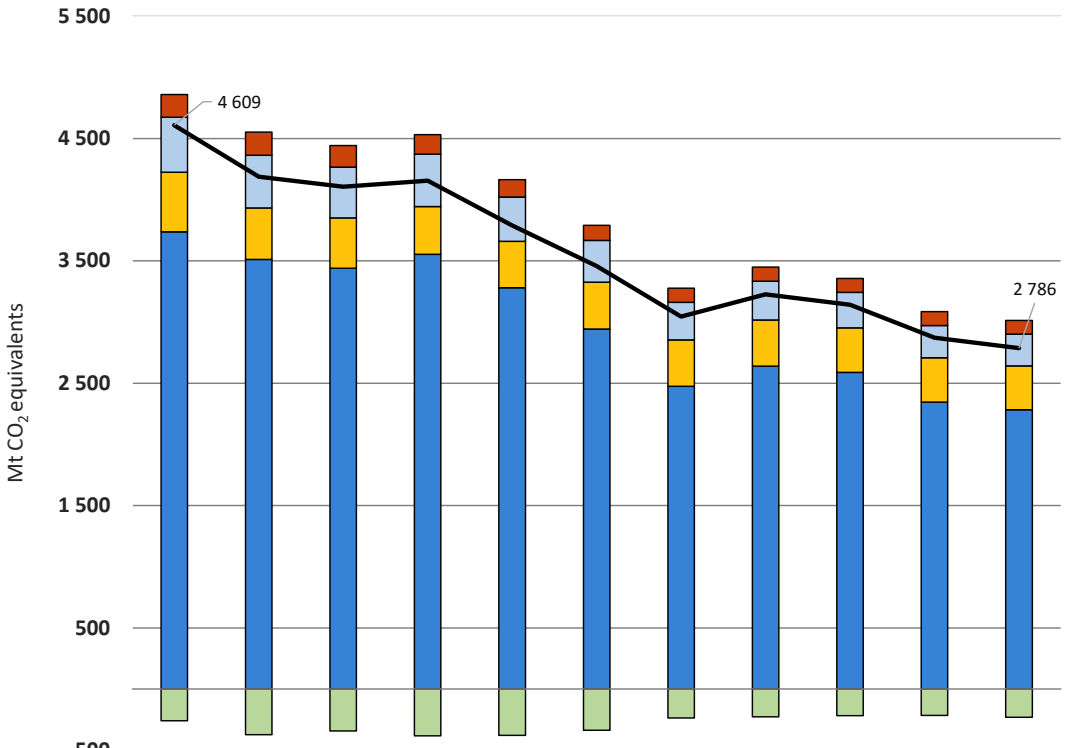
Thus, the EU should not be held responsible for technical issues and errors caused by the CRT electronic tool affecting the quality of the GHG inventory during the technical expert review. The EU expects that further development of the ETF tools should eventually eliminate the number of bugs and remaining errors.

[5] Unless otherwise specified, the national GHG totals in this report always include LULUCF and indirect CO_2 emissions. They may also be referred to as 'net' total GHG emissions. Besides LULUCF, the other UNFCCC sectors that are included in the national totals are energy, industrial processes and product use (IPPU), agriculture, and waste.

[6] According to the MPGs, Parties may report indirect CO_2 from the atmospheric oxidation of CH_4, CO and NMVOCs. For Parties that decide to report indirect CO_2, the national totals will be presented with and without indirect CO_2. The EU national total includes indirect CO_2 emissions if Member States have reported these emissions. The CRT tables include national totals, including and excluding indirect CO_2 emissions.

In 2024, total GHG emissions were 39.5 % (1 822 $MtCO_2$-eq) below 1990 levels. Emissions decreased by 3 % or 87 $MtCO_2$-eq between 2023 and 2024 (Figure ES. 1).

Figure ES. 1 EU GHG emissions and removals ($MtCO_2$-eq)



	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
LULUCF	-258	-372	-342	-383	-378	-337	-237	-226	-218	-216	-231
Waste	185	189	177	159	141	122	116	115	114	113	111
IPPU	450	430	414	429	364	342	306	316	290	263	260
Agriculture	487	422	411	389	379	382	381	378	364	363	359
Energy	3 737	3 511	3 441	3 554	3 280	2 944	2 474	2 639	2 588	2 345	2 283
Total net GHG emissions (including indirect CO2)	4 609	4 187	4 107	4 154	3 790	3 458	3 044	3 227	3 142	2 873	2 786

Notes: CO_2 emissions from biomass with energy recovery are reported as a Memorandum item according to UNFCCC guidelines and are not included in national totals. In addition, no adjustments for temperature variations or electricity trade are considered. The 100-year global warming potentials are those from the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

ES-2.1 Main trends by source category, 1990-2024

Total GHG emissions (including LULUCF and indirect CO_2 emissions) decreased by 1 822 $MtCO_2$-eq since 1990 reaching 2 786 $MtCO_2$-eq in 2024. These emissions exclude international aviation and international navigation.

There has been a progressive decoupling between gross domestic product (GDP) and emissions, with GDP increasing by over 70% and greenhouse gas emissions falling by almost 40% between 1990 and 2024.

The trend in GHG emissions over the 34-year period was driven by a variety of factors, including the growing share in the use of renewables, the use of less carbon intensive fossil fuels and improvements in energy efficiency, as well as to structural changes in the economy.

The long-lasting changes have resulted in a lower energy intensity of the economy and in a lower carbon intensity of energy production and consumption in 2024 compared to 1990. Demand for energy to heat households has also been lower, as, besides better insulation standards in buildings, Europe on average has experienced milder winters since 1990, which has also helped reduce emissions.

GHG emissions decreased in most sectors between 1990 and 2024, with the notable exception of transport, refrigeration and air conditioning, where emissions increased, and forest land, where net removals decreased and the negative trend accelerated in the past few years.

Emissions from road transportation increased both for passenger and freight transport, in spite of the deployment of less carbon intensive and more efficient vehicles on the market, including electric vehicles. Increasing transport demand has partly outpaced climate benefits. Hydrofluorocarbon (HFC) emissions from refrigeration and air conditioning increased strongly between 1990 and 2014 but have decreased for the tenth consecutive year since then, due to phase down of F-gases as required by EU legislation, and more recently a phase out. The main reasons for the decrease in net removals include the aging of the forests from the late 2000s and a lower annual increment, as well as increased harvesting and the negative impacts from climate change. At the aggregate level, emission reductions were largest for public electricity and heat production, manufacturing industries and construction, residential combustion, and iron and steel production (including energy-related emissions).

On the positive side, the top three emission reductions occurred in electricity and heat production, residential and the industrial sector.

A combination of factors can explain lower emissions in industrial sectors, such as improved efficiency and lower carbon intensity as well as structural changes in the economy, with a higher share of services and a lower share of more-energy-intensive industry in total GDP. For industry as a whole, including both combustion and processes, EU emissions almost halved between 1990 and 2024.

Emissions from electricity and heat production also decreased strongly, by 58%, over the past 34 years since 1990. In addition to improved energy efficiency there has been a move towards less carbon intense fuels. Between 1990 and 2024, the use of solid and liquid fuels in thermal power stations decreased strongly (by 68 % and 86 %, respectively) whereas natural gas consumption developed in the opposite direction (increasing by 44 %, although in the past two years since 2022 emissions fell by almost 18%). Coal consumption in 1990 was over three times higher than in 2024. 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.

Emissions in the residential sector also represented one of the largest reductions. Energy efficiency improvements from better insulation standards in buildings, and a less carbon-intensive fuel mix, can partly explain lower demand for space heating in the EU over the past 34 years.

A number of policies, both EU and Member State specific, have contributed to the overall GHG emission reduction, such as key agricultural and environmental policies in the 1990s and climate and energy policies in the past two decades since 2005. The latter include the implementation of the EU Emissions Trading System as well as national policies for the sectors not covered by this system. More information on policies and measures can be found in the EU's first Biennial Transparency Report under the Enhanced Transparency Framework of the Paris Agreement.

Almost all EU Member States reduced emissions compared to 1990 and thus contributed to the overall positive EU performance (see Table ES.3).

Additional information on EU key trends and drivers is available from the EEA briefing published alongside this report and available from the EEA website.

Table ES. 1 shows those categories that made the largest contribution to the change in total GHG emissions and removals in the EU between 1990 and 2024.

Table ES. 1 Overview of EU categories whose emissions and/or removals increased or decreased by more than 20 $MtCO_2$-eq in the period 1990–2024

Source category	Million tonnes (CO_2 equivalents)
Road Transportation (CO2 from 1.A.3.b)	148
International Aviation (CO2 from 1.D.1.a)	75
Forest land remaining forest land (CO_2 from 4.A.1)	71
Forest land (CO_2 from 4.A)	65
Refrigeration and Air conditioning (HFCs from 2.F.1)	50
Land use, land-use change and forestry (CO_2 from 4)	28
International Navigation (CO2 from 1.D.1.b)	26
Cropland remaining cropland (CO_2 from 4.B.1)	-20
Unmanaged Waste Disposal Sites (CH4 from 5.A.2)	-23
Grassland (CO_2 from 4.C)	-24
Agricultural soils: Direct N2O emissions (N2O from 3.D.1)	-27
Cropland (CO_2 from 4.B)	-30
Adipic Acid Production (N2O from 2.B.3)	-34
Cement Production (CO2 from 2.A.1)	-37
Managed Waste Disposal Sites (CH4 from 5.A.1)	-37
Nitric Acid Production (N2O from 2.B.2)	-39
Fugitive Emissions from Oil and Natural Gas (CH4 from 1.B.2)	-48
Enteric Fermentation: Cattle (CH4 from 3.A.1)	-53
Fugitive Emissions from Solid Fuels (CH4 from 1.B.1)	-64
Manufacture of Solid Fuels and Other Energy Industries (CO2 from 1.A.1.c)	-74
Fuels used Commercial/Institutional Sector (CO2 from 1.A.4.a)	-74
Iron and Steel Production (CO2 from 1.A.2.a + 2.C.1)	-135
Fuels used Residential Sector (CO2 from 1.A.4.b)	-179
Manufacturing industries (excl. Iron and steel) (Energy-related CO2 from 1.A.2 excl. 1.A.2.a)	-284
Public Electricity and Heat Production (CO2 from 1.A.1.a)	-713
Total (with net CO_2 emissions/removals)	**-1822**

Notes: As the table only presents sectors whose emissions have increased or decreased by at least 20 $MtCO_2$-eq, the sum of the EU key categories in this table does not match the total change in emissions listed at the bottom of the table, which includes all emission sources in the EU inventory. Note that LULUCF categories and the indirect CO_2 emissions are reflected in this table.

ES-2.2 Main emission changes by source category, 2023–2024

Total GHG emissions (including LULUCF) decreased in 2024 by 87 $MtCO_2$-eq, or 3 % compared to 2023, to reach 2 786 $MtCO_2$-eq in 2024. The year 2023 performance represented one of the largest relative and absolute reductions in GHG emissions in the EU since 1990. The year 2024 saw a further decrease in GHG emissions.

The largest decrease in emissions in 2024 occurred in the energy sector, and particularly in public electricity and heat production, where emissions decreased by over 9% (corresponding to 53 $MtCO_2$-eq).Lower emissions in the power sector in the EU in 2024 was due to both a strong reduction in the consumption of coal, particularly, but also of natural gas.

According to Eurostat data, the use of renewable electricity represented 47% of the net electricity generated in the EU in 2024mostly driven by hydro, wind and solar energy..

The other category showing significant improvements in the last year is cropland (-15 $MtCO_2$-eq). As Member States move to Tier 3 methods for mineral soils, estimates reflect climate variability and this can create large interannual variation in emissions and removals from mineral and organic soils. Lower emissions in the cropland category can be largely attributed to higher precipitation in Germany in 2024 compared to 2023.

Table ES. 2 shows the categories making the largest contribution to the change in GHG emissions and removals in the EU between 2023 and 2024.

Table ES. 2 Overview of EU categories whose emissions and/or removals increased or decreased by more than 3 $MtCO_2$-eq in the period 2023–2024

Source category	Million tonnes (CO_2 equivalents)
Road Transportation (CO2 from 1.A.3.b)	9
Grassland (CO_2 from 4.C)	4
Forest land (CO_2 from 4.A)	-3
Fuels used Residential Sector (CO2 from 1.A.4.b)	-5
Manufacturing industries (excl. Iron and steel) (Energy-related CO2 from 1.A.2 excl. 1.A.2.a)	-7
Cropland (CO_2 from 4.B)	-15
Public Electricity and Heat Production (CO2 from 1.A.1.a)	-53
Total (with net CO_2 emissions/removals)	**-87**

Notes: As the table only presents sectors whose emissions have increased or decreased by at least 3 $MtCO_2$-eq, the sum of the EU key categories in this table does not match the total change in emissions listed at the bottom of the table, which includes all emission sources in the EU inventory. Note that LULUCF categories and the indirect CO_2 emissions are reflected in this table.

ES-2.3 Overview of total GHG emissions by countries

Table ES.3 gives an overview of total GHG emissions by countries, illustrating where the main changes occurred.

Table ES. 3 GHG emissions in $MtCO_2$-eq

	1990 (million tonnes)	2024 (million tonnes)	2023 - 2024 (million tonnes)	Change 2023 - 2024 (%)	Change 1990-2024 (%)	Share MS/EU 2024
Austria	65.9	70.0	-5.3	-7.1%	6.2%	2.5%
Belgium	142.6	97.4	0.0	0.0%	-31.7%	3.5%
Bulgaria	83.9	35.4	-2.6	-6.9%	-57.8%	1.3%
Croatia	25.1	20.9	1.1	5.5%	-16.8%	0.7%
Cyprus	5.5	8.7	0.0	0.5%	57.5%	0.3%
Czechia	185.3	92.0	-6.5	-6.6%	-50.4%	3.3%
Denmark	78.5	36.6	-1.7	-4.4%	-53.3%	1.3%
Estonia	36.3	12.1	-1.2	-9.2%	-66.5%	0.4%
Finland	43.0	49.1	1.0	2.0%	14.0%	1.8%
France	520.9	325.8	-13.2	-3.9%	-37.4%	11.7%
Germany	1289.6	707.6	-35.2	-4.7%	-45.1%	25.4%
Greece	101.7	68.8	1.1	1.6%	-32.3%	2.5%
Hungary	91.7	47.3	-1.6	-3.2%	-48.4%	1.7%
Ireland	62.1	56.4	-1.5	-2.6%	-9.1%	2.0%
Italy	507.7	299.4	-20.2	-6.3%	-41.0%	10.7%
Latvia	13.9	12.5	0.9	8.2%	-10.1%	0.4%
Lithuania	43.6	10.5	-1.1	-9.4%	-76.0%	0.4%
Luxembourg	12.7	6.9	-0.3	-3.9%	-46.1%	0.2%
Malta	2.6	2.2	0.0	-1.5%	-16.8%	0.1%
Netherlands	226.6	144.4	-1.7	-1.2%	-36.3%	5.2%
Poland	433.7	316.4	8.6	2.8%	-27.0%	11.4%
Portugal	64.1	52.1	-0.5	-1.0%	-18.7%	1.9%
Romania	232.9	64.6	-0.1	-0.2%	-72.3%	2.3%
Slovakia	65.1	28.9	-0.6	-1.9%	-55.6%	1.0%
Slovenia	14.2	11.0	0.6	5.4%	-22.5%	0.4%
Spain	247.6	215.8	-1.6	-0.8%	-12.8%	7.7%
Sweden	11.7	-6.7	-4.9	271.3%	-157.7%	-0.2%
EU	**4608.5**	**2786.2**	**-86.6**	**-3.0%**	**-39.5%**	

ES-2.4 Summary of emissions and removals by main greenhouse gas

Table ES. 4 gives an overview of the main trends in EU GHG emissions and removals for 1990–2024. In the EU the most important GHG is CO_2, accounting for 72 % of total EU emissions in 2024 including LULUCF. In 2024, CO_2 emissions including LULUCF were 2 158 Mt, which was 40 % below 1990 levels, thus responsible for the largest reduction in emissions since 1990. Emissions of CH_4 and N_2O also decreased substantially in the past 34 years since 1990, reflecting among other things lower levels of mining activities, lower oil and gas production and leaks from pipeline networks, lower agricultural livestock, particularly of cattle, as well as lower emissions from managed waste disposal on land and from reduced adipic and nitric acid production. Emissions of HFCs increased compared to 1990 but have reported significant reductions in past years.

Table ES. 4 Overview of EU GHG emissions and removals from 1990 to 2023 in $MtCO_2$-eq

GREENHOUSE GAS EMISSIONS	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
Net CO_2 emissions/removals	3 591	3 243	3 242	3 337	3 030	2 733	2 365	2 552	2 491	2 233	2 158
CO_2 emissions (without LULUCF)	3 879	3 646	3 613	3 747	3 436	3 096	2 628	2 806	2 737	2 479	2 418
CH_4	670	612	556	506	470	442	416	414	404	399	391
N_2O	298	276	246	234	198	191	190	191	180	180	178
HFCs	13	21	42	62	83	83	65	62	60	56	54
PFCs	22	15	10	6	3	3	2	2	1	1	1
Unspecified mix of HFCs and PFCs	5	5	2	1	1	1	2	2	1	0	0
SF_6	10	14	9	7	6	6	5	5	4	4	4
NF_3	0	0	0	0	0	0	0	0	0	0	0
Total (with net CO_2 emissions/removals)	**4 609**	**4 187**	**4 107**	**4 154**	**3 790**	**3 458**	**3 044**	**3 227**	**3 142**	**2 873**	**2 786**
Total (without LULUCF)	**4 867**	**4 559**	**4 449**	**4 537**	**4 169**	**3 794**	**3 281**	**3 453**	**3 360**	**3 088**	**3 017**

Notes: CO_2 emissions include indirect CO_2. Please note that historical data may have changed compared to last year's Inventory Report due to recalculations.

ES-2.5 Summary of emissions and removals by main source and sink category

Figure ES. 1 and Table ES. 5 show EU GHG emissions for the main sectors for the period 1990–2024. The most important sector in terms of GHG emissions is energy (i.e. combustion and fugitive emissions), which accounted for 76 % of total EU net emissions in 2024. The second largest sector is agriculture (12 %), followed by industrial processes (9 %). The LULUCF sector accounted for - 8 % of the EU's net national total emissions in 2024. More detailed trend descriptions are included in the individual sector chapters (chapters 3-7).

Table ES. 5 Overview of EU GHG emissions (in $MtCO_2$-eq) in the main source and sink categories for the period 1990 to 2024

GHG SOURCE AND SINK	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
1. Energy	3 737	3 511	3 441	3 554	3 280	2 944	2 474	2 639	2 588	2 345	2 283
2. Industrial Processes	450	430	414	429	364	342	306	316	290	263	260
3. Agriculture	487	422	411	389	379	382	381	378	364	363	359
4. Land-Use, Land-Use Change and Forestry	-258	-372	-342	-383	-378	-337	-237	-226	-218	-216	-231
5. Waste	185	189	177	159	141	122	116	115	114	113	111
6. Other	0	0	0	0	0	0	0	0	0	0	0
indirect CO_2 emissions	8	7	6	6	5	4	4	4	4	4	4
Total (with net CO_2 emissions/removals)	**4 609**	**4 187**	**4 107**	**4 154**	**3 790**	**3 458**	**3 044**	**3 227**	**3 142**	**2 873**	**2 786**
Total (without LULUCF)	**4 867**	**4 559**	**4 449**	**4 537**	**4 169**	**3 794**	**3 281**	**3 453**	**3 360**	**3 088**	**3 017**

ES-2.6 Summary of EU Member State emission trends

Table ES. 6 gives an overview of Member States' contributions to EU GHG emissions for the period 1990–2024. Countries show large variations in GHG emissions trends.

Table ES. 6 Overview of countries' contributions to total EU GHG emissions, including LULUCF, international aviation and including indirect CO_2, from 1990 to 2024 in $MtCO_2$-eq

Member State	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
Austria	65.9	61.9	63.1	77.9	73.6	75.3	73.4	74.3	72.8	75.4	70.0
Belgium	142.6	150.9	146.5	142.8	132.5	117.6	106.3	109.1	102.1	97.4	97.4
Bulgaria	83.9	56.7	42.1	48.4	49.1	54.1	40.1	46.0	50.1	38.0	35.4
Croatia	25.1	14.2	19.1	21.9	21.2	18.9	18.2	18.6	19.6	19.8	20.9
Cyprus	5.5	6.9	8.3	9.2	9.3	8.2	8.3	8.6	8.6	8.6	8.7
Czechia	185.3	145.5	138.2	137.1	129.8	115.6	121.1	122.9	116.8	98.5	92.0
Denmark	78.5	85.2	77.6	73.3	67.4	50.1	44.3	44.3	41.8	38.3	36.6
Estonia	36.3	16.2	15.2	17.7	17.0	18.4	12.7	13.5	15.0	13.4	12.1
Finland	43.0	43.3	40.6	35.5	44.7	34.2	45.3	55.5	53.7	48.1	49.1
France	520.9	505.8	517.9	495.1	467.0	415.8	350.3	382.4	368.0	339.0	325.8
Germany	1289.6	1119.5	1050.7	1000.2	944.6	905.2	778.6	807.7	806.9	742.8	707.6
Greece	101.7	106.5	124.1	133.2	115.8	92.6	70.7	72.8	72.5	67.7	68.8
Hungary	91.7	71.3	74.4	71.5	62.2	56.7	56.0	56.6	54.5	48.9	47.3
Ireland	62.1	66.6	75.2	76.4	65.9	63.4	60.9	63.1	61.5	58.0	56.4
Italy	507.7	499.5	529.4	549.7	472.6	391.1	330.4	362.0	360.7	319.6	299.4
Latvia	13.9	-1.1	0.3	4.1	9.1	9.2	7.9	9.9	12.5	11.6	12.5
Lithuania	43.6	17.3	9.2	18.7	9.5	12.5	13.8	13.8	12.0	11.6	10.5
Luxembourg	12.7	9.6	9.0	12.4	12.0	9.9	8.6	8.8	7.5	7.1	6.9
Malta	2.6	2.7	2.7	3.0	3.0	2.1	2.1	2.1	2.3	2.2	2.2
Netherlands	226.6	235.6	223.3	218.7	219.0	199.3	167.8	170.8	155.9	146.1	144.4
Poland	433.7	384.8	348.6	341.8	343.3	340.3	336.9	365.0	334.5	307.8	316.4
Portugal	64.1	64.7	84.5	91.3	66.7	65.6	55.2	55.5	57.9	52.7	52.1
Romania	232.9	161.8	108.7	115.8	90.3	72.7	68.9	75.4	69.8	64.7	64.6
Slovakia	65.1	45.1	41.2	48.0	42.7	36.7	31.0	34.7	31.2	29.5	28.9
Slovenia	14.2	13.6	12.5	13.4	12.6	17.4	11.6	11.7	11.4	10.5	11.0
Spain	247.6	284.8	337.3	389.2	306.4	277.1	217.6	233.8	240.2	217.4	215.8
Sweden	11.7	17.6	6.9	8.2	3.0	-2.4	6.1	7.9	2.0	-1.8	-6.7
EU	**4 609**	**4 187**	**4 107**	**4 154**	**3 790**	**3 458**	**3 044**	**3 227**	**3 142**	**2 873**	**2 786**

The largest emitters in the EU inventory in 2024 were Germany (25 % of EU net emissions), followed by France, Poland and Italy. The majority of EU Member States contributed to the strong decrease in GHG emissions in the EU between 1990 and 2024, with Germany, Italy, France, Romania and Poland together accounting for 70 % of the total net reduction.

Common drivers to lower GHG emissions in most EU countries over the past 34 years have been the use of less carbon intensive fuels, with a switch from coal to gas and a strong increase in the use of renewable energy sources, as well as significant improvements in energy efficiency, both in transformation and end use.

More information on GHG emission trends by Member State can be found in the relevant national inventory reports to UNFCCC https://unfccc.int/ghg-inventories-annex-i-parties/2026.

ES-3 OTHER INFORMATION

INTERNATIONAL AVIATION AND MARITIME TRANSPORTATION

After a sharp drop due to the COVID-19 pandemic, emissions from international aviation were almost at 1990 levels in 2020. However, after 2020 emissions increased rapidly and were 138 % above the 1990 level in 2024. Between 2023 and 2024 alone, emissions increased by 5.9 %. GHG emissions from international shipping also increased in 2024 compared to 2023 by 3.8 % and were 27 % above 1990 levels in 2024. In 2024, international aviation accounted for 130 $MtCO_2$-eq and international shipping for 127 $MtCO_2$-eq.

INDIRECT GREENHOUSE GAS EMISSIONS

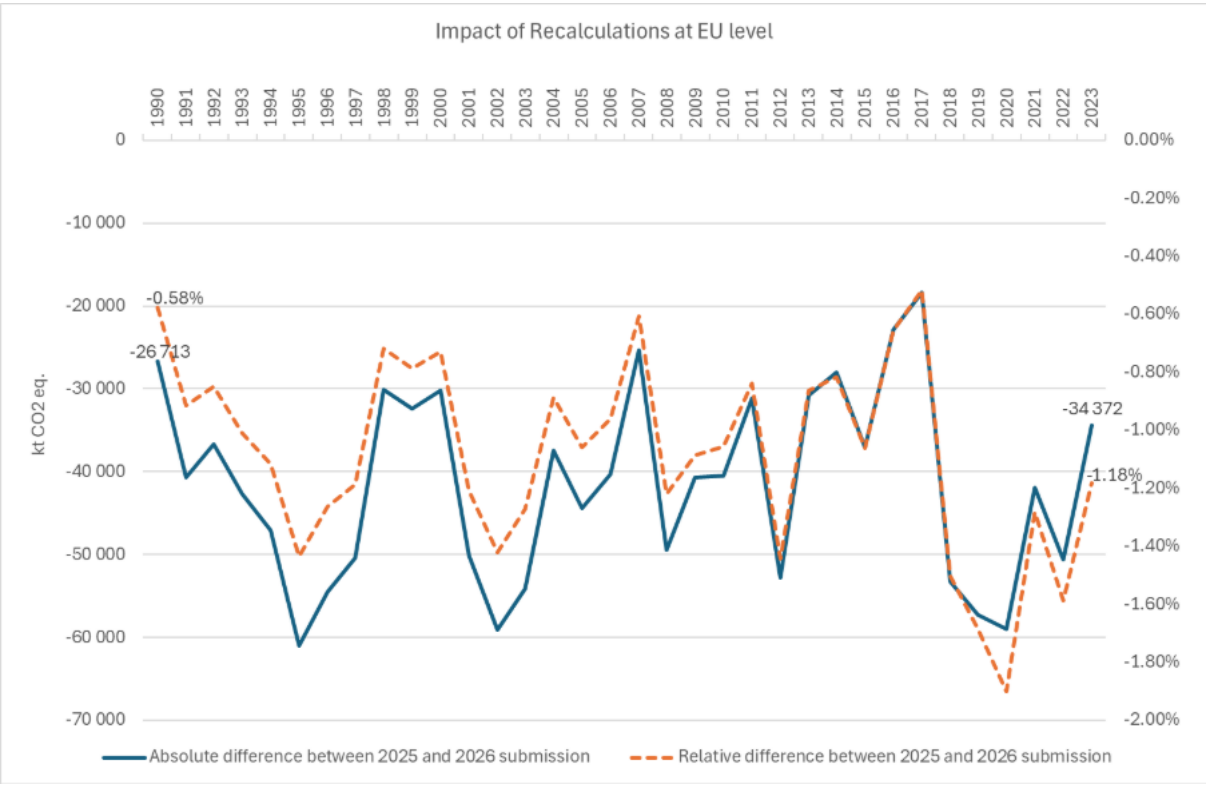
The CO_2 resulting from the atmospheric oxidation of CH_4, CO and NMVOC is referred to as indirect CO_2. According to Decision 18/CMA.1, Parties may report indirect CO_2 and national GHG emission totals shall be presented with and without indirect CO_2. These indirect CO_2 emissions are included in the general methodological approach which assumes that all the carbon in the fuel (minus the portion that remains as soot or ash) is oxidized to CO_2 whereas a fraction of this carbon is initially emitted as CH_4, CO or NMVOC. Also, according to Decision 18/CMA.1, Parties should report indirect N_2O emissions from sources other than those in the agriculture and LULUCF sectors as a memo item, and those estimates shall not be included in GHG emission totals. The EU total GHG emissions include indirect CO_2 emissions, as reported by its Member States. For more information on indirect CO_2 emissions see chapter 9.

INFORMATION ON RECALCULATIONS

According to the MPGs, the inventory for the whole time series should be estimated using the same methodologies, and the underlying activity data and emissions factors should be used in a consistent manner, ensuring that changes in emissions trends are not introduced as a result of changes in estimation methods. Thus, recalculations of past emissions data occur every year based on GHG inventory improvements by countries, which should ensure the consistency of the time series and be carried out to improve the accuracy and/or completeness of the inventory.

Figure ES.2 shows the absolute and relative difference in the 2025 and the 2026 submission for all years. Forest Land 4A had the biggest impact on these recalculations, mainly driven by new available data and/or improvements in land monitoring modeling in Sweden, Germany and France.

Figure ES. 2 Absolute and relative difference of total EU GHG emission trends 1990–2023 (with LULUCF) between the latest and the previous submission



ES-4 KEY CATEGORY ANALYSIS

A level and a trend assessment was carried out for 1990 and 2024 for emissions both excluding and including LULUCF.

The key category analysis including LULUCF identified 94 key categories for the EU in 2024 while the key category analysis excluding LULUCF resulted in 85 key categories.

ES-5 IMPROVEMENTS INTRODUCED

In 2024, the EU adapted its reporting to the first inventory under the Paris Agreement. The NID outline has been amended to be in line with the new reporting guidelines. Descriptions of categories have been aligned accordingly. Information across sectors has been streamlined to provide a harmonised approach across the whole NID. Any recommendations for improvement of earlier UNFCCC reviews have been continuously followed up and implemented.

In 2025, the transparency of the information in the EU NID has been further improved. In response to the in country review of the EU GHG inventory in February 2025, several adaptations and improvements have been implemented. The status of each UNFCCC review finding is documented in Chapter 10.4 of this report.

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1 NATIONAL CIRCUMSTANCES, INSTITUTIONAL ARRANGEMENTS AND CROSS CUTTING INFOMRATION

This report is the official inventory submission of the European Union (EU) for 2026 under the United Nations Framework Convention on Climate Change (UNFCCC) and follows the modalities, procedures and guidelines (MPGs) under the Enhanced Transparency Framework (ETF) of the Paris Agreement (Decisions 18/CMA.1 and 5/CMA.3).

The European Union (EU), as a party to the Paris Agreement and to the United Nations Framework Convention on Climate Change (UNFCCC), reports annually on greenhouse gas (GHG) inventories for the years between 1990 and the current calendar year (t) minus two (t-2), for emissions and removals within the area covered by its 27 Member States (i.e. emissions taking place within the EU territory). The EU Member States are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden. Even though not all Member States were part of the European Union in 1990, GHG emissions in the EU are time-series consistent since 1990 and account for all sources and sinks of the current 27 EU MS. For reasons of clarity, please note that in some cases the terms 'Member States' and ''EU' and 'Union' may be used.

This chapter aims to present transparent information on the process and methods of compiling the EU GHG inventory. It addresses the relevant aspects at EU level, but does not describe detailed sectoral methodologies of the Member States' GHG inventories. The EU GHG inventory is based on the GHG inventories of its Member States[7]. They are responsible for the methods, emissions, emission factors, and other activity and background data reported in their GHG inventories, and will consider national inventory priorities and any resource constraints when estimating and reporting emissions and removals according to the MPGs and the IPCC Guidelines based on the data available in the country.

As the data used in the EU inventory are the aggregation of emissions and removals of the 27 Member States inventories, the detailed sectoral methodologies used in the EU inventory are fully consistent with the methodologies reported by the Member States to both the EU and UNFCCC. As such, the complete details on the methodologies used by the Member States are available in the national inventory reports of the Member States, which are submitted to the UNFCCC and published in the UNFCCC website. To facilitate the work of the expert review teams during the annual UNFCCC review process, and as follow up to previous review recommendations, the EU submission in 2025 includes an Annex (Annex III) with a summary description of the methodologies used by each Member State for the EU key categories. The more detailed descriptions can be found in Member State's own submissions. Note that all Member States' submissions (common reporting format (CRT) tables and inventory reports), are considered to be part of the EU inventory. Several chapters in this report refer to information provided by the Member States, where additional insights can be gained. In many cases this Member State information is presented in summary overview tables.

The EU greenhouse gas inventory has been compiled under Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action [8] (hereafter referred to as the Governance Regulation). The emissions compiled in the EU GHG inventory are the sum of the respective emissions in the respective national inventories, except for the Intergovernmental Panel on Climate Change (IPCC) reference approach for CO_2 emissions from the combustion of fossil fuels, where energy statistics from Eurostat are used.

[7] The EU Greenhouse gas inventory data in this report was compiled using the September 2024 release of the 'CRT reporting tool' developed by the UNFCCC Secretariat. Because of the ongoing improvements in the ETF tool by the UNFCCC secretariat after the compilation of the EU GHG inventory, reported data may differ from actual inventory data in some cases. The EU should not be held responsible for any remaining technical issues and errors caused by the CRT electronic tool affecting the quality of the GHG inventory during the technical expert review

[8] OJ L 328, 21.12.2018, p. 1–77 .

1.1 Background information on greenhouse gas inventories and climate Change

The annual EU GHG inventory is required for two purposes.

Firstly, the EU, as the only regional economic integration organisation having joined the Paris Agreement and the UNFCCC as a Party, has to report annually on GHG inventories within the area covered by its Member States.

Secondly, under the EU Governance Regulation, the European Commission has to assess annually whether the actual and projected progress of Member States is sufficient to ensure fulfilment of the EU's commitments under the UNFCCC, and with respect to EU legislation for reduction of GHG emissions (Effort Sharing Regulation)[9]. For this purpose, the Commission has to prepare a progress evaluation report (State of the Energy Union Report), which has to be forwarded to the European Parliament and the Council. The annual EU inventory is used for the evaluation of actual progress.

Regarding the review process under the Paris Agreement and the UNFCCC, the following conclusions from the GHG lead reviewers[10] are of particular relevance to the EU.

Conclusions of the 16th meeting of GHG lead reviewers[11]*:*

Reviewing the GHG inventory of the European Union (EU): the LRs noted that the review of the EU submission is unique in that it is the direct sum of emissions and removals from the national inventories compiled by the EU member States as well as Iceland, and that individual member States as well as Iceland are also subject to an inventory review. The LRs further noted that the focus of the EU review should be on ensuring that the EU submission accurately reflects the summation of the emissions and removals of its member States as well as Iceland and that information is transparently reported in the EU NID, particularly for key categories identified at the level of the EU. Recommendations directed at specific member States as well as Iceland are beyond the scope for inclusion in the ARR of the EU. The LRs encouraged the secretariat to conduct the review of the EU submission after the submissions from individual EU member States and Iceland have been reviewed.

Conclusions of the 19th meeting of GHG lead reviewers, on the scope of and approach to the review of the EU GHG inventory[12]*:*

The LRs concluded that the conclusions from the 16th meeting of LRs on the focus of the EU review, considering elements of the conclusions from the 3rd meeting of LRs, should be supplemented with the following recommendations for ERTs:

(i) At the start of the review, the LRs should request the ERT to focus the review on the transparency of the information reported in the EU national inventory report and provide guidance thereon, particularly for key categories identified at the EU level, followed by categories for which recalculations have been performed, and categories that are the subject of recommendations in the previous review report, as well as for findings in the initial assessment and progress in the implementation of planned improvements. The LRs recalled that the EU

[9] Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (OJ L 156, 19.6.2018, p. 26–42.

[10] https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/review-process

[11] https://unfccc.int/sites/default/files/resource/04_GHG-LRs-2019-conclusions_0.pdf

[12] https://unfccc.int/sites/default/files/resource/Nineteenth%20meeting%20of%20Inventory%20Lead%20Reviewers.pdf

GHG inventory is compiled from the national GHG inventories of the EU member States, Iceland and the United Kingdom of Great Britain and Northern Ireland and that the ERT should assess whether the EU GHG inventory is compiled in accordance with the UNFCCC Annex I inventory reporting guidelines.

(ii) The LRs should ensure that recommendations in the review report are addressed to the EU, because the inventories of the member States, Iceland and the United Kingdom fall outside the scope of the EU review.

(iii) The LRs noted that the ERT may also consider information on the efforts undertaken at the EU level to address the main issues pertaining to the member States, Iceland and the United Kingdom, as reflected in previous EU review reports.

1.2 A description of the institutional arrangements

1.2.1 Institutional, legal and procedural arrangements among entities involved

In accordance with the Governance Regulation Article 37(3), a Union Inventory system is established to ensure the timeliness, transparency, accuracy, consistency, comparability and completeness of national inventories with regard the Union greenhouse gas inventory. The Commission's Staff Working Document (SWD (2013) 308 final[13]) outlines the main elements of the Union inventory system. An overview is presented in Figure 1.1.

The Directorate General Climate Action of the European Commission has overall responsibility for the inventory of the European Union (EU) while each Member State is responsible for the preparation of its own inventory which is the basic input for the inventory of the European Union. DG Climate Action is supported in the establishment of the inventory by the following main institutions: the European Environment Agency (EEA) and its European Topic Centre on Climate Change Mitigation (ETC/CM) as well as the DG Eurostat[14].

The legal basis of the compilation of the EU inventory is the Governance Regulation and Commission Implementing Regulation (EU) 2020/1208 of 7 August 2020 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council and repealing Commission Implementing Regulation (EU) No 749/2014[15] and the Commission Delegated Regulation (EU) 2020/1044 of 8 May 2020 supplementing Regulation (EU) 2018/1999 of the European Parliament and of the Council with regard to values for global warming potentials and the inventory guidelines and with regard to the Union inventory system and repealing Commission Delegated Regulation (EU) No 666/2014.

These regulations establish a mechanism for inter alia: (1) ensuring the timeliness, transparency, accuracy, consistency, comparability and completeness of reporting by the Union and its Member States to the UNFCCC Secretariat; (2) reporting and verifying information relating to commitments of the Union and its Member States pursuant to the UNFCCC and the Paris Agreement and to decisions adopted thereunder and evaluating progress towards meeting those commitments; (3) monitoring and reporting all anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol on substances that deplete the ozone layer in the Member States; (4) evaluating progress by the Member States towards meeting their obligations under the Effort Sharing Regulation.

[13] https://ec.europa.eu/clima/sites/clima/files/strategies/progress/monitoring/docs/swd_2013_308_en.pdf

[14] The Statistical Office of the European Communities (Eurostat) is a DG of the European Commission. For simplicity reasons, this institution is referred to as 'Eurostat'in this report.

[15] OJ L 278, 26.8.2020, pp. 1–132

Under the provisions of Article 26(3) of the Governance Regulation and Articles 8-18 of the Commission Implementing Regulation 2020/1208, the Member States shall determine and report to the Commission by 15 January each year (year X) inter alia:

- their anthropogenic emissions of greenhouse gases listed in Annex I of the MMR (same as in Annex A to the Kyoto Protocol) for the year X-2, in accordance with UNFCCC reporting requirements
- data in accordance with UNFCCC reporting requirements on their anthropogenic emissions of carbon monoxide (CO), sulphur dioxide (SO_2), nitrogen oxides (NO_X) and volatile organic compounds, for the year X-2
- their anthropogenic greenhouse gas emissions by sources and removals of CO_2 by sinks resulting from LULUCF, for the year X-2, in accordance with UNFCCC reporting requirements
- any changes to the information referred to in points above relating to the years between 1990 and the year three-years previous (year X – 3);
- the elements of the national inventory report necessary for the preparation of the EU greenhouse gas inventory report, such as information on the Member State's quality assurance/quality control plan, a general uncertainty evaluation, a general assessment of completeness, information on methods and emission factors used, and information on recalculations performed.

Submissions of updated or additional inventory data and complete national inventory reports by Member States shall be reported by 15 March.

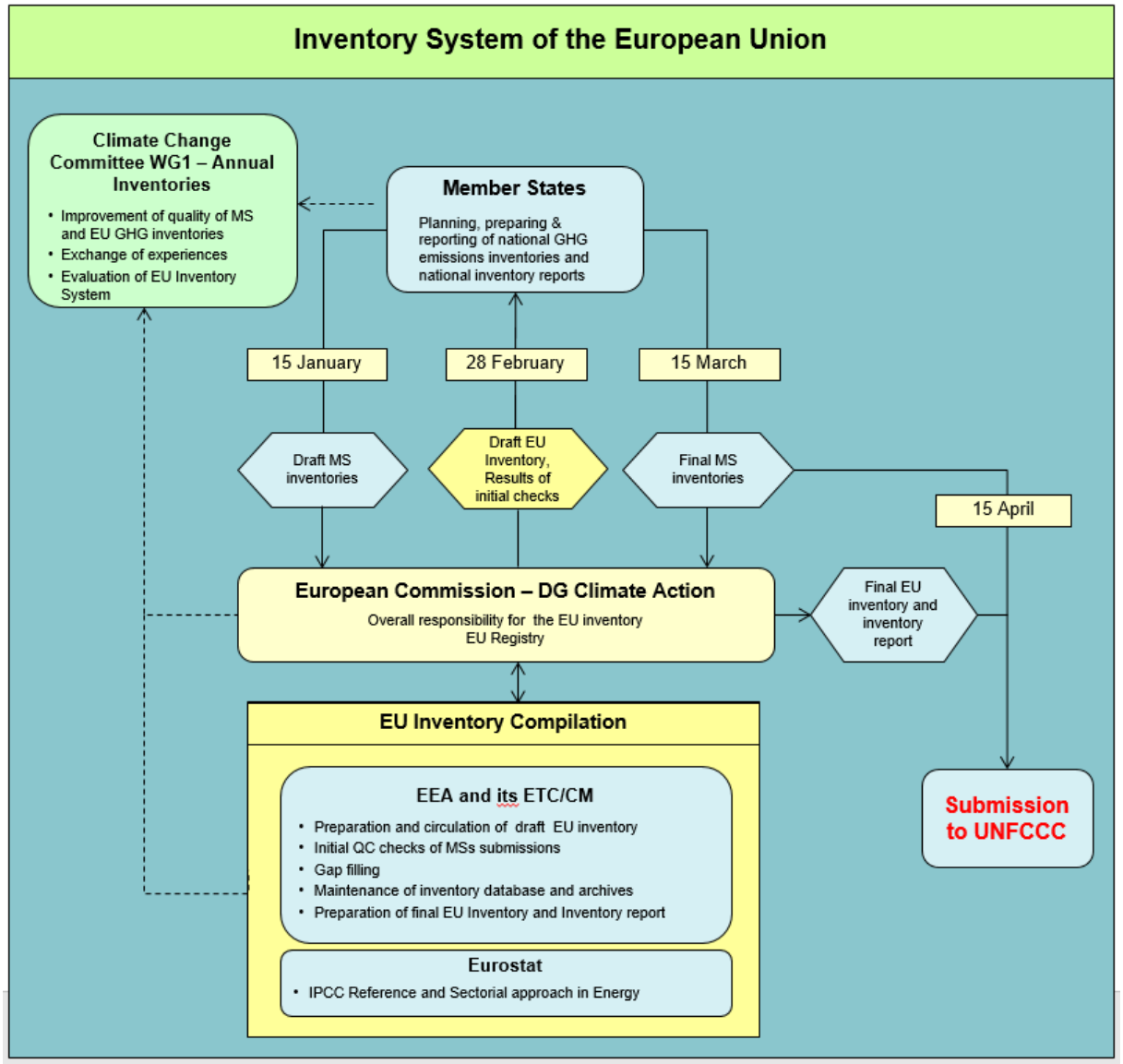
Specific requirements on structure, format, submission processes under the Governance Regulation are detailed in the Commission Implementing Regulation 2020/1208. According to the Governance Regulation and its implementing decision, the reporting requirements are exactly the same as for the UNFCCC, regarding content and format. The EU and its Member States prepare the inventory according to the relevant provisions under the UNFCCC.

In relation to the UNFCCC review of the EU GHG inventory, it is relevant to highlight that the EU GHG inventory is based on the inventories of its MS. They are responsible for the methods, emission factors and emissions used, and for the implementation of the UNFCCC reporting guidelines and the 2006 IPCC Guidelines, taking into account inventory priorities and resource constraints.

The unique nature of the EU GHG inventory has been recognized by the GHG lead reviewers and is reflected in their conclusions (16th and 19th meetings, respectively).

Table 1.1 shows the main institutions involved in the compilation and submission of the EU inventory.

Figure 1.1 Inventory system of the European Union



1.2.1.1 The Member States

All EU Member States are Parties to UNFCCC and the Paris Agreement and have to prepare national GHG inventories in accordance with the MPGs and submit those inventories to the UNFCCC secretariat by 15 April.

In this context, all Member States are required to establish, operate and seek to continuously improve national inventory systems in accordance to Article 37(1) of the Governance Regulation. Detailed information on institutional arrangements/national systems of each Member State is included in the respective national inventory reports.

The European Union's inventory is based on the inventories reported to the EU by Member States. The total estimate of the EU greenhouse gas emissions should accurately reflect the sum of Member States' national greenhouse gas inventories. Member States are responsible for choosing activity data, emission factors and other parameters used for their national inventories as well as the correct application of methodologies provided in the 2006 IPCC Guidelines. Member States are also responsible for establishing quality assurance/quality control (QA/QC) programmes for their inventories. The QA/QC activities of each Member State are described in the respective national inventory reports.

For the EU to be able to provide the GHG inventory to the UNFCCC on time, all Member States are required to report individual GHG inventories prepared in accordance with the MPGs to the European Commission and to the European Environment Agency (EEA) by 15 January every year.

After the submission of national GHG inventories and inventory reports, QA/QC checks are performed by the EU team. The outcome of these 'initial checks', together with the draft EU inventory report is sent to Member States for checking, reviewing and providing of comments. The Member States take part in the review and comment phase of the draft EU inventory report. The purpose of circulating the draft EU inventory report is to improve the quality of the EU inventory. The Member States check their national data and information used in the EU inventory report, answer to the initial checks findings and send updates, as relevant by the 15th March. In addition, they can comment on the general aspects of the EU inventory report by the same deadline.

During the UNFCCC review of the Union inventory, Member States are also required to provide answers related to the issues under their responsibility as soon as possible. In these cases, the issues are forwarded directly as requested by the EU team.

The inventory authorities of the Member States take part in the Working Group 1 'Annual Inventories' (WG1) of the Climate Change Committee established under the Governance Regulation. The purpose of the Climate Change Committee is to assist the European Commission in its tasks under the Governance Regulation. Information on the WG1 tasks and responsibilities can be found in the next paragraph, but the main task of the WG1 members is to ensure the coordination of inventory activities between the Union system and the national inventory systems.

Table 1.1 shows the main institutions and persons involved in the compilation and submission of the EU inventory.

Table 1.1 List of institutions and experts responsible for the compilation of Member States' inventories and for the preparation of the EU inventory

Member State/EU institution	Contact address
Austria	Michael Anderl Environment Agency Austria
Belgium	Olivier BIERNAUX Belgian interregional Environment Agency (CELINE-IRCEL) Miet D'HEER FIemish Environment Agency (VMM) Régis DESCHAMPS Walloon Agency for Air and Climate (AWAC) Marion LEROY Brussels Environment
Bulgaria	Detelina Petrova Executive Environment Agency
Croatia	Vlatka Palčić Ministry of Environmental Protection and Green Transition Tatjana Obučina Ministry of Environmental Protection and Green Transition Iva Švedek Ekonerg - Energy and Environmental Protection Institute Iva Prgomet Ernst Ministry of Environmental Protection and Green Transition
Cyprus	Theodoulos Mesimeris Department of Environment
Czech Republic	Ing. Eva Krtkova Czech Hydrometeorological Institute (CHMI)
Denmark	Ole-Kenneth Nielsen

Member State/EU institution	Contact address
	Aarhus University
Estonia	Eve Suursild Ministry of Climate Adviser Climate Department Cris-Tiina Pärn Adviser, Estonian Environmental Research Centre
Finland	Pia Forsell Statistics Finland Sini Niinistö Statistics Finland
France	Pascale Vizy Ministère de l'Environnement, de l'Energie et de la Mer (MEEM) Etienne Mathias Centre Interprofessionel Technique d'Etudes de la Pollution Atmosphérique (CITEPA)
Germany	Dirk Günther Federal Environmental Agency
Greece	Mr. Kyriakos Psychas Ministry of Environment and Energy
Hungary	Mr. Gábor KIS-KOVÁCS Hungarian Meteorological Service
Ireland	Paul Duffy Environmental Protection Agency
Italy	M. Contaldi, R. de Lauretis, D. Romano National Environment Protection Agency (ANPA)
Latvia	Agita Gancone Ministry of Climate and Energy
Lithuania	Ms. Jolanta Merkeliene Climate Change Policy Division of the Ministry of Environment Lithuanian Ministry of Environment
Luxembourg	Eric De Brabanter Département de l'Environnement Ministère du Développement durable et des Infrastructures Dr. Marc Schuman Administration de l'Environnement
Malta	Dr Emma Cassar Taliana Climate Action Authority – Data and Reporting
Netherlands	Margreet van Zanten National Institute for Public Health and the Environment
Poland	Anna Olecka Jacek Skoskiewicz National Centre for Emissions Management Institute of Environmental Protection - National Research Institute
Portugal	Ana Paula Rodrigues Agência Portuguesa do Ambiente, Departamento de Alterações Climáticas (DCLIMA)
Romania	Sorin Deaconu National Agency for Environment and Protected Areas
Slovakia	Janka Szemesova Department of Emissions and Biofuels, Slovak Hydrometeorological Institute
Slovenia	Tajda Mekinda Majaron Environmental Agency of the Republic of Slovenia
Spain	Maj Britt Larka Abellán

Member State/EU institution	Contact address
	Dirección General de Calidad y Evaluación Ambiental y Medio Natural Ministerio de Agricultura, Alimentación y Medio Ambiente
Sweden	Anne Wisten The Ministry of the Environment Frida Löfström The Swedish Environmental Protection Agency
European Commission	Roxanne Lake European Commission, DG Climate Action
European Environment Agency (EEA)	Ricardo Fernandez, Claire Qoul European Environment Agency
European Topic Centre on Climate Change (ETC/CM)	Nicole Mandl, Michaela Stiefmann, Elisabeth Rigler European Topic Centre on Climate Change Mitigationand Energy, Umweltbundesamt
Eurostat	Michael Goll Statistical Office of the European Communities (Eurostat)

1.2.1.2 The European Commission, Directorate-General Climate Action

The European Commission's DG Climate Action in consultation with the Member States has the overall responsibility for the EU inventory. Member States are required to submit their national inventories and inventory reports under the Governance Regulation to the European Commission, DG Climate Action; and the European Commission, DG Climate Action itself submits the inventory and inventory report of the EU to the UNFCCC Secretariat, on behalf of the European Union. In the actual compilation of the EU inventory and inventory report, the European Commission, DG Climate Action, is assisted by the EEA including the EEA's ETC/CM and by Eurostat.

The consultation between the DG Climate Action and the Member States takes place in the Climate Change Committee established under Article 44(1)(a) of the Governance Regulation. The Committee is composed of the representatives of the Member States and chaired by the representative of the DG Climate Action. In order to facilitate decision-making in the Committee, working groups have been established, one of which is Working Group 1 on 'Annual inventories'. The objectives and tasks of Working Group 1 under the Climate Change Committee include:

- the promotion of the timely delivery of national annual GHG inventories as required under the Governance Regulation;
- the improvement of the quality of GHG inventories on all relevant aspects (transparency, consistency, comparability, completeness, accuracy and use of good practices);
- the exchange of practical experience on inventory preparation, on all quality aspects and on the use of national methodologies for GHG estimation;
- the evaluation of the current organisational aspects of the preparation process of the EU inventory and the preparation of proposals for improvements where needed.

1.2.1.3 The European Environment Agency

Under Article 42 of the Governance Regulation the role of the European Environment Agency (EEA) is defined as providing assistance to the Commission in its work. In relation to the inventories, this assistance includes the following:

(a) Compilation of the Union greenhouse gas inventory and preparation of the Union greenhouse gas inventory report;
(b) Performance of the quality assurance and quality control procedures for the preparation of the Union greenhouse gas inventory;
(c) Preparation of estimates for data not reported in the national greenhouse gas inventories;
(d) Conduction of the reviews of MS inventories.

The tasks of the EEA are facilitated by the European environmental information and observation network (Eionet), which consists of the EEA as central node (supported by European topic centres) and national institutions in the EEA member countries[16] (see http://eionet.eea.europa.eu). Member States report the information reported pursuant to Article 26(3) of the Governance Regulation to the Commission with a copy to the European Environment Agency, and for this reason they are making use of the EEA's ReportNet's Central Data Repository under the Eionet ('CDR', see http://cdr.eionet.europa.eu/).

Apart from the data capturing processes, and as part of its responsibility to compile the GHG inventory and prepare the Union GHG inventory report, the EEA is also responsible for the implementation of the QA/QC Programme of the EU, by performing inter alia a number of QA/QC checks focused on ensuring the completeness and consistency of the Union and Member States inventories. Since 2023 EEA is also responsible for initial checks and compilation of NID chapters for the sectors agriculture and LULUCF (supported by ETC/CM – see below); in previous years these tasks were carried out by the Directorate General Joint Research Centre of the European Commission.

Finally, in the end of the process the EEA publishes the GHG inventory dataset and the EU National Inventory Report on its website. To facilitate the access of the GHG information to the general public, the EEA data viewer is also provided.

The EEA is further assisted by its European Topic Centre on Climate Change Mitigation (ETC/CM), which is an international consortium working with the EEA under a framework partnership agreement. The activities of the EEA's ETC/CM are further deployed in the next paragraph.

1.2.1.4 The European Topic Centre on Climate Change Mitigation

The EEA's European Topic Centre on Climate Change Mitigation (ETC/CM) was established by a contract between the lead organisation Vito (vision on technology) in Belgium and EEA for the years 2022-2026, continuing on part of the work of the previous ETC/CME on Climate change Mitigation and Energy, which ended in 2021.

The EEA's ETC/CM involves 15 organisations and institutions in ten European countries. The technical annex of the work plan for the EEA's ETC/CM and a yearly action plan defines the specific tasks of the EEA's ETC/CM partner organisations with regard to the preparation of the EU inventory and inventory report. Environment Agency Austria is the task leader for the compilation of the EU annual inventory and inventory report in the EEA's ETC/CM. The specific tasks undertaken by EEA's ETC/CM in this task include:

- Implementation of the quality assurance and quality control (QA/QC) procedures of the EU GHG inventory national system for the compilation and submission of the Union GHG inventory to the UNFCCC. Initial QA/QC checks of Member States' submissions are performed in cooperation with Eurostat and documented in the EEA review tool;
- Performing the first step of the annual Effort Sharing Regulation (ESR) review and identifying significant issues according to Art. 30 and Annex XXII of the Commission Implementing Regulation 2020/1208;
- Consultation with Member States in order to clarify data and other information provided;
- Preparation of the draft EU inventory and inventory report by 28 February based on Member States' submissions;
- Preparation of the final EU inventory and inventory report by 15 April (to be submitted by the Commission to the UNFCCC Secretariat).

The European Environment Agency provides database systems and queries on EEA CWS environment developed to ensure the EU submission is fully consistent with member state's (MS) submissions. From

[16] EEA member countries include the EU Member States, Iceland, Liechtenstein, Norway, Switzerland and Turkey.

CWS the aggregated EU inventory is transferred into the CRT reporter software for preparing the official EU GHG submission.

1.2.1.5 Eurostat

Eurostat collects national energy statistics reported under the EU Energy Statistics Regulation on an annual basis. These data are used for the estimation of the IPCC Reference Approach and the Sectoral Approach. The EEA compares the results of the two approaches with MS CRT submissions. These comparisons are normally sent to MS during the consultation on the Draft EU GHG inventory by 28 February. The Energy Statistics Regulation (Regulation EC/1099/2008) as amended by Commission Regulation (EU) No 147/2013 of 13 February 2013 is the basis for MS reporting of energy data to Eurostat. Article 6(2) of the Energy statistics regulation stipulates: 'Every reasonable effort shall be undertaken to ensure coherence between energy data declared in the energy statistics regulation, and data declared in accordance with Commission Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol'. The consistency of energy balances and CRT activity data is essential for good quality GHG estimates in the energy sector, and therefore it is at the core of the QA/QC activities at EU level.

1.2.2 Inventory preparation process

The annual process of compilation of the EU inventory is summarised in Table 1.2. The Member States submit their annual GHG inventory by 15 January each year to the European Commission's DG Climate Action using the EEA's Reportnet Central Data Repository. Then, EEA's ETC/CM performs initial checks of the submitted data up to 28 February. The ETC/CM transfers the nationally submitted data from the JSON-files into the EEA database. The data are aggregated and transferred into the CRT reporter software for preparing the official EU GHG inventory submission. Any information reported by MS in categories that do not have standardized UIDs or in categories for which several country settings are possible have to be included in the CRT Reporter manually.

Table 1.2 Annual process of submission and review of Member States inventories and compilation of the EU inventory[17]

Element	Who	When	What
1. Submission of annual inventories (complete CRT and elements of the national inventory report) by Member States	Member States	15 January	Elements listed in Article 26(3) of the Governance Regulation
2. 'Initial checks' of Member States submissions	Commission (incl. Eurostat), assisted by the EEA	For the Member State submission from 15 January at the latest until 28 February	Checks to verify the transparency, accuracy, consistency, completeness and comparability of Member States' inventories (by EEA). Comparison of energy data provided by Member States in the CRT with Eurostat energy data (sectoral and reference approach) by Eurostat and EEA. Check of Member States' agriculture inventories by EEA (in consultation with Member States). Check of Member States' land use, land-use change and forestry (LULUCF) inventories by EEA (in consultation with EEA and Member States).The findings of the initial checks will be documented.
3. Compilation of draft Union inventory and inventory report (elements of the Union inventory report)	Commission (incl. Eurostat), assisted by the EEA	up to 28 February	Draft Union inventory and inventory report (compilation of Member State information), based on Member State inventories and additional information

[17] At COP27 in Sharm COP decision (4/CP.27 Revision of the modalities and procedures for international assessment and review) clarifying that the date was moved to not later than 31 December 2024.

Element	Who	When	What
			where needed (as submitted on 15 January).
4. Circulation of 'initial check' findings including notification of potential gap-filling	Commission (DG Climate Action) assisted by the EEA	28 February	Circulation of 'initial check' findings including notification of potential gap-filling and making available the findings
5. Circulation of draft **Union** inventory and inventory report	Commission (DG Climate Action) assisted by the EEA	28 February	Circulation of the draft Union inventory on 28 February to Member States. Member States check data.
6. Submission of updated or additional inventory data and complete national inventory reports by Member States	Member States	15 March	Updated or additional inventory data submitted by Member States (to remove inconsistencies or fill gaps) and complete national inventory reports.
7. Member State commenting on the draft Union inventory	Member States	15 March	If necessary, provide corrected data and comments to the draft Union inventory
8. Member State responses to the 'initial checks'	Member States	15 March	Member States respond to 'initial checks' if applicable.
9. Circulation of follow-up initial check findings	Commission assisted by EEA 31 March	Commission assisted by EEA 31 March	Circulation of follow-up initial check findings and making available the findings
10. Estimates for data missing from a national inventory	Commission (DG Climate Action) assisted by EEA	31 March	The Commission prepares estimates for missing data by 31 March of the reporting year, following consultation with the Member State concerned, and communicate these to the Member States.
11. Comments from Member States regarding the Commission estimates for missing data	Member States	7 April	Member States provide comments on the Commission estimates for missing data, for consideration by the Commission.
12. Member States responses to follow-up 'initial checks'	Member States	7 April	Member States provide responses to follow up of 'initial checks'.
13. Member States submissions to the UNFCCC	Member States	15 April	Submissions to the UNFCCC (with a copy to EEA)
14. Final annual Union inventory (incl. EU inventory report)	Commission (DG Climate Action) assisted by EEA	15 April	Submission to UNFCCC of the final annual Union inventory.
15. Submission of any other resubmission after the initial check phase	Member States	When additional resubmissions occur	Member States provide to the Commission any other resubmission (CRT or national inventory report) which they provide to the UNFCCC secretariat after

By 28 February, the draft EU GHG inventory and inventory report are circulated to the Member States for review and comment. The Member States check their national data and information used in the EU inventory report and send updates, if necessary, and review the EU inventory report by 15 March. This procedure should assure the timely submission of the EU GHG inventory and inventory report to the UNFCCC Secretariat, and it should guarantee that the EU submission to the UNFCCC Secretariat is consistent with Member States' UNFCCC submissions.

The final EU GHG inventory and inventory report is prepared by the EEA's ETC/CM by 15 April for submission to the UNFCCC Secretariat. After the submission to UNFCCC the inventory and the inventory report are published on the EEA website (http://www.eea.europa.eu) and the data are made available through the EEA data service (http://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-9) and the EEA GHG data viewer (http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer.)

The EU inventory is compiled in accordance with Decision 18/CMA.1 Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement, Annex Chapter II 'UNFCCC guidelines for the preparation of national communications by parties included in Annex 1 to the Convention, Part 1: UNFCCC reporting guidelines on annual inventories' (FCCC/CP/2013/10/Add.3),and Decision 18/CMA.1 and 5/CMA.3. The *2006 IPCC*

guidelines for national greenhouse gas inventories have been applied. The 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories has been used on a voluntary basis by Member States, where appropriate and feasible. Finally, for the compilation of the EU GHG inventory, the Governance Regulation and its implementing legislation is applicable.

The EU GHG inventory is compiled on the basis of the inventories of the 27 Member States. The emissions of each source category are the sum of the emissions of the respective source and sink categories of the Member States.

The reference approach is calculated for the EU on the basis of Eurostat energy data (see Section 3.6) and the key category analysis (Section 1.5) is separately performed at EU level[18]. Note that in 2025 the reference approach cannot be calculated due to persistent problems with the UNFCCC ETF tool. However, the comparisons between Member States' energy data reported in GHG inventories and Member States' energy data reported to Eurostat have been made as part of the initial QA/QC checks and would be available to the technical expert review team. Since Member States use different national methodologies, national activity data or country-specific emission factors in accordance with IPCC and the MPGs, these methodologies are reflected in the EU GHG inventory data. The EU believes, and the review process has confirmed, that it is consistent with Decision 18.CMA.1 of the Enhanced Transparency Framework under the Paris Agreement to use different methodologies for the same category across the EU as this reduces the uncertainty of emissions and removals, provided that the methodologies used are consistent with the 2006 IPCC Guidelines and its 2019 refinement..

In general, no separate methodological information is provided at EU level except summaries of methodologies used by Member States. Annex III includes a summary description of the methodologies used by each Member State for the EU key categories. The more detailed descriptions can be found in Member State's own submissions, which are considered to be part of the EU inventory.

1.2.3 Internal consistency of the EU CRT tables

In principle, every single EU value is aggregated from the respective value of the EU Member States. However, sometimes there are consistency problems when compiling the EU CRT tables (i.e. the sum of sub-categories is not equal to the category total) in those categories where Member States have difficulties to allocate emissions to the sub-categories. Member States use notation keys like IE or C if they cannot provide an emission estimate for a certain sub-category. At Member State level, the use of the notation keys makes transparent the reason for not providing emission estimates. However, at EU-level, the sub-category emission value is the sum of Member States emission values and the information of the notation keys used by some Member States is lost in the EU CRT submission. JSONTo make this more transparent, the CRF tables include the values or notation keys reported by the MS as comments. To address this problem, some source categories have been reallocated for the EU CRT tables.

A second problem is the reporting of Member States in "grey cells" or in categories that do not have standardized UIDs which then need to be included in the CRT reporter manually.

As the EU is currently not able to import into the ETF tool the JSON file (that contains the aggregated data of all MS' submissions) no manual changes have been performed in this submission. The EU CRT tables submitted as part of its 15 April inventory under the Convention are based on the aggregation of standard variables reported in the inventories of its Member States. Implied emission factors, various calculated values and Country-specific variables are not included in the EU CRT tables due to outstanding issues with the ETF tool. The UNFCCC secretariat is improving the ETF tool to allow this specific, and crucial issue to the EU, to be resolved so that the EU can re-submit its CRT tables including all values. It is important to highlight that no emissions or removals are missing from the CRT tables,

[1818] However, the choice of the emission calculation methodology is made at Member State level and is based on the key category analysis of each individual Member State.

but that the level of disaggregation has been affected. The EU has all the information reported by Member States in the GHG inventories submitted to the EU, which has been used for the production of the EU's NID. All emissions and removals are also available from the data viewers and databases published on the EEA website.

1.2.3.1 Overview of Member States submissions

Table 1.3 summarises timeliness and completeness of the EU Member States submissions in 2026 that were taken into account for the compilation EU GHG inventory.

Table 1.3 Date, mode and content of submission of EU Member States in 2026 that were taken into account for the compilation of EU GHG inventory

MS	Date	Submission mode	JSON	NID
AUT	12 Mar 2026	CDR	AUT-CRT-2026-V0-3-DataEntry-20260310-145337	x
BEL	13 Mar 2026	CDR	BEL-CRT-2026-V0-5-DataEntry-20260311-132617	x
BGR	15 Mar 2026	CDR	BGR-CRT-2026-V0-1-DataEntry-20260311-141503	x
CYP	17 Mar 2026	CDR	CYP-CRT-2026-V0-2-DataEntry-20260317-094212	x
CZE	13 Mar 2026	CDR	CZE-CRT-2026-V0-1-DataEntry-20260313-103125	x
DEU	13 Mar 2026	CDR	DEU-CRT-2026-V0-1-DataEntry-20260308-073402	x
DNK	15 Mar 2026	CDR	DNK-CRT-2026-V0-1-DataEntry-20260115-102514	x
ESP	13 Mar 2026	CDR	ESP-CRT-2026-V0-3-DataEntry-20260312-083409	x
EST	15 Mar 2026	CDR	EST-CRT-2026-V0-2-DataEntry-20260313-193255	x
FIN	13 Mar 2026	CDR	FIN-CRT-2026-V0-6-DataEntry-20260306-125954	x
FRA	13 Mar 2026	CDR	FRA-CRT-2026-V0-1-DataEntry-20260313-094846	x
GRC	13 Mar 2026	CDR	GRC-CRT-2026-V0-1-DataEntry-20260311-140026	x
HRV	16 Mar 2026	CDR	HRV-CRT-2026-V0-1-DataEntry-20260313-101726	x
HUN	16 Mar 2026	CDR	HUN-CRT-2026-V0-1-DataEntry-20260316-141657	
IRL	13 Mar 2026	CDR	IRL-CRT-2026-V0-4-DataEntry-20260225-091111	x
ITA	12 Mar 2026	CDR	ITA-CRT-2026-V0-1-DataEntry-20260310-163011	x
LTU	15 Mar 2026	CDR	LTU-CRT-2026-V0-2-DataEntry-20260315-090833	x
LUX	12 Mar 2026	CDR	LUX-CRT-2026-V0-1-DataEntry-20260310-093243	x
LVA	11 Mar 2026	CDR	LVA-CRT-2026-V0-3-DataEntry-20260311-090826	x
MLT	13 Mar 2026	CDR	CAA70265_MLT-CRT-2026-V0-3-DataEntry-20260312-133253	x
NLD	12 Mar 2026	CDR	NLD-CRT-2026-V0-6-DataEntry-20260311-143519	x
POL	13 Mar 2026	CDR	POL-CRT-2026-V0-2-DataEntry-20260313-082146	x
PRT	15 Mar 2026	CDR	PRT-CRT-2026-V0-2-DataEntry-20260315-101734	x
ROU	13 Mar 2026	CDR	ROU-CRT-2026-V0-4-DataEntry-20260216-153956	x
SVK	13 Mar 2026	CDR	SVK-CRT-V1-1-15-03-2026	x
SVN	12 Mar 2026	CDR	SVN-CRT-2026-V0-3-DataEntry-20260311-195950	x
SWE	15 Mar 2026	CDR	SWE-CRT-2026-V0-2-DataEntry-20260121-150839	x

1.2.3.2 Overview of personnel involved

Table 1.4 gives an overview on people involved in the compilation of the EU GHG inventory submission in 2026 and their individual responsibilities in this process.

Table 1.4 Responsibility list for the compilation of the EU GHG inventory submission in 2026

	Name	EU GHG inventory/inventory report compilation				Initial Checks			
		Overall responsibility	Project manager	Sector experts	Quality expert	Overall responsibility	QA/QC coordinator	Sector experts/ expert	Quality expert
Commission	Roxanne Lake (DG Clima)	X			Executive summary, introduction				
	HLAVACEK Jan (DG Clima)	X			Executive summary, introduction				
	Michael Goll (Eurostat)			1A Reference approach				1A Reference approach	
EEA	Ricardo Fernandez (EEA)	X			executive summary, chapter 1 and 2, chapter 10	X			
	Claire Qoul (EEA)	X			executive summary, chapter 1 and 2, chapter 10	X			
	Peter Iversen (EEA)			sector 4				sector 4	
	Raul Abad-Vinas (EEA)			sector 4				sector 4	
	Lucia Perugini (EEA)				sector 4				sector 4
	Herdis Gudbrandsdottir (EEA)			Data checks					
	Gorka Mendiguren (EEA)			sector plots				sector plots	
	Ondrej Pastierik (EEA)			sector 3				sector 3	
	Katarzyna Kowalczewska (EEA)			sector 3				sector 3	
ETC/CM	Michaela Stiefmann (ETC/CM; UBA-V)		Data manager X	uncertainties	executive summary, chapter 1 and 2,		X		
	Günther Schmidt (ETC/CM; UBA-V)		Data manager						
	Nicole Mandl (ETC/CM; UBA-V)		X	Executive summary, chapter 1 and 2			X	cross-cutting issues	cross-cutting issues
	Bernd Gugele (ETC/CM; UBA-V)			1A reference approach				1A reference approach	

Name	EU GHG inventory/inventory report compilation				Initial Checks			
	Overall responsibility	Project manager	Sector experts	Quality expert	Overall responsibility	QA/QC coordinator	Sector experts/ expert	Quality expert
Bradley Matthews (ETC/CM; UBA-V)				uncertainties				
Manuela Wieser (ETC/CM; UBA-V)				sector 2 - F-gases only				sector 2 - F-gases only
Maria Purzner (ETC/CM; UBA-V)				sector 2 - F-gases only				sector 2 - F-gases only
Oscar Redeyoff (ETC/CM; UBA-V)		Support				support		
Marion Pinterits (ETC/CM; Klarfakt)		Support	1B, 1C	reference approach			1B, 1C	reference approach
Elisabeth Kampel (ETC/CM, Klarfakt)		Support	chapter 10					
Barbora Koci (ETC/CM; CHMI)			1A4, 1A5				1A4, 1A5	
Jitka Slamova (ETC/CM; CHMI)			1A2				1A2	
SAARIKIVI RISTO JUHANA (ETC/CM; CHMI)				sector 5				sector 5
Monika Filipenska (ETC/CM;CHMI)				1A1				1A1
Céline GUEGUEN (ETC/CM; T4L)			sector 5				sector 5	
Grégoire Bongrand (ETC/CM; CITEPA)			EU ETS, 2C				EU ETS, 2C	
Julien Vincent (ETC/CM; CITEPA)			1A1, 2D, 2G3-2G4, 2H	1A2, 1A4, 1A5; 1B, 1C			1A1, 2D, 2G3-2G4, 2H	1A2, 1A4, 1A5; 1B, 1C
Etienne MATHIAS (ETC/CM; CITEPA)				sector 3				sector 3
Anais Durand (ETC/CM; CITEPA)			sector 3				sector 3	
Athina Grigoriadou (ETC/CM; Emisia)			1A3 + bunkers, comparison with Eurocontrol				1A3 + bunkers	
Giannis Papadimitriou (ETC/CM; Emisia)				1A3 + bunkers, comparison with Eurocontrol				1A3 + bunkers

Name	EU GHG inventory/inventory report compilation				Initial Checks			
	Overall responsibility	Project manager	Sector experts	Quality expert	Overall responsibility	QA/QC coordinator	Sector experts/ expert	Quality expert
Barbara Gschrey (ETC/CM; Oeko Recherche)			F-gases, 2B9 2E, 2F, 2G1-2				F-gases, 2B9 2E, 2F, 2G1-2	
David Behringer (ETC/CM; Oeko Recherche)			F-gases, 2B9 2E, 2F, 2G1-2				F-gases, 2B9 2E, 2F, 2G1-2	
Lorenz Moosmann (ETC/CM; Oeko)			sectors 2A, 2B				2A, 2B	
Lukas Emele (ETC/CM; Oeko)			sectors 2A, 2B				2A, 2B	
Ils Moorkens (ETC/CM; VITO)				sector 2 (excl. F-gases)				sector 2 (excl. F-gases)

1.2.4 Documentation and archiving

The documentation consists of quality management documentation in forms, checklists, inventory reports and correspondence. Archiving includes archiving of inventory documents and QM documents; a systematic archiving procedure is a prerequisite for a transparent inventory system.

All the material used for the compilation of the EU GHG inventory including inventory documents and QM documents are posted in a separate folder at the Environment Agency Austria, which is not publicly accessible:

There are four sub-directories under this directory:

1. \Inventory
2. \Archive
3. \Quality manual
4. \General

The Member States submissions and all correspondence are stored in the sub-directory\Archive. The central tool for documenting all the material received from MS (including correspondence) is the MS archive database which includes references, short characterisations and links to e-mails for all MS submissions. The MS archive database can be searched for documents (CRT, JSON, NID, etc.) or for mails. Each submission is numbered consecutively.

Documentation related to the compilation of the EU inventory, including MS submissions, database query files and quality check files are stored on Microsoft SharePoint locations. Correspondence related to the quality checks is kept on the EEA Emission Review Tool (EMRT; https://emrt-esd.eionet.europa.eu/), where the communication takes place.

1.2.5 Processes for official consideration and approval of inventory

The report is prepared and approved by EEA. The official submission is done by DG CLIMA of the European Commission on behalf of the EU using the final EEA report.

1.3 Brief general description of methodologies and data sources used

As mentioned above, the EU GHG inventory is based on the inventories of its MS. They are responsible for the methods, emission factors and emissions used, and for the implementation of the reporting guidelines (MPGs) and the 2006 IPCC Guidelines, taking into account inventory priorities and resource constraints.

Member States use different national methodologies, national activity data or country-specific emission factors in accordance with the IPCC and the MPGs, and these are reflected in the EU GHG inventory. The EU believes, and the review process has confirmed, that it is consistent with Decision 18.CMA.1 of the Enhanced Transparency Framework under the Paris Agreement to use different methodologies for the same category across the EU as this reduces the uncertainty of emissions and removals, provided that the methodologies used are consistent with the 2006 IPCC Guidelines and its 2019 refinement.

In addition, according to the MPGs (Decision 18.CMA.1), each Party shall use methods from the 2006 IPCC guidelines and any subsequent version or refinement of the IPCC guidelines agreed upon by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA). In

Glasgow (Decision 5/CMA.3), Parties agreed to use the 2019 refinement on a voluntary basis. In addition, the MPGs say that each Party should make every effort to use a recommended method (tier level) for key categories in accordance with those IPCC guidelines.

The rationale for the methods used by Member States for EU key categories is consistent with the methodological choice and the Decision trees from the 2006 IPCC Guidelines and/or its 2019 refinement. Higher tier methods should be used for key categories, but the choice also needs to consider both inventory priorities and resources. This also implies that, even though Member States should make every effort to use a recommended method, tier 1 methods can still be used for key categories depending on national circumstances and prioritization, as well as on the availability of the activity data and other parameters required to perform the estimations.

The use of higher tier methods has increased over time in the EU inventory and remains a key element in the improvement of inventory quality, particularly its accuracy. Table 1.5 gives an overview on the share of emissions for which higher tiers are used in the EU for all key categories for which this estimation was possible.

Table 1.5 Share of higher tier methodologies used on the total of each EU key categories (excluding LULUCF)

Source category (gas)	**share of higher Tier**
1.A.1.a Public electricity and heat production: Gaseous Fuels (CO_2)	99.0%
1.A.1.a Public electricity and heat production: Liquid Fuels (CO_2)	95.4%
1.A.1.a Public electricity and heat production: Other Fuels (CO_2)	95.6%
1.A.1.a Public electricity and heat production: Peat (CO_2)	99.3%
1.A.1.a Public electricity and heat production: Solid Fuels (CO_2)	96.4%
1.A.1.b Petroleum refining: Gaseous Fuels (CO_2)	98.5%
1.A.1.b Petroleum refining: Liquid Fuels (CO_2)	97.5%
1.A.1.c Manufacture of solid fuels and other energy industries: Gaseous Fuels (CO_2)	95.6%
1.A.1.c Manufacture of solid fuels and other energy industries: Solid Fuels (CO_2)	99.83 %
1.A.2.a Iron and steel: Gaseous Fuels (CO_2)	99.15 %
1.A.2.a Iron and steel: Liquid Fuels (CO_2)	99.95 %
1.A.2.a Iron and steel: Solid Fuels (CO_2)	95.31 %
1.A.2.b Non-ferrous metals: Gaseous Fuels (CO_2)	99.66 %
1.A.2.c Chemicals: Gaseous Fuels (CO_2)	85.10 %
1.A.2.c Chemicals: Liquid Fuels (CO_2)	99.89 %
1.A.2.c Chemicals: Solid Fuels (CO_2)	99.10 %
1.A.2.d Pulp, paper and print: Gaseous Fuels (CO_2)	90.74 %
1.A.2.d Pulp, paper and print: Liquid Fuels (CO_2)	94.51 %
1.A.2.d Pulp, paper and print: Solid Fuels (CO_2)	97.22 %
1.A.2.e Food processing, beverages and tobacco: Gaseous Fuels (CO_2)	80.89 %
1.A.2.e Food processing, beverages and tobacco: Liquid Fuels (CO_2)	99.21 %
1.A.2.e Food processing, beverages and tobacco: Solid Fuels (CO_2)	98.83 %
1.A.2.f Non-metallic minerals: Gaseous Fuels (CO_2)	96.89 %
1.A.2.f Non-metallic minerals: Liquid Fuels (CO_2)	66.43 %
1.A.2.f Non-metallic minerals: Other Fuels (CO_2)	96.44 %
1.A.2.f Non-metallic minerals: Solid Fuels (CO_2)	95.3 %
1.A.2.g Other: Gaseous Fuels (CO_2)	97.18 %
1.A.2.g Other: Liquid Fuels (CO_2)	92.5 %
1.A.2.g Other: Other Fuels (CO_2)	99.56 %

Source category (gas)	share of higher Tier
1.A.2.g Other: Solid Fuels (CO_2)	99.83%
1.A.3.a Domestic aviation: Jet Kerosene (CO_2)	94.1 %
1.A.3.b Road transportation: Diesel Oil (CO_2)	83 %
1.A.3.b Road transportation: Diesel Oil (N_2O)	95.6 %
1.A.3.b Road transportation: Gaseous Fuels (CO_2)	91.4 %
1.A.3.b Road transportation: Gasoline (CO_2)	90 %
1.A.3.b Road transportation: Liquefied Petroleum Gases (LPG) (CO_2)	95 %
1.A.3.c Railways: Liquid Fuels (CO_2)	73.7 %
1.A.3.d Domestic navigation: Gas/Diesel Oil (CO_2)	74.3 %
1.A.3.d Domestic navigation: Residual Fuel Oil (CO_2)	65.7 %
1.A.4.a Commercial/institutional: Gaseous Fuels (CO_2)	94 %
1.A.4.a Commercial/institutional: Liquid Fuels (CO_2)	80 %
1.A.4.a Commercial/institutional: Other Fuels (CO_2)	97 %
1.A.4.a Commercial/institutional: Solid Fuels (CO_2)	98 %
1.A.4.b Residential: Biomass (CH_4)	50 %
1.A.4.b Residential: Gaseous Fuels (CO_2)	94 %
1.A.4.b Residential: Liquid Fuels (CO_2)	83 %
1.A.4.b Residential: Solid Fuels (CH_4)	8 %
1.A.4.b Residential: Solid Fuels (CO_2)	98 %
1.A.4.c Agriculture/forestry/fishing: Gaseous Fuels (CO_2)	87 %
1.A.4.c Agriculture/forestry/fishing: Liquid Fuels (CO_2)	77 %
1.A.4.c Agriculture/forestry/fishing: Solid Fuels (CO_2)	97 %
1.A.5.a Stationary: Solid Fuels (CO_2)	97 %
1.A.5.b Mobile: Liquid Fuels (CO_2)	83 %
1.B.1.a Coal mining and handling: no classification (CH_4)	74 %
1.B.2.a Oil: no classification (CH_4)	31 %
1.B.2.a Oil: no classification (CO_2)	83 %
1.B.2.b Natural gas: no classification (CH_4)	70 %
1.B.2.c Venting and flaring: no classification (CH_4)	26 %
2.A.1 Cement production: no classification (CO_2)	100 %
2.A.2 Lime production: no classification (CO_2)	99.95 %
2.A.4 Other process uses of carbonates: no classification (CO_2)	87.99 %
2.B.1 Ammonia production: no classification (CO_2)	98.3 %
2.B.2 Nitric acid production: no classification (N_2O)	100 %
2.B.3 Adipic acid production: no classification (N_2O)	100 %
2.B.8 Petrochemical and carbon black production: no classification (CO_2)	93.3 %
2.B.9 Fluorochemical production: no classification (HFCs)	100 %
2.B.10. Other: no classification (CO_2)	41.6 %
2.C.1 Iron and steel production: no classification (CO_2)	100 %
2.C.3 Aluminium production: no classification (PFCs)	100 %
2.F.1. Refrigeration and air-conditioning: no classification (HFCs)	100 %
2.H Other: no classification (Unspecified mix of HFCs and PFCs)	100 %
3.A. Enteric fermentation: no classification (CH_4)	96.3%
3.B. Manure management: no classification (CH_4)	95 %
3.B. Manure management: no classification (N_2O)	68.4 %

Source category (gas)	share of higher Tier
3.D.1. Direct N_2O emissions from managed soils: Direct N_2O Emissions From Managed Soils (N_2O)	56.0 %
3.D.2. Indirect N_2O emissions from managed soils: no classification (N_2O)	62.5 %
3.G.1. Limestone $CaCO_3$: no classification (CO_2)	0 %
5.A.1 Managed waste disposal sites: no classification (CH_4)	94 %
5.A.2 Unmanaged waste disposal sites: no classification (CH_4)	100 %
5.D.1 Domestic wastewater: no classification (CH_4)	66 %
5.D.1 Domestic wastewater: no classification (N_2O)	38 %
5.D.2 Industrial wastewater: no classification (CH_4)	44 %

1.3.1 Use of data from EU ETS for the purposes of the national GHG inventories in EU Member States

1.3.1.1 Overview

As in Annex V under the MMR, Annex XII under Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action (GOV REG) requires Member States to report EU ETS emissions per CRT categories and to comment the share of EU ETS emissions in CRT categories.

The EU ETS generates an EU-27 data set on verified installation-specific emissions for the sectors covered by the scheme. For 2024, the main activities, the number of entities and the verified emissions reported under the EU ETS are presented in Table 1.6

Table 1.6 Activities and emissions covered by the EU ETS in 2024 (for combined EU 27 Member States)

Main activity	Activity code	Number of entities*	Verified emissions (Mt CO_2-eq.)
Combustion of fuels	20	4 889	575.9
Refining of mineral oil	21	107	102.8
Production of coke	22	15	4.9
Metal ore roasting or sintering	23	10	1.8
Production of pig iron or steel	24	183	93.1
Production or processing of ferrous metals	25	197	6.3
Production of primary aluminium	26	17	2.5
Production of secondary aluminium	27	28	1.1
Production or processing of non-ferrous metals	28	70	5.4
Production of cement clinker	29	205	90.4
Production of lime, or calcination of dolomite/magnesite	30	206	21.1
Manufacture of glass	31	305	14.2
Manufacture of ceramics	32	828	9.2
Manufacture of mineral wool	33	47	1.7
Production or processing of gypsum or plasterboard	34	84	1.3
Production of pulp	35	131	3.5
Production of paper or cardboard	36	499	14.4
Production of carbon black	37	17	1.5
Production of nitric acid	38	27	2.0
Production of adipic acid	39	3	0.1
Production of glyoxal and glyoxylic acid	40	-	-
Production of ammonia	41	18	13.7
Production of bulk chemicals	42	282	29.7
Production of hydrogen and synthesis gas	43	59	8.0
Production of soda ash and sodium bicarbonate	44	10	3.4

Main activity	Activity code	Number of entities*	Verified emissions (Mt CO_2-eq.)
Capture of greenhouse gases under Directive 2009/31/EC	45	-	-
Transport of greenhouse gases under Directive 2009/31/EC	46	-	-
Other activity opted-in under Art. 24	99	174	0.7
All stationary installations		8 412	1 009

*Source: EEA, 2026 (EU ETS data viewer, EU 27) ; * for number of entities, the data are for the year 2023 as not available in 2026*

1.3.1.2 Mapping table between EU ETS activities and CRT categories

The table below indicates the mapping between the EU ETS activities and the IPCC/CRT categories, with supporting comments. Such table is based on the scope of the EU ETS in the fourth phase and the CRT categories based on the revised UNFCCC reporting guidelines (decision 24/CP.19) that implemented the 2006 IPCC Guidelines.

The legal framework defining the scope and the methodologies for the reporting of greenhouse gas emissions under the EU ETS presents differences compared to the 2006 IPCC guidelines. These differences lead to a different way of reporting emissions under the EU ETS and in the GHG inventory. Some of these differences may also prevent inventory compilers from using verified emissions reported under the EU ETS directly for emission reporting in the national GHG inventory. In order to use greenhouse gas emissions reported under the EU ETS in the national inventories, the inventory compilers need to deal with these differences.

Table 1.7 Mapping table outlining the correspondence of CRT categories related to the EU ETS activities

EU ETS activity	CRT category	Comment
20 Combustion of fuels	1.A.1.a Public electricity and heat production 1.A.1.b Petroleum refining 1.A.2.a Iron and steel 1.A.2.b Non-ferrous metals 1.A.2.c Chemicals 1.A.2.d Pulp, paper and print 1.A.2.e Food processing, beverages and tobacco 1.A.2.f Non-metallic minerals 1.A.2.g Other 1.A.3.e Other transportation (pipeline transport) 1.A.4.a Commercial/ Institutional 1.A.4.c Agriculture/ Forestry / Fisheries 1.B Fugitive emissions from fuels	• For standalone combustion installations, EU ETS covers combustion of fuels in installation with a total rated thermal input exceeding 20 MW. For GHG inventories no such threshold applies. • In the GHG inventory, emissions are classified based on the purpose of the combustion activity, while such a differentiation does not exist in the definition of EU ETS activities. • Installations for the incineration of hazardous or municipal waste are excluded in the definition of 'combustion activities' under the EU ETS but included in GHG inventories. Installations used for research, development and testing of new products and processes are also not covered by the ETS Directive according to Annex I paragraph 1. • In the EU ETS an installation with different types of activities is classified according to the activity with predominant emissions, while in the inventory such activities should be reported in separate categories if so defined. This difference mostly applies in cases of large integrated installations. • Usually, a very small share of EU ETS emission from fuel combustion falls in the category of 1.A.4.a Commercial/ Institutional and 1.a.4.c Agriculture/ Forestry/ Fisheries as installations in these sectors mostly are below the EU ETS threshold.
21 Refining of mineral oil	1.A.1.b Petroleum refining 1.A.1.c Manufacture of solid fuels and other energy industries 1.A.2.c Chemicals 1.B.2.c Venting and flaring 1.B.2.a.iv Fugitive emissions from oil refining/ storage 2.B.8 Petrochemical and carbon black production 2.B.10 Other	EU ETS activity covers CO_2 emissions from combustion and also fugitive and process emissions. Emission sources reported under these activities are allocated to different CRT categories in the inventory: • Combustion emissions →1.A.1.b Petroleum refining • Flaring emissions → 1.B.2.c Venting and flaring • Refining → 1.B.2.a.iv Oil Refining/ storage • Hydrogen production → may be reported in 1.B.2.a.iv refining/ storage or in 2.B.10 Other chemical industry • Coke production / calcination → 1.A.1.c.i Manufacture of solid fuels

EU ETS activity	CRT category	Comment
		• Flue gas scrubbing → 1.A.1.b Petroleum refining • Gasification of heavy fuel oil, methanol production → 2.B.8 Petro-chemical and carbon black production • Production of terephtalic acid → 2.B.10 Other chemical industry • Claus plants → 1.A.1.b Petroleum refining
22 Production of coke	1.A.1.c Manufacture of solid fuels and other energy industries 1.B Fugitive emissions 1.A.2 Manufacturing Industries 2.C.1 Iron and Steel	• Scopes of EU ETS and 2006 IPCC Guidelines are generally consistent, however EU ETS emissions may be allocated to several CRT categories in the inventory. • The use of mass balance approaches in integrated iron and steel installations may complicate allocation between iron and steel categories and coke production.
23 Metal ore roasting or sintering, including palletisation	1.A.2.a Iron and steel 2.C.1 Iron and steel production 2.C.5 Lead production 2.C.6 Zinc production 2.C.7 Other metal production	• No clear separate category for this EU ETS activity in the inventory, allocation depends on the metal type. • Combustion emissions should be allocated to 1.A.2.a Iron and steel. • Process emissions should be allocated to 2.C.1 Iron and steel production or other metal production categories under industrial processes.
24 Production of pig iron or steel including continuous casting	1.A.2.a Iron and steel 2.C.1 Iron and steel production 1.B Fugitive emissions 1.A.1.c Manufacture of solid fuels and other energy industries	• Emissions are included in EU ETS only for those pig iron or steel installations with a capacity exceeding a threshold of 2.5 tonnes per hour while in GHG inventories there is no threshold. • EU ETS activity includes combustion and process emissions. • Combustion emissions should be allocated to 1.A.2.a Iron and steel. • Process emissions should be allocated to 2.C.1 Iron and steel production. • Emissions from coke production should be allocated to 1.A.1.c Manufacture of solid fuels and other energy industries. • Clear separation of combustion and process emissions is not always possible when mass balance approaches are used. • Comparability of emissions is influenced by the allocation of the transfer of CO_2 in the process gases (coke oven gas, blast furnace gas, basic oxygen furnace gas) to EU ETS activities as well as to CRT categories. Article 48 of the EU ETS MRR specifies the allocation of inherent CO_2 which results from an EU ETS activity and is contained in a gas which transferred to other installations as a fuel. If transfers of inherent CO_2 take place between EU ETS installations, the CO_2 transferred should not be counted as emissions for the installation of origin, but for the installation where it is finally emitted. However, if the transfer occurs to an installation outside the EU ETS scope, the transferring installation has to account for the emissions.
25 Production or processing of ferrous metals	1.A.2.a Iron and steel 2.C.1. Iron and steel production 2.C.2 Ferroalloys production 1.A.1.c Manufacture of solid fuels and other energy industries	• Emissions are included in EU ETS only for those ferroalloy production installations exceeding rated thermal input of 20 MW while in GHG inventories there is no threshold. • EU ETS scope of activity 25 covers CO_2 emissions related to the production or processing of ferrous metals from: o conventional and alternative fuels, o reducing agents including coke, o graphite electrodes, o raw materials including limestone and dolomite, o carbon containing metal ores and concentrates, o secondary feed materials. • Combustion related emissions from EU ETS activity code 25 are included in in CRT 1.A.2.a. Iron and Steel. • Process related emissions can be included in CRT 2.C.1 Iron and steel production or 2.C.2. Ferroalloys Production.
26 Production of primary aluminium	2.C.3 Aluminium production 1.A.2.b Non-ferrous metals	• In EU ETS operators shall report emissions from the production of electrodes for primary aluminium smelting, including stand-alone-installations for the production of such electrodes. The operator shall consider CO_2 emissions from: fuels for the production of heat or steam,

EU ETS activity	CRT category	Comment
		electrode production, reduction of Al_2O_3 during electrolysis which is related to electrode consumption, use of soda ash or other carbonates for waste gas scrubbing. • For PFC emissions resulting from anode effects the scope of the EU ETS activity and CRT category 2.C.3 are consistent. PFC emissions are allocated to 2.C.3 Aluminium production. • CRT category 1.A.2.b Non-ferrous metals includes combustion emission and emission from waste gas scrubbing. • Emissions from electrode consumption in EU ETS activity code 26 are included in CRT 2.C.3 Aluminium Production.
27 Production of secondary aluminium	1.A.2.b Non-ferrous metals	• Emissions are included in EU ETS only for installations exceeding rated thermal input of 20 MW while in GHG inventories there is no threshold. • In secondary aluminium production no process emissions occur therefore all emissions in activity code 27 are from fuel combustion and are reported in CRT category 1.A.2.b Non-ferrous metals.
28 Production or processing of non-ferrous metals	1.A.2.b Non-ferrous metals 2.C.4 Magnesium production 2.C.5 Lead production 2.C.6 Zinc production 2.C.7 Other metal production	• Emissions are included in EU ETS only for non-ferrous metals production or processing installations exceeding rated thermal input of 20 MW (including reducing agents) while in GHG inventories there is no threshold. • EU ETS activity includes combustion and process emissions. • Process related emissions from EU ETS activity code 28 are included in CRT 2.C.4 Magnesium Production, 2.C.5 Lead production, 2.C.6 Zinc Production and 2.C.7 Other metal industry. • 2006 IPCC Guidelines do not provide methodologies for metals other than iron and steel, ferroalloys, aluminium, magnesium, lead and zinc while the EU ETS has a broader scope and covers, e.g. copper production.
29 Production of cement clinker in rotary kilns	2.A.1 Cement Production 1.A.2.f Non-metallic minerals	• Emissions are included in EU ETS only for installations with production capacity exceeding 500 tonnes per day or in other furnaces with capacity exceeding 50 tonnes per day. Inventory methodology has no threshold. • EU ETS activity includes combustion and process emissions. • Process related emissions from EU ETS activity code 29 are included in CRT 2.A.1 Cement Production • Combustion related emissions from ETS activity code 29 are included in CRT 1.A.2.f. Non-metallic minerals
30 Production of lime, or calcination of dolomite/magnesite in rotary kilns or in other furnaces	2.A.2 Lime production 1.A.2.f Non-metallic minerals	• Emissions are included in EU ETS only for installations with production capacity exceeding 50 tonnes per day. Inventory methodology has no threshold. • EU ETS activity includes combustion and process emissions. • Process related emissions from EU ETS activity code 30 are included in CRT 2.A.2 Lime Production • Combustion related emissions from EU ETS activity code 30 are included in CRT 1.A.2.f. Non-metallic minerals. • Non-marketed lime production in some industries such as iron and steel or sugar refining are included in the inventory in category 2.A.2, but may be included in the EU ETS in the dominant activity, e.g. iron and steel industry or fuel combustion.
31 Manufacture of glass including glass fibre	2.A.3 Glass production 1.A.2.f Non-metallic minerals	• Emissions are included in EU ETS only for installations with a melting capacity exceeding 20 tonnes per day. Inventory methodology has no threshold. • EU ETS activity includes combustion and process emissions. • Process related emissions from EU ETS activity code 31 are included in CRT 2.A.3 Glass Production • Combustion related emissions from EU ETS activity code 31 are included in CRT 1.A.2.f. Non-metallic minerals
32 Manufacture of ceramic products by firing, in particular	2.A.4 Other process uses of carbonates	• Emissions are included in EU ETS only for installations with a production capacity exceeding 75 tonnes per day. Inventory methodology has no threshold.

EU ETS activity	CRT category	Comment
roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain	1.A.2.f Non-metallic minerals	• EU ETS activity includes combustion and process emissions. • Process related emissions from EU ETS activity code 32 are included in CRT 2.A.4 Other process uses of carbonates. • Combustion related emissions from EU ETS activity code 32 are included in CRT 1.A.2.f. Non-metallic minerals. • EU ETS method A is based on carbonate input and is equivalent to IPCC tier 1 to 3 methods. EU ETS method B based on the alkali oxide output in the product has no equivalent method in the 2006 IPCC Guidelines. IPCC Guidelines also do not provide methods to estimate emissions from additives.
33 Manufacture of mineral wool insulation material using glass, rock or slag	2.A.3 Glass production 2.A.4 Other process uses of carbonates 2.A.5 Other 1.A.2.f Non-metallic minerals	• Emissions are included in EU ETS only for installations with a melting capacity exceeding 20 tonnes per day. Inventory methodology has no threshold. • EU ETS activity includes combustion and process emissions. • 2.A.3 Glass Production includes emissions from the production of glass wool, a category of mineral wool, where the production process is similar to glass making. Where the production of rock wool is emissive these emissions should be reported under IPCC Subcategory 2.A.5.
34 Drying or calcination of gypsum or production of plaster boards and other gypsum products	1.A.2.f Non-metallic minerals	• EU ETS covers CO_2 emissions from this activity, where combustion units have a total rated thermal input exceeding 20 MW. For GHG inventories no such threshold applies. • EU ETS activity only includes combustion-related emissions.
35 Production of pulp from timber or other fibrous materials	1.A.2.d Pulp, paper and print 2.A.4 Other process uses of carbonates (soda ash use)	• EU ETS activity includes combustion and process emissions. • Combustion related emissions from EU ETS activity code 35 are included in CRT 1.A.2.d. • Process related emissions are included in 2.A.4. Other process uses of carbonates.
36 Production of paper or cardboard	1.A.2.d Pulp, paper and print 2.A.4 Other process uses of carbonates (soda ash use)	• EU ETS activity includes combustion and process emissions. • Threshold in EU ETS: installations involved in the production of paper or cardboard a production capacity exceeding 20 tonnes per day. Inventory methodology has no threshold. • Combustion related emissions from EU ETS activity code 36 are included in CRT 1.A.2.d. • Process related emissions are included in 2.A.4 Other process uses of carbonates.
37 Production of carbon black involving the carbonisation of organic substances such as oils, tars, cracker and distillation residues	2.B.8 Petrochemical and carbon black production 1.A.2.c Chemicals	• EU ETS covers CO_2 emissions from this activity, where combustion units have a total rated thermal input exceeding 20 MW. For GHG inventories no such threshold applies. • EU ETS activity includes combustion and process emissions.
38 Production of nitric acid	2.B.2. Nitric acid production 1.A.2.c Chemicals	• Scopes of EU ETS and 2006 IPCC Guidelines for CO_2 emissions from nitric acid production are consistent. • EU ETS activity includes combustion and process emissions. • For EU ETS activity 38 all N_2O emissions are process-related and should be allocated to 2.B.2 Nitric acid production. • CO_2 emissions in activity code 38 are from fuel combustion and should be allocated to 1.A.2.c Chemicals.
39 Production of adipic acid	2.B.3. Adipic acid production (CO_2) 1.A.2.c Chemicals	• Scopes of EU ETS and 2006 IPCC Guidelines for CO_2 emissions from Adipic Acid production are consistent. • EU ETS activity includes combustion and process emissions. • For EU ETS activity 39 all N_2O emissions are process-related and should be allocated to CRT code 2.B.3 Adipic

EU ETS activity	CRT category	Comment
		Acid Production. • CO_2 emissions in activity code 38 are from fuel combustion and should be allocated to 1.A.2.c Chemicals .
40 Production of glyoxal and glyoxylic acid	2.B.4. Caprolactam, glyoxal and glyoxylic acid production 1.A.2.c Chemicals	• Scopes of EU ETS and 2006 IPCC Guidelines for N_2O emissions from glyoxal production and glyoxylic acid production are consistent. • EU ETS activity includes combustion and process emissions. • N_2O emissions should be allocated to CRT code 2.B.4 Caprolactam, glyoxal and glyoxylic acid production. • CO_2 emissions in activity code 40 are from fuel combustion and should be allocated to 1.A.2.c Chemicals
41 Production of ammonia	2.B.1. Ammonia production CO_2 captured for urea production: 3.H Urea Application 1.A.3.b Road transport 2.D.3 Other non-energy products from fuels and solvent use	• EU ETS scope of activity code 41 ammonia production includes: • combustion of fuels supplying the heat for reforming or partial oxidation, • fuels used as process input in the ammonia production process (reforming or partial oxidation), • fuels used for other combustion processes including for the purpose of producing hot water or steam. • According to 2006 IPCC Guidelines to avoid double counting, fuel consumption in ammonia production should be reported under Ammonia production. In this regard EU ETS and IPCC scopes are consistent. • In the inventory CO_2 from ammonia production which is recovered and used for urea production is subtracted and reported by the users. Urea use can be reported in different CRT sectors, e.g. in 1.A.3.b Road transport, 3.H Urea application in agriculture, 2.D.3 Other (e.g. in industry catalysts). Under the EU ETS the CO_2 transfer via urea out of the EU ETS system cannot be deducted from ammonia production for EU ETS reporting.
42 Production of bulk organic chemicals by cracking, reforming, partial or full oxidation or by similar processes	2.B.8 Petrochemical and carbon black production 2.B.10 Other chemical industry 1.A.2.c Chemicals	• Emissions are included in EU ETS only for installations with a production capacity exceeding 100 tonnes per day. Inventory methodology has no threshold. • EU ETS activity includes combustion and process emissions. • The combustion related emissions are allocated to CRT code 1.A.2.c Chemicals. • Some of the emissions reported under this EU ETS activity could be allocated to CRT category 2.B.8 Petrochemical and carbon black production (e.g. CO_2 process emissions). • Some of the emissions reported under this EU ETS activity could be allocated to CRT category 2.B.10 Other chemical industry (e.g. CO_2 emissions from flaring in chemical industry).
43 Production of hydrogen and synthesis gas by reforming or partial oxidation	1.A.2.c Chemicals 2.B.1. Ammonia production 2.B.8 Petrochemical and carbon black production 2.B.10 Other chemical industry 1.B.2.a.iv Fugitive emissions from oil refining/ storage	• Emissions are included in EU ETS only for installations with a production capacity exceeding 25 tonnes per day. IPCC methodology has no threshold. • EU ETS activity includes combustion and process emissions. • In the CRT, there is no separate reporting category for emissions from hydrogen production. Hydrogen and synthesis gas production are recognised as part of integrated chemical production. Therefore, MS have chosen different approaches for the inclusion of emissions from hydrogen production (e.g. 2.B.8 or 2.B.10). • Some emissions may also be reported under CRT category 1.B.2.a.iv Fugitive emissions from oil subcategory refining/ storage.
44 Production of soda ash and sodium bicarbonate	1.A.2.c Chemicals 2.B.7 Soda ash production	• EU ETS activity includes combustion and process emissions. • Combustion related emissions from EU ETS activity code 44 for production are included in CRT 1.A.2.c Chemicals. • Process related emissions are included in 2.B.7. Soda Ash Production
45 Capture of greenhouse gases	Capture of emissions would be reported under the respective inventory sector e.g. 1.A.1.a	• Consistent with scope and methodologies of inventory.

EU ETS activity	CRT category	Comment
under Directive 2009/31/EC	Public electricity and heat production.	
46 Transport of greenhouse gases by pipelines for geological storage in a storage site permitted under Directive 2009/31/EC	1.C.1 Transport of CO_2	• Consistent with scope and methodologies of inventory
47 Geological storage of greenhouse gases in a storage site permitted under Directive 2009/31/EC	1.C.2 Injection and storage	• Consistent with scope of inventory (currently no emissions reported under the EU ETS)
99 Other activity opted-in under Art. 24 of the ETS Directive	Depending on type of activity opted-in	Article 24 allows the unilateral inclusion of additional activities and gases under the EU ETS. These activities and gases are not allocated to a specific activity, but under a separate activity code.

In the GHG inventory, the emissions are reported per CRT categories (Annex V under the MMR (phase III of EU ETS); Annex XII under the GOV REG for phase IV). In the EU ETS a single installation can include several ETS activities as defined in Annex I of the EU ETS Directive. In the EU ETS emissions are attributed to a specific installation, independently from the Annex I activities covered. Nevertheless, the operator must report detailed information for each source stream of the installation, and include activities classification as per Annex I, in his annual report to the competent authorities. The different approaches can lead to differences in reported emissions if ETS activities and inventory categories are compared directly.

Scope of activities and installation boundaries

The EU ETS cover installations with activities overpassing certain capacity thresholds (which can sometimes be null). Hence, the inventory scopes for the same activities are often larger (or equal).

Determination of tiers

IPCC guidelines are based on methodological tiers that require higher tier levels of accuracy for emission sources contributing to a significant extent to the total emissions in a country.

In the EU ETS, tiers apply at installation level for each source stream activity data and calculation factors and are defined in legislation on the basis of the installation emissions (thresholds are < 50 kt, ≥ 50 kt and ≤ 500 kt and > 500 kt CO_2eq) and source stream contributions. EU ETS verified emissions, if aggregated at sectoral level, may include contributions from small, medium and large emitters and are therefore based on different EU ETS tiers.

The mapping table above shows that a direct comparison between verified emissions from EU ETS activities and emissions reported in CRT categories is not straightforward.

An analysis of data consistency between EU ETS and inventory data ideally requires: (1) an assessment of the assignment of the detailed data reported by each individual EU ETS installation to national competent authorities with respect to the CRT categories; (2) a detailed comparison of the methodological parameters (methods, activity data, calculation parameters).

1.3.1.3 Use of EU ETS data reported in 2026

Under the GOV REG article 37 (EU 2018a), Member States are required to perform consistency checks between the emissions reported in the GHG inventories and the verified emissions reported under the

EU ETS Directive. The installation-specific emissions data reported by operators under the EU ETS can be used in different ways for the purposes of the national GHG inventories:

1. Reported verified emissions can be directly used in the GHG inventory to report CO_2 emissions for a specific source category. This requires a number of careful checks, e.g. whether the coverage of the respective EU ETS emissions is complete for the respective source category and that EU ETS activities and CRT source categories follow the same definitions. If EU ETS emissions are not complete, the emissions for the remaining part of the source category not covered by the EU ETS have to be calculated separately and added to the EU ETS emissions.
2. Emission factors (or other parameters such as oxidation factors, carbon contents etc.) reported under the EU ETS can be compared with emission factors used in the inventory and the latter can be harmonised if the EU ETS provides improved information.
3. Activity data reported under the EU ETS can be used directly for the GHG inventory, in particular for source categories where energy statistics face difficulties in disaggregating fuel consumption to specific subcategories, e.g. to specific industrial sectors. EU ETS data can also be used to account for emissions related to specific non-marketed fuels which are not covered by the national energy balances or other statistics (e.g., process gases, waste derived fuels, sludge, etc.).
4. Data from EU ETS can be used for more general verification activities as part of national quality assurance (QA) activities without the direct use of emissions, activity data or emission factors.
5. Data from EU ETS can improve completeness of the estimation of IPCC source categories when additional data for sub-categories become available from EU ETS (e.g., use of carbon-rich materials in processes where national statistics can be missing).
6. EU ETS data can improve the allocation of industrial combustion emissions to sub-categories under 1.A.2 Manufacturing Industries and Construction.
7. The comparison of the data sets can be used to improve the uncertainty estimation for the GHG inventories based on the uncertainties of data reported by installations.

Based on the information submitted in the national inventory reports (NIDs) in 2026 to the European Commission, all Member States indicated that they used EU ETS data at least for QA/QC purposes (Table 1.8). 26 Member States indicated to directly use the verified emissions reported by installations under the EU ETS (depending on the sectors). All Member States used EU ETS data to improve country-specific emission factors. And all Member States reported that they used activity data (e.g. fuel use) provided under the EU ETS in the national inventory (depending on the sectors).

Table 1.8 Use of EU ETS data for the purposes of the national GHG inventory (source: Member States NID 2026)

Member State	Use of emissions	Use of activity data	Use of emission factors	Use for quality assurance
Austria	✓	✓	✓	✓
Belgium	✓	✓	✓	✓
Bulgaria	✓	✓	✓	✓
Croatia	✓	✓	✓	✓
Cyprus	✓	✓	✓	✓
Czech Republic	✓	✓	✓	✓
Denmark	✓	✓	✓	✓
Estonia		✓	✓	✓
France	✓	✓	✓	✓
Finland	✓	✓	✓	✓
Germany	✓	✓	✓	✓
Greece	✓	✓	✓	✓

Member State	Use of emissions	Use of activity data	Use of emission factors	Use for quality assurance
Hungary	✓	✓	✓	✓
Ireland	✓	✓	✓	✓
Italy	✓	✓	✓	✓
Latvia	✓	✓	✓	✓
Lithuania	✓	✓	✓	✓
Luxembourg	✓	✓	✓	✓
Malta	✓	✓	✓	✓
Netherlands	✓	✓	✓	✓
Poland	✓	✓	✓	✓
Portugal	✓	✓	✓	✓
Romania	✓ (for CRT 2)	✓ (for CRT 2)	✓	✓
Slovakia	✓	✓	✓	✓
Slovenia	✓	✓	✓	✓
Spain	✓	✓	✓	✓
Sweden	✓	✓	✓	✓

Source: Member States NID 2026

1.3.2 Cooperation with EUROCONTROL

At the end of 2010 the European Commission signed a framework contract with EUROCONTROL, the European organization for the safety of air navigation, regarding 'the support to the European Commission in relation to climate change policy and the implementation of the EU ETS'. This support project is organized in different Work Packages (WP) corresponding to the different areas identified in the framework contract and has been regularly continued.

One of these Work Packages pertains to the improvement of GHG and air pollutant emissions inventories submitted by the 27 Member States and the European Union to the UNFCCC and to the UNECE. The main objective of the WP is to assist EU Member States improve the reporting of annual greenhouse gas (and other air pollutant) emission inventories by e.g., estimating the fuel split domestic/international using real flight data from EUROCONTROL. The European Environment Agency and its ETC/CM assist DG CLIMA regarding the technical requirements.

To support the inventory process for the submission in 2026, in August/September 2025 Member States received fuel and emissions data for the years 2005 to 2024 as calculated by EUROCONTROL using a TIER 3b methodology applying the Advanced Emissions Model (AEM). This is a follow up of ERT recommendations made to perform QA exercises and to make data from EUROCONTROL available to Member States on a regular basis.

In the course of the 'initial checks' of MS inventories in the first months of 2026 the comparison between Tier 3b calculations from EUROCONTROL and time series of MS inventories has been conducted. In case of considerable differences between Member State results and those from EUROCONTROL, the European Environment Agency and its ETC/CM asked Member States via the EMRT about possible reasons. In addition, the European Environment Agency provided MS with a comparison between EUROCONTROL data and MS data on fuel consumption of civil and international aviation for the years 2015 and 2024, related emissions and implied emission factors for CO_2, CH_4 and N_2O.

Eurostat energy data

During the initial checks carried out before the compilation of the EU GHG inventory, Eurostat energy data is used for cross checking the sectoral and reference approach of the MS submissions. This check is an important QA/QC element of the EU GHG inventory compilation.

In general, the quality of the EU GHG inventory is directly affected by the quality of Member States and EU energy statistics collected by Eurostat on the basis of the relevant regulation[19]. The energy statistics regulation was adopted as part of the energy package and establishes a common framework for the production, transmission, evaluation and dissemination of comparable energy statistics in the EU. This regulation aims at collecting detailed statistical data on energy flows by energy commodity on an annual and monthly basis. It ensures harmonised and coherent reporting of national energy data, which is necessary for the assessment of EU related policies and targets.

The energy statistics regulation helps improving the QA/QC of the EU inventory as it:

- makes available more detailed energy statistics by fuel;
- allows the estimation of CO_2 emissions from energy with the reference and sectoral approach;
- assures the quality of the underlying energy statistics;
- improves timeliness of energy statistics;
- provides a formal legal framework assuring consistency between national and Eurostat data.

Moreover, Article 6, paragraph 2 stipulates that:

"Every reasonable effort shall be undertaken to ensure coherence between energy data declared in the energy statistics regulation, and data declared in accordance with Commission Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol."

In addition, Annex V of the Governance Regulation in conjunction with Article 17 of the Commission Implementing Regulation 2020/1208 requires Member States to report to the European Commission textual information on the comparison between the reference approach calculated on the basis of the data included in the greenhouse gas inventory and the reference approach calculated on the basis of the data reported pursuant to the Energy Statistics Regulation. Member States with differences of more than ± 2% in the total national apparent fossil fuel consumption have to provide quantitative information and explanations for the year X-2 in accordance with the tabular format set out in Annex XIV of the Commission Implementing Regulation.

1.4 Description of key categories

A key category analysis has been carried out according to the Tier 1 method (quantitative approach) described in the 2006 IPCC guidelines. A key category is defined as an emission source that has a significant influence on a country's GHG inventory in terms of the absolute level of emissions, the trend in emissions, or both.

In addition to the key category analysis at Union level, every Member State provides a national key category analysis which is independent from the assessment at Union level. The Union key category analysis is not intended to replace the key category analysis by Member States. The key category analysis at Union level is carried out to identify those categories for which overviews of Member States' methodologies, emission factors, quality estimates and emission trends are provided in this report. In addition, the Union key category analysis helps identifying those categories that should receive special

[19] REGULATION (EC) No 1099/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2008 on energy statistics as amended by Commission Regulation (EU) No 147/2013 of 13 February 2013.

attention with regard to QA/QC at EU level. The Member States use their key category analysis for improving the quality of emission estimates at Member State level.

To identify key categories of the EU the following procedure was applied:

- Starting point for the key category identification for this report was the EEA database. All categories where GHG emissions/removals occur were listed, at an aggregation level such as 2.B.1 and split by gas, while for the sector Energy a less aggregated level such as 1.A.1.a, split by fuel and per gas was chosen. It makes sense for the EU to rely on this less aggregated level for the KCA as also the initial checks of the MS submissions are performed at this level of detail and therefore guarantee a more profound quality checking for all EU key categories (at fuel level). Additionally, the EU KCA (at detailed level) is used in order to select the categories for which more detailed information is provided in the EU NID. Although the more detailed EU approach differs from the KCA generated in the CRT overall the results are very similar.
- Confidential data from Sweden were added as a lump sum to the total of all Member State (MS) emissions. Consequently, the sectoral shares are based on the correct EU total. However, as confidential data of Sweden are not visible on category level, they are excluded from the category-level analysis and the identification of key categories.
- A level and a trend assessment was carried out for the years 1990 and 2024. The assessment was carried out for emissions excluding LULUCF and including LULUCF.
  The key category analysis including LULUCF identified 94 key categories for the EU covering 95.1 % of total EU GHG emissions in 2024 (Table 1.9). The key category analysis excluding LULUCF resulted in 79 key categories (Annex I).

In Chapters 3 to 7 overview tables are presented for each EU key category showing the Member States' contributions to the EU key category in terms of level and trend.

Table 1.9 Key categories for the EU (kt CO_2 equivalent)

Category (gas)	kt CO_2 eq.		Trend	Level	
	1990	2024		1990	2024
1.A.1.a Public electricity and heat production: Gaseous Fuels (CO_2)	107649	154683	T	L	L
1.A.1.a Public electricity and heat production: Liquid Fuels (CO_2)	156323	21591	T	L	L
1.A.1.a Public electricity and heat production: Other Fuels (CO_2)	10453	36430	T	L	L
1.A.1.a Public electricity and heat production: Peat (CO_2)	9164	1731	T	L	0
1.A.1.a Public electricity and heat production: Solid Fuels (CO_2)	942629	298884	T	L	L
1.A.1.b Petroleum refining: Gaseous Fuels (CO_2)	5334	17115	T	0	L
1.A.1.b Petroleum refining: Liquid Fuels (CO_2)	97421	73363	T	L	L
1.A.1.c Manufacture of solid fuels and other energy industries: Gaseous Fuels (CO_2)	8199	7474	0	L	L
1.A.1.c Manufacture of solid fuels and other energy industries: Solid Fuels (CO_2)	88816	17969	T	L	L
1.A.2.a Iron and steel: Gaseous Fuels (CO_2)	29403	14954	T	L	L
1.A.2.a Iron and steel: Liquid Fuels (CO_2)	9044	941	T	L	0
1.A.2.a Iron and steel: Solid Fuels (CO_2)	112372	50166	T	L	L
1.A.2.b Non-ferrous metals: Gaseous Fuels (CO_2)	3015	5821	T	0	L
1.A.2.c Chemicals: Gaseous Fuels (CO_2)	49600	29230	0	L	L
1.A.2.c Chemicals: Liquid Fuels (CO_2)	29757	8628	T	L	L
1.A.2.c Chemicals: Solid Fuels (CO_2)	11978	6251	0	L	L
1.A.2.d Pulp, paper and print: Gaseous Fuels (CO_2)	11344	12778	T	L	L
1.A.2.d Pulp, paper and print: Liquid Fuels (CO_2)	10835	1515	T	L	0
1.A.2.d Pulp, paper and print: Solid Fuels (CO_2)	6761	803	T	0	0

Category (gas)	kt CO_2 eq.		Trend	Level	
	1990	2024		1990	2024
1.A.2.e Food processing, beverages and tobacco: Gaseous Fuels (CO_2)	15826	25853	T	L	L
1.A.2.e Food processing, beverages and tobacco: Liquid Fuels (CO_2)	18064	2622	T	L	0
1.A.2.e Food processing, beverages and tobacco: Solid Fuels (CO_2)	11557	2701	T	L	0
1.A.2.f Non-metallic minerals: Gaseous Fuels (CO_2)	27278	27312	T	L	L
1.A.2.f Non-metallic minerals: Liquid Fuels (CO_2)	46178	18021	T	L	L
1.A.2.f Non-metallic minerals: Other Fuels (CO_2)	1438	12921	T	0	L
1.A.2.f Non-metallic minerals: Solid Fuels (CO_2)	52351	8773	T	L	L
1.A.2.g Other: Gaseous Fuels (CO_2)	79981	68009	T	L	L
1.A.2.g Other: Liquid Fuels (CO_2)	81155	34350	T	L	L
1.A.2.g Other: Other Fuels (CO_2)	2451	4377	T	0	0
1.A.2.g Other: Solid Fuels (CO_2)	90603	5464	T	L	L
1.A.3.a Domestic aviation: Jet Kerosene (CO_2)	10822	13061	T	L	L
1.A.3.b Road transportation: Diesel Oil (CO_2)	270610	517731	T	L	L
1.A.3.b Road transportation: Diesel Oil (N_2O)	1389	6918	T	0	L
1.A.3.b Road transportation: Gaseous Fuels (CO_2)	508	4151	T	0	0
1.A.3.b Road transportation: Gasoline (CH_4)	5588	714	T	0	0
1.A.3.b Road transportation: Gasoline (CO_2)	330645	218219	T	L	L
1.A.3.b Road transportation: Other Fuels (CO_2)	1	2519	T	0	0
1.A.3.b Road transportation: Liquefied Petroleum Gases (LPG) (CO_2)	7428	14967	T	0	L
1.A.3.c Railways: Liquid Fuels (CO_2)	11549	3110	T	L	0
1.A.3.d Domestic navigation: Gas/Diesel Oil (CO_2)	13226	10165	0	L	L
1.A.3.d Domestic navigation: Residual Fuel Oil (CO_2)	8560	5437	0	L	L
1.A.4.a Commercial/institutional: Gaseous Fuels (CO_2)	50274	71025	T	L	L
1.A.4.a Commercial/institutional: Liquid Fuels (CO_2)	73164	18451	T	L	L
1.A.4.a Commercial/institutional: Other Fuels (CO_2)	748	4266	T	0	0
1.A.4.a Commercial/institutional: Solid Fuels (CO_2)	45123	1410	T	L	0
1.A.4.b Residential: Biomass (CH_4)	10427	10680	T	L	L
1.A.4.b Residential: Gaseous Fuels (CO_2)	129929	158417	T	L	L
1.A.4.b Residential: Liquid Fuels (CO_2)	174092	71264	T	L	L
1.A.4.b Residential: Solid Fuels (CH_4)	8905	1559	T	L	0
1.A.4.b Residential: Solid Fuels (CO_2)	118831	17628	T	L	L
1.A.4.c Agriculture/forestry/fishing: Gaseous Fuels (CO_2)	12287	10976	T	L	L
1.A.4.c Agriculture/forestry/fishing: Liquid Fuels (CO_2)	63562	53087	T	L	L
1.A.4.c Agriculture/forestry/fishing: Solid Fuels (CO_2)	9740	1427	T	L	0
1.A.5.a Stationary: Solid Fuels (CO_2)	6065	1	T	0	0
1.A.5.b Mobile: Liquid Fuels (CO_2)	8160	2584	0	L	0
1.B.1.a Coal mining and handling: no classification (CH_4)	80725	16543	T	L	L
1.B.2.a Oil: no classification (CH_4)	6985	713	T	0	0
1.B.2.a Oil: no classification (CO_2)	8378	9393	T	L	L
1.B.2.b Natural gas: no classification (CH_4)	47075	10391	T	L	L
1.B.2.c Venting and flaring: no classification (CH_4)	6377	1272	T	0	0
2.A.1 Cement production: no classification (CO_2)	95237	58710	0	L	L
2.A.2 Lime production: no classification (CO_2)	23870	13865	0	L	L
2.A.4 Other process uses of carbonates: no classification (CO_2)	11044	7514	0	L	L

Category (gas)	kt CO_2 eq.		Trend	Level	
	1990	2024		1990	2024
2.B.1 Ammonia production: no classification (CO_2)	31655	16042	T	L	L
2.B.10 Other: no classification (CO_2)	9209	13752	T	L	L
2.B.2 Nitric acid production: no classification (N_2O)	40387	1599	T	L	0
2.B.3 Adipic acid production: no classification (N_2O)	33558	46	T	L	0
2.B.8 Petrochemical and carbon black production: no classification (CO_2)	13689	13327	T	L	L
2.B.9 Fluorochemical production: no classification (HFCs)	12809	67	T	L	0
2.C.1 Iron and steel production: no classification (CO_2)	103487	53489	T	L	L
2.C.3 Aluminium production: no classification (PFCs)	17234	202	T	L	0
2.F.1 Refrigeration and air-conditioning: no classification (HFCs)	5	49687	T	0	L
2.H Other: no classification (Unspecified mix of HFCs and PFCs)	4960	139	T	0	0
3.A Enteric fermentation: no classification (CH_4)	241529	177310	T	L	L
3.B Manure management: no classification (CH_4)	55164	43615	T	L	L
3.B Manure management: no classification (N_2O)	27744	17617	0	L	L
3.D.1 Direct N_2O emissions from managed soils: Direct N_2O Emissions From Managed Soils (N_2O)	111566	84483	T	L	L
3.D.2 Indirect N_2O emissions from managed soils: no classification (N_2O)	31511	21334	0	L	L
3.G.1 Limestone $CaCO_3$: no classification (CO_2)	6702	4659	0	0	L
4 Land use, land-use change and forestry: Biomass Burning (CO_2)	18028	4102	T	L	0
4 Land use, land-use change and forestry: Direct N_2O Emissions from N Mineralization/Immobilization (N_2O)	5519	7384	T	0	L
4 Land use, land-use change and forestry: Emissions and removals from drainage and rewetting and other management of organic and mineral soils (CH_4)	16406	15293	T	L	L
4 Land use, land-use change and forestry: Emissions and removals from drainage and rewetting and other management of organic and mineral soils (CO_2)	8298	8723	T	L	L
4.A.1 Forest land remaining forest land: Carbon stock change (CO_2)	-350828	-274459	T	L	L
4.A.2 Land converted to forest land: Carbon stock change (CO_2)	-60162	-65647	T	L	L
4.B.1 Cropland remaining cropland: Carbon stock change (CO_2)	29795	10154	T	L	L
4.B.2 Land converted to cropland: Carbon stock change (CO_2)	42704	33004	T	L	L
4.C.1 Grassland remaining grassland: Carbon stock change (CO_2)	27636	22875	T	L	L
4.C.2 Land converted to grassland: Carbon stock change (CO_2)	-12705	-24263	T	L	L
4.D.1.a Peat extraction remaining peat extraction: Carbon stock change (CO_2)	7932	7171	0	0	L
4.D.2 Land converted to wetlands: Carbon stock change (CO_2)	2045	4392	T	0	0
4.E.2 Land converted to settlements: Carbon stock change (CO_2)	22934	34781	T	L	L
4.G Harvested wood products: Wood product (CO_2)	-27063	-24818	T	L	L
5.A.1 Managed waste disposal sites: no classification (CH_4)	102518	65728	0	L	L
5.A.2 Unmanaged waste disposal sites: no classification (CH_4)	31235	8149	T	L	L
5.D.1 Domestic wastewater: no classification (CH_4)	25779	10703	T	L	L
5.D.1 Domestic wastewater: no classification (N_2O)	7589	11293	T	0	L
5.D.2 Industrial wastewater: no classification (CH_4)	8315	4800	0	L	L
Total indirect (CO_2)	7648	3648	0	L	0

Note: EU totals for 2024 in sector Energy and IPPU may not include data for Sweden due to confidential reporting. For more details on confidential reporting from Sweden refer to section 1.7.2.

1.5 Quality assurance, quality control of the European Union inventory

1.5.1 QA/QC programme

The European Commission (Directorate General Climate Action) is responsible for coordinating QA/QC procedures for the EU inventory and ensures that the objectives of the QA/QC programme are implemented in the design of the QA/QC manual defining general and specific QC procedures for the EU GHG inventory submission. The European Environment Agency (EEA) is responsible for the annual implementation of these QA/QC procedures for the EU inventory.

In the EU QA/QC programme the general responsibilities for the QA/QC are defined as follows:

- The Member States are responsible for the quality of activity data, emission factors and other parameters used for their inventories, as well as for adherence to the IPCC methodologies. Member States are also responsible for establishing national QA/QC programmes for their inventories as part of their national inventory systems.
- The European Commission (DG CLIMA) ensures that the objectives of the QA/QC programme are fulfilled. The EEA is responsible for the annual implementation of QA/QC procedures for the Union inventory. The EEA performs the tasks relating to the objectives of the QA/QC programme while the EEA's ETC/CM coordinates QA/QC activities for the Union inventory and develops the QA/QC plan.

A number of specific objectives have been elaborated in order to ensure that the EU GHG inventory complies with the UNFCCC inventory principles of transparency, completeness, consistency, comparability, accuracy and timeliness. The quality objectives are implemented via the QA/QC plan that, among others, aims at ensuring the consistency of the Union inventory with the sum of Member States inventories so that the inventory is complete in terms of both geographical and sectoral coverage. The QA/QC plan describes the quality control procedures that take place before the EU inventory compilation, for checking the consistency, completeness and correctness of the Member States inventories, as well as during the compilation of the EU GHG inventory, for ensuring the correctness of the EU data prior to its submission. In addition, QA procedures are defined, such as the Working Group1, an internal review mechanism, sector specific workshops, UNFCCC review results.

1.5.2 Quality control procedures at MS inventory level

The QC activities of MS submissions include:

Completeness Check	- all gases for all years
	- correct use of notation keys
	- check of blank cells
Time series consistency	- consistency in emissions, IEF - detect identical values in different reporting years
IEF comparison	- identify IEF outliers
Recalculations	- identify recalculations > +/- 0.05% and/or 500 kt CO_2 eq - check explanations provided - check recalculations of resubmissions within year
EU ETS	- check consistency/transparency of EU ETS data with CRT data
Review recommendations	- check status of implementation of review recommendations
Potential over- and underestimates	- identify potential over- and underestimates and MS level
Methods and EF used	- collect and check information on methods and EF used

For the communication with Member States and the documentation of the observations made by sector experts during the 'initial checks' phase the EEA Emission Review Tool (EMRT; https://emrt-esd.eionet.europa.eu/) is used. For this reason, Member States nominations have been made to DG Climate Action and the EEA. The workflow in the tool allows the implementation of the 'four-eye' principle since the questions of the 'sectoral experts' are approved by the 'quality experts' team. Issues related to 'completeness', especially the ones that might need to be followed up by 'gap filling procedures' are also highlighted. All the issues identified in the EMRT are archived and can be accessed by the future EU sectoral and quality experts in the annual QA/QC procedures, to avoid repetition of questions on known issues.

According to the timeline provided above, the checks are performed between 15th January and 28th February.

On 28 February MS receive the EIONET/WG1 consultation package. In particular, Member States are asked to check:

1. the QA/QC findings flagged in the EMRT;
2. if the correct data/information has been included in the draft CRT tables/draft inventory report, including the information on methodologies and EFs used for the EU key categories (Annex III).

Both responses to the findings included in the EMRT and comments to the draft EU GHG inventory and inventory report are provided by latest 15 March to the EU inventory team. By that date Member States can resubmit their inventories, also correcting issues that came up during the initial checks. In order to follow up on significant issues, as provided for in the Governance Regulation, all the tools supporting the checks are re-produced and the findings in the EMRT are followed up. Between 15 March and 31 March follow-up questions and questions on new material received from MS may be asked in the EMRT.

Observations by the EU inventory team that are not resolved at the end of the QA/QC process in one submission year will be followed-up in the consecutive year.

1.5.3 Quality control at EU inventory level

After the initial checks of the emission data, the EEA imports the resubmitted national data from the JSON-files into their GHG database. The GHG database is maintained and managed by European Environment Agency.

As the EU GHG inventory is compiled on the basis of the inventories of the EU Member States, the focus of the quality control checks performed during the compilation of the EU GHG inventory lays on checking if the correct MS data are used, if the data can be summed-up (same units are used) and that the summing-up is correct. Finally, the consistency and the completeness of the EU GHG inventory is checked. These checking procedures are performed by the EEA and the results are shared with the ETC/CM and are archived. Comments to these results are then provided and used as relevant for approving the inventory prior to its submission. All the checks are carried out for the original submission by 15 April each year and for any resubmission.

1.5.4 Quality assurance procedures

The circulation of the draft EU inventory and inventory report on 28 February to the EU Member States for reviewing and commenting also aims to improve the quality of the EU inventory and inventory report. The Member States check their national data and information used in the EU inventory report and send updates, if necessary, and review the EU inventory report. This procedure should assure the timely submission of the EU GHG inventory and inventory report to the UNFCCC secretariat and it should guarantee that the EU submission to the UNFCCC secretariat is consistent with the Member States UNFCCC submissions.

A basic peer review is conducted during the process of updating the final EU NID. The responsibility list (Table 1.4) shows the quality experts responsible for the EU GHG inventory report compilation. Their role includes proofreading the text and performing consistency checks within each sector chapter and (if available) between data presented in the EU NID and the EU CRT tables.

Additional checks are carried out by the project managers during and after the compilation of the EU GHG inventory report. They cover mainly consistency checks between sector chapters and various layout and completeness checks.

EU internal reviews (Reviews under the Effort Sharing and LULUCF Regulations)

After the preparation of the EU GHG inventory, the EU carries out internal reviews and or capacity building activities in order to improve the GHG inventory estimates. In 2005, an EU internal review was carried out for the first time. Since 2012 the EU internal reviews are carried out in the context of the Effort Sharing Decision (ESD) / Effort Sharing Regulation (ESR) reviews, and since 2025 the LULUCF Regulation

Between 2012 and 2025, ten EU internal inventory reviews have been carried out:

Year	Review Type	Purpose of the Review
2012	1st comprehensive Review	Determine the emission allocations 2013-2020 for the EU internal GHG emission reduction targets 2020 and respective trajectories
2015, 2017, 2018, 2019, 2021, 2022	Annual Review	Compliance with their annual ESD targets, enable the use of flexibilities and the application of corrective action, where necessary, at the end of each relevant year.
2016	2nd comprehensive Review	Review of reference years 2005, 2008-2010, 2013-2014
2020	3rd Comprehensive Review	Fix the base year and the greenhouse gas emissions targets for 2030, and the trajectory years for 2021-2029
2021	Trial LULUCF review	Voluntary review of 15 countries to prepare for the full integration of LULUCF into the review cycles from 2023 onwards.
2025	4th Comprehensive Review (ESR and LULUCF)	ESR: determine the annual emission allocations for the years 2026 to 2030 under the Effort Sharing Regulation LULUCF: fix the linear trajectory to the 2030 LULUCF target to determine the budget for accounting of the period 2026-2029.

Capacity building activities based on the ESD / ESR reviews

After the ESD / ESR review in autumn, each year capacity building workshops/webinars are organized in order to discuss cases where MS had problems with implementing the 2006 IPCC guidelines and/or where the guidelines are not clear enough or where there are gaps and/or errors in the guidelines.

From 2017 to 2022 onwards, every year capacity building webinars have been organised for the Sectors Energy, IPPU, Agriculture, and Waste based on the most common issues detected during the EU internal reviews. Almost all Member States participated in the training sessions.

In 2021, a webinar was also organized for LULUCF based on the findings from the LULUCF trial review 2021 that was carried out in parallel with the ESD review 2021.

As a result of the capacity building webinars guidance documents have been developed to support the Member States in improving their inventories. By February 2026 19 guidance documents are available: five for the Energy Sector; six for the IPPU Sector; four for the Agriculture Sector; four for the Waste Sector.

Apart from the capacity building webinars open to all Member States the ESD / ESR project team carried out additional capacity building targeted at specific countries in 2018, 2019, 2020, 2023, 2024 and 2025 which also allowed for in-country visits.

UNFCCC reviews

In addition, European Union QA procedures build on the issues identified during the independent UNFCCC inventory review of Member States' inventories. Quality assurance procedures based on outcomes of the UNFCCC inventory review consist of the:

- Annual compilation of issues identified during the UNFCCC inventory review related to sectors, key source categories and the major inventory principles transparency, consistency, completeness, comparability and accuracy for all Member States;
- Identification of major issues from the compilation and discussion of ways to resolve them in WG1, including identification and documentation of follow-up actions that are considered as necessary within WG1;
- Reviews of the extent to which issues identified through this procedure in previous years have been addressed by Member States;
- Ongoing investigations of ways to produce a more transparent inventory for the unique circumstances of the European Union.

In February 2025 the European Union was last reviewed by the UNFCCC. The report on the technical expert review of the first biennial transparency report of the European Union was published in September 2025[20]. The status of implementation of review findings is documented in the improvement plan (see below) in chapter 10.4.

Improvement plan

Based on the findings of the UNFCCC reviews, the EU peer review, and the EU ESR review, and other recommendations, the improvement plan for the EU GHG inventory and inventory report is compiled before the annual compilation process starts. After the finalisation of the annual EU GHG inventory, it is evaluated if the improvements planned have been implemented.

1.5.5 Further improvement of the quality of inventories

One of the most important activities for improving the quality of national and EU GHG inventories is the organisation of workshops and expert meetings under EU legislation. A number of other workshops and expert meetings have been organised in recent years with a focus on sector-specific quality improvements. Table 1.10 lists the most recent workshops. The follow-up activities are subsequently addressed in meetings of WG 1 under the Climate Change Committee.

Table 1.10 Overview of recent GHG inventory related workshops and expert meetings organised by the EU

Workshop/expert meeting	Date and venue
JRC/EEA LULUCF Workshop 2025	6-7 May, Ispra (VA). Italy
JRC LULUCF workshop 2024	22-23 May, 2024. Ispra (VA). Italy.
JRC LULUCF workshop 2023: LULUCF inventories for enhancing climate action.	11-12 May, 2023. JRC, Ispra (VA). Italy.
JRC technical workshop: Towards 'fit for 55': updates in LULUCF reporting and accounting"	20-21 June 2022, Varese, Italy
JRC virtual technical workshop: LULUCF in transition: present and future challenges for reporting and accounting	7-8 June 2021, JRC, Ispra (VA). Italy.
JRC technical LULUCF workshop under the UNFCCC, the Kyoto Protocol (KP) and the EU LULUCF Decision No 529/2013	28-29 May 2019, Varese, Italy

[20] Report on the technical expert review of the first biennial transparency report of the European Union | UNFCCC

1.5.6 Changes in the national inventory arrangements since previous annual GHG inventory submission

There were no changes since previous annual GHG inventory submission.

1.6 General uncertainty evaluation

The main objective of the uncertainty assessment, together with the key category analysis, is to help prioritise national efforts to reduce the uncertainty of inventories in the future, and guide decisions on methodological choice (by Member States), including on data collection improvements.

The uncertainty analysis was made on the basis of the Tier 1 uncertainty estimates, which were submitted by EU Member States as part of their EU GHG inventory reporting requirements under Article 26(3) and Annex V(Part 1)(m) of the Governance Regulation (EU) 2018/1999.

As documented in previous NID submissions, some of the Member State Tier 1 uncertainty estimates that are reported for the purpose of compiling the Union inventory are incomplete e.g. uncertainties not estimated for LULUCF and indirect CO_2 emissions, certain subsector emissions are confidential. Further complexity is also introduced by the fact that the sector and gas resolution at which uncertainties are provided varies between the countries. Since the UNFCCC submission in 2022, the methodology for compiling the EU inventory uncertainties harmonises and gap-fills the MS uncertainty estimates so that the tables containing the EU uncertainties are consistent with the final aggregate-, sector- and subsector emission values reported in the EU Common reporting tables (CRT tables) and elsewhere in the NID document.

A processing routine, implemented in R, reads the individual country uncertainty files that are pre-formatted manually to assign consistent sector and gas labels to the respective estimates of emissions/removals and uncertainties. The uncertainty values are then aggregated to a common sector resolution, at which the emissions and removals reported in the Tier 1 uncertainty tables of the countries are then replaced with the respective values from the final CRT tables of the countries. These final CRT data are accessed via an SQL query of the EEA database containing the Member State CRT submissions.

Due to the issue of incompleteness mentioned above, the country-level data are then screened to identify residual emissions and removals for which no uncertainty estimates have been provided. Where sectors are partially complete, the residual net emission is quantified in CO_2 equivalents and incorporated. An uncertainty is then estimated, by calculating the overall sector uncertainty of the sources and sinks that were included in that country's reported Tier 1 uncertainty estimates and assigning this percentage average to the residual net emission. In cases where for certain sectors no uncertainties have been provided at all (e.g. indirect CO_2 emissions, LULUCF), an average sector uncertainty in percent is calculated from all the countries for which complete sectoral emissions and uncertainties were reported, and this average uncertainty is assigned to the country's sector GHG total reported in its final CRT tables.

With complete data on uncertainties as well as emissions and removals for all 27 EU Member States, the routine then aggregates emissions and uncertainties in units of kt CO_2e (uncertainties summed in quadrature) for a specified gas and subsector resolution at the EU level. Despite working with Tier 1 data from the countries, a hybrid approach is applied to estimate level uncertainties that allows consideration of error correlations. The gas and subsector resolution applied was chosen to allow the routine to access respective data from the CRT Table Summary 3 on emission factors and apply correlation coefficients (r) when aggregating the uncertainties. For a given gas and subsector, it is assumed that the errors of countries using default factors are completely correlated (r = 1), while errors

of countries using country-specific factors are assumed uncorrelated (r = 0). For countries using a mix of default and country-specific factors, it is assumed that these errors are partially correlated (r = 0.5) with one another and with the errors of countries using the default factors only.

Based on these correlation assumptions, the routine then aggregates emissions and uncertainties for the specified gas and subsector resolution at the EU level. Uncertainties at the GHG and sector total level (Table 1.16) are then aggregated from the subsector and gas estimates assuming no correlation between subsectors and gases. However, for countries reporting very coarse resolution estimates (e.g. total sector GHG emissions/removals) or where the sector has been partially or completely gap-filled, it is assumed that these uncertainties are partially correlated (r = 0.5) with one another and with the other reported subsector- and gas level estimates. Level uncertainties on the total emissions and removals (with and without LULUCF) are then aggregated from the sector estimates assuming no correlation between sectors.

Trend uncertainties are also calculated with a hybrid method with varying assumptions with respect to error correlations in time. At the individual gas and subsector resolution of each country, a trend and trend uncertainty are calculated assuming full error correlation between the base year and latest year estimates (r = 1). In the IPCC GPG 2000, it is suggested to assume that emission factors between years are fully correlated, and activity data are independent. However, in the EU uncertainty estimate, it is assumed that activity data uncertainties also correlate to some extent between years, because typically the same data collection methods are used each year. Therefore, for the EU uncertainty estimate it was decided to assume that emissions (at the gas and subsector level) between years are fully correlated, even though this may underestimate trend uncertainty to some extent. For countries reporting very coarse resolution estimates (e.g. total sector GHG emissions/removals) or where the sector has been partially or completely gap-filled, it is assumed in the trend uncertainty that the base year and latest year uncertainties at country level are only partially correlated with one another (r = 0.5). These trends and trend uncertainties at country level are then aggregated at EU level (Table 1.16) assuming no correlation in the trend uncertainties between the countries. Correlation in trend uncertainties between countries is more difficult to quantify, where correlation between different countries in different years should also be quantified. Furthermore, the effect of correlation on uncertainty (increasing or decreasing) depends on the direction and magnitude of trend for each country and each source category. Therefore, a simple conservative assumption cannot be made, and for simplicity, it was assumed that the trend uncertainty estimates between the countries is independent. Note that the trend and trend uncertainties are calculated by aggregating in units of kt CO_2e (uncertainties summed in quadrature) and then expressed as percentages relative to the respective base year emissions/removals. The trend and level uncertainties reported throughout the NID represent 95 % confidence intervals in the respective values.

Given the Tier 1 format of the reported country level uncertainties (95 % confidence intervals assuming normal distributions) the above method for the EU applies a first order, Gaussian error propagation approach. However, given the application of the pragmatic yet defensible assumptions of error correlations described above, it nonetheless constitutes a more sophisticated, hybrid approach than required minimum Tier 1 approach under the IPCC guidelines. For instance, assuming no correlation between level uncertainties between countries would almost certainly lead to underestimates of the EU total level uncertainties. The EU inventory team therefore considers the outlined pragmatic approach a workable and defensible methodology to estimate level uncertainties. Likewise, the assumptions applied to the trend uncertainty analysis is also considered justified, given that it is most important to consider the strong uncertainty correlation in time.

Effects of correlations were tested in previous submissions both with the previous analytical method developed, and by using Monte Carlo (MC) simulation, where normal distributions were used in all the cases to ensure comparability with analytical estimates. Table 1.11 gives an example of such a comparison made in 2006. The source category chosen for the example is 4D, N_2O emissions from agricultural soils, as this category has a major effect on inventory uncertainty in most MS. Both the effects of correlations between years and between Member States were tested.

Table 1.11 Trend uncertainty for EU emissions 2006 of N_2O from agricultural soils by using different assumptions of correlation estimated using Monte Carlo simulation

Years correlate	MS correlate	Trend uncertainty
YES	YES	-27 to +26
YES	NO	±13
NO	YES	-294 to +292
NO	NO	-116 to +115

Note: "YES" denotes full correlation between years or Member States. Trend uncertainty is presented as percentage points.

It should furthermore be mentioned that applying a MC approach in the EU case would not improve the uncertainty estimate. Given that the input data are provided by the countries in a Tier 1 format assuming normal error distributions, applying a MC procedure without any further detailed assumptions on distributions would simply lead to comparable estimates as the first order approximation (Table 1.12).

Table 1.12 .Comparison of trend uncertainty estimates 2005 for EU Waste Sector using the modified Tier 1 method and Monte Carlo simulation (Tier 2).

Sector	GHG	Tier 1	Tier 2
6A. Landfills	CH_4	±12	±12
6B. Wastewater	CH_4	±27	-28 to +27
6B. Wastewater	N_2O	±9	±9
6C. Waste incineration	CO_2	±7	±7
6C. Waste incineration	CH_4	±23	-23 to +24
6C. Waste incineration	N_2O	±18	±18
Waste Other	CH_4	±990	-976 to +993
Total Waste Sector		±11	±11

Note: Trend uncertainty is presented as percentage points.

Table 1.13 shows the main results of the Tier 1 uncertainty analysis for the EU. The lowest level uncertainty estimates are for Fuel combustion activities (2.2 %) and the highest estimates are for Waste (55.6 %). Overall level uncertainty estimates on total GHG emissions and removals including LULUCF is calculated at 5.2 %. If LULUCF is excluded, the total level uncertainty is lower at 3.7 %. With regard to trend uncertainty estimates (expressed as a percentage of base year emissions), the lowest uncertainty estimates are for Fuel combustion activities (+/-2.7 percentage points) and the highest estimates are for LULUCF (+/- 50.8 percentage points). Overall trend uncertainty (including LULUCF) of total emissions and removals is estimated to be 3.6 percentage points. Excluding LULUCF, the trend uncertainty is lower at 2.1 percentage points. More detailed uncertainty estimates for the source categories are provided in Chapters 3-7.

It is perhaps important to clarify that uncertainties are inherent to all kinds of estimates (statistics, measurements, model simulations etc) thus underlining the fundamental importance of uncertainty assessment. Furthermore, the estimated uncertainties here (and elsewhere in the NID) indicate the likely range around which the EU GHG emission levels and trends vary according to error assumptions on the underlying activity data and emission factors used by the Member States. They are thus estimates of confidence (95 % confidence intervals) in the results of the EU GHG emission inventory and are not indications of biases in given directions.

Overall, the uncertainty in the total EU emission and removal (excluding LULUCF) levels and trends are low at 3.7 % and 2.1 %, respectively. In general, trend uncertainty in percentage points is lower than level uncertainty given that inventory methods are applied consistently over time, meaning that uncertainties are likely correlated over time. For example, a thermometer with a given error (offset) may

provide an uncertain estimate of daily air temperature on a given day, but will provide a much less uncertain estimate of temperature change between days, assuming that the error remains stable over time.

While level and trend uncertainties in total EU GHG emissions and removals are low, uncertainties do vary considerably between and within sectors, reflecting the varying difficulty in estimating emissions and removals from different sources and sinks. Level uncertainties in 1.A Fuel combustion, the largest absolute sectoral contributor to the inventory level and trend, are low at 2.3%, while for Waste and LULUCF they are higher at 55.6% and 39.3%. Assessments of (sub-) sectoral uncertainty help guide targeted inventory methodological improvements that ultimately should lead to uncertainty reductions and accuracy improvements. While this is principally the responsibility of the individual Member States, it is worth noting relevant EU legislation targeting methodological improvements in some of the more uncertain sources/sinks of GHGs. For example, the amended EU LULUCF Regulation (2023/839) will require MS to move to higher Tier methodologies for all pools and categories of the LULUCF sector over the coming decade.

Table 1.13 Tier 1 uncertainty estimates of EU GHG emissions and removals (in CO_2 equivalents) for the main sectors

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
1.A Fuel combustion activities	all	3 571 714	2 236 501	-37.4%	2.2%	2.7%
1.B Fugitive emissions	all	164 953	46 712	-71.7%	34.9%	12.7%
2. Industrial processes	all	449 938	259 866	-42.2%	8.9%	2.2%
3. Agriculture	all	487 254	359 086	-26.3%	20.9%	2.9%
4. LULUCF	all	-258 371	-230 985	-10.6%	39.3%	50.8%
5. Waste	all	185 399	111 375	-39.9%	55.6%	16.4%
Indirect CO2 emissions	all	7 648	3 648	-52.3%	17.5%	4.4%
Total (excl LULUCF)	**all**	**4 866 905**	**3 017 188**	**-38.0%**	**3.7%**	**2.1%**
Total (incl LULUCF)	**all**	**4 608 535**	**2 786 203**	**-39.5%**	**5.2%**	**3.6%**

The uncertainty assessment for the sectors 1B Fugitive emissions, 4 LULUCF and 5 Waste shows notable changes compared to the previous EU GHG inventory submission, while all other sectors remain largely unchanged, with only minor variations. Recalculations of emissions/removals, revisions of uncertainties and changes in the resolution of the Member States' uncertainty reporting all influence the sector uncertainties. Therefore, changes in uncertainty estimates between submissions can hardly be attributed to a single cause.

Nonetheless, for 1B Fugitive emissions, a large part of the of decrease in level uncertainties can be attributed to Romania's recalculation in 1B1a CH_4. The rise in trend uncertainties is also partly driven by this recalculation (a higher difference between 1990 and 2024 emissions leads to higher trend uncertainties). An additional contributing factor is Germany's revision of 1B1 CH_4 uncertainty estimation, which has a higher effect on the trend uncertainty than the level uncertainty. This is because Germany's share of 1B1a CH_4 emissions declined from 35% in 1990 to 0.5% in 2024.

For 4 LULUCF, a large part of the reduced trend uncertainty can be attributed to Finland's revision of its 4A CO_2 uncertainty estimation (from 935% in 2025 to 365% in 2026). Additionally, Finland's share in the EU total of category 4A (CO_2 emissions) decreased from 9% in 1990 to 0.6% in 2024. Both developments influence the EU trend uncertainty. Changes in level uncertainty are more diffuse. Notable contributions towards lower level uncertainties come from reduced uncertainty estimates for 4A CO_2 in Croatia and Finland. Recalculations by Romania have mixed effects, decreasing in 4B CO_2 while increasing in 4C CO_2.

For 5 Waste a large part of the increase in level and trend uncertainties can be attributed to Spain's introduction of 5D N_2O uncertainty estimates in combination with a recalculation in this category.

For more detailed information on uncertainties at the sectoral level, please refer to the respective sector chapters. For more detailed information on Member States' uncertainties please refer to the Member States' submissions.

1.7 General assessment of the completeness

1.7.1 Completeness checks of Member States' submissions

The EU GHG inventory is compiled on the basis of the inventories of the EU Member States. Therefore, the completeness of the EU inventory depends on the completeness of the Member States' submissions.

In response to the Saturday paper 2010 the EU implemented an action plan in 2011 aiming at improving the completeness regarding NEs of the EU greenhouse gas inventory.

1. Given the fairly wide interpretations and applications of notation keys, the identification of a "real" gap needs expert assessment which is provided by the UNFCCC review and which cannot be automated by existing EU internal procedures. Thus any action plan implemented by the EU needs to continue to be based primarily on the UNFCCC review reports. This was in particular evident with regards to the KP LULUCF, where a carbon pool could be not reported ('NR' should be used) provided that transparent and verifiable information was provided indicating that the pool was not a source, while notation keys such as NO and NA may also sometimes be linked to incomplete estimates. In this respect it needs to be stressed that the late availability of the review reports complicates the follow-up with Member States related to potential missing GHG estimates before the next EU inventory submission.
2. The notation key 'NE' is not in all cases an indication of a problem and neither the IPCC guidelines nor the UNFCCC review guidelines foresee an automatic procedure of gap filling when NEs are reported. For example, the notation "NE" can be used if there are no methods available in the 2006 IPCC Guidelines. Overall, a fair and complete analysis of the use of "NE" including the situations highlighted in point 1 above was considered to be indispensable (see chapter 1.7.1).

Given the above considerations the specific steps of the action plan followed since 2011 are as follows:

1. Member States are required by the Governance Regulation to submit their national GHG inventories electronically to the European Commission by 15 January of each year. A software program was created by the EEA so that upon submission of the relevant XML/CRF files a report is generated containing a list of all non-estimated source categories per Member State, specifying which of these source categories have been flagged in the Saturday Papers and for which ones IPCC methods are available. This report is then immediately notified to each Member State. During February the experts of the EU inventory team consult and discuss with Member States' experts inter alia:
    a. how MS have addressed and documented (or plan to address) the potential issues flagged in their Saturday Papers regarding missing estimates;
    b. the need for applying gap-filling procedures and the selection of the most appropriate methods;
    c. the need to use different notation keys.
2. Any finding with regard to the use of the notation key "NE" or relevant blank cells is communicated to the Member States' via the EMRT by 28 February latest. According to the procedures and time scales described in Annex XXI of the Implementing Regulation, the Draft

EU inventory is sent to MS also by 28 February. Updated or additional inventory data submitted by MS (to remove inconsistencies or fill gaps) and complete final national inventory reports are submitted to the European Commission by 15 March.

3. In cases where, even after the two preceding steps a Member State's GHG inventory as submitted to the European Commission by 15 March still contained NEs for categories where IPCC methods exist, and/or if such reporting has been identified as a problem in previous reviews, then the EU inventory experts, in close cooperation with Member States, prepare the missing GHG source estimates in accordance with the gap-filling provisions in Article 5 of the Commission Delegated Regulation (EU) 2020/1044[21]. Article 5(3) requires Member States to use the gap-filled estimates in their national submissions to the UNFCCC to ensure consistency between the EU inventory and Member States' inventories.
4. A general assessment of completeness is included in the EU Greenhouse Gas Inventory Report. For transparency reasons, since 2011 the EU's inventory submission contains an improved description of this section to reflect the additional improvements discussed above.

In addition to the steps detailed above, the regular QA/QC procedures established to ensure the transparency, accuracy, comparability, consistency, and completeness of the EU inventory continue to be applied. The WG1 on annual inventories continues to address issues of completeness giving them priority and the EU peer reviews and the ESD reviews focus on identifying issues that may lead to an under- or overestimation of emissions.

Since 2012 the completeness checks have been extended to the use of the notation key NO and NA. All cases where less than seven Member States reported NO or NA and all other MS reported emission estimates were checked by the sector experts and clarified with Member States, if needed. With the implementation of the new 2006 IPCC Guidelines, there is an additional check regarding 'insignificance' as described in paragraph 37 of the UNFCCC Reporting Guidelines, which was also relevant for the ESD reviews.

Member States may only report NEs if:

1. There are no 2006 IPCC methods/EFs available.
2. Emissions are considered insignificant: below 0.05% of the NT & do not exceed 500 kt CO_2 eq. The sum of insignificant NEs shall remain below 0.1% of the NT.
    a. MS shall indicate in both the NIR and the CRF completeness table why such emissions/removals have not been estimated.
    b. MS should provide justifications for exclusion in terms of the likely level of emissions in the NIR, using approximated AD and default IPCC EFs.
3. Emissions have not been reported in a previous submission, otherwise they shall be reported in subsequent submissions.

➢ If MS report unjustified NEs (according to 1. 2. and 3. above) gap-filling rules will apply

For the sectors energy, industrial processes and product use, agriculture, LULUCF and waste sector-specific checks are performed by the EU sector experts using outlier tools similar to those of the UNFCCC and other QA/QC tools. The results of the consistency and completeness checks as well as the main findings of the sector specific checks are documented in the web-based EEA Emission Review

[21] Commission Delegated Regulation (EU) 2020/1044 of 8 May 2020 supplementing Regulation (EU) 2018/1999 of the European Parliament and of the Council with regard to values for global warming potentials and the inventory guidelines and with regard to the Union inventory system and repealing Commission Delegated Regulation (EU) No 666/2014; OJ L 230, 17.7.2020, p. 1–6

Tool (EMRT). This tool is accessible for MS inventory coordinators and inventory experts. The Member States are asked to respond to findings in this tool and if needed provide revised emission estimates or additional information.

For every updated inventory submission provided by the MS by 15 March follow-up checks are performed by the sector experts and additional findings are documented in the EEA Emission Review Tool (EMRT). In addition it is checked if issues identified in the QA/QC communication tool (initial checks), which are relevant for the EU inventory (report) have been clarified by the MS. If this is not the case MS are contacted for clarification.

Since 2015 also cases where neither numeric values nor notation keys have been reported (blank cells) have been included in the checking procedure. EU experts have checked with Member States if blank cells have been caused by the new CRF reporter software or if in fact the blank cells should be replaced by notation keys or a numeric values.

1.7.2 Reporting of notation key "NE"

As the EU GHG inventory is the sum of MS inventories all categories reported as "NE" by Member States are also reflected in the EU GHG inventories. However, the EU CRT include only a small number of categories where "NE" is actually visible because the "NE" of a Member State is only visible in the EU CRT in a category where all EU MS report notation keys.

1.7.3 Reporting of confidential data

According to the MPGs Parties may report specific categories with the notation key C in case of confidentiality. In 2026 Sweden reported correct sector totals for all sectors but in the sectors Energy and IPPU on a less aggregated level the country reported several sub-categories as confidential. Please note that the EU GHG inventory team – on request - obtains access to confidential MS data for quality checking purposes, which has been the case for Sweden in 2026.

Therefore, in the relevant sector chapters, EU trends at fuel level do not always include Sweden for confidentiality reasons and to preserve time series consistency for the EU. Consequently, the EU CRT tables at sub-category level and data shown on the same level in the NID are not always consistent. Note that at sector level and at national totals level the EU NID and the EU CRT are fully consistent.

Table 1.14 Confidential data reported by MS in key categories for the EU

Source category gas	Confidential data	
	1990	2024
1.A.1.a Public electricity and heat production: Gaseous Fuels (CO_2)		SWE
1.A.1.a Public electricity and heat production: Liquid Fuels (CO_2)		SWE
1.A.1.b Petroleum refining: Gaseous Fuels (CO_2)		SWE
1.A.1.b Petroleum refining: Liquid Fuels (CO_2)		SWE
1.A.2.c Chemicals: Other Fuels (CO_2)		SWE
1.A.2.c Chemicals: Solid Fuels (CO_2)		SWE
1.A.2.f Non-metallic minerals: Other Fuels (CO_2)		SWE
1.A.2.f Non-metallic minerals: Solid Fuels (CO_2)		SWE
2.A.1 Cement production: no classification (CO_2)		SWE
2.A.2 Lime production: no classification (CO_2)		SWE

As the EU GHG inventory is the sum of MS inventories all categories reported as confidential by Member States are also reflected in the EU GHG inventories. If Member States report confidential data the notation key “C” will be shown in the comments of the relevant cell in the CRT only.

1.7.4 Data gaps and gap-filling

1.7.4.1 Gap filling of emissions

The EU GHG inventory is compiled by using the inventory submissions of the EU Member States. If a Member State does not submit all data required for the compilation of the EU inventory by 15 March of a reporting year, the Commission prepares estimates for data missing in collaboration with the relevant Member State based on the following methodologies and data:

where a Member State has submitted in the previous reporting year a consistent time series of estimates for the relevant source category and:

- that Member State has submitted an approximated greenhouse gas inventory for the year X – 1 pursuant to Article 26(2) of Regulation (EU) 2018/1999 that includes the missing estimate, on the data from that approximated greenhouse gas inventory;
- that Member State has not submitted an approximated greenhouse gas inventory for the year X – 1 under Article 26(2) of Regulation (EU) 2018/1999, but the Union has estimated approximated greenhouse gas emissions for the year X – 1 for that Member State in accordance with Article 26(2) of Regulation (EU) 2018/1999[22], on the data from that Union approximated greenhouse gas inventory;
- the use of the data from the approximated greenhouse gas inventory of the Member State is not possible or may lead to a highly inaccurate estimation, for missing estimates in the energy sector, on the energy statistics data obtained in accordance with Regulation (EC) No 1099/2008 of the European Parliament and of the Council;
- the use of the data from the approximated greenhouse gas inventory is not possible or may lead to a highly inaccurate estimation, for missing estimates in non-energy sectors, on estimation methodologies consistent with the technical advice on gap filling in Section 2.2.3 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Vol. 1) using, where appropriate, European statistics;

where an estimate of an emission by source or removal by sink for the relevant category was subject to technical corrections in accordance with Article 38(2)(d) of Regulation (EU) 2018/1999 in the latest review prior to the submission and the Member State concerned has not submitted a revised estimate, on the method used by the technical expert review team to calculate the technical correction;

where a consistent time series of reported estimates for the relevant source category is not available, on estimation methodologies consistent with the technical advice on gap filling in Section 2.2.3 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Vol. 1).

The Commission prepares the estimates by 31 March of the reporting year, following consultation with the Member State concerned, and communicates the estimates to the other Member States. The Member State concerned shall use the estimates referred to for its national submission to the UNFCCC to ensure consistency between the EU inventory and Member States’ inventories.

[22] Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics; OJ L 304, 14.11.2008, p. 1

The methods used for gap filling include interpolation, extrapolation and clustering. These methods are consistent with the 2006 IPCC guidelines[23].

Since 2011 GHG inventory estimates have been complete for all EU Member States, and therefore no gap filling has been needed.

1.7.4.2 Gap filling of activity data

In response to recommendations of the UNFCCC review team the EU elaborated and implemented a gap filling procedure for gaps in activity data (for further details on the methodology also see chapter 4.4.2). Due to the large resource needs for gap filling the following rules apply:

- Only activity data for key categories will be gap-filled.
- If more than 75 % of the emissions are calculated on basis of consistent activity data.
- If the IEF has a reasonable degree of consistency (i.e. standard deviation divided by mean < 50 %).
- Only for the latest reporting year.

Applying the rules mentioned above activity data of the following categories have been gap-filled in this inventory submission for the year 2024:

- Cement Production 2A1
- Lime Production 2A2
- Ammonia Production 2B1
- Nitric Acid Production 2B3

1.7.5 Geographical coverage of the European Union inventory

Table 1.15 shows the geographical coverage of the EU Member States' national inventories. Note that the EU territory of a Member State is not always equivalent to the territory of the Party to the UNFCCC. For two Member States there are differences in geographical coverage as UNFCCC Party and/or EU Member State (Denmark and France). If there are differences in geographical coverage the respective country needs to prepare more than one inventory.

As the EU inventory is the sum of the Member States' inventories, the EU inventory covers the same geographical area as the inventories of the 27 Member States for their respective EU territory. Note that Denmark and France submit GHG inventories to the UNFCCC that may differ from the GHG inventories used for the EU inventory because these countries submit an inventory to the UNFCCC, which is consistent with the Party coverage of these countries. However, the EU's submission under the Convention is fully consistent with MS GHG emissions by sources and sinks according to the EU territory (see Table 1.15).

Table 1.15 Geographical coverage of the Union's GHG inventory

Member State	Geographical coverage	EU-territory coverage	Country code
Austria	Austria	✓	AUT
Belgium	Belgium consisting of Flemish Region, Walloon Region and Brussels Region	✓	BEL
Bulgaria	Bulgaria	✓	BGR
Croatia	Croatia	✓	HRV

[23] ETC ACC technical note on gap filling procedures, December 2006.

Member State	Geographical coverage	EU-territory coverage	Country code
Cyprus	Area under the effective control of the Republic of Cyprus	✓	CYP
Czechia	Czech Republic	✓	CZE
Denmark	Denmark (excluding Greenland and the Faeroe Islands)	✓	DNM
	Denmark (including Greenland and the Faeroe Islands)		DNK
Estonia	Estonia	✓	EST
Finland	Finland including Åland Islands	✓	FIN
France	Metropolitan France, the overseas departments (Guadeloupe, Martinique, French Guiana, Réunion and Mayotte) and the overseas community Saint-Martin; excluding the overseas communities French Polynesia, Wallis and Futuna, Saint-Pierre and Miquelon, and Saint-Barthélemy; and excluding the overseas territories (the French Southern and Antarctic Lands) and New Caledonia.	✓	FRK
	Metropolitan France, the overseas departments, the overseas communities, overseas territories and New Caledonia.		FRA
Germany	Germany	✓	DEU
Greece	Greece	✓	GRC
Hungary	Hungary	✓	HUN
Ireland	Ireland	✓	IRE
Italy	Italy	✓	ITA
Latvia	Latvia	✓	LVA
Lithuania	Lithuania	✓	LTU
Luxembourg	Luxembourg	✓	LUX
Malta	Malta	✓	MLT
Netherlands	The reported emissions are those that derive from the legal territory of the Netherlands. This includes a 12-mile zone out from the coastline and inland water bodies. It excludes the Dutch Caribbean territories Aruba, Curaçao and Sint Maarten, which are constituent countries of the Kingdom of the Netherlands. It also excludes Bonaire, Saba and Sint Eustatius, which since 10 October 2010 have been public bodies (openbare lichamen) with their own legislation that is not applicable to the European part of the Netherlands. Emissions from offshore oil and gas production on the Dutch part of the continental shelf are included.	✓	NLD
Poland	Poland	✓	POL
Portugal	Mainland Portugal and the two Autonomous regions of Madeira and Azores Islands. Includes also emissions from air traffic and navigation bunkers realised between these areas.	✓	PRT
Romania	Romania	✓	ROU
Slovakia	Slovakia	✓	SVK
Slovenia	Slovenia	✓	SVN
Spain	Spanish part of Iberian mainland, Canary Islands, Balearic Islands, Ceuta and Melilla	✓	ESP
Sweden	Sweden	✓	SWE
European Union	EU	✓	EUA

1.7.6 Completeness of the European Union submission

1.7.6.1 National inventory document

The EU NID follows – as far as possible - the annotated outline of the national inventory document following Annex V of Decision 5/CMA.3, apart from the annexes. The main reason for this is the nature of the EU inventory being the sum of Member States' inventories. Therefore, the main purpose of the annexes is to make transparent the EU emission estimates by providing the basic Member States tables for every CRF table. Table 1.16 provides information on what is included in the Annexes to the EU GHG

inventory report and provides explanations where the EU does not follow the UNFCCC reporting guidelines.

Table 1.16 Annexes as outlined in the UNFCCC reporting guidelines and annexes included in the EU submission

Annex required in Annex V of Decision 5/CMA.3	Annex included in the EU submission
Annex I: Key categories	Included: Key category analyses Tier 1 including and excluding LULUCF
Annex II: Assessment of uncertainty	The uncertainty assessment is included in the NID, section 1.6
Annex III: Any additional information, as applicable, including detailed methodological descriptions of source or sink categories and the national emission balance	Included: A summary description of the methodologies used by each Member State for the EU key categories
Annex IV: Improvement list	

1.7.6.2 Activity data in the EU CRT/JSON

The European Union cannot provide all data in the sectoral background tables. The main reasons for not completing all sectoral background data tables are: (1) limited data availability partly due to confidentiality issues; and (2) the use of different type of activity data by Member States. The latter is due to the fact that the Member States are responsible for calculating emissions. If they use country-specific methods they may also use different types of activity data. At EU-level these different types of activity data cannot be simply added up. It should be noted that at EU-level no emissions are calculated directly on the basis of activity data reported by MS. However, all the details for the calculation of MS emissions are documented in the Member States' CRT, as part of their national GHG inventories.

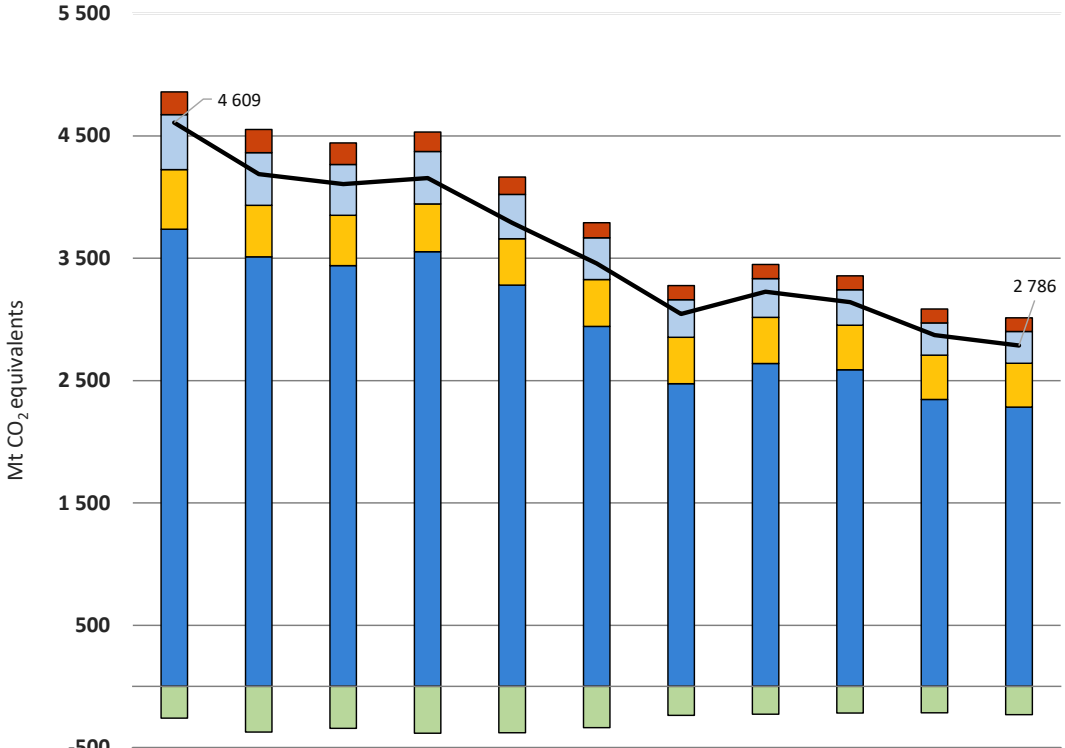
2 TRENDS IN EU GREENHOUSE GAS EMISSION AND REMOVALS

This chapter presents the main GHG emission trends in the EU. Aggregated results are described as regards total GHG and emission trends are briefly analyzed mainly at gas level. A short overview of countries contributions to total EU GHG trends is given. Finally, the trends of indirect GHGs and SO_2 emissions are presented.

2.1 Aggregated greenhouse gas emissions and removals

In 2024, total GHG emissions in the EU[24], including LULUCF and indirect CO_2, were 40 % (-1 822 million tonnes CO_2 equivalents) below 1990 levels. Emissions decreased by 3.0 % (-87 million tonnes CO_2 equivalents) between 2023 and 2024 (Figure 2.1).

Figure 2.1 EU GHG emissions and removals 1990–2024



	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
LULUCF	-258	-372	-342	-383	-378	-337	-237	-226	-218	-216	-231
Waste	185	189	177	159	141	122	116	115	114	113	111
IPPU	450	430	414	429	364	342	306	316	290	263	260
Agriculture	487	422	411	389	379	382	381	378	364	363	359
Energy	3 737	3 511	3 441	3 554	3 280	2 944	2 474	2 639	2 588	2 345	2 283
Total net GHG emissions (including indirect CO2)	4 609	4 187	4 107	4 154	3 790	3 458	3 044	3 227	3 142	2 873	2 786

Notes: CO_2 emissions from biomass with energy recovery are reported as a Memorandum item according to UNFCCC guidelines and are not included in national totals. In addition, no adjustments for temperature variations or electricity trade are considered. The 100-year global warming potentials are those from the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

[24] Unless otherwise specified, the national GHG totals in this report always include LULUCF. They may also be referred to as 'net' total GHG emissions. The other UNFCCC sectors that are included in the national totals are energy, industrial processes and product use, agriculture, waste and indirect CO_2 emissions.

2.1.1 Main trends by source category, 1990-2024

Total GHG emissions (including LULUCF and indirect CO_2 emissions) decreased by 1 822 Mt CO_2 eq. since 1990 reaching 2 786 Mt CO_2 equivalent in 2024. These emissions exclude international aviation and international navigation.

There has been a progressive decoupling between gross domestic product (GDP) and emissions, with GDP increasing by over 70% and greenhouse gas emissions falling by almost 40% between 1990 and 2024.

The trend in GHG emissions over the 34-year period was driven by a variety of factors, including the growing share in the use of renewables, the use of less carbon intensive fossil fuels and improvements in energy efficiency, as well as to structural changes in the economy.

The long-lasting changes have resulted in a lower energy intensity of the economy and in a lower carbon intensity of energy production and consumption in 2024 compared to 1990. Demand for energy to heat households has also been lower, as, besides better insulation standards in buildings, Europe on average has experienced milder winters since 1990, which has also helped reduce emissions.

GHG emissions decreased in most sectors between 1990 and 2024, with the notable exception of transport, refrigeration and air conditioning, where emissions increased, and forest land, where net removals decreased and the negative trend accelerated in the past few years.

Emissions from road transportation increased both for passenger and freight transport, in spite of the deployment of less carbon intensive and more efficient vehicles on the market, including electric vehicles. Increasing transport demand has partly outpaced climate benefits. Hydrofluorocarbon (HFC) emissions from refrigeration and air conditioning increased strongly between 1990 and 2014 but have decreased for the tenth consecutive year since then, due to phase down of F-gases as required by EU legislation, and more recently a phase out. The main reasons for the decrease in net removals include the aging of the forests from the late 2000s and a lower annual increment, as well as increased harvesting and the negative impacts from climate change. At the aggregate level, emission reductions were largest for public electricity and heat production, manufacturing industries and construction, residential combustion, and iron and steel production (including energy-related emissions).

On the positive side, the top three emission reductions occurred in electricity and heat production, residential and the industrial sector.

A combination of factors can explain lower emissions in industrial sectors, such as improved efficiency and lower carbon intensity as well as structural changes in the economy, with a higher share of services and a lower share of more-energy-intensive industry in total GDP. For industry as a whole, including both combustion and processes, EU emissions almost halved between 1990 and 2024.

Emissions from electricity and heat production also decreased strongly, by 58%, over the past 34 years since 1990. In addition to improved energy efficiency there has been a move towards less carbon intense fuels. Between 1990 and 2024, the use of solid and liquid fuels in thermal power stations decreased strongly (by 68 % and 86 %, respectively) whereas natural gas consumption developed in the opposite direction (increasing by 44 %, although in the past two years since 2022 emissions fell by almost 18%). Coal consumption in 1990 was over three times higher than in 2024. 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.

Emissions in the residential sector also represented one of the largest reductions. Energy efficiency improvements from better insulation standards in buildings, and a less carbon-intensive fuel mix, can partly explain lower demand for space heating in the EU over the past 34 years.

A number of policies, both EU and Member State specific, have contributed to the overall GHG emission reduction, such as key agricultural and environmental policies in the 1990s and climate and energy policies in the past two decades since 2005. The latter include the implementation of the EU Emissions Trading System as well as national policies for the sectors not covered by this system. More information on policies and measures can be found in the EU's first Biennial Transparency Report under the Enhanced Transparency Framework of the Paris Agreement.

Almost all EU Member States reduced emissions compared to 1990 and thus contributed to the overall positive EU performance (see Table ES.3).

Additional information on EU key trends and drivers is available from the EEA briefing published alongside this report and available from the EEA website.

Table 2.1 shows those categories that made the largest contribution to the change in total GHG emissions and removals in the EU between 1990 and 2024.

Table 2.1 Overview of EU categories whose emissions and/or removals increased or decreased by more than 20 million tonnes CO_2 equivalent in the period 1990–2024

Source category	Million tonnes (CO_2 equivalents)
Road Transportation (CO2 from 1.A.3.b)	148
International Aviation (CO2 from 1.D.1.a)	75
Forest land remaining forest land (CO_2 from 4.A.1)	71
Forest land (CO_2 from 4.A)	65
Refrigeration and Air conditioning (HFCs from 2.F.1)	50
Land use, land-use change and forestry (CO_2 from 4)	28
International Navigation (CO2 from 1.D.1.b)	26
Cropland remaining cropland (CO_2 from 4.B.1)	-20
Unmanaged Waste Disposal Sites (CH4 from 5.A.2)	-23
Grassland (CO_2 from 4.C)	-24
Agricultural soils: Direct N2O emissions (N2O from 3.D.1)	-27
Cropland (CO_2 from 4.B)	-30
Adipic Acid Production (N2O from 2.B.3)	-34
Cement Production (CO2 from 2.A.1)	-37
Managed Waste Disposal Sites (CH4 from 5.A.1)	-37
Nitric Acid Production (N2O from 2.B.2)	-39
Fugitive Emissions from Oil and Natural Gas (CH4 from 1.B.2)	-48
Enteric Fermentation: Cattle (CH4 from 3.A.1)	-53
Fugitive Emissions from Solid Fuels (CH4 from 1.B.1)	-64
Manufacture of Solid Fuels and Other Energy Industries (CO2 from 1.A.1.c)	-74
Fuels used Commercial/Institutional Sector (CO2 from 1.A.4.a)	-74
Iron and Steel Production (CO2 from 1.A.2.a + 2.C.1)	-135
Fuels used Residential Sector (CO2 from 1.A.4.b)	-179
Manufacturing industries (excl. Iron and steel) (Energy-related CO2 from 1.A.2 excl. 1.A.2.a)	-284
Public Electricity and Heat Production (CO2 from 1.A.1.a)	-713
Total (with net CO_2 emissions/removals)	**-1822**

Notes: As the table only presents sectors whose emissions have increased or decreased by at least 20 million tonnes CO_2 equivalent, the sum of the EU key categories in this table does not match the total change in emissions listed at the bottom of the table, which includes all emission sources in the EU inventory. Note that LULUCF categories and the indirect CO_2 emissions are reflected in this table.

2.1.2 Main emission changes by source category, 2023-2024

Total GHG emissions (including LULUCF) decreased in 2024 by 87 million tonnes, or 3 % compared to 2023, to reach 2 786 Mt CO_2 equivalent in 2024.

The year 2023 performance represented one of the largest relative and absolute reductions in GHG emissions in the EU since 1990. The year 2024 saw a further decrease in GHG emissions.

The largest decrease in emissions in 2024 occurred in the energy sector, and particularly in public electricity and heat production, where emissions decreased by over 9% (corresponding to 53 MtCO_2-eq).Lower emissions in the power sector in the EU in 2024 was due to both a strong reduction in the consumption of coal, particularly, but also of natural gas.

According to Eurostat data, the use of renewable electricity represented 47% of the net electricity generated in the EU in 2024mostly driven by hydro, wind and solar energy..

The other category showing significant improvements in the last year is cropland (-15 MtCO_2-eq). As Member States move to Tier 3 methods for mineral soils, estimates reflect climate variability and this can create large interannual variation in emissions and removals from mineral and organic soils. Lower emissions in the cropland category can be largely attributed to higher precipitation in Germany in 2024 compared to 2023. Table 2.2 shows the categories making the largest contribution to the change in GHG emissions and removals in the EU between 2023 and 2024.

Table 2.2 Overview of EU categories whose emissions and/or removals increased or decreased by more than 3 million tonnes CO_2 equivalent in the period 2023–2024

Source category	Million tonnes (CO_2 equivalents)
Road Transportation (CO2 from 1.A.3.b)	9
Grassland (CO_2 from 4.C)	4
Forest land (CO_2 from 4.A)	-3
Fuels used Residential Sector (CO2 from 1.A.4.b)	-5
Manufacturing industries (excl. Iron and steel) (Energy-related CO2 from 1.A.2 excl. 1.A.2.a)	-7
Cropland (CO_2 from 4.B)	-15
Public Electricity and Heat Production (CO2 from 1.A.1.a)	-53
Total (with net CO_2 emissions/removals)	**-87**

Notes: As the table only presents sectors whose emissions have increased or decreased by at least 3 million tonnes of CO_2 equivalent, the sum of the EU key categories in this table does not match the total change in emissions listed at the bottom of the table, which includes all emission sources in the EU inventory. Note that LULUCF categories and the indirect CO_2 emissions are reflected in this table.

Table 2.3 gives an overview on total GHG emissions by Member States, illustrating where main changes occurred.

Table 2.3 Greenhouse gas emissions in CO_2 equivalent (incl. LULUCF and incl. indirect CO_2)

	1990 (million tonnes)	2024 (million tonnes)	2023 - 2024 (million tonnes)	Change 2023 - 2024 (%)	Change 1990-2024 (%)	Share MS/EU 2024
Austria	65.9	70.0	-5.3	-7.1%	6.2%	2.5%
Belgium	142.6	97.4	0.0	0.0%	-31.7%	3.5%
Bulgaria	83.9	35.4	-2.6	-6.9%	-57.8%	1.3%
Croatia	25.1	20.9	1.1	5.5%	-16.8%	0.7%
Cyprus	5.5	8.7	0.0	0.5%	57.5%	0.3%
Czechia	185.3	92.0	-6.5	-6.6%	-50.4%	3.3%
Denmark	78.5	36.6	-1.7	-4.4%	-53.3%	1.3%
Estonia	36.3	12.1	-1.2	-9.2%	-66.5%	0.4%
Finland	43.0	49.1	1.0	2.0%	14.0%	1.8%
France	520.9	325.8	-13.2	-3.9%	-37.4%	11.7%
Germany	1289.6	707.6	-35.2	-4.7%	-45.1%	25.4%
Greece	101.7	68.8	1.1	1.6%	-32.3%	2.5%
Hungary	91.7	47.3	-1.6	-3.2%	-48.4%	1.7%
Ireland	62.1	56.4	-1.5	-2.6%	-9.1%	2.0%
Italy	507.7	299.4	-20.2	-6.3%	-41.0%	10.7%
Latvia	13.9	12.5	0.9	8.2%	-10.1%	0.4%
Lithuania	43.6	10.5	-1.1	-9.4%	-76.0%	0.4%
Luxembourg	12.7	6.9	-0.3	-3.9%	-46.1%	0.2%
Malta	2.6	2.2	0.0	-1.5%	-16.8%	0.1%
Netherlands	226.6	144.4	-1.7	-1.2%	-36.3%	5.2%
Poland	433.7	316.4	8.6	2.8%	-27.0%	11.4%
Portugal	64.1	52.1	-0.5	-1.0%	-18.7%	1.9%
Romania	232.9	64.6	-0.1	-0.2%	-72.3%	2.3%
Slovakia	65.1	28.9	-0.6	-1.9%	-55.6%	1.0%
Slovenia	14.2	11.0	0.6	5.4%	-22.5%	0.4%
Spain	247.6	215.8	-1.6	-0.8%	-12.8%	7.7%
Sweden	11.7	-6.7	-4.9	271.3%	-157.7%	-0.2%
EU	**4608.5**	**2786.2**	**-86.6**	**-3.0%**	**-39.5%**	

2.2 Emission and removal trends by gas

Table 2.10 gives an overview of the main trends in EU GHG emissions and removals for 1990-2024. In the EU the most important GHG is CO_2, accounting for 72 % of total EU emissions in 2024 including LULUCF. In 2024, CO_2 emissions including LULUCF were 2 158 Mt, which was 40 % below 1990 levels, thus responsible for the largest reduction in emissions since 1990. Emissions of CH_4 and N_2O also decreased substantially in the past 34 years since 1990, reflecting among other things lower levels of mining activities, lower oil and gas production and leaks from pipeline networks, lower agricultural livestock, particularly of cattle, as well as lower emissions from managed waste disposal on land and from reduced adipic and nitric acid production. Emissions of HFCs increased compared to 1990 but have reported significant reductions in past years.

Table 2.4 Overview of EU GHG emissions and removals from 1990 to 2024 in CO_2 equivalent

GREENHOUSE GAS EMISSIONS	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
Net CO_2 emissions/removals	3 591	3 243	3 242	3 337	3 030	2 733	2 365	2 552	2 491	2 233	2 158
CO_2 emissions (without LULUCF)	3 879	3 646	3 613	3 747	3 436	3 096	2 628	2 806	2 737	2 479	2 418
CH_4	670	612	556	506	470	442	416	414	404	399	391
N_2O	298	276	246	234	198	191	190	191	180	180	178
HFCs	13	21	42	62	83	83	65	62	60	56	54
PFCs	22	15	10	6	3	3	2	2	1	1	1
Unspecified mix of HFCs and PFCs	5	5	2	1	1	1	2	2	1	0	0
SF_6	10	14	9	7	6	6	5	5	4	4	4
NF_3	0	0	0	0	0	0	0	0	0	0	0
Total (with net CO_2 emissions/removals)	**4 609**	**4 187**	**4 107**	**4 154**	**3 790**	**3 458**	**3 044**	**3 227**	**3 142**	**2 873**	**2 786**
Total (without LULUCF)	**4 867**	**4 559**	**4 449**	**4 537**	**4 169**	**3 794**	**3 281**	**3 453**	**3 360**	**3 088**	**3 017**

Notes: CO_2 emissions include indirect CO_2. Please note that historical data may have changed compared to last year's Inventory Report due to recalculations

The largest source categories for CO_2 emissions (Table 2.11) have been reduced between 1990 and 2024 with the exception of 1.A.3.b Road transportation.

Table 2.5 CO_2 emissions by large source categories: absolute and relative change 1990 to 2024 in CO_2 equivalents (Mt) and their share in 2024 EU Total CO_2 emissions

GREENHOUSE GAS SOURCE CATEGORIES	1990 (kt)	2024 (kt)	absolute change (Mt)	% change (in Mt)	share 2024
1.A.3.b - Road Transportation	609635	757652	148	24%	31%
1.A.1.b - Petroleum Refining	107309	91137	-16	-15%	4%
2.C.1.a - Steel Production	77597	45883	-32	-41%	2%
2.A.1 - Cement Production	95237	58710	-37	-38%	2%
1.A.4.a - Commercial/Institutional	169542	95181	-74	-44%	4%
1.A.4.b - Residential	426437	247895	-179	-42%	10%
1.A.2 - Manufacturing Industries and Construction	715117	346350	-369	-52%	14%
1.A.1.a - Public Electricity and Heat Production	1226218	513319	-713	-58%	21%
Other	452247	262281	-190	-42%	11%
Total CO2	**3879338**	**2418408**	**-1461**	**-38%**	**100%**

Note: Other is calculated by subtracting the presented categories from the sector total excluding LULUCF. Percentages are rounded and may lead to a sum higher or lower than 100 %

CH_4 emissions account for 13 % of total EU GHG emissions in 2024 and decreased by 42 % since 1990 to 391 Mt CO_2 equivalents in 2024 (Table 2.6). The two largest source categories are enteric fermentation from cattle and anaerobic waste. They account for 56 % of CH_4 emissions in 2024.

Table 2.6 shows that the main reasons for declining CH_4 emissions were reductions in coal mining, cattle population and natural gas operations.

Table 2.6 CH_4 emissions by large source categories: absolute and relative change 1990 to 2024 in CO_2 equivalents (Mt) and their share in 2024 EU Total CH_4 emissions

GREENHOUSE GAS SOURCE CATEGORIES	1990 (kt)	2024 (kt)	absolute change (Mt)	% change (in Mt)	share 2024
1.A.4 - Other Sectors	23783	15737	-8	-34%	4%
3.A.2 - Enteric Fermentation - Sheep	23713	15160	-9	-36%	4%
3.B.1 - CH4 Emissions - Farming	55164	43615	-12	-21%	11%
5.D - Wastewater Treatment and Discharge - Wastewater	34344	15583	-19	-55%	4%
5.A.1.a - Anaerobic - Waste	96129	64961	-31	-32%	17%
1.B.2.b - Natural Gas - Operation	47075	10391	-37	-78%	3%
3.A.1 - Enteric Fermentation - Cattle	205067	151843	-53	-26%	39%
1.B.1.a - Coal Mining and Handling - Operation	80725	16543	-64	-80%	4%
Other	103873	57328	-47	-45%	15%
Total CH4	**669874**	**391160**	**-279**	**-42%**	**100%**

Note: Other is calculated by subtracting the presented categories from the sector total excluding LULUCF. Percentages are rounded and may lead to a sum higher or lower than 100 %

N_2O emissions are responsible for 6 % of total EU GHG emissions and decreased by 40 % to 178 Mt CO_2 equivalents in 2024 (Table 2.7). N_2O emissions derive mainly from the agriculture sector. The two largest source categories account for about 63 % of N_2O emissions in 2024. Table 2.7 shows that the main reason for large N_2O emission cuts were reductions in chemical industry and agricultural soils.

Table 2.7 N_2O emissions by large source categories: absolute and relative change 1990 to 2024 in CO_2 equivalents (Mt) and their share in 2024 EU Total N_2O emissions

GREENHOUSE GAS SOURCE CATEGORIES	1990 (kt)	2024 (kt)	absolute change (Mt)	% change (in Mt)	share 2024
5.D - Wastewater Treatment and Discharge - Wastewater	8824	12377	4	40%	7%
1.A.3.b - Road Transportation	4796	8260	3	72%	5%
1.A.1.a - Public Electricity and Heat Production	5283	3634	-2	-31%	2%
3.B.2 - N2O and NMVOC Emissions - Farming	27744	17617	-10	-37%	10%
3.D.2 - Agricultural Soils - Farming	31511	21334	-10	-32%	12%
3.D.1 - Agricultural Soils - Direct N2O Emissions From N	111566	84483	-27	-24%	47%
2.B - Chemical Industry	78460	2562	-76	-97%	1%
Other	30063	28197	-2	-6%	16%
Total N2O	**298247**	**178465**	**-120**	**-40%**	**100%**

Note: Other is calculated by subtracting the presented categories from the sector total excluding LULUCF. Percentages are rounded and may lead to a sum higher or lower than 100 %

Fluorinated gas emissions account for 2 % of total EU GHG emissions. In 2024, emissions amounted to 59 Mt CO_2 equivalents, which was 19 % above 1990 levels (Table 2.8). Refrigeration and air conditioning, the largest source category, accounts for 84 % of fluorinated gas emissions in 2024. The main reason for this is the phase-out of ozone-depleting substances such as chlorofluorocarbons under the Montreal Protocol and the replacement of these substances with HFCs (mainly in refrigeration, air conditioning, foam production and as aerosol propellants). On the other hand, the sum of HFC emissions from categories not presented individually in Table 2.8 decreased substantially.

Table 2.8 F-Gases emissions by large source categories: absolute and relative change 1990 to 2024 in CO2 equivalents (Mt) and their share in 2024 EU Total F-Gases emissions

GREENHOUSE GAS SOURCE CATEGORIES	1990 (kt)	2024 (kt)	absolute change (Mt)	% change (in Mt)	share 2024
2.F.1 - Refrigeration and Air conditioning - HFCs	5	49687	50	1065514%	84%
2.F.4 - Aerosols - HFCs	1	1941	2	149188%	3%
2.F.3 - Fire Protection - HFCs	0	1130	1	NA	2%
2.F.2 - Foam Blowing Agents - HFCs	0	1032	1	NA	2%
2.G.2 - SF6 and PFCs from Other Product Use - SF6	4276	1802	-2	-58%	3%
Other	45378	3350	-42	-93%	6%
Total F-gases	**49660**	**58942**	**9**	**19%**	**100%**

Note: Other is calculated by subtracting the presented categories from the sector total excluding LULUCF. Percentages are rounded and may lead to a sum higher or lower than 100 %

2.3 Emission and removal trends by sector

Table 2.9 gives an overview of EU emissions in the main source and sink categories for 1990–2024. The most important sector in terms of GHG emissions is energy (i.e. combustion and fugitive emissions), which accounted for 76 % of total emissions including LULUCF in 2024. The second largest sector is agriculture (12 %), followed by industrial processes (9 %) and waste (4 %). The LULUCF sector accounted for -8 % of the EU's net national total emissions in 2024. More detailed trend descriptions are included in the individual sector chapters (chapters 3-7) and chapter 9 on indirect CO_2 emissions.

Table 2.9 Overview of EU GHG emissions (in million tonnes CO_2 equivalent) in the main source and sink categories for the period 1990 to 2024

GHG SOURCE AND SINK	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
1. Energy	3 737	3 511	3 441	3 554	3 280	2 944	2 474	2 639	2 588	2 345	2 283
2. Industrial Processes	450	430	414	429	364	342	306	316	290	263	260
3. Agriculture	487	422	411	389	379	382	381	378	364	363	359
4. Land-Use, Land-Use Change and Forestry	-258	-372	-342	-383	-378	-337	-237	-226	-218	-216	-231
5. Waste	185	189	177	159	141	122	116	115	114	113	111
6. Other	0	0	0	0	0	0	0	0	0	0	0
indirect CO_2 emissions	8	7	6	6	5	4	4	4	4	4	4
Total (with net CO_2 emissions/removals)	**4 609**	**4 187**	**4 107**	**4 154**	**3 790**	**3 458**	**3 044**	**3 227**	**3 142**	**2 873**	**2 786**
Total (without LULUCF)	**4 867**	**4 559**	**4 449**	**4 537**	**4 169**	**3 794**	**3 281**	**3 453**	**3 360**	**3 088**	**3 017**

2.4 Emission trends by Member State

Table 2.10 gives an overview of EU Member States' contributions to the EU emissions including LULUCF and indirect CO_2 for 1990–2024. Countries show large variations in GHG emission trends.

Table 2.10 Overview of countries contributions to total EU GHG emissions, including LULUCF and including indirect CO_2 emissions from 1990 to 2024 in million tonnes CO_2 equivalent

Member State	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
Austria	65.9	61.9	63.1	77.9	73.6	75.3	73.4	74.3	72.8	75.4	70.0
Belgium	142.6	150.9	146.5	142.8	132.5	117.6	106.3	109.1	102.1	97.4	97.4
Bulgaria	83.9	56.7	42.1	48.4	49.1	54.1	40.1	46.0	50.1	38.0	35.4
Croatia	25.1	14.2	19.1	21.9	21.2	18.9	18.2	18.6	19.6	19.8	20.9
Cyprus	5.5	6.9	8.3	9.2	9.3	8.2	8.3	8.6	8.6	8.6	8.7
Czechia	185.3	145.5	138.2	137.1	129.8	115.6	121.1	122.9	116.8	98.5	92.0
Denmark	78.5	85.2	77.6	73.3	67.4	50.1	44.3	44.3	41.8	38.3	36.6
Estonia	36.3	16.2	15.2	17.7	17.0	18.4	12.7	13.5	15.0	13.4	12.1
Finland	43.0	43.3	40.6	35.5	44.7	34.2	45.3	55.5	53.7	48.1	49.1
France	520.9	505.8	517.9	495.1	467.0	415.8	350.3	382.4	368.0	339.0	325.8
Germany	1289.6	1119.5	1050.7	1000.2	944.6	905.2	778.6	807.7	806.9	742.8	707.6
Greece	101.7	106.5	124.1	133.2	115.8	92.6	70.7	72.8	72.5	67.7	68.8
Hungary	91.7	71.3	74.4	71.5	62.2	56.7	56.0	56.6	54.5	48.9	47.3
Ireland	62.1	66.6	75.2	76.4	65.9	63.4	60.9	63.1	61.5	58.0	56.4
Italy	507.7	499.5	529.4	549.7	472.6	391.1	330.4	362.0	360.7	319.6	299.4
Latvia	13.9	-1.1	0.3	4.1	9.1	9.2	7.9	9.9	12.5	11.6	12.5
Lithuania	43.6	17.3	9.2	18.7	9.5	12.5	13.8	13.8	12.0	11.6	10.5
Luxembourg	12.7	9.6	9.0	12.4	12.0	9.9	8.6	8.8	7.5	7.1	6.9
Malta	2.6	2.7	2.7	3.0	3.0	2.1	2.1	2.1	2.3	2.2	2.2
Netherlands	226.6	235.6	223.3	218.7	219.0	199.3	167.8	170.8	155.9	146.1	144.4
Poland	433.7	384.8	348.6	341.8	343.3	340.3	336.9	365.0	334.5	307.8	316.4
Portugal	64.1	64.7	84.5	91.3	66.7	65.6	55.2	55.5	57.9	52.7	52.1
Romania	232.9	161.8	108.7	115.8	90.3	72.7	68.9	75.4	69.8	64.7	64.6
Slovakia	65.1	45.1	41.2	48.0	42.7	36.7	31.0	34.7	31.2	29.5	28.9
Slovenia	14.2	13.6	12.5	13.4	12.6	17.4	11.6	11.7	11.4	10.5	11.0
Spain	247.6	284.8	337.3	389.2	306.4	277.1	217.6	233.8	240.2	217.4	215.8
Sweden	11.7	17.6	6.9	8.2	3.0	-2.4	6.1	7.9	2.0	-1.8	-6.7
EU	**4 609**	**4 187**	**4 107**	**4 154**	**3 790**	**3 458**	**3 044**	**3 227**	**3 142**	**2 873**	**2 786**

The largest emitters in the EU inventory in 2024 were Germany (25 % of EU net emissions), followed by France, Poland and Italy. The majority of EU Member States contributed to the strong decrease in GHG emissions in the EU between 1990 and 2024, with Germany, Italy, France and Romania together accounting for 63 % of the total net reduction.

Common drivers to lower GHG emissions in most EU countries over the past 33 years have been the use of less carbon intensive fuels, with a switch from coal to gas and a strong increase in the use of renewable energy sources, as well as significant improvements in energy efficiency, both in transformation and end use.

More information on GHG emission trends by Member State can be found in the relevant national inventory reports to UNFCCC https://unfccc.int/ghg-inventories-annex-i-parties/2026

2.5 Emission trends for indirect greenhouse gases and sulphur dioxide

Emissions of CO, NO_X, NMVOC and SO_2 have to be reported to the UNFCCC Secretariat because they influence climate change indirectly: CO, NO_X and NMVOC are precursor substances for ozone which itself is a greenhouse gas. Sulphur emissions produce microscopic particles (aerosols) that can reflect sunlight back out into space and also affect cloud formation. Table 2.11 shows the total indirect GHG and SO_2 emissions in the EU between 1990 and 2024. All emissions were reduced significantly from 1990 levels.

Table 2.11 Overview of EU indirect GHG and SO2 emissions for 1990–2024 (kt)

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	2024
NO_x	13 574	11 624	10 341	9 738	7 831	6 670	5 073	5 154	4 982	4 598	4 470
CO	55 185	42 310	33 545	27 248	23 225	19 063	16 006	16 721	16 291	14 553	14 337
NMVOC	16 056	12 949	10 911	9 661	8 405	7 628	7 226	7 030	7 301	6 938	6 633
SO_2	17 561	10 648	6 590	5 057	2 544	1 722	991	1 008	989	856	815

3 ENERGY (CRT SECTOR 1)

This chapter starts with an overview on emission trends in CRT Sector 1 Energy. For each EU key category as well as other important subsector specific categories, overview tables are presented including the countries' contributions to the category in terms of level and trend. This chapter includes also, the reference approach, and international bunkers.

3.1 Overview of sector

CRT Sector 1 Energy comprises the three sectors Fuel combustion activities (1.A), Fugitive emissions from fuels (1.B) and CO_2 Transport and storage (1.C). The energy sector contributes 76% to total GHG emissions and is the largest emitting sector in the EU. Total GHG emissions from this sector decreased by 39 % from 3 737 Mt in 1990 to 2 283 Mt in 2024 (Figure 3.1). In 2024, emissions increased by 3 % compared to 2023.

The most important energy-related gas is CO_2 that makes up 79 % of the total EU greenhouse gas emissions in 2024. CH_4 of the energy sector is responsible for 2 % and N_2O for 1 % of the total GHG emissions.

Figure 3.1 CRT Sector 1 Energy: EU GHG emissions in CO_2 equivalents (kt) for 1990–2024

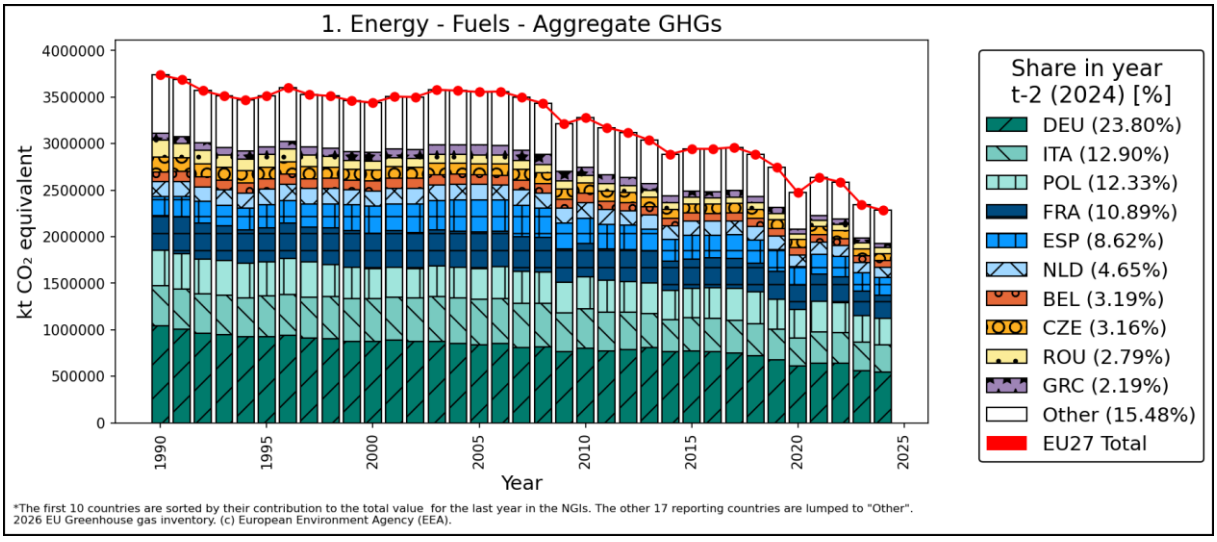


Table 3.1 shows that CO_2 emissions from source categories 1.A.1.a – Public Electricity and Heat Production and 1.A.3.b – Road Transportation account for 55 % from the whole Sector 1. Substantial decreases in absolute terms between 1990 and 2024 were reported in CO_2 emissions from sectors 1.A.1.a – Public Electricity and Heat Production and 1.A.2 – Manufacturing Industries and Construction, while CO_2 emissions from sector 1.A.3.b – Road Transportation increased by 24 % in the same period.

Table 3.1 Sector 1 Energy: Share and change major categories and all remaining categories in 1990 and 2024 in the EU

GREENHOUSE GAS SOURCE CATEGORIES	1990 (kt)	2024 (kt)	absolute change (Mt)	% change (in Mt)	share 2024
1.A.3.b - Road Transportation - CO2	609635	757652	148	24%	33%
1.A.1.b - Petroleum Refining - CO2	107309	91137	-16	-15%	4%
1.A.4.a - Commercial/Institutional - CO2	169542	95181	-74	-44%	4%
1.A.4.b - Residential - CO2	426437	247895	-179	-42%	11%
1.A.2 - Manufacturing Industries and Construction - CO2	715117	346350	-369	-52%	15%
1.A.1.a - Public Electricity and Heat Production - CO2	1226218	513319	-713	-58%	22%
Other	482410	231679	-251	-52%	10%
Total Energy	**3736667**	**2283213**	**-1453**	**-39%**	**100%**

The key categories in the energy sector are as follows:

- 1.A.1.a Public electricity and heat production: Gaseous Fuels (CO_2)
- 1.A.1.a Public electricity and heat production: Liquid Fuels (CO_2)
- 1.A.1.a Public electricity and heat production: Other Fuels (CO_2)
- 1.A.1.a Public electricity and heat production: Peat (CO_2)
- 1.A.1.a Public electricity and heat production: Solid Fuels (CO_2)
- 1.A.1.b Petroleum refining: Gaseous Fuels (CO_2)
- 1.A.1.b Petroleum refining: Liquid Fuels (CO_2)
- 1.A.1.c Manufacture of solid fuels and other energy industries: Gaseous Fuels (CO_2)
- 1.A.1.c Manufacture of solid fuels and other energy industries: Solid Fuels (CO_2)
- 1.A.2.a Iron and steel: Gaseous Fuels (CO_2)
- 1.A.2.a Iron and steel: Liquid Fuels (CO_2)
- 1.A.2.a Iron and steel: Solid Fuels (CO_2)
- 1.A.2.b Non-ferrous metals: Gaseous Fuels (CO_2)
- 1.A.2.c Chemicals: Gaseous Fuels (CO_2)
- 1.A.2.c Chemicals: Liquid Fuels (CO_2)
- 1.A.2.c Chemicals: Solid Fuels (CO_2)
- 1.A.2.d Pulp, paper and print: Gaseous Fuels (CO_2)
- 1.A.2.d Pulp, paper and print: Liquid Fuels (CO_2)
- 1.A.2.d Pulp, paper and print: Solid Fuels (CO_2)
- 1.A.2.e Food processing, beverages and tobacco: Gaseous Fuels (CO_2)
- 1.A.2.e Food processing, beverages and tobacco: Liquid Fuels (CO_2)
- 1.A.2.e Food processing, beverages and tobacco: Solid Fuels (CO_2)
- 1.A.2.f Non-metallic minerals: Gaseous Fuels (CO_2)
- 1.A.2.f Non-metallic minerals: Liquid Fuels (CO_2)
- 1.A.2.f Non-metallic minerals: Other Fuels (CO_2)
- 1.A.2.f Non-metallic minerals: Solid Fuels (CO_2)
- 1.A.2.g Other: Gaseous Fuels (CO_2)
- 1.A.2.g Other: Liquid Fuels (CO_2)
- 1.A.2.g Other: Other Fuels (CO_2)
- 1.A.2.g Other: Solid Fuels (CO_2)
- 1.A.3.a Domestic aviation: Jet Kerosene (CO_2)

- 1.A.3.b Road transportation: Diesel Oil (CO_2)
- 1.A.3.b Road transportation: Diesel Oil (N_2O)
- 1.A.3.b Road transportation: Gaseous Fuels (CO_2)
- 1.A.3.b Road transportation: Gasoline (CO_2)
- 1.A.3.b Road transportation: Liquefied Petroleum Gases (LPG) (CO_2)
- 1.A.3.c Railways: Liquid Fuels (CO_2)
- 1.A.3.d Domestic navigation: Gas/Diesel Oil (CO_2)
- 1.A.3.d Domestic navigation: Residual Fuel Oil (CO_2)
- 1.A.4.a Commercial/institutional: Gaseous Fuels (CO_2)
- 1.A.4.a Commercial/institutional: Liquid Fuels (CO_2)
- 1.A.4.a Commercial/institutional: Other Fuels (CO_2)
- 1.A.4.a Commercial/institutional: Solid Fuels (CO_2)
- 1.A.4.b Residential: Biomass (CH_4)
- 1.A.4.b Residential: Gaseous Fuels (CO_2)
- 1.A.4.b Residential: Liquid Fuels (CO_2)
- 1.A.4.b Residential: Solid Fuels (CH_4)
- 1.A.4.b Residential: Solid Fuels (CO_2)
- 1.A.4.c Agriculture/forestry/fishing: Gaseous Fuels (CO_2)
- 1.A.4.c Agriculture/forestry/fishing: Liquid Fuels (CO_2)
- 1.A.4.c Agriculture/forestry/fishing: Solid Fuels (CO_2)
- 1.A.5.a Stationary: Solid Fuels (CO_2)
- 1.A.5.b Mobile: Liquid Fuels (CO_2)
- 1.B.1.a Coal mining and handling: no classification (CH_4)
- 1.B.2.a Oil: no classification (CH_4)
- 1.B.2.a Oil: no classification (CO_2)
- 1.B.2.b Natural gas: no classification (CH_4)

3.2 Overview of trends in the Energy sector

Figure 3.2 shows the contribution of the respective subcategories in the Energy sector to the EU trend for the years 1990-2024. Emissions in Energy sector decreased by 39% since 1990. This is mainly influenced by reductions of CO_2 emissions in sectors 1.A.1 (-56%), 1.A.2 (-52%) and 1.A.4 (-40%). Only sector 1.A.3 shows an increase of CO_2 emissions over the time (+20%). In 1990, 18% of emissions in the Energy sector were related to Transport, while in 2024 the share increased to 35%

All categories show a decreasing trend between 2023 and 2024 (Table 3.2)

Figure 3.2: Trend of categories in Energy sector

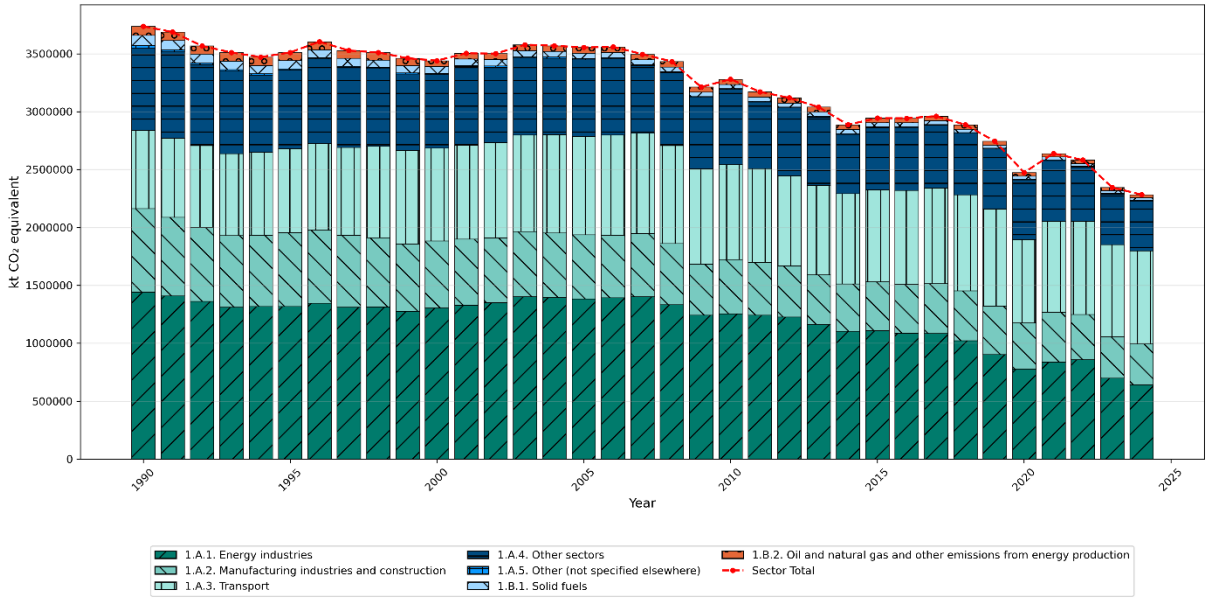


Table 3.2: Contribution of the different emission categories to the total trend in emissions from the energy sector

Emission category	Gas	Contribution to total energy emissions (2024)	Change of trend 1990-2024	Change of trend 2023-2024
1.A.1	CH_4	0.2%	229%	2%
1.A.1	CO_2	27.8%	-56%	-8%
1.A.1	N_2O	0.2%	-37%	-8%
1.A.2	CH_4	0.1%	50%	-5%
1.A.2	CO_2	15.2%	-52%	-2%
1.A.2	N_2O	0.1%	-25%	1%
1.A.3	CH_4	0.1%	-80%	3%
1.A.3	CO_2	34.8%	20%	1%
1.A.3	N_2O	0.4%	51%	-0.05%
1.A.4	CH_4	0.7%	-34%	-4%
1.A.4	CO_2	17.9%	-40%	-1%
1.A.4	N_2O	0.3%	-8%	-4%
1.A.5	CH_4	0.0%	-96%	1%
1.A.5	CO_2	0.3%	-68%	-4%
1.A.5	N_2O	0.002%	-71%	0%
1.B.1	CH_4	0.7%	-79%	-6%
1.B.1	CO_2	0.1%	-58%	-5%
1.B.1	N_2O	0.00001%	102%	-2%
1.B.2	CH_4	0.6%	-79%	-2%
1.B.2	CO_2	0.6%	-12%	2%
1.B.2	N_2O	0.002%	-3%	110%

3.3 Comparison between the sectoral approach and the reference approach

The IPCC reference approach for CO_2 from fossil fuels for the EU is based on Eurostat energy data for apparent consumption included in CRT table 1A(b) and data from MS CRT submissions for CRT table 1A(d). The reason for using Eurostat data in CRT table 1A(b) is that Eurostat provides a coherent data set for all Member States for apparent consumption in TJ whereas in the CRT submissions some MS use TJ and other MS use kt. Up to 2017 also for CRT table 1A(d) we used apparent consumption from Eurostat. The reason for having used Eurostat data in CRT table 1A(d) for many years was that also for non-energy use of fuels Eurostat provided a coherent data set for all EU Member States. The drawback of Eurostat data was that the definition of non-energy use of fuels in energy statistics is narrower than the definition in the IPCC guidelines because fuels used as reductants are not classified as non-energy use of fuels in energy statistics. In addition, Member States may use other data than the energy balance for compiling the non-energy use data (e.g. EU ETS data, environmental reporting of companies, etc.). Therefore, the EU decided to change the reporting in CRT table 1A(d) and calculate all data as the sum of respective MS data. The drawback of this approach is that Member States may use different allocation of energy use and non-energy use of fuels (e.g. in iron and steel) depending on the allocation in the sectoral approach.

Energy statistics are submitted to Eurostat by Member States on an annual basis with the five joint Eurostat/IEA/UNECE questionnaires on solid fuels, oil, natural gas, electricity and heat, and renewables and wastes. On the basis of this information Eurostat provides the annual energy balances which can be used for the estimation of CO_2 emissions from fossil fuels by Member State and for the EU as a whole.

The Eurostat data for the EU IPCC reference approach includes activity data and net calorific values as available in the Eurostat database. For the calculation of CO_2 emissions, the IPCC default carbon emission factors are used.

The IPCC reference approach method at EU level is a three-step process.

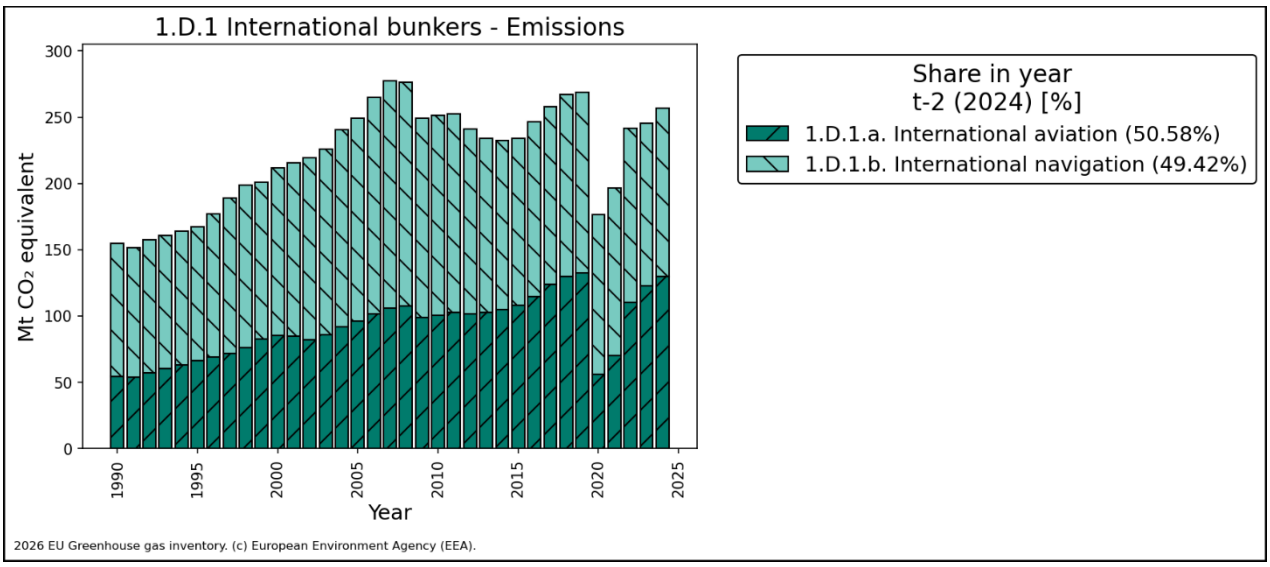
- The Energy Statistics Regulation (Regulation EC/1099/2008) is the basis for MS reporting of energy data to Eurostat as well as the basis for the EU's IPCC Reference Approach. For each of the EU Member States, annual data on energy production, imports, exports, international bunkers and stock changes by fuel are available from Eurostat's database http://ec.europa.eu/eurostat/data/database. The energy data used for the Reference Approach in the EU inventory submission, and reported in table 1.A(b), corresponds to the sum of the EU Member States.
- The energy data in Eurostat's database can be exported in mass or volume units or in Terajoules. The latter is based on the calorific values reported by MS in the energy questionnaires, on a net basis. Table 1.A(b) was reported in Terajoules.
- The carbon emission factors are those from the IPCC 2006 Guidelines http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html
- The carbon excluded from table 1.A(b) is fully consistent with the data included in table 1.A(d).
- Eurostat data is not used for table 1.A(d). Instead, we use the sum of the Member States CRT data because the definition of Eurostat non-energy use of fuels is narrower than in the IPCC guidelines and because the reporting in column I is closely linked to the inventories in IPPU sectors.
- The fractions of carbon oxidized reported in table 1.A(b) are the default 2006 IPCC factors of 1, thus assuming complete oxidation of emissions.

Note that in 2026 the reference approach tables (incl. feedstock tables) cannot be calculated due to persistent problems with the UNFCCC ETF tool.

3.4 International aviation (aviation bunkers) and international navigation (marine bunkers) (EU)

International bunker emissions include emissions from aviation and marine bunkers reported under CRT category 1.D.1. The EU emissions are derived as the sum of the international bunker emissions of the countries[25]. Between 1990 and 2024, total greenhouse gas emissions from international bunkers increased by 66 % in the EU. CO_2 emissions from marine bunkers accounted for 49.42 % of total greenhouse gas emissions from international bunkers in 2024, while from aviation bunkers 50.58 % (Figure 3.3).

Figure 3.3 1D1 International bunkers: Greenhouse gas emissions (in Mt of CO_2 equ.)



3.4.1 International Aviation (1D1a) (EU)

This mobile source category includes emissions from civil international aviation, i.e. passenger and freight activity of flights having their origin and destination (O-D) in different countries. The main fuel used is jet kerosene, while the use of aviation gasoline is almost negligible.

CO_2 emissions from 1D1a International Aviation

CO_2 emissions from international aviation accounted for 4 % of total GHG emissions in EU, 2024 (including indirect CO_2, with LULUCF and international aviation). Considering only international aviation, CO_2 accounted for 99.2 % of total GHG emissions from international aviation in EU, 2024.

The time series of CO_2 emissions and activity data from 1D1a International aviation, years 1990-2024, are shown in Figure 3.4.

[25] Specifically, what is considered as 'international bunker emissions' from the MS perspective, it is also considered from the perspective of the EU. Hence, the EU emissions are derived as the exact sum of emissions reported by the MS.

Figure 3.4 1D1a International Aviation: CO_2 emissions (in kt) and activity data (in TJ)

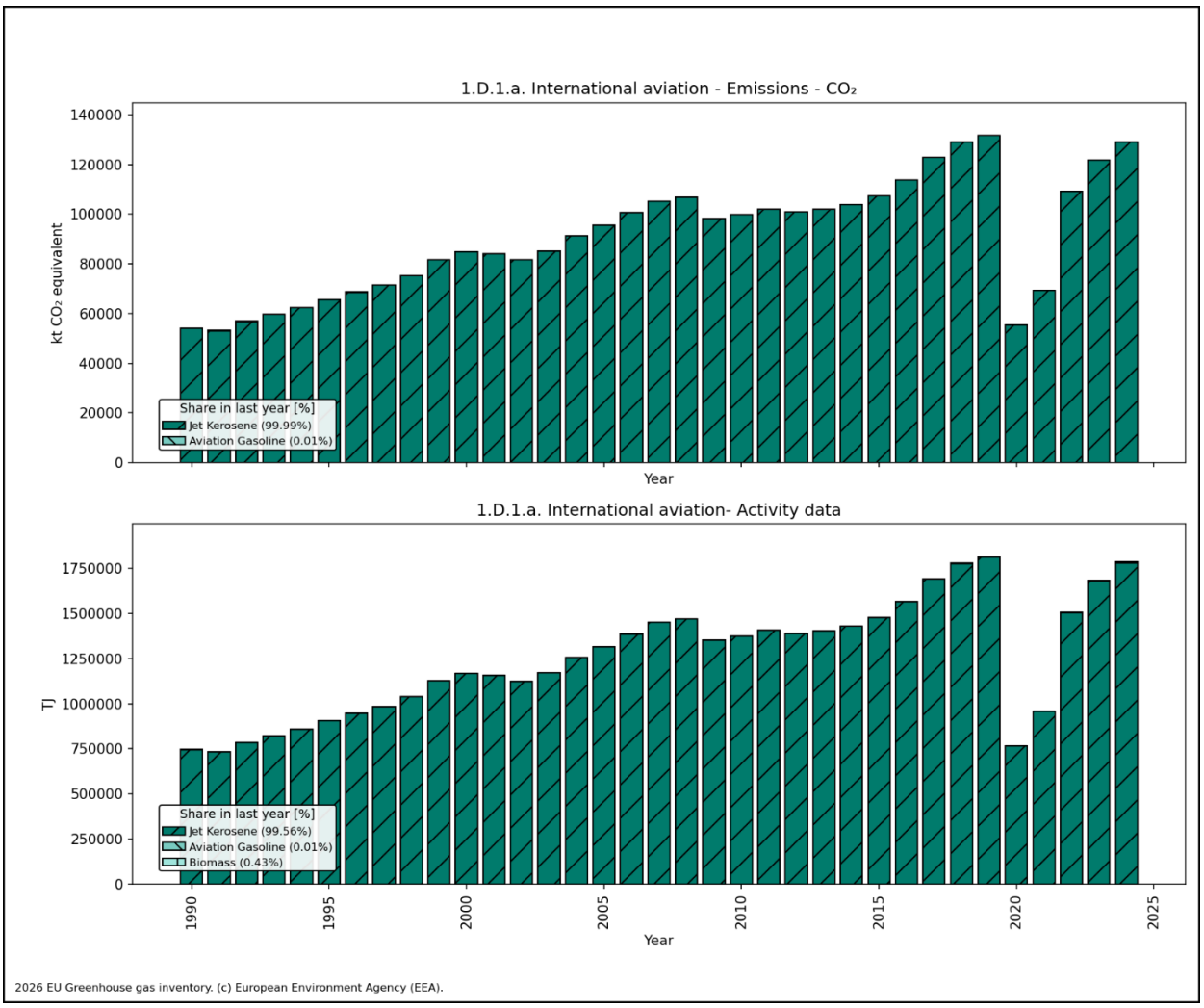


Table 3.3 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), and change between years for international aviation. Between 1990 and 2024, CO_2 emissions from international aviation increased by 138 % in the EU, while between 2023 and 2024 the corresponding change was 6 % increase.

Table 3.3 1D1a International Aviation bunkers: CO_2 emissions per country (in kt), share in EU (%), and change between years

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	880	2 634	2 933	2,3%	2 052	233%	299	11%
Belgium	3 125	5 261	5 770	4,5%	2 644	85%	508	10%
Bulgaria	713	660	704	0,5%	-9	-1%	44	7%
Croatia	497	596	735	0,6%	238	48%	138	23%
Cyprus	718	953	1 015	0,8%	297	41%	62	6%
Czechia	670	1 040	1 367	1,1%	697	104%	328	32%
Denmark	1 764	2 487	2 879	2,2%	1 115	63%	392	16%
Estonia	107	145	169	0,1%	62	58%	24	16%
Finland	1 008	1 923	2 034	1,6%	1 026	102%	111	6%
France	9 354	16 575	17 976	13,9%	8 622	92%	1 401	8%
Germany	12 027	28 366	27 194	21,1%	15 167	126%	-1 172	-4%
Greece	2 475	4 194	4 615	3,6%	2 140	86%	421	10%
Hungary	504	911	1 155	0,9%	650	129%	244	27%
Ireland	1 073	3 389	3 326	2,6%	2 253	210%	-63	-2%
Italy	4 285	11 603	12 877	10,0%	8 592	201%	1 274	11%
Latvia	221	407	396	0,3%	175	79%	-10	-3%
Lithuania	399	316	329	0,3%	-70	-18%	13	4%
Luxembourg	394	1 789	1 881	1,5%	1 487	377%	92	5%
Malta	197	469	524	0,4%	327	166%	55	12%
Netherlands	4 608	9 984	10 431	8,1%	5 823	126%	447	4%
Poland	640	3 525	4 001	3,1%	3 361	525%	476	14%
Portugal	1 533	4 774	4 973	3,9%	3 441	224%	200	4%
Romania	790	285	278	0,2%	-512	-65%	-7	-2%
Slovakia	67	152	173	0,1%	106	158%	21	14%
Slovenia	49	54	59	0,0%	10	20%	5	9%
Spain	4 741	17 210	19 402	15,0%	14 661	309%	2 192	13%
Sweden	1 355	2 112	1 791	1,4%	436	32%	-321	-15%
EU	**54 193**	**121 812**	**128 985**	**100%**	**74 791**	**138%**	**7 172**	**6%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period

1D1a International Aviation – Jet Kerosene (CO_2)

CO_2 emissions from jet kerosene accounted for 99.2 % of total GHG emissions from international aviation in 2024.

Figure 3.5 shows the time series of CO_2 emissions in EU from international aviation – jet kerosene and the highest shares of countries. Figure 3.5 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries (in t/TJ). It is observed that the CO_2 IEF at EU level is almost constant over the years at 72.5 t/TJ.

Figure 3.5: 1D1a International Aviation – Jet Kerosene: Time series of CO_2 emissions in EU and highest shares of countries

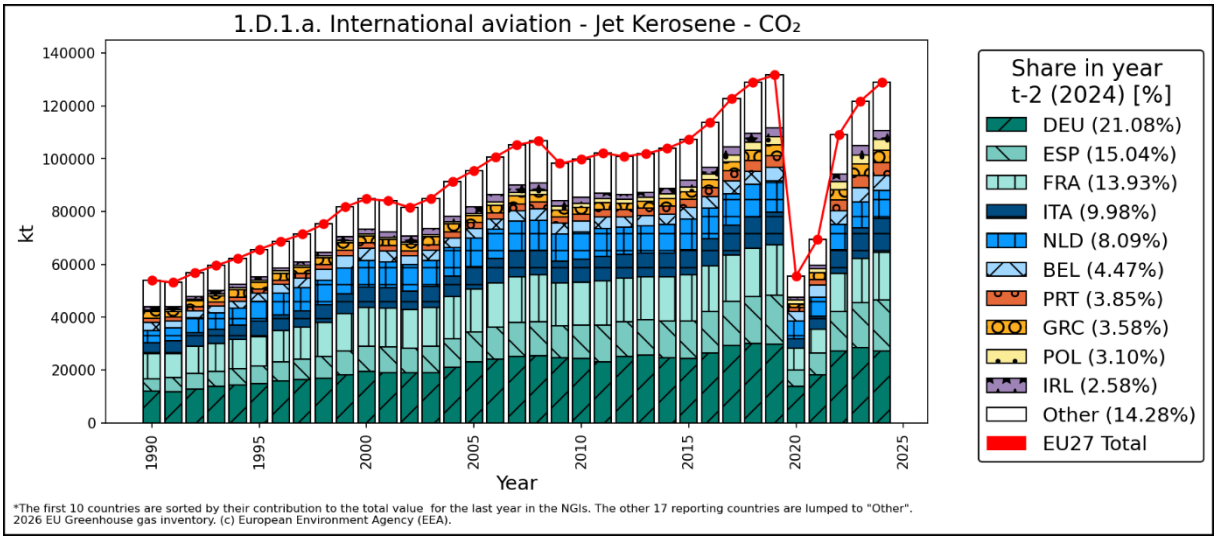
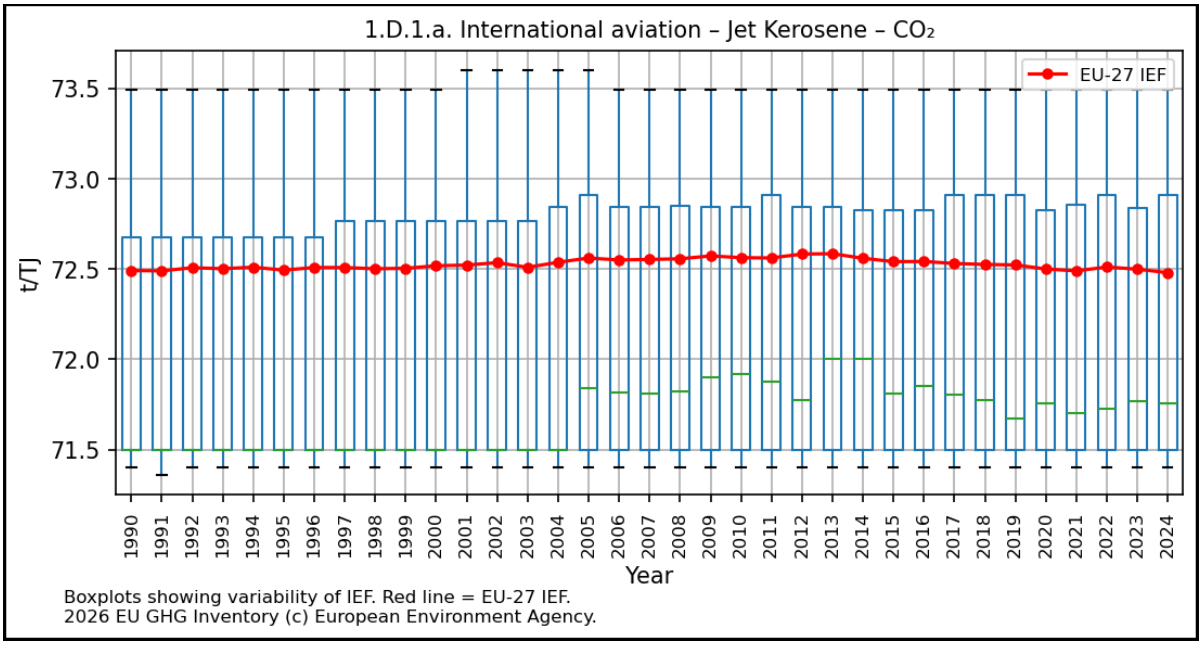


Figure 3.4: 1D1a International Aviation - Jet Kerosene: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



3.4.2 International Navigation (1D1b) (EU)

This mobile source category includes emissions from international waterborne transport, i.e. passenger and freight activity of trips having their origin and destination (O-D) in different countries. The main fuel

used is residual fuel oil, followed by gas/diesel oil. Fishing vessels are excluded and they are reported separately under category 1A4ciii (Other sectors – Fishing).

CO_2 emissions from 1D1b International Navigation

CO_2 emissions from international navigation accounted for 4 % of total GHG emissions in EU, 2024 (including indirect CO_2, with LULUCF and international aviation). Considering only international navigation, CO_2 accounted for 98.6 % of total GHG emissions from international navigation in EU, 2024.

The time series of CO_2 emissions and activity data from 1D1b International navigation, years 1990-2024, are shown in Figure 3.6.

Figure 3.6 1D1b International Navigation: CO_2 emissions (in kt) and activity data (in TJ)

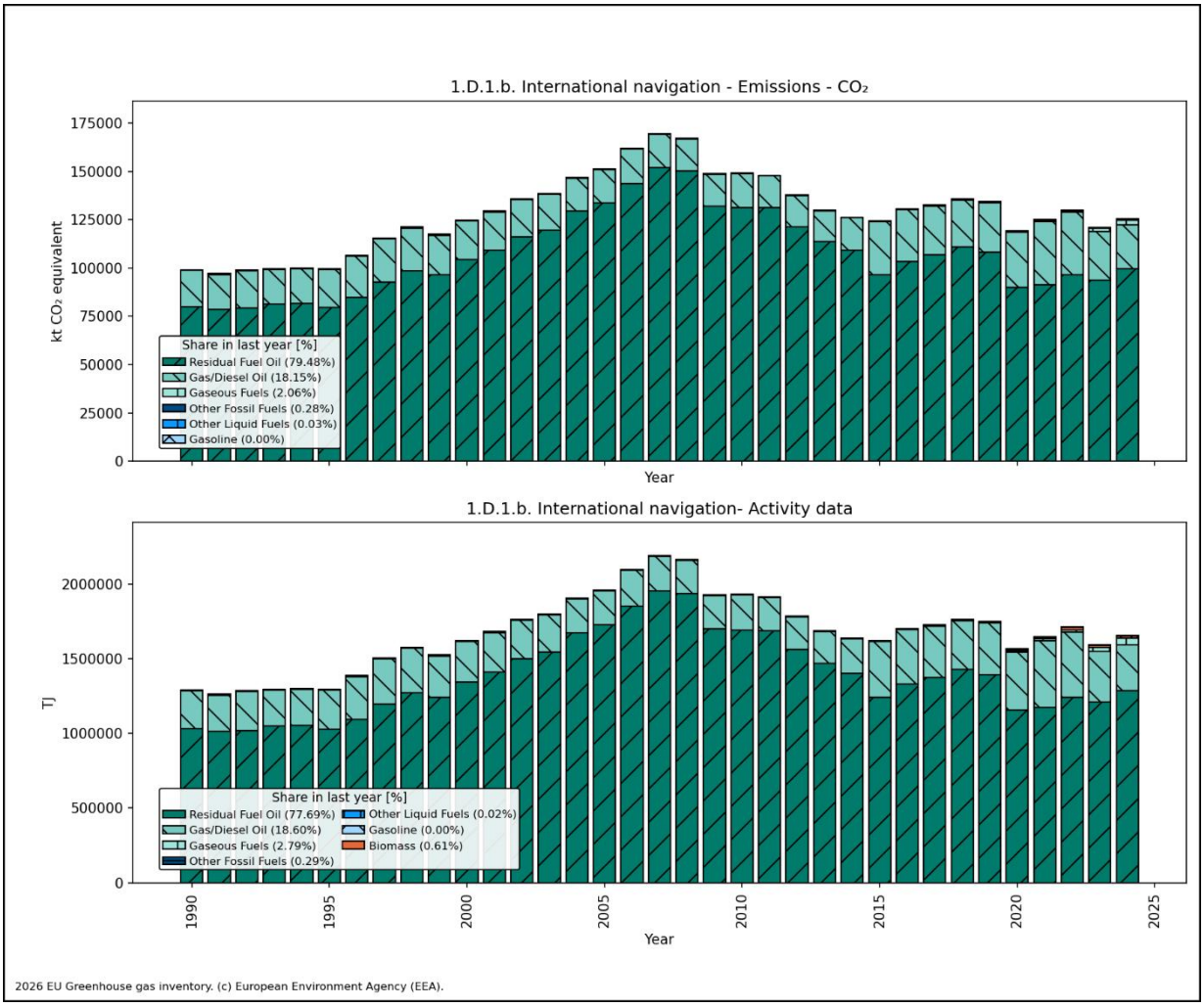


Table 3.4 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), and change between years for international navigation. Between 1990 and 2024, CO_2 emissions from international navigation increased by 26 % in the EU, while between 2023 and 2024 the corresponding change was 4 % increase.

Table 3.4: 1D1b International Navigation: CO_2 emissions per country (in kt), share in EU (%), and change between years

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	46	30	33	0,0%	-13	-29%	3	9%
Belgium	13 313	22 237	21 735	17,4%	8 422	63%	-502	-2%
Bulgaria	183	206	178	0,1%	-5	-3%	-29	-14%
Croatia	147	73	44	0,0%	-104	-70%	-30	-40%
Cyprus	183	740	679	0,5%	496	271%	-61	-8%
Czechia	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Denmark	3 019	1 624	3 244	2,6%	224	7%	1 619	100%
Estonia	573	722	738	0,6%	165	29%	16	2%
Finland	1 832	885	929	0,7%	-902	-49%	45	5%
France	6 082	3 640	3 987	3,2%	-2 095	-34%	347	10%
Germany	6 927	3 486	3 397	2,7%	-3 530	-51%	-89	-3%
Greece	8 106	6 545	6 601	5,3%	-1 505	-19%	56	1%
Hungary	NE,NO	NE,NO	NE,NO	-	-	-	-	-
Ireland	57	410	374	0,3%	317	559%	-36	-9%
Italy	4 280	4 610	4 213	3,4%	-67	-2%	-397	-9%
Latvia	1 515	117	62	0,0%	-1 454	-96%	-55	-47%
Lithuania	302	384	119	0,1%	-183	-60%	-265	-69%
Luxembourg	0	0	0	0,0%	0	-69%	0	-11%
Malta	895	7 225	6 744	5,4%	5 850	654%	-481	-7%
Netherlands	34 944	32 909	35 746	28,5%	801	2%	2 837	9%
Poland	1 265	822	561	0,4%	-705	-56%	-261	-32%
Portugal	1 400	1 804	1 761	1,4%	361	26%	-43	-2%
Romania	NO	67	31	0,0%	31	∞	-37	-54%
Slovakia	65	18	18	0,0%	-47	-73%	0	-2%
Slovenia	NA,NO	NO	NO	-	-	-	-	-
Spain	11 587	26 928	29 056	23,2%	17 470	151%	2 128	8%
Sweden	2 333	5 334	5 020	4,0%	2 687	115%	-314	-6%
EU	**99 054**	**120 816**	**125 268**	**100%**	**26 214**	**26%**	**4 452**	**4%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period

1D1b International Navigation – Residual Fuel Oil (CO_2)

CO_2 emissions from residual fuel oil accounted for 78 % of total GHG emissions from international navigation in 2024.

Figure 3.7 shows the time series of CO_2 emissions in EU from international navigation – residual fuel oil and the highest shares of countries. Figure 3.8 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries (in t/TJ). It is observed that the CO_2 IEF at EU level is almost constant over the years at 77.6 – 77.7 t/TJ.

Figure 3.7 1D1b International Navigation – Residual Fuel Oil: Time series of CO_2 emissions in EU and highest shares of countries

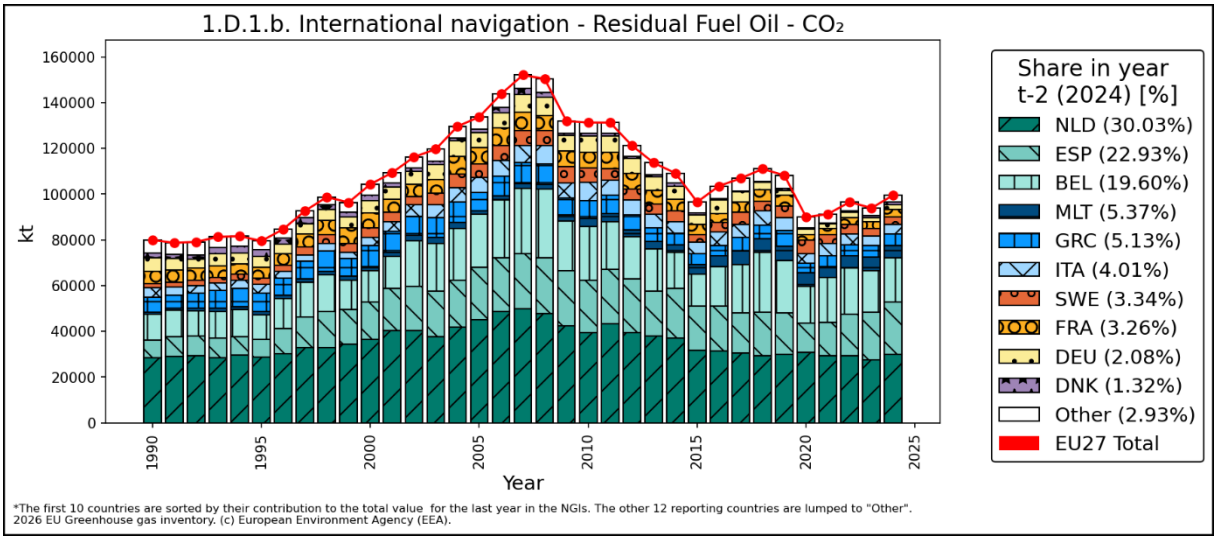
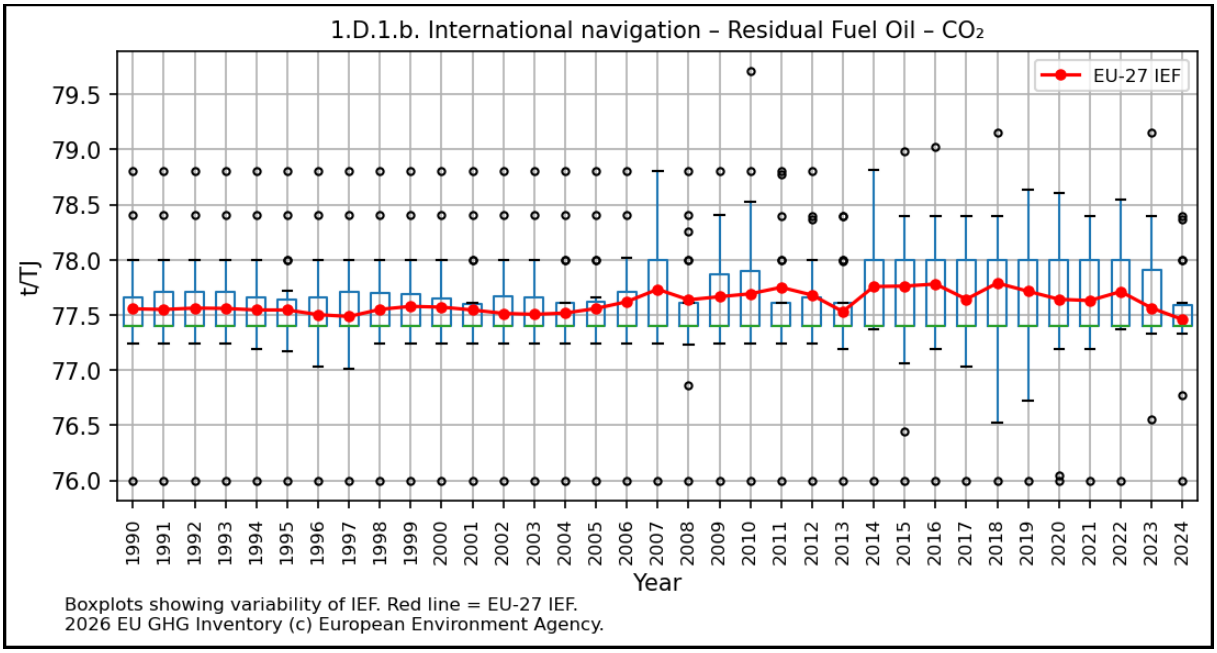


Figure 3.8 1D1b International Navigation – Residual Fuel Oil: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



1D1b International Navigation – Gas/Diesel Oil (CO_2)

CO_2 emissions from gas/diesel oil accounted for 18 % of total GHG emissions from international navigation in 2024.

Figure 3.9 shows the time series of CO_2 emissions in EU from international navigation – gas/diesel oil and the highest shares of countries. Figure 3.10 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries (in t/TJ). It is observed that the CO_2 IEF at EU level presents a small variation over the years ranging from 73.8 to 74.4 t/TJ.

Figure 3.9 1D1b International Navigation – Gas/Diesel Oil: Time series of CO_2 emissions in EU and highest shares of countries

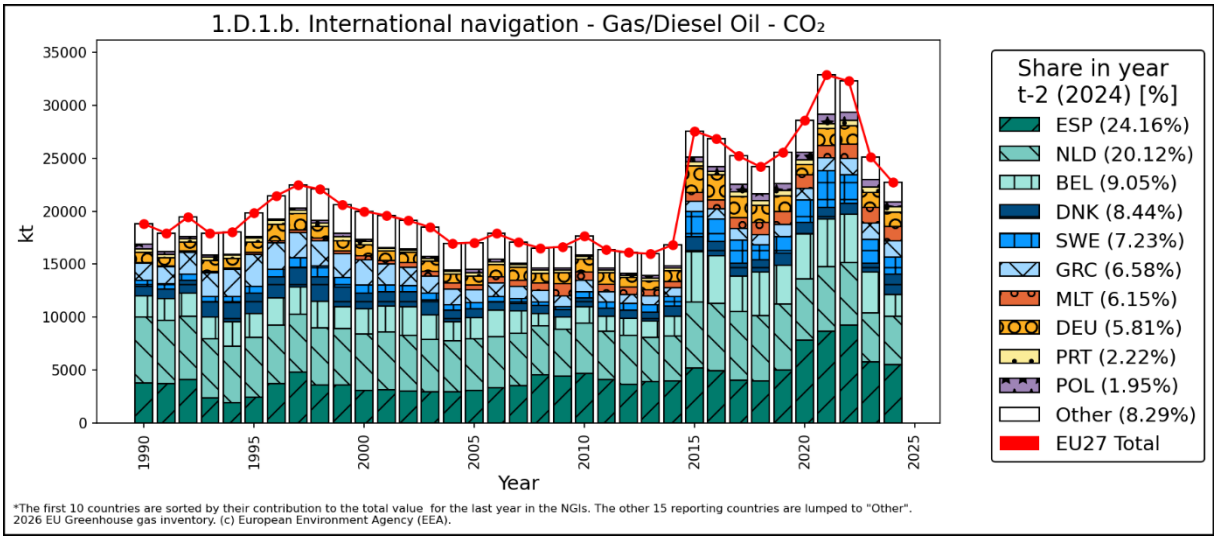
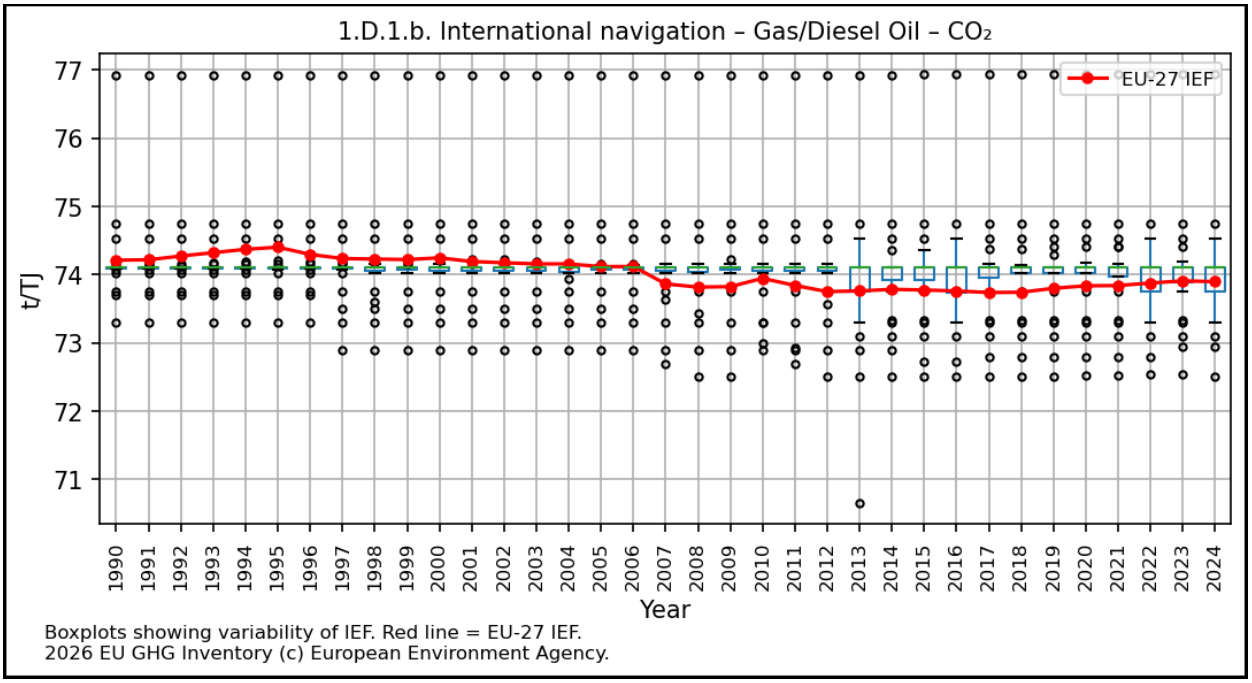


Figure 3.10: D1b International Navigation – Gas/Diesel Oil: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



3.5 Feedstocks and non-energy use of fuels

According to the 2006 IPCC guidelines non-energy fuels are divided into three categories:

(1) Raw materials for the chemical industry (Feedstocks). These fossil fuels are used in particular in the production of organic compounds and to a lesser extent in the production of inorganic chemicals (e.g. ammonia) and their derivatives. For organic substances, normally, part of the carbon contained in the feedstock remains largely stored in these products. Typical examples of raw materials are feedstocks for the petrochemical industry (naphtha), natural gas, or different types of oils (e.g. the production of hydrogen for the subsequent production of ammonia by partial oxidation).
(2) Reductants. Carbon is used as a reductant in metallurgy and inorganic technologies. Unlike the previous case, here, when using fossil fuel as a reductant, only a very small amount of carbon remains fixed in the products for a longer time, and the larger part of the carbon is oxidized during the reduction process. Metallurgical coke is a typical reductant.
(3) Non-energy products. Non-energy products are materials derived from fuels in refineries or coke plants which, unlike the previous two cases, are used directly for their conventional physical properties, specifically as lubricants (lubricating oils and petrolatum), diluents and solvents, bitumen (for covering roads and roofs) and paraffin. Emissions of CO_2 and other GHG occur only to a limited extent in the IPPU category (e.g. during the oxidation of lubricants and paraffin). Substantial emissions occur during their recovery and during disposal by incineration (in the sector Energy and in Waste).

The non-energy use of fuels is reported in CRT table 1.A(d). The purpose of CRT table 1A(d) is twofold:

(1) The table should make transparent the amount of carbon from non-energy use of fuels that is subtracted from the carbon included in all fuels (both energy and non-energy use) in order to make a meaningful comparison between the sectoral and reference approach.
(2) The table should make it transparent in which categories other than Energy, CO_2 emissions from non-energy use of fuels are included in the inventory (mostly IPPU). Therefore, the table serves as a basis for consistency checks with the IPPU sector reporting.

Note that in 2026, the reference approach tables (incl. feedstock tables) cannot be calculated due to persistent problems with the UNFCCC ETF tool.

3.6 Source categories and methodological issues

This section presents for each EU key category in CRT Sector 1 an overview of the Member States' contributions to the key categories in terms of level and trend, and - for each key category - summary information on methodologies and emission factors using the notations T1, T2, D, etc. No detailed explanations of Member States methods used are included for 1A because, for most categories, the method used is simply multiplying activity data by (country-specific) emissions factors. However, note that Annex III of the EU NID also includes for each Member State an overview of methods and emission factors used, including a short explanation, where relevant. In addition, the Member States' national inventory reports include more detailed information on national methods and circumstances.

3.6.1 Energy Industries (CRT Source Category 1.A.1)

Energy Industries (CRT 1.A.1) comprises emissions from fuels combusted by the fuel extraction or energy-producing industries and is subdivided into three categories: Public electricity and heat production (CRT 1.A.1.a), Petroleum-refining (CRT 1.A.1.b), and Manufacture of solid fuels and other energy industries (CRT 1.A.1.c). Each category is described in its own chapter.

Table 3.5 shows the nine key categories of sector 1.A.1, including information on whether the reasons for this categorization lie in their emission trend and/or level. Furthermore, it entails information on the share of higher tier methods used by the countries. In sector 1.A.1.a Germany, Poland and Italy have mainly been influencing this share of higher tier methods because of their weight of emissions. The same applies to Italy, Germany and Spain in sector 1.A.1.b and Germany, Italy and Czechia in sector 1.A.1.c.

Many countries are using country specific information from the EU ETS and apply default emission factors for emissions that are not covered by the EU ETS. Similarly, countries may use country specific emission factors for the most common fuels and use default emission factors for fuels of minor importance. Therefore, countries might use apparently contradicting information, such as "T1, T2" for Methods used and "CS, D" for Emission Factors applied. In such cases, we assumed that 90% of emissions are calculated using a higher tier method and 10% of emissions are calculated using the tier 1 method. When countries have reported country specific methods and emission factors it has been assumed that a higher tier method has been used.

Table 3.5: Key source categories for level and trend analyses and share of MS emissions using higher tier methods in sector 1.A.1

Source category gas	kt CO_2 equ.		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
1.A.1.a Public electricity and heat production: Gaseous Fuels (CO_2)	107649	154683	T	L	L	99.0%
1.A.1.a Public electricity and heat production: Liquid Fuels (CO_2)	156323	21591	T	L	L	95.4%
1.A.1.a Public electricity and heat production: Other Fuels (CO_2)	10453	36430	T	L	L	95.6%
1.A.1.a Public electricity and heat production: Peat (CO_2)	9164	1731	T	L	0	99.3%
1.A.1.a Public electricity and heat production: Solid Fuels (CO_2)	942629	298884	T	L	L	96.4%
1.A.1.b Petroleum refining: Gaseous Fuels (CO_2)	5334	17115	T	0	L	98.5%
1.A.1.b Petroleum refining: Liquid Fuels (CO_2)	97421	73363	T	L	L	97.5%
1.A.1.c Manufacture of solid fuels and other energy industries: Gaseous Fuels (CO_2)	8199	7474	0	L	L	95.6%
1.A.1.c Manufacture of solid fuels and other energy industries: Solid Fuels (CO_2)	88816	17969	T	L	L	96.4%

Figure 3.11 shows the trends in emissions in Energy Industries for the EU between 1990 and 2024, which were mainly dominated by CO_2 emissions from public electricity and heat production. Carbon dioxide from 1.A.1.a currently represents about 85% of greenhouse gas emissions in 1.A.1 in 1990 (i.e. including methane and nitrous oxide) and around 80% in 2024.

Total greenhouse gas emissions from 1.A.1 decreased by 54.4% between 1990 and 2024. This was mainly due to a decrease of CO_2eq emission from Public Electricity and Heat Production (-713 Mt CO_2eq), followed by -73.6 Mt CO_2eq from the manufacturing of solid fuels and -16.2 Mt CO_2eq from petroleum refining.

The decrease in fuel consumption since 2006 can be explained by the continuing effects of the economic downturn, the increased use of renewables, and also by enhanced energy efficiency in the newer EU Member States as well as mild winters. The reduction is particularly visible between 2019 and 2020 due to the COVID pandemic situation, and again since 2022 with a visible decrease in solid fuels consumption.

Figure 3.11 1.A.1 Energy Industries: Total GHG, emission trends and Activity Data

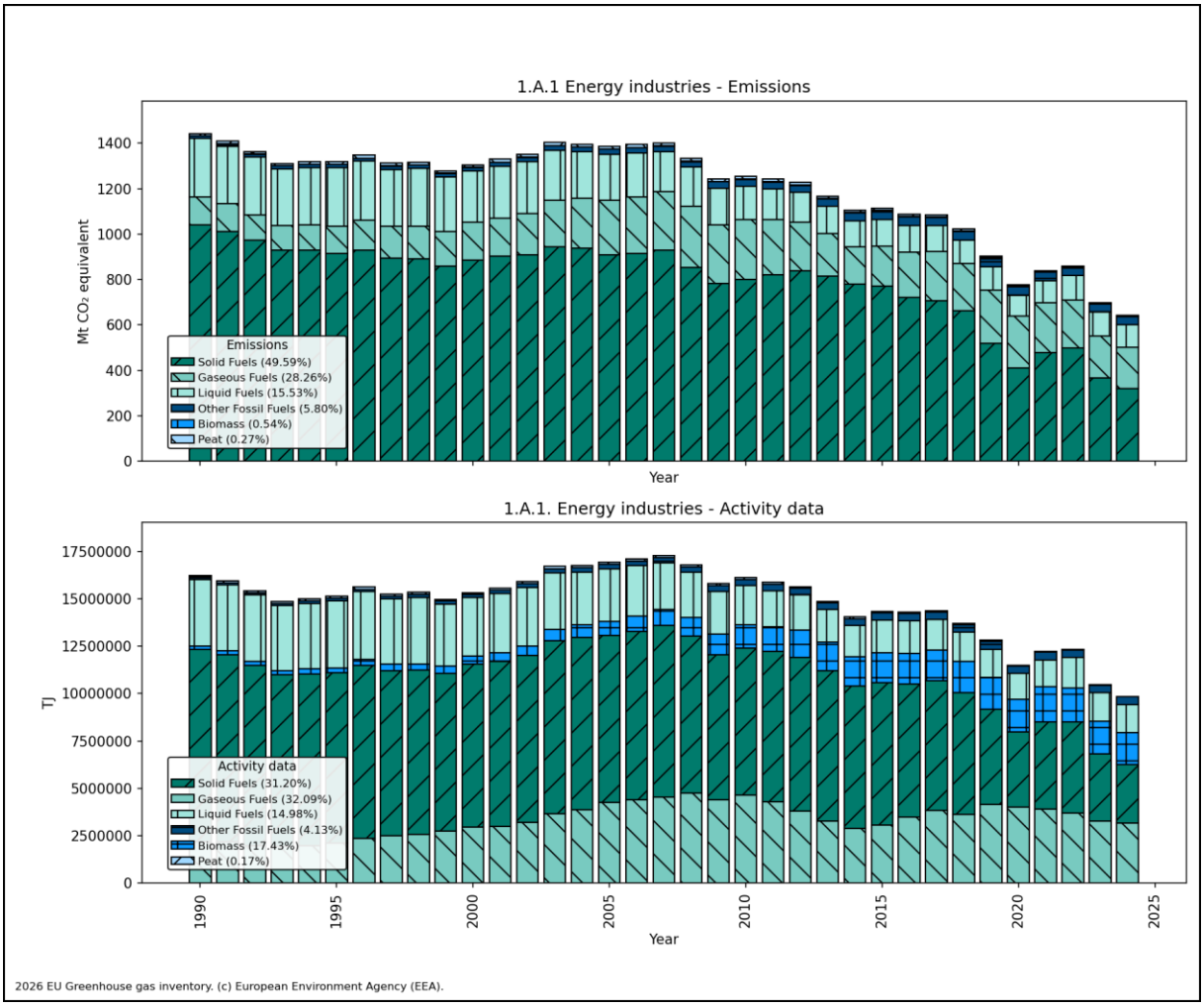


Table 3.6 breaks down the information by country. Between 1990 and 2024, greenhouse gas emissions from energy industries increased in two countries (Cyprus and Luxembourg) and fell in 25. The change in the EU was a net decrease of about 799.3 Mt CO_2eq or 55.4% in 34 years. The table shows the emissions of GHG, N_2O and CH_4 separately expressed in CO_2eq. The latter two greenhouse gases only contribute a very small part (combined approximately 1%) of the total emissions in the energy industries.

Table 3.6 1.A.1 Energy industries: Countries' contributions to CO_2, N_2O and CH_4 emissions

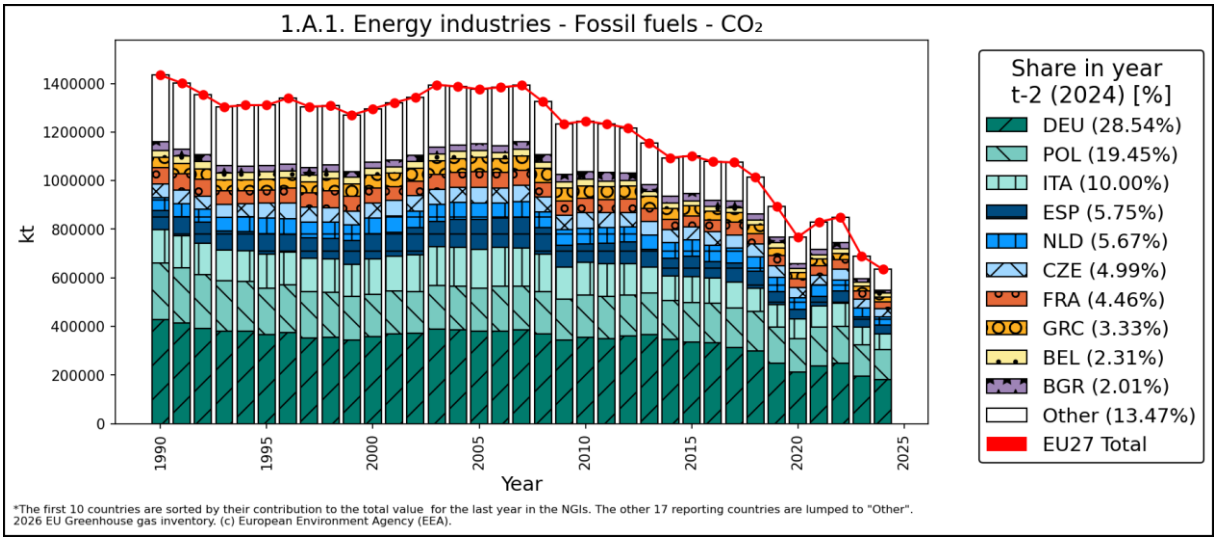
Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt		N2O emissions in kt CO2 equivalents		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024	1990	2024
Austria	14 008	7 256	13 961	7 147	37	82	9	26
Belgium	29 677	14 770	29 496	14 684	159	52	22	34
Bulgaria	36 526	12 843	36 401	12 765	111	59	15	19
Croatia	7 087	3 180	7 066	3 138	15	27	6	16
Cyprus	1 767	3 226	1 761	3 215	4	7	2	4
Czechia	56 830	31 888	56 594	31 695	218	153	19	40
Denmark	26 249	6 116	26 156	5 959	76	68	17	89
Estonia	28 285	4 741	28 269	4 693	13	28	3	20
Finland	18 909	8 366	18 794	8 145	104	188	11	34
France	66 304	28 538	65 822	28 324	400	181	82	33
Germany	431 083	185 374	427 953	181 191	2 816	1 414	314	2 768
Greece	43 238	21 203	43 094	21 164	129	27	16	12
Hungary	20 866	8 722	20 796	8 660	60	39	11	24
Ireland	11 216	7 061	11 145	6 960	64	91	7	11
Italy	137 667	63 857	136 941	63 503	425	233	300	121
Latvia	6 317	1 095	6 302	1 052	10	24	5	19
Lithuania	13 552	2 259	13 522	2 186	18	41	11	32
Luxembourg	35	158	32	151	1	4	1	3
Malta	1 765	737	1 759	737	5	0	1	0
Netherlands	53 355	36 306	53 147	36 006	131	180	77	120
Poland	235 233	123 966	234 298	123 433	905	502	30	31
Portugal	16 415	4 317	16 366	4 253	43	51	7	13
Romania	71 655	12 368	71 448	12 318	164	41	43	9
Slovakia	19 077	5 330	19 010	5 297	57	19	9	14
Slovenia	6 374	3 636	6 350	3 616	23	16	2	4
Spain	78 070	36 884	77 759	36 488	257	334	53	62
Sweden	10 200	8 216	10 074	7 990	100	165	25	61
EU	**1 441 759**	**642 415**	**1 434 314**	**634 771**	**6 346**	**4 027**	**1 100**	**3 617**

Abbreviations are explained in the Chapter 'Units and abbreviations'

Public heat and electricity production is the main source of emissions from energy industries. Furthermore, it is the largest source category in the EU greenhouse gas inventory. Differences in the intensity of greenhouse gas emissions of heat and electricity production between the countries are, to a large extent, explained by the mix of fuels or technologies which are used. Some countries rely more on coal than on gas. At the EU level, 35.8% of the fuel used in energy industries comes from solid fuels. Its contribution has been declining in favour of the relatively cleaner natural gas, with about 34.3% in 2024. However, solid fuels represent the first source of energy in 2024. Biomass has been constantly increasing, with a share of 21.2% in 2024.

The contribution of the MS can be seen in Figure 3.12.

Figure 3.12 1.A.1 Energy Industries, all fuels: Emission trend and share for CO_2



3.6.1.1 Public Electricity and Heat Production (1.A.1.a) (EU)

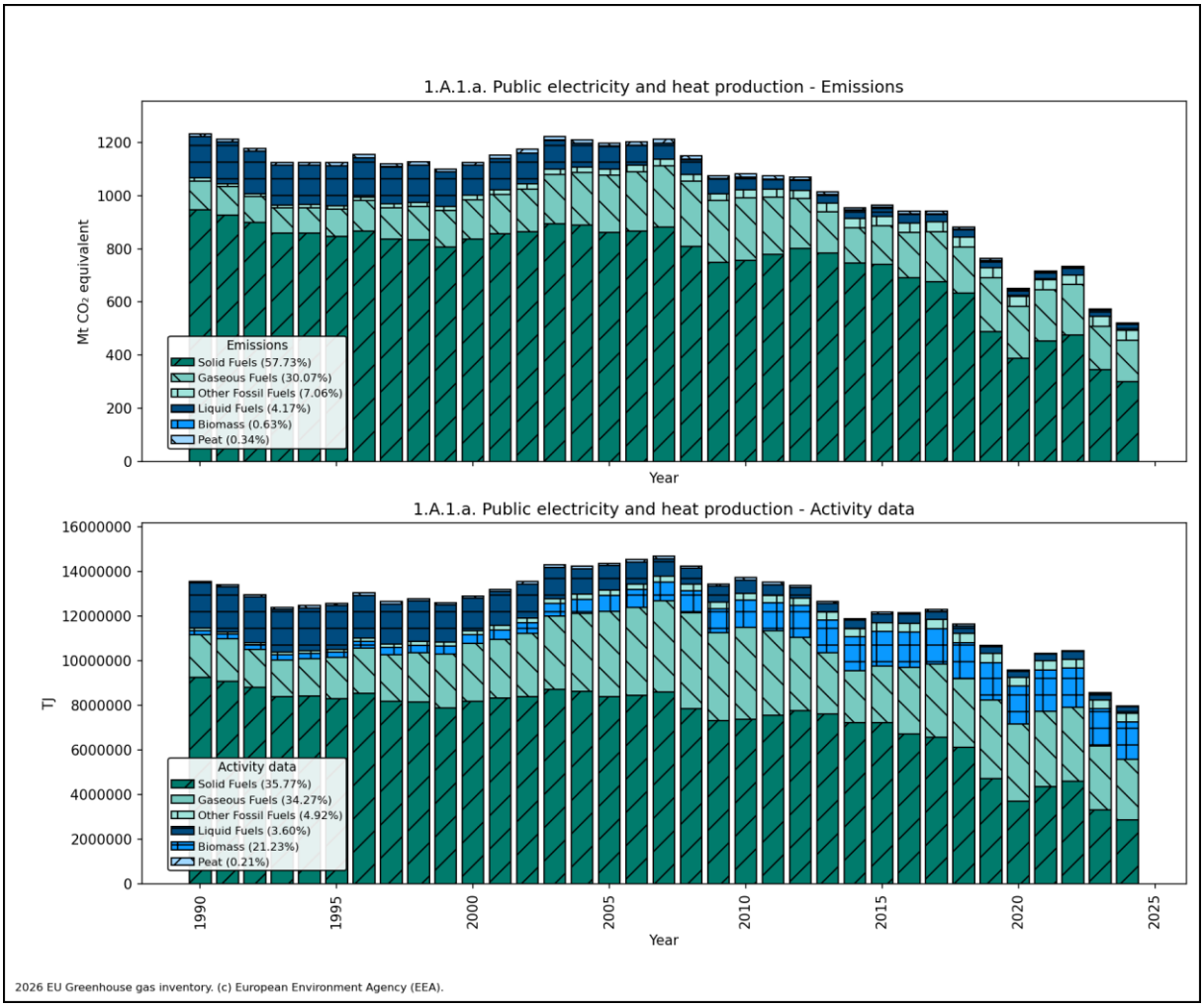
According to the 2006 IPCC guidelines, emissions from public electricity and heat production (CRT 1.A.1.a) should include emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (i.e. public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers (undertakings which generate electricity/heat wholly or partly for their own use, as an activity that supports their primary activity) should be assigned to the sector where they were generated and not under 1.A.1.a. autoproducers may be in public or private ownership.

CO_2 emissions from electricity and heat production is the largest key category in the EU accounting for 18.4% of total greenhouse gas emissions in 2024 and for about 80% of greenhouse gas emissions of the Energy Industries Sector. Between 1990 and 2024, CO_2 emissions from electricity and heat production decreased by 58% in the EU.

Figure 3.13 shows the trends in emissions originating from the production of public electricity and heat by fuel in the EU between 1990 and 2024 as well as the underlying activity data[26].

[26] CO_2 emissions from the combustion of biomass fuels are reported as a memo item and are therefore not included in the emissions from public electricity and heat production. The biomass used as a fuel is however included in the national energy consumption (i.e. activity data). The fact that CO_2 emissions from biomass are treated differently from other fuel emissions does not imply emissions from the production of heat and electricity are due to fossil fuel combustion only. Biomass CO_2 emissions are just reported elsewhere. Non-CO_2 emissions from the combustion of biomass (CH_4 and N_2O) are reported under the energy sector.

Figure 3.13 1.A.1.a Public Electricity and Heat Production: Total emission and activity data trends



Fuel used for public electricity and heat production decreased by 41.3% in the EU between 1990 and 2024. Solid fuels represent 35.8% of the fuel used in public conventional thermal power plants; their combustion has been declining by 69.2% between 1990 and 2024. Gaseous fuels have increased very rapidly, by a factor of almost 3 between 1990 and 2010, declined until 2014, and now see a new increase in use until 2019. In 2024, natural gas represented a share of 34.3% of all the fuels used for the production of heat and electricity in the EU. Liquid fuels still account for some 3.6%, but their use has declined gradually since 1990. The use of biomass has increased even more rapidly than the use of gas: its share in the fuel mix is now around 21.2%. Finally, other fossil fuels consumptions have been multiplied by almost 4 between 1990 and 2024 and represent 4.9% of total consumptions. Peat remains marginal with a share of 0.2% in 2024.Carbon dioxide emissions amount to 98.7% of greenhouse gas emissions from public electricity and heat production. The change in the EU between 1990 and 2024 was a net decrease of 712.9 Mt CO_2, respectively of 58%. Table 3.7 shows emissions arising from the production of public heat and electricity by country.

Table 3.7 1.A.1.a Public Electricity and Heat Production: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	11 056	4 450	4 351	0.8%	-6 705	-61%	-99	-2%	-	-
Belgium	23 173	10 843	9 760	1.9%	-13 413	-58%	-1 083	-10%	NA,T1,T3	D,NA,PS
Bulgaria	35 179	14 713	11 735	2.3%	-23 443	-67%	-2 978	-20%	NA	NA
Croatia	3 729	3 023	2 136	0.4%	-1 593	-43%	-887	-29%	-	-
Cyprus	1 676	3 050	3 215	0.6%	1 540	92%	166	5%	CS,NA	CS,NA
Czechia	54 585	33 527	30 512	5.9%	-24 073	-44%	-3 015	-9%	NA	NA
Denmark	24 717	4 659	3 992	0.8%	-20 725	-84%	-667	-14%	T1,T2,T3	CS,D,PS
Estonia	28 191	3 663	3 065	0.6%	-25 126	-89%	-598	-16%	T1,T2,T3	CS,D,PS
Finland	16 453	8 034	6 607	1.3%	-9 846	-60%	-1 427	-18%	NA,T3	CS,D,NA,PS
France	49 148	25 802	21 117	4.1%	-28 031	-57%	-4 685	-18%	T2,T3	CS,D,OTH,PS
Germany	338 451	166 863	151 375	29.5%	-187 076	-55%	-15 488	-9%	CS	CS
Greece	40 617	15 335	15 820	3.1%	-24 796	-61%	485	3%	NA	NA
Hungary	17 850	7 414	7 051	1.4%	-10 799	-60%	-362	-5%	NA	NA
Ireland	10 876	7 337	6 746	1.3%	-4 131	-38%	-591	-8%	T1,T3	CS,D,PS
Italy	108 670	53 262	43 638	8.5%	-65 032	-60%	-9 624	-18%	T3	CS
Latvia	6 097	904	961	0.2%	-5 135	-84%	58	6%	-	-
Lithuania	12 003	925	821	0.2%	-11 182	-93%	-104	-11%	NA,T2,T3	CS,NA,PS
Luxembourg	32	178	151	0.0%	119	365%	-27	-15%	NA	NA
Malta	1 759	799	737	0.1%	-1 022	-58%	-62	-8%	NA,T2	CS,NA
Netherlands	40 026	26 186	25 457	5.0%	-14 569	-36%	-729	-3%	CS,NA,T2	CS,NA
Poland	227 279	119 090	115 377	22.5%	-111 902	-49%	-3 713	-3%	NA,T1,T2	CS,D,NA
Portugal	14 355	4 406	2 765	0.5%	-11 590	-81%	-1 641	-37%	T1,T2,T3	D,PS
Romania	67 020	10 488	9 543	1.9%	-57 477	-86%	-945	-9%	NA,T1,T2,T3	CS,D,NA,PS
Slovakia	14 700	3 203	2 359	0.5%	-12 341	-84%	-844	-26%	NA,T2	CS,NA
Slovenia	6 096	3 291	3 616	0.7%	-2 481	-41%	324	10%	NA,T1,T2,T3	CS,D,NA,PS
Spain	64 812	30 377	25 934	5.1%	-38 878	-60%	-4 443	-15%	NA,T1,T2	CS,NA,PS
Sweden	7 668	4 725	4 476	0.9%	-3 192	-42%	-249	-5%	T2	CS
EU	**1 226 218**	**566 547**	**513 319**	**100%**	**-712 899**	**-58%**	**-53 228**	**-9%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period Abbreviations are explained in the Chapter 'Units and abbreviations'.

N_2O emissions currently represent 0.7 % of greenhouse gas emissions from public electricity and heat production. Between 1990 and 2024, emissions decreased by 31% (Table 3.8).

Table 3.8 1.A.1.a Public Electricity and Heat Production: Countries' contributions to N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	35	81	79	2.2%	44	125%	-2	-3%	-	-
Belgium	45	43	36	1.0%	-10	-21%	-7	-17%	NA,T1,T3	D,NA
Bulgaria	109	73	59	1.6%	-50	-46%	-14	-19%	NA	NA
Croatia	12	28	26	0.7%	14	123%	-2	-7%	-	-
Cyprus	3	6	7	0.2%	3	93%	0	5%	NA,T1	D,NA
Czechia	215	160	150	4.1%	-65	-30%	-10	-6%	NA	NA
Denmark	70	62	62	1.7%	-9	-12%	0	0%	T1,T2	CS,D
Estonia	13	27	27	0.7%	14	111%	-1	-3%	T1,T2	CS,D
Finland	89	190	174	4.8%	85	95%	-16	-8%	NA,T3	CS,NA
France	374	223	176	4.9%	-198	-53%	-47	-21%	T1,T2,T3	D,PS
Germany	2 141	1 328	1 242	34.2%	-899	-42%	-86	-6%	T2	CS
Greece	126	28	23	0.6%	-102	-81%	-5	-16%	NA	NA
Hungary	56	35	38	1.0%	-18	-32%	2	7%	NA	NA
Ireland	63	91	90	2.5%	27	43%	-1	-1%	T1,T2	D
Italy	273	140	114	3.1%	-159	-58%	-26	-19%	T3	CR,D
Latvia	10	23	23	0.6%	13	140%	0	1%	-	-
Lithuania	17	38	40	1.1%	23	140%	2	4%	NA,T1	D,NA
Luxembourg	1	4	4	0.1%	3	215%	0	11%	NA	NA
Malta	5	0	0	0.0%	-5	-93%	0	-10%	NA,T1	D,NA
Netherlands	117	172	159	4.4%	42	35%	-13	-7%	D,NA,T1	D,NA
Poland	891	522	494	13.6%	-397	-45%	-28	-5%	NA,T1	D,NA
Portugal	41	73	51	1.4%	10	25%	-23	-31%	T1	D
Romania	160	41	37	1.0%	-124	-77%	-4	-9%	NA,T1	D,NA
Slovakia	52	23	17	0.5%	-35	-67%	-6	-26%	NA,T1	D,NA
Slovenia	22	15	16	0.5%	-6	-27%	1	9%	NA,T1	D,NA
Spain	244	371	328	9.0%	85	35%	-43	-11%	NA,T2	D,NA,OTH
Sweden	98	169	162	4.4%	64	65%	-8	-5%	T2	CS
EU	**5 283**	**3 967**	**3 634**	**100%**	**-1 649**	**-31%**	**-333**	**-8%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period Abbreviations are explained in the Chapter 'Units and abbreviations'.

Finally, CH_4 emissions currently represent 0.6% of greenhouse gas emissions from public electricity and heat production. Between 1990 and 2024, emissions increased by 464% (Table 3.5).

Table 3.9 1.A.1.a Public Electricity and Heat Production: Countries' contributions to CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	7	24	24	0.7%	17	250%	-1	-3%	-	-
Belgium	13	30	30	0.9%	17	137%	0	0%	NA,T1,T3	D,NA
Bulgaria	14	21	18	0.5%	5	34%	-3	-12%	NA	NA
Croatia	4	14	15	0.5%	11	301%	1	10%	-	-
Cyprus	2	3	4	0.1%	2	90%	0	5%	NA,T1	D,NA
Czechia	17	38	40	1.2%	22	129%	1	3%	NA	NA
Denmark	16	91	88	2.6%	71	434%	-4	-4%	T1,T2	CS,D
Estonia	3	18	18	0.6%	16	542%	0	0%	T1,T2	CS,D
Finland	10	34	33	1.0%	23	228%	-1	-2%	NA,T3	CS,NA
France	15	35	28	0.8%	13	91%	-7	-20%	T1,T2,T3	CS,D
Germany	193	2 566	2 638	78.5%	2 445	1268%	72	3%	T2	CS
Greece	14	8	9	0.3%	-5	-38%	1	9%	NA	NA
Hungary	8	21	23	0.7%	15	178%	2	10%	NA	NA
Ireland	7	11	11	0.3%	3	48%	0	0%	T1,T2	D
Italy	106	87	91	2.7%	-15	-15%	4	4%	T3	CR,D
Latvia	5	18	18	0.5%	13	253%	0	2%	-	-
Lithuania	10	30	31	0.9%	21	214%	1	5%	NA,T1	D,NA
Luxembourg	1	3	3	0.1%	2	216%	0	11%	NA	NA
Malta	1	0	0	0.0%	-1	-72%	0	-9%	NA,T1	D,NA
Netherlands	43	96	88	2.6%	45	103%	-7	-8%	NA,T1,T2	CS,D,NA
Poland	22	25	25	0.8%	3	14%	1	4%	NA,T1,T2	CS,D,NA
Portugal	5	12	12	0.3%	7	159%	0	0%	T1	D
Romania	40	7	7	0.2%	-33	-83%	0	-4%	NA,T1	D,NA
Slovakia	7	14	12	0.4%	6	89%	-1	-11%	NA,T1	D,NA
Slovenia	2	4	4	0.1%	2	98%	0	8%	NA,T1	D,NA
Spain	19	44	42	1.3%	23	119%	-1	-3%	NA,T2	CR,CS,D,NA
Sweden	12	51	47	1.4%	36	307%	-4	-7%	T2	CS
EU	**596**	**3 304**	**3 360**	**100%**	**2 764**	**464%**	**56**	**2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period Abbreviations are explained in the Chapter 'Units and abbreviations'.

1.A.1.a Electricity and Heat Production - Liquid Fuels (CO_2)

CO_2 emissions arising from the combustion of liquid fuels for public electricity and heat generation account for about 4.1% of all greenhouse gas emissions from 1.A.1.a. Within the EU, emissions fell by 86%, respectively by 134.7 Mt CO_2 between 1990 and 2024 (Table 3.10).

Table 3.10 1.A.1.a Public Electricity and Heat Production, Liquid Fuels: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	1 229	149	45	0.2%	-1 183	-96%	-103	-69%
Belgium	644	44	28	0.1%	-616	-96%	-16	-36%
Bulgaria	3 245	54	48	0.2%	-3 197	-99%	-7	-12%
Croatia	2 142	15	11	0.1%	-2 131	-99%	-4	-26%
Cyprus	1 676	3 050	3 215	14.9%	1 540	92%	166	5%
Czechia	1 174	122	79	0.4%	-1 094	-93%	-43	-35%
Denmark	953	132	134	0.6%	-819	-86%	2	1%
Estonia	3 519	106	113	0.5%	-3 406	-97%	6	6%
Finland	1 234	825	728	3.4%	-506	-41%	-97	-12%
France	8 209	3 601	3 376	15.6%	-4 834	-59%	-225	-6%
Germany	8 637	1 330	1 206	5.6%	-7 431	-86%	-123	-9%
Greece	5 416	3 089	3 094	14.3%	-2 322	-43%	6	0%
Hungary	1 443	31	44	0.2%	-1 400	-97%	12	40%
Ireland	1 087	180	484	2.2%	-602	-55%	304	169%
Italy	64 597	1 188	549	2.5%	-64 049	-99%	-639	-54%
Latvia	3 079	57	25	0.1%	-3 054	-99%	-32	-56%
Lithuania	6 021	243	73	0.3%	-5 948	-99%	-170	-70%
Luxembourg	NO	1	0	0.0%	0	∞	-1	-66%
Malta	1 049	16	10	0.0%	-1 039	-99%	-7	-40%
Netherlands	233	289	211	1.0%	-22	-10%	-78	-27%
Poland	5 198	1 391	1 474	6.8%	-3 724	-72%	83	6%
Portugal	6 434	737	712	3.3%	-5 722	-89%	-25	-3%
Romania	20 441	318	406	1.9%	-20 035	-98%	88	28%
Slovakia	1 033	8	3	0.0%	-1 031	-100%	-6	-68%
Slovenia	272	12	11	0.1%	-260	-96%	-1	-7%
Spain	6 081	5 672	5 512	25.5%	-570	-9%	-161	-3%
Sweden	1 277	C	C	-	-	-	-	-
EU	**155 046**	**22 660**	**21 591**	**100%**	**-133 455**	**-86%**	**-1 069**	**-5%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period Abbreviations are explained in the Chapter 'Units and abbreviations'. The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.

Figure 3.14 shows the contribution to the emission trend for liquid fuels by the main countries.

Figure 3.14 1.A.1.a Public Electricity and Heat Production, Liquid Fuels: Emission trend and share for CO_2

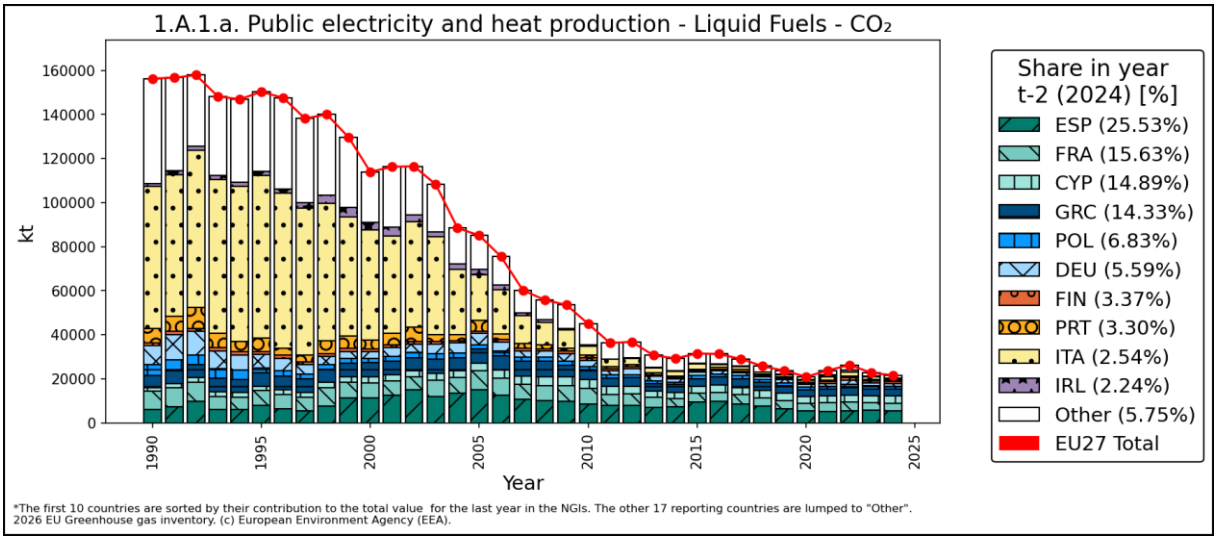
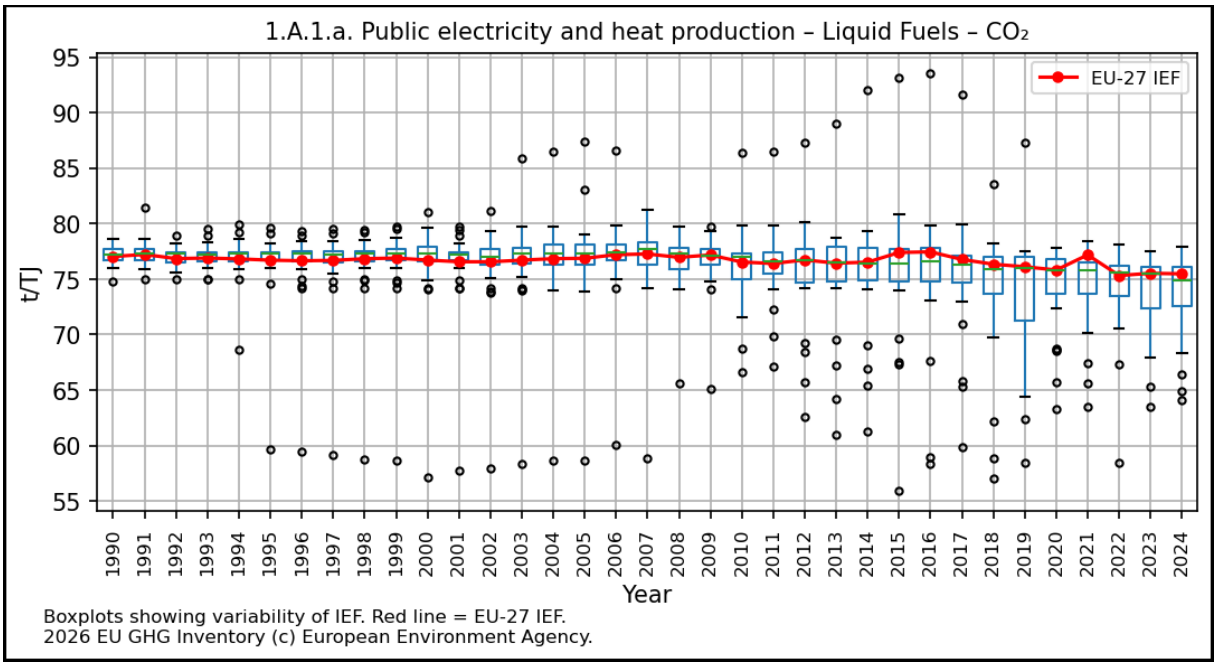


Figure 3.15 shows the implied emission factors for CO_2 emissions from liquid fuels used in public electricity and heat production. The IEFs in most countries range between 76 and 78 t/TJ onfor the entire time-series. The average IEF within the EU is 75.5 t/TJ in 2024.

Figure 3.15 1.A.1.a Public Electricity and Heat Production, Liquid Fuels: Implied Emission Factors for CO_2



1.A.1.a Electricity and Heat Production - Solid Fuels (CO_2)

CO_2 emissions from the combustion of solid fuels represented about 57.4% of all greenhouse gas emissions from public electricity and heat production. Within the EU, emissions fell by 68% between 1990 and 2024 (Table 3.11). A reason for the recent decline is that coal is being phased out of the fuel mix.

Table 3.11 1.A.1.a Public Electricity and Heat Production, Solid Fuels: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	6 247	NO	NO	-	-6 247	-100%	-	-
Belgium	19 148	4 025	4 815	1.6%	-14 333	-75%	790	20%
Bulgaria	25 638	12 923	9 862	3.3%	-15 776	-62%	-3 062	-24%
Croatia	595	1 082	664	0.2%	68	12%	-418	-39%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	52 368	30 577	27 531	9.2%	-24 837	-47%	-3 045	-10%
Denmark	22 225	2 323	1 542	0.5%	-20 683	-93%	-781	-34%
Estonia	22 017	3 172	2 529	0.8%	-19 488	-89%	-643	-20%
Finland	9 281	3 468	2 530	0.8%	-6 750	-73%	-938	-27%
France	37 412	3 861	3 496	1.2%	-33 915	-91%	-365	-9%
Germany	307 246	121 653	104 443	34.9%	-202 803	-66%	-17 210	-14%
Greece	35 201	6 074	4 496	1.5%	-30 705	-87%	-1 578	-26%
Hungary	12 266	3 086	2 786	0.9%	-9 480	-77%	-301	-10%
Ireland	4 845	1 231	631	0.2%	-4 213	-87%	-600	-49%
Italy	27 756	11 979	3 519	1.2%	-24 237	-87%	-8 460	-71%
Latvia	211	2	1	0.0%	-210	-100%	-1	-47%
Lithuania	174	3	2	0.0%	-172	-99%	-2	-53%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	710	NO	NO	-	-710	-100%	-	-
Netherlands	25 862	10 625	10 947	3.7%	-14 915	-58%	321	3%
Poland	220 132	109 096	103 561	34.6%	-116 571	-53%	-5 535	-5%
Portugal	7 921	NO	NO	-	-7 921	-100%	-	-
Romania	25 734	7 007	6 089	2.0%	-19 646	-76%	-919	-13%
Slovakia	11 542	1 552	482	0.2%	-11 060	-96%	-1 070	-69%
Slovenia	5 712	2 942	3 220	1.1%	-2 492	-44%	278	9%
Spain	58 156	5 247	4 570	1.5%	-53 586	-92%	-676	-13%
Sweden	4 231	1 633	1 168	0.4%	-3 063	-72%	-465	-28%
EU	**942 629**	**343 564**	**298 884**	**100%**	**-643 745**	**-68%**	**-44 680**	**-13%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 3.16 shows the trend of emissions for solid fuels for main contributing countries.

Figure 3.16 1.A.1.a Public Electricity and Heat Production, Solid Fuels: Emission trend and share for CO_2

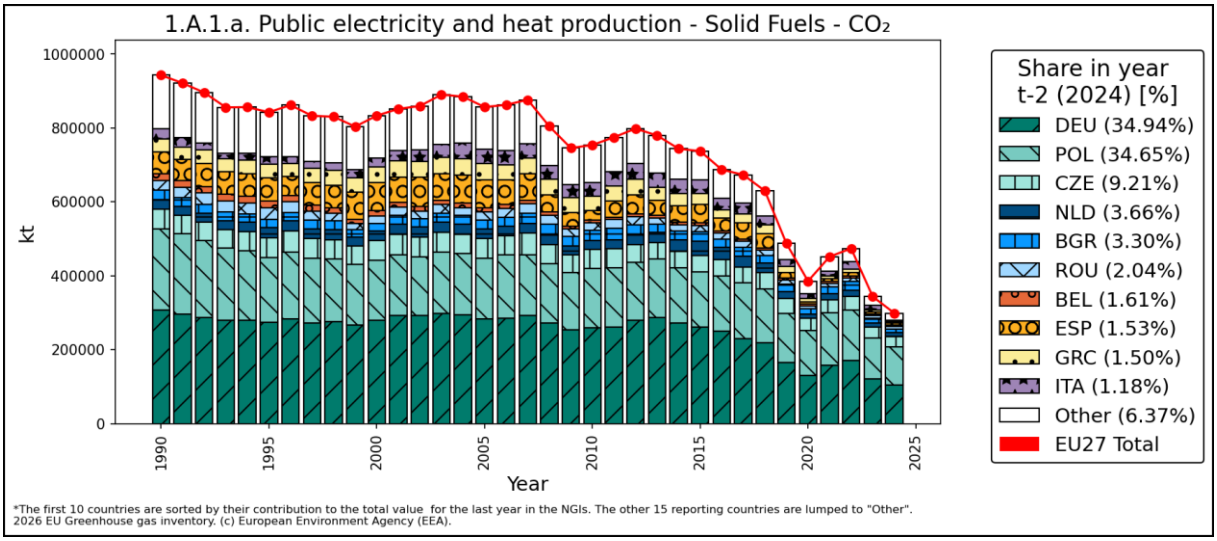
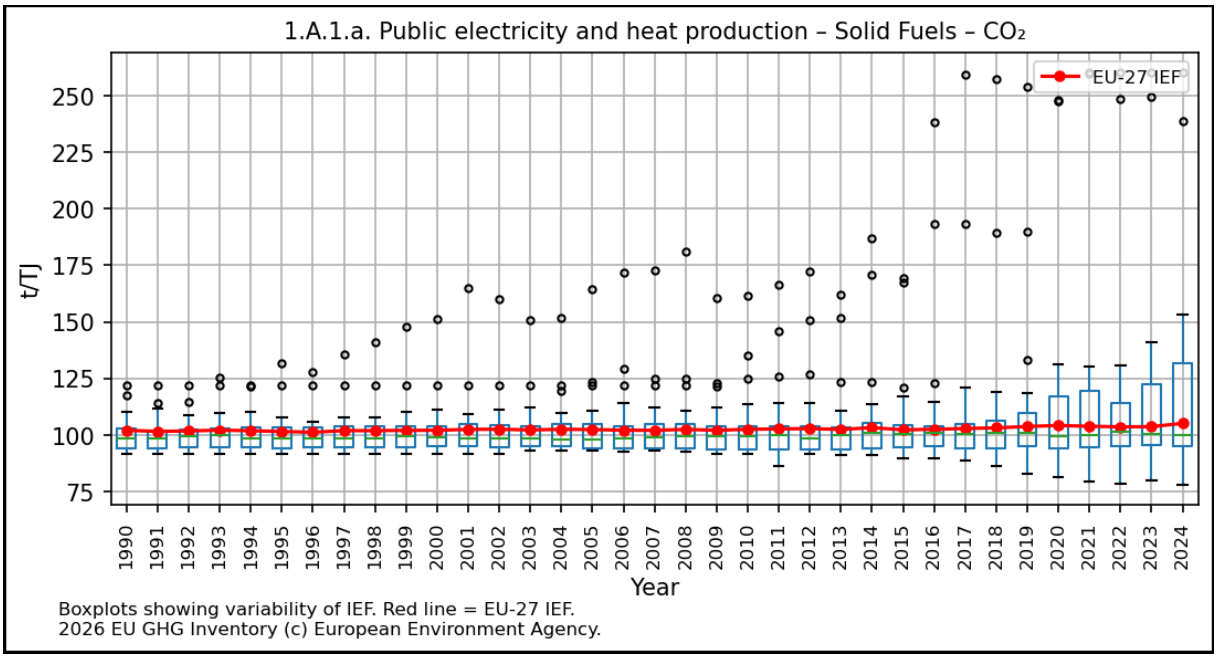


Figure 3.17 (on the next page) shows the relevant implied emission factors for solid fuels. The EU implied emission factor has remained fairly stable between 100 t/TJ and 103 t/TJ on the entire time-series (around 105.1 t/TJ in 2024).

Figure 3.17 1.A.1.a Public Electricity and Heat Production, Solid Fuels: Implied Emission Factors for CO_2



1.A.1.a Electricity and Heat Production - Gaseous Fuels (CO_2)

CO_2 emissions from the combustion of gaseous fuels accounted for 29.7% of all greenhouse gas emissions from public electricity and heat generation in 2024. Emissions increased by 44% in the EU between 1990 and 2024 (Table 3.12).

Table 3.12 1.A.1.a Electricity and heat production, Gaseous Fuels: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	3 294	3 208	3 283	2.1%	-11	0%	75	2%
Belgium	2 706	4 699	2 899	1.9%	192	7%	-1 800	-38%
Bulgaria	6 295	1 735	1 825	1.2%	-4 470	-71%	90	5%
Croatia	991	1 925	1 461	0.9%	470	47%	-464	-24%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	1 019	2 518	2 581	1.7%	1 562	153%	63	3%
Denmark	1 000	504	493	0.3%	-507	-51%	-11	-2%
Estonia	1 812	231	290	0.2%	-1 522	-84%	59	26%
Finland	1 989	873	1 018	0.7%	-970	-49%	146	17%
France	970	11 271	7 172	4.6%	6 202	639%	-4 099	-36%
Germany	18 447	30 855	32 701	21.1%	14 253	77%	1 845	6%
Greece	NO	6 172	8 230	5.3%	8 230	∞	2 058	33%
Hungary	4 111	4 100	4 013	2.6%	-98	-2%	-88	-2%
Ireland	1 881	5 204	5 194	3.4%	3 314	176%	-10	0%
Italy	16 173	39 988	39 459	25.5%	23 286	144%	-529	-1%
Latvia	2 658	845	936	0.6%	-1 722	-65%	91	11%
Lithuania	5 797	437	507	0.3%	-5 289	-91%	70	16%
Luxembourg	NO	88	65	0.0%	65	∞	-23	-26%
Malta	NO	782	727	0.5%	727	∞	-56	-7%
Netherlands	13 329	12 724	11 883	7.7%	-1 446	-11%	-841	-7%
Poland	1 197	7 645	9 373	6.1%	8 176	683%	1 728	23%
Portugal	NO	3 268	1 540	1.0%	1 540	∞	-1 728	-53%
Romania	20 845	3 163	3 048	2.0%	-17 797	-85%	-115	-4%
Slovakia	2 089	1 485	1 714	1.1%	-375	-18%	229	15%
Slovenia	113	317	361	0.2%	248	219%	44	14%
Spain	447	17 659	13 908	9.0%	13 462	3014%	-3 750	-21%
Sweden	486	C	C	-	-	-	-	-
EU	**107 164**	**161 695**	**154 683**	**100%**	**47 519**	**44%**	**-7 013**	**-4%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period Abbreviations are explained in the Chapter 'Units and abbreviations'. The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.

Figure 3.18 shows the trend of emissions from gaseous fuels by the main contributing countries. One of the reasons for the recent increase is that coal is in the process of being phased out of the fuel mix and replaced by gaseous fuels in many countries. However, consumption has been decreasing since 2019, particularly between 2022 and 2023, with a drop of 14% of consumptions due to international circumstances.

Figure 3.18 1.A.1.a Public Electricity and Heat Production, Gaseous Fuels: Emission trend and share for CO_2

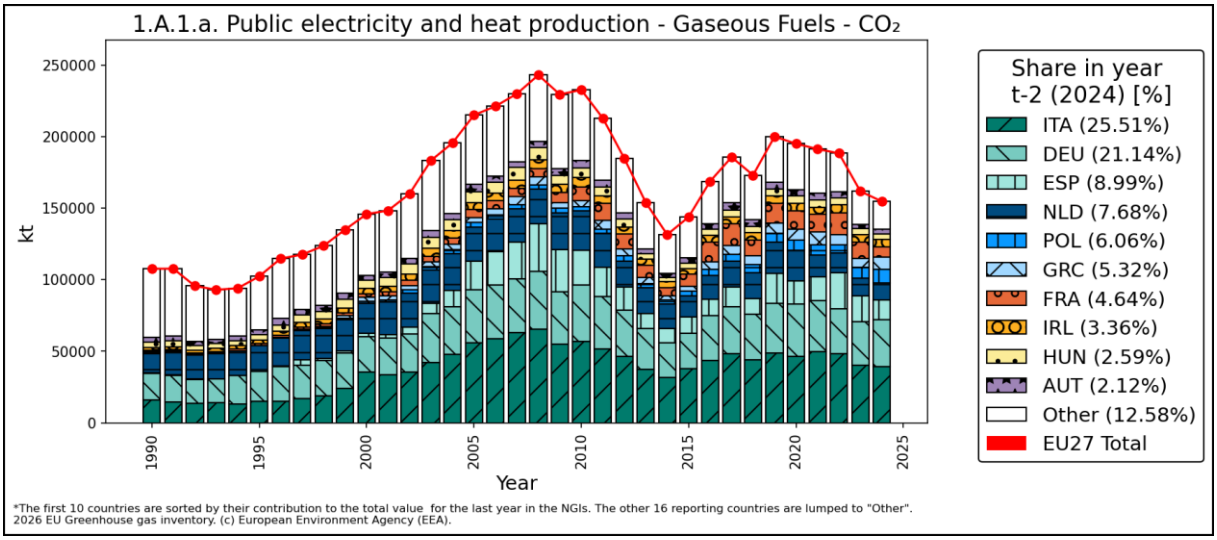
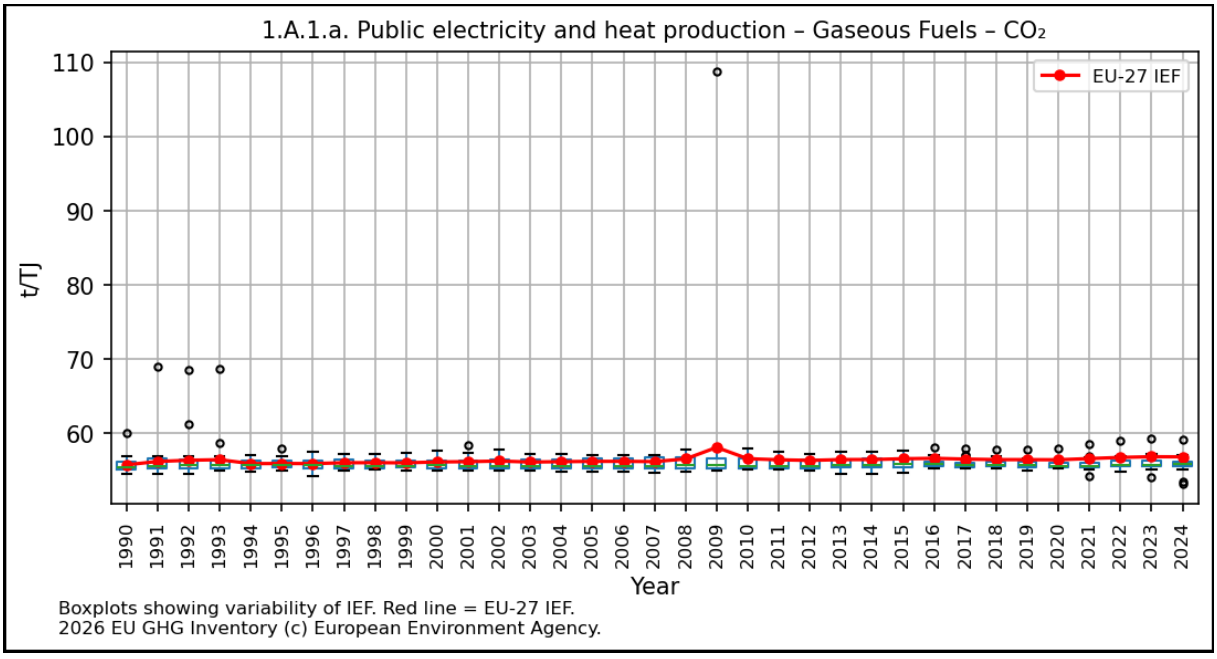


Figure 3.19 (on the next page) shows the implied emission factors from gaseous fuels for CO_2. The EU implied emission factor has slightly increased since 2020 from 56.4 to 56.8, which is close to the default emission factor of natural gas (56.1 t/TJ). The IEF is driven by the source of importation of natural gas and its composition.

Figure 3.19 1.A.1.a Public Electricity and Heat Production, Gaseous Fuels: Implied Emission Factors for CO_2



1.A.1.a Electricity and Heat Production - Other Fuels (CO_2)

In 2024, the share of CO_2 emissions from other fuels amounts to 7.0% of total greenhouse gas emissions from public electricity and heat generation. Other fuels cover mainly the fossil part of municipal solid waste incineration, where there is energy recovery, including plastics, hazardous waste, bulky waste and waste sludge (Table 3.13).

Table 3.13 1.A.1.a Public Electricity and Heat Production, Other Fuels: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	286	1 094	1 023	2.8%	736	257%	-71	-6%
Belgium	674	2 076	2 019	5.5%	1 344	199%	-57	-3%
Bulgaria	NO	NO	NO	-	-	-	-	-
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	24	310	320	0.9%	296	1231%	10	3%
Denmark	539	1 700	1 823	5.0%	1 285	239%	123	7%
Estonia	NO	137	125	0.3%	125	∞	-13	-9%
Finland	1	624	709	1.9%	708	70700%	85	14%
France	2 557	7 068	7 073	19.4%	4 516	177%	5	0%
Germany	4 121	13 025	13 025	35.8%	8 904	216%	0	0%
Greece	NO	NO	NO	-	-	-	-	-
Hungary	30	196	209	0.6%	179	598%	14	7%
Ireland	NO	529	436	1.2%	436	∞	-94	-18%
Italy	143	106	111	0.3%	-33	-23%	4	4%
Latvia	3	NO	NO	-	-3	-100%	-	-
Lithuania	NO	234	230	0.6%	230	∞	-4	-2%
Luxembourg	32	88	85	0.2%	53	163%	-3	-3%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	601	2 548	2 416	6.6%	1 814	302%	-132	-5%
Poland	753	958	970	2.7%	217	29%	11	1%
Portugal	NO	401	513	1.4%	513	∞	112	28%
Romania	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Slovakia	36	158	160	0.4%	124	349%	2	1%
Slovenia	NO	20	24	0.1%	24	∞	3	15%
Spain	128	1 800	1 944	5.3%	1 816	1424%	144	8%
Sweden	524	2 994	3 216	8.8%	2 692	513%	222	7%
EU	**10 453**	**36 067**	**36 430**	**100%**	**25 977**	**249%**	**363**	**1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 3.20 illustrates clearly the strong increase of emissions caused by other fuels over the past 34 years.

Figure 3.20 1.A.1.a Public Electricity and Heat Production, Other Fuels: Emission trend and share for CO_2

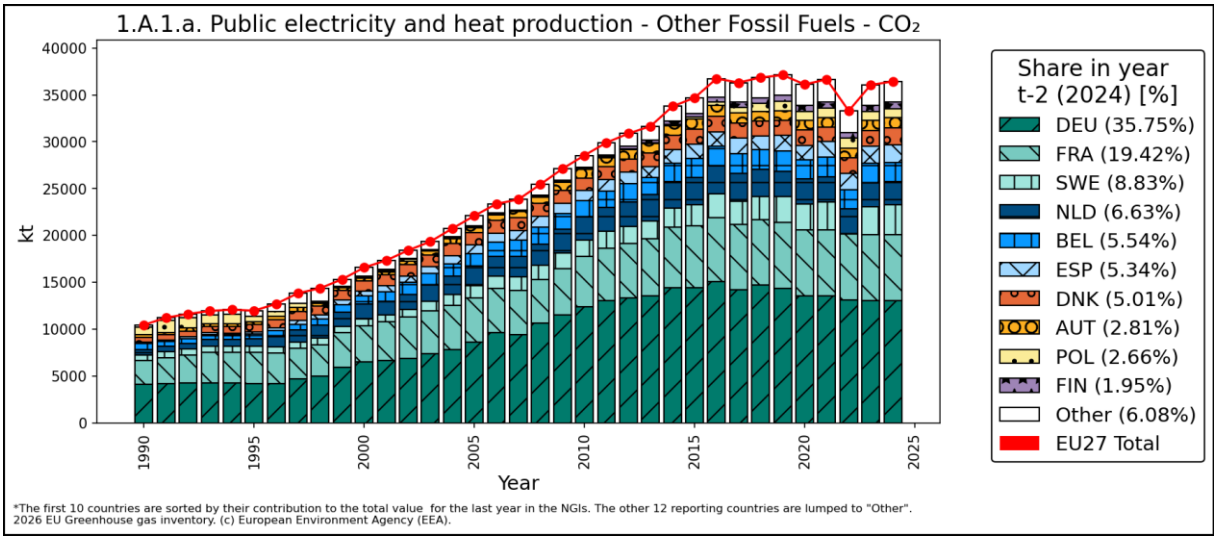
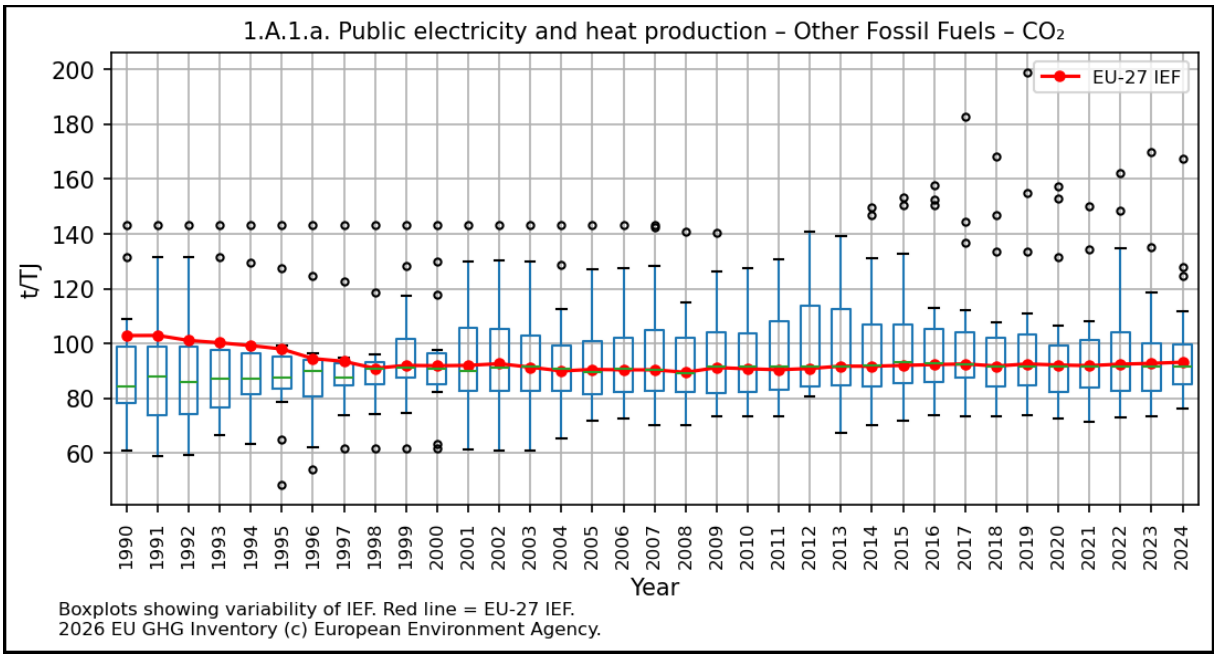


Figure 3.21 shows the implied emission factors from other fuels for CO_2. The EU implied emission factor has gradually fallen until 1998, then levelled out between 86 and 90 t/TJ on the entire time-series. This is because the combustion of industrial waste was greatly reduced in the early 1990s, whereas the combustion of residential waste for electricity and heat has increased in the complete reporting period; furthermore, the calorific value of the applied waste has increased due to better national waste separation management. There is a large diversity in waste composition across countries, leading to differences in countries' IEFs.

Figure 3.21 1.A.1.a Public Electricity and Heat Production, Other Fuels: Implied Emission Factors for CO_2



1.A.1.a Electricity and Heat Production - Peat (CO_2)

CO_2 emissions from the combustion of peat represented 0.3% of all greenhouse gas emissions from public electricity and heat production. Peat in its raw state is a fossil sedimentary deposit of vegetal origin with high water content. Within the EU, emissions declined by 81%, respectively 7.4 Mt CO_2

between 1990 and 2024 and by 32%, between 2023 and 2024 with the phase-out of Ireland in 2024 (Table 3.14).

Table 3.14 1.A.1.a Public Electricity and Heat Production, Peat: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	NO	NO	NO	-	-	-	-	-
Belgium	NO	NO	NO	-	-	-	-	-
Bulgaria	NO	NO	NO	-	-	-	-	-
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	NO	NO	NO	-	-	-	-	-
Denmark	NO	NO	NO	-	-	-	-	-
Estonia	843	16	8	0.5%	-835	-99%	-8	-48%
Finland	3 950	2 245	1 623	93.7%	-2 327	-59%	-623	-28%
France	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Germany	NO	NO	NO	-	-	-	-	-
Greece	NO	NO	NO	-	-	-	-	-
Hungary	NO	NO	NO	-	-	-	-	-
Ireland	3 065	193	NO	-	-3 065	-100%	-193	-100%
Italy	NO	NO	NO	-	-	-	-	-
Latvia	146	0	NO	-	-146	-100%	0	-100%
Lithuania	11	8	9	0.5%	-2	-22%	1	9%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	NO	NO	NO	-	-	-	-	-
Poland	NO	NO	NO	-	-	-	-	-
Portugal	NO	NO	NO	-	-	-	-	-
Romania	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Slovakia	NO	NO	NO	-	-	-	-	-
Slovenia	NO	NO	NO	-	-	-	-	-
Spain	NO	NO	NO	-	-	-	-	-
Sweden	1 150	98	92	5.3%	-1 058	-92%	-6	-6%
EU	**9 164**	**2 560**	**1 731**	**100%**	**-7 433**	**-81%**	**-829**	**-32%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 3.22 illustrates the trend of peat emissions throughout the last 34 years.

Figure 3.22 1.A.1.a Public Electricity and Heat Production, Peat: Emission trend and share for CO_2

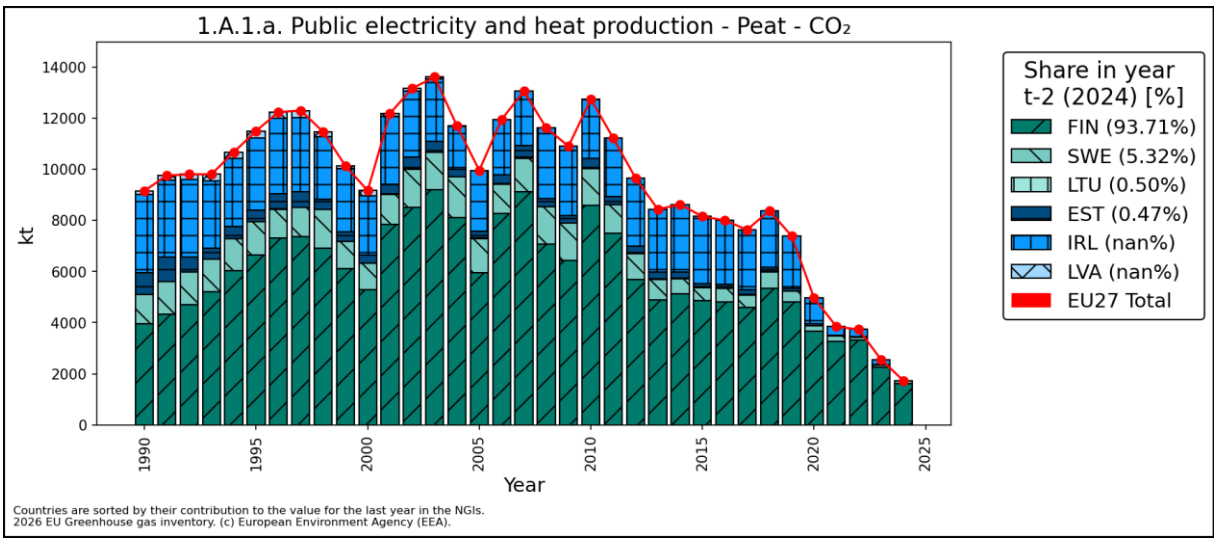
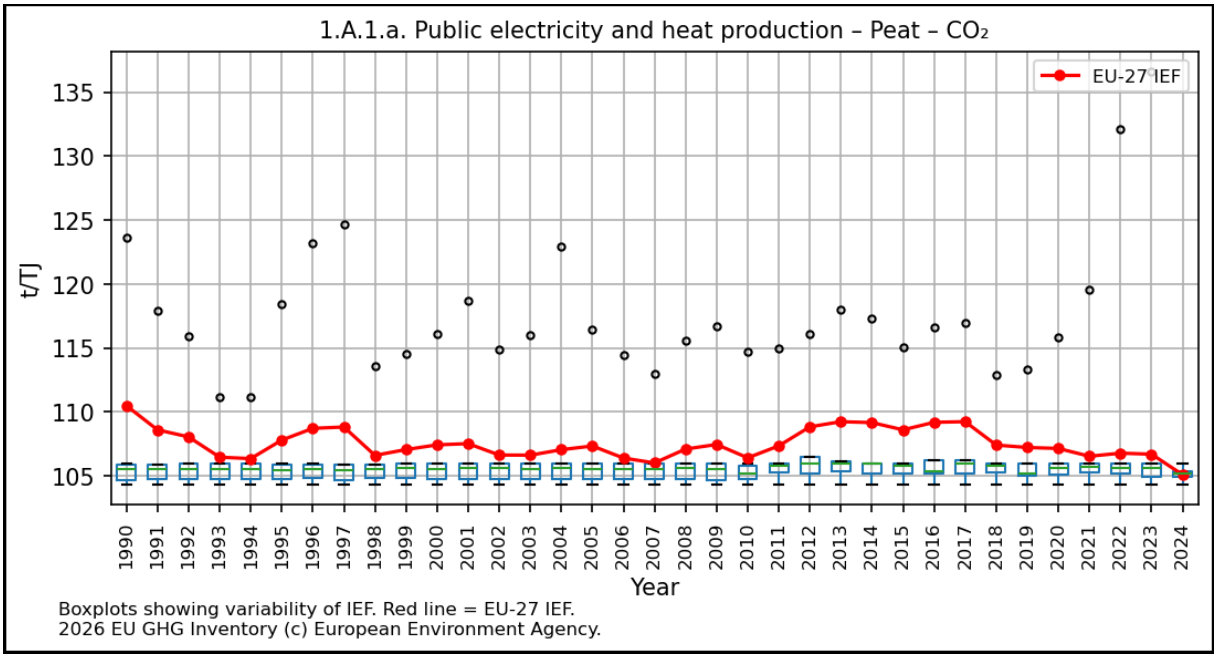


Figure 3.23 shows the implied emission factors of peat for CO_2. The EU implied emission factor amounts to 105.1 t/TJ in 2024 and has been quite stable over the last 34 years. The default emission factor for peat is 106 t/TJ according to the 2006 IPCC guidelines.

Figure 3.23 1.A.1.a Public Electricity and Heat Production, Peat: Implied Emission Factors for CO_2



3.6.1.2 Petroleum Refining (1.A.1.b) (EU)

According to the 2006 IPCC guidelines, Petroleum Refining (CRT 1.A.1.b) should include all combustion activities supporting the refining of petroleum products, including on-site combustion for the generation of electricity and heat for own use. It does not include evaporative emissions occurring at the refinery. These emissions should be reported separately under 1.B.2.a as well as venting and flaring under 1.B.2.c.

Total emissions from Petroleum Refining account for 3.3% of total greenhouse gas emissions in the year 2024. Between 1990 and 2024, EU CO_2 emissions decreased by 15% (Table 3.15). The decrease at the European level can be explained by the reduction in Liquid fuels consumption.

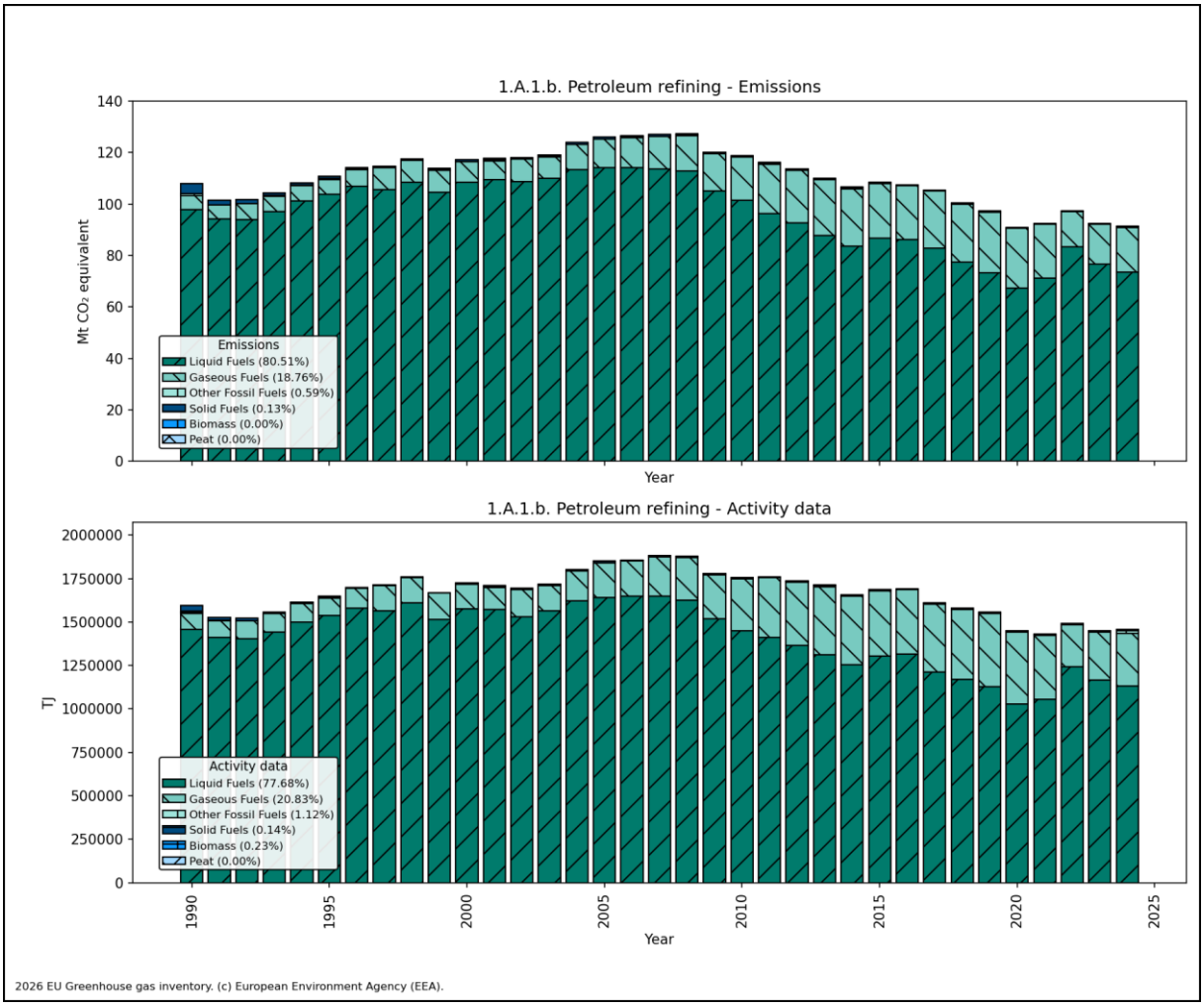
Table 3.15 1.A.1.b Petroleum Refining: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	2 394	2 580	2 620	2.9%	226	9%	41	2%	NA,T2	CS,NA
Belgium	4 299	4 525	4 768	5.2%	469	11%	243	5%	CS,NA,T3	NA,PS
Bulgaria	860	955	1 025	1.1%	165	19%	70	7%	NA,T1,T2	CS,D,NA
Croatia	2 425	717	703	0.8%	-1 722	-71%	-14	-2%	NA,T1	D,NA
Cyprus	86	NO	NO	-	-86	-100%	-	-	NA	NA
Czechia	493	528	462	0.5%	-31	-6%	-66	-12%	NA,T1,T2	CS,D,NA
Denmark	908	898	849	0.9%	-59	-7%	-49	-6%	NA,T2,T3	CS,NA,PS
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	1 994	1 391	1 202	1.3%	-792	-40%	-189	-14%	NA,T3	CS,NA,PS
France	11 935	5 624	5 462	6.0%	-6 473	-54%	-162	-3%	T2,T3	CS,D,OTH,PS
Germany	24 212	20 373	21 080	23.1%	-3 133	-13%	707	3%	CS,NA	CS,NA
Greece	2 375	5 535	5 306	5.8%	2 931	123%	-229	-4%	NA,T2	NA,PS
Hungary	2 376	1 562	1 469	1.6%	-906	-38%	-93	-6%	NA,T2,T3	CS,NA,PS
Ireland	168	287	210	0.2%	41	25%	-77	-27%	NA,T3	CS,NA,PS
Italy	15 817	18 248	17 182	18.9%	1 365	9%	-1 066	-6%	NA,T3	CS,NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	1 510	1 373	1 332	1.5%	-178	-12%	-41	-3%	NA,T2,T3	CS,NA,PS
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	11 010	9 291	8 636	9.5%	-2 374	-22%	-655	-7%	NA,T2	CS,D,NA
Poland	2 169	4 483	4 684	5.1%	2 515	116%	201	4%	NA,T1,T2	CS,D,NA
Portugal	1 870	1 373	1 488	1.6%	-382	-20%	115	8%	NA,T2	R,CS,D,NA,PS
Romania	4 282	1 051	1 088	1.2%	-3 194	-75%	37	3%	NA,T2	CS,NA
Slovakia	2 990	1 883	1 754	1.9%	-1 237	-41%	-129	-7%	NA,T3	NA,PS
Slovenia	171	NO	NO	-	-171	-100%	-	-	NA	NA
Spain	10 858	9 534	9 817	10.8%	-1 041	-10%	283	3%	NA,T2,T3	NA,PS
Sweden	2 106	C,NO	C,NO	-	-	-	-	-	T2	CS
EU	**105 203**	**92 210**	**91 137**	**100%**	**-14 066**	**-13%**	**-1 073**	**-1%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations are explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.
EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.

Figure 3.24 shows the trends in activity data and the associated emissions originating from the refining of petroleum by fuel in the EU between the years 1990 and 2024. Fuel used for petroleum refining decreased by 8.7% in the EU between 1990 and 2024. In the year 2024, liquid fuels represent about 78% of all fuel used in the refining of petroleum. Gaseous fuels almost fully account for the remaining part (around 21%) of the activity data. Gaseous fuels use is three times higher in 2024 compared to 1990. There remains a small amount of other, biomass and solid fuels, used respectively, accounting for 1.1, 0.23% and 0.14% in petroleum refining.

Figure 3.24 1.A.1.b Petroleum Refining: Total emission and activity trends



1.A.1.b Petroleum Refining - Liquid Fuels (CO_2)

CO_2 emissions from the combustion of liquid fuels used for petroleum refining accounted for 80.2% of all greenhouse gas CO_2 emissions from petroleum refining in 2024. Emissions decreased by 25% between 1990 and 2024 (Table 3.16).

Table 3.16 1.A.1.b Petroleum Refining, Liquid Fuels: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	1 958	2 252	2 184	3.0%	226	12%	-68	-3%	T2	CS
Belgium	4 285	3 151	3 276	4.5%	-1 009	-24%	125	4%	CS,T3	PS
Bulgaria	791	914	974	1.3%	183	23%	60	7%	T1	D
Croatia	2 411	387	356	0.5%	-2 055	-85%	-31	-8%	T1	D
Cyprus	86	NO	NO	-	-86	-100%	-	-	NA	NA
Czechia	176	312	274	0.4%	98	56%	-38	-12%	T1	CS,D
Denmark	908	865	819	1.1%	-89	-10%	-46	-5%	T2,T3	CS,PS
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	1 383	1 346	1 129	1.5%	-254	-18%	-218	-16%	-	CS,PS
France	11 413	4 233	4 085	5.6%	-7 329	-64%	-148	-4%	T2,T3	CS,D,OTH,PS
Germany	19 464	18 362	18 466	25.2%	-997	-5%	104	1%	CS	CS
Greece	2 375	5 535	5 306	7.2%	2 931	123%	-229	-4%	T2	PS
Hungary	1 683	953	857	1.2%	-826	-49%	-96	-10%	T3	PS
Ireland	168	275	199	0.3%	31	18%	-75	-27%	T3	CS,PS
Italy	15 656	15 517	14 438	19.7%	-1 219	-8%	-1 079	-7%	T3	CS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	1 510	1 361	1 320	1.8%	-189	-13%	-41	-3%	T2,T3	CS,PS
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	9 968	7 870	6 806	9.3%	-3 162	-32%	-1 063	-14%	T2	CS,D
Poland	1 326	2 678	2 756	3.8%	1 430	108%	78	3%	T1,T2	CS,D
Portugal	1 870	836	928	1.3%	-942	-50%	91	11%	T2	CS
Romania	4 282	893	932	1.3%	-3 350	-78%	39	4%	T2	CS
Slovakia	2 786	1 378	1 260	1.7%	-1 525	-55%	-117	-9%	T3	PS
Slovenia	43	NO	NO	-	-43	-100%	-	-	NA	NA
Spain	10 812	7 130	6 998	9.5%	-3 814	-35%	-132	-2%	T2,T3	PS
Sweden	2 068	C	C	-	-	-	-	-	T2	CS
EU	**95 353**	**76 247**	**73 363**	**100%**	**-21 990**	**-23%**	**-2 884**	**-4%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations are explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.
EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.

Figure 3.25 illustrates that the trend for liquid fuels has been continuously decreasing since the year 2008, with a stabilization between 2014 and 2016. An increase can be observed between 2020 and 2022, following the COVID crisis, followed by a slight decrease.

Figure 3.25 1.A.1.b Petroleum Refining, Liquid Fuels: Emission trend and share for CO_2

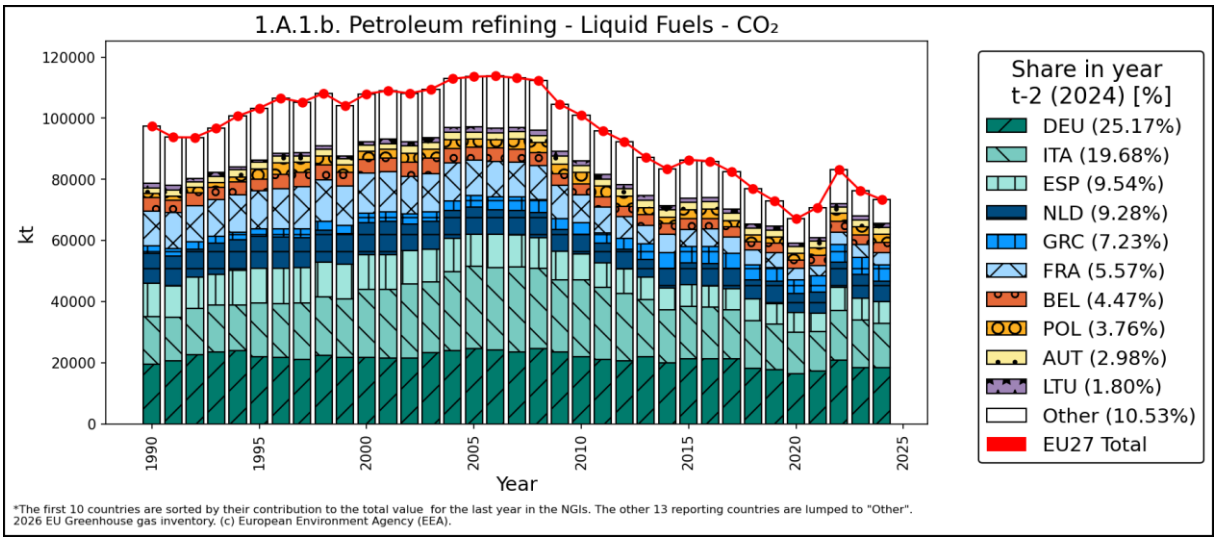
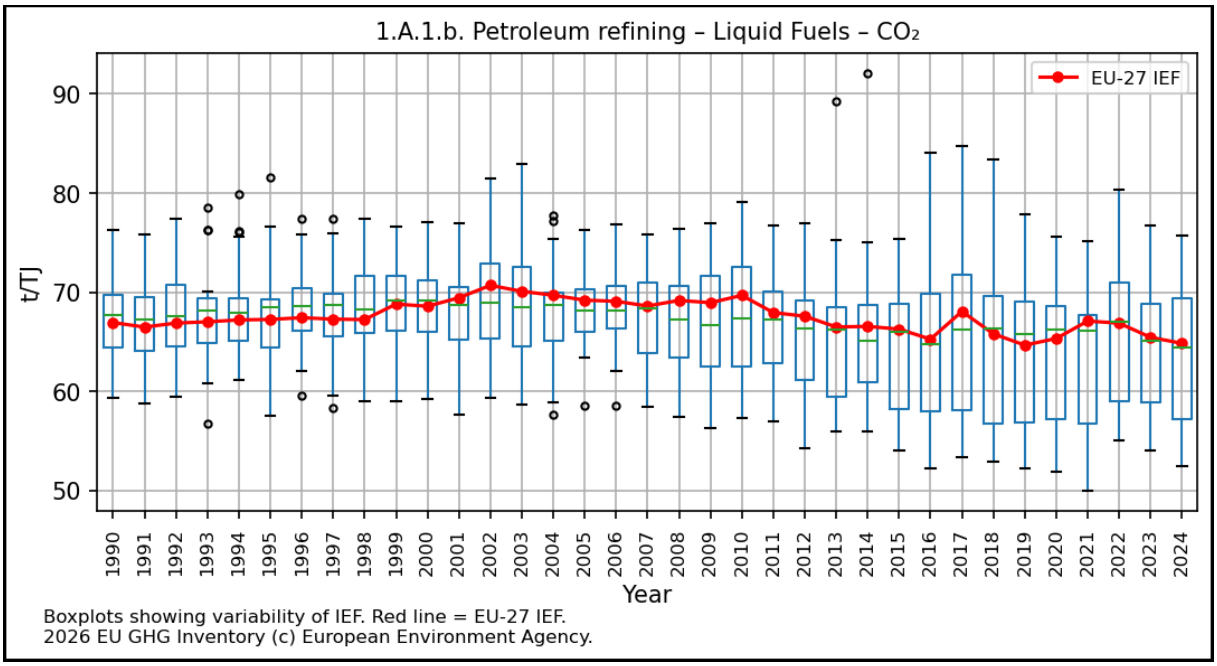


Figure 3.26 (on the next page) shows the emission factors for CO_2 emissions from liquid fuels. The EU implied emission factor shows variations around 68 t/TJ over the time series and amounts to 64.8 t/TJ in 2024. In general, the fluctuating IEF is due to the annual variations of fuel consumption with different carbon content. The IEF declining trend observed since 2002 is due to the higher share of refinery gas in the energy mix.

Figure 3.26 1.A.1.b Petroleum Refining, Liquid Fuels: Implied Emission Factors for CO_2



1.A.1.b Petroleum Refining - Solid Fuels (CO_2)

CO_2 emissions from the combustion of solid fuels in petroleum refining represented around 0.1% of all CO_2 emissions from 1.A.1.b in 2024. Over the whole time series, emissions fell by 97% (Table 3.17).

Table 3.17 1.A.1.b Petroleum Refining, Solid Fuels: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	NO	NO	-	-	-	-	-	NA	NA
Belgium	NO	NO	NO	-	-	-	-	-	NA	NA
Bulgaria	NO	NO	NO	-	-	-	-	-	NA	NA
Croatia	NO	NO	NO	-	-	-	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	NO	NO	NO	-	-	-	-	-	NA	NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	12	NO	NO	-	-12	-100%	-	-	NA	NA
France	486	NO	NO	-	-486	-100%	-	-	T2,T3	CS,D,OTH,PS
Germany	3 131	36	58	47.7%	-3 073	-98%	22	61%	CS	CS
Greece	NO	NO	NO	-	-	-	-	-	NA	NA
Hungary	NO	NO	NO	-	-	-	-	-	NA	NA
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	NO	NO	NO	-	-	-	-	-	NA	NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	NO	NO	NO	-	-	-	-	-	NA	NA
Poland	4	56	64	52.3%	59	1392%	7	13%	T1,T2	CS,D
Portugal	NO	NO	NO	-	-	-	-	-	NA	NA
Romania	NO	NO	NO	-	-	-	-	-	NA	NA
Slovakia	NO	NO	NO	-	-	-	-	-	NA	NA
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	NO	NO	NO	-	-	-	-	-	NA	NA
Sweden	NO	NO	NO	-	-	-	-	-	-	-
EU	**3 633**	**92**	**122**	**100%**	**-3 511**	**-97%**	**29**	**32%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 3.27 illustrates the trend of emissions in 1.A.1.b for solid fuels for the past 34 years. The use of solid fuels in petroleum refining has declined drastically since 1990.

Figure 3.27 1.A.1.b Petroleum Refining, Solid Fuels: Emission trend and share for CO_2

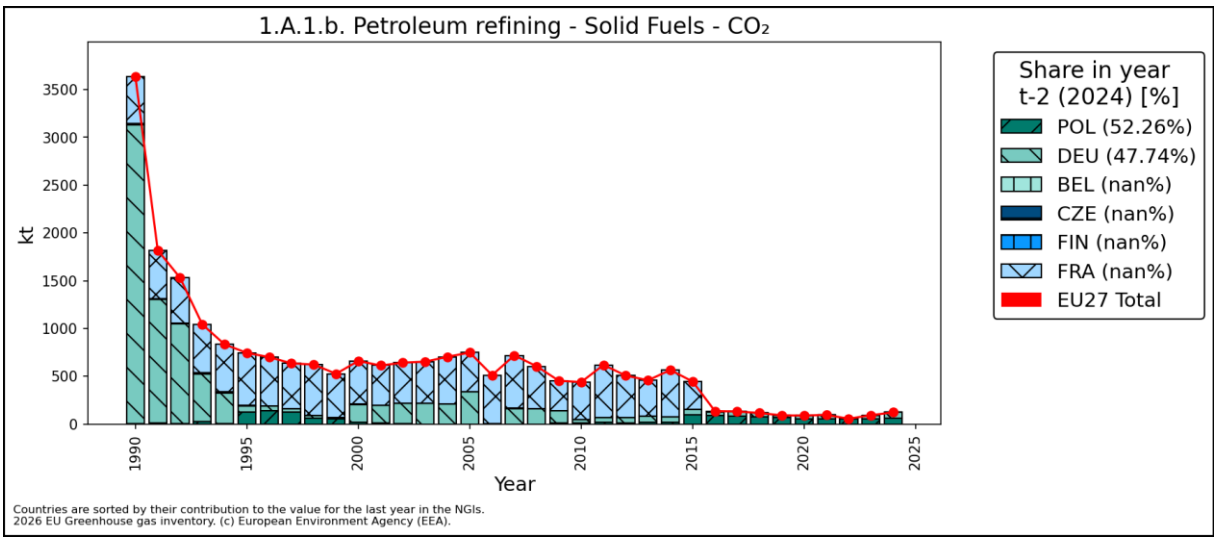
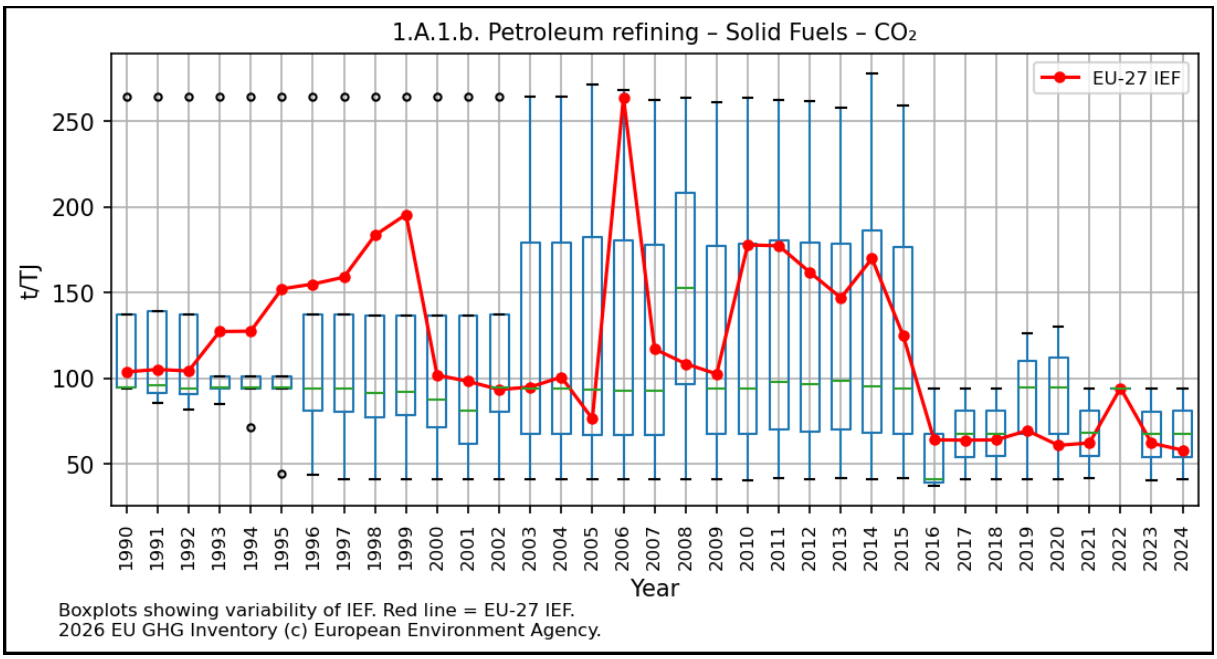


Figure 3.28 shows the relevant implied emission factors. The EU implied emission factor showed strong fluctuations and amounts to 57.9 t/TJ in 2024. One explanation for this is the low number of countries reporting this category. Apart from that, the variation in the EU factor can be partly explained by the declining use of solid fuels in petroleum refining. The evolution of the IEF on the time-series can be explained by the fuel mix (including the use of blast furnace gas, lignite, etc., for example).

Figure 3.28 1.A.1.b Petroleum Refining, Solid Fuels: Implied Emission Factors for CO_2



1.A.1.b Petroleum Refining - Gaseous Fuels (CO_2)

In 2024, CO_2 emissions from the combustion of gaseous fuels used for petroleum refining accounted for about 18.7% of total CO_2 emissions from 1.A.1.b. Emissions in the EU increased by 221% between 1990 and 2024 (Table 3.18).

Table 3.18 1.A.1.b Petroleum Refining, Gaseous Fuels: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	437	327	436	2.5%	-1	0%	109	33%	T2	CS
Belgium	14	1 369	1 488	8.7%	1 474	10614%	119	9%	CS,T3	PS
Bulgaria	69	41	51	0.3%	-18	-26%	10	24%	T2	CS
Croatia	14	330	347	2.0%	333	2390%	17	5%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	317	216	188	1.1%	-129	-41%	-28	-13%	T2	CS
Denmark	NO	33	30	0.2%	30	∞	-3	-10%	T2	CS
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	599	45	73	0.4%	-526	-88%	29	63%	T3	CS
France	36	1 179	1 171	6.8%	1 135	3137%	-8	-1%	T2,T3	CS,D,OTH,PS
Germany	1 444	1 975	2 555	14.9%	1 111	77%	580	29%	CS	CS
Greece	NO	IE	IE	-	-	-	-	-	NA	NA
Hungary	693	602	605	3.5%	-87	-13%	4	1%	T3	PS
Ireland	NO	12	10	0.1%	10	∞	-2	-14%	T3	CS,PS
Italy	161	2 732	2 745	16.0%	2 584	1608%	13	0%	T3	CS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	12	12	0.1%	12	∞	0	0%	T2	CS
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	1 042	1 421	1 830	10.7%	788	76%	409	29%	T2	CS
Poland	92	1 749	1 865	10.9%	1 772	1917%	116	7%	T2	CS
Portugal	NO	536	560	3.3%	560	∞	24	4%	T2	CR,D,PS
Romania	NO	158	156	0.9%	156	∞	-2	-2%	T2	CS
Slovakia	205	505	493	2.9%	289	141%	-12	-2%	T3	PS
Slovenia	128	NO	NO	-	-128	-100%	-	-	NA	NA
Spain	46	2 383	2 498	14.6%	2 452	5333%	115	5%	T2,T3	PS
Sweden	38	C	C	-	-	-	-	-	T2	CS
EU	**5 296**	**15 627**	**17 115**	**100%**	**11 819**	**223%**	**1 488**	**10%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations are explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.
EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.

Figure 3.29 illustrates the trend of increasing emissions from gaseous fuels in category 1.A.1.b in the last 34 years. A big drop was observed between 2020 and 2022, followed by an increase since 2022.

Figure 3.29 1.A.1.b Petroleum Refining, Gaseous Fuels: Emission trend and share for CO_2

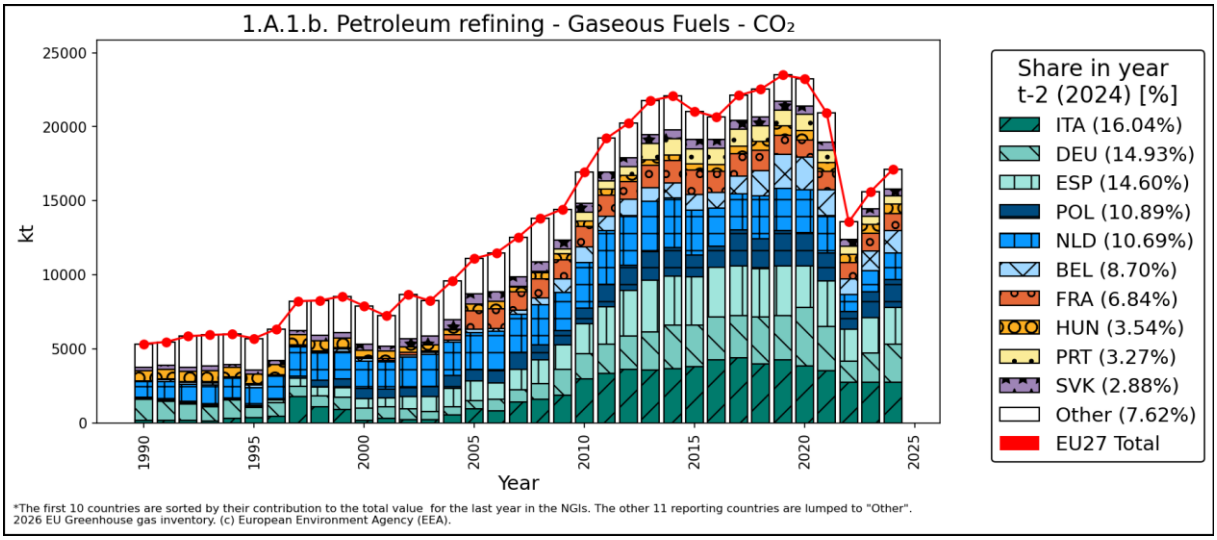
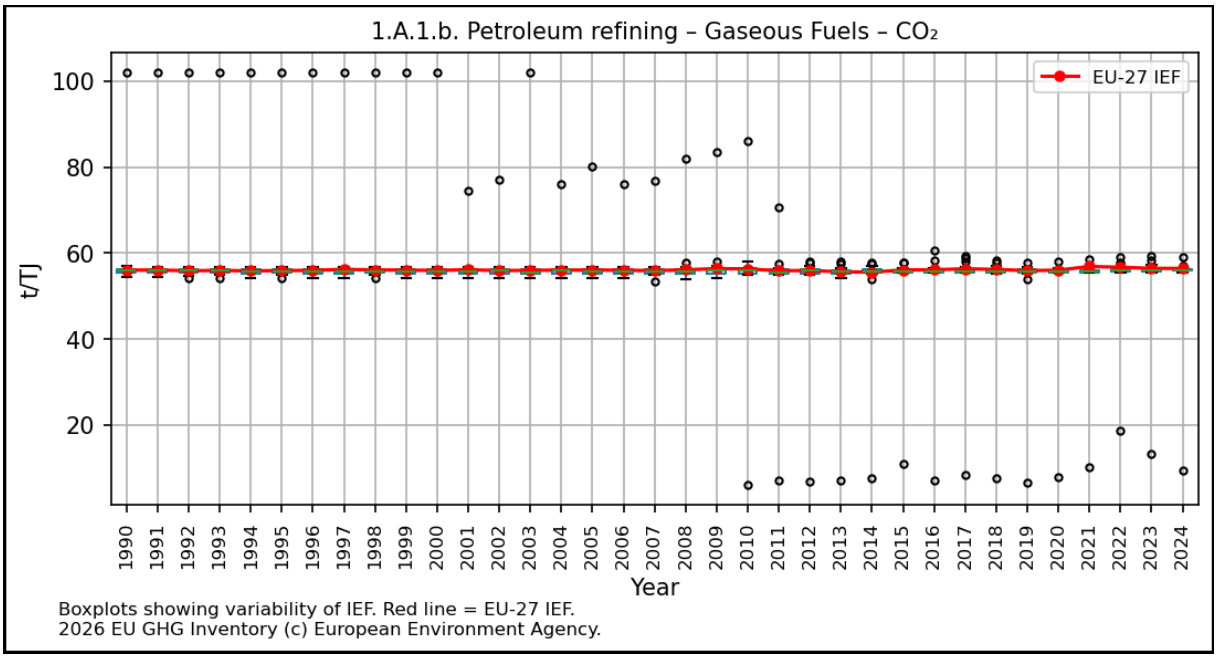


Figure 3.30 shows the implied emission factors for CO_2 emissions from gaseous fuels. The EU implied emission factor has remained broadly stable around 56.0 t/TJ on average on the entire time-series, with a high value of 56.4 t/TJ in 2024 which remains in the IPCC range.

Figure 3.30 1.A.1.b Petroleum Refining, Gaseous Fuels: Implied Emission Factors for CO_2



3.6.1.3 Manufacture of Solid Fuels and Other Energy Industries (1.A.1.c) (EU)

According to the 2006 IPCC guidelines, the manufacture of solid fuels and other energy industries includes combustion emissions from fuel use during the manufacture of secondary and tertiary products from solid fuels, including the production of charcoal. It comprises combustion emissions from the production of coke, brown coal briquettes and patent fuel. It can also cover the emissions from own-energy use in coal mining and gas extraction. Emissions from own on-site fuel use should be included. In addition, this category includes emissions from fuel combustion in oil and natural gas production.

Total emissions from this category accounted for 1.0% of total EU greenhouse gas emissions in 2024. Between 1990 and 2024, CO_2 emissions fell by 73% in the EU (Table 3.19).

Table 3.19 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	510	155	176	0.6%	-334	-66%	21	14%	-	-
Belgium	2 024	157	155	0.6%	-1 869	-92%	-2	-1%	NA,T3	NA,PS
Bulgaria	362	5	5	0.0%	-357	-99%	0	4%	NA	NA
Croatia	912	314	299	1.1%	-613	-67%	-15	-5%	-	-
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	1 516	1 415	721	2.7%	-795	-52%	-694	-49%	NA	NA
Denmark	530	933	1 118	4.1%	588	111%	186	20%	NA,T2,T3	CS,NA
Estonia	78	1 760	1 628	6.0%	1 550	1977%	-132	-7%	T3	PS
Finland	347	320	335	1.2%	-12	-3%	15	5%	NA,T3	CS,NA
France	4 738	2 035	1 744	6.4%	-2 994	-63%	-290	-14%	T2,T3	CS,OTH,PS
Germany	65 289	8 855	8 736	32.2%	-56 553	-87%	-120	-1%	CS	CS
Greece	102	36	38	0.1%	-64	-63%	2	5%	NA	NA
Hungary	570	209	139	0.5%	-431	-76%	-71	-34%	NA	NA
Ireland	100	34	4	0.0%	-96	-96%	-29	-87%	T3	CS
Italy	12 454	3 310	2 683	9.9%	-9 771	-78%	-626	-19%	T3	CS
Latvia	205	64	91	0.3%	-114	-56%	27	43%	-	-
Lithuania	9	39	33	0.1%	24	257%	-6	-15%	NA,T2	CS,NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	2 110	1 609	1 913	7.0%	-197	-9%	304	19%	NA,T2	CS,NA
Poland	4 849	3 464	3 372	12.4%	-1 478	-30%	-92	-3%	NA,T1,T2	CS,D,NA
Portugal	141	NO	NO	-	-141	-100%	-	-	NA	NA
Romania	146	1 191	1 687	6.2%	1 541	1055%	497	42%	NA,T1,T2,T3	CS,D,NA,PS
Slovakia	1 319	1 267	1 184	4.4%	-135	-10%	-83	-7%	NA,T2	CS,NA
Slovenia	82	NO	NO	-	-82	-100%	-	-	NA	NA
Spain	2 089	1 091	738	2.7%	-1 352	-65%	-353	-32%	NA,T1,T2	CS,D,NA,PS
Sweden	300	373	354	1.3%	54	18%	-19	-5%	T2	CS
EU	**100 786**	**28 634**	**27 154**	**100%**	**-73 632**	**-73%**	**-1 480**	**-5%**	**-**	**-**

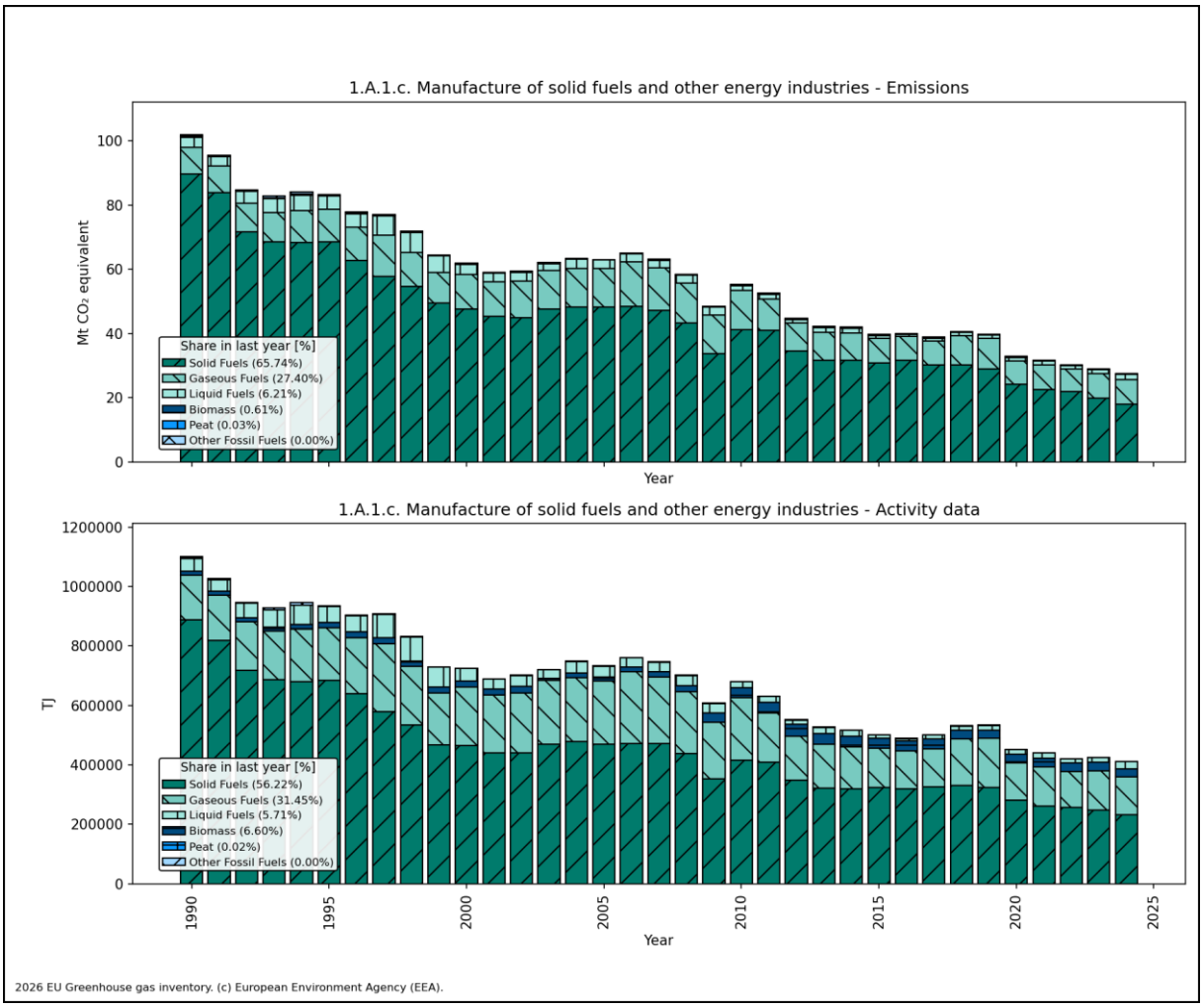
Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 3.31 shows the trends in emissions from this source category by fuel in the EU between 1990 and 2024. The largest share of greenhouse gas emissions from the manufacture of solid fuels can be accounted to CO_2 emissions from solid fuels (about 65.3% of emissions), gaseous fuels (27.2%) and liquid fuels (the remaining share). Emissions from solid fuels fell markedly during the 1990s and then stabilized for a few years. Since 2006, they have begun to decrease again. The strong drop in 2009 was

due to the drop-in coke production associated with the iron and steel production triggered by the economic downturn.

Fuel used for manufacturing solid fuels fell by 62.7% in the EU between 1990 and 2024. The strongest decline was reported for solid fuels (-74.0%), followed by peat (-94.3%) and liquid fuels (-44.5%). Only biomass consumption increased in the period from 1990 to 2024.

Figure 3.31 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries: Total emission and activity trends



1.A.1.c Manufacture of Solid Fuels and Other Energy Industries – Solid Fuels (CO_2)

CO_2 emissions from the combustion of solid fuels used for the manufacture of solid fuels accounted for 65.4% of total greenhouse gas emissions from 1.A.1.c in 2024. Emissions in the EU declined by 73% since 1990.

Table 3.20 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries, Solid Fuels: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Belgium	2 017	157	155	0.9%	-1 862	-92%	-2	-1%
Bulgaria	274	0	0	0.0%	-274	-100%	0	-1%
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	1 352	1 403	709	3.9%	-642	-48%	-694	-49%
Denmark	NO	NO	NO	-	-	-	-	-
Estonia	78	1 760	1 628	9.1%	1 550	1977%	-132	-7%
Finland	347	320	335	1.9%	-12	-3%	15	5%
France	4 054	2 035	1 744	9.7%	-2 310	-57%	-290	-14%
Germany	61 101	7 310	7 233	40.3%	-53 868	-88%	-78	-1%
Greece	NO	NO	NO	-	-	-	-	-
Hungary	220	82	36	0.2%	-184	-84%	-46	-56%
Ireland	NO	NO	NO	-	-	-	-	-
Italy	10 891	2 054	1 431	8.0%	-9 460	-87%	-623	-30%
Latvia	NO	NO	NO	-	-	-	-	-
Lithuania	NO	NO	NO	-	-	-	-	-
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	916	664	957	5.3%	40	4%	292	44%
Poland	4 009	1 932	1 817	10.1%	-2 192	-55%	-115	-6%
Portugal	91	NO	NO	-	-91	-100%	-	-
Romania	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Slovakia	1 319	1 231	1 155	6.4%	-164	-12%	-76	-6%
Slovenia	37	NO	NO	-	-37	-100%	-	-
Spain	1 809	490	413	2.3%	-1 395	-77%	-76	-16%
Sweden	300	373	354	2.0%	54	18%	-19	-5%
EU	**88 816**	**19 812**	**17 969**	**100%**	**-70 848**	**-80%**	**-1 843**	**-9%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations are explained in the Chapter 'Units and abbreviations'.
Austria includes the emissions from 1.A.1.c Solid fuels (occurring in coke ovens) in 1.A.2.a Iron and Steel Industries.

Solid fuels have fallen steadily to one-third of the 1990 levels. The decline in emissions (see Figure 3.32 below) in Germany is mainly due to a large decline in lignite production in the 1990s. Lignite use decreased strongly. From raw lignite, a range of refined products used to be produced for industry, households and small commercial operations. A comprehensive transition from lignite to other fuels then took place until the end of the 1990s.

Figure 3.32 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries, Solid Fuels: Emission trend and share for CO_2

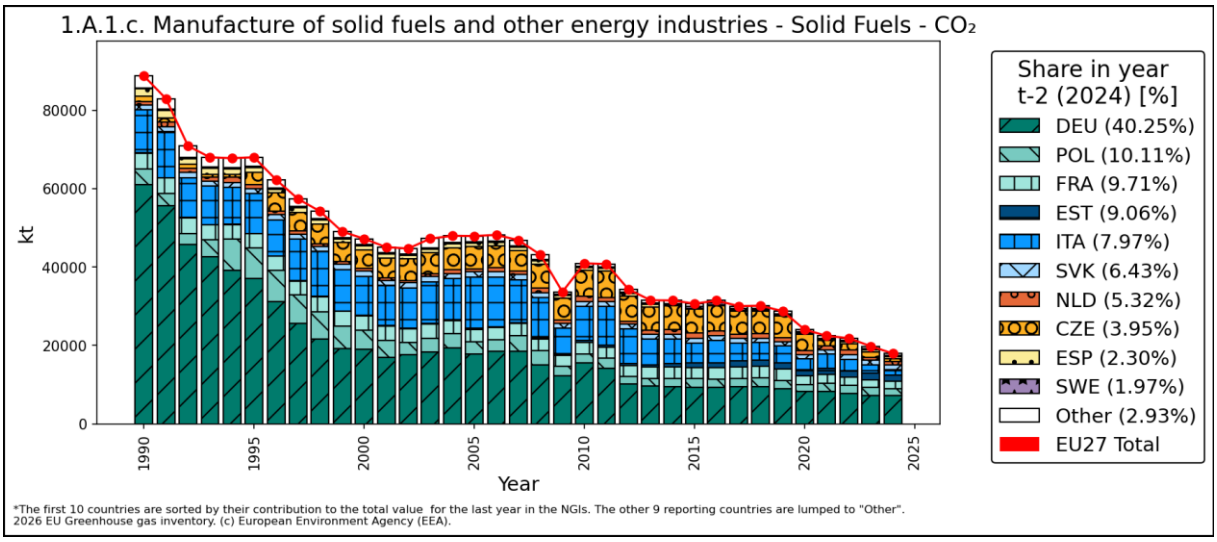
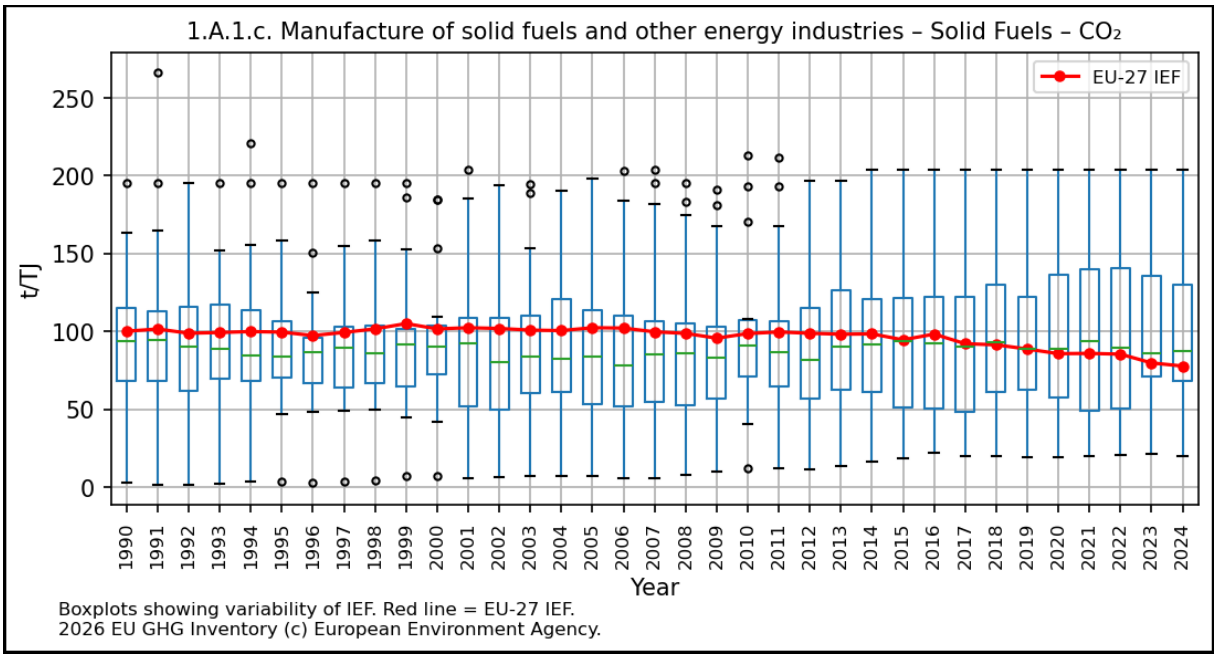


Figure 3.33 shows the relevant implied emission factors for solid fuels. The EU implied emission factor amounted to 77.8 t/TJ in 2024: it is the lowest of the entire time-series.

In general, the variation can be explained by the mix of different fuels and the shifts in their energy consumption between years.

Figure 3.33 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries, Solid Fuels: Implied Emission Factors for CO_2



1.A.1.c Manufacture of Solid Fuels and Other Energy Industries – Gaseous Fuels (CO_2)

CO_2 emissions from the combustion of gaseous fuels used in category 1.A.1.c accounted for about 27.2% of total CO_2 emissions from this category in 2024. Emissions in the EU decreased by 25% (Table 3.21 below) between the years 1990 and 2024. After a strong increase in the 1990s and stabilisation in the 2000s, there has been a significant reduction in the last few years.

Table 3.21 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries, Gaseous Fuels: Countries' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	506	155	176	2.4%	-330	-65%	21	14%
Belgium	3	NO	NO	-	-3	-100%	-	-
Bulgaria	NO	1	2	0.0%	2	∞	0	9%
Croatia	875	314	299	4.0%	-576	-66%	-15	-5%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	NO	5	6	0.1%	6	∞	1	11%
Denmark	525	897	1 031	13.8%	506	96%	134	15%
Estonia	IE	IE	IE	-	-	-	-	-
Finland	NO	NO	NO	-	-	-	-	-
France	531	NO	NO	-	-531	-100%	-	-
Germany	2 622	1 535	1 498	20.0%	-1 124	-43%	-37	-2%
Greece	102	36	38	0.5%	-64	-63%	2	5%
Hungary	311	122	102	1.4%	-208	-67%	-20	-16%
Ireland	IE	4	4	0.1%	4	∞	1	16%
Italy	621	1 256	1 252	16.7%	631	102%	-4	0%
Latvia	105	31	19	0.3%	-85	-81%	-12	-38%
Lithuania	NO	31	25	0.3%	25	∞	-6	-19%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	1 184	945	957	12.8%	-227	-19%	12	1%
Poland	684	1 458	1 468	19.6%	784	114%	10	1%
Portugal	NO	NO	NO	-	-	-	-	-
Romania	IE,NO	234	260	3.5%	260	∞	26	11%
Slovakia	NO	36	29	0.4%	29	∞	-7	-20%
Slovenia	42	NO	NO	-	-42	-100%	-	-
Spain	89	600	308	4.1%	219	245%	-292	-49%
Sweden	IE,NO	IE,NO	IE,NO	-	-	-	-	-
EU	**8 199**	**7 661**	**7 474**	**100%**	**-725**	**-9%**	**-187**	**-2%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Estonia includes the emissions from 1.A.1.c in 1A1a.
Sweden includes emissions from 1.A.1.c in 1.A.2.g

Figure 3.34 illustrates the emission trend for gaseous fuels split by countries over the last 34 years. Although the emissions in the year 2024 compared to 1990 decreased by 25% over the whole time series, there was a strong increase in the 1990s and a decline after 2009.

Figure 3.34 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries, Gaseous Fuels: Emission trend and share for CO_2

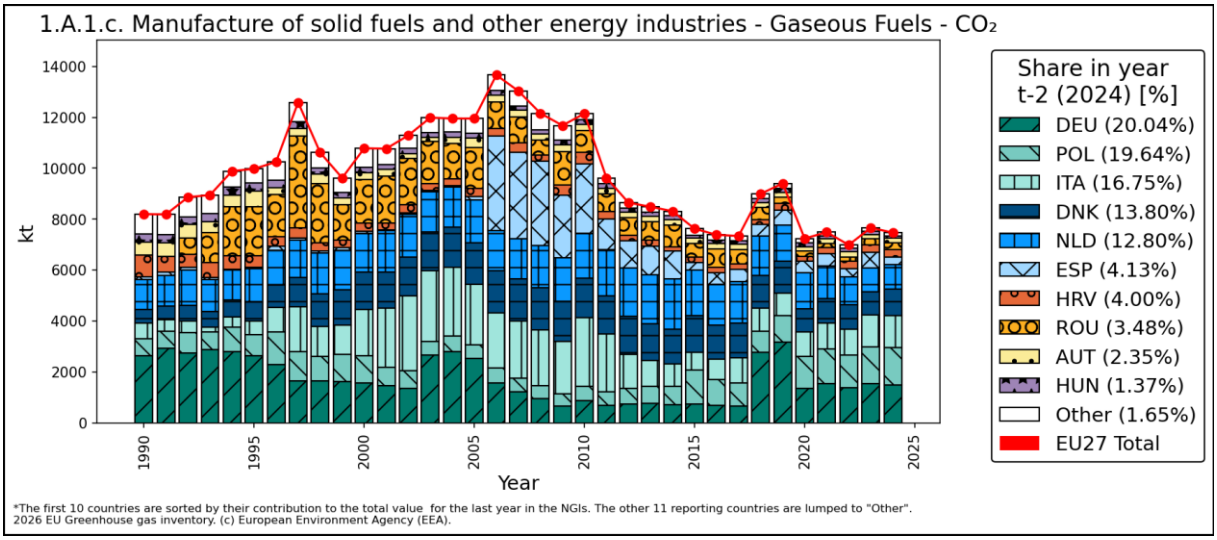
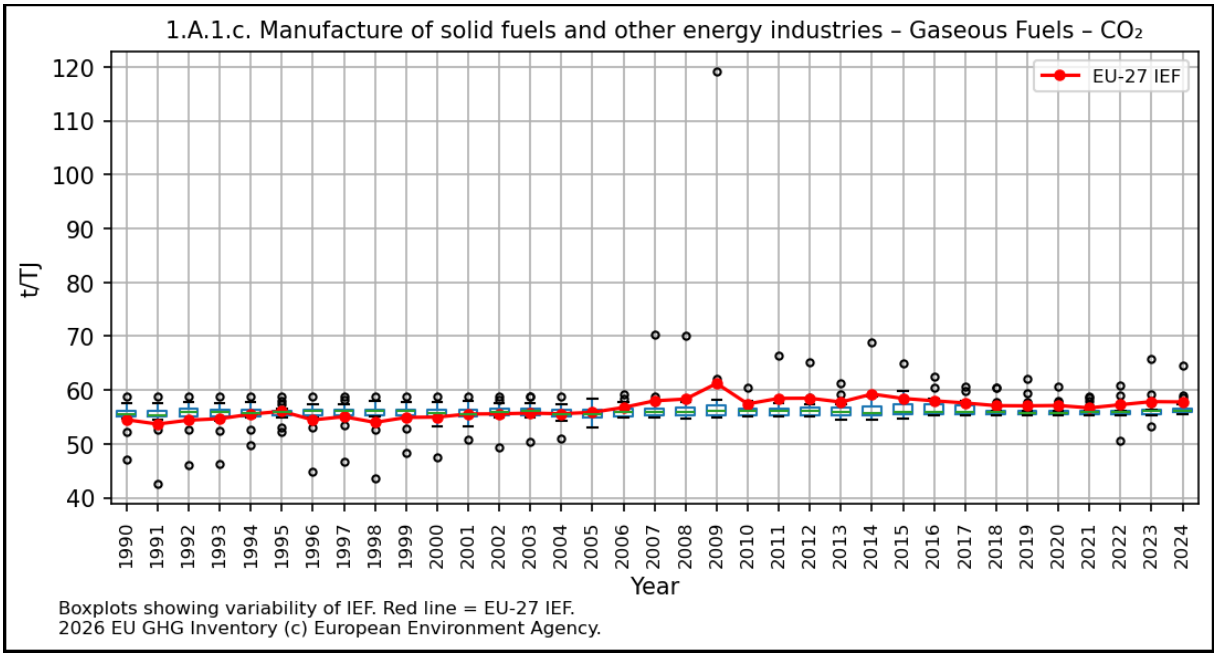


Figure 3.35 shows the implied emission factors for gaseous fuels. The EU implied emission factor is 57.8 t/TJ in 2024 and varies between 55 and 59 t/TJ over the last 34 years. The IPCC default values range between 54.3 t/TJ (lower) and 58.3 t/TJ (upper).

Figure 3.35 1.A.1.c Manufacture of Solid Fuels and Other Energy Industries, Gaseous Fuels: Implied Emission Factors for CO_2



3.6.2 Manufacturing industries and construction (CRT Source Category 1.A.2)

Category 1.A.2 includes emissions from combustion of fuels in manufacturing industries and construction including fuel use of non-public electricity and heat generation (auto producers). According to the guidelines, emissions from fuel combustion in coke oven plants are reported under 1.A.1.c. Austria reports emissions from onsite coke ovens of integrated iron and steel plants under category 1.A.2.a. Some MS report emissions of blast furnace and coke oven gas combustion under categories 1.A.1.a public electricity and heat production or 1.A.4 other sectors and some MS are reporting emissions from refinery gas under 1.A.2. Emissions from category 1.A.2 are specified by the sum of subsectors that correspond to the International Standard Industrial Classification of All Economic Activities (ISIC, see listing below). Emissions from transport used by industry are reported under category 1.A.3 Transport. Most countries report emissions arising from off-road and other mobile machinery used in industry (e.g. construction machinery) under category 1.A.2.g. Emissions from non-energy fuel use (e.g. reducing agents used in blast furnaces or natural gas used for ammonia production) should be reported under category 2 Industrial Processes.

The following enumeration shows the correspondence of 1A2 subcategories and ISIC Rev 3.1 codes:

- 1 A 2 a Iron and Steel: ISIC Group 271 and Class 2731.
- 1 A 2 b Non-Ferrous Metals: ISIC Group 272 and Class 2732.
- 1 A 2 c Chemicals: ISIC Division 24.
- 1 A 2 d Pulp, Paper and Print: ISIC Divisions 21 and 22
- 1 A 2 e Food Processing, Beverages and Tobacco: ISIC Divisions 15 and 16.
- 1 A 2 f Non-metallic Minerals: ISIC Division 26
- 1 A 2 g Other manufacturing industries: ISIC Divisions 17 to 20, 25, 28 to 37 and 45.

The following table shows the share of specific tier methods used for each 1.A.2 category emission estimates. It can be seen that most countries use Tier 2 methodology for emission estimates.

Table 3.22: Share of Tier methods for 1.A.2 by type of reported method and method combinations.

Methods and method combinations	Share of emissions which are estimated by the specific Tier method'
CS	29.2%
T1	0,7%
T1,T2	16.2%
T1,T3	-
T2	20.4%
T2,T3	0.3%
T3	1.4 %
T1,T2,T3	17.1%
CS,T1	0.2%
Other combination	14.5%

Information about methodology used by countries for calculating emissions from category 1.A.2.g is not included in submission files for specific fuels but only as overall methodology information.

Table 3.23: Key categories for sector 1.A.2.

Source category gas	kt CO_2 equivalent		Trend	Level		Share of higher Tiers [%]
	1990	2024		1990	2024	
1.A.2.a Iron and steel: Gaseous Fuels (CO_2)	29403	14954	T	L	L	99.83
1.A.2.a Iron and steel: Liquid Fuels (CO_2)	9044	941	T	L	0	99.15
1.A.2.a Iron and steel: Solid Fuels (CO_2)	112372	50166	T	L	L	99.95
1.A.2.b Non-ferrous metals: Gaseous Fuels (CO_2)	3015	5821	T	0	L	95.31
1.A.2.c Chemicals: Gaseous Fuels (CO_2)	49600	29230	0	L	L	99,66
1.A.2.c Chemicals: Liquid Fuels (CO_2)	29757	8628	T	L	L	85,10
1.A.2.c Chemicals: Solid Fuels (CO_2)	11978	6251	0	L	L	99.89
1.A.2.d Pulp, paper and print: Gaseous Fuels (CO_2)	11344	12778	T	L	L	99.10
1.A.2.d Pulp, paper and print: Liquid Fuels (CO_2)	10835	1515	T	L	0	90.74
1.A.2.d Pulp, paper and print: Solid Fuels (CO_2)	6761	803	T	0	0	94.51
1.A.2.e Food processing, beverages and tobacco: Gaseous Fuels (CO_2)	15826	25853	T	L	L	97.22
1.A.2.e Food processing, beverages and tobacco: Liquid Fuels (CO_2)	18064	2622	T	L	0	80.89
1.A.2.e Food processing, beverages and tobacco: Solid Fuels (CO_2)	11557	2701	T	L	0	99.21
1.A.2.f Non-metallic minerals: Gaseous Fuels (CO_2)	27278	27312	T	L	L	98.83
1.A.2.f Non-metallic minerals: Liquid Fuels (CO_2)	46178	18021	T	L	L	96.89
1.A.2.f Non-metallic minerals: Other Fuels (CO_2)	1438	12921	T	0	L	66.43
1.A.2.f Non-metallic minerals: Solid Fuels (CO_2)	52351	8773	T	L	L	96.44
1.A.2.g Other: Gaseous Fuels (CO_2)	79981	68009	T	L	L	95.3
1.A.2.g Other: Liquid Fuels (CO_2)	81155	34350	T	L	L	97.18
1.A.2.g Other: Other Fuels (CO_2)	2451	4377	T	0	0	92.5
1.A.2.g Other: Solid Fuels (CO_2)	90603	5464	T	L	L	99.56

In 2024, category 1.A.2 contributed to 350 628.6 kt CO_2 equivalents of which 98.5 % share belongs to CO_2 emissions, 0.9 % to N_2O emissions and 0.6 % to CH_4 emissions. Total CO_2 emissions decreased by 52 % since 1990. Total CO_2 emissions decreased by 2% between 2023 and 2024.

Category 1.A.2 is dominated by CO_2 from category 1.A.2.g Other which contributes to total kt CO_2 equivalents emissions by 32.6 % followed by 1.A.2.f Non-metallic Minerals contributing by 19.4 %, 1.A.2.a Iron and steel contributing by 19 %, 1.A.2.c Chemicals by 13.1 %, 1.A.2.e Food processing, beverages and tobacco by 9.1 %, 1.A.2.d Pulp, paper and print by 4.7 % and 1.A.2.b Non-ferrous metals by 2.2 %. Some Member States do not allocate emissions to all sub-categories under 1.A.2., which is one reason for 1.A.2.g being the largest sub-category within 1.A.2 source category.

Figure 3.36 shows the emission trends within source category 1.A.2. The share of liquid fuels on CO_2 emissions from 1.A.2. decreased from 28% in 1990 to 19 % in 2024. The share of solid fuels on CO_2 emissions from 1.A.2. decreased from 41% in 1990 to 22% in 2024. The share of gaseous fuels on CO_2 emissions from 1.A.2. increased from 30% in 1990 to 53% in 2024.

For the years 2013 to 2026 Sweden makes excessive use of confidential reporting (Notation key ‘C’), which implies that sub-categories include emissions without providing detailed fuel specific emissions. However, all Swedish confidential emissions are included in the total emissions of 1.A.2 and have been included in ‘other fossil fuels’ of the EU inventory.

Figure 3.36: 1.A.2. Manufacturing Industries and Construction: Total emission trends

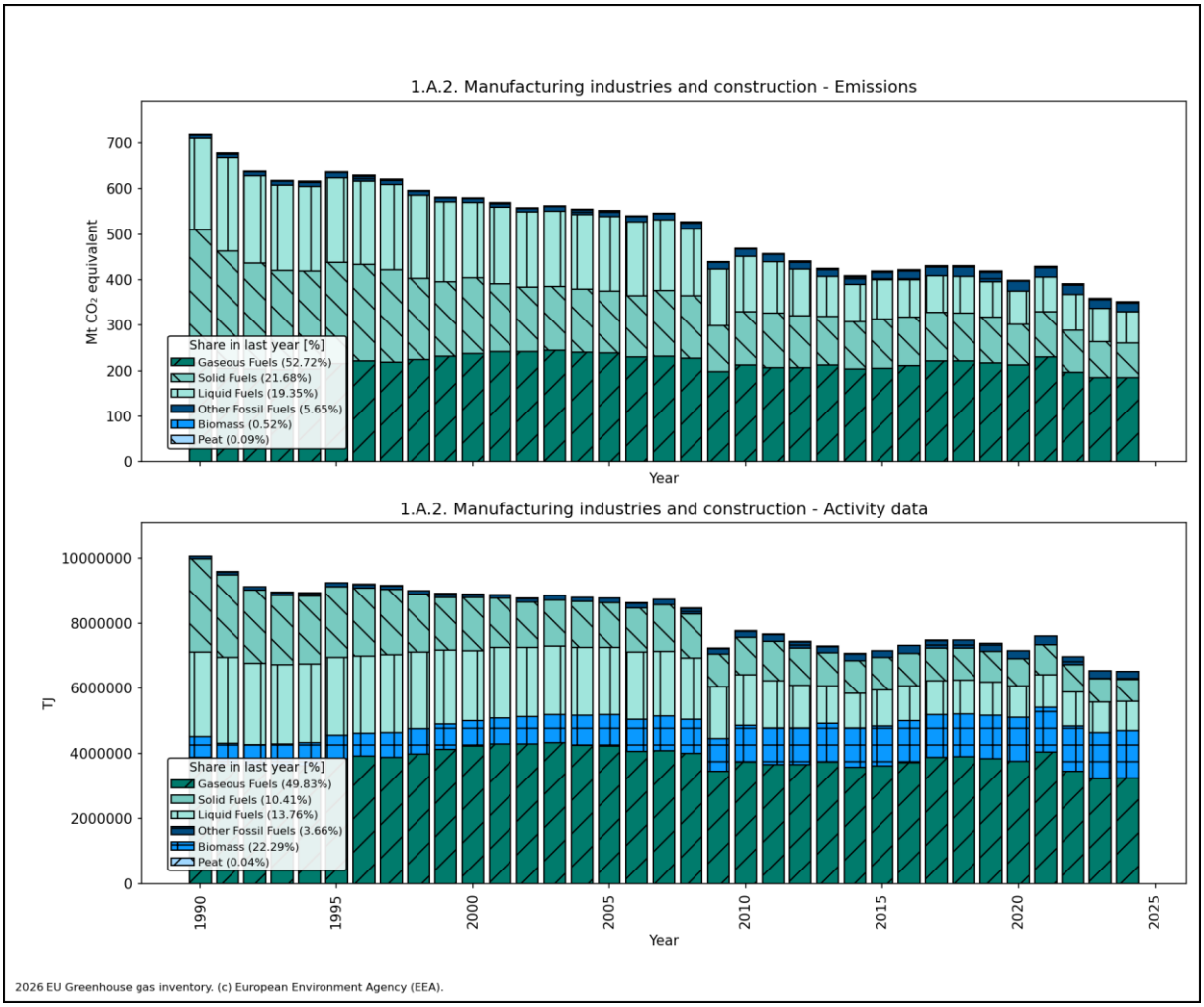


Table 3.23 summarizes information by countries on GHG emissions and CO_2 emissions from 1.A.2 Manufacturing Industries and Construction in 1990 and 2024.

Table 3.24: 1.A.2. Manufacturing Industries and Construction: Member States contributions to total GHG and CO_2 emissions

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt	
	1990	2024	1990	2024
Austria	9 621	9 149	9 545	9 013
Belgium	23 604	12 990	23 464	12 838
Bulgaria	17 757	4 056	17 664	3 999
Croatia	5 128	2 540	5 103	2 519
Cyprus	505	561	502	552
Czechia	47 105	8 865	46 824	8 761
Denmark	5 732	2 684	5 668	2 630
Estonia	3 454	260	3 446	259
Finland	13 354	4 845	13 189	4 711
France	64 530	35 414	63 989	34 586
Germany	184 425	101 878	182 953	101 000
Greece	9 400	4 693	9 338	4 644
Hungary	13 509	4 080	13 475	4 037
Ireland	4 093	4 313	4 058	4 262
Italy	92 151	46 159	90 773	45 251
Latvia	3 965	624	3 910	565
Lithuania	6 158	1 124	6 106	1 101
Luxembourg	6 244	955	6 229	933
Malta	53	41	53	40
Netherlands	29 230	17 611	29 135	17 517
Poland	42 831	25 944	42 621	25 690
Portugal	8 994	5 809	8 853	5 634
Romania	54 080	11 110	53 942	11 047
Slovakia	16 095	5 435	16 027	5 392
Slovenia	3 096	1 495	3 067	1 474
Spain	44 880	32 991	44 537	32 070
Sweden	10 786	5 940	10 647	5 824
EU	**720 780**	**351 562**	**715 117**	**346 350**

Abbreviations explained in the Chapter 'Units and abbreviations'.

1.A.2 Manufacturing Industries and Construction is the fourth largest sector in the EU accounting for 14 % of total GHG emissions from Energy sector in 2024. Between 1990 and 2024, CO_2 emissions from 1.A.2. Manufacturing Industries and Construction declined by 52 %. Decrease of total emissions is caused by decrease of fossil fuel consumption in category 1.A.2. Manufacturing Industries and Construction.

A shift from solid and liquid fuels to mainly natural gas took place and an increase of biomass CO_2 emissions by 139 %.

Decrease of emissions in 2006 to 2008 were influenced by the features of national economy development when in-country industrial production already started to diminish due to increasing costs of the production and dominance of imported products. Crisis in national economy in the second part of 2008 also caused a significant decrease in total emissions. The decline in recent years is caused by restrictions during the COVID and very challenging macroeconomic and geopolitical situation.

3.6.2.1 Iron and Steel (1.A.2.a)

This chapter provides information about European emission trend, Member States contribution to the overall emission trend, activity data and emission factors used for emission estimates by countries for category 1.A.2.a Iron and Steel.

Category 1.A.2.a (more specifically CO_2 emissions from use of gaseous, liquid and solid fuels) was identified as a key category by level and trend and thus the following description focuses only on CO_2 emissions. CO_2 emissions trend and activity data trends can be observed in

Figure 3.37. Detailed data related to countries CO_2 emissions and percentage differences is depicted in Table 3.25. CO_2 emissions have almost 100 % share on total emissions from 1.A.2.a.

Total CO_2 emissions from 1.A.2.a amounted to 66 289,5 kt CO_2 eq. in 2024. The trend of total CO_2 emissions for 1990 to 2024 from category 1.A.2.a is depicted in *Figure* 3.37

Total CO_2 emissions decreased by 56 % since 1990, mainly due to improved efficiency of restructured iron and steel plants and ongoing consequences of the economic crisis in 2009. Total CO_2 emissions increased by 0.5% between 2023 and 2024. CO_2 emissions from 1.A.2.a Iron and Steel accounted for 19% of 1.A.2. source category. The share of liquid fuels on CO_2 emissions from 1.A.2.a decreased from 6% in 1990 to 1.4 % in 2024. The share of solid fuels on CO_2 emissions from 1.A.2.a was 76% in 2024 and 74% in 1990. The share of gaseous fuels on CO_2 emissions from 1.A.2.a increased from 19% in 1990 to 23% in 2024.

Figure 3.37: 1.A.2.a Iron and Steel: total emissions and activity data trends

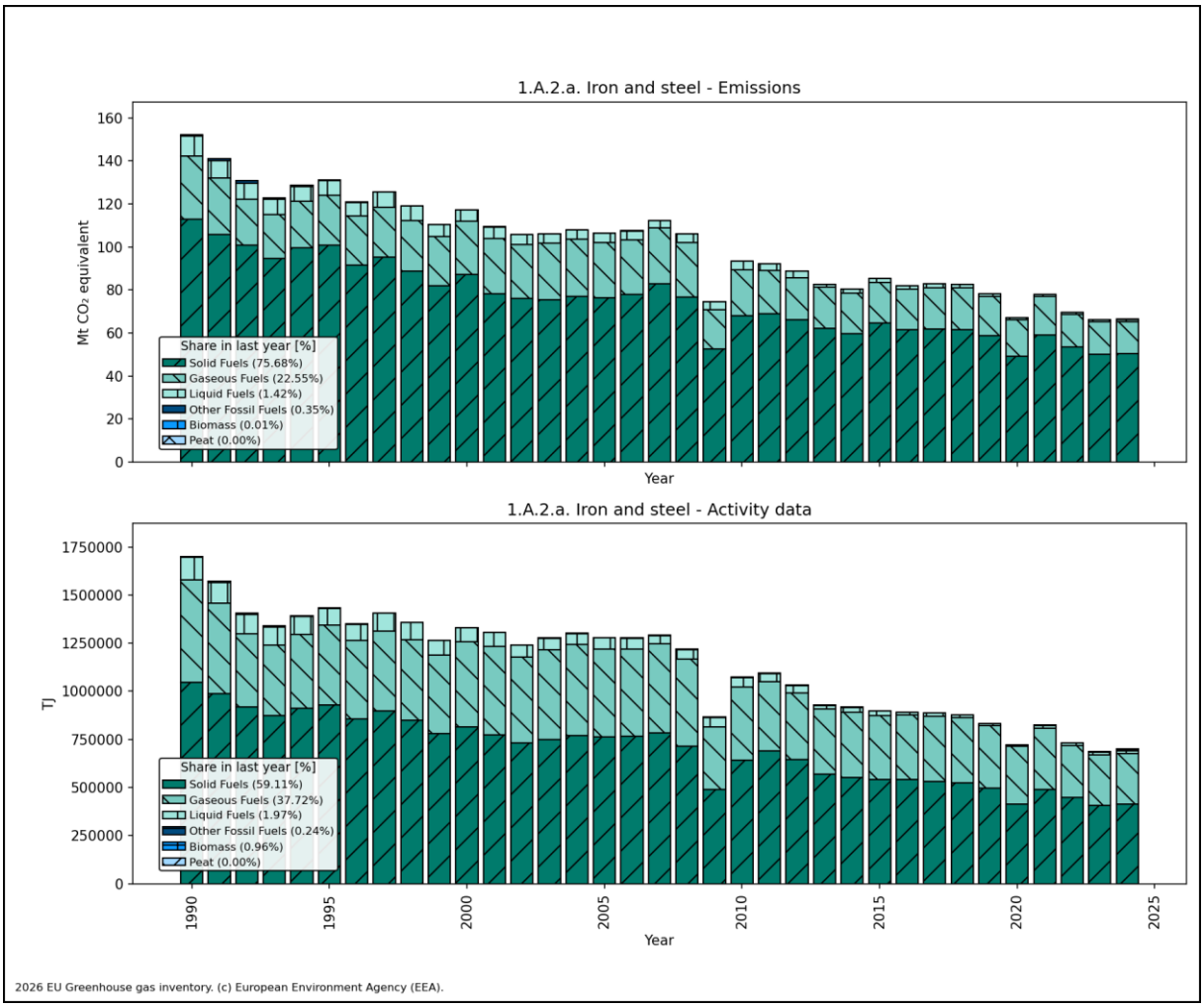


Table 3.25: 1.A.2.a Iron and Steel: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	1 833	1 817	1 680	2.5%	-152	-8%	-136	-8%	NA,T2	CS,NA
Belgium	5 662	986	1 067	1.6%	-4 594	-81%	81	8%	NA,T1,T3	CS,D,NA,PS
Bulgaria	2 705	112	108	0.2%	-2 597	-96%	-3	-3%	NA,T1,T2	CS,D,NA
Croatia	1 062	65	254	0.4%	-808	-76%	189	291%	NA,T1	D,NA
Cyprus	1	0	0	0.0%	-1	-96%	0	0%	NA,T1	D,NA
Czechia	14 861	1 349	897	1.4%	-13 964	-94%	-453	-34%	NA,T2	CS,D,NA
Denmark	136	82	84	0.1%	-52	-38%	3	3%	NA,T2,T3	CS,NA
Estonia	NO	0	1	0.0%	1	∞	0	7%	NA,T2	CS,NA
Finland	2 499	755	770	1.2%	-1 729	-69%	14	2%	NA,T3	CS,NA,PS
France	8 777	3 333	3 254	4.9%	-5 523	-63%	-79	-2%	T2,T3	CS
Germany	35 269	33 300	33 166	50.0%	-2 103	-6%	-134	0%	CS,NA	CS,NA,NO
Greece	447	88	100	0.2%	-348	-78%	12	13%	NA,T2	CS,NA,PS
Hungary	2 524	60	56	0.1%	-2 468	-98%	-4	-7%	NA,T1,T2	CS,D,NA
Ireland	175	2	2	0.0%	-173	-99%	0	0%	NA,T2	CS,NA
Italy	25 255	7 997	7 674	11.6%	-17 581	-70%	-323	-4%	NA,T2	CS,NA
Latvia	389	2	0	0.0%	-389	-100%	-2	-89%	NA,T2	CS,NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	5 393	236	259	0.4%	-5 133	-95%	24	10%	NA,T2	CS,NA
Malta	NO	0	0	0.0%	0	∞	0	6%	NA,T1	D,NA
Netherlands	5 599	3 596	4 596	6.9%	-1 002	-18%	1 000	28%	NA,T2	CS,NA
Poland	16 247	3 221	3 580	5.4%	-12 668	-78%	359	11%	NA,T1,T2	CS,D,NA
Portugal	373	100	104	0.2%	-269	-72%	4	4%	NA,T1,T2	CS,D,NA
Romania	9 154	503	383	0.6%	-8 771	-96%	-120	-24%	NA,T1,T2	CS,D,NA
Slovakia	2 682	2 633	2 446	3.7%	-235	-9%	-187	-7%	NA,T2	CS,NA
Slovenia	423	168	168	0.3%	-255	-60%	1	0%	NA,T1,T2	CS,D,NA
Spain	8 303	4 332	4 604	6.9%	-3 699	-45%	272	6%	NA,T1,T2,T3	CS,D,NA,PS
Sweden	1 706	1 253	1 033	1.6%	-672	-39%	-220	-18%	T2	CS
EU	**151 475**	**65 992**	**66 290**	**100%**	**-85 185**	**-56%**	**297**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

1.A.2.a Iron and Steel - Liquid Fuels (CO_2)

CO_2 emissions from the use of liquid fuels in category 1.A.2.a amounted 941 kt in 2024 for EU. CO_2 emissions decreased compared to the year 1990 by 90 % and decreased by 2 % compared to 2023. This category corresponds to 0.3% share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 88% compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.26.

Table 3.26: 1.A.2.a Iron and Steel, liquid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	76	8	5	0.5%	-72	-94%	-4	-43%	T2	CS
Belgium	885	34	32	3.4%	-852	-96%	-2	-5%	T1,T3	D,PS
Bulgaria	37	1	1	0.1%	-37	-98%	0	2%	T1	D
Croatia	208	9	7	0.8%	-201	-97%	-2	-17%	T1	D
Cyprus	1	0	0	0.0%	-1	-96%	0	0%	T1	D
Czechia	427	NO	NO	-	-427	-100%	-	-	NA	NA
Denmark	25	5	3	0.4%	-22	-87%	-1	-29%	T2	CS
Estonia	NO	0	NO	-	-	-	0	-100%	NA	NA
Finland	305	18	17	1.9%	-288	-94%	0	-2%	T3	CS
France	1 725	167	134	14.3%	-1 591	-92%	-32	-19%	T2,T3	CS
Germany	916	11	10	1.0%	-906	-99%	-1	-11%	CS	CS
Greece	447	33	31	3.2%	-417	-93%	-2	-7%	T2	PS
Hungary	583	NO	NO	-	-583	-100%	-	-	NA	NA
Ireland	16	NO	NO	-	-16	-100%	-	-	NA	NA
Italy	156	45	97	10.3%	-59	-38%	52	117%	T2	CS
Latvia	92	2	NO	-	-92	-100%	-2	-100%	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	37	NO	NO	-	-37	-100%	-	-	NA	NA
Malta	NO	0	0	0.0%	0	∞	0	6%	T1	D
Netherlands	19	NO	NO	-	-19	-100%	-	-	NA	NA
Poland	870	16	15	1.6%	-855	-98%	-1	-6%	T1,T2	CS,D
Portugal	109	0	0	0.0%	-109	-100%	0	-23%	T1	D
Romania	NO	0	0	0.0%	0	∞	0	-23%	T1,T2	CS,D
Slovakia	164	2	2	0.2%	-162	-99%	0	-9%	T2	CS
Slovenia	54	5	3	0.3%	-51	-94%	-2	-35%	T1,T2	CS,D
Spain	1 059	35	22	2.3%	-1 037	-98%	-13	-38%	T1,T2,T3	CS,D,PS
Sweden	831	569	561	59.6%	-270	-32%	-8	-1%	T2	CS
EU	**9 044**	**959**	**941**	**100%**	**-8 103**	**-90%**	**-18**	**-2%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.38 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.38: 1.A.2.a Iron and Steel, Liquid fuels: Emission trend and share for CO_2

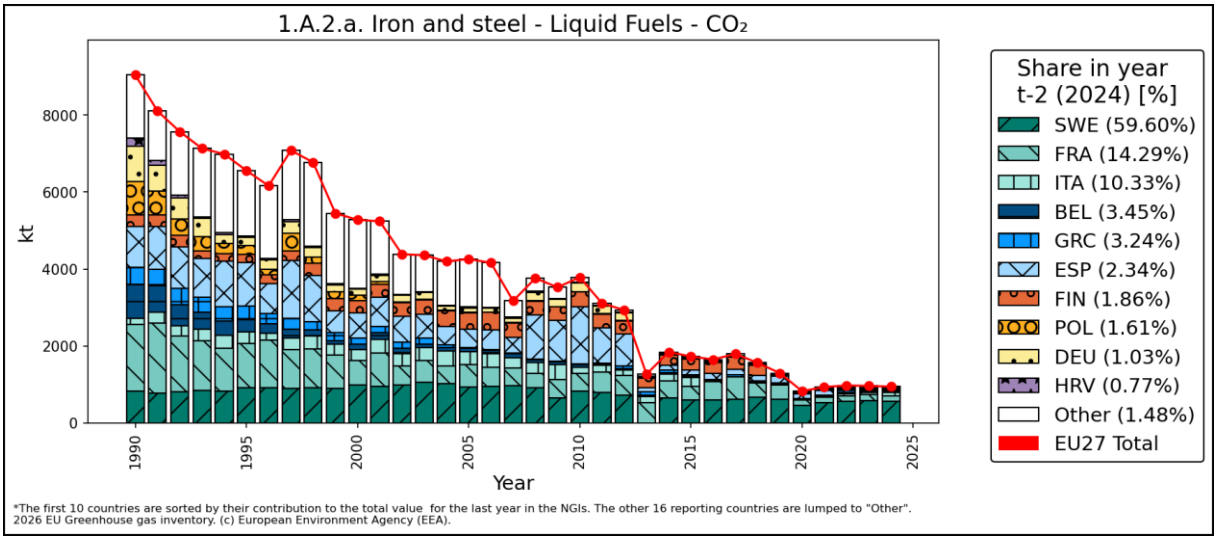
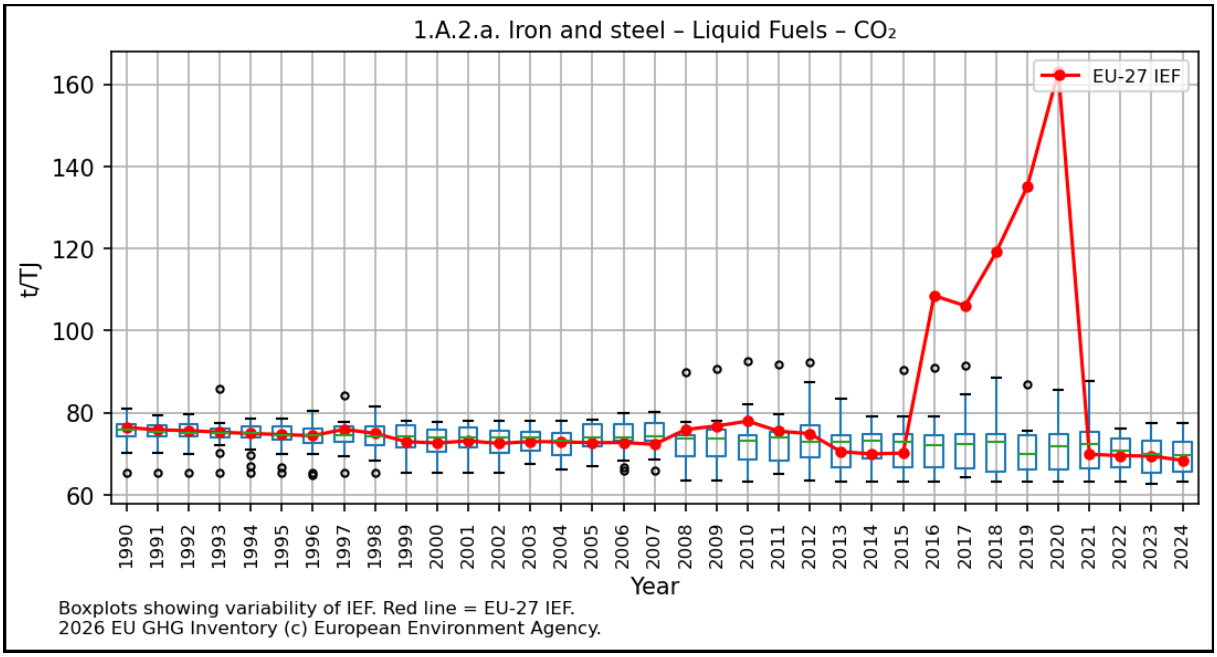


Figure 3.39 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. In the graph, data from Sweden aren't included due to reported confidential data in years 2015-2020, this probable influence the trend of EU IEF as the steep increase occurred exactly in the same period. Sweden has the 60 % share in EU sector total. The EU CO_2 IEF equaled 68.39 t/TJ in 2024.

Figure 3.39: 1.A.2.a Iron and Steel, Liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



Note: The EU IEF for CO_2 emissions of category 1.A.2.a. liquid fuels displayed in this graph does not include data from SWE due to reported confidential data.

1.A.2.a Iron and Steel - Solid Fuels (CO_2)

CO_2 emissions from the use of solid fuels in category 1.A.2.a amounted 50 166 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 55 % and increased compared to 2023 by 0.2 %. This category represents 14 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 61 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.27.

Table 3.27: 1.A.2.a Iron and Steel, solid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	1 107	734	643	1.3%	-464	-42%	-92	-12%	T2	CS
Belgium	3 284	14	12	0.0%	-3 272	-100%	-2	-15%	T3	PS
Bulgaria	1 631	NO	NO	-	-1 631	-100%	-	-	NA	NA
Croatia	625	14	10	0.0%	-616	-98%	-4	-31%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	13 709	1 004	531	1.1%	-13 178	-96%	-473	-47%	T2	CS,D
Denmark	5	NO	NO	-	-5	-100%	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	2 084	411	418	0.8%	-1 666	-80%	7	2%	T3	CS,PS
France	4 253	1 570	1 496	3.0%	-2 757	-65%	-74	-5%	T2,T3	CS
Germany	29 912	30 658	30 638	61.1%	726	2%	-19	0%	CS	CS
Greece	NO	NO	NO	-	-	-	-	-	NA	NA
Hungary	629	5	7	0.0%	-622	-99%	2	50%	T1,T2	CS,D
Ireland	115	NO	NO	-	-115	-100%	-	-	NA	NA
Italy	20 762	4 390	4 108	8.2%	-16 654	-80%	-282	-6%	T2	CS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	4 959	NO	NO	-	-4 959	-100%	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	4 913	3 146	4 084	8.1%	-829	-17%	938	30%	T2	CS
Poland	11 870	2 194	2 447	4.9%	-9 423	-79%	253	12%	T1,T2	CS,D
Portugal	264	NO	NO	-	-264	-100%	-	-	NA	NA
Romania	2 599	83	71	0.1%	-2 527	-97%	-12	-14%	T1,T2	CS,D
Slovakia	2 296	2 484	2 307	4.6%	10	0%	-178	-7%	T2	CS
Slovenia	57	14	15	0.0%	-43	-75%	0	2%	T1	D
Spain	6 449	2 773	2 992	6.0%	-3 458	-54%	218	8%	T1,T2,T3	CS,PS
Sweden	850	563	387	0.8%	-463	-54%	-176	-31%	T2	CS
EU	**112 372**	**50 059**	**50 166**	**100%**	**-62 206**	**-55%**	**107**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.40 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.40: 1.A.2.a Iron and Steel, solid fuels: Emission trend and share for CO_2

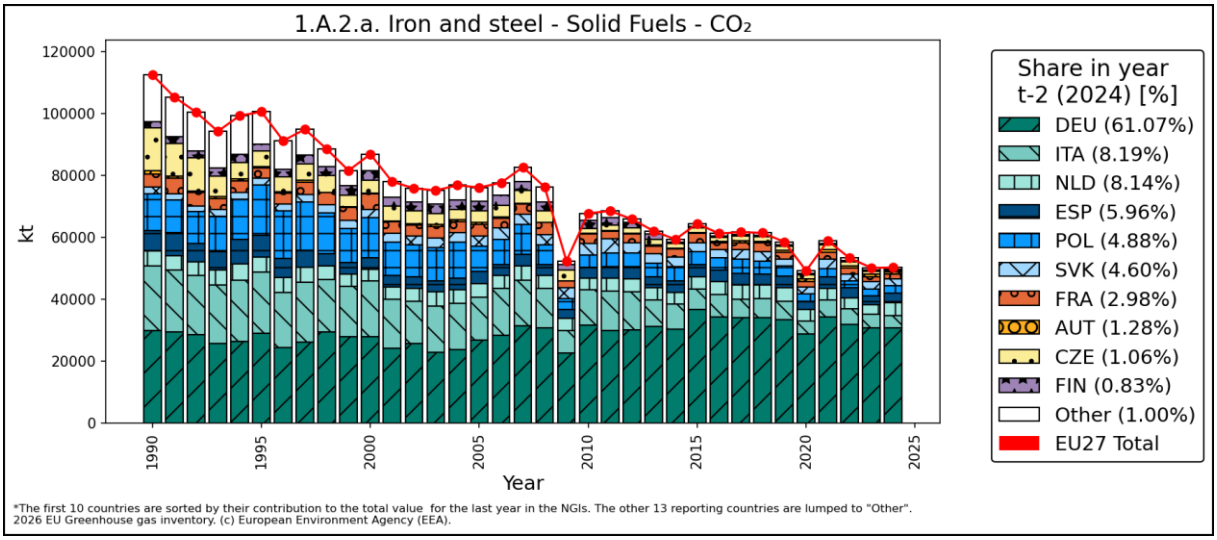
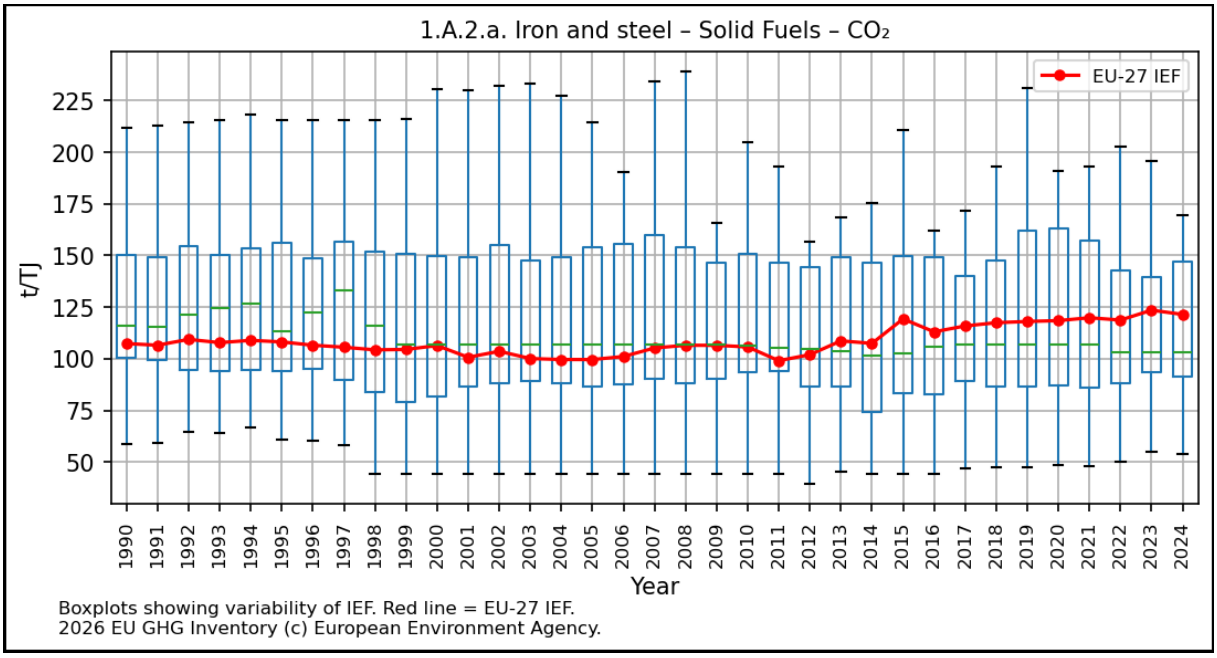


Figure 3.41 shows implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. It can be seen that CO_2 IEF fluctuate during the whole time series. CO_2 IEF equalled to 121.40 t/TJ in 2024.

Figure 3.41: 1.A.2.a Iron and Steel, Solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.a Iron and Steel - Gaseous Fuels (CO_2)

CO_2 emissions from the use of gaseous fuels in category 1.A.2.a amounted 14 954 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 49 % and decreased compared to 2023 by 0.02 %. This category represents 4 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 50 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.28.

Table 3.28: 1.A.2.a Iron and Steel, gaseous fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	650	1 074	1 033	6.9%	383	59%	-41	-4%	T2	CS
Belgium	1 493	934	1 016	6.8%	-477	-32%	82	9%	T3	CS,PS
Bulgaria	1 037	111	108	0.7%	-929	-90%	-3	-3%	T2	CS
Croatia	229	35	26	0.2%	-203	-89%	-9	-26%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	724	345	366	2.4%	-359	-50%	21	6%	T2	CS
Denmark	106	77	81	0.5%	-25	-24%	4	5%	T3	CS
Estonia	NO	0	1	0.0%	1	∞	0	8%	T2	CS
Finland	110	326	334	2.2%	224	204%	8	2%	T3	CS
France	2 788	1 593	1 614	10.8%	-1 173	-42%	22	1%	T2,T3	CS
Germany	4 442	2 632	2 518	16.8%	-1 923	-43%	-113	-4%	CS	CS
Greece	NO	55	69	0.5%	69	∞	14	25%	T2	CS
Hungary	1 312	55	49	0.3%	-1 263	-96%	-7	-12%	T2	CS
Ireland	44	2	2	0.0%	-41	-95%	0	0%	T2	CS
Italy	4 338	3 563	3 469	23.2%	-869	-20%	-94	-3%	T2	CS
Latvia	236	0	0	0.0%	-235	-100%	0	-33%	T2	CS
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	397	236	259	1.7%	-138	-35%	24	10%	T2	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	667	450	513	3.4%	-154	-23%	62	14%	T2	CS
Poland	2 924	1 010	1 117	7.5%	-1 806	-62%	107	11%	T2	CS
Portugal	NO	100	104	0.7%	104	∞	4	4%	T2	CS
Romania	6 556	419	311	2.1%	-6 244	-95%	-108	-26%	T2	CS
Slovakia	221	147	138	0.9%	-83	-38%	-9	-6%	T2	CS
Slovenia	312	149	151	1.0%	-161	-52%	2	2%	T2	CS
Spain	795	1 524	1 591	10.6%	796	100%	67	4%	T2,T3	CS,PS
Sweden	25	120	85	0.6%	60	239%	-35	-29%	T2	CS
EU	**29 403**	**14 957**	**14 954**	**100%**	**-14 449**	**-49%**	**-3**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.42 shows CO_2 emissions trend as well as the share of countries with the highest contribution to the total CO_2 emissions.

Figure 3.42: 1.A.2.a Iron and Steel, Gaseous fuels: Emission trend and share for CO_2

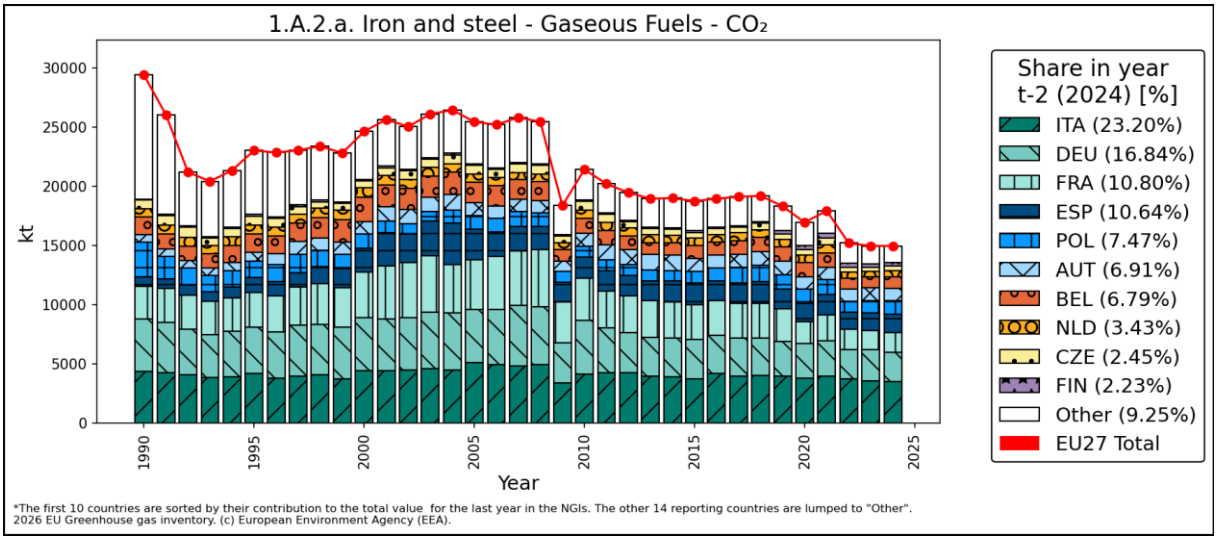
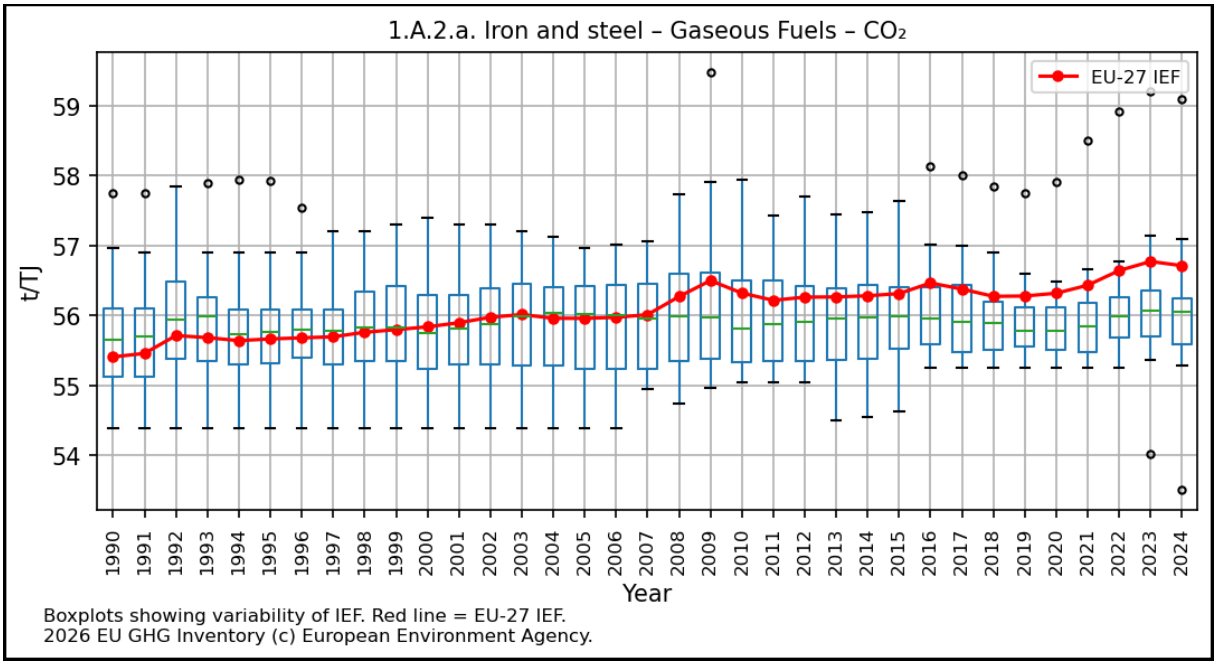


Figure 3.43 shows implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. It can be seen that the CO_2 IEF gradually increases over the entire period of interest. CO_2 IEF equaled to 56.71 t/TJ in 2024.

Figure 3.43: 1.A.2.a Iron and Steel, Gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



3.6.2.2 Non-Ferrous Metals (1.A.2.b)

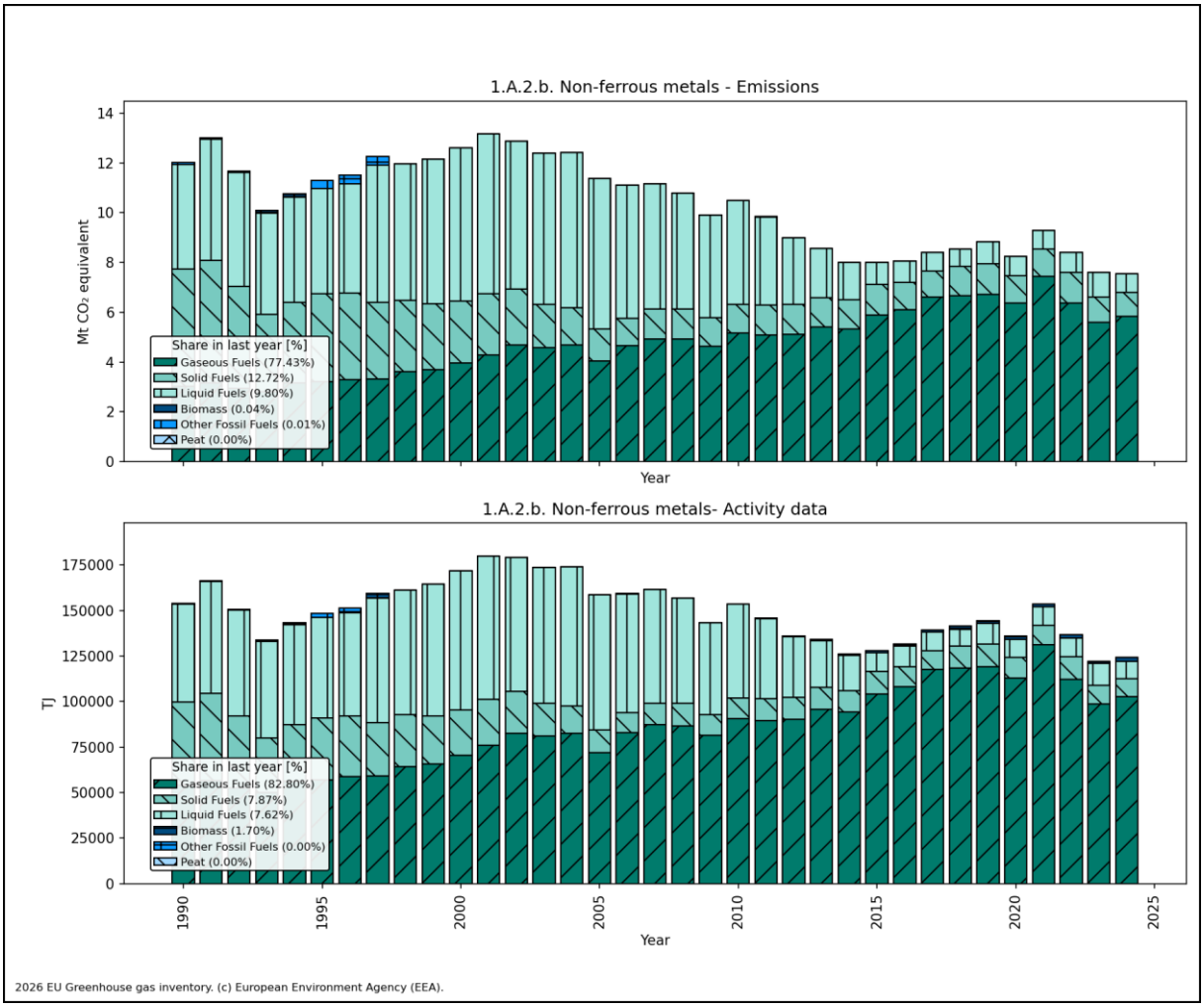
This chapter provides information about European emission trend, Member States contribution to the overall emission trend, activity data and emission factors used for emission estimates by countries for category 1.A.2.b Non-Ferrous Metals.

Total CO_2 emissions from 1.A.2.b amounted to 7 510 kt CO_2 eq. in 2024. The trend of total emissions for 1990 to 2024 from category 1.A.2.b is depicted in Figure 3.44.

Total CO_2 emissions decreased by 37 % since 1990 and decreased by 1 % between 2023 and 2024. Total CO_2 emissions from 1.A.2.b Non-Ferrous Metals accounted for 2 % of 1.A.2. source category.

Figure 3.44 shows the emission trend within the category 1.A.2.b, which is dominated by CO_2 emissions from gaseous fuels in 2024. The share of liquid fuels on CO_2 emissions from 1.A.2.b decreased from 35% in 1990 to 10 % in 2024. The share of solid fuels on CO_2 emissions from 1.A.2.b decreased from 39% in 1990 to 13 % in 2024. The share of gaseous fuels on CO_2 emissions from 1.A.2.b increased from 25% in 1990 to 77 % in 2024.

Figure 3.44: 1.A.2.b Non-ferrous Metals: total emissions and activity data trends



Detailed data related to the EU submissions are depicted in Table.3.29.

Table.3.29: 1.A.2.b Non-ferrous Metals: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	132	285	276	3.7%	144	109%	-8	-3%	NA,T2	CS,NA
Belgium	629	396	381	5.1%	-248	-39%	-15	-4%	NA,T1,T3	CS,D,NA,PS
Bulgaria	299	240	217	2.9%	-82	-28%	-23	-10%	NA,T1,T2	CS,D,NA
Croatia	17	30	31	0.4%	14	82%	2	6%	NA,T1	D,NA
Cyprus	4	2	2	0.0%	-2	-56%	0	0%	NA,T1	D,NA
Czechia	102	140	140	1.9%	38	38%	1	1%	NA,T2	CS,D,NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	1	1	0.0%	1	∞	0	-4%	NA,T1,T2	CS,D,NA
Finland	338	90	92	1.2%	-245	-73%	3	3%	NA,T3	CS,NA
France	2 260	707	546	7.3%	-1 713	-76%	-161	-23%	T2	CS
Germany	1 377	151	177	2.4%	-1 200	-87%	25	17%	CS,NA	CS,NA
Greece	582	620	646	8.6%	64	11%	26	4%	NA,T2	CS,NA,PS
Hungary	301	149	153	2.0%	-148	-49%	4	3%	NA,T1,T2	CS,D,NA
Ireland	809	1 179	1 218	16.2%	409	51%	39	3%	NA,T1,T2	CS,D,NA
Italy	735	1 087	1 033	13.8%	298	41%	-53	-5%	NA,T2	CS,NA
Latvia	NO	2	2	0.0%	2	∞	0	15%	NA,T2	CS,NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	28	42	41	0.5%	12	44%	-1	-3%	NA,T2	CS,NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	214	102	99	1.3%	-115	-54%	-3	-3%	NA,T2	CS,NA
Poland	1 053	1 014	1 001	13.3%	-51	-5%	-12	-1%	NA,T1,T2	CS,D,NA
Portugal	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
Romania	81	123	159	2.1%	78	96%	37	30%	NA,T1,T2	CS,D,NA
Slovakia	1 256	49	56	0.7%	-1 200	-96%	7	14%	NA,T2	CS,NA
Slovenia	440	120	136	1.8%	-304	-69%	16	13%	NA,T1,T2	CS,D,NA
Spain	1 178	957	997	13.3%	-181	-15%	40	4%	NA,T1,T2,T3	CS,D,NA,PS
Sweden	129	104	103	1.4%	-26	-20%	0	0%	T2	CS
EU	**11 964**	**7 587**	**7 510**	**100%**	**-4 454**	**-37%**	**-77**	**-1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period Portugal include emissions under 1.A.2.g. Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

1.A.2.b Non-Ferrous Metals - Liquid Fuels (CO_2)

CO_2 emissions from the use of liquid fuels in category 1.A.2.b amounted 735 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 82 % and compared to 2023 decreased by 27 %. Category has 0.2 % share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 82 % compared to 1990. The category was not identified as a key category for this submission but it was identified in previous submissions and thus the description of the category is still included in the reporting.

Detailed data related to the EU submissions are depicted in *Table 3.30*.

Table 3.30: 1.A.2.b Non-ferrous Metals, liquid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	35	9	9	1.2%	-26	-74%	0	0%	T2	CS
Belgium	220	43	37	5.1%	-183	-83%	-6	-14%	T1	D
Bulgaria	199	50	45	6.1%	-154	-77%	-5	-10%	T1	D
Croatia	17	5	4	0.5%	-13	-78%	-1	-25%	T1	D
Cyprus	4	2	2	0.3%	-2	-56%	0	0%	T1	D
Czechia	3	NO	NO	-	-3	-100%	-	-	NA	NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	1	1	0.1%	1	∞	0	-4%	T1,T2	CS,D
Finland	174	68	68	9.3%	-106	-61%	1	1%	T3	CS
France	570	208	39	5.3%	-530	-93%	-169	-81%	T2	CS
Germany	144	95	94	12.8%	-50	-34%	0	0%	CS	CS
Greece	582	15	16	2.2%	-566	-97%	1	6%	T2	PS
Hungary	202	3	3	0.4%	-199	-99%	0	0%	T1	D
Ireland	766	23	23	3.1%	-743	-97%	0	0%	T1,T2	CS,D
Italy	18	22	23	3.1%	5	29%	1	5%	T2	CS
Latvia	NO	0	0	0.0%	0	∞	0	200%	T2	CS
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	15	NO	NO	-	-15	-100%	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	NO	0	1	0.1%	1	∞	0	27%	-	-
Poland	62	25	25	3.4%	-38	-60%	-1	-3%	T1,T2	CS,D
Portugal	IE	IE	IE	-	-	-	-	-	NA	NA
Romania	IE	1	1	0.1%	1	∞	0	-22%	T1,T2	CS,D
Slovakia	23	2	1	0.1%	-22	-97%	-1	-60%	T2	CS
Slovenia	121	8	5	0.7%	-115	-96%	-3	-34%	T1,T2	CS,D
Spain	923	332	251	34.2%	-672	-73%	-81	-24%	T1,T2,T3	CS,D,PS
Sweden	110	87	87	11.8%	-23	-21%	0	0%	T2	CS
EU	**4 190**	**1 001**	**735**	**100%**	**-3 454**	**-82%**	**-265**	**-27%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Portugal includes emissions under 1.A.2.g. Romania includes emissions under 1.A.2.a from 1990 to 2017 (except 2007).
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.45 shows CO_2 emissions trend as well as the share of the Member States with the highest contribution to the total CO_2 emissions.

Figure 3.45: 1.A.2.b Non-ferrous Metals, liquid fuels: Emission trend and share for CO_2

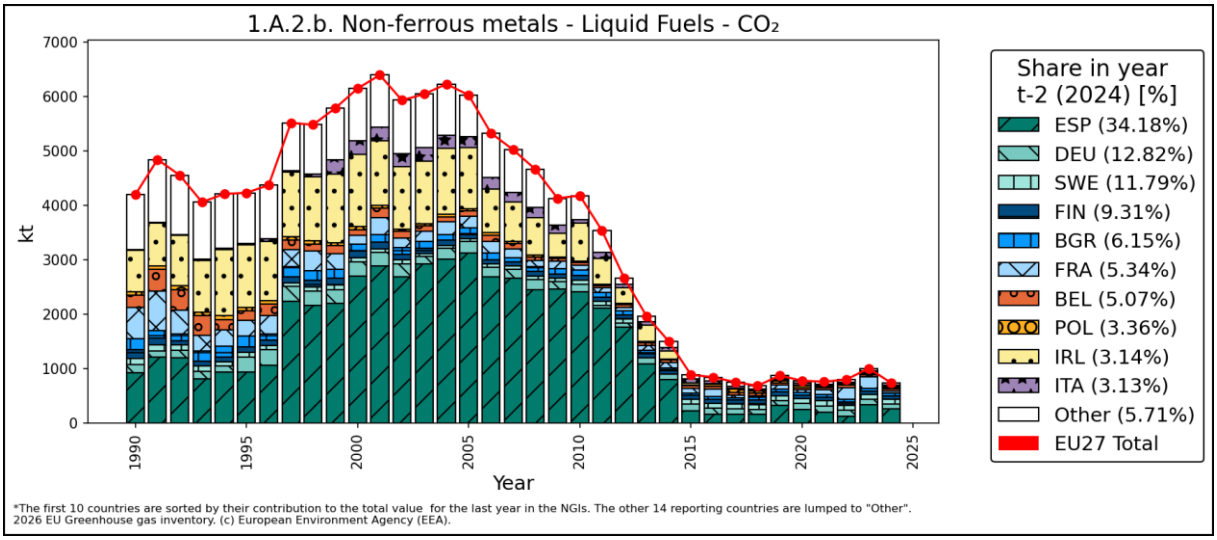
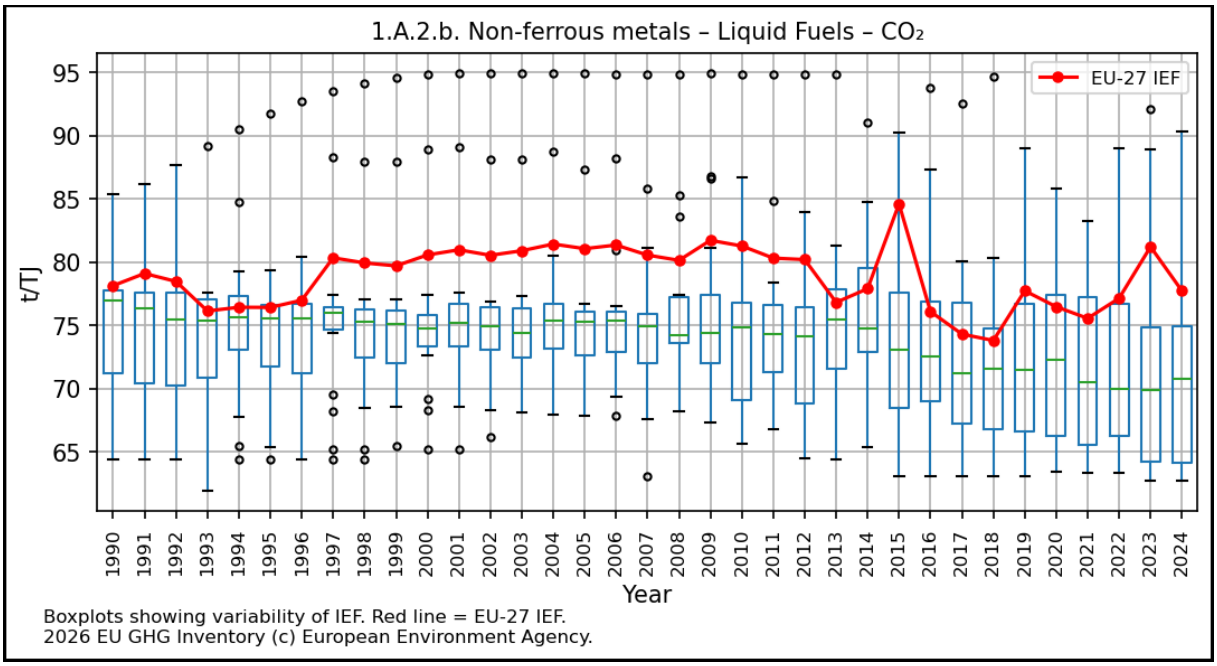


Figure 3.46 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. It can be seen that CO_2 IEF fluctuated at the beginning of the time series and since 2013 shows major fluctuations. The peak in the 2015 implied emission factor, as presented in the figure below, occurs because Sweden reported activity data as confidential. Increase in the EU IEF in 2023 is probably influenced by increase in Spain fuel consumption from 1488 TJ in year 2022 to 3681 TJ in year 2023 and also increase of Spain IEF, Spain has 34 % share in sector total. CO_2 IEF equalled to 77.71 t/TJ in 2024.

Figure 3.46: 1.A.2.b Non-ferrous Metals, liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.b Non-Ferrous Metals - Solid Fuels (CO_2)

CO_2 emissions from the use of solid fuels in category 1.A.2.b amounted 953 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 80 % and compared to 2023 decreased by 5 %.

Category has 0.3 % share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 79 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.31.

Table 3.31: 1.A.2.b Non-ferrous Metals, solid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	22	15	16	1.7%	-6	-27%	1	7%	T2	CS
Belgium	147	88	71	7.4%	-77	-52%	-17	-19%	T1	D
Bulgaria	76	94	55	5.7%	-22	-28%	-40	-42%	T1,T2	CS,D
Croatia	0	NO	NO	-	0	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	46	14	14	1.5%	-31	-69%	0	2%	T2	CS,D
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	155	22	24	2.5%	-131	-85%	2	11%	T3	CS
France	942	6	5	0.5%	-937	-99%	-1	-10%	T2	CS
Germany	1 233	57	82	8.6%	-1 150	-93%	25	45%	CS	CS
Greece	IE	IE	IE	-	-	-	-	-	NA	NA
Hungary	12	NO	NO	-	-12	-100%	-	-	NA	NA
Ireland	4	NO	NO	-	-4	-100%	-	-	NA	NA
Italy	152	43	18	1.9%	-134	-88%	-25	-58%	T2	CS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	0	NO	NO	-	0	-100%	-	-	NA	NA
Poland	673	591	575	60.3%	-99	-15%	-16	-3%	T1,T2	CS,D
Portugal	IE	IE	IE	-	-	-	-	-	NA	NA
Romania	81	IE	IE	-	-81	-100%	-	-	NA	NA
Slovakia	798	5	8	0.9%	-790	-99%	3	54%	T2	CS
Slovenia	154	3	3	0.4%	-151	-98%	0	15%	T1,T2	CS,D
Spain	182	63	82	8.6%	-100	-55%	19	29%	T1,T2	CS,D
Sweden	8	NO	NO	-	-8	-100%	-	-	-	-
EU	**4 687**	**1 001**	**953**	**100%**	**-3 734**	**-80%**	**-48**	**-5%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Portugal includes emissions under 1.A.2.g. From 1991, Romania includes emissions under 1.A.2.a.
Greece includes emissions in the Industrial processes sector (as non-energy use of fuels).
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.47 shows CO_2 emissions trend as well as the share of countries with the highest contribution to the total CO_2 emissions.

Figure 3.47: 1.A.2.b Non-ferrous Metals, solid fuels: Emission trend and share for CO_2

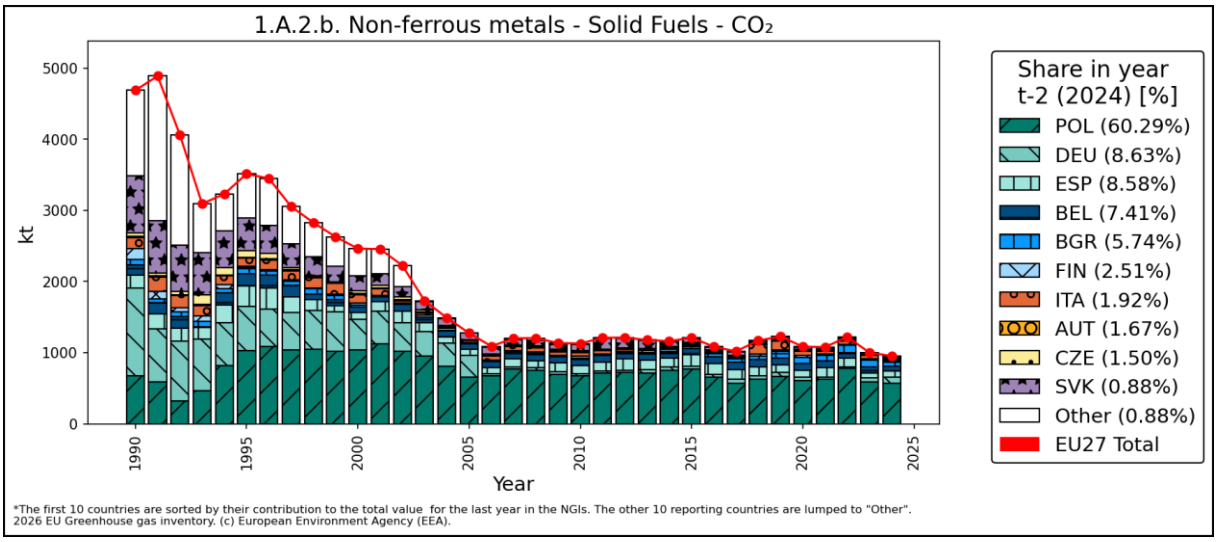
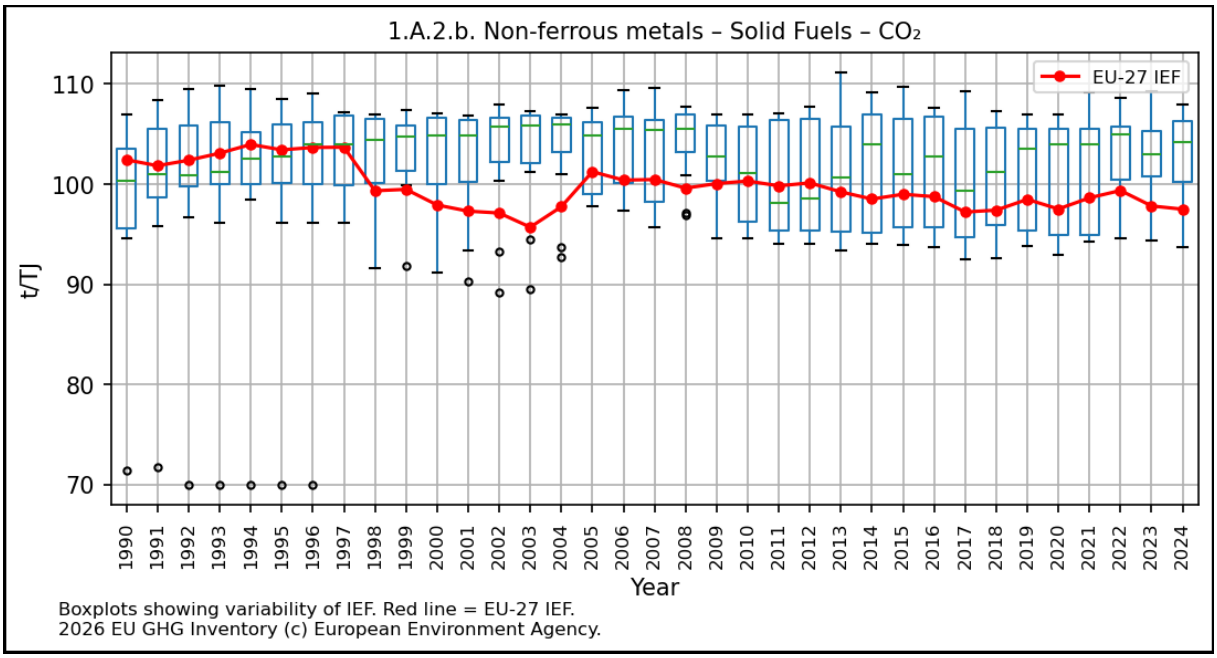


Figure 3.48 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. CO_2 IEF equalled to 97.50 t/TJ in 2024.

Figure 3.48: 1.A.2.b Non-ferrous Metals, solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.b Non-Ferrous Metals - Gaseous Fuels (CO_2)

CO_2 emissions from the use of gaseous fuels in category 1.A.2.b amounted 5 821 kt in 2024 for EU. CO_2 emissions increased compared to year 1990 by 93 % and compared to year 2023 decreased by 4 %. This category represents 1.7 % share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption increased by 91 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.32.

Table 3.32: 1.A.2.b Non-ferrous Metals, gaseous fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	75	260	251	4.3%	176	235%	-9	-4%	T2	CS
Belgium	261	265	273	4.7%	12	5%	9	3%	T3	CS,PS
Bulgaria	23	95	117	2.0%	94	400%	22	23%	T2	CS
Croatia	NO	25	28	0.5%	28	∞	3	12%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	53	126	126	2.2%	73	137%	1	0%	T2	CS
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	NO	0	0	0.0%	0	∞	0	-83%	T3	CS
France	748	493	502	8.6%	-246	-33%	9	2%	T2	CS
Germany	IE	IE	IE	-	-	-	-	-	CS	CS
Greece	NO	605	630	10.8%	630	∞	25	4%	T2	CS
Hungary	86	147	150	2.6%	64	74%	4	3%	T2	CS
Ireland	39	1 156	1 195	20.5%	1 157	2999%	39	3%	T2	CS
Italy	566	1 021	992	17.0%	426	75%	-29	-3%	T2	CS
Latvia	NO	2	2	0.0%	2	∞	0	9%	T2	CS
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	13	42	41	0.7%	28	205%	-1	-3%	T2	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	213	102	99	1.7%	-115	-54%	-3	-3%	T2	CS
Poland	254	397	402	6.9%	148	58%	5	1%	T2	CS
Portugal	IE	IE	IE	-	-	-	-	-	NA	NA
Romania	IE	122	159	2.7%	159	∞	37	30%	T2	CS
Slovakia	435	42	47	0.8%	-388	-89%	5	12%	T2	CS
Slovenia	165	109	127	2.2%	-37	-23%	18	17%	T2	CS
Spain	73	561	664	11.4%	591	806%	103	18%	T2,T3	CS,PS
Sweden	10	17	17	0.3%	6	59%	0	0%	T2	CS
EU	**3 015**	**5 585**	**5 821**	**100%**	**2 805**	**93%**	**236**	**4%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Portugal includes emissions under 1.A.2.g. From 1990 to 2017, Romania includes emissions under 1.A.2.a.
Germany reported emissions under 1.A.2.g (unspecified industrial power plants) because of confidential data.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.49 shows CO_2 emissions trend as well as the share of countries with the highest contribution to the total CO_2 emissions.

Figure 3.49: 1.A.2.b Non-ferrous Metals, Gaseous fuels: Emission trend and share for CO_2

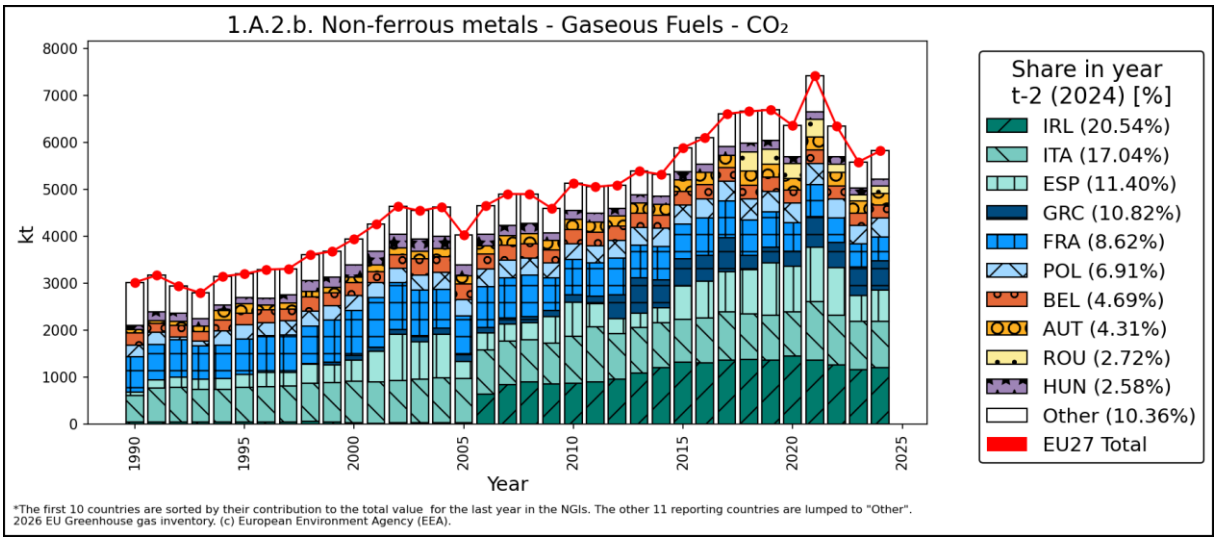
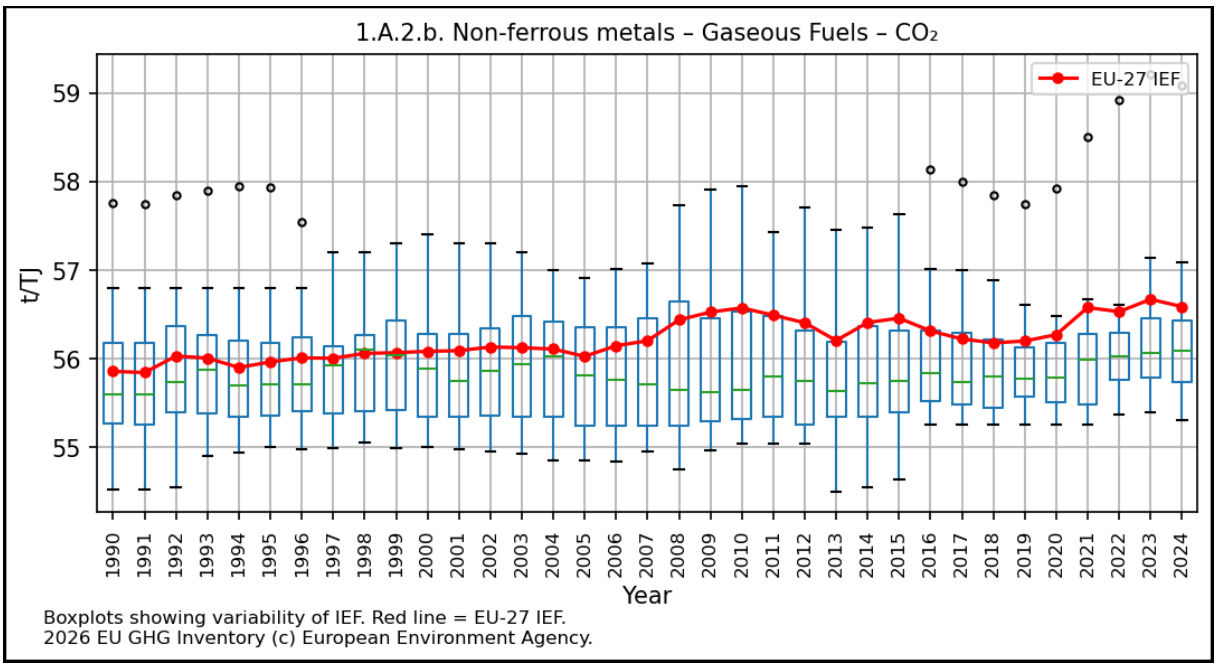


Figure 3.50 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. CO_2 IEF equalled to 56.59 t/TJ in 2024.

Figure 3.50: 1.A.2.b Non-ferrous Metals, Gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



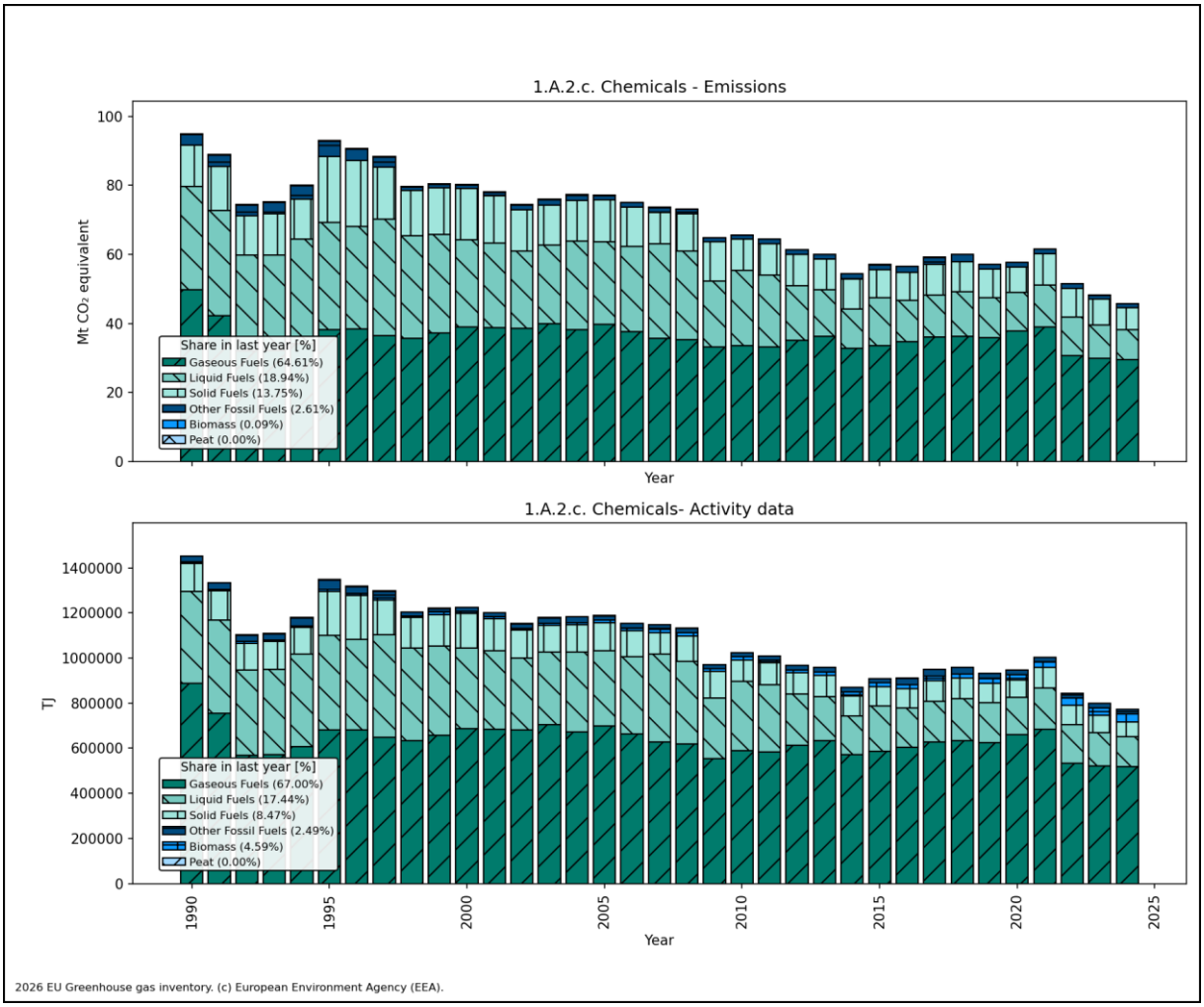
3.6.2.3 Chemicals (1.A.2.c)

This chapter provides information about European emission trend contribution to the overall emission trend, activity data and emission factors used for emission estimates by countries for category 1.A.2.c Chemicals.

Total CO_2 emissions from 1.A.2.c amounted to 45 282 kt CO_2 eq. in 2024. The trend of total CO_2 emissions for 1990 to 2024 from category 1.A.2.c is depicted in Figure 3.51. CO_2 emissions decreased by 52 % since 1990 and decreased by 5 % between 2023 and 2024. CO_2 emissions from 1.A.2.c Chemicals accounted for 13 % of 1.A.2. source category.

Figure 3.51 shows the emission trend within the category 1.A.2.c, which is dominated by CO_2 emissions from gaseous fuels in 2024. The share of liquid fuels on CO_2 emissions from 1.A.2.c decreased from 31 % in 1990 to 19 % in 2024. The share of solid fuels on CO_2 emissions from 1.A.2.c slightly increased from 13 % in 1990 to 14 % in 2024. The share of gaseous fuels on CO_2 emissions from 1.A.2.c increased from 52 % in 1990 to 65 % in 2024.

Figure 3.51: 1.A.2.c Chemicals: Total emission and activity trends



Detailed data related to the EU submissions are depicted in Table 3.33.

Table 3.33: 1.A.2.c Chemicals: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	859	983	1 042	2.3%	183	21%	59	6%	NA,T2	CS,NA
Belgium	5 098	3 739	4 070	9.0%	-1 029	-20%	331	9%	NA,T1,T3	CS,D,NA,PS
Bulgaria	966	1 085	1 271	2.8%	306	32%	186	17%	NA,T1,T2	CS,D,NA
Croatia	738	115	103	0.2%	-634	-86%	-12	-10%	NA,T1	D,NA
Cyprus	2	12	12	0.0%	10	458%	0	4%	NA,T1	D,NA
Czechia	2 996	2 952	2 499	5.5%	-497	-17%	-453	-15%	NA,T1,T2	CS,D,NA
Denmark	337	186	182	0.4%	-155	-46%	-5	-3%	NA,T2,T3	CS,NA
Estonia	390	7	8	0.0%	-382	-98%	1	18%	NA,T1,T2	CS,D,NA
Finland	1 187	555	646	1.4%	-541	-46%	91	16%	NA,T3	CS,NA
France	13 187	7 643	6 994	15.4%	-6 192	-47%	-649	-8%	T2,T3	CS,PS
Germany	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
Greece	808	383	812	1.8%	4	1%	429	112%	NA,T2	CS,NA
Hungary	1 626	378	399	0.9%	-1 228	-75%	21	6%	NA,T1,T2,T3	CS,D,NA,PS
Ireland	410	347	376	0.8%	-35	-8%	29	8%	NA,T2	CS,NA
Italy	21 429	7 991	7 058	15.6%	-14 371	-67%	-933	-12%	NA,T2	CS,NA
Latvia	294	22	23	0.1%	-270	-92%	1	5%	NA,T2	CS,NA
Lithuania	397	209	223	0.5%	-174	-44%	13	6%	NA,T2	CS,NA
Luxembourg	170	88	89	0.2%	-81	-47%	1	1%	NA,T1,T3	CS,D,NA
Malta	NO	5	4	0.0%	4	∞	0	-5%	NA,T1	D,NA
Netherlands	11 574	5 810	5 792	12.8%	-5 781	-50%	-18	0%	NA,T1,T2	CS,D,NA
Poland	4 003	5 012	4 877	10.8%	874	22%	-136	-3%	NA,T1,T2	CS,D,NA
Portugal	1 412	651	504	1.1%	-909	-64%	-147	-23%	NA,T1,T3	D,NA,PS
Romania	17 833	1 271	1 299	2.9%	-16 534	-93%	28	2%	NA,T1,T2	CS,D,NA
Slovakia	2 652	398	389	0.9%	-2 262	-85%	-9	-2%	NA,T2	CS,NA
Slovenia	211	67	50	0.1%	-161	-76%	-18	-26%	NA,T1,T2	CS,D,NA
Spain	5 227	7 397	6 192	13.7%	964	18%	-1 205	-16%	NA,T1,T2	CS,D,NA,PS
Sweden	683	397	369	0.8%	-314	-46%	-28	-7%	T2	CS
EU	**94 487**	**47 704**	**45 282**	**100%**	**-49 205**	**-52%**	**-2 422**	**-5%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Emissions of Germany are included in 1.A.2.g.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

1.A.2.c Chemicals - Liquid Fuels (CO_2)

CO_2 emissions from the use of liquid fuels in category 1.A.2.c amounted 8 628 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 71 % and compared to 2023 decreased by 10 %. Category has 2 % share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 67 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.34.

Table 3.34: 1.A.2.c Chemicals, Liquid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	97	40	20	0.2%	-77	-79%	-20	-50%	T2	CS
Belgium	1 852	226	244	2.8%	-1 608	-87%	18	8%	T1	D
Bulgaria	855	631	750	8.7%	-105	-12%	119	19%	T1	D
Croatia	291	9	5	0.1%	-286	-98%	-3	-39%	T1	D
Cyprus	2	12	12	0.1%	10	458%	0	4%	T1	D
Czechia	175	267	261	3.0%	86	49%	-5	-2%	T1	D
Denmark	220	46	32	0.4%	-188	-85%	-14	-30%	T2	CS
Estonia	229	0	0	0.0%	-228	-100%	0	17%	T1,T2	CS,D
Finland	677	486	581	6.7%	-96	-14%	95	20%	T3	CS
France	4 871	1 838	1 479	17.1%	-3 392	-70%	-359	-20%	T2,T3	CS,PS
Germany	IE	IE	IE	-	-	-	-	-	NA	NA
Greece	639	97	85	1.0%	-554	-87%	-12	-12%	T2	CS
Hungary	431	12	9	0.1%	-423	-98%	-3	-25%	T1	D
Ireland	131	24	27	0.3%	-103	-79%	4	16%	T2	CS
Italy	13 126	3 633	2 761	32.0%	-10 365	-79%	-872	-24%	T2	CS
Latvia	270	12	13	0.2%	-257	-95%	1	12%	T2	CS
Lithuania	69	18	13	0.2%	-55	-81%	-5	-26%	T2	CS
Luxembourg	112	0	0	0.0%	-112	-100%	0	-93%	T1,T3	CS,D
Malta	NO	5	4	0.0%	4	∞	0	-5%	T1	D
Netherlands	791	80	118	1.4%	-674	-85%	38	48%	T2	CS,D
Poland	308	690	873	10.1%	565	183%	183	27%	T1,T2	CS,D
Portugal	1 373	227	58	0.7%	-1 316	-96%	-169	-75%	T1,T3	D,PS
Romania	NO	922	956	11.1%	956	∞	34	4%	T1,T2	CS,D
Slovakia	51	3	2	0.0%	-49	-96%	0	-19%	T2	CS
Slovenia	32	12	11	0.1%	-21	-65%	-1	-12%	T1,T2	CS,D
Spain	2 729	13	21	0.2%	-2 708	-99%	8	59%	T1,T2	CS,D
Sweden	424	287	290	3.4%	-134	-32%	3	1%	T2	CS
EU	**29 757**	**9 588**	**8 628**	**100%**	**-21 128**	**-71%**	**-960**	**-10%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
From 1990 to 2023 Germany includes emissions under 1.A.2.g.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.52 shows CO_2 emissions trend as well as the share of countries with the highest contribution to the total CO_2 emissions.

Figure 3.52: 1.A.2.c Chemicals, Liquid fuels: Emission trend and share for CO_2

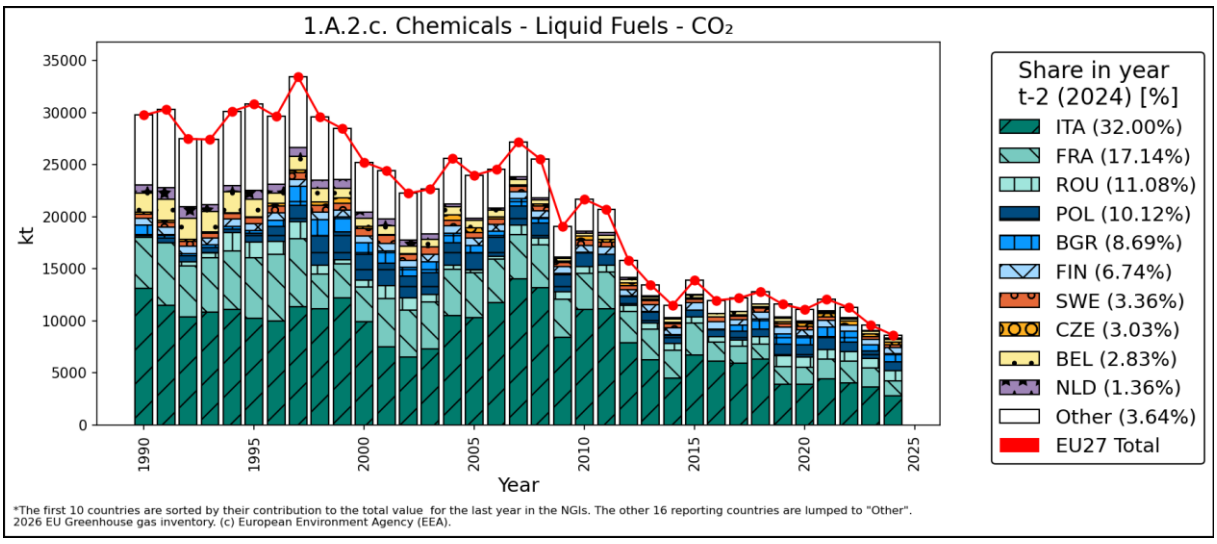
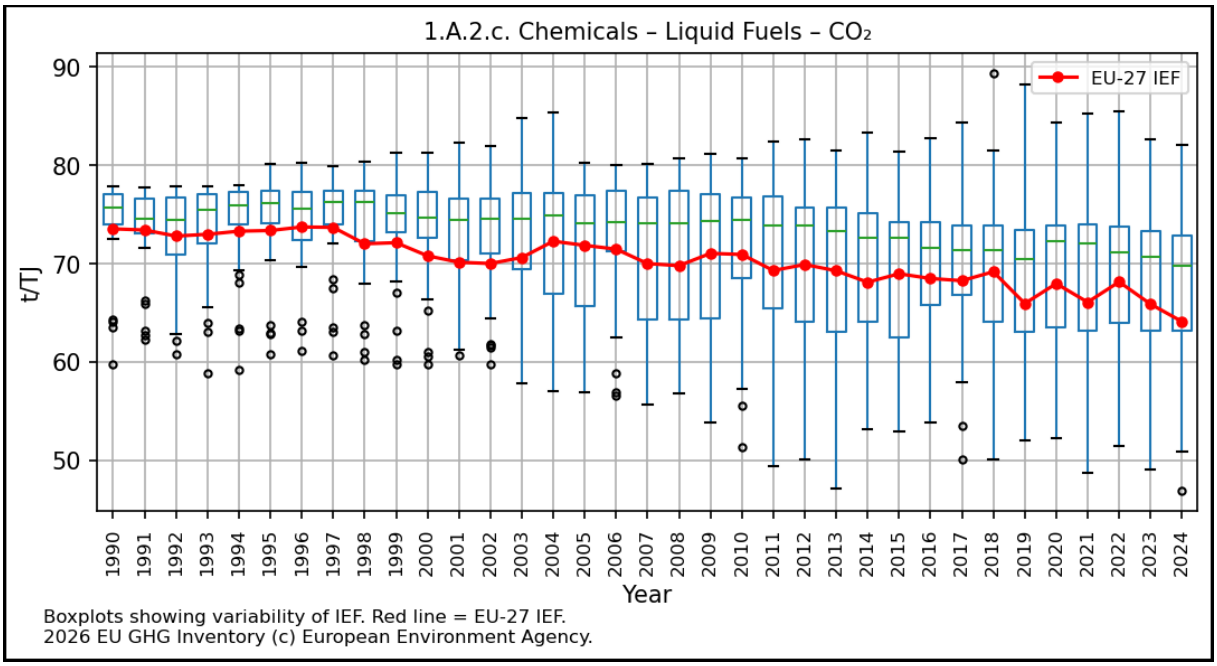


Figure 3.53 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. It can be seen that CO_2 IEF fluctuates over the time period with decreasing trend. CO_2 IEF equaled to 64.08 t/TJ in 2024.

Figure 3.53: 1.A.2.c Chemicals, Liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.c Chemicals - Solid Fuels (CO_2)

CO_2 emissions from the use of solid fuels in category 1.A.2.c amounted 6 251 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 48 % and compared to 2023 decreased by 15 %. Category has 2% share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 48 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.35.

Table 3.35: 1.A.2.c Chemicals, Solid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	106	22	22	0.3%	-84	-80%	-1	-3%	T2	CS
Belgium	688	2	3	0.0%	-685	-100%	1	26%	T1	D
Bulgaria	80	353	372	5.9%	291	362%	18	5%	T1,T2	CS,D
Croatia	101	0	NO	-	-101	-100%	0	-100%	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	2 487	2 155	1 633	26.1%	-854	-34%	-521	-24%	T2	CS,D
Denmark	6	NO	NO	-	-6	-100%	-	-	NA	NA
Estonia	5	NO	NO	-	-5	-100%	-	-	NA	NA
Finland	214	NO	NO	-	-214	-100%	-	-	NA	NA
France	2 123	903	770	12.3%	-1 353	-64%	-134	-15%	T2,T3	CS,PS
Germany	IE	IE	IE	-	-	-	-	-	NA	NA
Greece	169	NO	NO	-	-169	-100%	-	-	NA	NA
Hungary	140	NO	NO	-	-140	-100%	-	-	NA	NA
Ireland	72	NO	NO	-	-72	-100%	-	-	NA	NA
Italy	640	NO	NO	-	-640	-100%	-	-	NA	NA
Latvia	NO	0	NO	-	-	-	0	-100%	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	1 087	5	4	0.1%	-1 083	-100%	-1	-20%	T1	D
Poland	1 012	3 419	2 944	47.1%	1 932	191%	-475	-14%	T1,T2	CS,D
Portugal	39	NO	NO	-	-39	-100%	-	-	NA	NA
Romania	644	0	0	0.0%	-644	-100%	0	155%	T1,T2	CS,D
Slovakia	1 584	8	9	0.1%	-1 575	-99%	1	19%	T2	CS
Slovenia	1	NO	NO	-	-1	-100%	-	-	NA	NA
Spain	678	500	494	7.9%	-184	-27%	-5	-1%	T1,T2	CS,D,PS
Sweden	101	9	C	-	-	-	-	-	T2	CS
EU	**11 978**	**7 377**	**6 251**	**100%**	**-5 727**	**-48%**	**-1 126**	**-15%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions. EU trends for 2024 in this table do not include emissions from Sweden for confidentiality reasons, but 1990 and 2023 EU sums do include emission from Sweden.

Figure 3.54 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.54: 1.A.2.c Chemicals, Solid fuels: Emission trend and share for CO_2

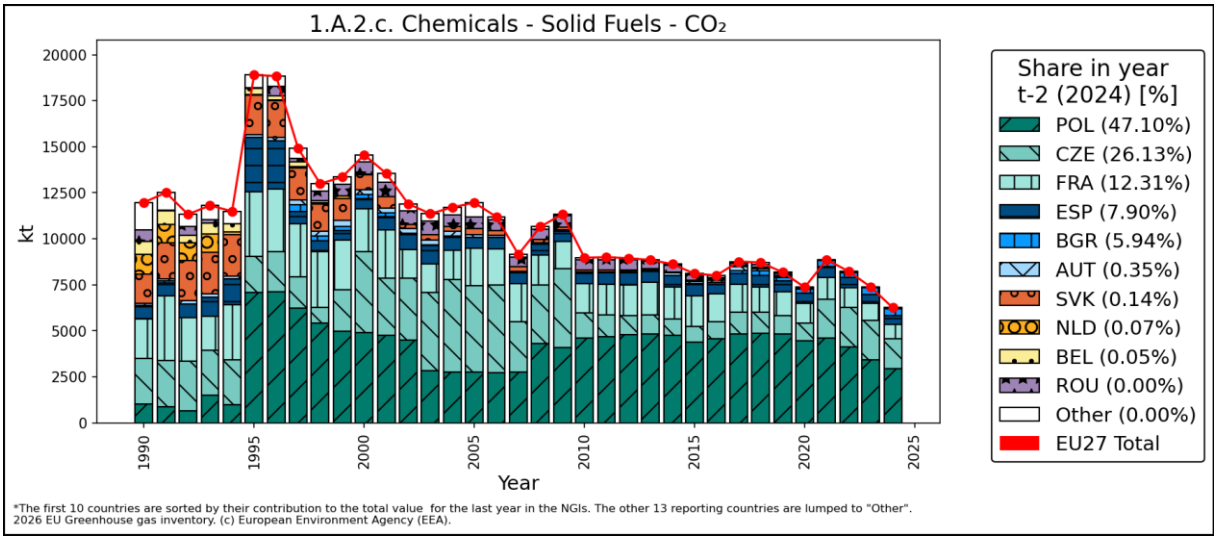
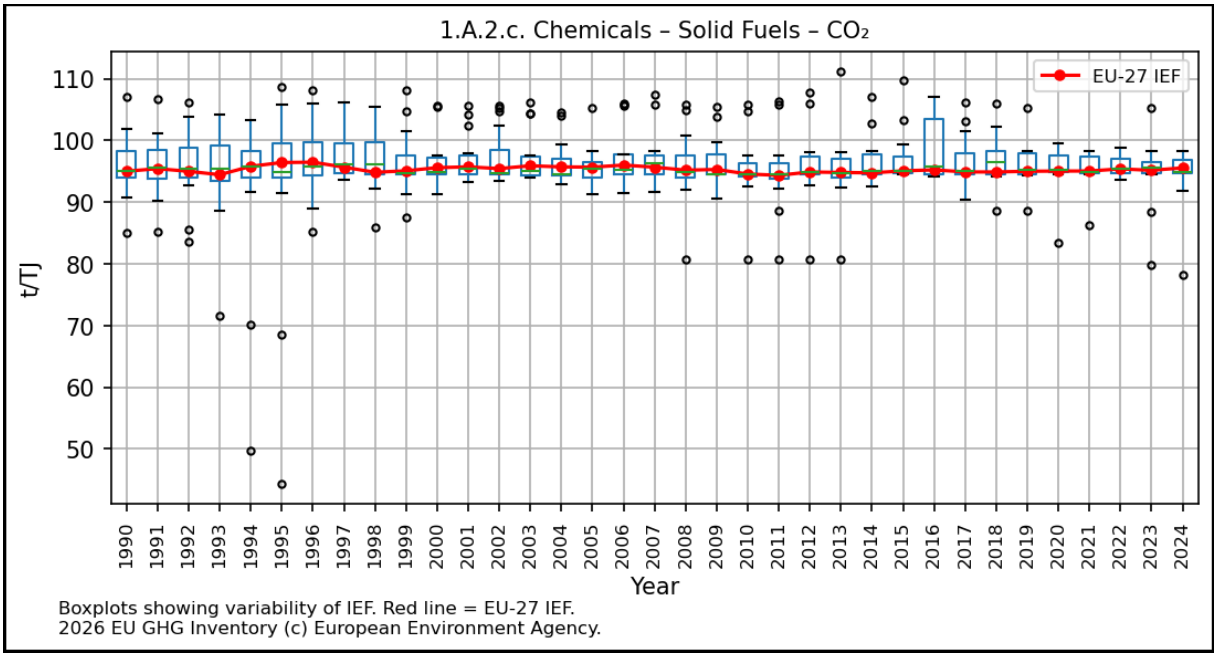


Figure 3.55 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. The CO_2 IEF is more or less stable through the whole time series 1990-2024. CO_2 IEF equalled to 95.55 t/TJ in 2024.

Figure 3.55: 1.A.2.c Chemicals, Solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.c Chemicals – Gaseous Fuels (CO_2)

CO_2 emissions from the use of gaseous fuels in category 1.A.2.c amounted 29 230 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 41 % and compared to 2023 CO_2 emissions decreased by 1 %. This category represents 8 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 42 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.36.

Table 3.36: 1.A.2.c Chemicals, gaseous fuels: Member States contributions to CO_2

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	530	703	804	2.8%	274	52%	101	14%	T2	CS
Belgium	2 559	3 492	3 807	13.0%	1 249	49%	315	9%	T3	CS,PS
Bulgaria	30	101	150	0.5%	119	395%	49	48%	T2	CS
Croatia	346	106	98	0.3%	-248	-72%	-8	-8%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	334	531	605	2.1%	271	81%	74	14%	T2	CS
Denmark	110	140	149	0.5%	39	35%	9	7%	T3	CS
Estonia	156	7	8	0.0%	-148	-95%	1	18%	T2	CS
Finland	95	46	45	0.2%	-50	-52%	-1	-2%	T3	CS
France	5 789	4 026	3 837	13.1%	-1 952	-34%	-189	-5%	T2,T3	CS,PS
Germany	IE	IE	IE	-	-	-	-	-	NA	NA
Greece	NO	286	727	2.5%	727	∞	441	154%	T2	CS
Hungary	1 055	352	378	1.3%	-677	-64%	25	7%	T2	CS
Ireland	207	323	348	1.2%	141	68%	25	8%	T2	CS
Italy	7 663	4 358	4 296	14.7%	-3 367	-44%	-61	-1%	T2	CS
Latvia	24	10	10	0.0%	-13	-57%	0	-1%	T2	CS
Lithuania	328	191	209	0.7%	-119	-36%	18	9%	T2	CS
Luxembourg	57	88	89	0.3%	32	55%	1	2%	T3	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	9 695	5 725	5 671	19.4%	-4 024	-42%	-55	-1%	T2	CS
Poland	293	895	1 052	3.6%	760	260%	157	18%	T2	CS
Portugal	NO	424	446	1.5%	446	∞	21	5%	T1,T3	D,PS
Romania	17 189	344	340	1.2%	-16 849	-98%	-4	-1%	T2	CS
Slovakia	989	377	367	1.3%	-622	-63%	-10	-3%	T2	CS
Slovenia	177	55	39	0.1%	-138	-78%	-16	-29%	T2	CS
Spain	1 819	6 884	5 676	19.4%	3 857	212%	-1 208	-18%	T2	CS
Sweden	155	78	79	0.3%	-76	-49%	1	1%	T2	CS
EU	**49 600**	**29 544**	**29 230**	**100%**	**-20 370**	**-41%**	**-313**	**-1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.

Figure 3.56 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.56: 1.A.2.c Chemicals, Gaseous fuels: Emission trend and share for CO_2

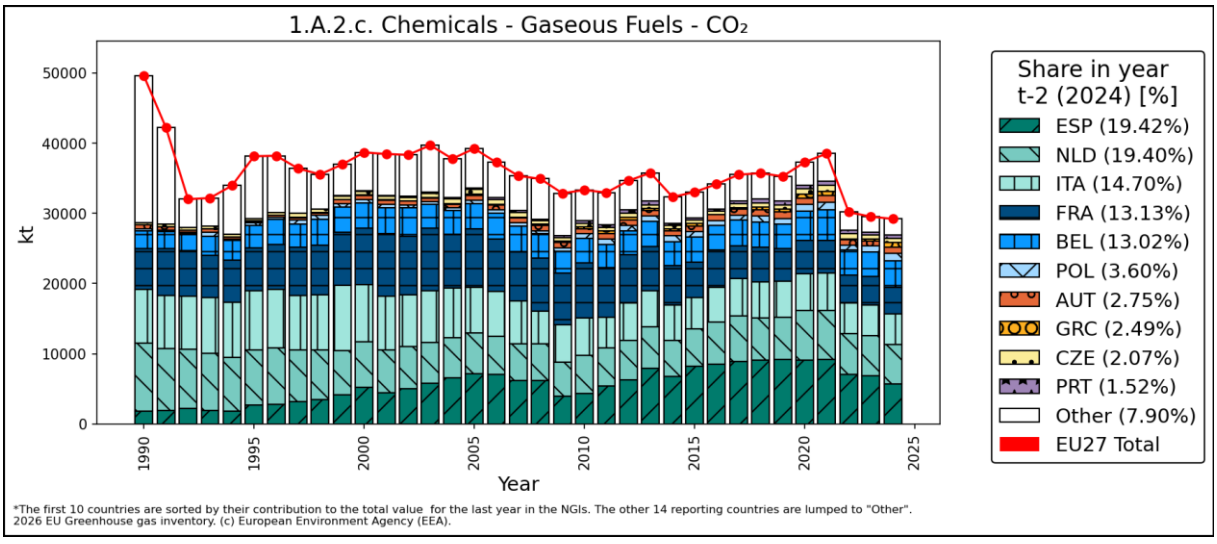
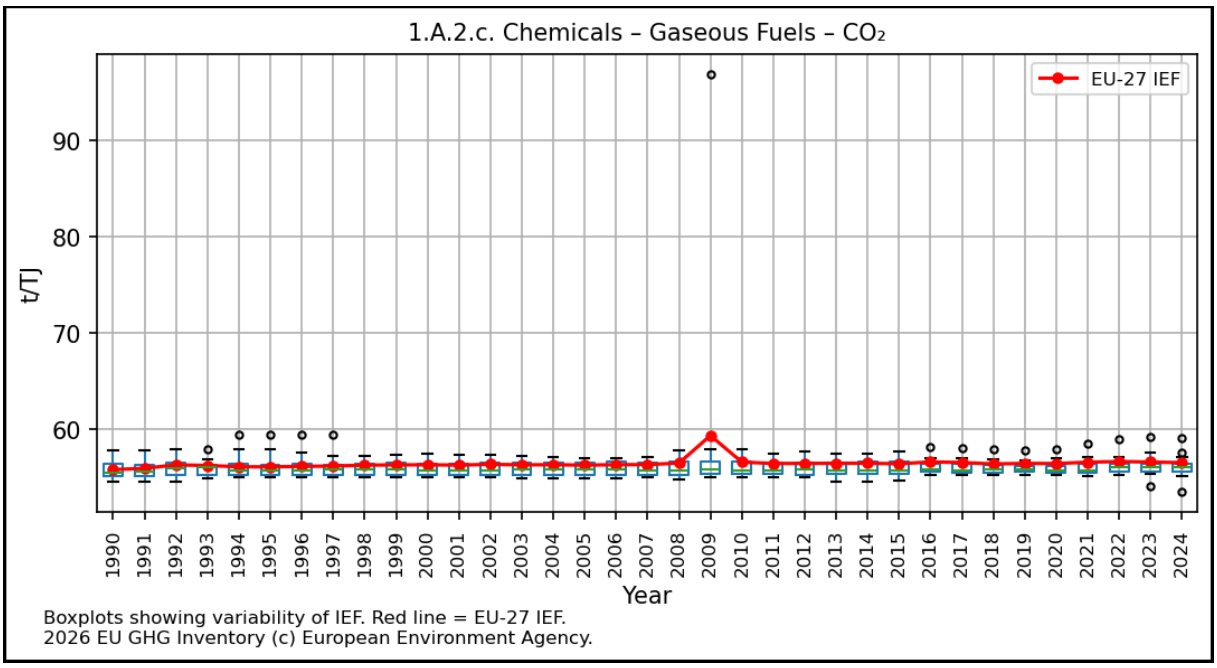


Figure 3.57 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. CO_2 IEF equaled to 56.50 t/TJ in 2024.

Figure 3.57: 1.A.2.c Chemicals, Gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



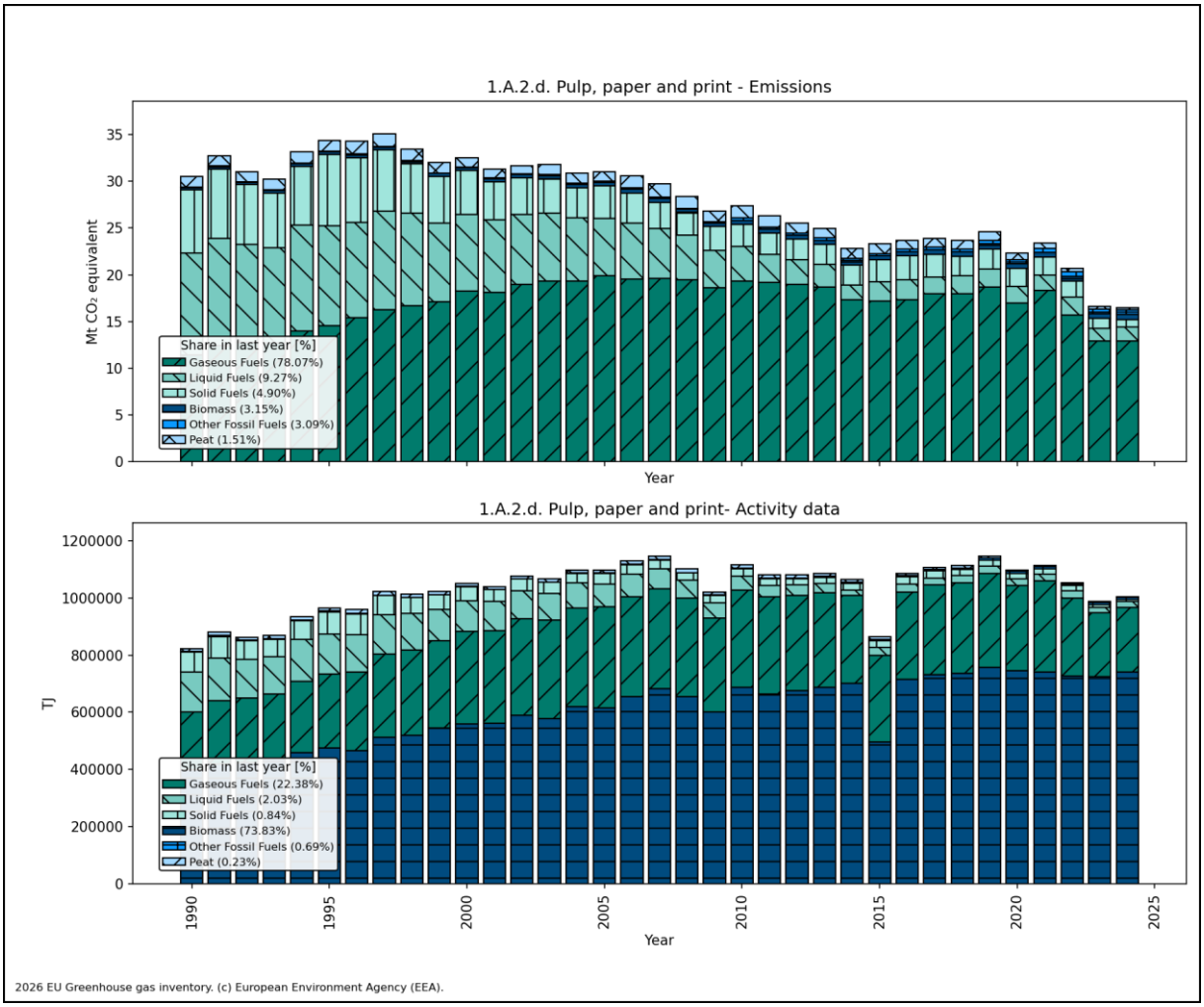
3.6.2.4 Pulp, Paper and Print (1.A.2.d)

This chapter provides information about European emission trend and Member States contribution to the overall emission trend, activity data and emission factors used for emission estimates by countries for category 1.A.2.d Pulp, Paper and Print.

Total CO_2 emissions from 1.A.2.d amounted to 15 842 kt CO_2 eq. in 2024. The trend of total emissions for 1990 to 2024 from category 1.A.2.d is depicted in Figure 3.58. Total CO_2 emissions decreased by 47 % since 1990 and decreased by 1% between 2023 and 2024. CO_2 emissions from 1.A.2.d Pulp, Paper and Print accounted for 4.7% of 1.A.2. source category.

Figure 3.58 shows the emission trend within the category 1.A.2.d, which is dominated by CO_2 emissions from gaseous fuels in 2024. The share of liquid fuels on CO_2 emissions from 1.A.2.d decreased from 36 % in 1990 to 10% in 2024. The share of solid fuels on CO_2 emissions from 1.A.2.d decreased from 22 % in 1990 to 5% in 2024. The share of gaseous fuels on CO_2 emissions from 1.A.2.d increased from 38 % in 1990 to 81 % in 2024. This sector includes a high amount of biomass consumption which is also gradually increasing since 1990. The activity data shows a strong switch from liquid and solid fuels to gaseous fuels and biomass.

Figure 3.58: 1.A.2.d Pulp, Paper and Print: Total emission and activity trends



Detailed data related to the EU submissions are depicted in Table 3.37.

Table 3.37: 1.A.2.d Pulp, Paper and Print: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	2 208	1 206	1 065	6.7%	-1 143	-52%	-141	-12%	NA,T2	CS,NA
Belgium	644	524	512	3.2%	-132	-20%	-12	-2%	NA,T1,T3	CS,D,NA,PS
Bulgaria	16	58	47	0.3%	31	202%	-11	-19%	NA,T1,T2	CS,D,NA
Croatia	303	114	118	0.7%	-185	-61%	4	4%	NA,T1	D,NA
Cyprus	5	2	2	0.0%	-3	-54%	0	12%	NA,T1	D,NA
Czechia	2 285	508	364	2.3%	-1 921	-84%	-144	-28%	NA,T1,T2	CS,D,NA
Denmark	343	52	45	0.3%	-298	-87%	-7	-13%	NA,T2,T3	CS,NA
Estonia	145	25	29	0.2%	-116	-80%	4	15%	NA,T1,T2	CS,D,NA
Finland	5 330	1 302	1 090	6.9%	-4 239	-80%	-212	-16%	T3	CS
France	4 478	1 797	1 808	11.4%	-2 670	-60%	12	1%	T2,T3	CS,D,OTH,PS
Germany	4	10	9	0.1%	5	143%	-2	-16%	CS,NA	CS,NA
Greece	306	98	105	0.7%	-202	-66%	6	6%	NA,T2	CS,NA
Hungary	349	370	357	2.3%	8	2%	-13	-4%	NA,T1,T2,T3	CS,D,NA,PS
Ireland	28	12	14	0.1%	-15	-52%	1	9%	NA,T2	CS,NA
Italy	3 108	3 950	3 794	24.0%	687	22%	-156	-4%	NA,T2	CS,NA
Latvia	168	5	6	0.0%	-163	-96%	1	11%	NA,T2	CS,NA
Lithuania	255	24	24	0.2%	-231	-91%	0	1%	NA,T2	CS,NA
Luxembourg	IE,NO	8	9	0.1%	9	∞	1	8%	NA,T2	CS,NA
Malta	NO	1	1	0.0%	1	∞	0	6%	NA,T1	D,NA
Netherlands	1 668	662	694	4.4%	-974	-58%	32	5%	NA,T2	CS,NA
Poland	284	1 195	1 182	7.5%	898	316%	-13	-1%	NA,T1,T2	CS,D,NA
Portugal	754	815	734	4.6%	-20	-3%	-81	-10%	NA,T1,T3	CS,D,NA
Romania	NO	159	173	1.1%	173	∞	14	9%	NA,T1,T2	CS,D,NA
Slovakia	2 329	177	139	0.9%	-2 191	-94%	-39	-22%	NA,T2	CS,NA
Slovenia	381	199	216	1.4%	-165	-43%	17	9%	NA,T1,T2,T3	CS,D,NA,PS
Spain	2 567	2 687	2 754	17.4%	186	7%	67	2%	NA,T1,T2,T3	CS,D,NA,PS
Sweden	2 156	22	552	3.5%	-1 604	-74%	530	2435%	T2	CS
EU	**30 115**	**15 983**	**15 842**	**100%**	**-14 273**	**-47%**	**-140**	**-1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Emissions of Luxembourg from 1990 to 1999 are included in 1.A.2.g.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

1.A.2.d Pulp, Paper and Print – Liquid Fuels (CO_2)

CO_2 emissions from the use of liquid fuels in category 1.A.2.d amounted 1 515 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 86% and compared to 2023 increased by 13%. Category has 0.4% share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 86% compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.38.

Table 3.38: 1.A.2.d Pulp, Paper and Print, Liquid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	853	38	20	1.3%	-832	-98%	-18	-47%	T2	CS
Belgium	235	12	14	0.9%	-221	-94%	2	16%	T1,T3	D,PS
Bulgaria	16	1	1	0.1%	-15	-93%	0	-10%	T1	D
Croatia	58	3	3	0.2%	-55	-95%	0	0%	T1	D
Cyprus	5	2	2	0.1%	-3	-54%	0	12%	T1	D
Czechia	461	18	22	1.4%	-439	-95%	4	23%	T1	CS,D
Denmark	94	25	17	1.1%	-77	-82%	-8	-31%	T2	CS
Estonia	145	3	4	0.3%	-141	-97%	1	35%	T1,T2	CS,D
Finland	1 138	414	309	20.4%	-828	-73%	-105	-25%	T3	CS
France	1 386	144	119	7.8%	-1 267	-91%	-25	-18%	T2,T3	CS,D,OTH,PS
Germany	IE	IE	IE	-	-	-	-	-	NA	NA
Greece	302	41	41	2.7%	-261	-86%	0	1%	T2	CS
Hungary	69	6	4	0.3%	-65	-94%	-2	-29%	T1	D
Ireland	28	3	3	0.2%	-26	-90%	0	11%	T2	CS
Italy	1 017	159	96	6.3%	-920	-91%	-63	-40%	T2	CS
Latvia	16	2	2	0.1%	-14	-89%	0	-13%	T2	CS
Lithuania	69	1	0	0.0%	-68	-100%	0	-47%	T2	CS
Luxembourg	IE	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	1	1	0.1%	1	∞	0	6%	T1	D
Netherlands	2	0	0	0.0%	-2	-95%	0	-69%	T2	CS
Poland	106	111	99	6.6%	-7	-6%	-11	-10%	T1,T2	CS,D
Portugal	754	239	107	7.1%	-647	-86%	-132	-55%	T1	D
Romania	NO	2	1	0.1%	1	∞	-1	-55%	T1,T2	CS,D
Slovakia	985	4	0	0.0%	-985	-100%	-3	-94%	T2	CS
Slovenia	98	3	3	0.2%	-95	-97%	0	16%	T1,T2	CS,D
Spain	1 214	112	122	8.1%	-1 091	-90%	10	9%	T1,T2,T3	CS,D,PS
Sweden	1 786	C	523	34.5%	-1 263	-71%	-	-	T2	CS
EU	**10 835**	**1 343**	**1 515**	**100%**	**-9 320**	**-86%**	**172**	**13%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Emissions of Germany are included in 1.A.2.g.
EU trends for 2023 in this table do not include emissions from Sweden for confidentiality reasons, but 1990 and 2024 EU sum do include emission from Sweden.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.59 shows CO_2 emissions trend as well as the share of countries with the highest contribution to the total CO_2 emissions.

Figure 3.59: 1.A.2.d Pulp, Paper and Print, Liquid fuels: Emission trend and share for CO_2

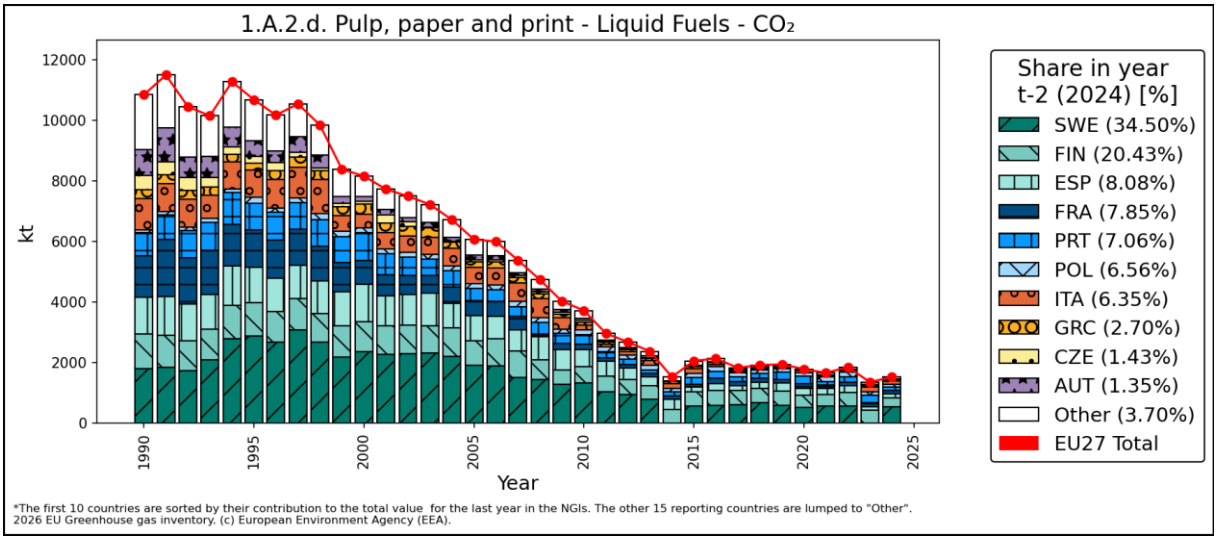
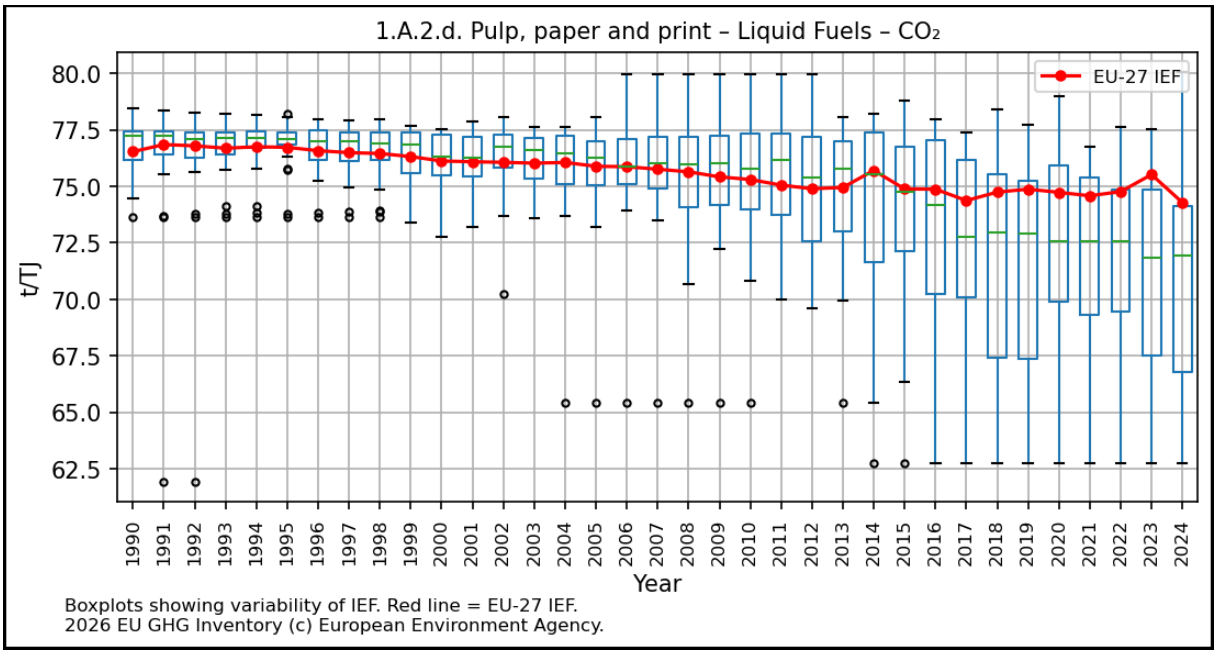


Figure.3.60 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. It can be seen that CO_2 IEF is decreasing during whole time period, which is caused by increasing consumption of Liquified Petroleum Gas with lower CO_2 IEF and decreasing consumption of Heavy Fuel Oil with higher CO_2 IEF. CO_2 IEF equaled to 74.28 t/TJ in 2024.

Figure.3.60: 1.A.2.d Pulp, Paper and Print, Liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.d Pulp, Paper and Print - Solid Fuels (CO_2)

CO_2 emissions from the use of solid fuels in category 1.A.2.d amounted 803 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 88 % and decreased by 22 % to 2023. This category represents 0.2 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 88 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.39.

Table 3.39: 1.A.2.d Pulp, Paper and Print, solid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	398	49	72	8.9%	-327	-82%	22	45%	T2	CS
Belgium	128	75	44	5.5%	-83	-65%	-30	-41%	T1	D
Bulgaria	NO	4	4	0.5%	4	∞	0	3%	T1,T2	CS,D
Croatia	68	NO	NO	-	-68	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	1 646	253	147	18.3%	-1 499	-91%	-106	-42%	T2	CS,D
Denmark	125	NO	NO	-	-125	-100%	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	1 318	38	4	0.6%	-1 313	-100%	-33	-88%	T3	CS
France	1 021	NO	NO	-	-1 021	-100%	-	-	T2,T3	CS,D,OTH,PS
Germany	IE	IE	IE	-	-	-	-	-	NA	NA
Greece	4	NO	NO	-	-4	-100%	-	-	NA	NA
Hungary	9	117	107	13.3%	98	1104%	-10	-9%	T3	PS
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	6	NO	NO	-	-6	-100%	-	-	NA	NA
Latvia	3	NO	NO	-	-3	-100%	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	8	NO	NO	-	-8	-100%	-	-	NA	NA
Poland	173	432	414	51.5%	241	139%	-19	-4%	T1,T2	CS,D
Portugal	NO	NO	NO	-	-	-	-	-	NA	NA
Romania	NO	0	0	0.0%	0	∞	0	-12%	T1,T2	CS,D
Slovakia	1 142	31	NO	-	-1 142	-100%	-31	-100%	NA	NA
Slovenia	172	33	12	1.5%	-160	-93%	-21	-64%	T3	PS
Spain	277	NO	NO	-	-277	-100%	-	-	NA	NA
Sweden	265	NO	NO	-	-265	-100%	-	-	T2	CS
EU	**6 761**	**1 033**	**803**	**100%**	**-5 957**	**-88%**	**-230**	**-22%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Emissions of Germany are included in 1.A.2.g.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.61 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.61: 1.A.2.d Pulp, Paper and Print, Solid fuels: Emission trend and share for CO_2

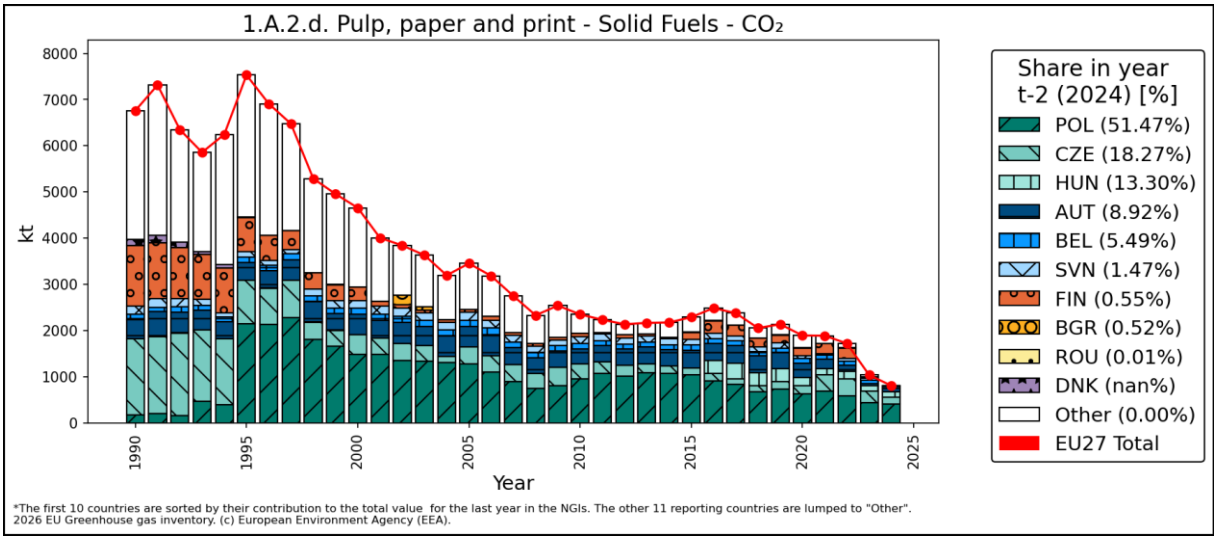
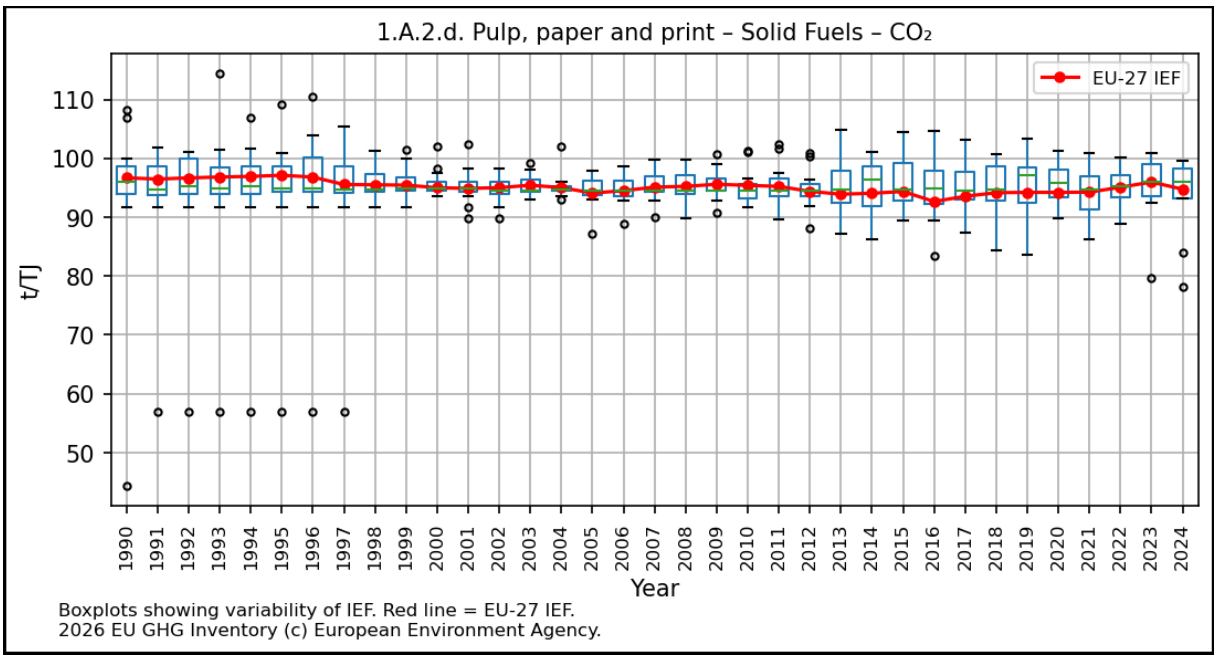


Figure 3.62 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. CO_2 IEF equaled to 96.64 t/TJ in 2024.

Figure 3.62: 1.A.2.d Pulp, Paper and Print, Solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.d Pulp, Paper and Print - Gaseous Fuels (CO_2)

CO_2 emissions from the use of gaseous fuels in category 1.A.2.d amounted 12 778 kt in 2024 for EU. CO_2 emissions increased compared to year 1990 by 13 % and decreased compared to 2023 by 0.2 %. This category has 4 % share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption increased by 11 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.40.

Table 3.40: 1.A.2.d Pulp, Paper and Print, Gaseous fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	943	1 100	964	7.5%	22	2%	-136	-12%	T2	CS
Belgium	282	294	303	2.4%	21	7%	8	3%	T3	CS,PS
Bulgaria	NO	52	42	0.3%	42	∞	-11	-20%	T2	CS
Croatia	177	111	115	0.9%	-62	-35%	4	4%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	179	238	196	1.5%	17	10%	-42	-18%	T2	CS
Denmark	124	27	28	0.2%	-96	-78%	1	4%	T3	CS
Estonia	NO	22	25	0.2%	25	∞	3	13%	T2	CS
Finland	1 757	503	477	3.7%	-1 280	-73%	-26	-5%	T3	CS
France	2 071	1 632	1 662	13.0%	-409	-20%	29	2%	T2,T3	CS,D,OTH,PS
Germany	IE	IE	IE	-	-	-	-	-	NA	NA
Greece	NO	58	64	0.5%	64	∞	6	10%	T2	CS
Hungary	271	113	129	1.0%	-142	-52%	16	14%	T2	CS
Ireland	NO	10	11	0.1%	11	∞	1	8%	T2	CS
Italy	2 085	3 791	3 698	28.9%	1 614	77%	-92	-2%	T2	CS
Latvia	150	3	4	0.0%	-146	-97%	1	24%	T2	CS
Lithuania	187	23	24	0.2%	-163	-87%	1	2%	T2	CS
Luxembourg	IE	8	9	0.1%	9	∞	1	8%	T2	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	1 659	662	694	5.4%	-964	-58%	32	5%	T2	CS
Poland	6	532	555	4.3%	549	9852%	23	4%	T2	CS
Portugal	NO	576	627	4.9%	627	∞	52	9%	T3	CS
Romania	NO	145	160	1.3%	160	∞	16	11%	T2	CS
Slovakia	203	142	139	1.1%	-64	-32%	-4	-3%	T2	CS
Slovenia	110	163	201	1.6%	91	82%	38	23%	T2	CS
Spain	1 077	2 575	2 631	20.6%	1 554	144%	56	2%	T2,T3	CS,PS
Sweden	66	22	22	0.2%	-44	-67%	0	-1%	T2	CS
EU	**11 344**	**12 802**	**12 778**	**100%**	**1 433**	**13%**	**-24**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Emissions of Germany are included in 1.A.2.g.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.63 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.63: 1.A.2.d Pulp, Paper and Print, Gaseous fuels: Emission trend and share for CO_2

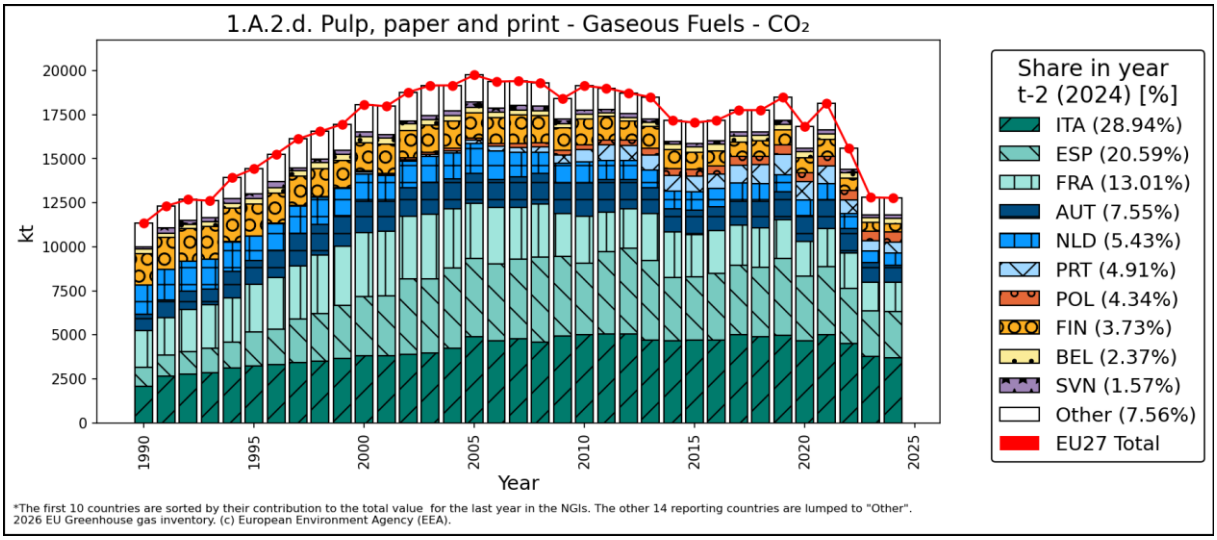
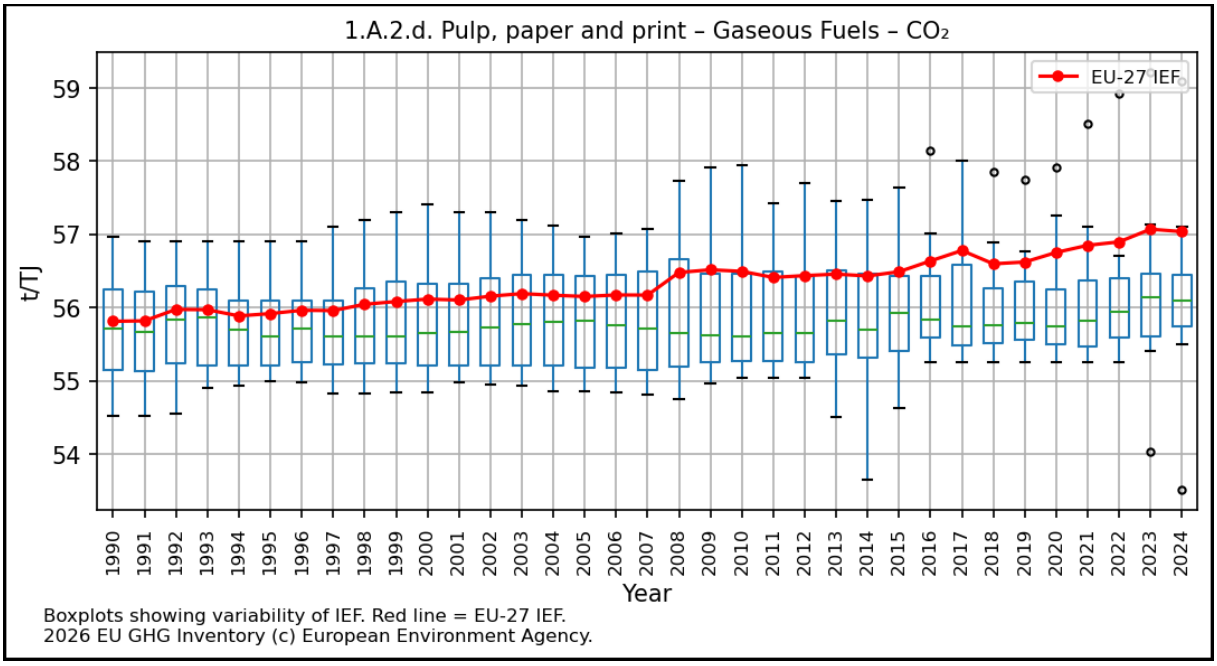


Figure 3.64 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. CO_2 IEF shows relatively stable slightly increasing trend without major fluctuations for whole time series. The main reason for increasing trend of the CO_2 IEF is the growing share of Italy and Spain on total EU emissions; their CO_2 IEFs have been slightly growing since 1990. CO_2 IEF equalled to 56.80 t/TJ in 2024.

Figure 3.64: 1.A.2.d Pulp, Paper and Print, Gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



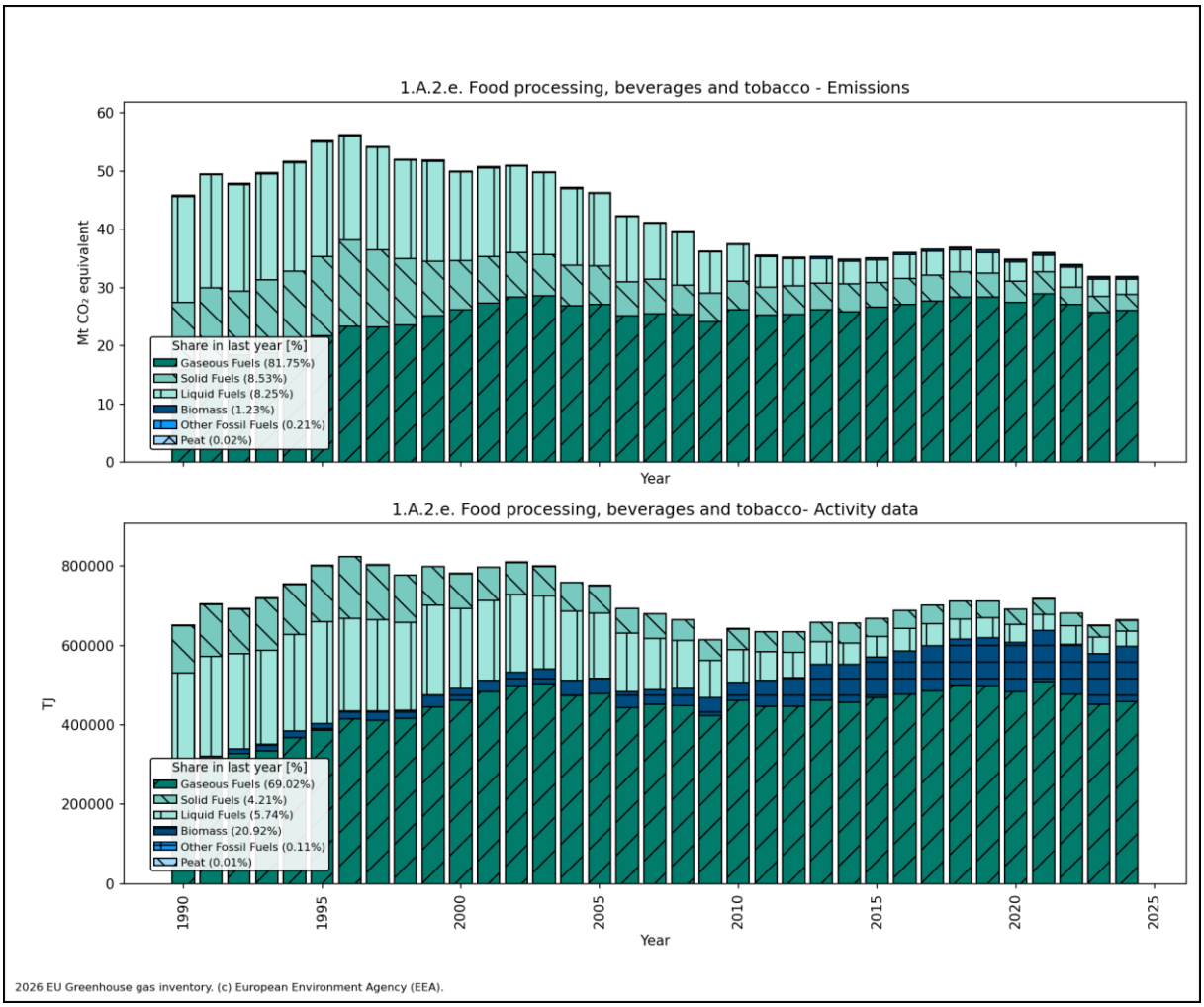
3.6.2.5 Food Processing, Beverages and Tobacco (1.A.2.e)

This chapter provides information about European emission trend, Member States contribution to the overall emission trend, activity data and emission factors used for emission estimates by countries for category 1.A.2.e Food Processing, Beverages and Tobacco.

Total CO_2 emissions from 1.A.2.e amounted to 31 248 kt CO_2 eq. in 2024. The trend of total CO_2 emissions for 1990 to 2024 from category 1.A.2.e is depicted in Figure 3.65. Total CO_2 emissions decreased by 31 % since 1990. There was no significant change in emissions between 2023 and 2024 (decreased by 0.02 %). CO_2 emissions from 1.A.2.e Food Processing, Beverages and Tobacco accounted for 9 % of 1.A.2. source category.

Figure 3.65 shows the emission trend within the category 1.A.2.e, which is dominated by CO_2 emissions from gaseous fuels in 2024. The share of liquid fuels on CO_2 emissions from 1.A.2.e decreased from 40 % in 1990 to 8 % in 2024. The share of solid fuels on CO_2 emissions from 1.A.2.e decreased from 25 % in 1990 to 9 % in 2024. The share of gaseous fuels on CO_2 emissions from 1.A.2.e increased from 35 % in 1990 to 83 % in 2024.

Figure 3.65: 1.A.2.e Food Processing, Beverages and Tobacco: Total emission and activity trends



Detailed data related to the EU submissions are depicted in Table 3.41.

Table 3.41: 1.A.2.e Food Processing, Beverages and Tobacco: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	870	799	852	2.7%	-17	-2%	54	7%	NA,T2	CS,NA
Belgium	3 023	2 421	2 543	8.1%	-481	-16%	122	5%	NA,T1,T3	CS,D,NA,PS
Bulgaria	454	288	286	0.9%	-168	-37%	-3	-1%	NA,T1,T2	CS,D,NA
Croatia	729	304	288	0.9%	-441	-61%	-16	-5%	NA,T1	D,NA
Cyprus	73	49	53	0.2%	-20	-28%	3	7%	NA,T1	D,NA
Czechia	2 988	949	898	2.9%	-2 090	-70%	-50	-5%	NA,T1,T2	CS,D,NA
Denmark	1 651	707	602	1.9%	-1 049	-64%	-105	-15%	NA,T1,T2,T3	CS,D,NA,PS
Estonia	695	46	73	0.2%	-623	-90%	27	57%	NA,T1,T2	CS,D,NA
Finland	828	94	86	0.3%	-742	-90%	-8	-9%	NA,T3	CS,NA
France	8 668	6 339	6 504	20.8%	-2 165	-25%	165	3%	T2,T3	CS,D,OTH,PS
Germany	2 016	190	209	0.7%	-1 807	-90%	19	10%	CS,NA	CS,NO
Greece	917	640	644	2.1%	-272	-30%	4	1%	NA,T2	CS,NA
Hungary	2 279	795	831	2.7%	-1 448	-64%	36	4%	NA,T1,T2	CS,D,NA
Ireland	1 018	1 062	1 138	3.6%	120	12%	75	7%	NA,T1,T2	CS,D,NA
Italy	3 891	3 305	3 189	10.2%	-702	-18%	-116	-4%	NA,T2	CS,NA
Latvia	840	89	87	0.3%	-753	-90%	-2	-3%	NA,T2	CS,NA
Lithuania	676	265	271	0.9%	-405	-60%	6	2%	NA,T2	CS,NA
Luxembourg	5	12	10	0.0%	5	85%	-2	-19%	NA,T2	CS,NA
Malta	NO	8	9	0.0%	9	∞	0	4%	NA,T1	D,NA
Netherlands	4 009	3 171	3 123	10.0%	-886	-22%	-47	-1%	NA,T2	CS,D,NA
Poland	3 715	4 233	4 342	13.9%	626	17%	109	3%	NA,T1,T2	CS,D,NA
Portugal	830	624	620	2.0%	-210	-25%	-4	-1%	NA,T1	CR,D,NA
Romania	132	784	782	2.5%	651	494%	-2	0%	NA,T1,T2	CS,D,NA
Slovakia	1 140	307	321	1.0%	-819	-72%	14	4%	NA,T2	CS,NA
Slovenia	221	92	93	0.3%	-128	-58%	1	1%	NA,T1,T2	CS,D,NA
Spain	2 977	3 577	3 181	10.2%	204	7%	-396	-11%	NA,T1,T2	CS,D,NA
Sweden	945	102	214	0.7%	-732	-77%	112	110%	T2	CS
EU	**45 591**	**31 254**	**31 248**	**100%**	**-14 343**	**-31%**	**-6**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

1.A.2.e Food Processing, Beverages and Tobacco - Liquid Fuels (CO_2)

CO_2 emissions from the use of liquid fuels in category 1.A.2.e amounted 2 622 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 85 % and compared to 2023 decreased by 10 %. This category represents 0.8 % share of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 84 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.42.

Table 3.42: 1.A.2.e Food Processing, Beverages and Tobacco, liquid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	345	148	54	2.1%	-291	-84%	-94	-64%	T2	CS
Belgium	1 689	101	94	3.6%	-1 595	-94%	-8	-8%	T1	D
Bulgaria	409	31	26	1.0%	-383	-94%	-5	-16%	T1	D
Croatia	342	62	58	2.2%	-284	-83%	-3	-6%	T1	D
Cyprus	73	49	53	2.0%	-20	-28%	3	7%	T1	D
Czechia	472	51	48	1.8%	-424	-90%	-3	-6%	T1	CS,D
Denmark	786	257	145	5.5%	-641	-82%	-112	-44%	T2,T3	CS,PS
Estonia	695	19	30	1.1%	-666	-96%	11	59%	T1,T2	CS,D
Finland	365	41	37	1.4%	-328	-90%	-4	-10%	T3	CS
France	3 156	534	615	23.4%	-2 541	-81%	81	15%	T2,T3	CS,D,OTH,PS
Germany	908	37	17	0.6%	-891	-98%	-20	-55%	CS	CS
Greece	863	459	468	17.9%	-394	-46%	9	2%	T2	CS
Hungary	810	44	41	1.6%	-769	-95%	-3	-6%	T1	D
Ireland	433	232	233	8.9%	-200	-46%	0	0%	T1,T2	CS,D
Italy	1 424	90	66	2.5%	-1 358	-95%	-25	-27%	T2	CS
Latvia	565	29	20	0.8%	-545	-96%	-9	-30%	T2	CS
Lithuania	174	36	32	1.2%	-142	-82%	-4	-10%	T2	CS
Luxembourg	2	3	NO	-	-2	-100%	-3	-100%	NA	NA
Malta	NO	8	9	0.3%	9	∞	0	4%	T1	D
Netherlands	165	0	1	0.0%	-164	-99%	1	18321%	T2	CS,D
Poland	232	315	238	9.1%	6	2%	-77	-24%	T1,T2	CS,D
Portugal	829	131	122	4.7%	-707	-85%	-10	-7%	T1	CR,D
Romania	NO	86	85	3.3%	85	∞	0	-1%	T1,T2	CS,D
Slovakia	359	15	2	0.1%	-357	-100%	-13	-89%	T2	CS
Slovenia	146	25	22	0.9%	-123	-85%	-2	-10%	T1,T2	CS,D
Spain	2 227	113	51	1.9%	-2 176	-98%	-62	-55%	T1	D
Sweden	596	C	56	2.2%	-540	-91%	-	-	T2	CS
EU	**18 064**	**2 916**	**2 622**	**100%**	**-15 442**	**-85%**	**-295**	**-10%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
EU trends for 2023 in this table do not include emissions from Sweden for confidentiality reasons, but 1990 and 2024 EU sum do include emission from Sweden.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.66 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.66: 1.A.2.e Food Processing, Beverages and Tobacco, Liquid fuels: Emission trend and share for CO_2

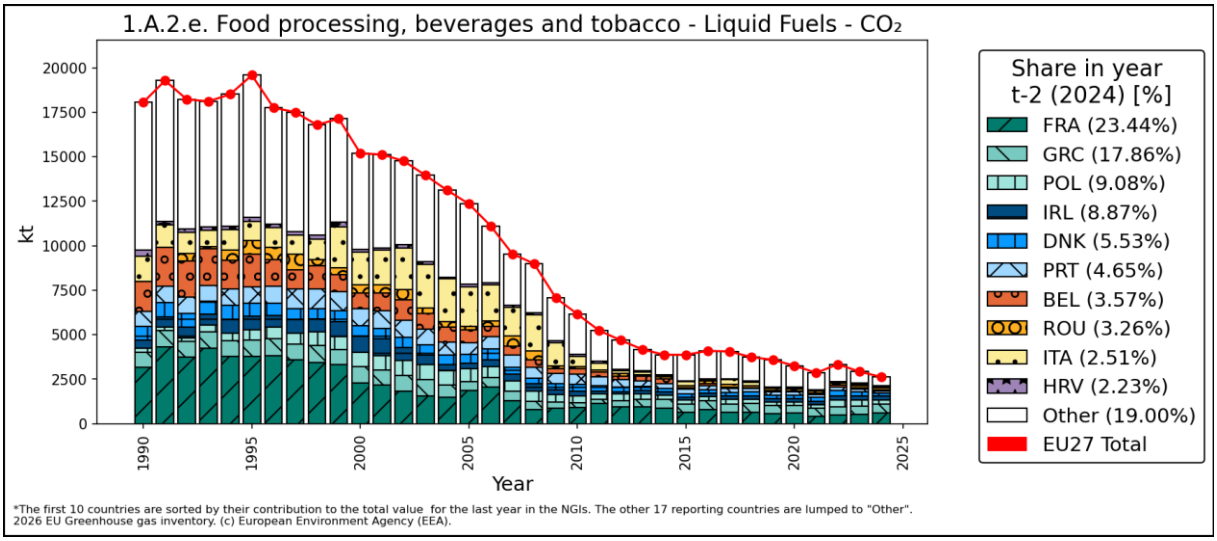
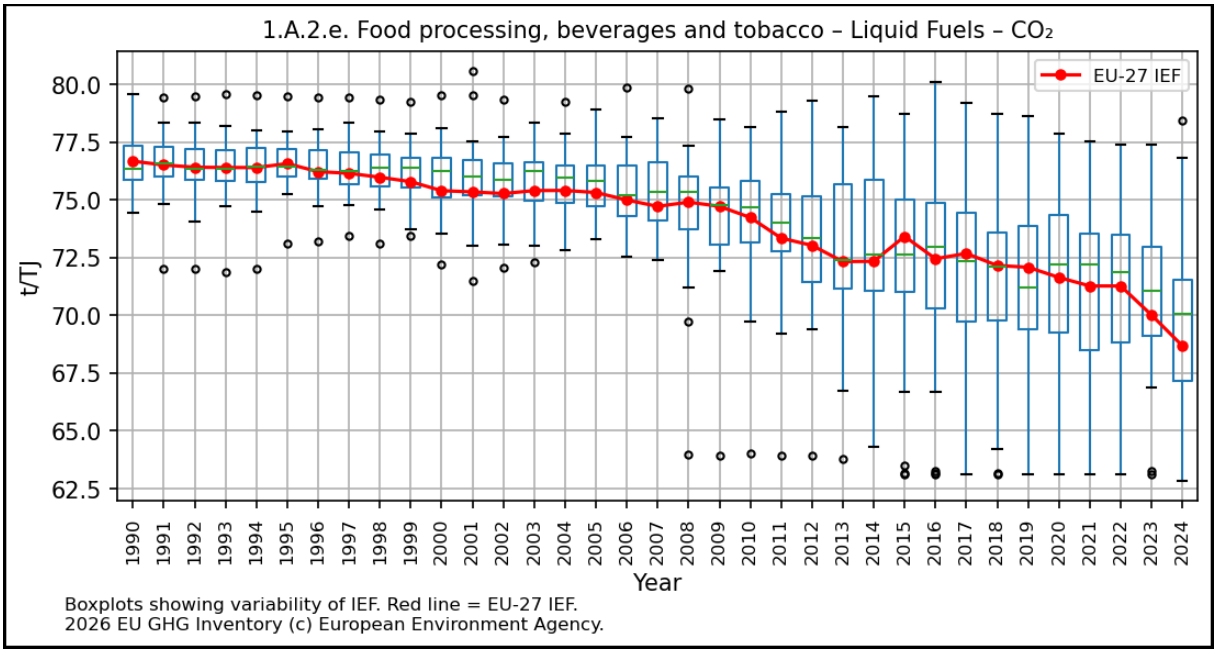


Figure 3.67 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. It can be seen that whole time series CO_2 IEF has decreasing trend with minor fluctuation between 2014 and 2018. CO_2 IEF equalled to 68.67 t/TJ in 2024.

Figure 3.67: 1.A.2.e Food Processing, Beverages and Tobacco, Liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.e Food Processing Beverages and Tobacco - Solid Fuels (CO_2)

CO_2 emissions from the use of solid fuels in category 1.A.2.e amounted 2 701 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 77 % and compared to 2023 decreased by 2 %. This category represents 0.8 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 77 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.43.

Table 3.43: 1.A.2.e Food Processing, Beverages and Tobacco, Solid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	18	16	19	0.7%	1	3%	3	16%	T2	CS
Belgium	651	30	14	0.5%	-637	-98%	-16	-55%	T1	D
Bulgaria	33	4	3	0.1%	-30	-91%	-1	-27%	T1,T2	CS,D
Croatia	207	7	8	0.3%	-199	-96%	1	14%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	1 789	325	260	9.6%	-1 529	-85%	-66	-20%	T2	CS,D
Denmark	399	82	43	1.6%	-356	-89%	-39	-48%	T1,T2,T3	CS,D,PS
Estonia	NO	0	0	0.0%	0	∞	0	0%	T2	CS
Finland	257	25	2	0.1%	-254	-99%	-22	-91%	T3	CS
France	2 053	159	139	5.1%	-1 914	-93%	-20	-13%	T2,T3	CS,D,OTH,PS
Germany	1 108	153	192	7.1%	-915	-83%	39	26%	CS	CS
Greece	54	NO	NO	-	-54	-100%	-	-	NA	NA
Hungary	241	6	9	0.3%	-231	-96%	3	49%	T1,T2	CS,D
Ireland	292	NO	NO	-	-292	-100%	-	-	NA	NA
Italy	87	NO	NO	-	-87	-100%	-	-	NA	NA
Latvia	100	1	1	0.0%	-99	-99%	1	86%	T2	CS
Lithuania	33	8	9	0.3%	-24	-73%	1	15%	T2	CS
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	227	31	36	1.3%	-191	-84%	5	17%	T2	CS
Poland	3 374	1 893	1 931	71.5%	-1 443	-43%	38	2%	T1,T2	CS,D
Portugal	1	NO	NO	-	-1	-100%	-	-	NA	NA
Romania	132	3	2	0.1%	-129	-98%	-1	-24%	T2	CS
Slovakia	312	4	5	0.2%	-307	-98%	1	27%	T2	CS
Slovenia	9	NO	NO	-	-9	-100%	-	-	NA	NA
Spain	90	20	27	1.0%	-63	-70%	7	37%	T1,T2	CS,D
Sweden	90	NO	NO	-	-90	-100%	-	-	T2	CS
EU	**11 557**	**2 767**	**2 701**	**100%**	**-8 856**	**-77%**	**-66**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.68 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.68: 1.A.2.e Food Processing, Beverages and Tobacco, solid fuels: Emission trend and share for CO_2

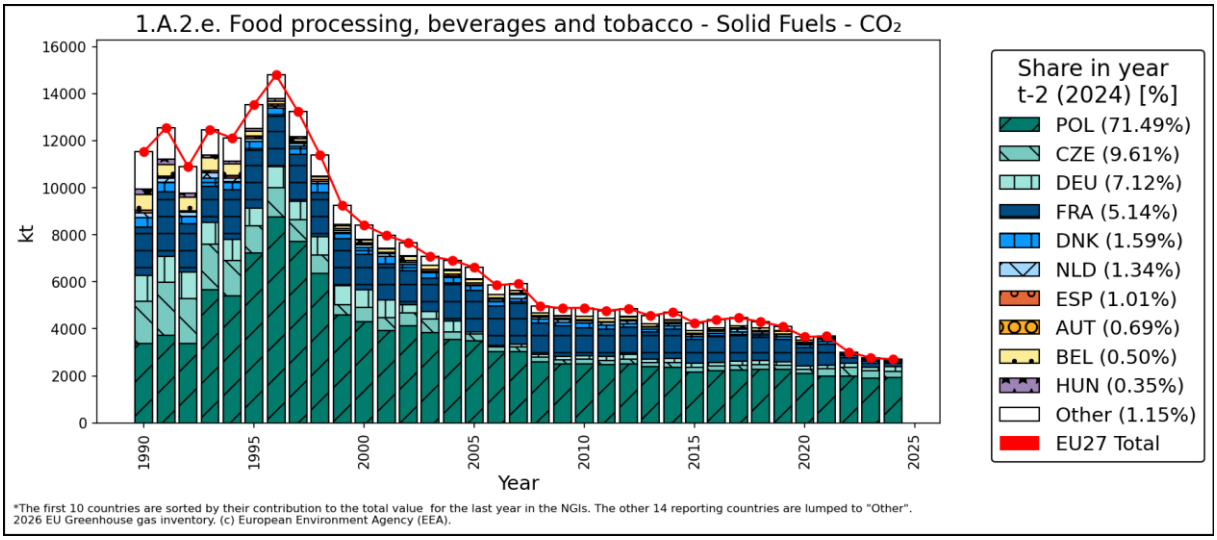
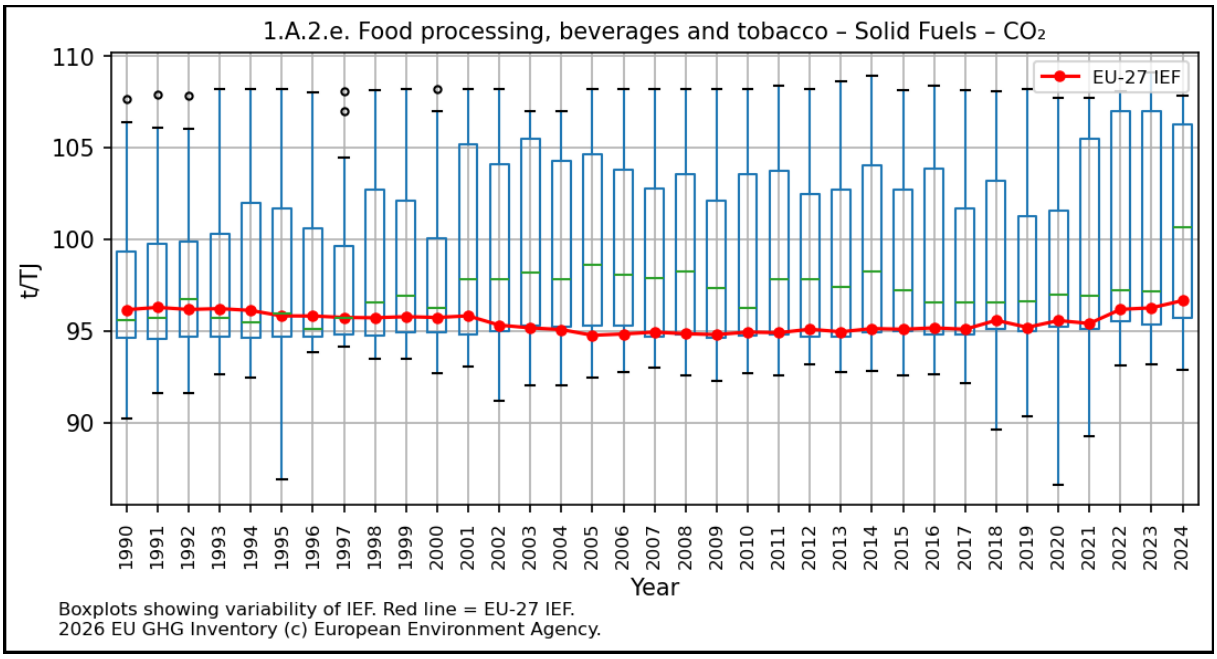


Figure 3.69 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. It can be seen that CO_2 IEF is relatively stable during whole period. CO_2 IEF equalled to 96.64 t/TJ in 2024.

Figure 3.69: 1.A.2.e Food Processing, Beverages and Tobacco, Solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.e Food Processing Beverages and Tobacco - Gaseous Fuels (CO_2)

CO_2 emissions from the use of gaseous fuels in category 1.A.2.e amounted 25 853 kt in 2024 for EU. CO_2 emissions increased compared to year 1990 by 63 % and increased by 1 % compared to 2023. This category represents 7 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption increased by 62 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.44.

Table 3.44: 1.A.2.e Food Processing, Beverages and Tobacco, gaseous fuels: Member States contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	507	635	780	3.0%	273	54%	145	23%	T2	CS
Belgium	684	2 290	2 436	9.4%	1 752	256%	146	6%	T3	CS,PS
Bulgaria	11	253	257	1.0%	245	2146%	3	1%	T2	CS
Croatia	180	235	222	0.9%	41	23%	-13	-6%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	727	572	591	2.3%	-137	-19%	18	3%	T2	CS
Denmark	466	367	414	1.6%	-52	-11%	46	13%	T3	CS
Estonia	NO	27	43	0.2%	43	∞	15	56%	T2	CS
Finland	67	29	41	0.2%	-26	-38%	13	44%	T3	CS
France	3 459	5 625	5 726	22.1%	2 267	66%	102	2%	T2,T3	CS,D,OTH,PS
Germany	IE	IE	IE	-	-	-	-	-	CS	CS
Greece	NO	181	176	0.7%	176	∞	-5	-3%	T2	CS
Hungary	1 228	745	780	3.0%	-448	-36%	35	5%	T2	CS
Ireland	293	830	905	3.5%	612	209%	75	9%	NA	NA
Italy	2 380	3 215	3 123	12.1%	743	31%	-92	-3%	T2	CS
Latvia	175	60	66	0.3%	-109	-62%	6	9%	T2	CS
Lithuania	469	221	229	0.9%	-239	-51%	9	4%	T2	CS
Luxembourg	4	9	10	0.0%	6	165%	1	8%	T2	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	3 617	3 140	3 086	11.9%	-531	-15%	-54	-2%	T2	CS
Poland	109	2 025	2 172	8.4%	2 063	1893%	147	7%	T2	CS
Portugal	NO	492	498	1.9%	498	∞	6	1%	T1	D
Romania	NO	658	653	2.5%	653	∞	-5	-1%	T2	CS
Slovakia	470	289	315	1.2%	-155	-33%	26	9%	T2	CS
Slovenia	66	67	71	0.3%	5	7%	4	5%	T2	CS
Spain	660	3 445	3 103	12.0%	2 444	370%	-341	-10%	T2	CS
Sweden	254	102	157	0.6%	-97	-38%	55	54%	T2	CS
EU	**15 826**	**25 512**	**25 853**	**100%**	**10 027**	**63%**	**341**	**1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Emissions of Germany included in 1.A.2.g.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.70 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.70: 1.A.2.e Food Processing, Beverages and Tobacco, Gaseous fuels: Emission trend and share for CO_2

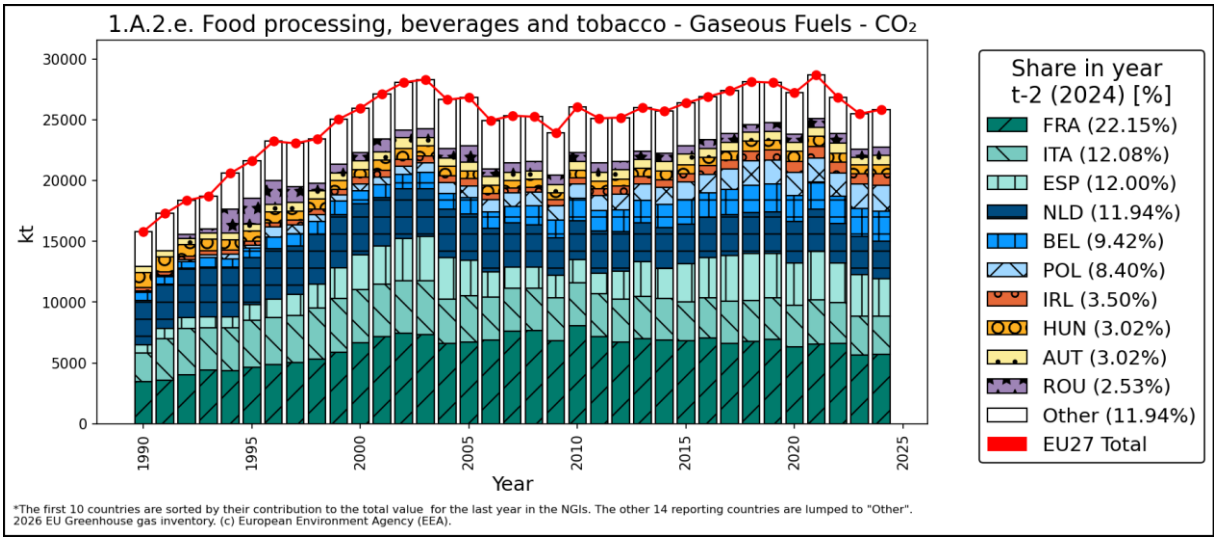
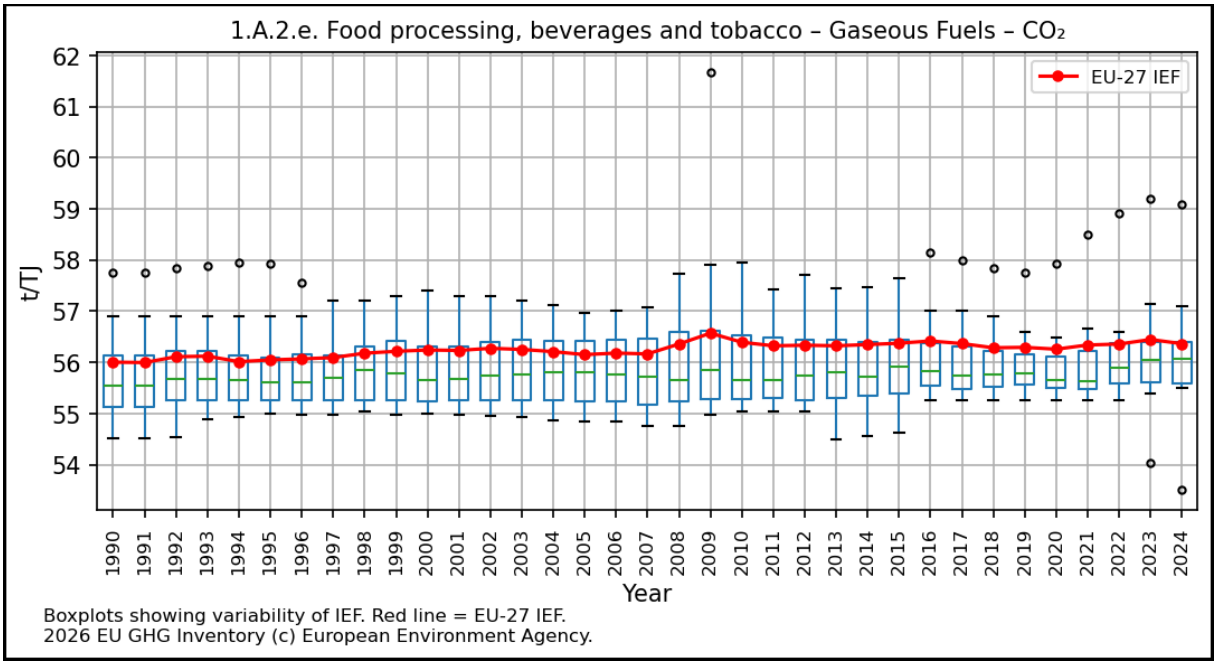


Figure 3.71 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024 which is stable with slightly increasing trend during whole time period. CO_2 IEF equalled to 56.36 t/TJ in 2024.

Figure 3.71: 1.A.2.e Food Processing, Beverages and Tobacco, Gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



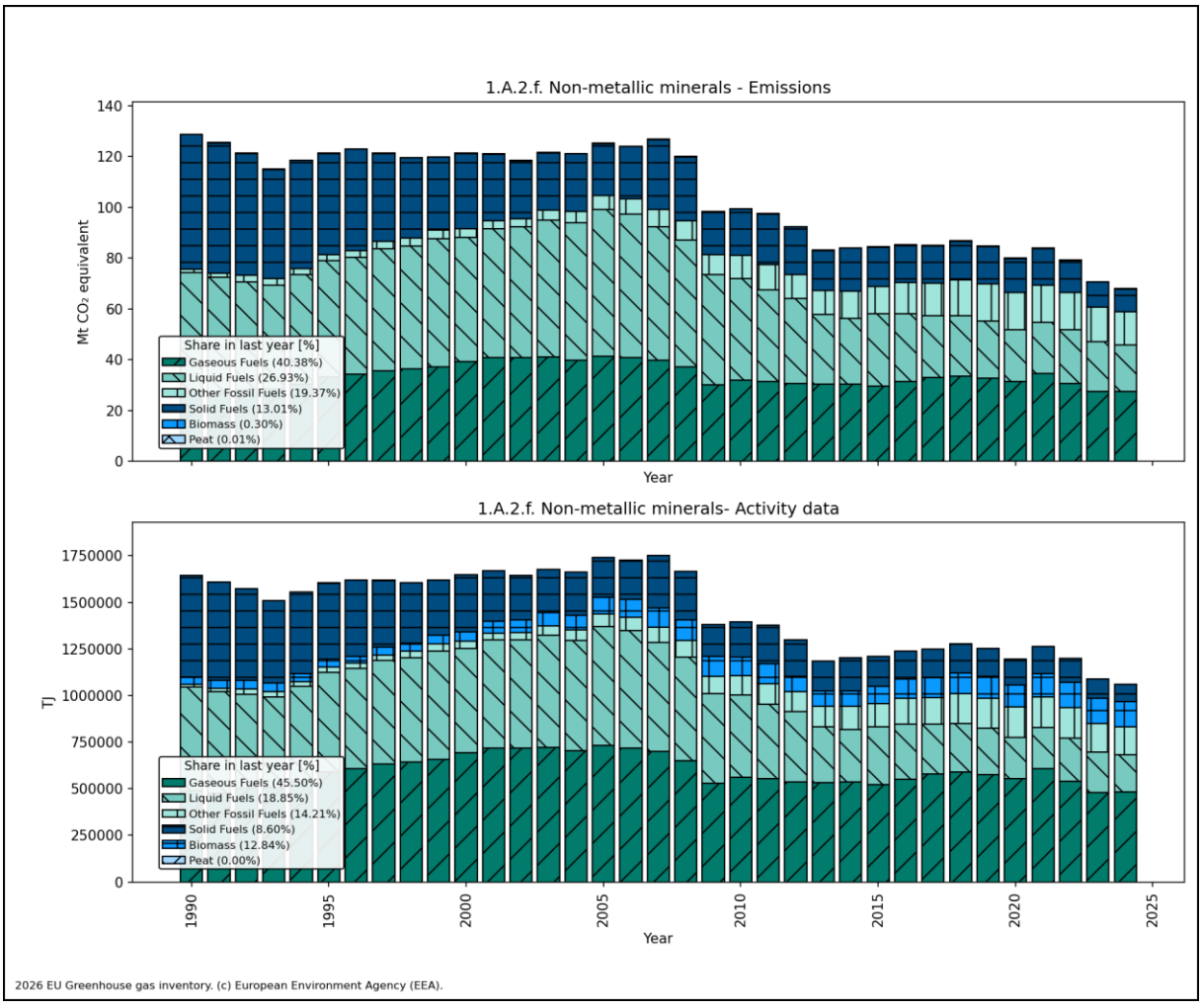
3.6.2.6 Non-metallic Minerals (1.A.2.f)

This chapter provides information about European emission trend, Member States contribution to the overall emission trend, activity data and emission factors used for emission estimates by countries for category 1.A.2.f Non-metallic Minerals.

Total CO_2 emissions from 1.A.2.f amounted to 67 031 kt CO_2 eq. in 2024. The trend of total emissions for 1990 to 2024 from category 1.A.2.f is depicted in Figure 3.72. Total CO_2 emissions decreased by 47 % since 1990 and decreased by 4 % between 2023 and 2024. The sharp decline in 2009 is due to the economic crisis and sharp decline in building activity. CO_2 emissions from 1.A.2.f Non-metallic Minerals accounted for 19 % of 1.A.2. source category.

Figure 3.72 shows the emission trend within the category 1.A.2.f which is dominated by CO_2 emissions from gaseous fuels in 2024. The share of liquid fuels on CO_2 emissions from 1.A.2.f decreased from 36 % in 1990 to 27 % in 2024. The share of solid fuels on CO_2 emissions from 1.A.2.f decreased from 41 % in 1990 to 13 % in 2024. The share of gaseous fuels on CO_2 emissions from 1.A.2.f increased from 21 % in 1990 to 41 % in 2024.

Figure 3.72: 1.A.2.f Non-metallic Minerals: Activity data and total emission trends



Detailed data related to the EU submissions are depicted in Table.3.45.

Table.3.45: 1.A.2.f Non-metallic Minerals: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	1 669	1 378	1 320	2.0%	-350	-21%	-58	-4%	NA,T2	CS,NA
Belgium	5 525	2 670	2 503	3.7%	-3 022	-55%	-167	-6%	NA,T1,T3	CS,D,NA,PS
Bulgaria	2 646	941	889	1.3%	-1 757	-66%	-52	-6%	NA,T1,T2	CS,D,NA
Croatia	1 924	1 357	1 216	1.8%	-708	-37%	-140	-10%	NA,T1	D,NA
Cyprus	380	404	390	0.6%	10	3%	-14	-4%	CS,NA	CS,NA
Czechia	4 527	2 190	2 056	3.1%	-2 471	-55%	-134	-6%	NA,T1,T2	CS,D,NA
Denmark	1 347	969	789	1.2%	-557	-41%	-179	-19%	NA,T2,T3	CS,NA,PS
Estonia	1 053	61	55	0.1%	-998	-95%	-6	-10%	NA,T1,T2,T3	CS,D,NA,PS
Finland	1 368	420	387	0.6%	-981	-72%	-32	-8%	NA,T3	CS,NA
France	15 063	7 837	7 158	10.7%	-7 905	-52%	-679	-9%	T1,T2,T3	CS,D,OTH,PS
Germany	18 507	10 582	9 582	14.3%	-8 925	-48%	-1 000	-9%	CS,NA	CS,NA
Greece	6 278	2 468	2 337	3.5%	-3 941	-63%	-131	-5%	NA,T2	CS,NA,PS
Hungary	2 471	604	551	0.8%	-1 920	-78%	-53	-9%	NA,T1,T2,T3	CS,D,NA,PS
Ireland	819	1 067	906	1.4%	86	11%	-161	-15%	NA,T1,T2,T3	CS,D,NA,PS
Italy	21 045	10 304	10 387	15.5%	-10 658	-51%	83	1%	NA,T2	CS,NA
Latvia	599	255	219	0.3%	-380	-64%	-36	-14%	NA,T2	CS,NA,PS
Lithuania	3 210	373	383	0.6%	-2 827	-88%	10	3%	NA,T2,T3	CS,NA,OTH,PS
Luxembourg	537	159	170	0.3%	-366	-68%	11	7%	NA,T1,T2,T3	CS,D,NA,PS
Malta	NO	10	11	0.0%	11	∞	1	9%	NA,T1	D,NA
Netherlands	2 298	1 010	911	1.4%	-1 386	-60%	-99	-10%	NA,T2	CS,NA
Poland	10 340	7 859	8 007	11.9%	-2 333	-23%	148	2%	NA,T1,T2	CS,D,NA
Portugal	3 289	2 352	2 472	3.7%	-817	-25%	120	5%	NA,T1,T2,T3	D,NA,PS
Romania	285	2 529	2 618	3.9%	2 333	819%	90	4%	NA,T1,T2	CS,D,NA
Slovakia	3 408	1 103	1 128	1.7%	-2 280	-67%	26	2%	NA,T2	CS,NA
Slovenia	297	409	393	0.6%	96	32%	-16	-4%	NA,T1,T2,T3	CS,D,NA,PS
Spain	16 556	10 129	9 882	14.7%	-6 675	-40%	-247	-2%	NA,T1,T2	CS,D,NA,PS
Sweden	1 832	312	310	0.5%	-1 522	-83%	-2	0%	T2	CS
EU	**127 273**	**69 752**	**67 031**	**100%**	**-60 242**	**-47%**	**-2 721**	**-4%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

1.A.2.f Non-metallic Minerals - Liquid Fuels (CO_2)

CO_2 emissions from the use of liquid fuels in category 1.A.2.f amounted 18 021 kt in 2024 for EU. CO_2 emissions decreased compared to 1990 by 61 % and compared to 2023 decreased by 8 %. Category has 5.1% share on total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 60 % compared to 1990. One of the reasons for the decline is increase in the use of waste as a fuel.

Detailed data related to the EU submissions are depicted in Table 3.46.

Table 3.46: 1.A.2.f Non-metallic Minerals , liquid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	508	190	179	1.0%	-329	-65%	-11	-6%	T2	CS
Belgium	1 509	207	203	1.1%	-1 305	-87%	-4	-2%	T1,T3	D,PS
Bulgaria	666	288	155	0.9%	-511	-77%	-132	-46%	T1	D
Croatia	745	494	354	2.0%	-391	-52%	-140	-28%	T1	D
Cyprus	148	133	144	0.8%	-4	-3%	11	8%	CS	CS
Czechia	1 029	40	40	0.2%	-990	-96%	0	0%	T1	CS,D
Denmark	535	451	403	2.2%	-132	-25%	-48	-11%	T2,T3	CS,PS
Estonia	448	11	21	0.1%	-427	-95%	10	88%	T1,T2	CS,D
Finland	437	205	254	1.4%	-182	-42%	50	24%	T3	CS
France	6 508	2 502	1 936	10.7%	-4 571	-70%	-566	-23%	T1,T2,T3	CS,D,OTH,PS
Germany	2 663	828	522	2.9%	-2 141	-80%	-306	-37%	CS	CS
Greece	2 914	1 958	1 843	10.2%	-1 071	-37%	-115	-6%	T2	PS
Hungary	463	98	82	0.5%	-381	-82%	-16	-16%	T1,T2	CS,D
Ireland	312	562	432	2.4%	120	38%	-130	-23%	T1,T2	CS,D
Italy	11 359	3 477	3 625	20.1%	-7 734	-68%	148	4%	T2	CS
Latvia	267	7	4	0.0%	-263	-99%	-3	-44%	T2	CS
Lithuania	2 750	19	16	0.1%	-2 735	-99%	-3	-16%	T2	CS
Luxembourg	23	2	2	0.0%	-21	-91%	0	8%	T2	CS
Malta	NO	10	11	0.1%	11	∞	1	9%	T1	D
Netherlands	468	3	2	0.0%	-466	-100%	-1	-32%	T2	CS
Poland	394	446	322	1.8%	-73	-18%	-124	-28%	T1,T2	CS,D
Portugal	1 319	1 104	1 137	6.3%	-183	-14%	33	3%	T1,T3	D,PS
Romania	NO	1 040	1 062	5.9%	1 062	∞	23	2%	T1,T2	CS,D
Slovakia	1 219	233	242	1.3%	-978	-80%	9	4%	T2	CS
Slovenia	64	127	124	0.7%	60	95%	-4	-3%	T1,T2	CS,D
Spain	8 805	4 823	4 665	25.9%	-4 140	-47%	-158	-3%	T1,T2	CS,D
Sweden	625	244	241	1.3%	-384	-61%	-2	-1%	T2	CS
EU	**46 178**	**19 500**	**18 021**	**100%**	**-28 157**	**-61%**	**-1 479**	**-8%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure.3.73 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure.3.73: 1.A.2.f Non-metallic Minerals, liquid fuels: Emission trend and share for CO_2

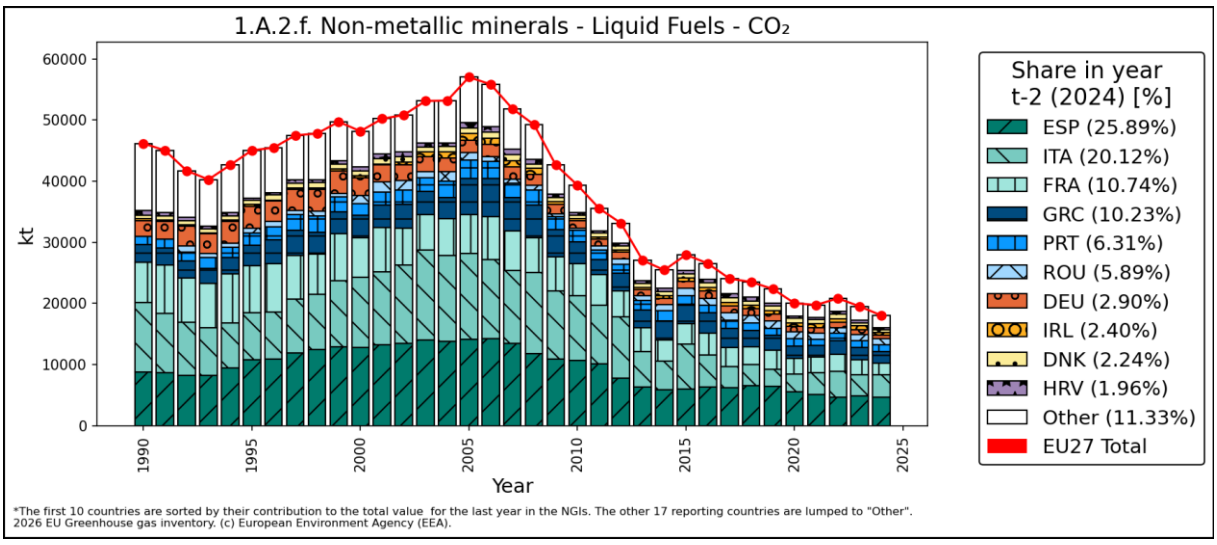
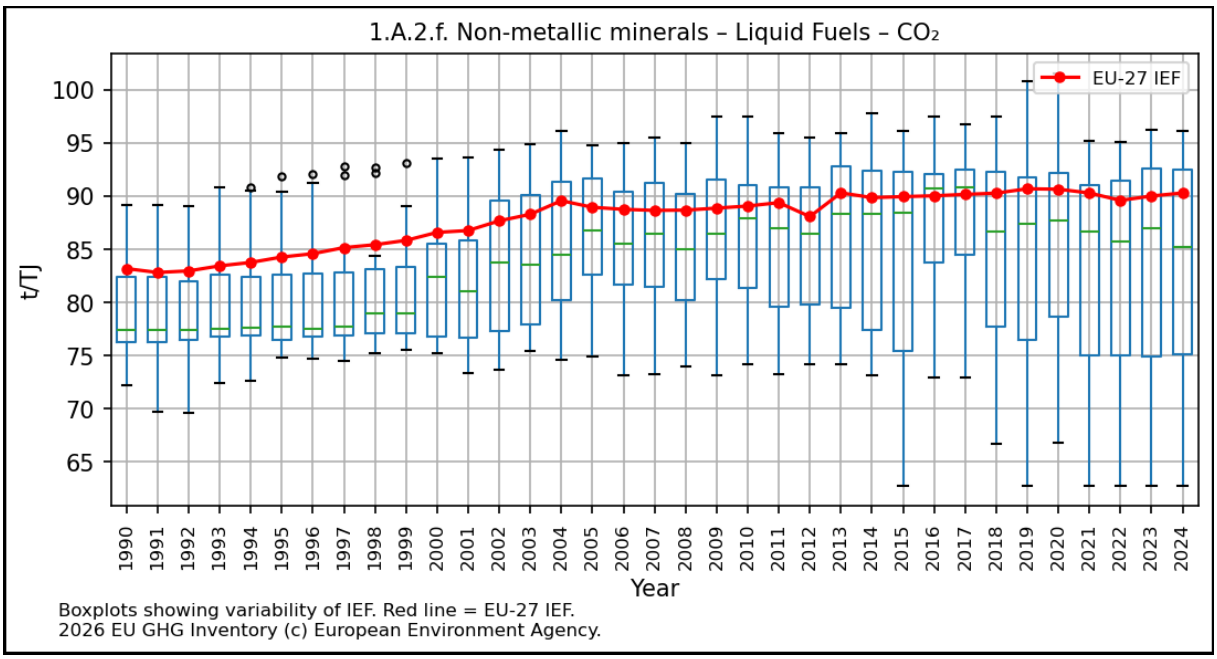


Figure.3.74 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. CO_2 IEF equalled to 90.28 t/TJ in 2024.

Figure.3.74: 1.A.2.f Non-metallic Minerals, liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.f Non-metallic Minerals - Solid Fuels (CO_2)

CO_2 emissions from the use of solid fuels in category 1.A.2.f amounted 8 773 kt in 2024 for EU. CO_2 emissions decreased compared to year 1990 by 83 % and compared to 2023 decreased by 11 %. This category represents 2.5 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 83 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.47.

Table 3.47: 1.A.2.f Non-metallic Minerals, solid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	535	128	79	0.9%	-456	-85%	-49	-39%	T2	CS
Belgium	2 466	896	793	9.0%	-1 673	-68%	-103	-11%	T1,T3	D,PS
Bulgaria	295	107	124	1.4%	-171	-58%	17	16%	T1,T2	CS,D
Croatia	535	253	253	2.9%	-281	-53%	1	0%	T1	D
Cyprus	232	101	52	0.6%	-180	-78%	-49	-48%	CS	CS
Czechia	2 209	525	453	5.2%	-1 756	-80%	-73	-14%	T2	CS,D
Denmark	574	254	131	1.5%	-444	-77%	-123	-48%	T2,T3	CS,PS
Estonia	595	10	NO	-	-595	-100%	-10	-100%	NA	NA
Finland	806	116	43	0.5%	-763	-95%	-73	-63%	T3	CS
France	4 769	768	659	7.5%	-4 110	-86%	-109	-14%	T1,T2,T3	CS,D,OTH,PS
Germany	12 053	3 495	3 199	36.5%	-8 854	-73%	-296	-8%	CS	CS
Greece	3 364	133	106	1.2%	-3 258	-97%	-27	-20%	T2	PS
Hungary	350	31	34	0.4%	-316	-90%	3	8%	T1,T2	D,PS
Ireland	375	179	150	1.7%	-224	-60%	-29	-16%	T2	CS
Italy	3 690	198	212	2.4%	-3 478	-94%	14	7%	T2	CS
Latvia	16	32	22	0.3%	6	38%	-9	-30%	T2	CS
Lithuania	60	281	255	2.9%	195	328%	-26	-9%	T2	CS
Luxembourg	312	78	59	0.7%	-254	-81%	-19	-25%	T1	D
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	346	82	88	1.0%	-258	-75%	6	8%	T2	CS
Poland	8 576	1 221	1 249	14.2%	-7 327	-85%	28	2%	T1,T2	CS,D
Portugal	1 958	NO	NO	-	-1 958	-100%	-	-	NA	NA
Romania	285	339	356	4.1%	71	25%	17	5%	T2	CS
Slovakia	1 474	315	283	3.2%	-1 191	-81%	-32	-10%	T2	CS
Slovenia	113	43	43	0.5%	-70	-62%	-1	-1%	T1,T3	D,PS
Spain	5 221	230	129	1.5%	-5 092	-98%	-100	-44%	T1,T2	CS,D
Sweden	1 142	C	C	-	-	-	-	-	T2	CS
EU	**51 210**	**9 814**	**8 773**	**100%**	**-42 437**	**-83%**	**-1 041**	**-11%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions. EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.75 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.75: 1.A.2.f Non-metallic Minerals, solid fuels: Emission trend and share for CO_2

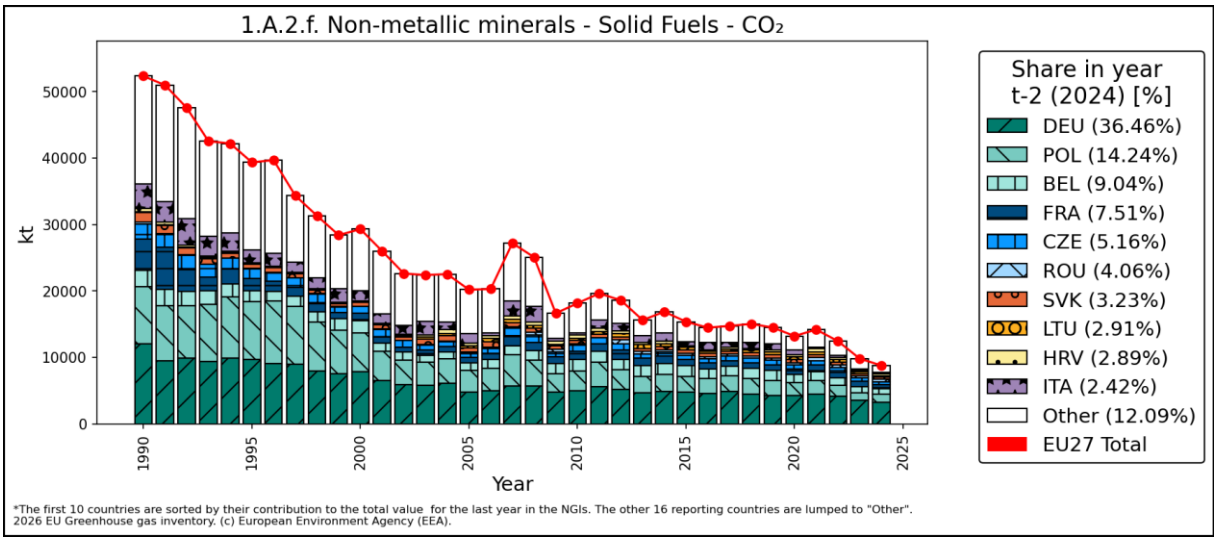
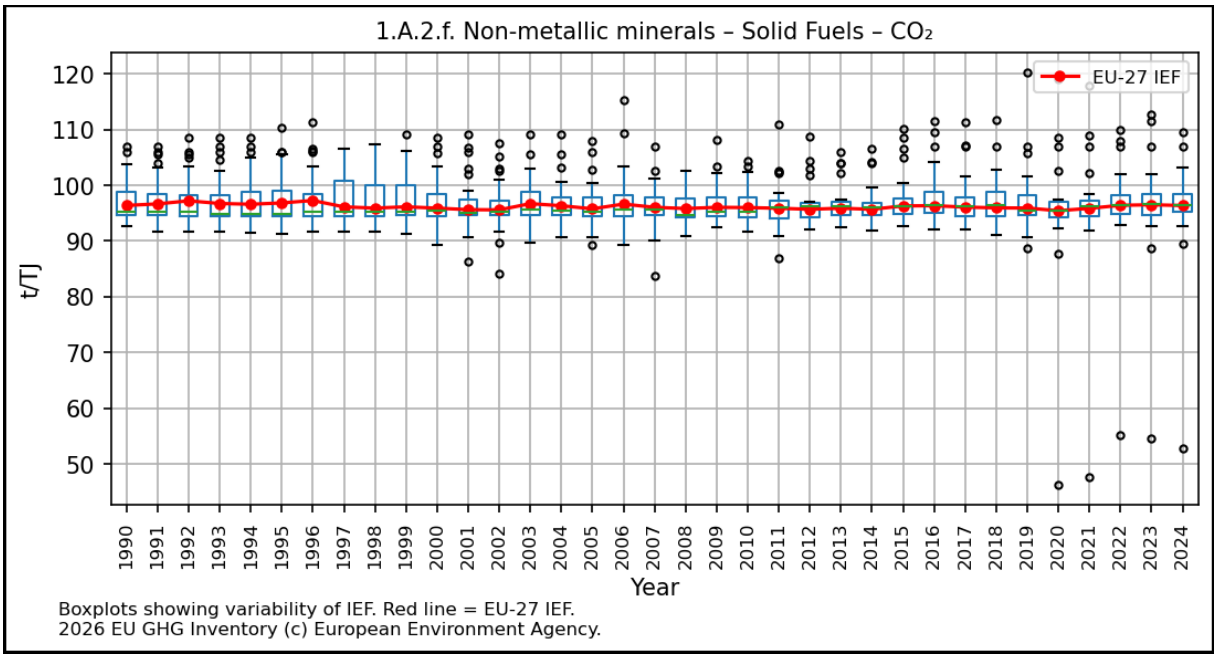


Figure 3.76 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. The IEF slightly fluctuates within the whole time series. CO_2 IEF equalled to 96.36 t/TJ in 2024.

Figure 3.76: 1.A.2.f Non-metallic Minerals, solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.f Non-metallic Minerals - Gaseous Fuels (CO_2)

CO_2 emissions from the use of gaseous fuels in category 1.A.2.f amounted 27 312 kt in 2024 for EU. CO_2 emissions increased compared to year 1990 by 0.13 % and compared to 2023 decreased by 0.35 %. This category represents 7.8 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption increased by 1.5 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.48.

Table 3.48: 1.A.2.f Non-metallic Minerals, gaseous fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	559	506	524	1.9%	-35	-6%	18	4%	T2	CS
Belgium	1 364	1 145	1 085	4.0%	-279	-20%	-61	-5%	T3	CS,PS
Bulgaria	1 684	546	609	2.2%	-1 075	-64%	63	12%	T2	CS
Croatia	645	321	318	1.2%	-326	-51%	-2	-1%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	1 289	1 073	1 082	4.0%	-207	-16%	9	1%	T2	CS
Denmark	237	128	141	0.5%	-97	-41%	13	10%	T3	CS
Estonia	NO	23	24	0.1%	24	∞	1	2%	T2	CS
Finland	126	48	50	0.2%	-76	-60%	2	3%	T3	CS
France	3 446	3 491	3 553	13.0%	107	3%	62	2%	T1,T2,T3	CS,D,OTH,PS
Germany	3 265	3 632	3 543	13.0%	278	9%	-89	-2%	CS	CS
Greece	NO	156	137	0.5%	137	∞	-19	-12%	T2	CS
Hungary	1 658	266	268	1.0%	-1 390	-84%	3	1%	T2	CS
Ireland	132	52	56	0.2%	-77	-58%	4	8%	T2	CS
Italy	5 996	6 170	6 026	22.1%	30	0%	-145	-2%	T2	CS
Latvia	316	57	61	0.2%	-255	-81%	3	6%	T2	CS
Lithuania	382	27	27	0.1%	-355	-93%	0	-1%	T2	CS
Luxembourg	201	11	69	0.3%	-132	-66%	58	535%	T2	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	1 484	926	821	3.0%	-662	-45%	-104	-11%	T2	CS
Poland	1 359	2 287	2 388	8.7%	1 029	76%	101	4%	T2	CS
Portugal	0	1 006	1 079	3.9%	1 079	8752048%	72	7%	T2,T3	D,PS
Romania	NO	435	485	1.8%	485	∞	51	12%	T2	CS
Slovakia	542	297	331	1.2%	-211	-39%	35	12%	T2	CS
Slovenia	116	143	130	0.5%	14	12%	-13	-9%	T2	CS
Spain	2 411	4 402	4 437	16.2%	2 026	84%	35	1%	T2	CS
Sweden	65	68	69	0.3%	4	6%	1	1%	T2	CS
EU	**27 278**	**27 216**	**27 312**	**100%**	**34**	**0%**	**96**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.

Figure 3.77 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.77: 1.A.2.f Non-metallic Minerals, gaseous fuels: Emission trend and share for CO_2

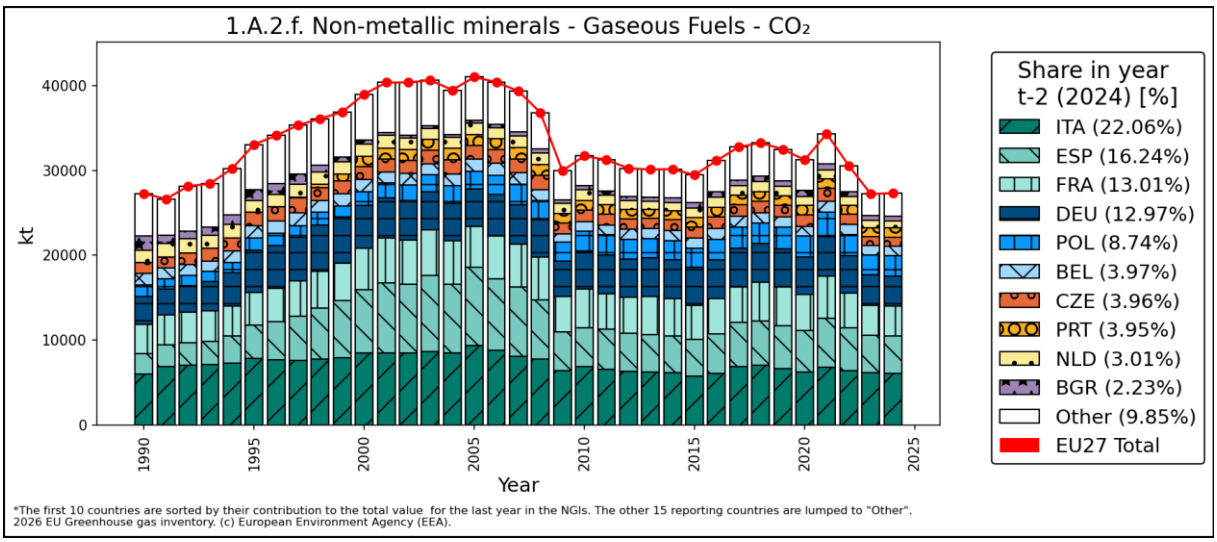
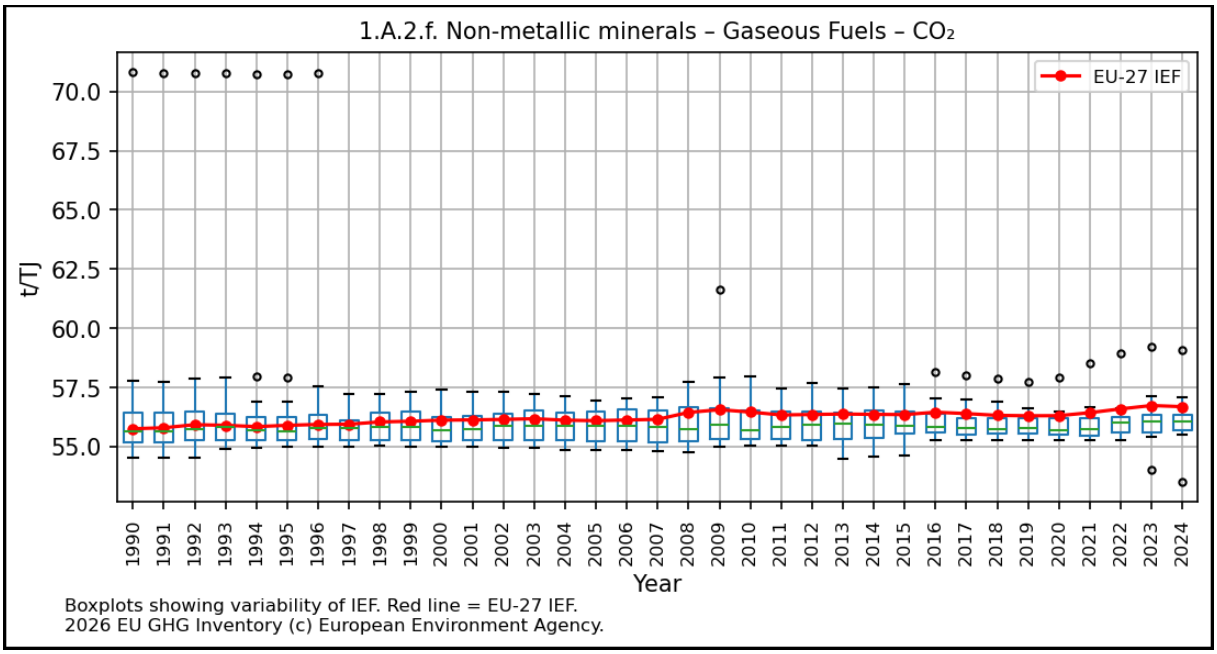


Figure 3.78 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. CO_2 IEF is stable during whole time period with slightly increasing trend. CO_2 IEF equalled to 56.68 t/TJ in 2024.

Figure 3.78: 1.A.2.f Non-metallic Minerals, gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.f Non-metallic Minerals – Other Fossil Fuels (CO_2)

CO_2 emissions from the use of other fossil fuels in category 1.A.2.f amounted 12 921 kt in 2024 for EU. CO_2 emissions increased compared to year 1990 by 799 % and decreased by 2% compared to 2023. This category represents 3.7 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption increased by 769 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.49.

Table 3.49: 1.A.2.f Non-metallic Minerals, other fossil fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	67	554	538	4.2%	471	700%	-16	-3%	T2	CS
Belgium	186	422	422	3.3%	236	127%	0	0%	T1,T3	D,PS
Bulgaria	NO	NO	NO	-	-	-	-	-	NA	NA
Croatia	NO	289	290	2.2%	290	∞	2	1%	T1	D
Cyprus	NO	170	194	1.5%	194	∞	24	14%	CS	CS
Czechia	NO	552	481	3.7%	481	∞	-70	-13%	T2	CS
Denmark	NO	135	115	0.9%	115	∞	-20	-15%	T3	PS
Estonia	NO	7	7	0.1%	7	∞	0	-6%	T3	PS
Finland	NO	51	40	0.3%	40	∞	-11	-21%	T3	CS
France	340	1 076	1 010	7.8%	670	197%	-66	-6%	T1,T2,T3	CS,D,OTH,PS
Germany	526	2 627	2 317	17.9%	1 792	341%	-310	-12%	CS	CS
Greece	NO	222	251	1.9%	251	∞	29	13%	T2	PS
Hungary	NO	209	167	1.3%	167	∞	-42	-20%	T3	PS
Ireland	NO	274	267	2.1%	267	∞	-7	-3%	T3	PS
Italy	NO	459	525	4.1%	525	∞	66	14%	T2	CS
Latvia	NO	159	132	1.0%	132	∞	-27	-17%	T2	PS
Lithuania	NO	46	85	0.7%	85	∞	39	85%	T2,T3	OTH,PS
Luxembourg	NO	69	41	0.3%	41	∞	-28	-41%	T1,T3	D,PS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	NO	NO	NO	-	-	-	-	-	NA	NA
Poland	10	3 905	4 047	31.3%	4 038	41522%	142	4%	T1	D
Portugal	12	242	257	2.0%	245	2004%	15	6%	T1,T3	D,PS
Romania	NO	715	714	5.5%	714	∞	-1	0%	T2	CS
Slovakia	173	258	272	2.1%	99	58%	14	5%	T2	CS
Slovenia	5	96	97	0.8%	92	1971%	1	1%	T1,T3	D,PS
Spain	120	675	650	5.0%	531	444%	-24	-4%	T2	CS,PS
Sweden	NO	C	C	-	-	-	-	-	T2	CS
EU	**1 438**	**13 211**	**12 921**	**100%**	**11 483**	**799%**	**-290**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions. EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.

Figure 3.79 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.79: 1.A.2.f Non-metallic Minerals, other fossil fuels: Emission trend and share for CO_2

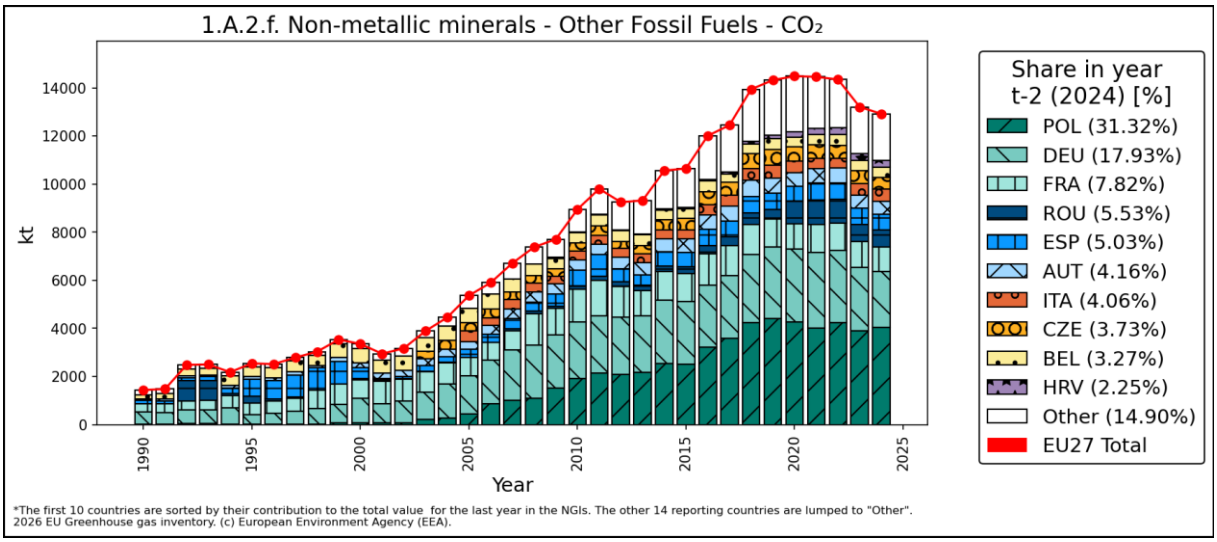
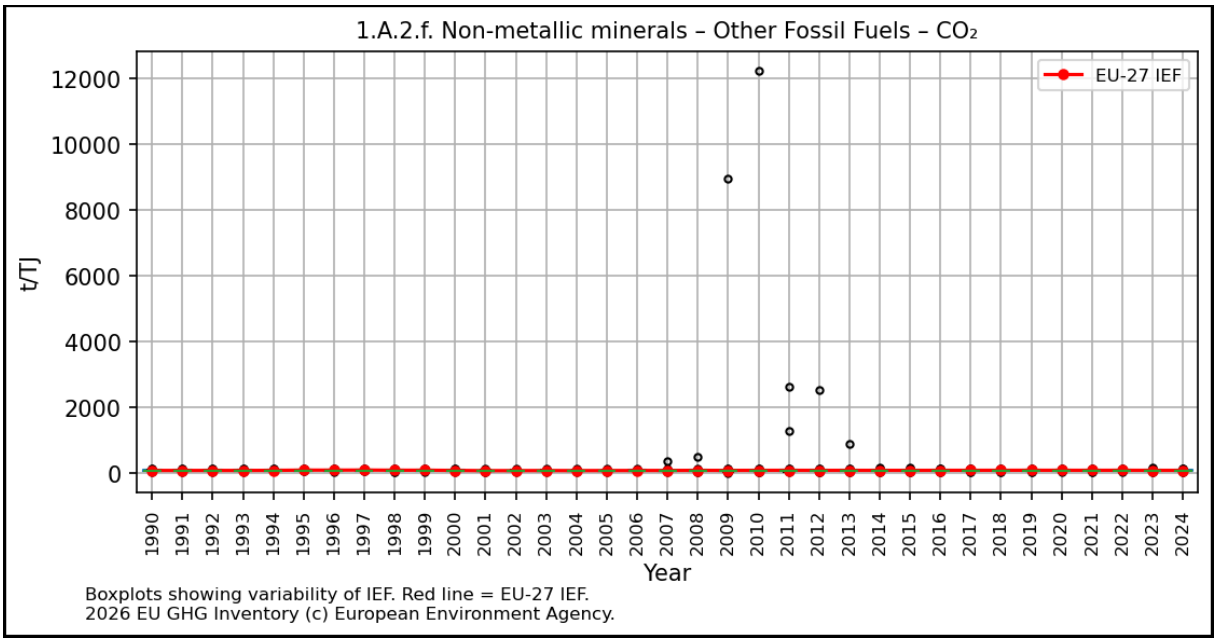


Figure 3.80 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. The CO_2 IEF for year 2024 equalled to 85.83 t/TJ.

Figure 3.80: 1.A.2.f Non-metallic Minerals, other fossil fuels: Implied Emission Factors for CO_2 (in t/TJ)



3.6.2.7 Other (1.A.2.g)

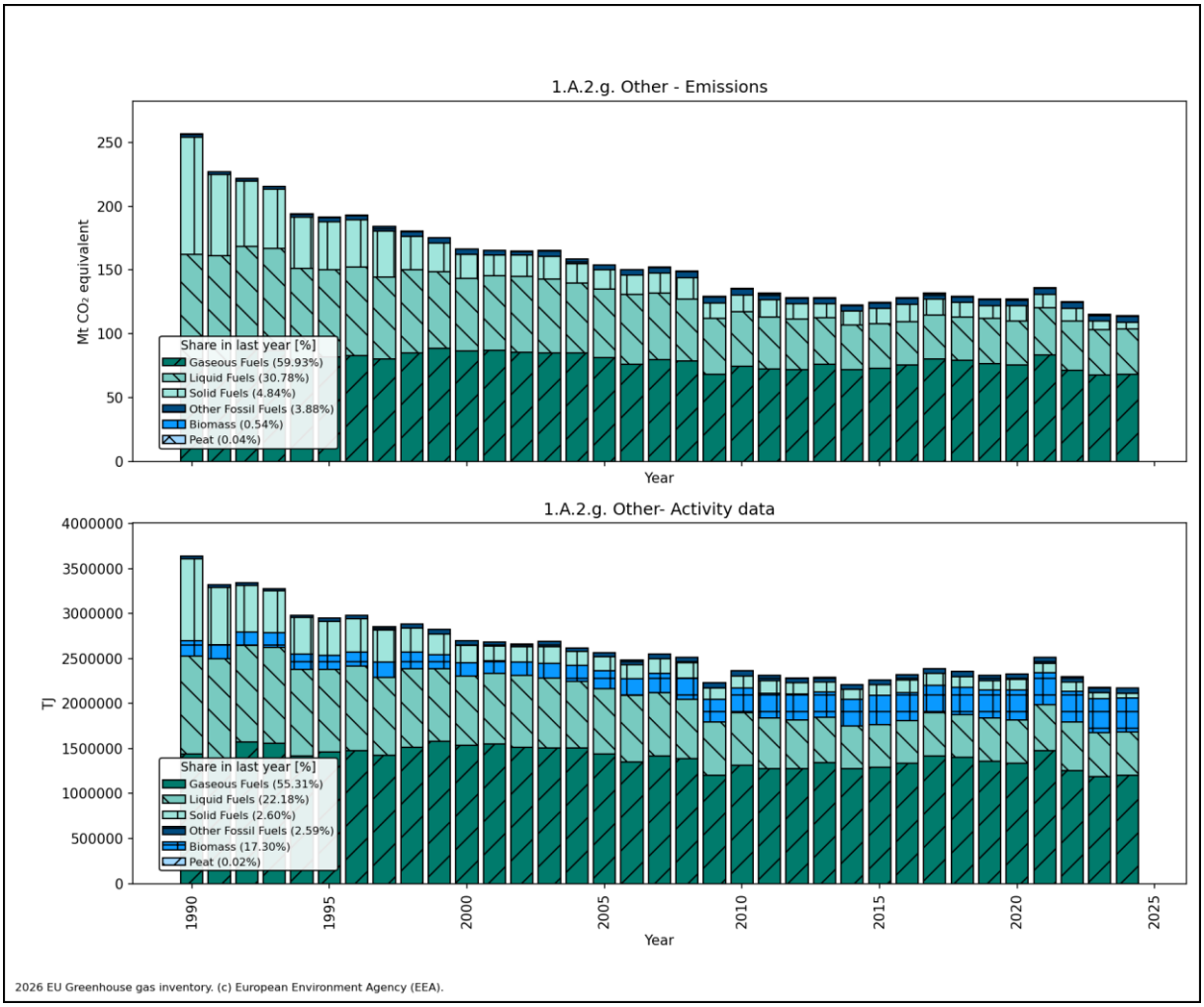
This chapter provides information about European emission trend, Member States contribution to the overall emission trend, activity data and emission factors used for emission estimates by countries for category 1.A.2.g Other.

Emissions for category 1.A.2.g other (manufacturing industries and construction) include emissions from stationary combustion but also may include emissions from mobile sources (e.g. construction machinery). Some countries use this category to report emissions which cannot be allocated to the categories 1.A.2.a to 1.A.2.f due to lack of detailed data, e.g. IEA data provides fuel consumption of Industrial Auto-producers (Electricity, CHP, Heat) for total industry only. This category is dominated by Germany; Germany reports all emissions from power and heat production in industry under this category. Greece reports emissions of 1.A.2.g together with category 1A2f. Ireland presumably includes it in the transport sector (1A3). Cyprus, Czechia, Estonia, France, Malta and Slovakia report data from 1.A.2.g.vii together with agricultural mobile sources under the category 1.A.4.c.ii while Italy and Poland report data under residential or commercial under categories 1.A.4 or 1.A.5.

Total CO_2 emissions from 1.A.2.g amounted to 112 243 kt CO_2 eq. in 2024. The trend of total CO_2 emissions for 1990 to 2024 from category 1.A.2.g is depicted in Figure 3.81. Total CO_2 emissions decreased by 56 % since 1990 and by 1 % between 2023 and 2024. CO_2 emissions from 1.A.2.g Other accounted for 32.6 % of 1.A.2. source category.

Figure 3.81 shows the emission trend within the category 1.A.2.g which is mainly dominated by CO_2 emissions from gaseous, liquid and solid fuels; the decrease in the early 1990s was mainly due to a decline of solid fuel consumption.

Figure 3.81: 1.A.2.g Other: Activity data and total emission trends



Detailed data related to the EU submissions are depicted in Table 3.50.

Table 3.50: 1.A.2.g Other: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	1 974	2 859	2 778	2.5%	804	41%	-81	-3%	-	-
Belgium	2 883	1 713	1 762	1.6%	-1 121	-39%	49	3%	CS,M,NA,T1,T3	CS,D,NA,PS
Bulgaria	10 579	1 058	1 182	1.1%	-9 397	-89%	124	12%	NA	NA
Croatia	329	451	508	0.5%	179	54%	57	13%	-	-
Cyprus	38	88	94	0.1%	56	146%	5	6%	NA,T1	D,NA
Czechia	19 064	1 962	1 905	1.7%	-17 159	-90%	-57	-3%	NA	NA
Denmark	1 855	929	927	0.8%	-928	-50%	-2	0%	NA,T2,T3	CR,CS,D,NA
Estonia	1 163	86	93	0.1%	-1 070	-92%	7	8%	NA	NA
Finland	1 639	1 649	1 640	1.5%	1	0%	-10	-1%	NA,T3	CS,NA
France	11 558	8 175	8 322	7.4%	-3 235	-28%	147	2%	T2	CS,D,OTH,PS
Germany	125 780	57 579	57 857	51.5%	-67 923	-54%	278	0%	CS	CS,M
Greece	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
Hungary	3 924	1 679	1 691	1.5%	-2 233	-57%	12	1%	NA	NA
Ireland	799	594	609	0.5%	-190	-24%	15	3%	NA	NA
Italy	15 310	14 064	12 115	10.8%	-3 195	-21%	-1 949	-14%	T2	CS
Latvia	1 620	210	228	0.2%	-1 391	-86%	18	9%	-	-
Lithuania	1 567	198	201	0.2%	-1 366	-87%	3	2%	NA,T2	CS,NA
Luxembourg	96	328	354	0.3%	258	268%	26	8%	NA	NA
Malta	53	15	15	0.0%	-38	-72%	0	2%	NA,NO,T1	D,NA,NO
Netherlands	3 773	2 561	2 300	2.0%	-1 473	-39%	-261	-10%	NA,T2	CS,NA
Poland	6 979	2 870	2 701	2.4%	-4 277	-61%	-168	-6%	NA,T1,T2	CS,D,NA
Portugal	2 195	1 208	1 200	1.1%	-995	-45%	-8	-1%	NA	NA
Romania	26 456	5 295	5 632	5.0%	-20 824	-79%	337	6%	NA,T1,T2,T3	CS,D,NA,PS
Slovakia	2 560	959	913	0.8%	-1 647	-64%	-46	-5%	NA,T2	CS,NA
Slovenia	1 094	437	418	0.4%	-677	-62%	-20	-4%	NA,T1,T2	CS,D,NA
Spain	7 728	4 811	4 460	4.0%	-3 267	-42%	-351	-7%	CR,NA,T1,T2,T3	R,CS,D,NA,PS
Sweden	3 197	1 161	2 338	2.1%	-858	-27%	1 178	101%	T2	CS
EU	**254 212**	**112 939**	**112 243**	**100%**	**-141 969**	**-56%**	**-697**	**-1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'. Presented methods and emission factor information refer to the last inventory year.
Greece includes emissions of 1.A.2.g in category 1.A.2.f

1.A.2.g Other – Liquid Fuels (CO_2)

CO_2 emissions from the use of liquid fuels in category 1.A.2.g amounted 34 350 kt in 2024 for EU. CO_2 emissions decreased compared to the year 1990 by 58 % and decreased by 2 % compared to 2023. This category represents 9.8 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 56 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table.3.51.

Table.3.51: 1.A.2.g Other, liquid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	866	1 514	1 511	4.4%	645	74%	-4	0%
Belgium	1 646	920	982	2.9%	-664	-40%	63	7%
Bulgaria	8 632	387	431	1.3%	-8 201	-95%	44	12%
Croatia	329	451	508	1.5%	179	54%	57	13%
Cyprus	38	88	94	0.3%	56	146%	5	6%
Czechia	2 935	156	207	0.6%	-2 727	-93%	51	33%
Denmark	1 242	793	762	2.2%	-479	-39%	-31	-4%
Estonia	683	59	61	0.2%	-622	-91%	2	3%
Finland	1 480	1 230	1 219	3.5%	-261	-18%	-11	-1%
France	6 322	5 141	5 242	15.3%	-1 080	-17%	100	2%
Germany	28 162	9 832	9 584	27.9%	-18 579	-66%	-248	-3%
Greece	IE	IE	IE	-	-	-	-	-
Hungary	1 160	724	748	2.2%	-411	-35%	25	3%
Ireland	626	390	389	1.1%	-238	-38%	-2	0%
Italy	5 707	5 256	3 598	10.5%	-2 109	-37%	-1 658	-32%
Latvia	1 066	155	166	0.5%	-900	-84%	11	7%
Lithuania	812	77	83	0.2%	-728	-90%	6	8%
Luxembourg	52	288	295	0.9%	242	463%	7	3%
Malta	53	15	15	0.0%	-38	-72%	0	2%
Netherlands	2 022	1 620	1 448	4.2%	-574	-28%	-172	-11%
Poland	1 028	839	741	2.2%	-287	-28%	-97	-12%
Portugal	2 145	507	485	1.4%	-1 660	-77%	-22	-4%
Romania	4 826	1 502	1 563	4.6%	-3 263	-68%	62	4%
Slovakia	66	19	14	0.0%	-52	-78%	-5	-26%
Slovenia	586	163	146	0.4%	-440	-75%	-17	-11%
Spain	5 685	1 739	1 760	5.1%	-3 926	-69%	20	1%
Sweden	2 985	1 111	2 297	6.7%	-688	-23%	1 186	107%
EU	**81 155**	**34 976**	**34 350**	**100%**	**-46 805**	**-58%**	**-626**	**-2%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Greece includes emissions of 1.A.2.g in category 1.A.2.f
The information on methodologies and emission factors is not available from the JSON on fuels level. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.82 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.82: 1.A.2.g Other, liquid fuels: Emission trend and share for CO_2

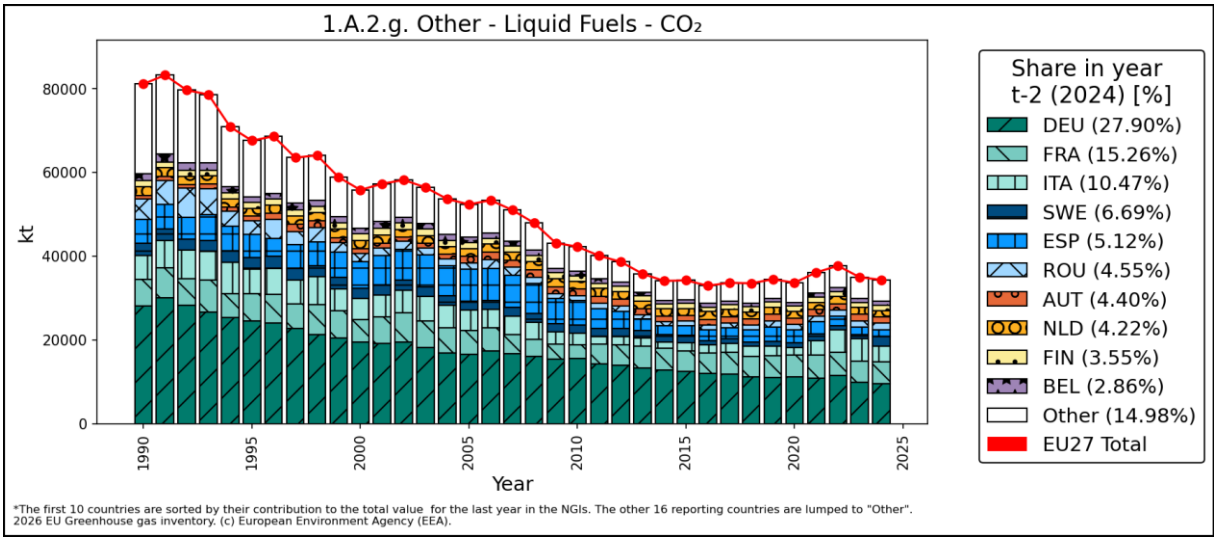
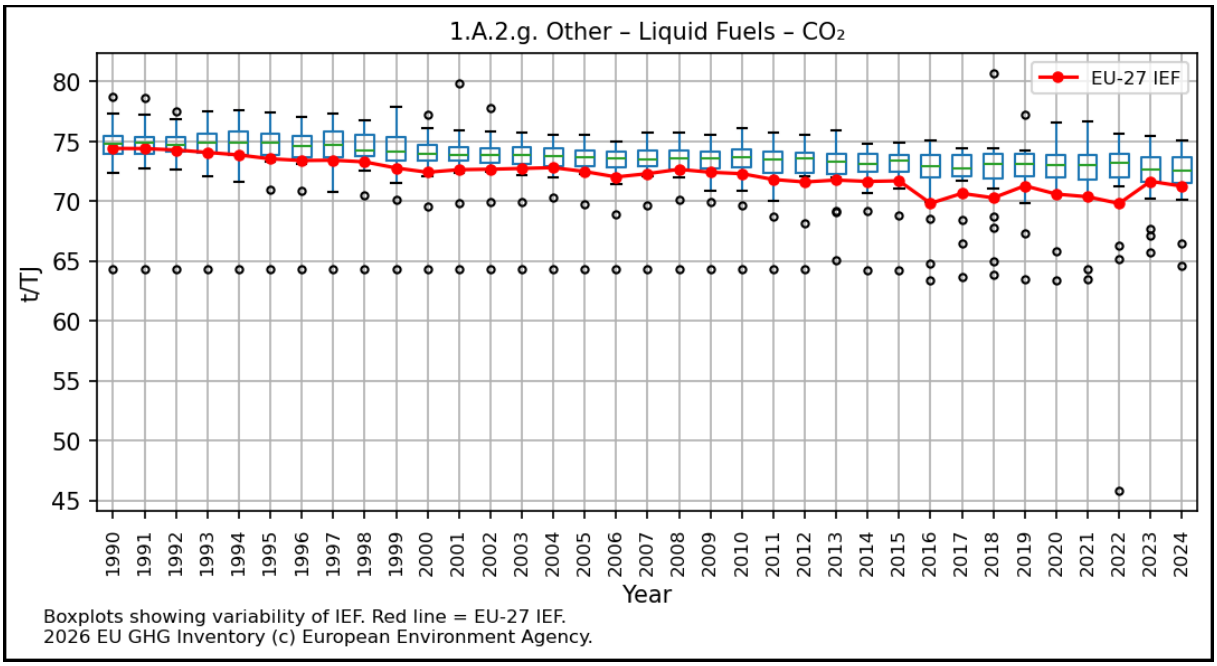


Figure 3.83 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. The CO_2 IEF shows a decreasing trend with minor fluctuations since 2015. This trend is driven mainly by Germany and is caused by changes in fuel mix. CO_2 IEF equaled to 71.26 t/TJ in 2024.

Figure 3.83: 1.A.2.g Other, liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.g Other – Solid Fuels (CO_2)

CO_2 emissions from the use of solid fuels in category 1.A.2.g amounted 5 464 kt in 2024 for EU. CO_2 emissions decreased compared to the year 1990 by 94 % and compared to 2023 decreased by 17 %. This category represents 1.6 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 94 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.52.

Table 3.52: 1.A.2.g Other, solid fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	91	1	6	0.1%	-85	-94%	5	699%
Belgium	33	17	13	0.2%	-20	-61%	-4	-25%
Bulgaria	1 858	65	70	1.3%	-1 788	-96%	5	8%
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	13 750	101	77	1.4%	-13 674	-99%	-24	-24%
Denmark	323	1	NO	-	-323	-100%	-1	-100%
Estonia	194	NO	NO	-	-194	-100%	-	-
Finland	8	NO	NO	-	-8	-100%	-	-
France	808	39	38	0.7%	-770	-95%	-1	-3%
Germany	57 580	5 221	4 437	81.2%	-53 144	-92%	-784	-15%
Greece	IE	IE	IE	-	-	-	-	-
Hungary	406	24	23	0.4%	-384	-94%	-1	-4%
Ireland	14	NO	NO	-	-14	-100%	-	-
Italy	396	181	NO	-	-396	-100%	-181	-100%
Latvia	27	2	2	0.0%	-25	-94%	0	-15%
Lithuania	79	2	1	0.0%	-78	-99%	-1	-39%
Luxembourg	20	7	7	0.1%	-13	-64%	0	-2%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	42	NO	NO	-	-42	-100%	-	-
Poland	5 082	543	475	8.7%	-4 607	-91%	-68	-13%
Portugal	49	8	11	0.2%	-39	-78%	3	32%
Romania	8 006	2	2	0.0%	-8 004	-100%	0	0%
Slovakia	1 422	334	303	5.6%	-1 119	-79%	-31	-9%
Slovenia	89	NO	NO	-	-89	-100%	-	-
Spain	226	NO	NO	-	-226	-100%	-	-
Sweden	98	-	-	-	-98	-100%	-	-
EU	**90 603**	**6 547**	**5 464**	**100%**	**-85 138**	**-94%**	**-1 083**	**-17%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Greece includes emissions of 1.A.2.g in category 1.A.2.f
The information on methodologies and emission factors is not available from the JSON on fuels level. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure.3.84 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure.3.84: 1.A.2.g Other, solid fuels: Emission trend and share for CO_2

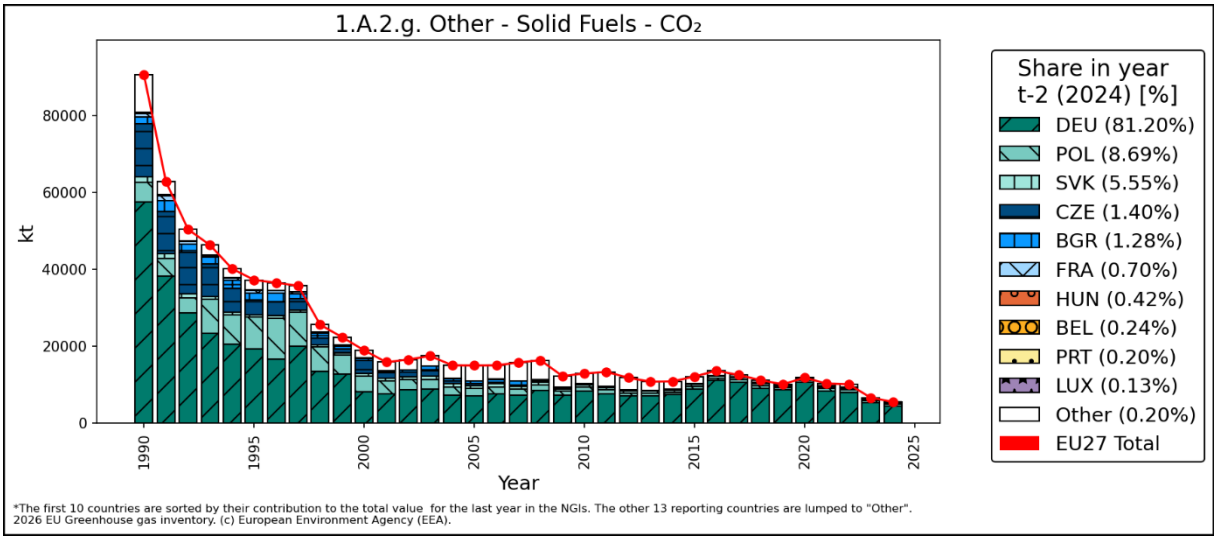
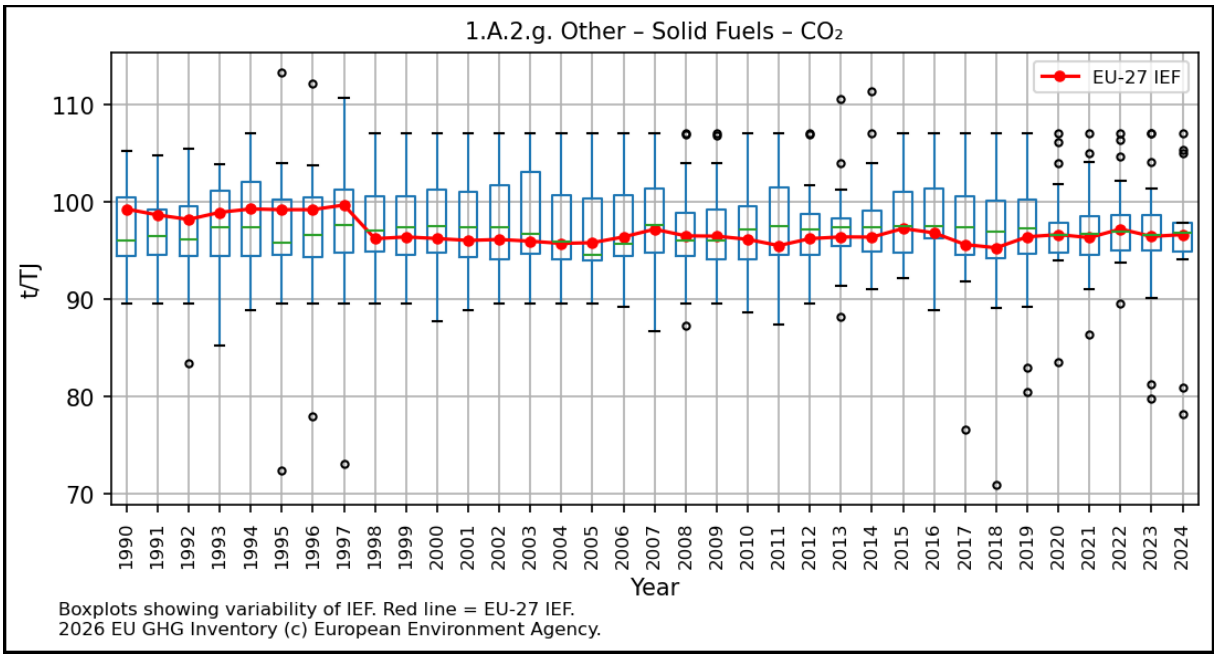


Figure 3.85 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024 which is slightly fluctuating throughout the entire time series. CO_2 IEF equaled to 96.63 t/TJ in 2024.

Figure 3.85: 1.A.2.g Other, solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.g Other – Gaseous Fuels (CO_2)

CO_2 emissions from the use of gaseous fuels in category 1.A.2.g amounted 68 009 kt in 2024 for EU. The is a decrease of 15 % between 1990 and 2024 CO_2 emissions and 1 % increase between 2023 and 2024. This category represents 19.3 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption decreased by 16 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.53.

Table 3.53: 1.A.2.g Other, gaseous fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	1 014	1 269	1 163	1.7%	149	15%	-106	-8%
Belgium	1 204	764	752	1.1%	-452	-38%	-12	-2%
Bulgaria	89	281	287	0.4%	199	223%	6	2%
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	2 379	1 706	1 621	2.4%	-757	-32%	-84	-5%
Denmark	289	129	123	0.2%	-167	-58%	-7	-5%
Estonia	286	27	32	0.0%	-254	-89%	5	20%
Finland	41	36	30	0.0%	-11	-28%	-6	-18%
France	4 416	2 969	3 024	4.4%	-1 393	-32%	54	2%
Germany	37 693	39 087	40 447	59.5%	2 754	7%	1 360	3%
Greece	IE	IE	IE	-	-	-	-	-
Hungary	2 358	932	919	1.4%	-1 438	-61%	-12	-1%
Ireland	158	203	220	0.3%	62	39%	17	8%
Italy	9 207	8 628	8 518	12.5%	-690	-7%	-110	-1%
Latvia	527	53	54	0.1%	-473	-90%	1	3%
Lithuania	677	118	117	0.2%	-560	-83%	-2	-1%
Luxembourg	24	11	22	0.0%	-2	-9%	11	96%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	1 710	938	848	1.2%	-862	-50%	-90	-10%
Poland	865	1 467	1 466	2.2%	601	69%	-1	0%
Portugal	IE,NO	693	704	1.0%	704	∞	11	2%
Romania	13 624	3 790	4 066	6.0%	-9 558	-70%	276	7%
Slovakia	1 071	606	595	0.9%	-476	-44%	-10	-2%
Slovenia	420	265	265	0.4%	-155	-37%	0	0%
Spain	1 816	3 072	2 701	4.0%	884	49%	-371	-12%
Sweden	113	41	37	0.1%	-76	-67%	-4	-9%
EU	**79 981**	**67 084**	**68 009**	**100%**	**-11 972**	**-15%**	**925**	**1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Greece includes emissions of 1.A.2.g in category 1.A.2.f
Abbreviations explained in the Chapter 'Units and abbreviations'.
The information on methodologies and emission factors is not available from the JSON on fuels level Only information from major emitters have been included to the table as well as voluntarily provided information by countries. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

Figure 3.86 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.86: 1.A.2.g Other, gaseous fuels: Emission trend and share for CO_2

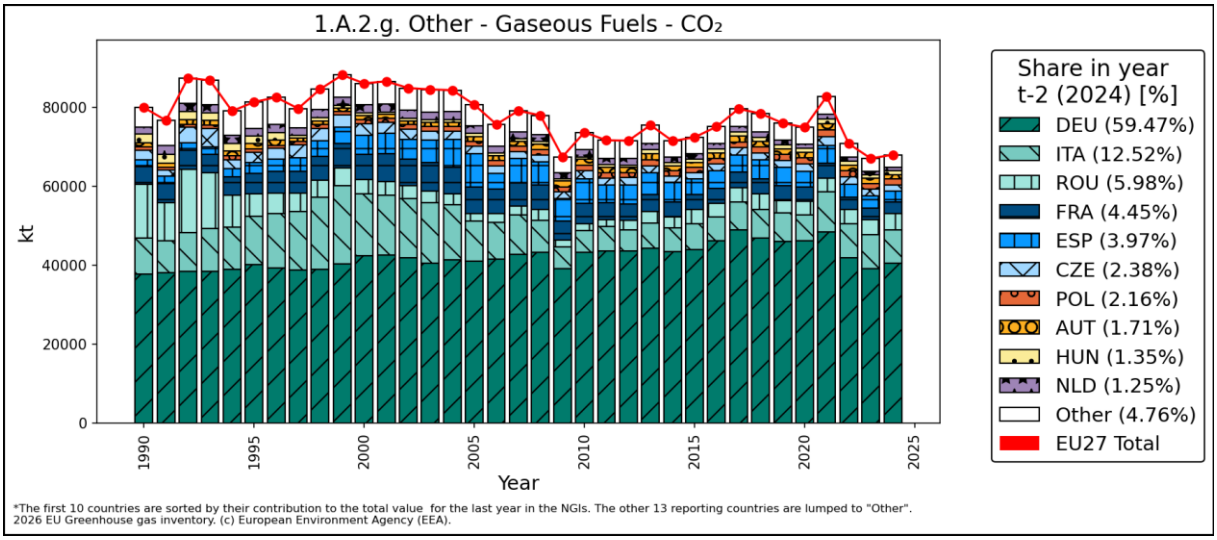
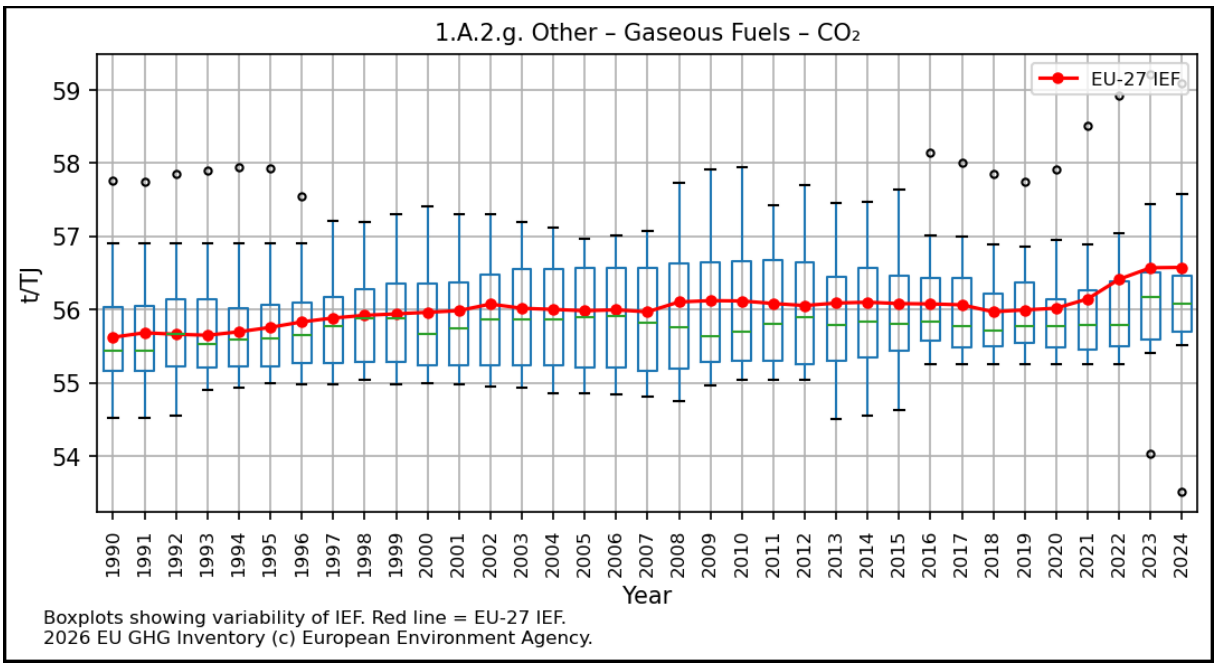


Figure 3.87 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2023. CO_2 IEF is relatively stable during reporting period. CO_2 IEF equaled to 56.57 t/TJ in 2024.

Figure 3.87: 1.A.2.g Other, gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.2.g Other – Other fossil fuels (CO_2)

CO_2 emissions from the use of other fossil fuels in category 1.A.2.g amounted 4 377 kt in 2024 for EU. CO_2 emissions increased compared to year 1990 by 79 % and compared to 2023 increased by 2 %. This category represents 1.2 % of total CO_2 equivalent emissions from category 1.A.2. Fuel consumption increased by 71 % compared to 1990.

Detailed data related to the EU submissions are depicted in Table 3.54.

Table 3.54: 1.A.2.g Other, other fossil fuels: Member States contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	3	75	99	2.3%	95	2761%	24	32%
Belgium	NO	12	15	0.3%	15	∞	3	23%
Bulgaria	NO	325	393	9.0%	393	∞	68	21%
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	0	0	0.0%	0	∞	0	0%
Czechia	NO	NO	NO	-	-	-	-	-
Denmark	1	7	42	1.0%	41	3985%	36	531%
Estonia	NO	NO	NO	-	-	-	-	-
Finland	88	344	355	8.1%	267	304%	11	3%
France	11	25	19	0.4%	8	70%	-6	-25%
Germany	2 344	3 440	3 390	77.5%	1 046	45%	-50	-1%
Greece	IE	IE	IE	-	-	-	-	-
Hungary	NO	NO	NO	-	-	-	-	-
Ireland	NO	NO	NO	-	-	-	-	-
Italy	NO	NO	NO	-	-	-	-	-
Latvia	NO	NO	NO	-	-	-	-	-
Lithuania	NO	NO	NO	-	-	-	-	-
Luxembourg	NO	22	31	0.7%	31	∞	8	37%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	NO	3	4	0.1%	4	∞	1	17%
Poland	3	21	19	0.4%	16	495%	-2	-9%
Portugal	IE,NA,NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-
Romania	NO	0	0	0.0%	0	∞	0	10%
Slovakia	NO	NO	NO	-	-	-	-	-
Slovenia	NO	9	6	0.1%	6	∞	-2	-27%
Spain	NO	NO	NO	-	-	-	-	-
Sweden	NO	9	3	0.1%	3	∞	-5	-60%
EU	**2 451**	**4 293**	**4 377**	**100%**	**1 925**	**79%**	**84**	**2%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.
The information on methodologies and emission factors are only partially available from the JSON on fuels level.

Figure 3.88 shows CO_2 emissions trend as well as the share of the countries with the highest contribution to the total CO_2 emissions.

Figure 3.88: 1.A.2.g Other, other fossil fuels: Emission trend and share for CO_2

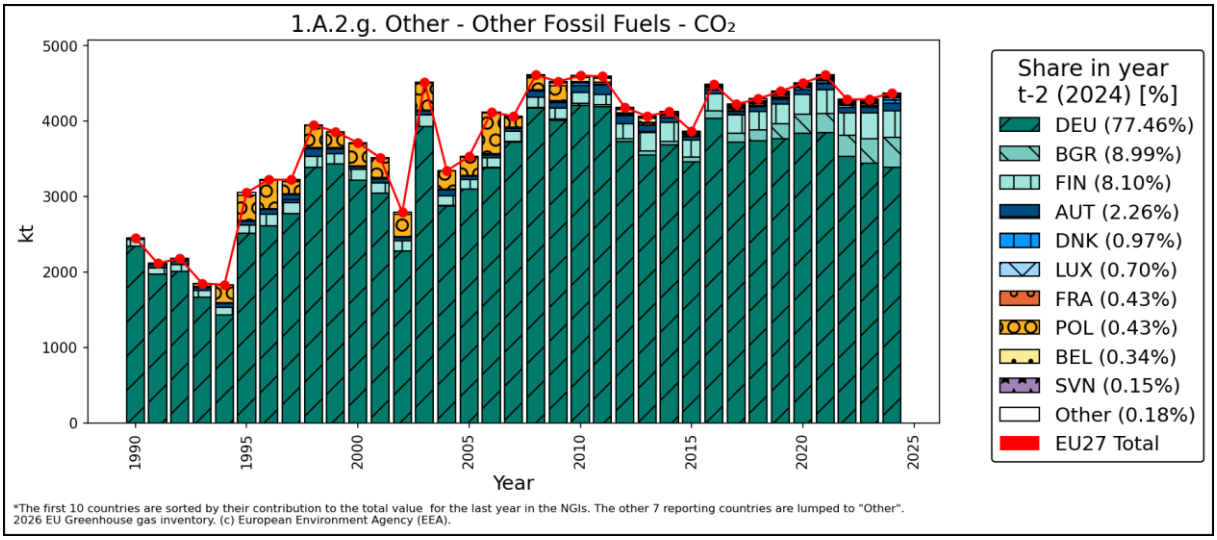
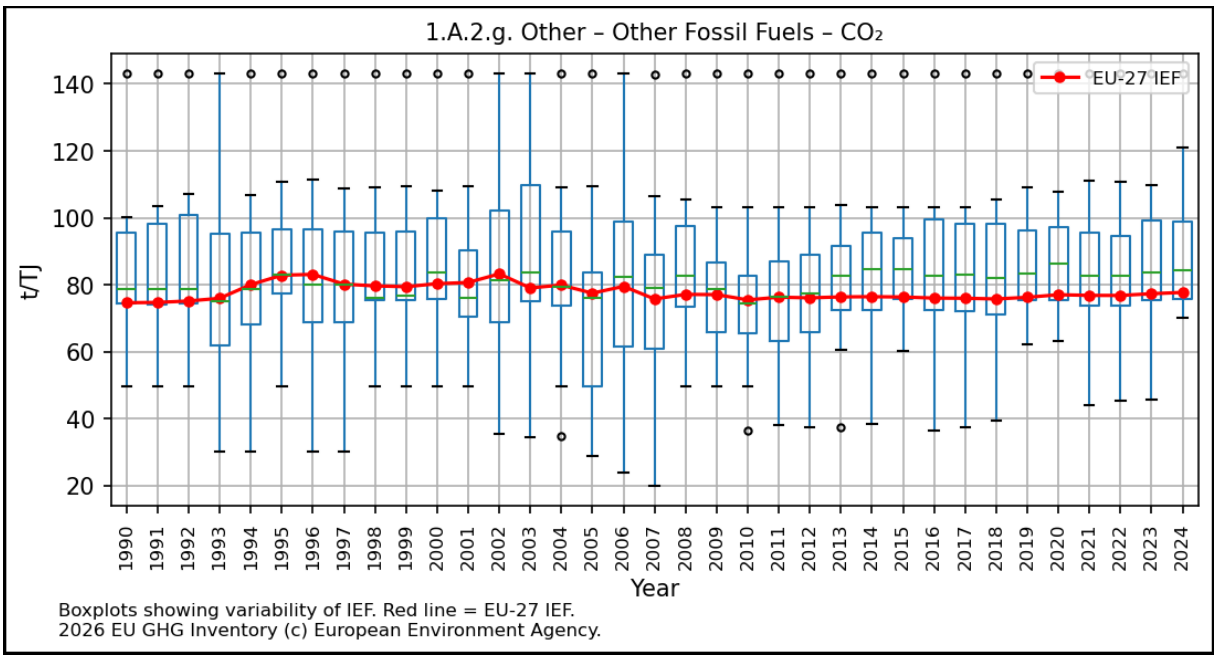


Figure 3.89 shows CO_2 implied emission factor (CO_2 IEF) calculated from EU submissions for 1990-2024. CO_2 IEF equaled to 77.67 t/TJ in 2024.

Figure 3.89: 1.A.2.g Other, other fossil fuels: Implied Emission Factors for CO_2 (in t/TJ)



3.6.3 Transport (CRT Source Category 1A3) (EU)

The time series of greenhouse gas (GHG) emissions and activity data from 1A3 Transport, years 1990-2024, are shown in Figure 3.90. In 2024, CO_2 emissions from the transport sector accounted for 27.3 %, CH_4 for 0.04 %, and N_2O for 0.3 % of total GHG emissions from all sources (including indirect CO_2, with LULUCF and international aviation).

Figure 3.90 1A3 Transport: Greenhouse gas emissions (in kt of CO_2 equ.) and activity data (in TJ)

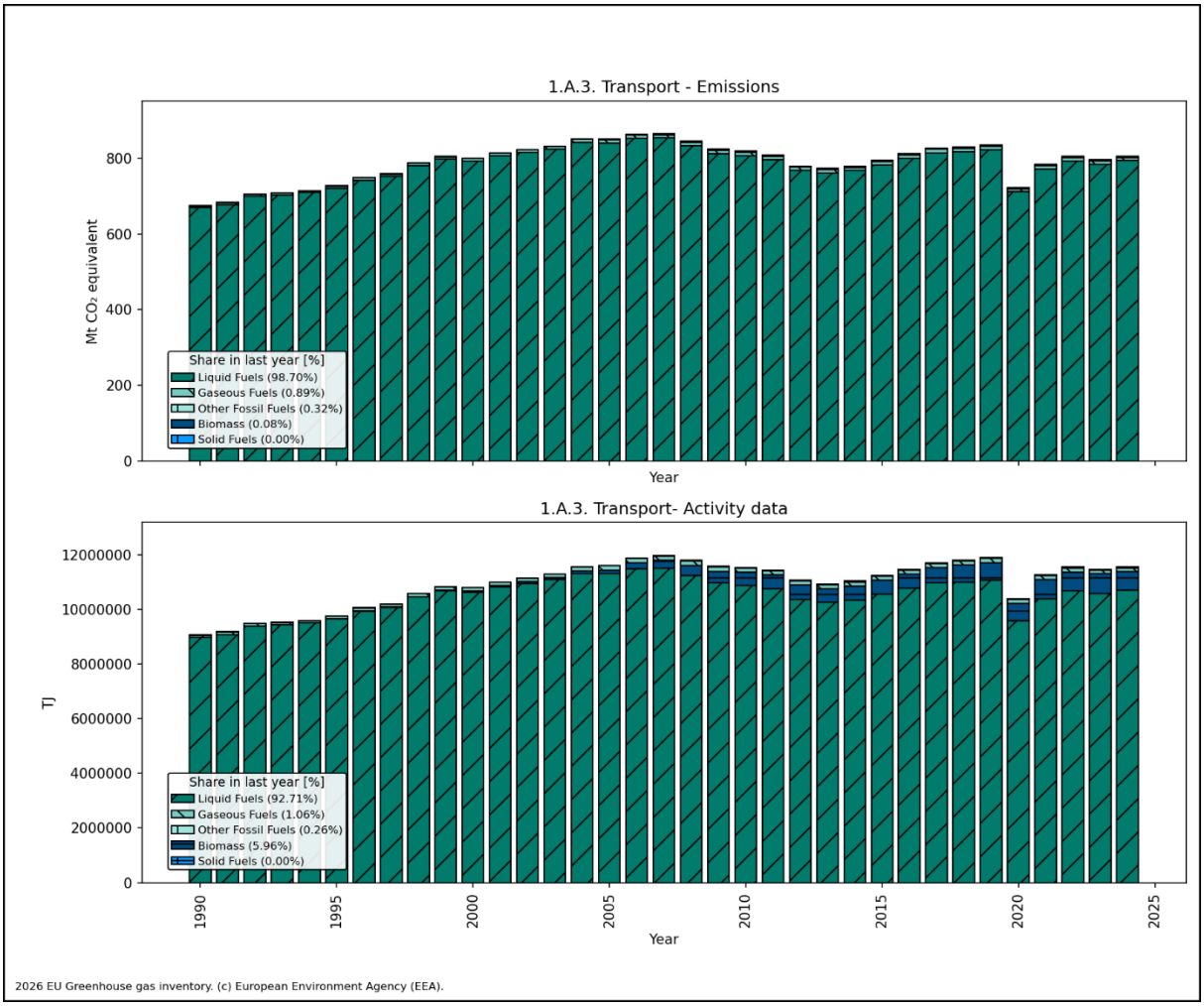


Table 3.55*: Key category analysis for the EU (1A3): Key source categories for level and trend analyses and share of countries using higher tier methods* summarizes the share of countries using higher tier methods for calculating emissions for the key categories of the transport sector. If the information on the tier methods used was not available, the countries' NIDs were studied in order to obtain it and calculate the share of higher tiers. In general, most countries use higher tier methods, especially for road transport (83 – 95.6 %) and domestic aviation (94.1 %). Lower percentages are observed for domestic navigation (65.7 % and 74.3 %) and railways (73.7 %). It should be noted that as 'high tier' are considered all methods apart from T1.

Table 3.55: Key category analysis for the EU (1A3): Key source categories for level and trend analyses and share of countries using higher tier methods

Source category (gas)	kt CO_2 equ.		Trend	Level		Share of higher Tier
	1990	2024		1990	2024	
1.A.3.a Domestic aviation: Jet Kerosene (CO_2)	10822	13061	T	L	L	94.1 %
1.A.3.b Road transportation: Diesel Oil (CO_2)	270610	517731	T	L	L	83 %
1.A.3.b Road transportation: Diesel Oil (N_2O)	1389	6918	T	0	L	95.6 %
1.A.3.b Road transportation: Gaseous Fuels (CO_2)	508	4151	T	0	0	91.4 %
1.A.3.b Road transportation: Gasoline (CO_2)	330645	218219	T	L	L	90 %
1.A.3.b Road transportation: Liquefied Petroleum Gases (LPG) (CO_2)	7428	14967	T	0	L	95 %
1.A.3.c Railways: Liquid Fuels (CO_2)	11549	3110	T	L	0	73.7 %

Source category (gas)	kt CO_2 equ.		Trend	Level		Share of higher Tier
	1990	2024		1990	2024	
1.A.3.d Domestic navigation: Gas/Diesel Oil (CO_2)	13226	10165	0	L	L	74.3 %
1.A.3.d Domestic navigation: Residual Fuel Oil (CO_2)	8560	5437	0	L	0	65.7 %

Table 3.56 shows the total GHG, CO_2, N_2O, and CH_4 emissions from 1A3 Transport per country and at EU level. Between 1990 and 2024, total GHG from transport increased by 19 % in the EU.

Table 3.56 1A3 Transport: Total GHG, CO_2, N_2O, CH_4, emissions per country (in kt of CO_2 equ.)

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt		N2O emissions in kt CO2 equivalents		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024	1990	2024
Austria	13 949	19 512	13 754	19 074	107	400	88	39
Belgium	20 964	24 916	20 646	24 528	160	365	159	23
Bulgaria	6 527	10 893	6 347	10 714	100	157	80	23
Croatia	3 899	8 386	3 787	8 299	65	76	47	10
Cyprus	1 238	2 103	1 219	2 086	11	14	8	3
Czechia	11 270	20 759	11 078	20 394	102	337	90	28
Denmark	10 734	10 803	10 557	10 545	88	251	89	7
Estonia	2 571	2 702	2 511	2 650	35	49	25	3
Finland	12 091	9 632	11 821	9 542	143	75	126	15
France	123 994	122 356	121 926	121 013	897	1 180	1 171	163
Germany	164 457	144 866	161 430	143 288	1 183	1 334	1 845	245
Greece	14 503	18 230	14 137	17 925	242	234	124	71
Hungary	8 936	14 016	8 749	13 769	110	224	77	22
Ireland	5 143	11 783	5 030	11 524	59	247	55	12
Italy	102 191	113 282	100 319	112 221	861	891	1 010	170
Latvia	3 037	2 869	2 940	2 808	73	58	24	3
Lithuania	5 811	5 908	5 685	5 828	81	72	45	8
Luxembourg	2 627	3 938	2 599	3 841	14	92	14	5
Malta	351	788	346	781	2	5	3	1
Netherlands	27 964	25 130	27 668	24 777	96	284	200	69
Poland	20 697	70 010	20 264	69 263	275	665	157	82
Portugal	10 821	18 109	10 618	17 936	91	150	111	22
Romania	12 432	22 712	12 071	22 412	256	261	105	39
Slovakia	6 816	7 720	6 693	7 504	89	210	34	7
Slovenia	2 738	5 743	2 673	5 617	33	121	31	5
Spain	58 651	90 374	57 728	89 407	463	832	461	135
Sweden	20 273	17 224	19 918	17 002	171	169	183	53
EU	**674 684**	**804 764**	**662 515**	**794 748**	**5 807**	**8 752**	**6 362**	**1 263**

3.6.3.1 Domestic Aviation (1A3a) (EU)

This mobile source category includes emissions from civil domestic aviation, i.e. passenger and freight activity of flights having their origin and destination (O-D) within the same country. The EU emissions are derived as the sum of the civil domestic aviation of the countries[27]. The main fuel used is jet kerosene, while there is also a small part of aviation gasoline. The emissions from military mobile sources related to aviation are excluded from 1A3a and are reported separately under category 1A5b (Other mobile military use).

[27]Specifically, what is considered as 'civil domestic aviation' from the MS perspective, it is also considered from the perspective of the EU. Hence, the EU emissions are derived as the exact sum of emissions reported by the MS.

CO_2 emissions from 1A3a Domestic Aviation

CO_2 emissions from domestic aviation accounted for only 0.4 % of total GHG emissions in EU, 2024 (including indirect CO_2, with LULUCF and international aviation). Considering only domestic aviation, CO_2 accounted for 99.2 % of total GHG emissions from domestic aviation in EU, 2024.

The time series of CO_2 emissions and activity data from 1A3a Domestic aviation, years 1990-2024, are shown in Figure 3.91.

Figure 3.91 1A3a Domestic Aviation: CO_2 emissions (in kt) and activity data (in TJ)

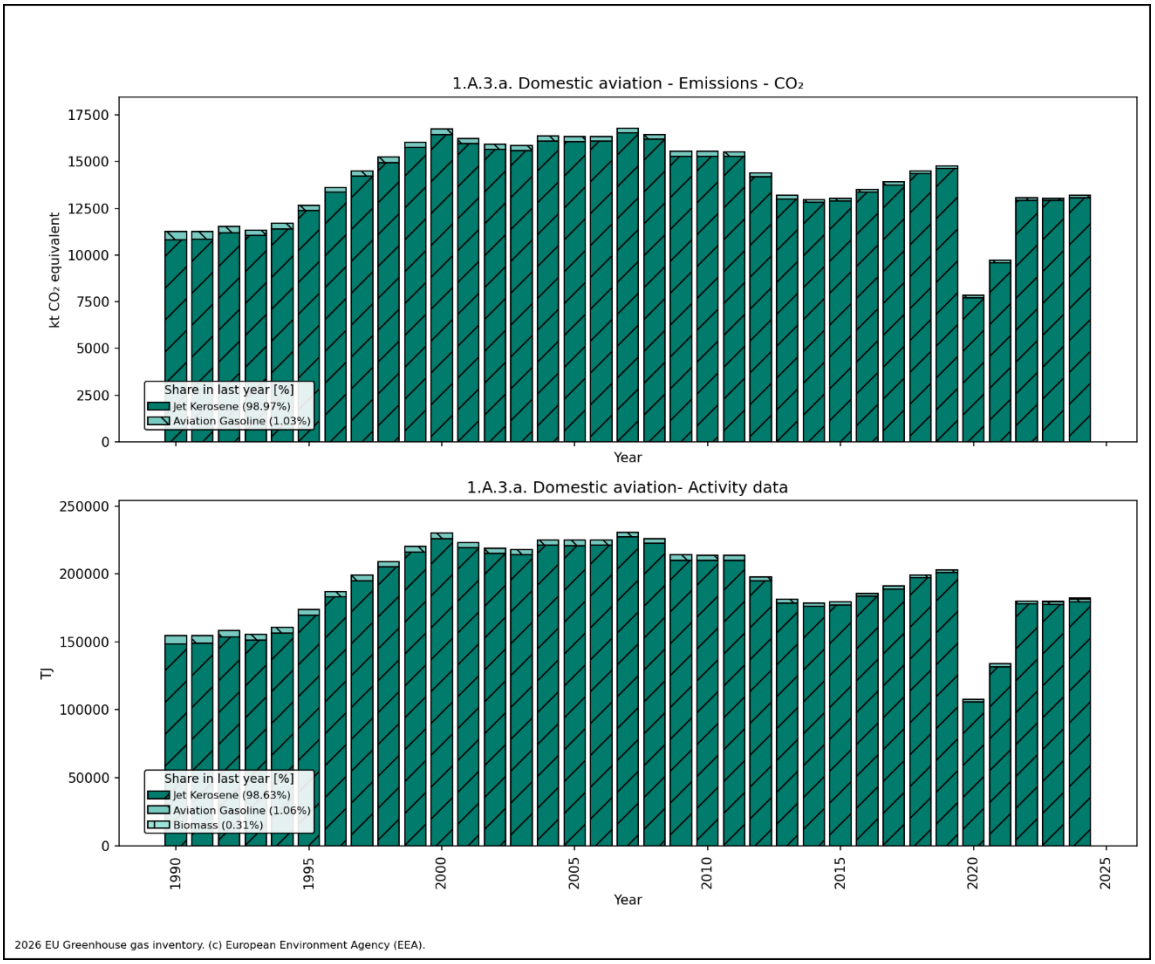


Table 3.57 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for domestic aviation. Between 1990 and 2024, CO_2 emissions from domestic aviation increased by 17 % in the EU, while between 2023 and 2024 the corresponding change was 1 % increase. Top three countries in 2024 were France, Spain, and Italy, which accounted for the 77 % of the EU value.

Table 3.57 1A3a Domestic Aviation: CO_2 emissions per country (in kt), share in EU (%), change, method and EF information

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	38	30	26	0,2%	-12	-31%	-4	-13%	T2,T3	CS,D
Belgium	15	8	9	0,1%	-6	-41%	0	5%	T1	D
Bulgaria	50	17	17	0,1%	-33	-66%	0	-2%	NA,T3	CR,NA
Croatia	7	30	31	0,2%	24	367%	1	2%	T1	D
Cyprus	26	1	0	0,0%	-26	-98%	-1	-53%	NA,T3	M,NA
Czechia	IE	12	16	0,1%	16	∞	3	25%	T1,T2	M
Denmark	215	122	124	0,9%	-91	-42%	2	2%	T2	CS
Estonia	6	6	5	0,0%	0	-2%	0	-2%	NA,T2	D,NA
Finland	385	135	147	1,1%	-239	-62%	12	9%	T1,T2	CS
France	3 631	4 365	4 203	31,8%	571	16%	-163	-4%	T3	D
Germany	2 310	1 083	1 087	8,2%	-1 223	-53%	5	0%	CS,T1,T2	CS,D,M
Greece	336	416	446	3,4%	110	33%	29	7%	T2,T3	D
Hungary	6	7	5	0,0%	-1	-14%	-2	-32%	T1,T2	CS,D
Ireland	48	23	26	0,2%	-22	-46%	3	12%	M,T3	CS
Italy	1 493	2 359	2 419	18,3%	926	62%	60	3%	T1,T2	CS
Latvia	0	3	2	0,0%	2	3275%	0	-17%	T1	D
Lithuania	8	2	2	0,0%	-7	-82%	-1	-30%	T1	CS
Luxembourg	0	0	0	0,0%	0	99%	0	-7%	NA,T1	D,NA
Malta	1	0	4	0,0%	3	243%	4	1594%	T1	D
Netherlands	85	29	27	0,2%	-58	-68%	-2	-7%	T1	CS,D
Poland	63	145	155	1,2%	91	145%	10	7%	T1	D
Portugal	178	511	567	4,3%	390	219%	57	11%	T1,T3	D,OTH
Romania	25	117	114	0,9%	90	360%	-3	-2%	T1,T2	D,OTH
Slovakia	4	2	2	0,0%	-2	-56%	0	5%	T2	D
Slovenia	1	1	1	0,0%	0	40%	0	26%	T1	D
Spain	1 655	3 270	3 498	26,5%	1 843	111%	227	7%	T3	D
Sweden	683	349	265	2,0%	-417	-61%	-84	-24%	T1	D
EU	**11 268**	**13 044**	**13 198**	**100%**	**1 930**	**17%**	**154**	**1%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

1A3a Domestic Aviation – Jet Kerosene (CO_2)

CO_2 emissions from jet kerosene accounted for 98.2 % of total GHG emissions from domestic aviation in 2024.

Table 3.58 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for domestic aviation – jet kerosene. Between 1990 and 2024, CO_2 emissions increased by 21 % in the EU, while between 2023 and 2024 the corresponding change was 1 % increase. Top three countries in 2024 were France, Spain, and Italy, which accounted for the 77 % of the EU value.

Table 3.58 1A3a Domestic Aviation – Jet Kerosene: CO_2 emissions per country (in kt), share in EU (%), change, method and EF information

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	31	25	21	0,2%	-9	-30%	-4	-15%	T3	D
Belgium	12	7	7	0,1%	-4	-36%	0	5%	T1	D
Bulgaria	28	17	17	0,1%	-11	-40%	0	-2%	T3	CR
Croatia	6	29	30	0,2%	23	370%	1	3%	T1	D
Cyprus	26	1	0	0,0%	-26	-98%	-1	-53%	T3	M
Czechia	IE	6	9	0,1%	9	∞	3	50%	T1,T2	M
Denmark	206	122	124	0,9%	-82	-40%	2	2%	T2	CS
Estonia	6	6	5	0,0%	0	-2%	0	-2%	T2	D
Finland	377	133	145	1,1%	-233	-62%	12	9%	T2	CS
France	3 530	4 321	4 153	31,8%	623	18%	-167	-4%	T3	D
Germany	2 161	1 075	1 078	8,3%	-1 084	-50%	2	0%	CS,T2	CS,M
Greece	311	409	439	3,4%	128	41%	30	7%	T3	D
Hungary	3	4	2	0,0%	-1	-35%	-2	-57%	T2	CS
Ireland	45	21	24	0,2%	-21	-46%	3	16%	M,T3	CS
Italy	1 459	2 355	2 412	18,5%	953	65%	57	2%	T1,T2	CS
Latvia	0	2	2	0,0%	2	3057%	0	-20%	T1	D
Lithuania	7	1	1	0,0%	-7	-88%	0	50%	T1	CS
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	1	0	4	0,0%	3	248%	4	2519%	T1	D
Netherlands	73	25	23	0,2%	-50	-69%	-2	-9%	T1	D
Poland	38	138	137	1,0%	99	258%	-1	-1%	T1	D
Portugal	176	509	566	4,3%	390	222%	57	11%	T1,T3	D,OTH
Romania	25	114	111	0,9%	86	347%	-3	-2%	T2	OTH
Slovakia	4	1	1	0,0%	-2	-59%	0	3%	T2	D
Slovenia	NO	0	0	0,0%	0	∞	0	-58%	T1	D
Spain	1 628	3 258	3 485	26,7%	1 857	114%	227	7%	T3	D
Sweden	668	347	264	2,0%	-404	-61%	-84	-24%	T1	D
EU	**10 822**	**12 926**	**13 061**	**100%**	**2 239**	**21%**	**135**	**1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

Figure 3.92 shows the time series of CO_2 emissions in EU from domestic aviation – jet kerosene and the highest shares of countries. Figure 3.93 *1A3a Domestic Aviation - Jet Kerosene: CO2 Implied Emission Factor (IEF) in EU (in t/TJ)* shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the CO_2 IEF at EU level is almost constant over the years at 72.7 t/TJ.

Figure 3.92 1A3a Domestic Aviation – Jet Kerosene: Time series of CO_2 emissions in EU and highest shares of countries

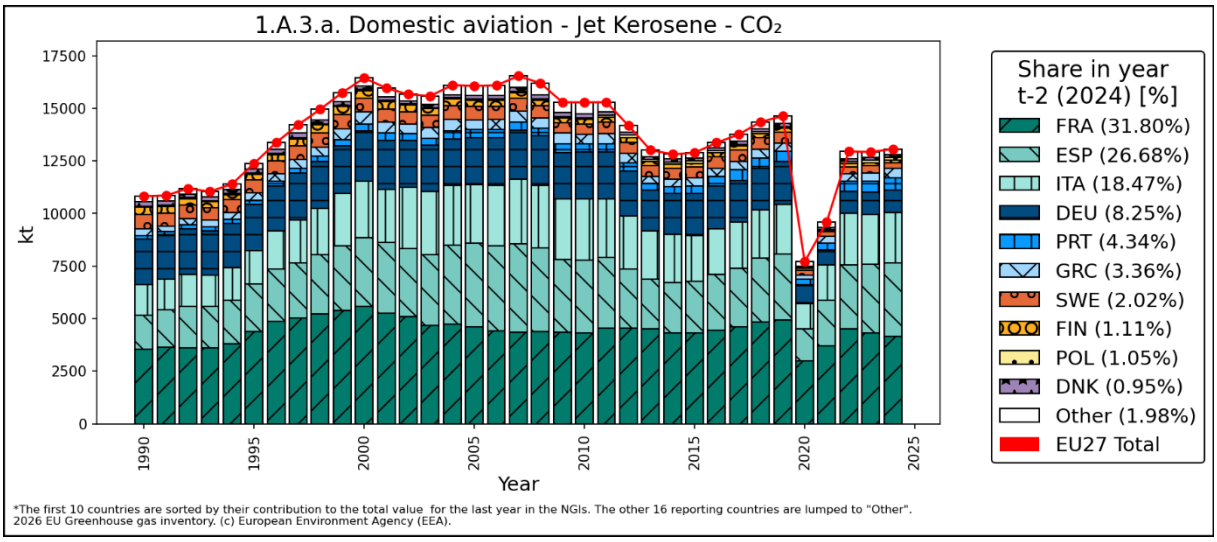
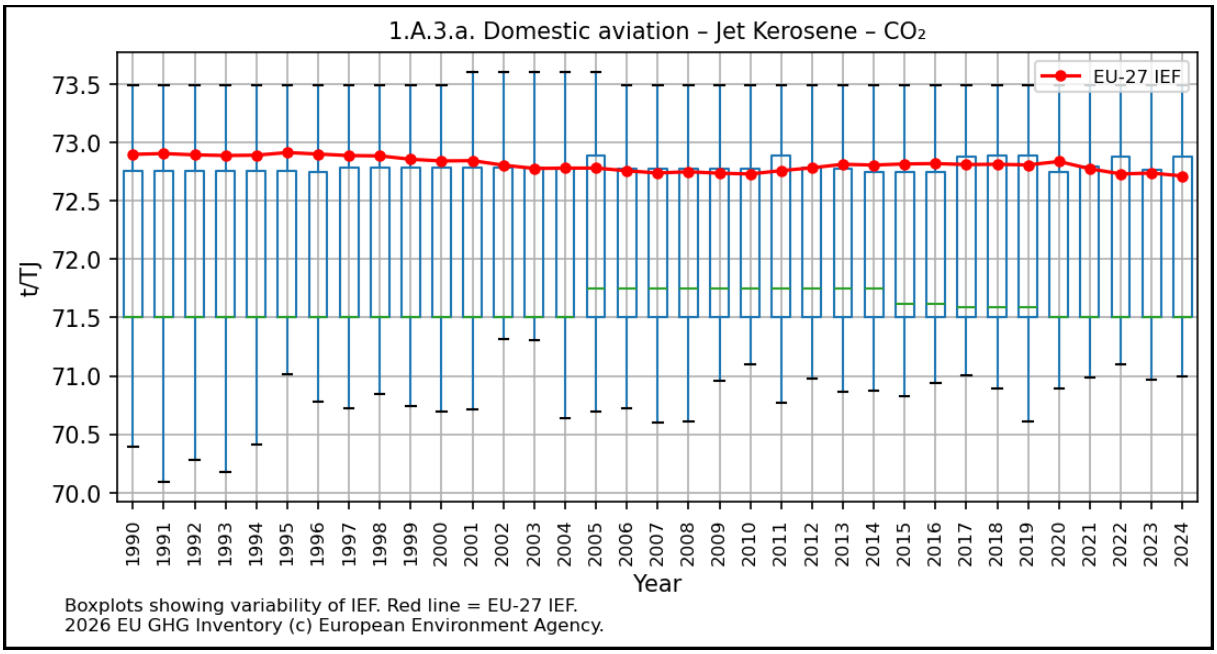


Figure 3.93 1A3a Domestic Aviation - Jet Kerosene: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



3.6.3.2 Road Transportation (1A3b) (EU)

The mobile source category 1A3b Road transportation includes all types of light and heavy duty vehicles, i.e. passenger cars, light commercial vehicles, lorries, tractors, trailers and semi-trailers, and buses; in addition, all types of two and three-wheelers, i.e. mopeds and motorcycles (including tricycles). All these vehicles operate on various liquid and gaseous fuel types.

CO_2 emissions from 1A3b Road Transportation

CO_2 emissions from road transport are one of the largest key source categories among all sources in the EU accounting for 26 % of total GHG emissions in 2024 (including indirect CO_2, with LULUCF and international aviation). Considering only road transport, CO_2 accounted for 98.78 % of total GHG emissions from road transport in EU, 2024.

The time series of CO_2 emissions and activity data from 1A3b Road transportation, years 1990-2024, are shown in Figure 3.94. From this figure it can be observed that the largest contribution to emissions comes from the usage of diesel oil and gasoline.

Figure 3.94 1A3b Road Transportation: CO_2 emissions (in Mt) and activity data (in TJ)

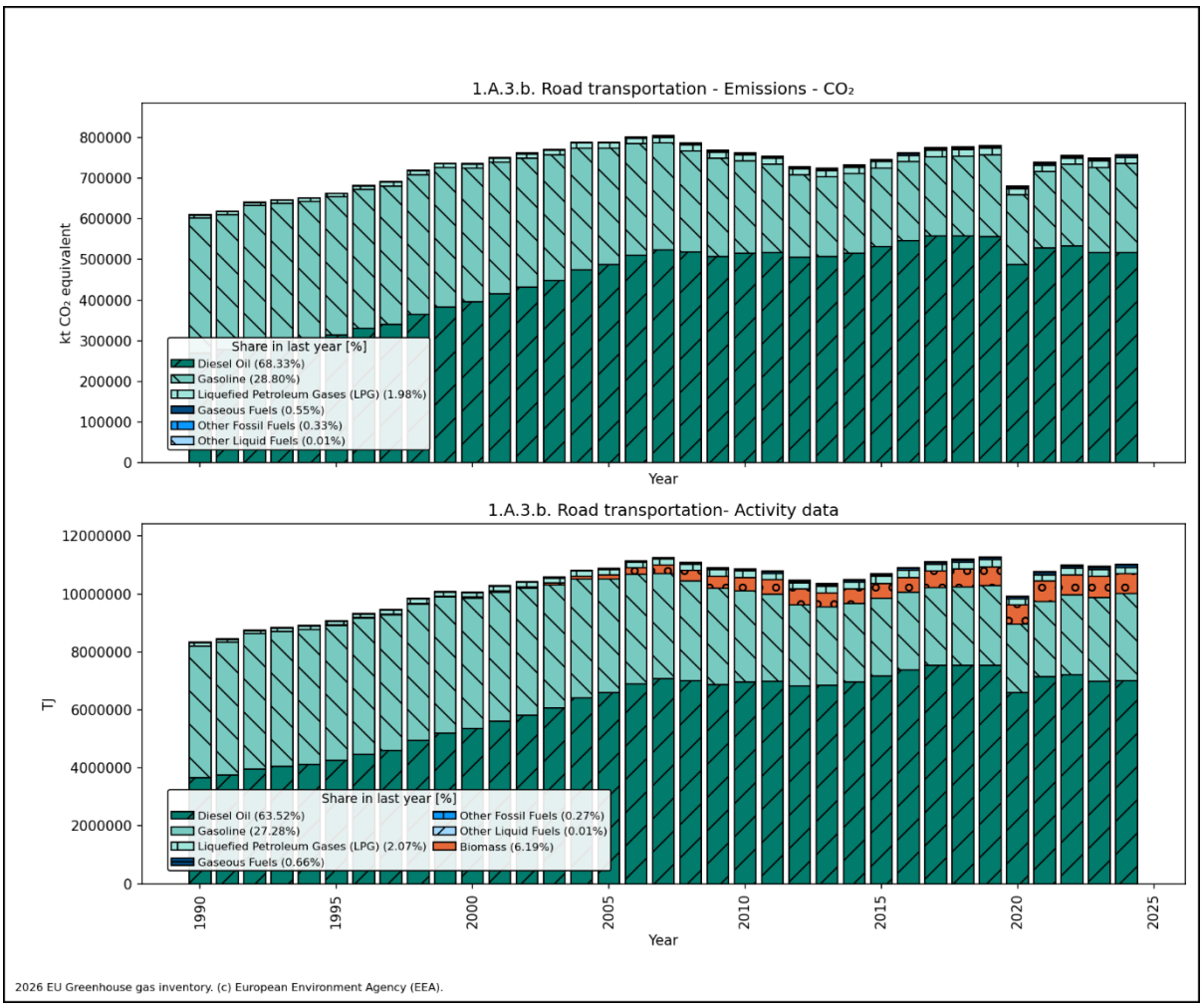


Table 3.59 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for 1A3b Road transportation. Between 1990 and 2024, CO_2 emissions increased by 24 % in the EU, while between 2023 and 2024 the corresponding change was 1% increase. Top three countries in 2024 were Germany, France, and Italy, which accounted for the 47 % of the EU value.

Table 3.59 1A3b Road Transportation: CO_2 emissions per country (in kt), share in EU (%), change, method and EF information

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	13 280	19 415	18 869	2,5%	5 589	42%	-546	-3%	NA,T2	CS,D,NA
Belgium	19 675	23 436	23 711	3,1%	4 036	21%	275	1%	M,NA,T2	CS,M,NA
Bulgaria	5 786	9 775	10 356	1,4%	4 570	79%	581	6%	NA,T1,T2	CR,D,NA
Croatia	3 506	7 288	8 060	1,1%	4 554	130%	771	11%	NA,T1	D,NA
Cyprus	1 191	2 055	2 079	0,3%	887	74%	24	1%	NA,T1,T2	D,M,NA
Czechia	10 251	19 435	20 152	2,7%	9 901	97%	717	4%	NA,T2	M,NA
Denmark	9 337	10 974	9 847	1,3%	510	5%	-1 127	-10%	NA,T2	CR,CS,D,NA
Estonia	2 235	2 346	2 373	0,3%	138	6%	27	1%	NA,T2	CS,NA
Finland	10 804	8 852	9 062	1,2%	-1 742	-16%	210	2%	NA,T2	CS,NA
France	114 051	115 617	114 401	15,1%	350	0%	-1 216	-1%	NA,T3	CS,D,M,NA
Germany	151 890	139 702	139 372	18,4%	-12 518	-8%	-331	0%	CS,T2,T3	CS,M,NA
Greece	11 793	14 756	15 336	2,0%	3 543	30%	580	4%	NA,T1,T2,T3	CS,D,NA
Hungary	7 851	13 650	13 605	1,8%	5 754	73%	-45	0%	NA,T1,T2	CS,D,NA
Ireland	4 690	11 055	10 914	1,4%	6 224	133%	-141	-1%	NA,T2,T3	CS,M,NA
Italy	92 332	99 916	104 025	13,7%	11 693	13%	4 109	4%	NA,T2	CS,M,NA
Latvia	2 402	3 023	2 754	0,4%	352	15%	-269	-9%	NA,T1,T2	CS,D,NA
Lithuania	5 247	5 934	5 694	0,8%	447	9%	-240	-4%	NA,T1,T2	CS,D,NA
Luxembourg	2 572	4 011	3 834	0,5%	1 262	49%	-177	-4%	NA,T1,T2	CS,D,NA
Malta	333	681	685	0,1%	352	106%	4	1%	NA,T1	D,NA
Netherlands	26 424	24 694	23 468	3,1%	-2 957	-11%	-1 226	-5%	NA,T1,T2	CS,NA
Poland	18 427	67 844	68 747	9,1%	50 320	273%	903	1%	NA,T1,T2	D,NA
Portugal	10 000	17 241	17 045	2,2%	7 044	70%	-196	-1%	NA,T1	NA,OTH
Romania	10 366	21 234	21 840	2,9%	11 474	111%	606	3%	NA,T3	NA,OTH
Slovakia	4 503	7 538	7 411	1,0%	2 908	65%	-127	-2%	NA,T2	CS,D,NA
Slovenia	2 607	5 285	5 594	0,7%	2 988	115%	309	6%	M,NA	M,NA
Spain	50 429	80 355	82 711	10,9%	32 281	64%	2 356	3%	CR,NA	CR,CS,NA
Sweden	17 651	12 632	15 708	2,1%	-1 943	-11%	3 076	24%	T2	CS
EU	**609 635**	**748 743**	**757 652**	**100%**	**148 017**	**24%**	**8 909**	**1%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

Table 3.60 shows the share of different fuels in total EU fuel consumption for road transport in 2024. Diesel oil has the largest percentage with 64.2 %, followed by gasoline with 27.1 %, biomass 6.0 %, LPG 1.9 %, gaseous fuels 0.5 %, and other fossil fuels 0.3 %.

Table 3.60 1A3b Road Transportation: Share of different fuels in total EU consumption (2024)

Diesel oil	Gasoline	Biomass	Liquefied petroleum gases (LPG)	Gaseous fuels	Other fossil
64.2 %	27.1 %	6.0 %	1.9 %	0.5 %	0.3 %

1A3b Road Transportation – Diesel Oil (CO_2)

CO_2 emissions from diesel oil accounted for 67.5 % of total GHG emissions from road transport in 2024. Table 3.61 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%) and change between years for 1A3b Road transportation – diesel oil. Between 1990 and 2024, CO_2 emissions increased by 91 % in the EU, while between 2023 and 2024, CO_2 emissions remained almost unchanged. Top three countries in 2024 were Germany, France, and Italy, which accounted for the 46 % of the EU value.

Table 3.61: 1A3b Road Transportation – Diesel Oil: CO_2 emissions per country (in kt), share in EU (%) and change between years

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	5 358	14 695	14 107	2,7%	8 748	163%	-588	-4%
Belgium	11 027	16 258	15 832	3,1%	4 806	44%	-425	-3%
Bulgaria	1 539	6 792	7 205	1,4%	5 666	368%	414	6%
Croatia	1 159	5 547	6 187	1,2%	5 028	434%	640	12%
Cyprus	671	1 017	1 021	0,2%	349	52%	3	0%
Czechia	6 655	14 081	14 624	2,8%	7 970	120%	543	4%
Denmark	4 417	7 325	6 437	1,2%	2 020	46%	-888	-12%
Estonia	693	1 688	1 694	0,3%	1 001	144%	6	0%
Finland	4 923	5 639	5 680	1,1%	757	15%	42	1%
France	54 622	85 118	81 891	15,8%	27 269	50%	-3 227	-4%
Germany	54 478	88 030	87 054	16,8%	32 576	60%	-976	-1%
Greece	4 264	7 687	8 080	1,6%	3 816	89%	393	5%
Hungary	2 388	9 253	9 208	1,8%	6 819	286%	-45	0%
Ireland	1 914	8 833	8 631	1,7%	6 717	351%	-202	-2%
Italy	47 808	68 309	71 227	13,8%	23 419	49%	2 918	4%
Latvia	623	2 484	2 244	0,4%	1 621	260%	-240	-10%
Lithuania	2 134	4 778	4 460	0,9%	2 326	109%	-319	-7%
Luxembourg	1 286	2 917	2 683	0,5%	1 397	109%	-234	-8%
Malta	150	424	419	0,1%	269	179%	-5	-1%
Netherlands	13 008	12 033	10 642	2,1%	-2 366	-18%	-1 391	-12%
Poland	8 769	46 254	46 634	9,0%	37 866	432%	380	1%
Portugal	5 625	13 325	12 903	2,5%	7 277	129%	-422	-3%
Romania	3 648	16 800	17 243	3,3%	13 594	373%	443	3%
Slovakia	3 123	5 594	5 424	1,0%	2 302	74%	-170	-3%
Slovenia	867	3 889	4 213	0,8%	3 347	386%	325	8%
Spain	24 706	60 886	61 744	11,9%	37 038	150%	857	1%
Sweden	4 756	7 486	10 244	2,0%	5 489	115%	2 758	37%
EU	**270 610**	**517 140**	**517 731**	**100%**	**247 121**	**91%**	**591**	**0%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
The information on methodologies and emission factors is not available from the JSON on fuels level Only information from major emitters have been included to the table as well as voluntarily provided information by countries. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

Figure 3.95 shows the time series of CO_2 emissions in EU from road transport – diesel oil and the highest shares of countries. Figure 3.96 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the CO_2 IEF at EU level is almost constant over the years at 74 t/TJ.

Figure 3.95 1A3b Road Transportation - Diesel Oil: Time series of CO_2 emissions in EU and highest shares of countries

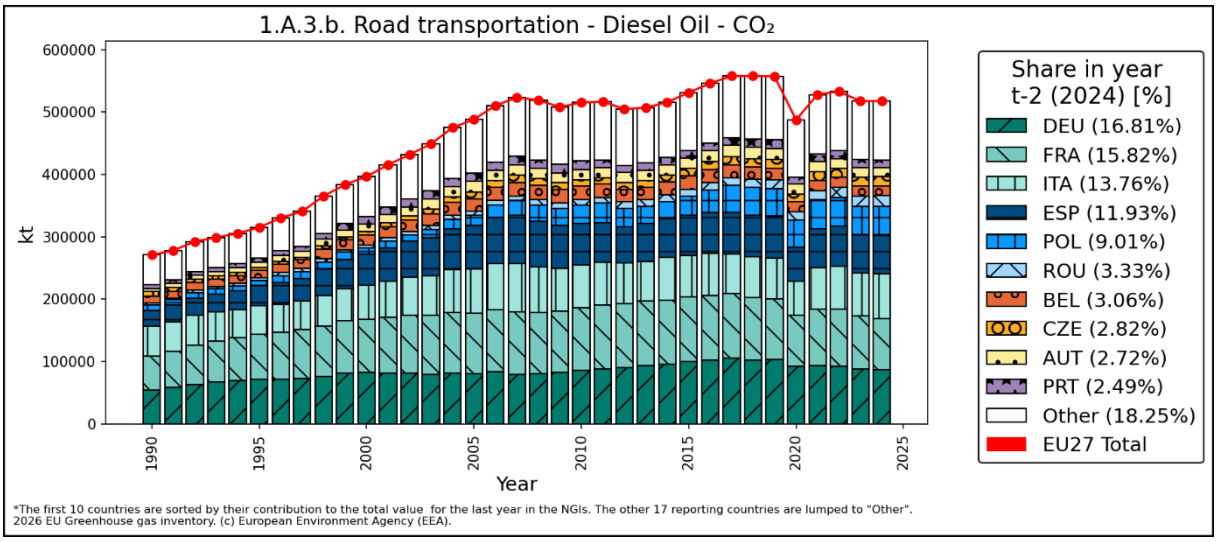
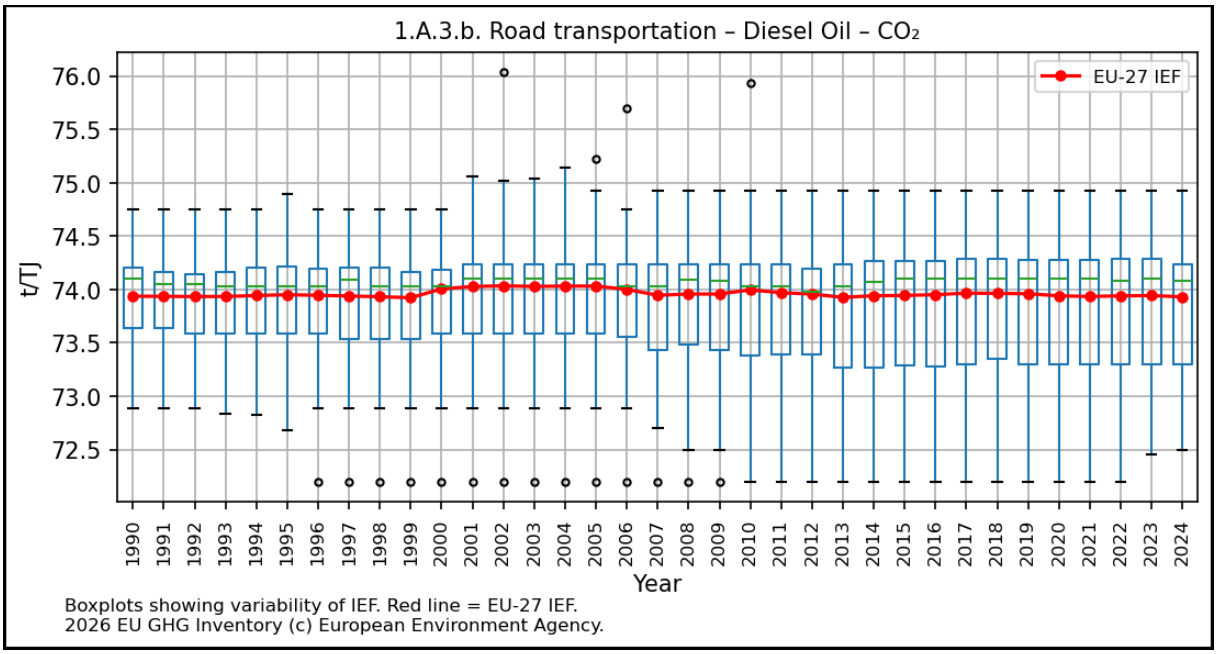


Figure 3.96 1A3b Road Transportation – Diesel Oil: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



1A3b Road Transportation – Gasoline (CO_2)

CO_2 emissions from gasoline accounted for 28.4 % of total GHG emissions from road transport in 2024. Table 3.9 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%) and change between years for 1A3b Road transportation – gasoline. Between 1990 and 2024, CO_2 emissions decreased by 34 % in the EU, while between 2023 and 2024 the corresponding change was 4 % increase. Top three countries in 2024 were Germany, France, and Italy, which accounted for the 50 % of the EU value.

Table 3.9 1A3b Road Transportation – Gasoline: CO_2 emissions per country (in kt), share in EU (%) and change between years

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	7 896	4 625	4 673	2,1%	-3 222	-41%	48	1%
Belgium	8 478	6 743	7 479	3,4%	-998	-12%	737	11%
Bulgaria	4 241	1 561	1 744	0,8%	-2 497	-59%	183	12%
Croatia	2 347	1 609	1 747	0,8%	-600	-26%	138	9%
Cyprus	519	1 033	1 052	0,5%	533	103%	20	2%
Czechia	3 597	4 883	5 068	2,3%	1 472	41%	185	4%
Denmark	4 910	3 611	3 369	1,5%	-1 542	-31%	-242	-7%
Estonia	1 542	608	615	0,3%	-927	-60%	7	1%
Finland	5 880	3 161	3 332	1,5%	-2 549	-43%	171	5%
France	59 267	28 471	30 281	13,9%	-28 985	-49%	1 811	6%
Germany	97 217	50 250	51 230	23,5%	-45 986	-47%	981	2%
Greece	7 438	6 332	6 484	3,0%	-955	-13%	151	2%
Hungary	5 429	4 295	4 291	2,0%	-1 137	-21%	-3	0%
Ireland	2 758	2 176	2 240	1,0%	-517	-19%	65	3%
Italy	39 949	25 547	26 692	12,2%	-13 257	-33%	1 145	4%
Latvia	1 722	441	411	0,2%	-1 311	-76%	-30	-7%
Lithuania	3 053	855	917	0,4%	-2 136	-70%	62	7%
Luxembourg	1 275	1 080	1 139	0,5%	-136	-11%	59	5%
Malta	183	254	263	0,1%	79	43%	8	3%
Netherlands	10 675	12 169	12 294	5,6%	1 618	15%	125	1%
Poland	9 658	15 709	16 372	7,5%	6 714	70%	663	4%
Portugal	4 369	3 660	3 852	1,8%	-518	-12%	192	5%
Romania	6 591	4 204	4 376	2,0%	-2 214	-34%	173	4%
Slovakia	1 380	1 797	1 880	0,9%	499	36%	83	5%
Slovenia	1 740	1 342	1 329	0,6%	-411	-24%	-13	-1%
Spain	25 639	18 271	19 705	9,0%	-5 933	-23%	1 434	8%
Sweden	12 892	5 065	5 383	2,5%	-7 509	-58%	317	6%
EU	**330 645**	**209 751**	**218 219**	**100%**	**-112 426**	**-34%**	**8 468**	**4%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
The information on methodologies and emission factors is not available from the JSON on fuels level Only information from major emitters have been included to the table as well as voluntarily provided information by countries. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

Figure 3.97 shows the time series of CO_2 emissions in EU from road transport – gasoline and the highest shares of countries. Figure 3.98 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the CO_2 IEF at EU level is almost constant over the years at 72.8 t/TJ.

Figure 3.97 1A3b Road Transportation – Gasoline: Time series of CO_2 emissions in EU and highest shares of countries

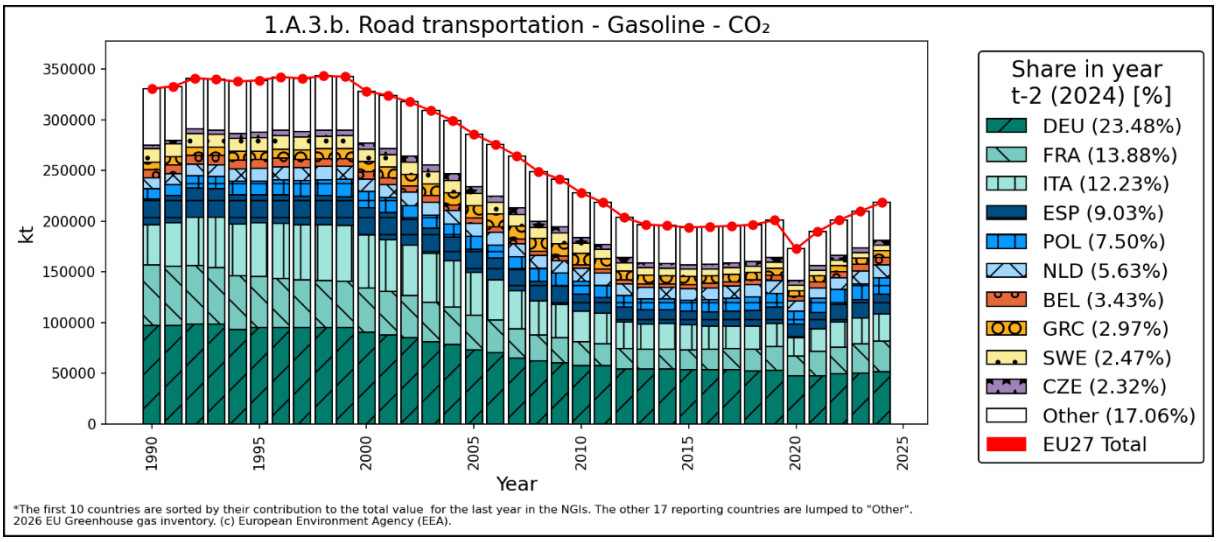
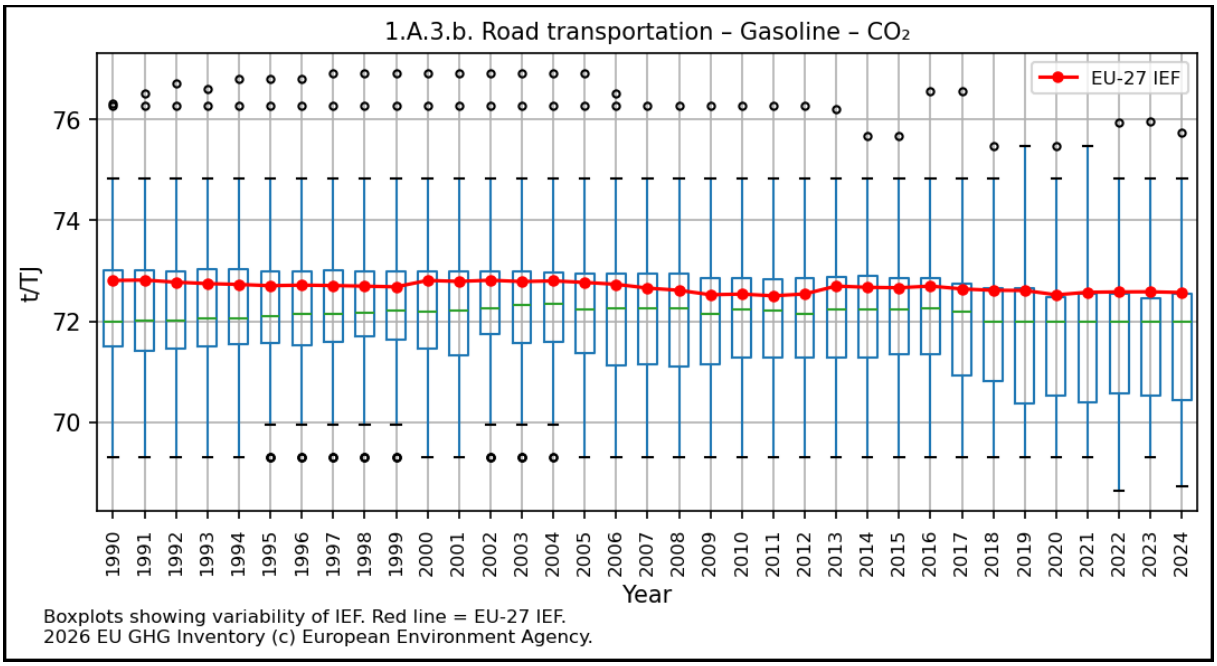


Figure 3.98 1A3b Road Transportation – Gasoline: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



1A3b Road Transportation – LPG (CO_2)

CO_2 emissions from LPG accounted for 2 % of total GHG emissions from road transport in 2024. Table 3.62 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%) and change between years for 1A3b Road transportation – LPG. Between 1990 and 2024, CO_2 emissions increased by 101 % in the EU, while between 2023 and 2024 the corresponding change was 1 % decrease. Top three countries in 2024 were Poland, Italy, and Bulgaria, which accounted for the 77 % of the EU value.

Table 3.62: 1A3b Road Transportation – LPG: CO_2 emissions per country (in kt), share in EU (%) and change between years

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	26	5	6	0,0%	-21	-79%	1	10%
Belgium	169	137	135	0,9%	-34	-20%	-2	-2%
Bulgaria	NO	1 267	1 247	8,3%	1 247	∞	-20	-2%
Croatia	NO	125	121	0,8%	121	∞	-5	-4%
Cyprus	NO	1	1	0,0%	1	∞	0	-15%
Czechia	NO	269	257	1,7%	257	∞	-12	-4%
Denmark	10	0	0	0,0%	-10	-100%	0	8%
Estonia	1	22	38	0,3%	38	6406%	16	75%
Finland	NA,NO	NA,NO	NA,NO	-	-	-	-	-
France	150	309	309	2,1%	159	106%	0	0%
Germany	9	525	508	3,4%	499	5517%	-17	-3%
Greece	91	531	527	3,5%	436	481%	-4	-1%
Hungary	NO	41	41	0,3%	41	∞	0	0%
Ireland	19	4	2	0,0%	-17	-89%	-2	-53%
Italy	4 026	4 697	4 749	31,7%	723	18%	52	1%
Latvia	37	86	79	0,5%	42	113%	-7	-8%
Lithuania	60	262	272	1,8%	212	352%	10	4%
Luxembourg	11	1	1	0,0%	-10	-91%	0	-9%
Malta	NA,NO	2	3	0,0%	3	∞	0	10%
Netherlands	2 740	331	357	2,4%	-2 384	-87%	26	8%
Poland	IE,NO	5 645	5 466	36,5%	5 466	∞	-179	-3%
Portugal	0	127	159	1,1%	159	250864%	32	25%
Romania	NO	231	221	1,5%	221	∞	-10	-4%
Slovakia	NO	114	72	0,5%	72	∞	-42	-37%
Slovenia	NO	28	26	0,2%	26	∞	-2	-7%
Spain	79	341	372	2,5%	293	374%	30	9%
Sweden	0	IE,NO	IE,NO	-	0	-100%	-	-
EU	**7 428**	**15 103**	**14 967**	**100%**	**7 539**	**101%**	**-135**	**-1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
The information on methodologies and emission factors is not available from the JSON on fuels level Only information from major emitters have been included to the table as well as voluntarily provided information by countries. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

1A3b Road Transportation – Gaseous Fuels (CO_2)

CO_2 emissions from gaseous fuels accounted for 0.5 % of total GHG emissions from road transport in 2024. Table 3.63 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%) and change between years for 1A3b Road transportation – gaseous fuels. Between 1990 and 2024, CO_2 emissions increased by 718 % in the EU, while between 2023 and 2024 the corresponding change was 1 % increase. Top three countries in 2024 were Italy, France, and Spain, which accounted for the 68 % of the EU value.

Table 3.63: 1A3b Road Transportation – Gaseous Fuels: CO_2 emissions per country (in kt), share in EU (%) and change between years

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	NO	36	33	0,8%	33	∞	-3	-8%
Belgium	0	154	151	3,6%	151	3526006%	-3	-2%
Bulgaria	NO	128	135	3,2%	135	∞	6	5%
Croatia	NO	7	5	0,1%	5	∞	-2	-27%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	NO	170	171	4,1%	171	∞	1	1%
Denmark	0	16	15	0,4%	15	74997%	-1	-5%
Estonia	NO	28	26	0,6%	26	∞	-2	-6%
Finland	NA,NO	52	50	1,2%	50	∞	-2	-5%
France	0	816	891	21,5%	890	250010%	74	9%
Germany	NA	391	137	3,3%	137	∞	-254	-65%
Greece	NO	67	104	2,5%	104	∞	37	55%
Hungary	0	22	28	0,7%	28	10130%	6	29%
Ireland	NO	5	6	0,1%	6	∞	1	20%
Italy	487	1 145	1 214	29,2%	727	149%	69	6%
Latvia	17	6	8	0,2%	-9	-53%	2	28%
Lithuania	NO	26	32	0,8%	32	∞	6	24%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Netherlands	NA,NO	129	137	3,3%	137	∞	8	6%
Poland	NO	94	134	3,2%	134	∞	40	43%
Portugal	NO	82	86	2,1%	86	∞	4	5%
Romania	NO	0	0	0,0%	0	∞	0	-23%
Slovakia	NO	19	13	0,3%	13	∞	-5	-29%
Slovenia	NO	12	12	0,3%	12	∞	0	0%
Spain	NO	661	720	17,3%	720	∞	59	9%
Sweden	3	33	44	1,1%	41	1430%	11	34%
EU	**508**	**4 100**	**4 151**	**100%**	**3 643**	**718%**	**51**	**1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
The information on methodologies and emission factors is not available from the JSON on fuels level Only information from major emitters have been included to the table as well as voluntarily provided information by countries. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

Figure 3.99 shows the time series of CO_2 emissions in EU from road transport – gaseous fuels and the highest shares of countries. Figure 3.100 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the CO_2 IEF at EU level is almost constant over the years at 56 - 57 t/TJ.

Figure 3.99: 1A3b Road Transportation – Gaseous Fuels: Time series of CO_2 emissions in EU and highest shares of countries

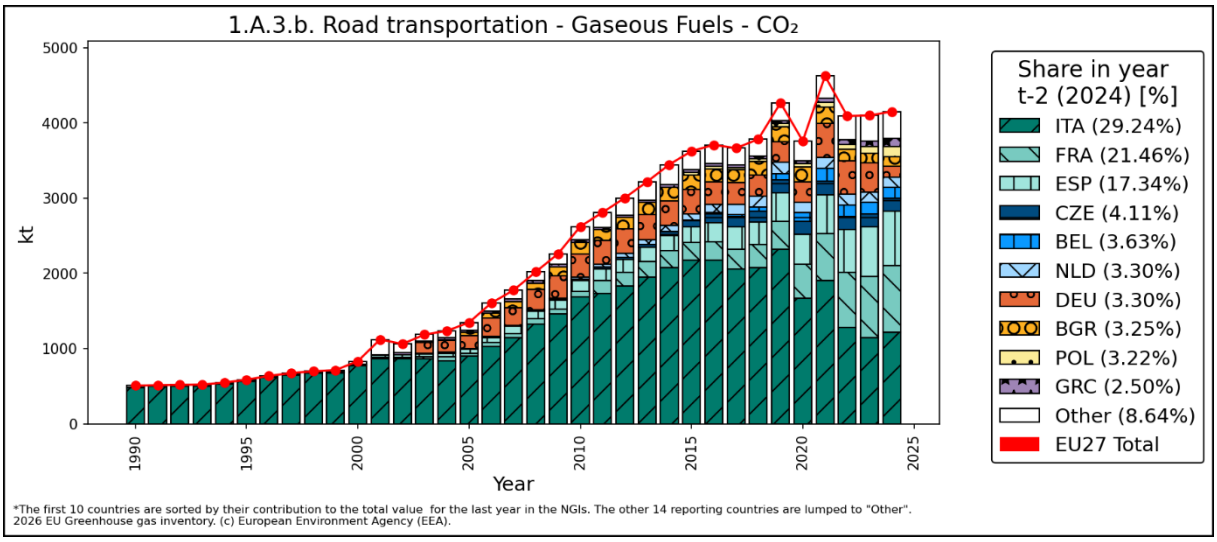
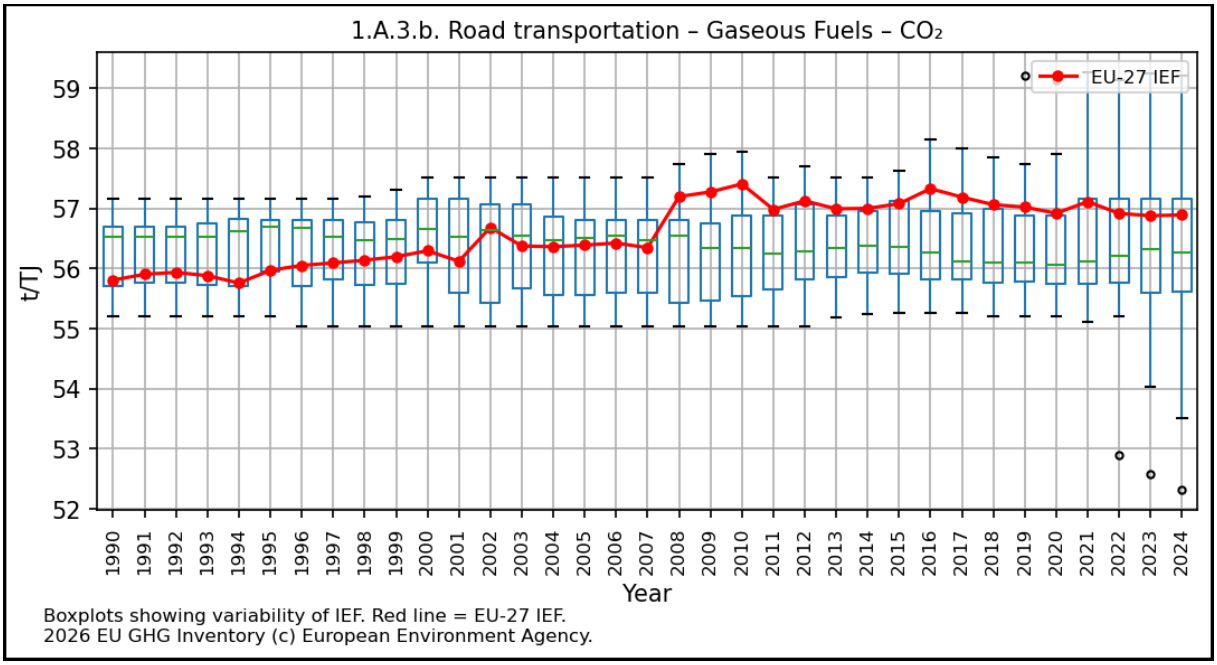


Figure 3.100 1A3b Road Transportation – Gaseous Fuels: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



1.A.3.b Road Transportation: Other Fossil Fuels (CO_2)

This category covers the CO_2 emissions from the fossil part of biofuels. According to the 2006 IPCC Guidelines (vol. 2, chapter 3, section 'CO_2 emissions from biofuels'. p. 3.17*): "… it is important to assess the biofuel origin so as to identify and separate fossil from biogenic feedstocks".* In other words, a part of the carbon of biofuels (and the associated CO_2 emissions) may have a fossil origin. The IPCC Guidelines provide some examples about biofuels' fossil part: *"… biodiesel made from coal methanol with animal feedstocks has a non-zero fossil fuel fraction and is therefore not fully carbon neutral. Ethanol from the fermentation of agricultural products will generally be purely biogenic (carbon neutral), except in some cases, such as fossil-fuel derived methanol. Products which have undergone further chemical transformation may contain substantial amounts of fossil carbon ranging from about 5-10 percent in the fossil methanol used for biodiesel production upwards to 46 percent in ethyl-tertiary-butyl-ether (ETBE) from fossil isobutene. Some processes may generate biogenic by-products such as glycol or glycerine, which may then be used elsewhere."*

Based on the above, all countries are encouraged to calculate these emissions and include them separately in the CRT tables under "Other fossil fuels". The contribution of this category to total GHG emissions from road transport was 0.3 % in 2024 (i.e. very small).

Table 3.64 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%) and change between years for 1A3b Road transportation – Other Fossil Fuels. Between 1990 and 2024, CO_2 emissions increased by 388842 % in the EU, while between 2023 and 2024 the corresponding change was 3 % decrease. Top three countries in 2024 were France, Germany, and Spain, which accounted for the 65 % of the EU value.

Table 3.64: 1A3b Road Transportation – Other Fossil Fuels: CO_2 emissions per country (in kt), share in EU (%) and change between years

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	NO	54	51	2.0%	51	∞	-3	-6%
Belgium	NO	143	113	4.5%	113	∞	-31	-21%
Bulgaria	NO	27	25	1.0%	25	∞	-1	-5%
Croatia	NO	0	0	0.0%	0	∞	0	62%
Cyprus	1	4	4	0.2%	4	595%	1	13%
Czechia	NO	32	32	1.3%	32	∞	0	0%
Denmark	NO	NO	NO	-	-	-	-	-
Estonia	NO	NO	NO	-	-	-	-	-
Finland	NA	NA	NA	-	-	-	-	-
France	NO	899	1 025	40.7%	1 025	∞	126	14%
Germany	NA	501	438	17.4%	438	∞	-63	-13%
Greece	NA,NO	139	142	5.6%	142	∞	3	2%
Hungary	NO	38	35	1.4%	35	∞	-3	-8%
Ireland	NO	37	35	1.4%	35	∞	-2	-6%
Italy	NO	201	125	5.0%	125	∞	-76	-38%
Latvia	NO	0	7	0.3%	7	∞	6	1614%
Lithuania	NO	13	13	0.5%	13	∞	1	4%
Luxembourg	NO	13	12	0.5%	12	∞	-2	-13%
Malta	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Netherlands	NA,NO	32	38	1.5%	38	∞	6	19%
Poland	NO	141	141	5.6%	141	∞	0	0%
Portugal	NO	45	43	1.7%	43	∞	-1	-3%
Romania	NO	NO	NO	-	-	-	-	-
Slovakia	NO	15	22	0.9%	22	∞	7	44%
Slovenia	NO	15	14	0.5%	14	∞	-1	-5%
Spain	NO	193	168	6.7%	168	∞	-25	-13%
Sweden	NO	48	37	1.5%	37	∞	-11	-23%
EU	**1**	**2 589**	**2 519**	**100%**	**2 518**	**388842%**	**-71**	**-3%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.
The information on methodologies and emission factors is not available from the JSON on fuels level Only information from major emitters have been included to the table as well as voluntarily provided information by countries. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

CH_4 emissions from 1A3b Road Transportation

CH_4 emissions from road transport accounted only for 0.039 % of total GHG emissions in EU, 2024 (including indirect CO_2, with LULUCF and international aviation). Considering only road transport, CH_4 accounted for 0.15 % of total GHG emissions from road transport in EU, 2024.

The time series of CH_4 emissions and activity data from 1A3b Road transportation, years 1990-2024, are shown in Figure 3.101. From this figure it can be observed that the largest contribution to emissions comes from the usage of gasoline.

Figure 3.101 1A3b Road Transportation: CH_4 emissions (in Mt of CO_2 equ.) and activity data (in TJ)

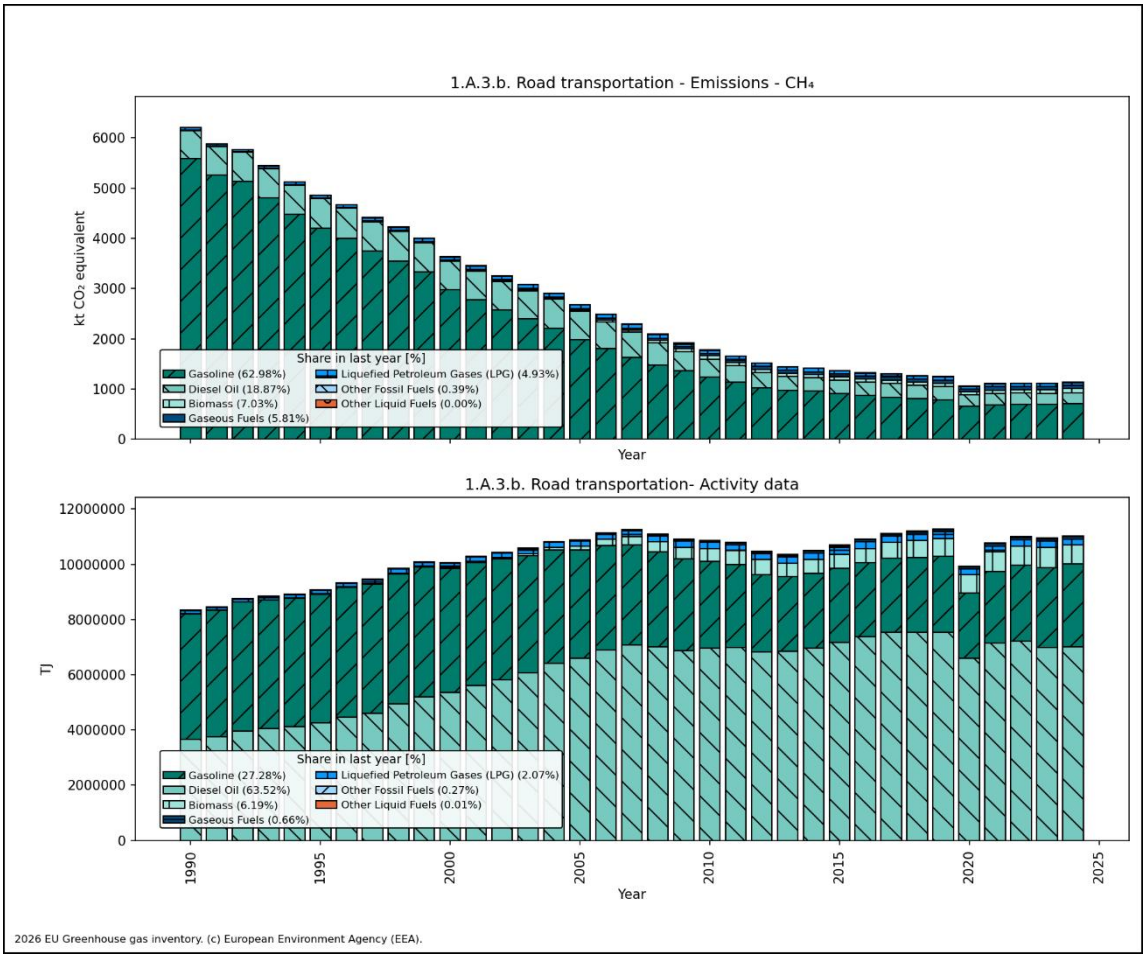


Table 3.65 shows the CH_4 emissions per country and at EU level (in kt of CO_2 equ.), share of each country in EU (%), change between years, method and EF information for 1A3b Road transportation. Between 1990 and 2024, CH_4 emissions decreased by 82 % in the EU, while between 2023 and 2024 the corresponding change was 2 % increase. Top three countries in 2024 were Germany, Italy, and France, which accounted for the 46 % of the EU value.

Table 3.65 1A3b Road Transportation: CH_4 emissions per country (in kt of CO_2 equ.), share in EU (%), change, method and EF information

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	87	37	38	3,4%	-49	-56%	1	4%	NA,T3	CS,NA
Belgium	157	21	22	1,9%	-135	-86%	1	3%	M,NA,T3	CS,M,NA
Bulgaria	79	23	23	2,0%	-57	-71%	0	0%	NA,T2	CR,NA
Croatia	46	9	10	0,9%	-36	-79%	1	7%	NA,T1,T3	CR,D,NA
Cyprus	8	4	3	0,3%	-5	-60%	-1	-15%	NA,T1,T2	D,M,NA
Czechia	89	25	27	2,4%	-62	-70%	2	8%	NA,T3	M,NA
Denmark	88	7	7	0,6%	-82	-93%	-1	-8%	NA,T3	CR,NA
Estonia	24	3	3	0,3%	-21	-87%	0	5%	NA,T3	CS,NA
Finland	120	12	11	1,0%	-108	-90%	0	-1%	NA,T3	CR,NA
France	1 143	139	137	12,1%	-1 005	-88%	-1	-1%	NA,T3	CS,M,NA
Germany	1 813	229	229	20,2%	-1 583	-87%	0	0%	CS,M,NA,T2,T3	CS,M,NA
Greece	120	62	67	5,9%	-53	-44%	5	8%	M,NA,T1,T2	D,M,NA
Hungary	75	23	22	2,0%	-53	-71%	-1	-3%	NA,T1,T3	D,M,NA
Ireland	54	10	11	0,9%	-44	-81%	0	1%	NA,T3	M,NA
Italy	969	149	150	13,2%	-819	-85%	1	1%	NA,T3	M,NA
Latvia	23	3	3	0,3%	-20	-87%	0	1%	NA,T1,T3	CR,D,M,NA
Lithuania	44	8	8	0,7%	-36	-82%	0	-4%	NA,T1,T3	CR,D,NA
Luxembourg	14	5	5	0,4%	-9	-64%	0	3%	NA,T3	M,NA
Malta	3	1	1	0,1%	-2	-65%	0	3%	NA,T3	M,NA
Netherlands	197	57	56	4,9%	-141	-72%	-2	-3%	NA,T1,T2,T3	CS,NA
Poland	155	84	81	7,2%	-74	-48%	-3	-3%	NA,T1,T3	D,NA
Portugal	109	20	21	1,8%	-88	-81%	1	4%	NA,NO,T3	NA,NO,OTH
Romania	101	37	38	3,3%	-63	-63%	1	3%	NA,T1,T3	D,NA,OTH
Slovakia	33	7	7	0,6%	-26	-80%	0	-4%	NA,T3	D,NA
Slovenia	31	5	5	0,5%	-26	-83%	0	-1%	M,NA	M,NA
Spain	446	113	126	11,1%	-320	-72%	13	12%	CR,NA	CR,NA
Sweden	178	23	23	2,0%	-155	-87%	0	-1%	M,NA,T1,T2	CS,D,NA
EU	**6 206**	**1 114**	**1 133**	**100%**	**-5 073**	**-82%**	**19**	**2%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

1A3b Road Transportation – Gasoline (CH_4)

CH_4 emissions from gasoline accounted for 0.10 % of total GHG emissions from road transport in 2024. Table 3.66 shows the CH_4 emissions per country and at EU level (in kt of CO_2 equ.), share of each country in EU (%) and change between years for 1A3b Road transportation – gasoline. Between 1990 and 2024, CH_4 emissions decreased by 87 % in the EU, while between 2023 and 2024 CH_4 emissions increased by 2%. Top three countries in 2024 were Germany, Italy, and France, which accounted for the 48 % of the EU value.

Table 3.66 1A3b Road Transportation – Gasoline: CH_4 emissions per country (in kt of CO_2 equ.), share in EU (%) and change between years

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	83	21	22	3,1%	-61	-74%	1	6%
Belgium	130	13	14	1,9%	-117	-89%	1	8%
Bulgaria	74	7	8	1,1%	-67	-90%	0	5%
Croatia	43	6	7	1,0%	-36	-84%	0	7%
Cyprus	6	3	2	0,3%	-4	-65%	-1	-22%
Czechia	68	16	14	2,0%	-54	-79%	-2	-10%
Denmark	77	6	6	0,8%	-72	-93%	0	-8%
Estonia	22	2	2	0,2%	-20	-92%	0	2%
Finland	104	8	8	1,2%	-96	-92%	0	1%
France	1 012	94	94	13,2%	-918	-91%	0	0%
Germany	1 762	141	140	19,7%	-1 621	-92%	-1	-1%
Greece	109	44	47	6,6%	-62	-57%	2	5%
Hungary	68	16	15	2,1%	-53	-78%	0	-3%
Ireland	49	6	6	0,9%	-43	-88%	0	-1%
Italy	821	104	104	14,6%	-716	-87%	0	0%
Latvia	20	1	1	0,1%	-19	-95%	0	-11%
Lithuania	36	3	3	0,4%	-33	-91%	0	10%
Luxembourg	13	2	3	0,4%	-11	-80%	0	8%
Malta	2	1	1	0,1%	-2	-68%	0	3%
Netherlands	157	31	31	4,3%	-126	-80%	0	-1%
Poland	134	38	37	5,2%	-97	-72%	-1	-2%
Portugal	94	13	13	1,9%	-81	-86%	1	5%
Romania	91	23	24	3,4%	-67	-73%	1	3%
Slovakia	23	3	3	0,4%	-20	-87%	0	-4%
Slovenia	29	3	3	0,5%	-25	-89%	0	-5%
Spain	384	81	93	13,1%	-291	-76%	12	15%
Sweden	174	11	11	1,6%	-163	-94%	0	3%
EU	**5 588**	**699**	**714**	**100%**	**-4 874**	**-87%**	**15**	**2%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
The information on methodologies and emission factors is not available from the JSON on fuels level Only information from major emitters have been included to the table as well as voluntarily provided information by countries. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

Figure 3.102 shows the time series of CH_4 emissions in EU from road transport – gasoline and the highest shares of countries. Figure 3.103 shows the CH_4 implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the CH_4 IEF at EU level decreases over time from 44 kg/TJ in 1990 to 10 kg/TJ in 2024.

Figure 3.102 1A3b Road Transportation – Gasoline: Time series of CH_4 emissions in EU and highest shares of countries

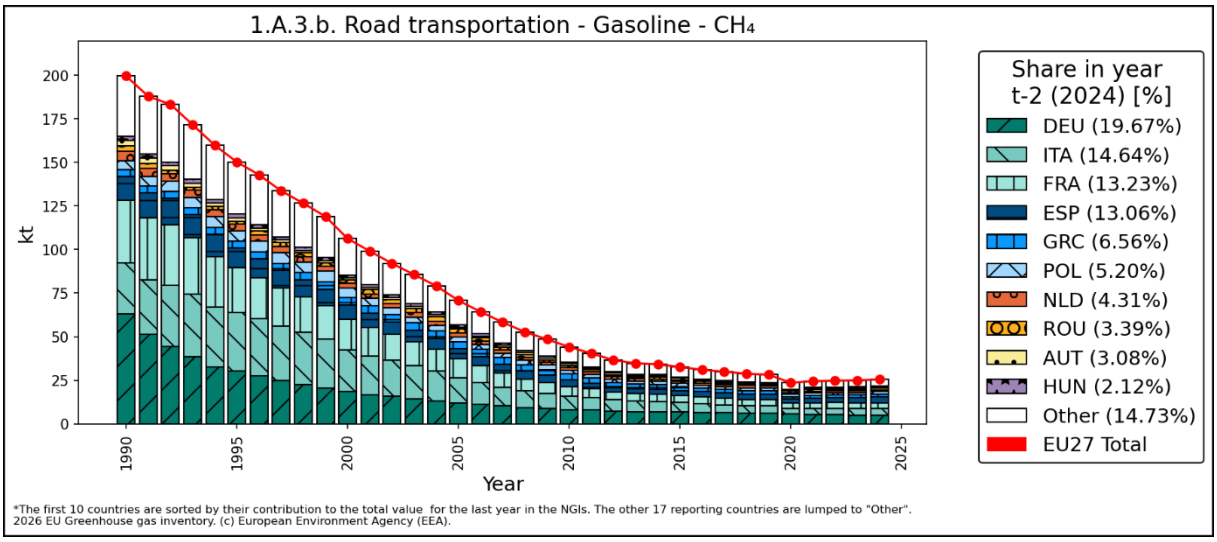
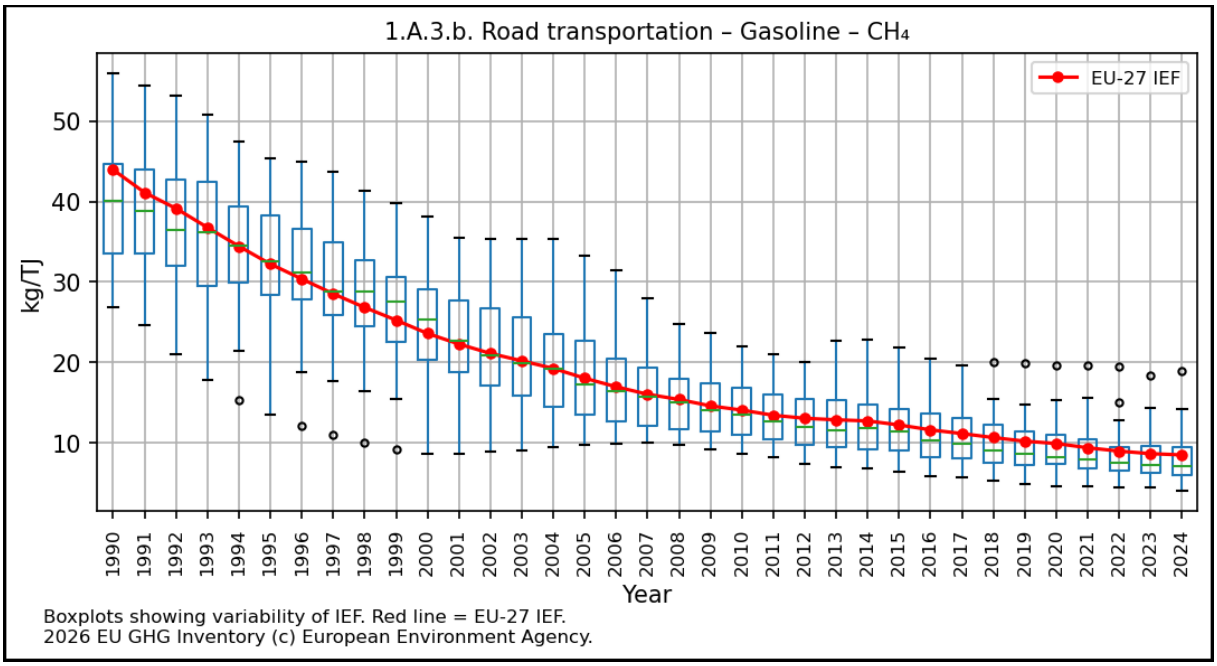


Figure 3.103 1A3b Road Transportation – Gasoline: CH_4 Implied Emission Factor (IEF) in EU (in kg/TJ)



N_2O emissions from 1A3b Road Transportation

N_2O emissions from road transport accounted only for 0.28 % of total GHG emissions in EU, 2024 (including indirect CO_2, with LULUCF and international aviation). Considering only road transport, N_2O accounted for 1.08 % of total GHG emissions from road transport in EU, 2024.

The time series of N_2O emissions and activity data from 1A3b Road transportation, years 1990-2024, are shown in Figure 3.104. From this figure it can be observed that the largest contribution to emissions comes from the usage of diesel oil since 2006; for years prior to 2006 the higher contribution was coming from gasoline.

Figure 3.104 1A3b Road Transportation: N_2O emissions (in Mt of CO_2 equ.) and activity data (in TJ)

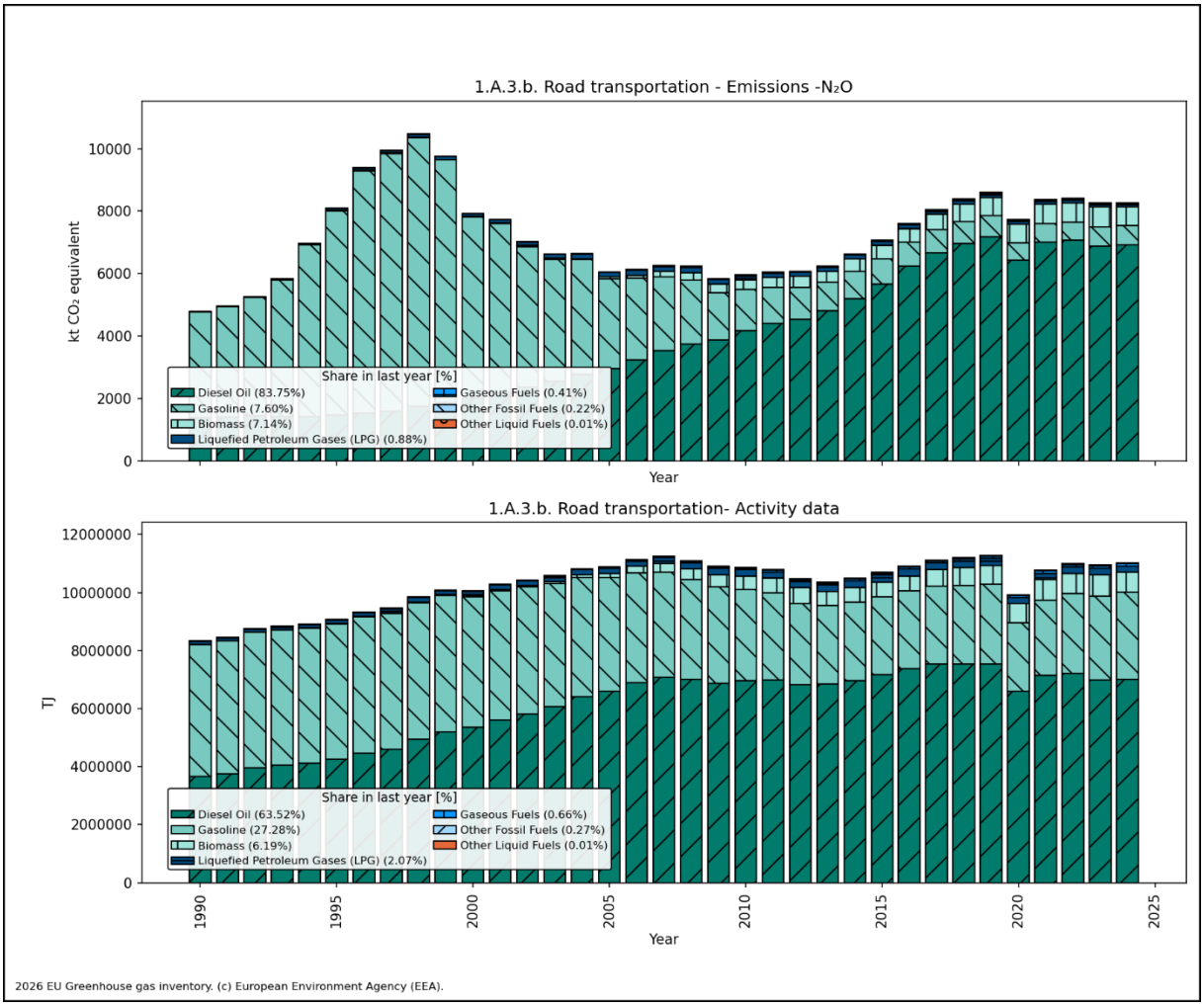


Table 3.67 shows the N_2O emissions per country and at EU level (in kt of CO_2 equ.), share of each country in EU (%), change between years, method and EF information for 1A3b Road transportation. Between 1990 and 2024, N_2O emissions increased by 72 % in the EU, while between 2023 and 2024 N_2O emissions remained almost unchanged. Top three countries in 2024 were Germany, France, and Italy, which accounted for the 40 % of the EU value.

Table 3.67 1A3b Road Transportation: N_2O emissions per country (in kt of CO_2 equ.), share in EU (%), change, method and EF information

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	88	393	390	4,7%	302	342%	-3	-1%	NA,T3	CS,NA
Belgium	141	357	356	4,3%	214	152%	-2	0%	M,NA,T3	CS,M,NA
Bulgaria	52	143	153	1,9%	101	193%	10	7%	NA,T2	CR,NA
Croatia	52	62	69	0,8%	17	33%	7	11%	NA,T1,T3	CR,D,NA
Cyprus	10	14	14	0,2%	4	37%	0	-1%	NA,T1,T2	D,M,NA
Czechia	101	327	336	4,1%	235	234%	8	3%	NA,T3	M,NA
Denmark	78	291	246	3,0%	167	213%	-46	-16%	NA,T3	CR,NA
Estonia	19	37	42	0,5%	23	117%	4	12%	NA,T3	CS,NA
Finland	137	74	72	0,9%	-65	-48%	-2	-3%	NA,T3	CR,NA
France	839	1 156	1 133	13,7%	294	35%	-24	-2%	NA,T3	CS,M,NA
Germany	1 123	1 313	1 307	15,8%	183	16%	-6	0%	CS,M,NA,T2,T3	CS,M,NA
Greece	104	103	116	1,4%	12	11%	13	13%	M,NA,T1,T2	D,M,NA
Hungary	54	220	214	2,6%	160	296%	-6	-3%	NA,T1,T3	D,M,NA
Ireland	44	234	230	2,8%	186	425%	-4	-2%	NA,T3	M,NA
Italy	746	806	830	10,0%	84	11%	24	3%	NA,T3	M,NA
Latvia	19	55	53	0,6%	34	185%	-2	-3%	NA,T1,T3	CR,D,M,NA
Lithuania	44	49	61	0,7%	17	38%	12	24%	NA,T1,T3	CR,D,NA
Luxembourg	14	102	92	1,1%	78	572%	-10	-9%	NA,T3	M,NA
Malta	2	4	4	0,1%	2	101%	0	0%	NA,T3	M,NA
Netherlands	90	279	275	3,3%	185	205%	-4	-1%	NA,T1,T2	CS,NA
Poland	137	626	638	7,7%	501	365%	12	2%	NA,T1,T3	D,NA
Portugal	70	144	141	1,7%	71	101%	-3	-2%	NA,NO,T3	NA,NO,OTH
Romania	202	221	228	2,8%	26	13%	8	3%	NA,T1,T3	D,NA,OTH
Slovakia	50	208	202	2,4%	151	302%	-6	-3%	NA,T3	D,NA
Slovenia	27	113	119	1,4%	92	346%	6	5%	M,NA	M,NA
Spain	413	772	786	9,5%	373	90%	14	2%	CR,NA	CR,NA
Sweden	138	156	153	1,9%	16	11%	-3	-2%	M,NA,T1,T2	CS,D,NA
EU	**4 796**	**8 261**	**8 260**	**100%**	**3 464**	**72%**	**-1**	**0%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

1A3b Road Transportation – Diesel Oil (N_2O)

N_2O emissions from diesel oil accounted for 0.90 % of total GHG emissions from road transport in 2024. Table 3.68 shows the N_2O emissions per country and at EU level (in kt of CO_2 equ.), share of each country in EU (%) and change between years for 1A3b Road transportation – diesel oil. Between 1990 and 2024, N_2O emissions increased by 398 % in the EU, while between 2023 and 2024 the corresponding change was 1 % increase. Top three countries in 2024 were Germany, France, and Spain, which accounted for the 41 % of the EU value.

Table 3.68 1A3b Road Transportation – Diesel Oil: N_2O emissions per country (in kt of CO_2 equ.), share in EU (%) and change between years

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	14	354	348	5,0%	334	2396%	-6	-2%
Belgium	55	300	303	4,4%	248	452%	3	1%
Bulgaria	14	112	123	1,8%	109	769%	11	10%
Croatia	15	55	62	0,9%	46	304%	6	12%
Cyprus	3	11	11	0,2%	8	240%	0	0%
Czechia	64	292	300	4,3%	236	369%	9	3%
Denmark	27	268	221	3,2%	194	706%	-47	-17%
Estonia	6	35	39	0,6%	32	512%	4	12%
Finland	58	51	51	0,7%	-7	-12%	0	0%
France	234	955	927	13,4%	693	297%	-28	-3%
Germany	129	1 163	1 172	16,9%	1 042	806%	8	1%
Greece	35	58	69	1,0%	34	98%	11	20%
Hungary	19	184	180	2,6%	161	853%	-4	-2%
Ireland	12	210	203	2,9%	191	1535%	-6	-3%
Italy	305	668	706	10,2%	400	131%	38	6%
Latvia	6	52	49	0,7%	43	720%	-3	-6%
Lithuania	20	46	57	0,8%	36	180%	11	24%
Luxembourg	3	90	81	1,2%	78	2588%	-9	-10%
Malta	1	3	3	0,0%	3	402%	0	-1%
Netherlands	24	143	128	1,9%	104	438%	-15	-10%
Poland	63	497	513	7,4%	450	710%	16	3%
Portugal	26	117	114	1,6%	88	338%	-4	-3%
Romania	27	175	180	2,6%	153	558%	6	3%
Slovakia	37	186	180	2,6%	144	389%	-5	-3%
Slovenia	9	101	107	1,6%	99	1149%	7	7%
Spain	169	654	668	9,7%	500	296%	14	2%
Sweden	12	96	123	1,8%	111	885%	27	28%
EU	**1 389**	**6 874**	**6 918**	**100%**	**5 529**	**398%**	**44**	**1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
The information on methodologies and emission factors is not available from the JSON on fuels level Only information from major emitters have been included to the table as well as voluntarily provided information by countries. Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

Figure 3.105 shows the time series of N_2O emissions in EU from road transport – diesel oil and the highest shares of countries. Figure 3.106 shows the N_2O implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the N_2O IEF at EU level increased from 1.37 kg/TJ in 1990 to 3.2 kg/TJ in 2024.

Figure 3.105 1A3b Road Transportation – Diesel Oil: Time series of N_2O emissions in EU and highest shares of countries

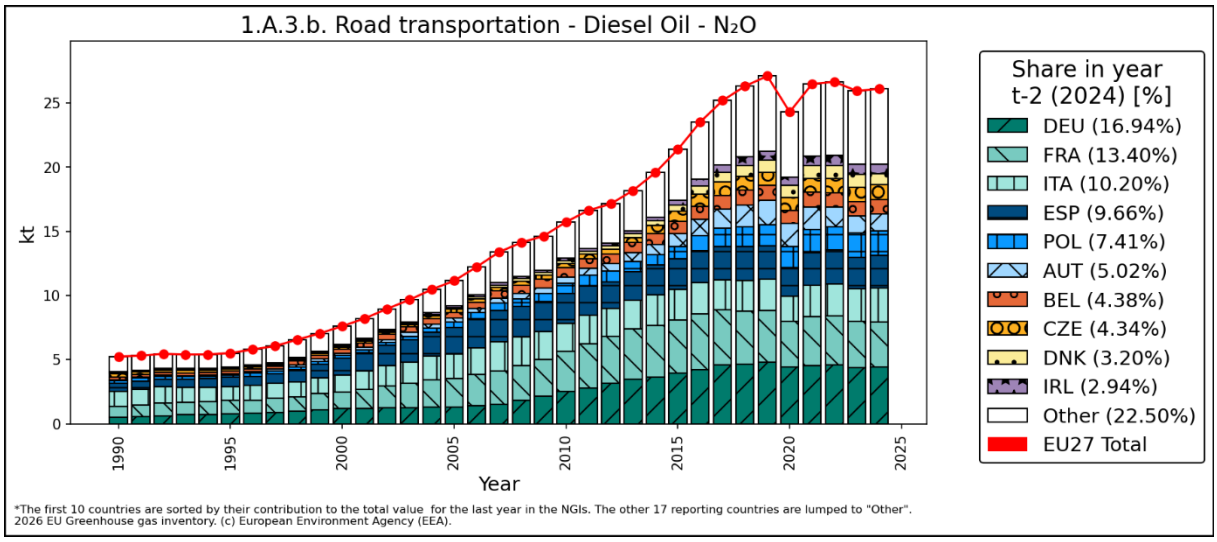
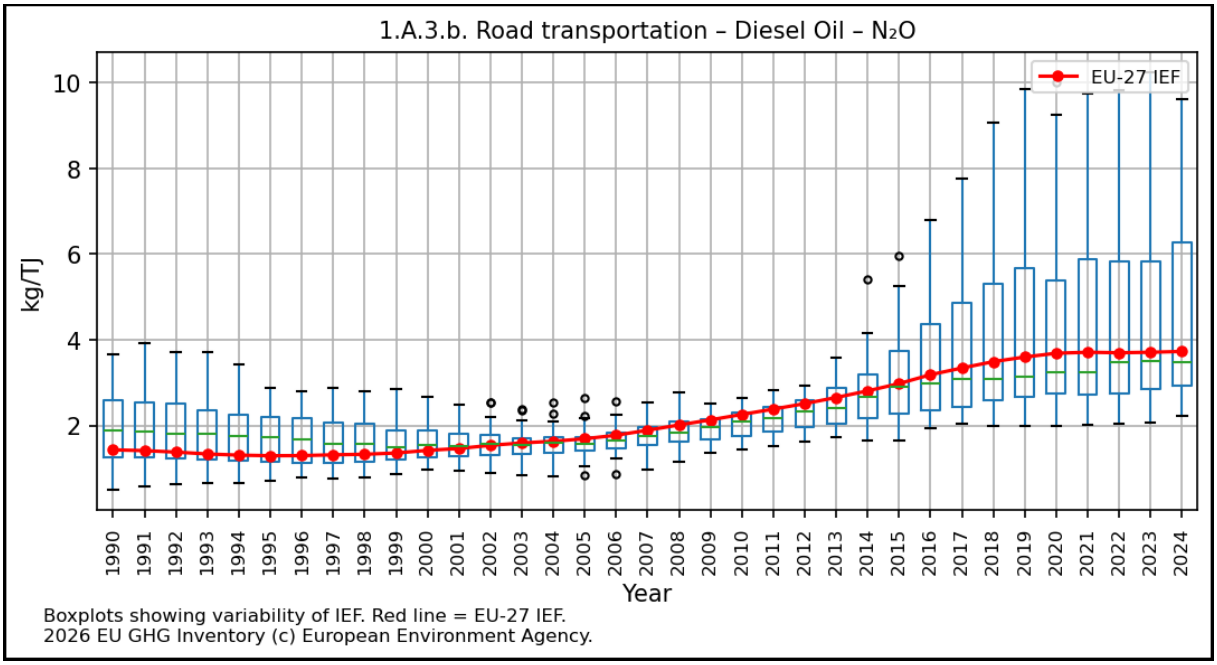


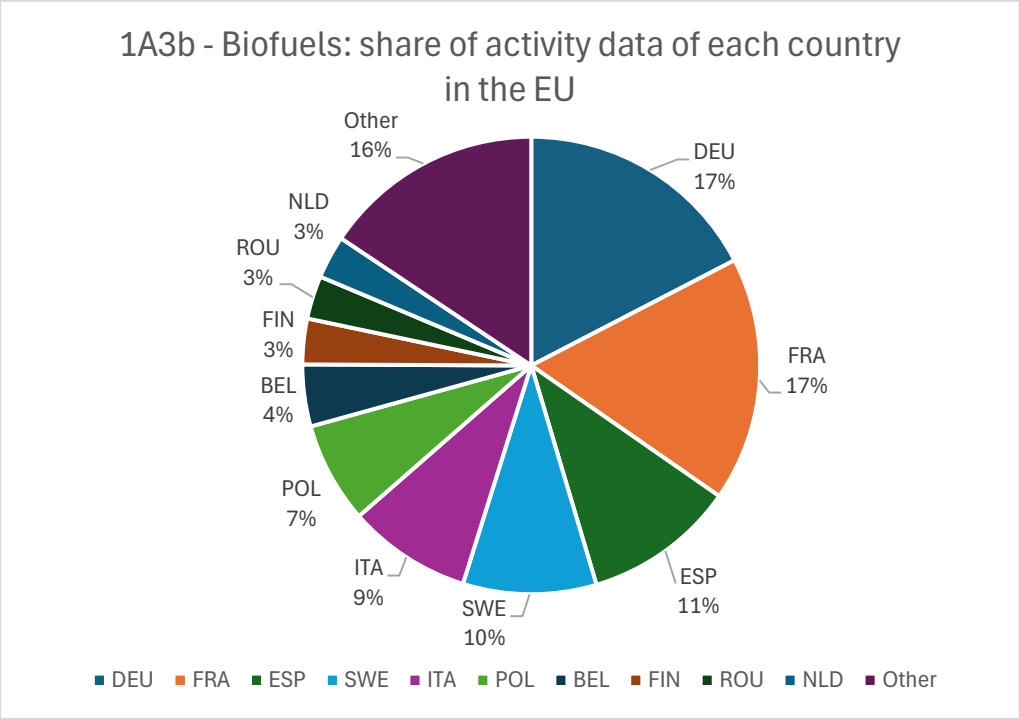
Figure 3.106 1A3b Road Transportation – Diesel Oil: N_2O Implied Emission Factor (IEF) in EU (in kg/TJ)



1A3b Road Transportation – Biofuels (activity data)

Figure 3.107 shows the share of activity data biofuels of each country in EU (%) in 2024. Top five countries in 2024 were France, Germany, Italy, Sweden, and Spain, which accounted for the 64 % of the EU value.

Figure 3.107 1A3b Road Transportation – Biofuels: Share of activity data of each country in EU (%)



3.6.3.3 Railways (1A3c) (EU)

The mobile source category 1A3c Railways includes all types of locomotives operating mainly on liquid fuels; in addition, there is a small part of solid fuels usage.

CO_2 emissions from 1A3c Railways

CO_2 emissions from railways accounted only for 0.11 % of total GHG emissions in EU, 2024 (including indirect CO_2, with LULUCF and international aviation). Considering only railways, CO_2 accounted for 95.7 % of total GHG emissions from railways in EU, 2024.

The time series of CO_2 emissions and activity data from 1A3c Railways, years 1990-2024, are shown in Figure 3.108. From this figure it can be observed that the largest contribution to emissions comes from the usage of liquid fuels.

Figure 3.108 1A3c Railways: CO_2 emissions (in Mt) and activity data (in TJ)

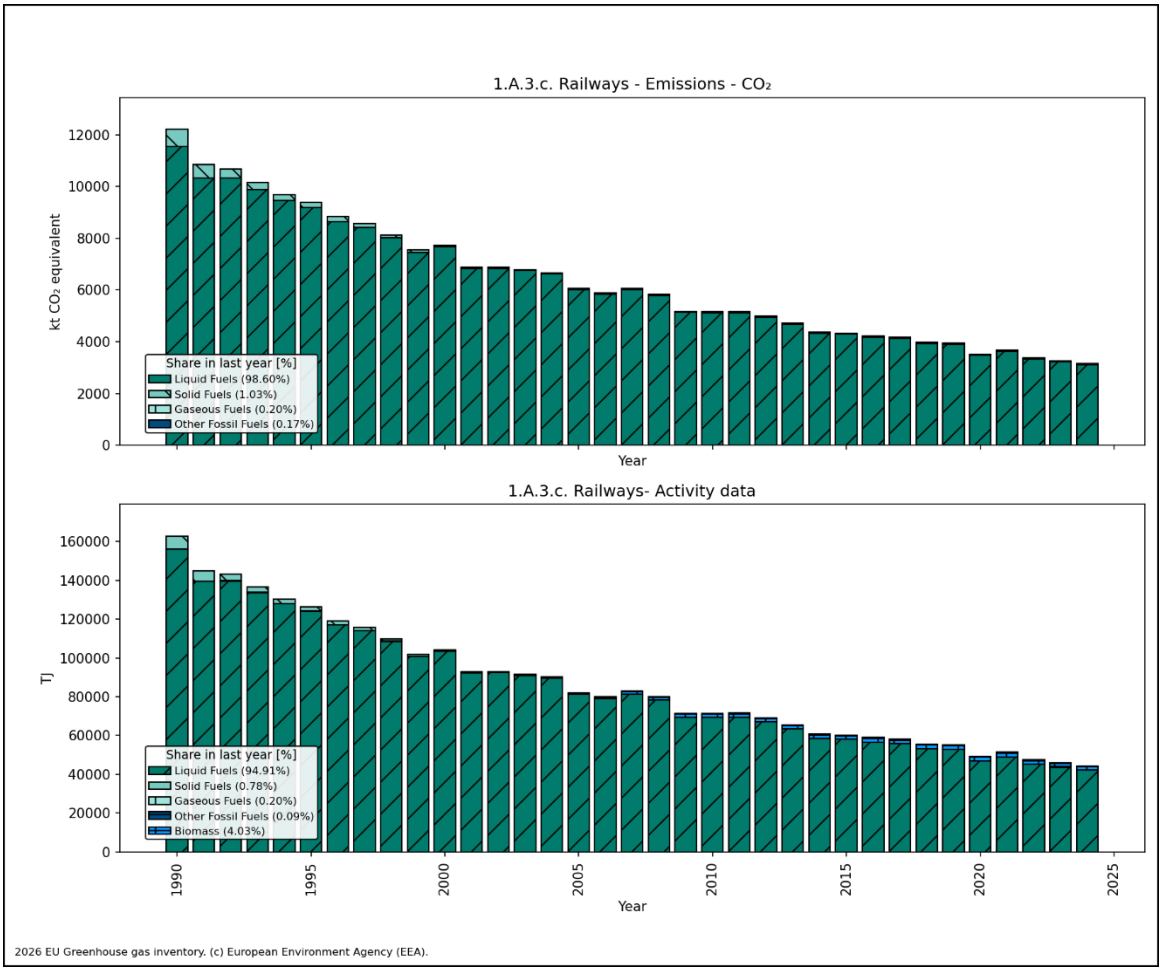


Table 3.69 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for 1A3c Railways. Between 1990 and 2024, CO_2 emissions decreased by 74 % in the EU, while between 2023 and 2024 the corresponding change was 3 % decrease. Top three countries in 2024 were Germany, Romania, and France, which accounted for the 46 % of the EU value.

Table 3.69 1A3c Railways: CO_2 emissions per country (in kt), share in EU (%), change, method and EF information

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	178	73	68	2,2%	-110	-62%	-5	-7%	NA,T2	CS,D,NA
Belgium	227	71	69	2,2%	-158	-69%	-1	-2%	NA,T1	CS,D,NA
Bulgaria	323	30	31	1,0%	-292	-90%	1	5%	NA,T1	D,NA
Croatia	140	38	54	1,7%	-86	-61%	16	41%	NA,T1	D,NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	768	219	216	6,8%	-552	-72%	-3	-1%	NA,T1,T2	CS,D,NA
Denmark	297	165	166	5,3%	-132	-44%	0	0%	NA,T2	D,NA,OTH
Estonia	159	42	43	1,4%	-117	-73%	0	0%	NA,T2	CS,NA
Finland	191	56	45	1,4%	-146	-76%	-10	-18%	NA,T2	CS,NA
France	1 078	379	396	12,6%	-683	-63%	17	5%	T2	CS
Germany	3 133	777	743	23,6%	-2 390	-76%	-34	-4%	CS,M,T1	CS,D,M,NA
Greece	199	13	12	0,4%	-187	-94%	-1	-4%	NA,T2	CS,NA
Hungary	534	105	102	3,2%	-432	-81%	-3	-3%	NA,T1,T2	CS,D,NA
Ireland	133	123	132	4,2%	-1	-1%	8	7%	NA,T2	CS,NA
Italy	613	37	18	0,6%	-595	-97%	-19	-51%	NA,T2	CS,NA
Latvia	537	67	49	1,5%	-488	-91%	-19	-28%	NA,T1,T2	CS,D,NA
Lithuania	350	86	82	2,6%	-268	-76%	-3	-4%	NA,T1,T2	CS,D,NA
Luxembourg	25	6	6	0,2%	-19	-77%	-1	-11%	NA,T1,T2	CS,D,NA
Malta	NA,NO	NA,NO	NA,NO	-	-	-	-	-	NA	NA
Netherlands	91	68	59	1,9%	-32	-35%	-8	-13%	NA,T2	CS,NA
Poland	1 624	257	252	8,0%	-1 372	-84%	-5	-2%	NA,T1	D,NA
Portugal	177	24	24	0,8%	-153	-87%	0	-1%	NA,T1	D,NA
Romania	473	313	300	9,5%	-173	-37%	-13	-4%	NA,T1,T2	CS,D,NA
Slovakia	372	81	72	2,3%	-300	-81%	-9	-12%	NA,T1	CS,NA
Slovenia	65	21	21	0,7%	-45	-69%	-1	-4%	NA,T1	D,NA
Spain	422	174	159	5,0%	-263	-62%	-15	-9%	NA,T1	D,NA
Sweden	103	39	36	1,2%	-67	-65%	-2	-6%	NA,T2	CS,NA
EU	**12 213**	**3 263**	**3 154**	**100%**	**-9 059**	**-74%**	**-109**	**-3%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

1A3c Railways – Liquid Fuels (CO_2)

CO_2 emissions from liquid fuels accounted for 94.3 % of total GHG emissions from railways in 2024. Table 3.70 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for 1A3c Railways – liquid fuels. Between 1990 and 2024, CO_2 emissions decreased by 73 % in the EU, while between 2023 and 2024 the corresponding change was 3 % decrease. Top three countries in 2024 were Germany, Romania, and France, which accounted for the 45 % of the EU value.

Table 3.70 1A3c Railways – Liquid Fuels: CO_2 emissions per country (in kt), share in EU (%), change, method and EF information

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	171	73	68	2,2%	-104	-61%	-5	-7%	T2	CS
Belgium	227	71	69	2,2%	-158	-69%	-1	-2%	T1	CS,D
Bulgaria	323	30	31	1,0%	-292	-90%	1	5%	T1	D
Croatia	119	38	54	1,7%	-65	-55%	16	41%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	768	217	214	6,9%	-554	-72%	-3	-1%	T2	CS
Denmark	297	158	159	5,1%	-138	-46%	1	1%	T2	D
Estonia	142	42	43	1,4%	-100	-70%	0	0%	T2	CS
Finland	191	56	45	1,5%	-146	-76%	-10	-18%	T2	CS
France	1 078	377	394	12,7%	-684	-63%	17	5%	T2	CS
Germany	2 858	743	710	22,8%	-2 148	-75%	-33	-4%	CS,M	CS,M
Greece	199	13	12	0,4%	-187	-94%	-1	-4%	T2	CS
Hungary	528	105	102	3,3%	-427	-81%	-3	-3%	T2	CS
Ireland	133	123	132	4,2%	-1	-1%	8	7%	T2	CS
Italy	613	37	18	0,6%	-595	-97%	-19	-51%	T2	CS
Latvia	537	67	49	1,6%	-488	-91%	-19	-28%	T2	CS
Lithuania	350	85	82	2,6%	-268	-77%	-3	-4%	T2	CS
Luxembourg	25	6	6	0,2%	-19	-77%	-1	-11%	T2	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	91	67	59	1,9%	-32	-35%	-8	-13%	T2	CS
Poland	1 319	257	252	8,1%	-1 067	-81%	-5	-2%	T1	D
Portugal	177	24	24	0,8%	-153	-87%	0	-1%	T1	D
Romania	440	313	300	9,6%	-140	-32%	-13	-4%	T1,T2	CS,D
Slovakia	372	81	72	2,3%	-300	-81%	-9	-12%	T1	CS
Slovenia	65	21	21	0,7%	-45	-69%	-1	-4%	T1	D
Spain	422	174	159	5,1%	-263	-62%	-15	-9%	T1	D
Sweden	103	39	36	1,2%	-67	-65%	-2	-6%	T2	CS
EU	**11 549**	**3 218**	**3 110**	**100%**	**-8 439**	**-73%**	**-108**	**-3%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

Figure 3.109 shows the time series of CO_2 emissions in EU from railways – liquid fuels and the highest shares of countries. Figure 3.110 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the CO_2 IEF at EU level is almost constant over the years at 73.8 - 74 t/TJ.

Figure 3.109 1A3c Railways – Liquid Fuels: Time series of CO_2 emissions in EU and highest shares of countries

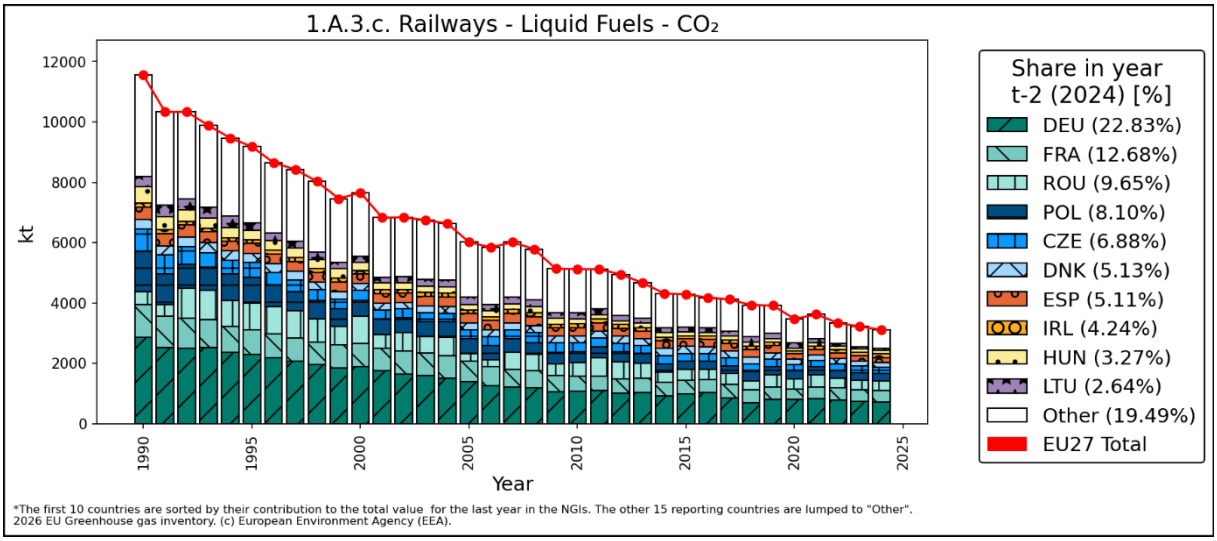
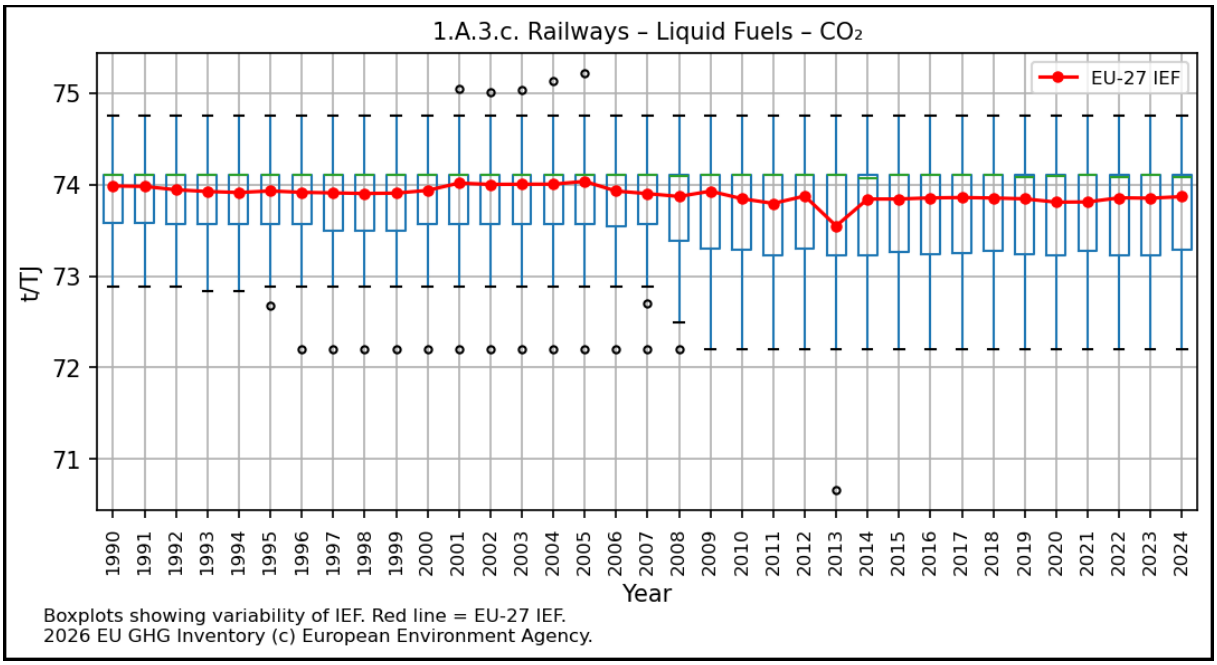


Figure 3.110 1A3c Railways – Liquid Fuels: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



3.6.3.4 Domestic Navigation (1A3d) (EU)

This mobile source category includes emissions from domestic waterborne transport, i.e. passenger and freight activity of trips having their origin and destination (O-D) within the same country. The main fuel used is gas/diesel oil, followed by residual fuel oil, while there is also a small part of gasoline. The emissions from military mobile sources related to navigation are excluded from 1A3d and are reported separately under category 1A5b (Other mobile military use). Fishing vessels are also excluded, and they are reported separately under category 1A4ciii (Other sectors – Fishing).

CO_2 emissions from 1A3d Domestic Navigation

CO_2 emissions from domestic navigation accounted only for 0.6 % of total GHG emissions in EU, 2024 (including indirect CO_2, with LULUCF and international aviation). Considering only domestic navigation, CO_2 accounted for 98.1 % of total GHG emissions from domestic navigation in EU, 2024.

The time series of CO_2 emissions and activity data from 1A3d Domestic navigation, years 1990-2024, are shown in Figure 3.111. From this figure it can be observed that the largest contribution to emissions comes from the usage of gas/diesel oil, followed by residual fuel oil.

Figure 3.111 1A3d Domestic Navigation: CO_2 emissions (in Mt) and activity data (in TJ)

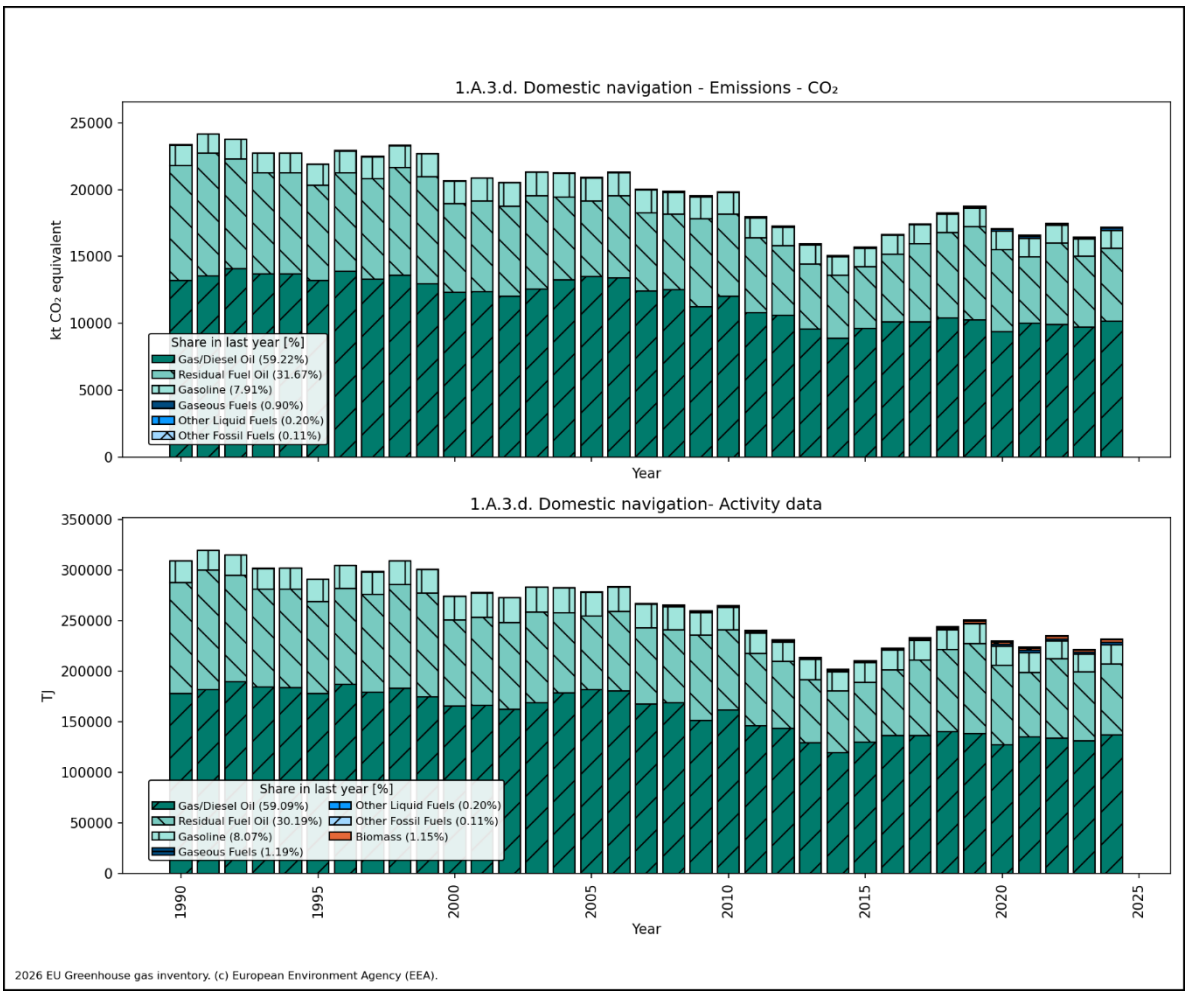


Table 3.71 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for 1A3d Domestic Navigation. Between 1990 and 2024, CO_2 emissions decreased by 26 % in the EU, while between 2023 and 2024 the corresponding change was 4 % increase. Top three countries in 2024 were Italy, Spain, and Greece, which accounted for the 59 % of the EU value.

Table 3.71 1A3d Domestic Navigation: CO_2 emissions per country (in kt), share in EU (%), change, method and EF information

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	28	69	73	0,4%	45	160%	4	5%	NA,T2	CS,D,NA
Belgium	394	370	375	2,2%	-19	-5%	5	1%	NA,T1,T3	CS,D,NA
Bulgaria	56	6	6	0,0%	-50	-89%	0	7%	NA,T1	D,NA
Croatia	134	148	155	0,9%	20	15%	7	4%	NA,T1	D,NA
Cyprus	2	6	7	0,0%	4	197%	1	12%	NA,T1	D,NA
Czechia	53	13	9	0,1%	-44	-82%	-3	-25%	NA,T2	CS,NA
Denmark	709	444	408	2,4%	-300	-42%	-36	-8%	NA,T2	CS,D,NA,OTH
Estonia	22	20	20	0,1%	-2	-8%	0	0%	NA,T2	CS,NA
Finland	441	315	288	1,7%	-153	-35%	-27	-9%	NA,T2	CS,NA
France	2 955	1 659	1 713	10,0%	-1 242	-42%	54	3%	T1	CS,D,OTH,PS
Germany	3 014	1 345	1 411	8,2%	-1 603	-53%	65	5%	CS,M,NA,T1	CS,M,NA
Greece	1 809	2 059	2 131	12,4%	322	18%	72	3%	NA,T1	CS,NA
Hungary	209	10	13	0,1%	-196	-94%	3	33%	NA,T1	D,NA
Ireland	85	321	297	1,7%	213	250%	-23	-7%	NA,T2	CS,NA
Italy	5 470	4 613	5 012	29,2%	-458	-8%	399	9%	NA,T1,T2	CS,NA
Latvia	1	3	3	0,0%	2	177%	0	-12%	NA,T1,T2	CS,D,NA
Lithuania	15	8	8	0,0%	-8	-51%	0	-4%	NA,T1	CS,NA
Luxembourg	1	1	1	0,0%	-1	-57%	0	-8%	NA,T1,T2	CS,D,NA
Malta	12	78	92	0,5%	81	683%	15	19%	NA,T1	D,NA
Netherlands	726	1 042	1 139	6,6%	413	57%	97	9%	NA,T2	CS,NA
Poland	151	19	25	0,1%	-125	-83%	6	32%	NA,T1	D,NA
Portugal	263	293	301	1,8%	38	15%	8	3%	NA,NO,T2	D,NA,NO
Romania	1 142	150	137	0,8%	-1 005	-88%	-12	-8%	NA,T2	CS,NA
Slovakia	0	5	6	0,0%	5	24373%	0	3%	NA,T1	CS,NA
Slovenia	0	0	0	0,0%	0	417%	0	-3%	NA,T1	D,NA
Spain	5 203	2 776	2 917	17,0%	-2 286	-44%	141	5%	NA,T1,T2	CS,D,NA
Sweden	452	674	621	3,6%	169	37%	-52	-8%	NA,T2	CS,NA
EU	**23 348**	**16 443**	**17 166**	**100%**	**-6 182**	**-26%**	**723**	**4%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

1A3d Domestic Navigation – Gas/Diesel Oil (CO_2)

CO_2 emissions from gas/diesel oil accounted for 58.1 % of total GHG emissions from domestic navigation in 2024. Table 3.72 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for 1A3d Domestic navigation – gas/diesel oil. Between 1990 and 2024, CO_2 emissions decreased by 23 % in the EU, while between 2023 and 2024 the corresponding change was 5 % increase. Top three countries in 2024 were Italy, Spain, Germany, and Italy, which accounted for the 54 % of the EU value.

Table 3.72 1A3d Domestic Navigation – Gas/Diesel Oil: CO_2 emissions per country (in kt), share in EU (%), change, method and EF information

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	18	63	66	0,7%	48	261%	4	6%	T2	CS
Belgium	394	370	375	3,7%	-19	-5%	5	1%	T1,T3	CS,D
Bulgaria	56	6	6	0,1%	-50	-89%	0	7%	T1	D
Croatia	128	148	154	1,5%	27	21%	7	4%	T1	D
Cyprus	2	6	7	0,1%	4	196%	1	12%	T1	D
Czechia	53	13	9	0,1%	-44	-82%	-3	-25%	T2	CS
Denmark	350	330	310	3,0%	-40	-11%	-20	-6%	T2	D
Estonia	22	20	20	0,2%	-2	-8%	0	0%	T2	CS
Finland	186	181	143	1,4%	-43	-23%	-37	-21%	T2	CS
France	696	579	587	5,8%	-109	-16%	8	1%	T1	CS,D,OTH,PS
Germany	2 754	1 288	1 344	13,2%	-1 410	-51%	56	4%	CS	CS,M
Greece	1 063	1 001	1 020	10,0%	-43	-4%	19	2%	T1	CS
Hungary	28	10	13	0,1%	-16	-55%	3	33%	T1	D
Ireland	22	321	297	2,9%	275	1239%	-23	-7%	T2	CS
Italy	2 326	2 281	2 463	24,2%	137	6%	181	8%	T1,T2	CS
Latvia	1	3	2	0,0%	2	193%	0	-11%	T2	CS
Lithuania	15	8	8	0,1%	-8	-51%	0	-4%	T1	CS
Luxembourg	1	1	1	0,0%	0	-48%	0	-9%	T2	CS
Malta	6	75	85	0,8%	78	1230%	10	13%	T1	D
Netherlands	697	926	1 008	9,9%	311	45%	81	9%	T2	CS
Poland	81	19	25	0,2%	-56	-69%	6	32%	T1	D
Portugal	73	81	79	0,8%	6	8%	-2	-3%	T2	D
Romania	112	145	132	1,3%	21	19%	-12	-9%	T2	CS
Slovakia	0	5	6	0,1%	5	24373%	0	3%	T1	CS
Slovenia	0	0	0	0,0%	0	393%	0	1%	T1	D
Spain	3 960	1 476	1 720	16,9%	-2 240	-57%	244	17%	T1	D
Sweden	181	371	285	2,8%	104	58%	-86	-23%	T2	CS
EU	**13 226**	**9 726**	**10 165**	**100%**	**-3 061**	**-23%**	**440**	**5%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

Figure 3.112 shows the time series of CO_2 emissions in EU from domestic navigation – gas/diesel oil and the highest shares of countries. Figure 3.113 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the CO_2 IEF at EU level is almost constant over the years at 74 – 74.3 t/TJ.

Figure 3.112 1A3d Domestic Navigation – Gas/Diesel Oil: Time series of CO_2 emissions in EU and highest shares of countries

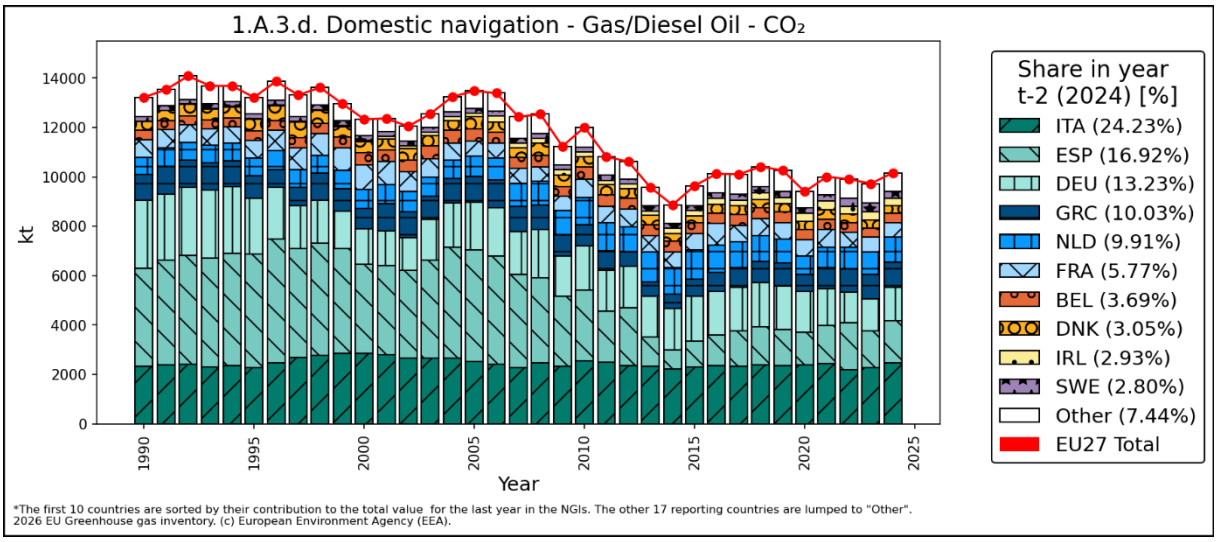
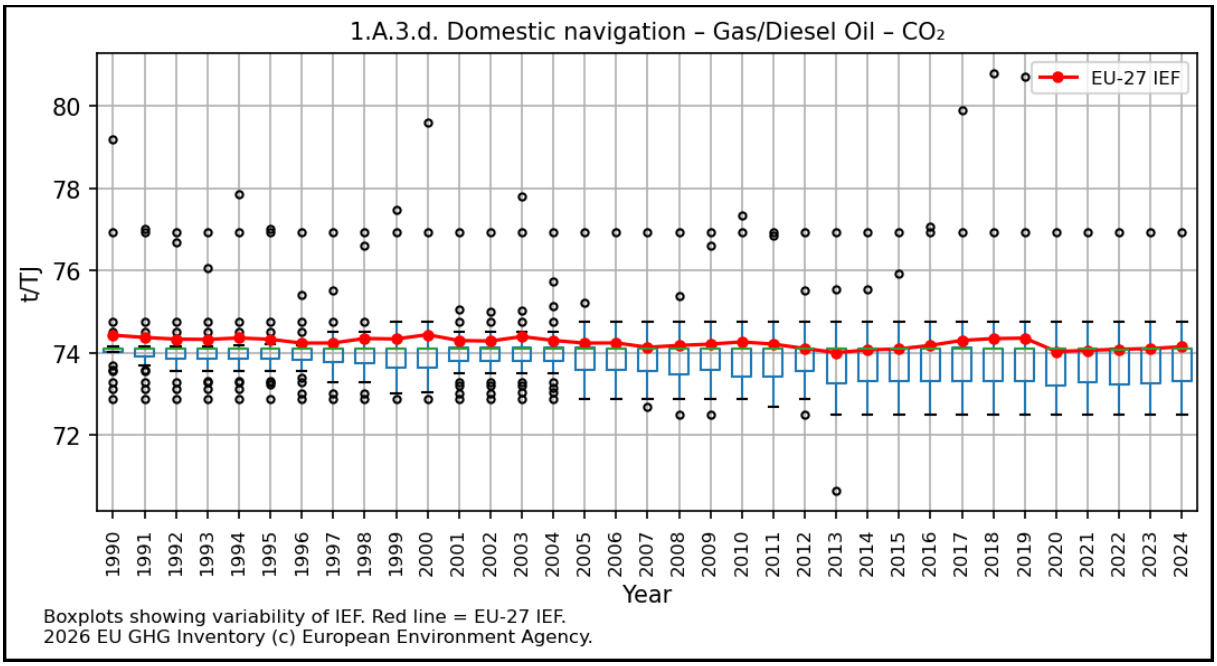


Figure 3.113 1A3d Domestic Navigation – Gas/Diesel Oil: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



1A3d Domestic Navigation – Residual Fuel Oil (CO_2)

CO_2 emissions from residual fuel oil accounted for 31.1 % of total GHG emissions from domestic navigation in 2024. Table 3.73 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for 1A3d Domestic navigation – residual fuel oil. Between 1990 and 2024, CO_2 emissions decreased by 36 % in the EU, while between 2023 and 2024 the corresponding change was 3 % increase. Top three countries in 2024 were Italy, Spain, and Greece, which accounted for the 85 % of the EU value.

Table 3.73 1A3d Navigation, residual fuel oil: Member States' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	NO	NO	-	-	-	-	-	NA	NA
Belgium	IE	IE	IE	-	-	-	-	-	NA	NA
Bulgaria	NO	NO	NO	-	-	-	-	-	NA	NA
Croatia	7	NO	NO	-	-7	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	NO	NO	NO	-	-	-	-	-	NA	NA
Denmark	359	109	93	1,7%	-266	-74%	-16	-15%	T2	CS
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	123	12	15	0,3%	-109	-88%	3	25%	T2	CS
France	1 712	288	325	6,0%	-1 387	-81%	37	13%	T1	CS,D,OTH,PS
Germany	240	16	18	0,3%	-222	-93%	2	14%	CS	CS,M
Greece	746	1 057	1 111	20,4%	365	49%	53	5%	T1	CS
Hungary	3	NO	NO	-	-3	-100%	-	-	NA	NA
Ireland	63	NO	NO	-	-63	-100%	-	-	NA	NA
Italy	2 576	2 122	2 299	42,3%	-276	-11%	177	8%	T1,T2	CS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	5	1	6	0,1%	1	12%	5	401%	T1	D
Netherlands	NO	NO	NO	-	-	-	-	-	NA	NA
Poland	70	NO	NO	-	-70	-100%	-	-	NA	NA
Portugal	190	211	222	4,1%	32	17%	10	5%	T2	D
Romania	1 030	NO	NO	-	-1 030	-100%	-	-	NA	NA
Slovakia	NO	NO	NO	-	-	-	-	-	NA	NA
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	1 242	1 300	1 196	22,0%	-46	-4%	-103	-8%	T2	CS
Sweden	195	164	153	2,8%	-42	-22%	-11	-7%	T2	CS
EU	**8 560**	**5 280**	**5 437**	**100%**	**-3 123**	**-36%**	**157**	**3%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

Figure 3.114 shows the time series of CO_2 emissions in EU from domestic navigation – residual fuel oil and the highest shares of countries. Figure 3.115 shows the CO_2 implied emission factor (IEF) in EU and its variability due to differences among countries. It is observed that the CO_2 IEF at EU level is almost constant over the years at 77.6 - 78.0 t/TJ.

Figure 3.114 1A3d Domestic Navigation – Residual Fuel Oil: Time series of CO_2 emissions in EU and highest shares of countries

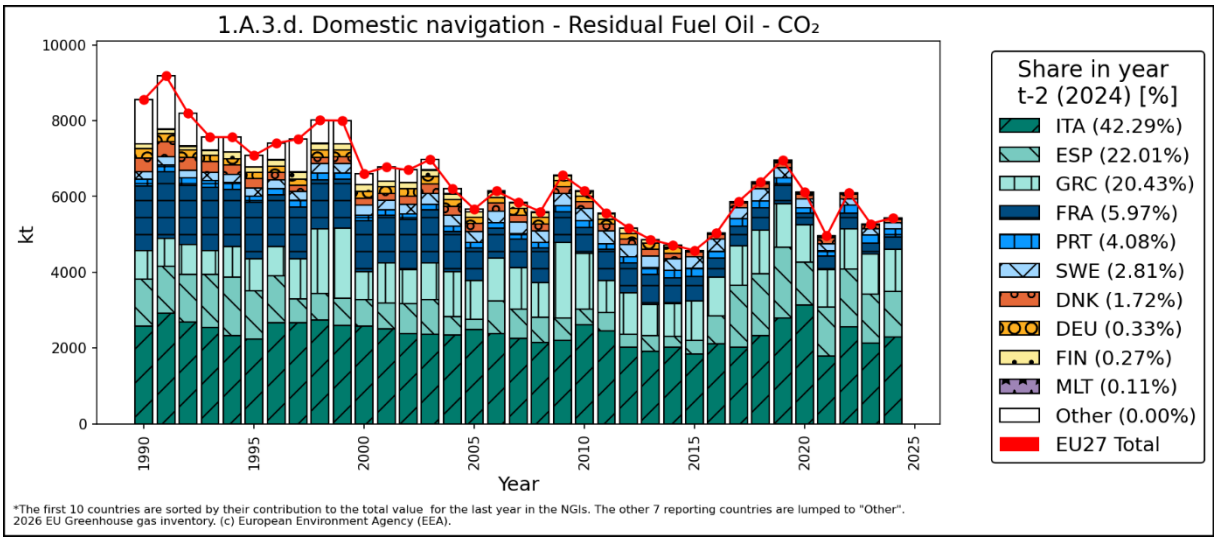
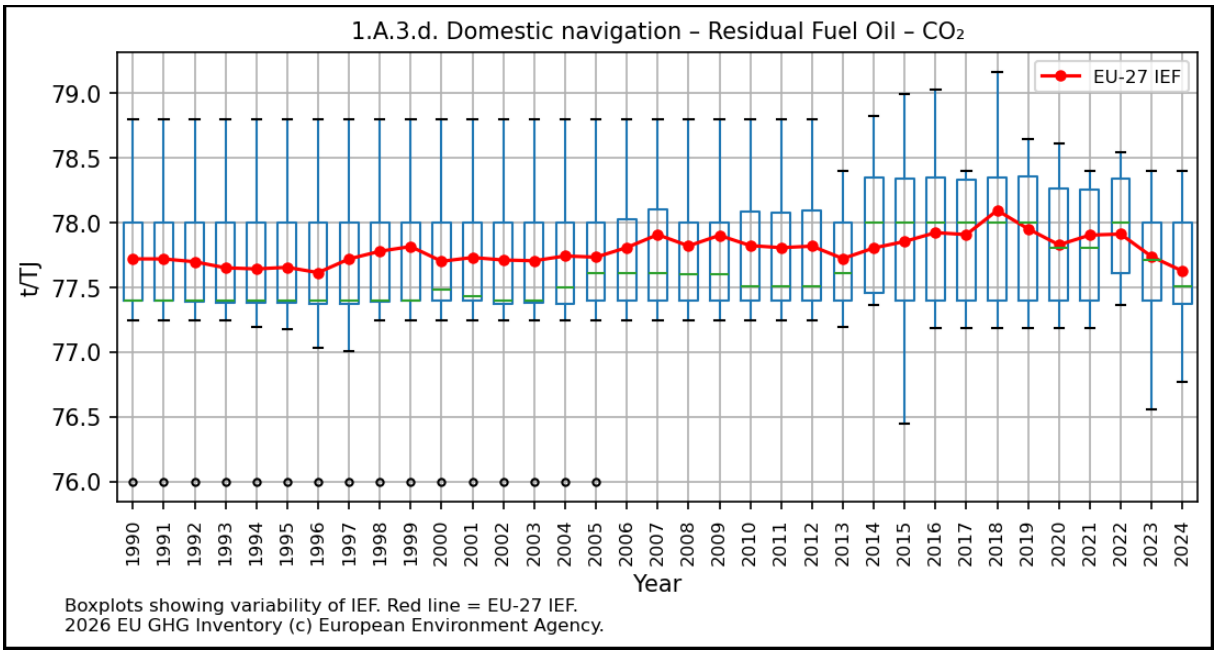


Figure 3.115 1A3d Domestic Navigation – Residual Fuel Oil: CO_2 Implied Emission Factor (IEF) in EU (in t/TJ)



3.6.3.5 Other (1A3e) (EU)

This mobile source category includes mainly emissions from pipeline transport using gaseous fuels; in addition, there is a small part from ground activities in airports and harbours using liquid fuels.

CO_2 emissions from 1A3e Other

CO_2 emissions from 1A3e Other accounted only for 0.12% of total GHG emissions in EU, 2024 (including indirect CO_2, with LULUCF and international aviation).

Table 3.74 shows the CO_2 emissions per country and at EU level (in kt), share of each country in EU (%), change between years, method and EF information for 1A3e Other. Between 1990 and 2024, CO_2

emissions decreased by 41 % in the EU, while between 2023 and 2024 the corresponding change was 14 % decrease. Top three countries in 2024 were Italy, Germany, and Belgium, which accounted for the 50 % of the EU value.

Table 3.74 1A3e Other: CO_2 emissions per country (in kt), share in EU (%), change, method and EF information

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	229	36	38	1.1%	-191	-84%	1	4%	NA,T2	CS,NA
Belgium	334	498	364	10.2%	29	9%	-134	-27%	CS,NA,T3	D,NA
Bulgaria	132	220	303	8.5%	172	130%	83	38%	NA,T2	CS,NA
Croatia	NO	NO	NO	-	-	-	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	5	2	1	0.0%	-4	-82%	-1	-40%	NA,T2	CS,NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	90	208	209	5.8%	119	133%	2	1%	NA,T2	CS,NA
Finland	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
France	210	370	300	8.4%	90	43%	-70	-19%	NA,T2	CS,NA,PS
Germany	1 083	936	675	18.9%	-408	-38%	-261	-28%	CS,NA	CS,NA
Greece	NO	9	IE,NO	-	-	-	-9	-100%	NA	NA
Hungary	149	40	45	1.3%	-104	-70%	5	12%	NA,T2	CS,NA
Ireland	73	149	155	4.3%	82	112%	6	4%	NA,T2	CS,NA
Italy	411	946	748	20.9%	337	82%	-198	-21%	NA,T2	CS,NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	64	49	42	1.2%	-22	-34%	-6	-13%	NA,T2	CS,NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NA,NO	NA,NO	NA,NO	-	-	-	-	-	NA	NA
Netherlands	342	73	84	2.4%	-258	-75%	11	15%	NA,T2	CS,NA
Poland	NO	87	84	2.3%	84	∞	-3	-3%	NA,T1	D,NA
Portugal	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA,NO	NA,NO
Romania	65	19	21	0.6%	-45	-68%	2	9%	NA,T1,T2	CS,D,NA
Slovakia	1 814	21	14	0.4%	-1 800	-99%	-7	-33%	NA,T2	CS,NA
Slovenia	NA,NO	0	1	0.0%	1	∞	0	715%	NA,T2	CS,NA
Spain	19	185	123	3.4%	104	543%	-62	-33%	NA,T1	CS,D,NA
Sweden	1 030	321	371	10.4%	-658	-64%	50	16%	T2	CS
EU	**6 051**	**4 169**	**3 578**	**100%**	**-2 473**	**-41%**	**-590**	**-14%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Methods and emission factor information refer to the last inventory year.

3.6.4 Other Sectors (CRT Source Category 1.A.4)

Category 1.A.4. mainly includes emissions from 'small scale fuel combustion' used for space heating and hot water production in commercial and institutional buildings, households, agriculture and forestry. It includes also emissions from mobile machinery used within these categories (e.g. mowers, harvesters, tractors, chain saws, motor pumps) as well as fuel used for grain drying, horticultural greenhouse heating or CO_2 fertilization and stall heating. Category 1.A.4.c includes emissions from domestic inland, coastal, deep sea and international fishing. Emissions from transportation of agricultural goods are reported under category 1.A.3 Transport. The emissions reported under 1.A.4 can be generally defined as heat production processes for internal consumption.

The main driving force for CO_2 emissions in the 1.A.4 in energy consumption is the combustion for purposes of space heating. The fluctuations in consumption can be ascribed to differences in cold winter periods. The trend in eventually decreasing CO_2 emissions is a result of higher standards for new buildings and of successful execution of energy-efficiency-oriented modernization of existing buildings.

The following enumeration shows the correspondence of 1.A.4 subcategories and ISIC 3.1 rev codes:

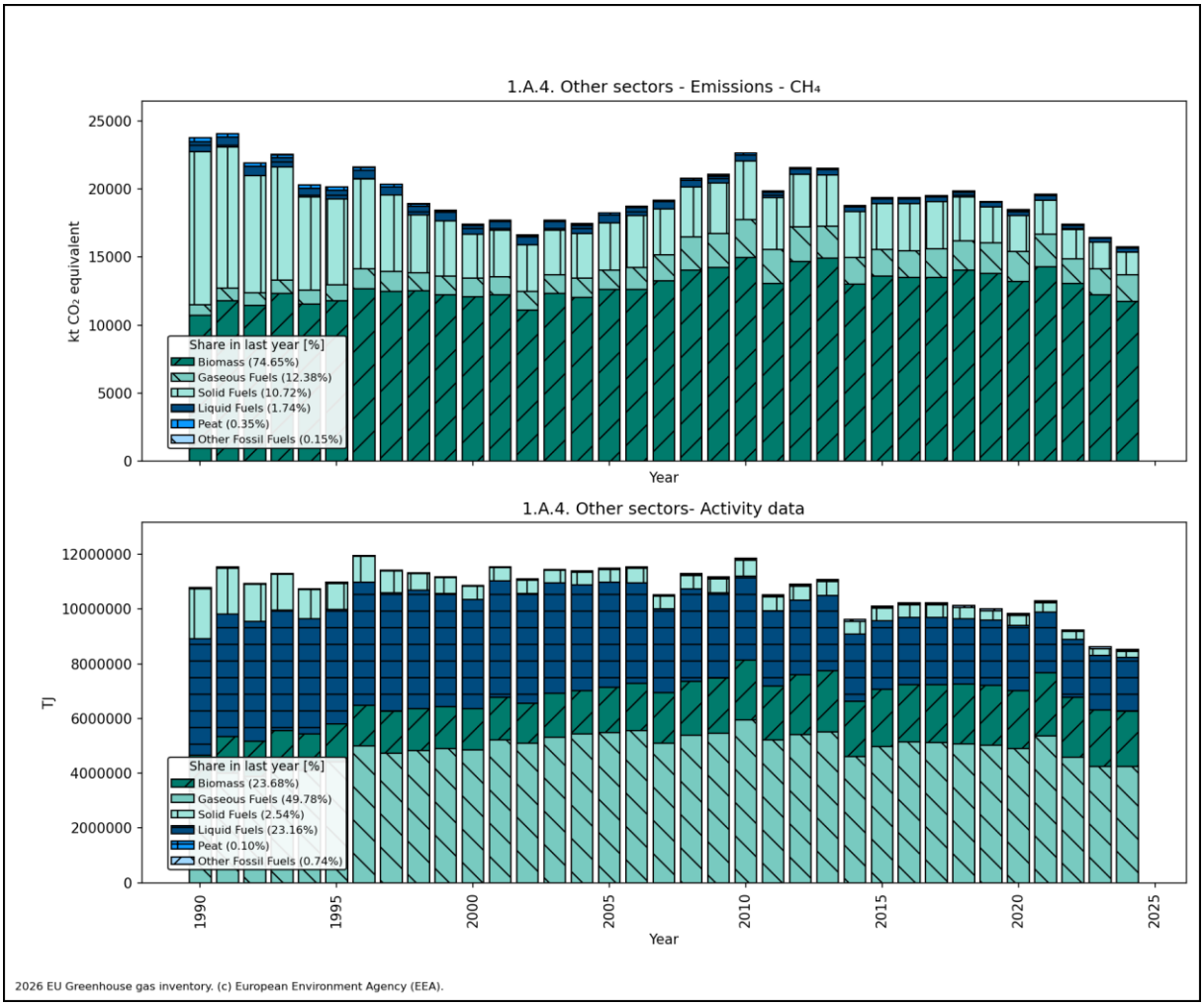
- 1.A.4.a Commercial/Institutional: ISIC categories 4103, 42, 6, 719, 72, 8, and 91-96
- 1.A.4.b Residential: All emissions from fuel combustion in households

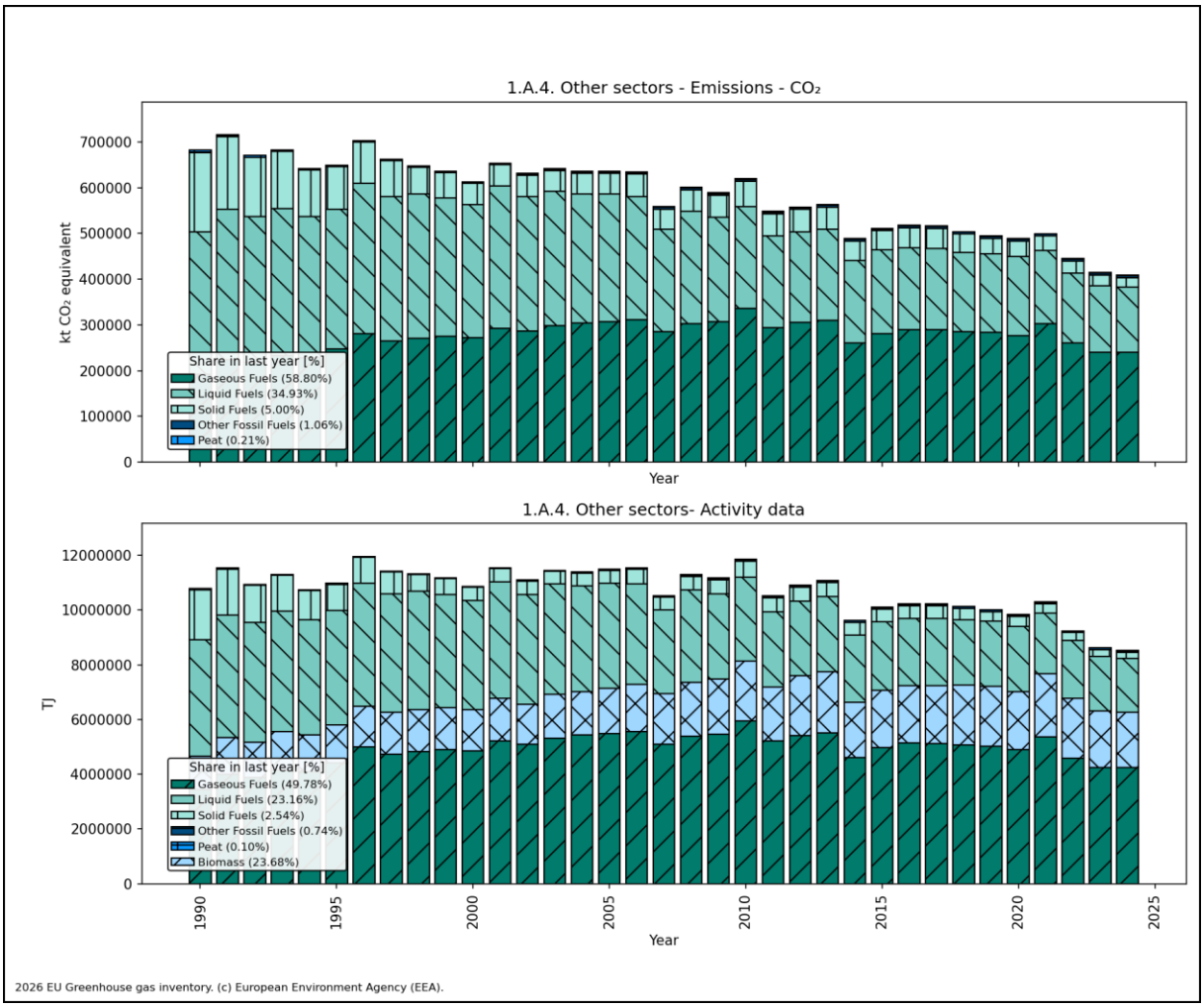
- 1.A.4.c Agriculture/Forestry/Fishing: ISIC categories 05, 11, 12, 1302

In 2024 category 1.A.4 contributed to 430 706 kt CO_2 equivalents of which 94.9% CO_2, 3.7% CH_4 and 1.4% N_2O.

Figure 3.116 shows the trend of total GHG emissions within source category 1.A.4 and the dominating sources that are CO_2 emissions from 1.A.4.b Residential and from 1.A.4.a Commercial/Institutional. The emission trends of the large key sources show larger fluctuations between 1990 and 2024. Between 1990 and 2024, emissions from 1.A.4 decreased by 40%. From 2023 to 2024 emissions decreased by 3% (13.4 Mt CO_2 equivalents) which is mainly due to the decrease of category 1.A.4.b Residential and 1.A.4.c Agriculture/Forestry/Fisheries CO_2 emissions which both decreased by 2%.

Figure 3.116 1.A.4. Other Sectors: Total, CO_2 and CH_4 emission trends





In 2024 GHG emissions from source category 1.A.4. accounted for 0.8% of total GHG emissions. This source category includes twelve key sources which contributed to 97.6% of total 1.A.4. GHG emissions in 2024. The following list shows the key sources and their contribution to total 1.A.4 GHG emissions for the year 2024:

1.A.4.a Commercial/Institutional: Gaseous Fuels (CO_2) - 16.5%

1.A.4.a Commercial/Institutional: Liquid Fuels (CO_2) - 4.3%

1.A.4.a Commercial/Institutional: Other Fuels (CO_2) - 1.0%

1.A.4.a Commercial/Institutional: Solid Fuels (CO_2) - 0.3%

1.A.4.b Residential: Biomass (CH_4) - 2.5%

1.A.4.b Residential: Gaseous Fuels (CO_2) - 36.8%

1.A.4.b Residential: Liquid Fuels (CO_2) - 16.5%

1.A.4.b Residential: Solid Fuels (CH_4) - 0.4%

1.A.4.b Residential: Solid Fuels (CO_2) - 4.1%

1.A.4.c Agriculture/Forestry/Fishing: Gaseous Fuels (CO_2) - 2.5%

1.A.4.c Agriculture/Forestry/Fishing: Liquid Fuels (CO_2) - 12.3%

1.A.4.c Agriculture/Forestry/Fishing: Solid Fuels (CO_2) - 0.3%

The following table shows the share of higher tier methods used for each key source of category 1.A.4. It comprises all methods and method combinations as reported by countries for any of the 1.A.4 key sources.

Table 3.75: Key source categories for level and trend analyses and share of EU emissions using higher tier methods for sector 1.A.4.

Source category gas	kt CO_2 eq.		Trend	Level		Share of higher Tier
	1990	2024		1990	2024	
1.A.4.a Commercial/institutional: Gaseous Fuels (CO_2)	50274	71025	T	L	L	94 %
1.A.4.a Commercial/institutional: Liquid Fuels (CO_2)	73164	18451	T	L	L	80 %
1.A.4.a Commercial/institutional: Other Fuels (CO_2)	748	4266	T	0	0	97 %
1.A.4.a Commercial/institutional: Solid Fuels (CO_2)	45123	1410	T	L	0	98 %
1.A.4.b Residential: Biomass (CH_4)	10427	10680	T	L	L	50 %
1.A.4.b Residential: Gaseous Fuels (CO_2)	129929	158417	T	L	L	94 %
1.A.4.b Residential: Liquid Fuels (CO_2)	174092	71264	T	L	L	83 %
1.A.4.b Residential: Solid Fuels (CH_4)	8905	1559	T	L	0	8 %
1.A.4.b Residential: Solid Fuels (CO_2)	118831	17628	T	L	L	98 %
1.A.4.c Agriculture/forestry/fishing: Gaseous Fuels (CO_2)	12287	10976	T	L	L	87 %
1.A.4.c Agriculture/forestry/fishing: Liquid Fuels (CO_2)	63562	53087	T	L	L	77 %
1.A.4.c Agriculture/forestry/fishing: Solid Fuels (CO_2)	9740	1427	T	L	0	97 %

The following table shows the share of specific tier methods used for each 1.A.4 category emission estimates. Most countries use combination of T1 and T2 method for emission estimates.

Table 3.76: Share of Tier methods for 1.A.4 by type of reported method and method combinations.

Methods and method combinations	Share of emissions which are estimated by specific Tier method
T1	0.8%
T1,T2	26.7%
T2	19.6%
T1,T2,T3	14.7%
CS,T1,T2	4.7%
CS,T1,T2,T3	33.5%

Table 3.77 shows total GHG, CO_2 and CH_4 emissions from 1.A.4. Other sectors. Between 1990 and 2024 CO_2 emissions from 1.A.4. Other Sectors decreased by 40%, CH_4 decreased by 34% and N_2O emissions decreased by 3%.

Table 3.77 1.A.4. Other Sectors: Member States' contributions to total GHG, CO_2 and CH_4 emissions

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024
Austria	14 285	6 760	13 543	6 302	571	322
Belgium	28 151	19 836	27 783	19 266	287	479
Bulgaria	8 146	1 281	7 654	1 022	320	195
Croatia	4 245	3 112	3 719	2 669	401	334
Cyprus	434	462	430	451	3	10
Czechia	33 991	9 462	31 955	8 540	1 879	793
Denmark	9 012	2 744	8 768	2 595	193	101
Estonia	1 800	418	1 718	398	76	15
Finland	7 750	3 096	7 490	2 873	183	178
France	98 318	57 965	91 788	54 587	5 222	2 120
Germany	209 594	106 936	204 021	105 450	4 692	1 118
Greece	8 643	5 121	8 066	4 850	267	208
Hungary	21 972	9 766	20 920	9 230	962	464
Ireland	10 513	7 733	9 916	7 534	505	120
Italy	78 868	66 160	76 042	62 478	1 278	1 982
Latvia	5 933	1 518	5 493	1 283	300	156
Lithuania	7 304	1 926	6 903	1 731	235	104
Luxembourg	1 361	1 334	1 343	1 314	13	16
Malta	265	135	264	133	1	1
Netherlands	39 958	25 159	39 274	23 622	638	1 489
Poland	57 185	43 608	53 442	39 447	3 142	3 197
Portugal	4 139	4 160	3 463	3 776	483	233
Romania	11 373	11 739	10 863	10 442	468	1 043
Slovakia	11 539	4 238	11 067	4 102	429	89
Slovenia	1 907	1 331	1 688	1 195	180	98
Spain	24 368	32 494	23 276	31 491	924	816
Sweden	10 935	2 213	10 723	2 099	132	57
EU	**711 988**	**430 706**	**681 612**	**408 880**	**23 783**	**15 737**

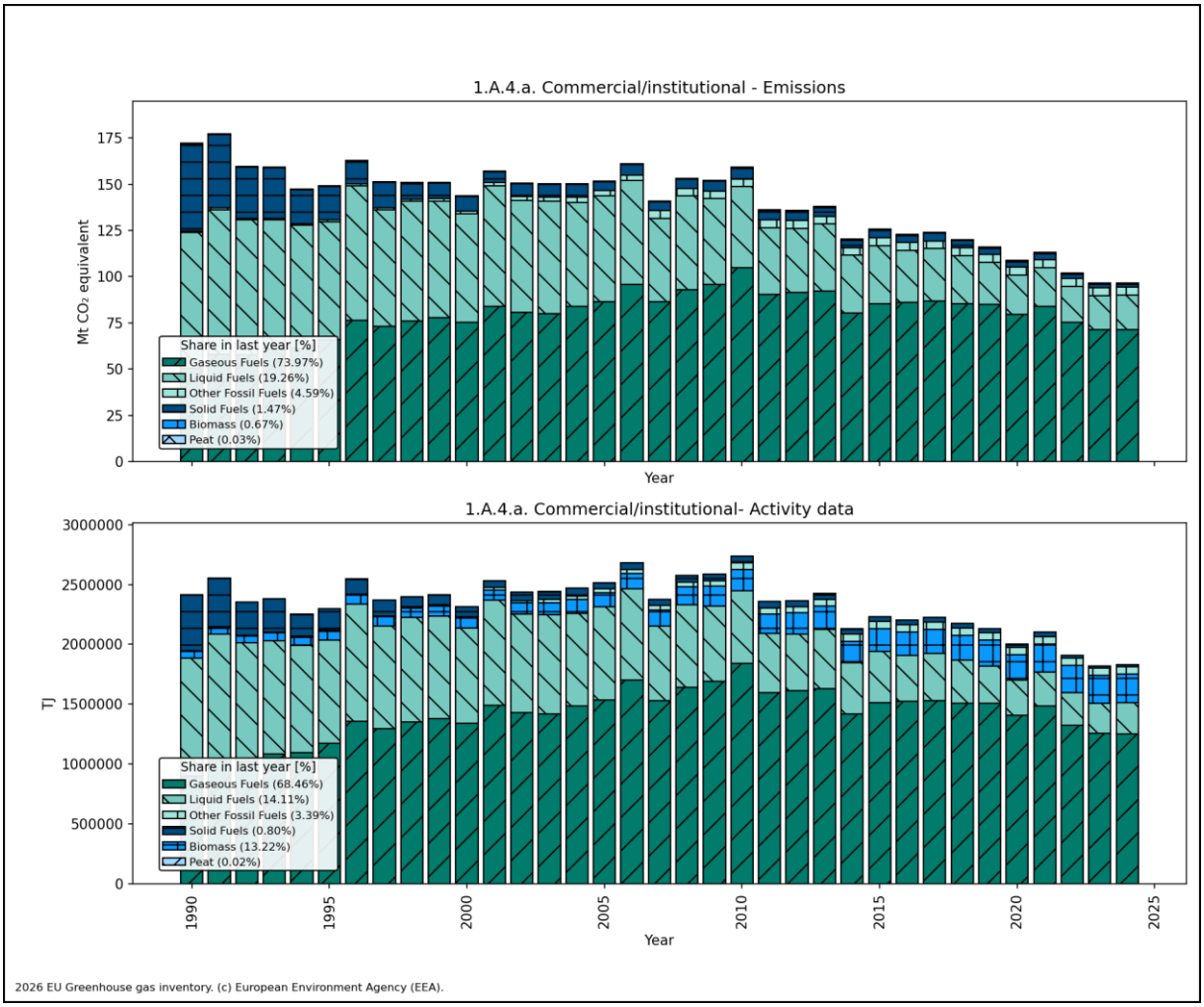
Abbreviations explained in the Chapter 'Units and abbreviations'.

3.6.4.1 Commercial/Institutional (1.A.4.a)

CO_2 emissions from 1.A.4.a Commercial/Institutional accounted for 22.1% of total GHG emissions from 1.A.4 Other in 2024 and were in total 95 181 kt CO_2 eq. The subcategory 1.A.4.a. includes all combustion sources that utilize heat combustion for heating production halls and operational buildings in institutions, commercial facilities, services and trade.

Figure 3.117 shows the emission trend within the category 1.A.4.a, which is mainly dominated by CO_2 emissions from gaseous fuels. Between 1990 and 2024 CO_2 emissions decreased by 44% (see also the Table 3.78), mainly due to decreases in CO_2 emissions from solid (-97%) and liquid (-75%) fuels while CO_2 emissions from gaseous fuels increased by 41% and show a fluctuating trend since 2006. Between 2023 and 2024 the GHG emissions decreased only by 47 kt CO_2 eq.

Figure 3.117 1.A.4.a Commercial/Institutional: Total emission and activity trends



Main factors influencing CO_2 emissions from this source category are (1) outdoor temperature, (2) number and size of offices, (3) building codes, (4) thermal properties of building stock, (5) fuel split for heating and warm water, (6) use of renewable energy sources, e.g. biomass or solar panels, and (7) use of district heating. Fuel consumption in 1.A.4.a decreased by 24% between 1990 and 2024 and biomass consumption increased by 351%.

Table 3.78 1.A.4.a Commercial/Institutional: Member States' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	2 292	1 010	1 084	1.1%	-1 208	-53%	73	7%	-	-
Belgium	4 170	4 378	4 457	4.7%	286	7%	79	2%	NA,T1,T2	CS,D,NA
Bulgaria	3 117	311	305	0.3%	-2 812	-90%	-6	-2%	NA	NA
Croatia	855	496	501	0.5%	-354	-41%	5	1%	-	-
Cyprus	75	103	106	0.1%	30	40%	2	2%	NA,T1	D,NA
Czechia	9 907	2 049	2 264	2.4%	-7 644	-77%	214	10%	NA	NA
Denmark	1 567	454	460	0.5%	-1 107	-71%	6	1%	NA,T2,T3	CR,CS,D,NA
Estonia	165	163	176	0.2%	12	7%	13	8%	T1,T2	CS,D
Finland	2 473	1 130	1 121	1.2%	-1 351	-55%	-9	-1%	NA,T2,T3	CS,NA
France	26 626	13 678	13 575	14.3%	-13 051	-49%	-103	-1%	T1,T2,T3	CS,D,OTH,PS
Germany	64 026	21 955	21 324	22.4%	-42 702	-67%	-631	-3%	-	-
Greece	519	647	719	0.8%	200	38%	72	11%	NA	NA
Hungary	2 766	2 014	1 913	2.0%	-854	-31%	-102	-5%	NA	NA
Ireland	2 121	1 324	1 430	1.5%	-690	-33%	106	8%	NA,T2	CS,NA
Italy	11 902	19 128	19 342	20.3%	7 440	63%	215	1%	NA	NA
Latvia	2 726	421	386	0.4%	-2 340	-86%	-35	-8%	-	-
Lithuania	3 059	295	256	0.3%	-2 802	-92%	-39	-13%	NA,T2	CS,NA
Luxembourg	639	457	409	0.4%	-230	-36%	-47	-10%	NA	NA
Malta	165	50	53	0.1%	-111	-68%	3	6%	NA,T1	D,NA
Netherlands	8 593	5 660	5 177	5.4%	-3 416	-40%	-483	-9%	NA,T2	CS,D,NA
Poland	9 715	5 262	5 556	5.8%	-4 159	-43%	294	6%	NA,T1,T2	CS,D,NA
Portugal	704	1 138	983	1.0%	278	40%	-155	-14%	NA	NA
Romania	IE,NO	2 250	1 968	2.1%	1 968	∞	-282	-13%	NA,T1,T2	CS,D,NA
Slovakia	4 148	1 333	1 302	1.4%	-2 846	-69%	-31	-2%	NA,T2	CS,NA
Slovenia	624	338	477	0.5%	-146	-23%	139	41%	NA,T1,T2	CS,D,NA
Spain	3 809	8 696	9 285	9.8%	5 476	144%	589	7%	CR,NA,T2	CR,CS,D,NA
Sweden	2 781	486	553	0.6%	-2 228	-80%	67	14%	T2	CS
EU	**169 542**	**95 228**	**95 181**	**100%**	**-74 360**	**-44%**	**-47**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.

1.A.4. a Commercial/Institutional – Liquid Fuels (CO_2)

In 2024 CO_2 emissions from liquid fuels had a share of 19% within source category 1.A.4.a (compared to 43% in 1990). Between 1990 and 2024, CO_2 emissions decreased by 75% (Table 3.79) to 17 938 kt

CO_2. Only three Member States increased the use of liquid fuels in the time series. Between 2023 and 2024 EU CO_2 emissions increased by 3%.

Table 3.79 1.A.4.a Commercial/Institutional, liquid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	1 420	217	208	1.1%	-1 211	-85%	-8	-4%
Belgium	2 163	963	978	5.3%	-1 185	-55%	15	2%
Bulgaria	2 986	113	102	0.6%	-2 883	-97%	-11	-10%
Croatia	526	93	89	0.5%	-437	-83%	-4	-5%
Cyprus	75	103	106	0.6%	30	40%	2	2%
Czechia	2 000	58	58	0.3%	-1 942	-97%	0	0%
Denmark	1 162	260	246	1.3%	-916	-79%	-15	-6%
Estonia	140	73	78	0.4%	-62	-44%	5	6%
Finland	2 423	1 013	991	5.4%	-1 432	-59%	-22	-2%
France	16 555	2 480	2 544	13.8%	-14 011	-85%	64	3%
Germany	28 053	3 503	3 615	19.6%	-24 438	-87%	112	3%
Greece	499	359	358	1.9%	-141	-28%	-1	0%
Hungary	864	77	80	0.4%	-784	-91%	3	5%
Ireland	1 759	548	586	3.2%	-1 173	-67%	38	7%
Italy	1 530	1 413	1 329	7.2%	-201	-13%	-84	-6%
Latvia	1 017	154	125	0.7%	-893	-88%	-29	-19%
Lithuania	1 166	9	10	0.1%	-1 157	-99%	1	8%
Luxembourg	469	268	209	1.1%	-260	-55%	-58	-22%
Malta	165	50	53	0.3%	-111	-68%	3	6%
Netherlands	734	773	725	3.9%	-9	-1%	-48	-6%
Poland	IE,NO	804	1 240	6.7%	1 240	∞	436	54%
Portugal	704	547	383	2.1%	-321	-46%	-164	-30%
Romania	IE,NO	249	239	1.3%	239	∞	-10	-4%
Slovakia	384	17	17	0.1%	-366	-96%	0	1%
Slovenia	391	221	308	1.7%	-83	-21%	86	39%
Spain	3 284	3 272	3 407	18.5%	122	4%	135	4%
Sweden	2 695	300	367	2.0%	-2 328	-86%	67	23%
EU	**73 164**	**17 938**	**18 451**	**100%**	**-54 713**	**-75%**	**512**	**3%**

Notes: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
From 1990 to 1993 Poland does not report any liquid fuels for stationary sources and reports liquid fuels from 'Off-road vehicles and other machinery' under category 1A3 and therefore the notation key 'IE, NO' is reported.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.118 and Figure 3.119 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Fuel consumption decreased by 73% between 1990 and 2024. The CO_2 implied emission factor for liquid fuels was 71.46 t/TJ in 2024.

Figure 3.118 1.A.4.a Commercial/Institutional, liquid fuels: Emission trend and share for CO_2

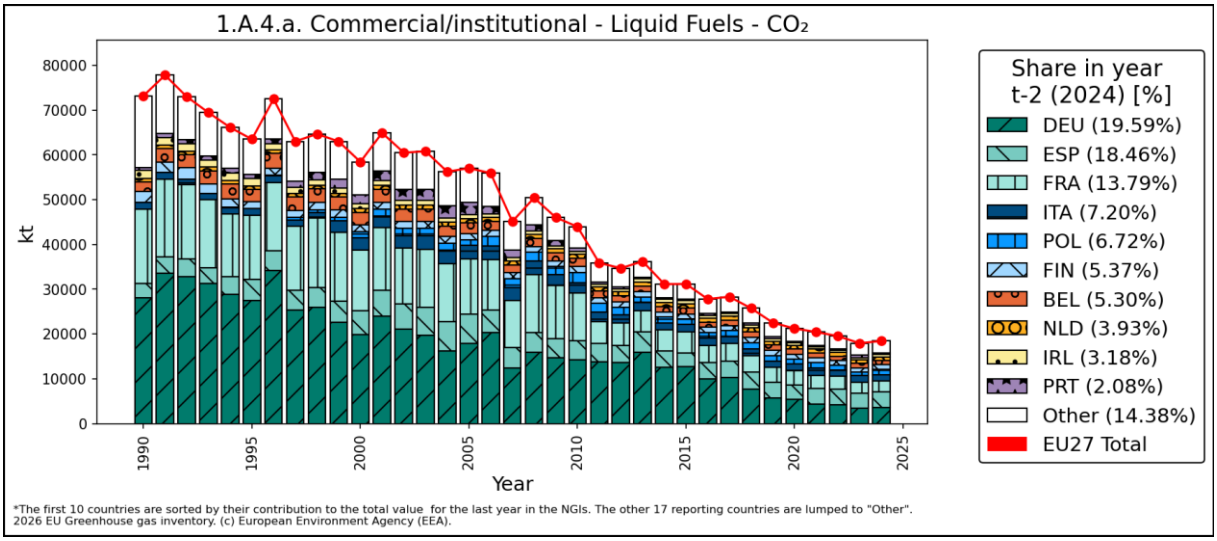
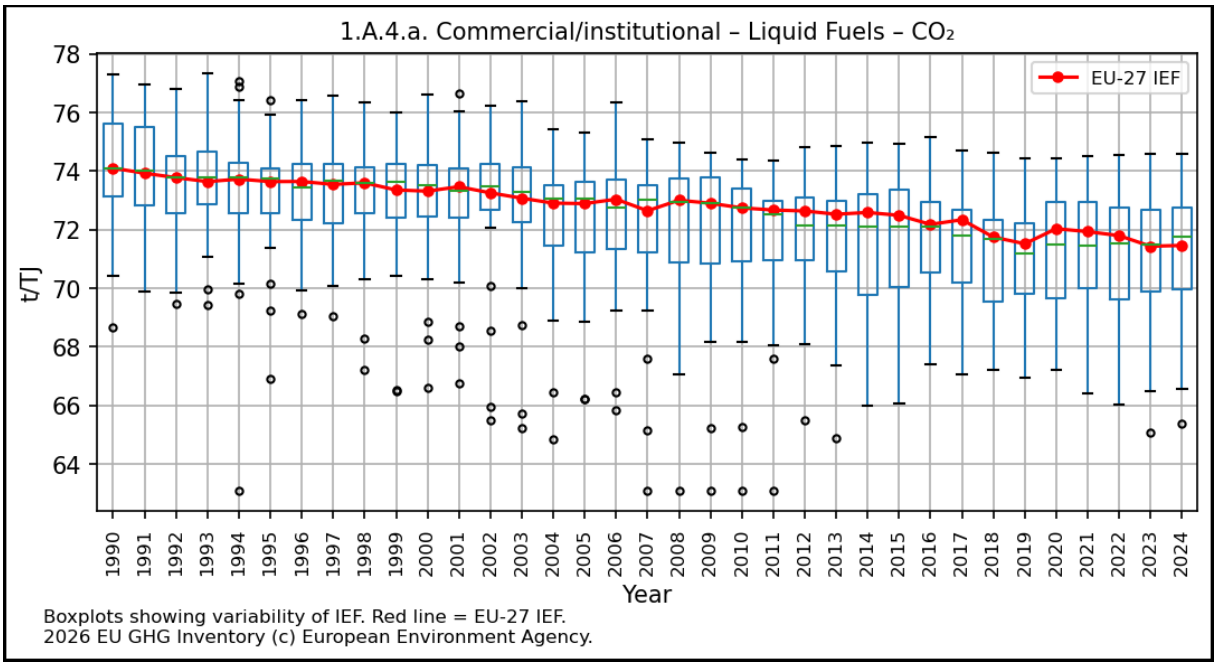


Figure 3.119 1.A.4.a Commercial/Institutional, liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.4.a Commercial/Institutional – Solid Fuels (CO_2)

In 2024, CO_2 from solid fuels had a share of 1.5% within source category 1.A.4.a (compared to 27% in 1990). Between 1990 and 2024 CO_2 emissions decreased by 97% (Table 3.80). Between 2023 and 2024 CO_2 emissions decreased by additional 23%.

Table 3.80 1.A.4.a Commercial/Institutional, solid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	91	NO	NO	-	-91	-100%	-	-
Belgium	9	0	0	0.0%	-9	-100%	0	0%
Bulgaria	89	7	5	0.3%	-84	-95%	-2	-32%
Croatia	88	IE,NO	IE,NO	-	-88	-100%	-	-
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	6 237	45	40	2.8%	-6 197	-99%	-5	-11%
Denmark	8	NO	NO	-	-8	-100%	-	-
Estonia	NO	2	1	0.1%	1	∞	-1	-62%
Finland	NO	NO	NO	-	-	-	-	-
France	2 078	119	117	8.3%	-1 961	-94%	-2	-2%
Germany	22 426	83	1	0.1%	-22 425	-100%	-82	-98%
Greece	20	NO	NO	-	-20	-100%	-	-
Hungary	473	2	1	0.1%	-471	-100%	-1	-50%
Ireland	3	1	1	0.1%	-2	-63%	0	0%
Italy	NO	NO	NO	-	-	-	-	-
Latvia	1 366	5	5	0.3%	-1 361	-100%	0	4%
Lithuania	1 173	49	19	1.3%	-1 154	-98%	-30	-61%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	101	NO	NO	-	-101	-100%	-	-
Poland	8 881	1 013	886	62.8%	-7 995	-90%	-127	-13%
Portugal	NO	NO	NO	-	-	-	-	-
Romania	IE,NO	0	0	0.0%	0	∞	0	49%
Slovakia	1 729	159	153	10.9%	-1 576	-91%	-6	-4%
Slovenia	203	NO	NO	-	-203	-100%	-	-
Spain	147	352	181	12.8%	35	24%	-171	-49%
Sweden	NO	NO	NO	-	-	-	-	-
EU	**45 123**	**1 836**	**1 410**	**100%**	**-43 713**	**-97%**	**-427**	**-23%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
The information on methodologies and emission factors is not available from the JSON on fuels level
Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Greece reports emissions from stationary combustion as 'NO' and emissions from mobile sources as 'IE'
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.120 and Figure 3.121 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Fuel consumption in the EU decreased by 97% between 1990 and 2024. The CO_2 implied emission factor for solid fuels was 96.03 t/TJ in 2024.

Figure 3.120 1.A.4.a Commercial/Institutional, solid fuels: Emission trend and share for CO_2

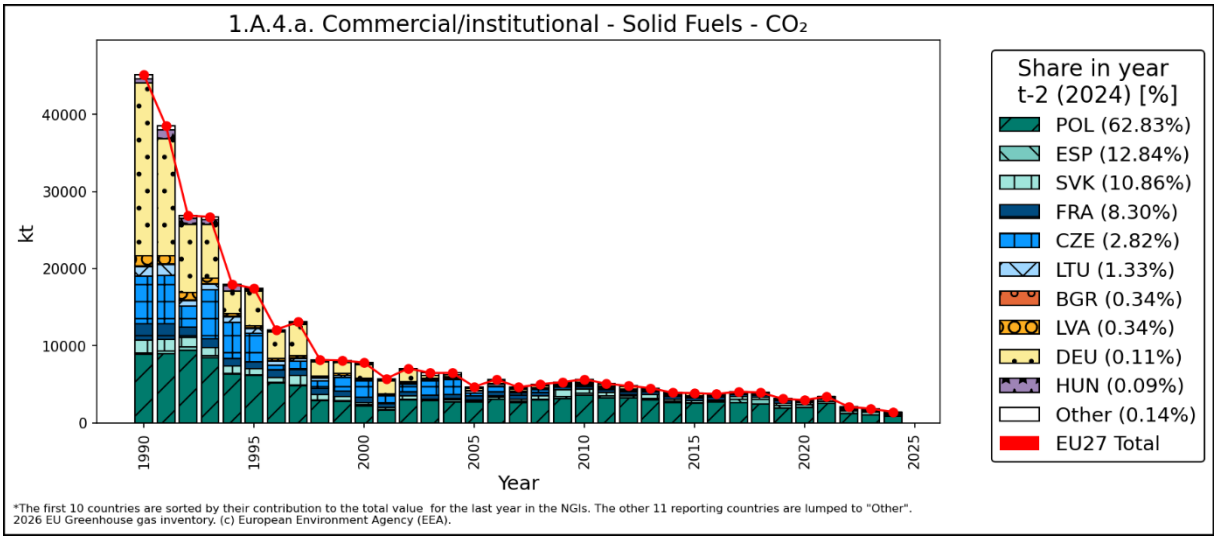
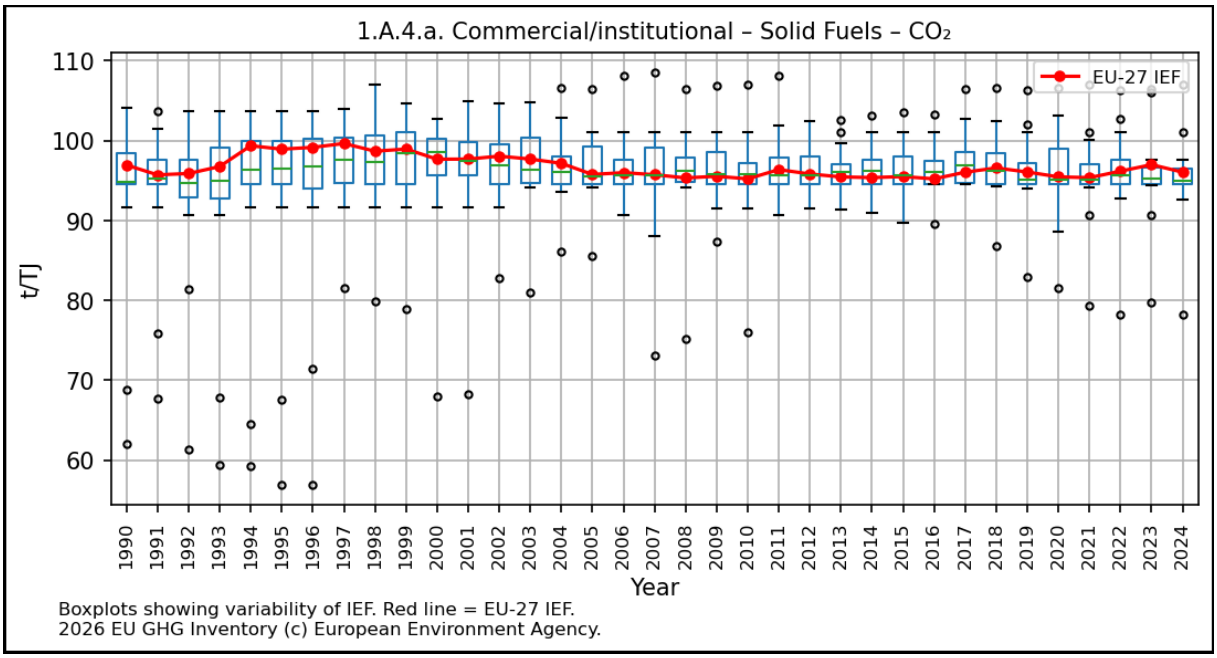


Figure 3.121 1.A.4.a Commercial/Institutional, solid fuels: of Implied Emission Factors for CO_2 (in t/TJ)



1.A.4.a Commercial/Institutional – Gaseous Fuels (CO_2)

In 2024 CO_2 from gaseous fuels had a share of 75% within source category 1.A.4.a (compared to 30% in 1990). Between 1990 and 2024, the emissions increased by 41% (Table 3.81). Between 2023 and 2024 CO_2 emissions decreased by 159 kt CO_2 eq.

Table 3.81 1.A.4.a Commercial/Institutional, gaseous fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	698	793	875	1.2%	177	25%	82	10%
Belgium	1 969	3 415	3 479	4.9%	1 510	77%	64	2%
Bulgaria	42	190	198	0.3%	156	370%	8	4%
Croatia	241	402	412	0.6%	172	71%	10	2%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	1 670	1 946	2 166	3.0%	496	30%	219	11%
Denmark	363	194	215	0.3%	-148	-41%	21	11%
Estonia	19	88	98	0.1%	79	423%	10	11%
Finland	37	106	120	0.2%	83	221%	14	13%
France	7 993	11 079	10 913	15.4%	2 921	37%	-166	-1%
Germany	13 547	18 366	17 706	24.9%	4 159	31%	-661	-4%
Greece	NO	288	361	0.5%	361	∞	72	25%
Hungary	1 429	1 763	1 678	2.4%	249	17%	-86	-5%
Ireland	224	775	843	1.2%	620	277%	68	9%
Italy	9 842	13 794	14 092	19.8%	4 250	43%	298	2%
Latvia	276	258	251	0.4%	-25	-9%	-7	-3%
Lithuania	708	214	213	0.3%	-494	-70%	0	0%
Luxembourg	170	189	200	0.3%	30	18%	11	6%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	7 758	4 886	4 451	6.3%	-3 307	-43%	-435	-9%
Poland	762	3 323	3 254	4.6%	2 492	327%	-69	-2%
Portugal	NO	591	600	0.8%	600	∞	9	2%
Romania	IE,NO	1 990	1 718	2.4%	1 718	∞	-273	-14%
Slovakia	2 035	1 157	1 132	1.6%	-903	-44%	-25	-2%
Slovenia	29	117	170	0.2%	141	480%	53	45%
Spain	379	5 073	5 698	8.0%	5 319	1405%	625	12%
Sweden	86	185	185	0.3%	99	115%	0	0%
EU	**50 274**	**71 184**	**71 025**	**100%**	**20 751**	**41%**	**-159**	**0%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.122 and Figure 3.123 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Fuel consumption increased by 39% between 1990 and 2024. The CO_2 implied emission factor for gaseous fuels was 56.69 t/TJ in 2024.

Figure 3.122 1.A.4.a Commercial/Institutional, gaseous fuels: Emission trend and share for CO_2

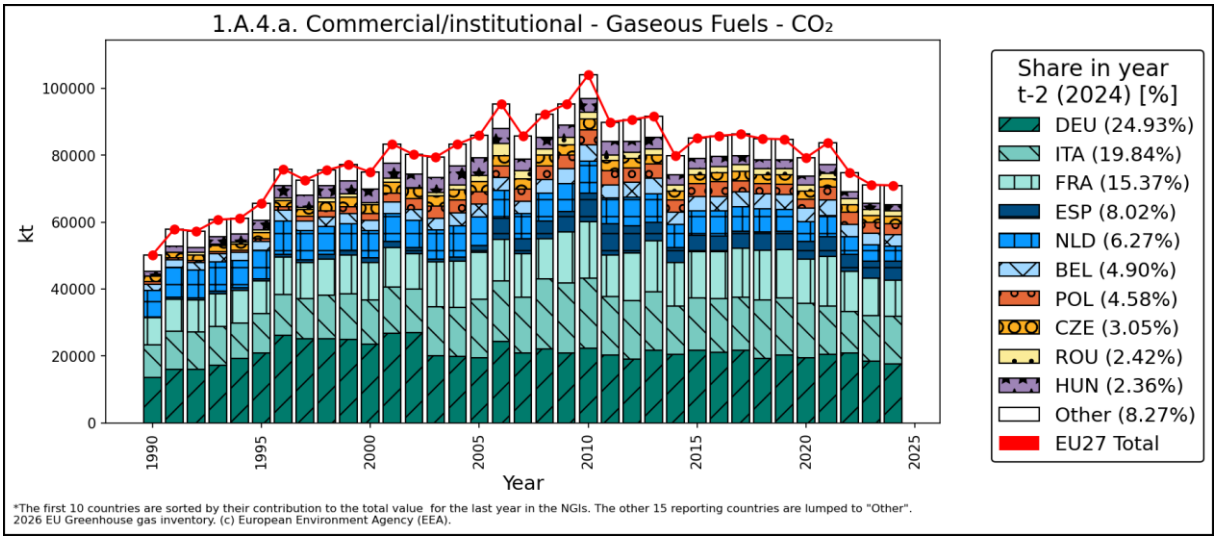
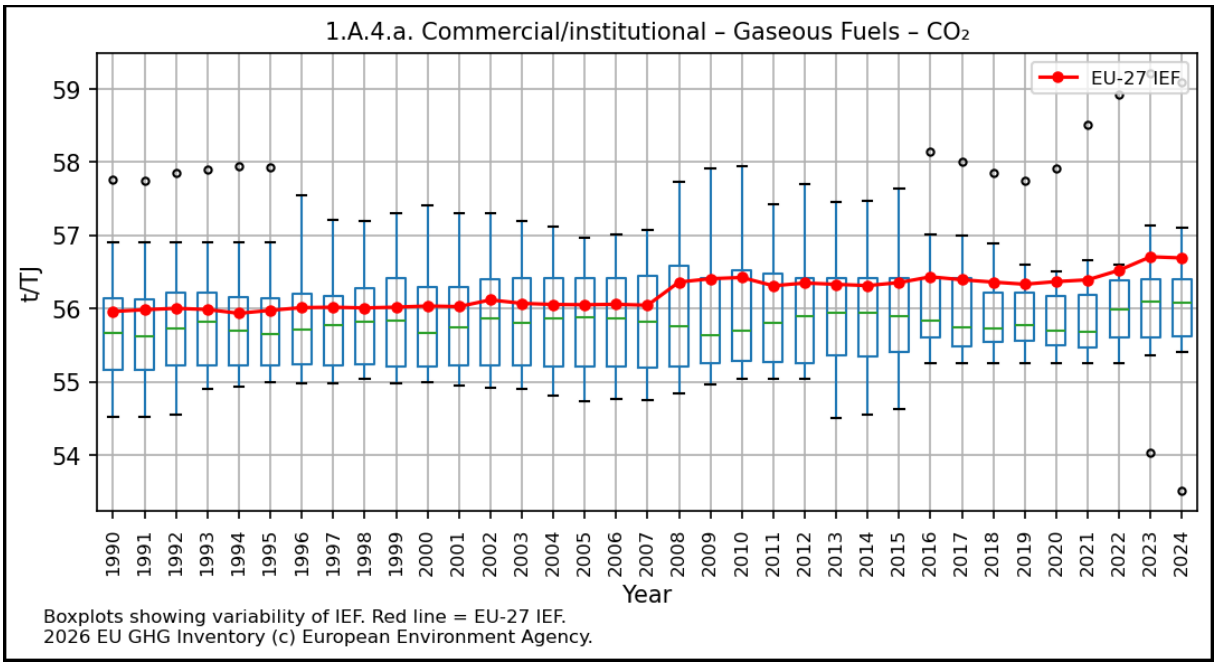


Figure 3.123 1.A.4.a Commercial/Institutional, gaseous fuels: Overview of outliers of Implied Emission Factors for CO_2 (in t/TJ)



1.A.4.a Commercial/Institutional – Other Fossil Fuels (CO_2)

Under this key category Member States report CO_2 emissions from waste incineration plants with energy recovery, whose main economic activity is the treatment of waste (as opposed to waste incineration plants with energy recovery whose main economic activity is power and heat production; these are reported under 1A1a).

In 2024, CO_2 from other fossil fuels had a share of 0.4% within category 1.A.4.a. Between 1990 and 2024 CO_2 emissions increased by 470% (Table 3.82). Seventeen Member States report emissions as 'Not occurring' in 2024 and seven other Member States estimate negligible emissions. Between 2023 and 2024 CO_2 increased by 1%.

Table 3.82: 1.A.4.a Commercial/Institutional, other fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	83	0	0	0.0%	-83	-100%	0	0%
Belgium	29	NO	NO	-	-29	-100%	-	-
Bulgaria	NO	NO	NO	-	-	-	-	-
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	0	0	0.0%	0	∞	0	0%
Czechia	NO	NO	NO	-	-	-	-	-
Denmark	34	NO	NO	-	-34	-100%	-	-
Estonia	NO	NO	NO	-	-	-	-	-
Finland	0	NO	NO	-	0	-100%	-	-
France	NO	0	1	0.0%	1	∞	0	83%
Germany	NA,NO	2	1	0.0%	1	∞	0	-19%
Greece	NO	NO	NO	-	-	-	-	-
Hungary	NO	172	153	3.6%	153	∞	-18	-11%
Ireland	NO	NO	NO	-	-	-	-	-
Italy	530	3 921	3 921	91.9%	3 392	640%	1	0%
Latvia	NO	NO	NO	-	-	-	-	-
Lithuania	NO	NO	NO	-	-	-	-	-
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	NO	1	2	0.0%	2	∞	0	22%
Poland	72	122	176	4.1%	104	144%	53	44%
Portugal	NO	NO	NO	-	-	-	-	-
Romania	IE,NO	11	11	0.3%	11	∞	0	0%
Slovakia	NO	NO	NO	-	-	-	-	-
Slovenia	NO	NO	NO	-	-	-	-	-
Spain	NO	NO	NO	-	-	-	-	-
Sweden	NO	1	1	0.0%	1	∞	0	-28%
EU	**748**	**4 230**	**4 266**	**100%**	**3 517**	**470%**	**36**	**1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.

Figure 3.125 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. The CO_2 implied emission factor for other fossil fuels was 68.71 t/TJ in 2024. The comparatively high implied emission factor is a calculated value from a mass balance calculation method and data from energy statistics.

Figure 3.124 1.A.4.a Commercial/Institutional, other fuels: Emission trend and share for CO_2

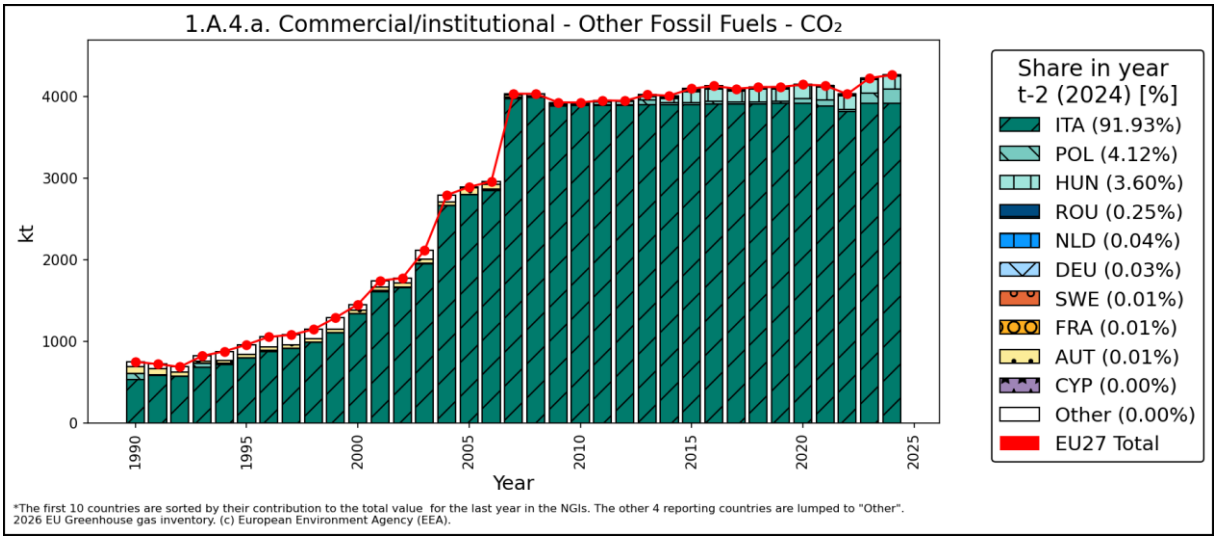
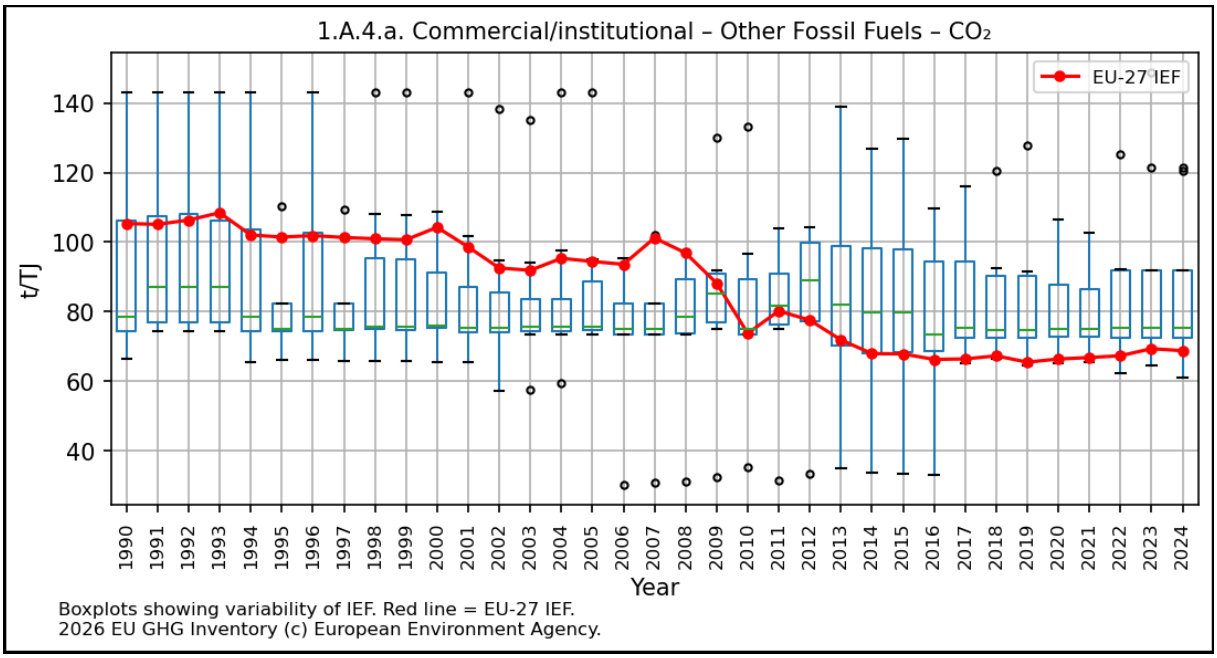


Figure 3.125 1.A.4.a Commercial/Institutional, other fuels: Overview of outliers of Implied Emission Factors for CO_2 (in t/TJ)



3.6.4.2 Residential (1.A.4.b)

CO_2 emissions from 1.A.4.b Residential account for 19% of total GHG emissions from 1.A Fuel Combustion in 2024.

Figure 3.126 shows the emission trend within the category 1.A.4.b, which is mainly dominated by CO_2 emissions from gaseous and liquid fuels. Total GHG emissions decreased by 42% since 1990, although CO_2 emissions from gaseous fuels increased strongly (22%) which was counterbalanced by decreasing emissions from liquid and solid fuels. From 2023 to 2024, CO_2 emissions decreased by 2% and energy consumption decreased by 22%. Biomass consumption reached a share of 29% in the year 2024 while the share of solid fossil fuels consumption dropped to 3%.

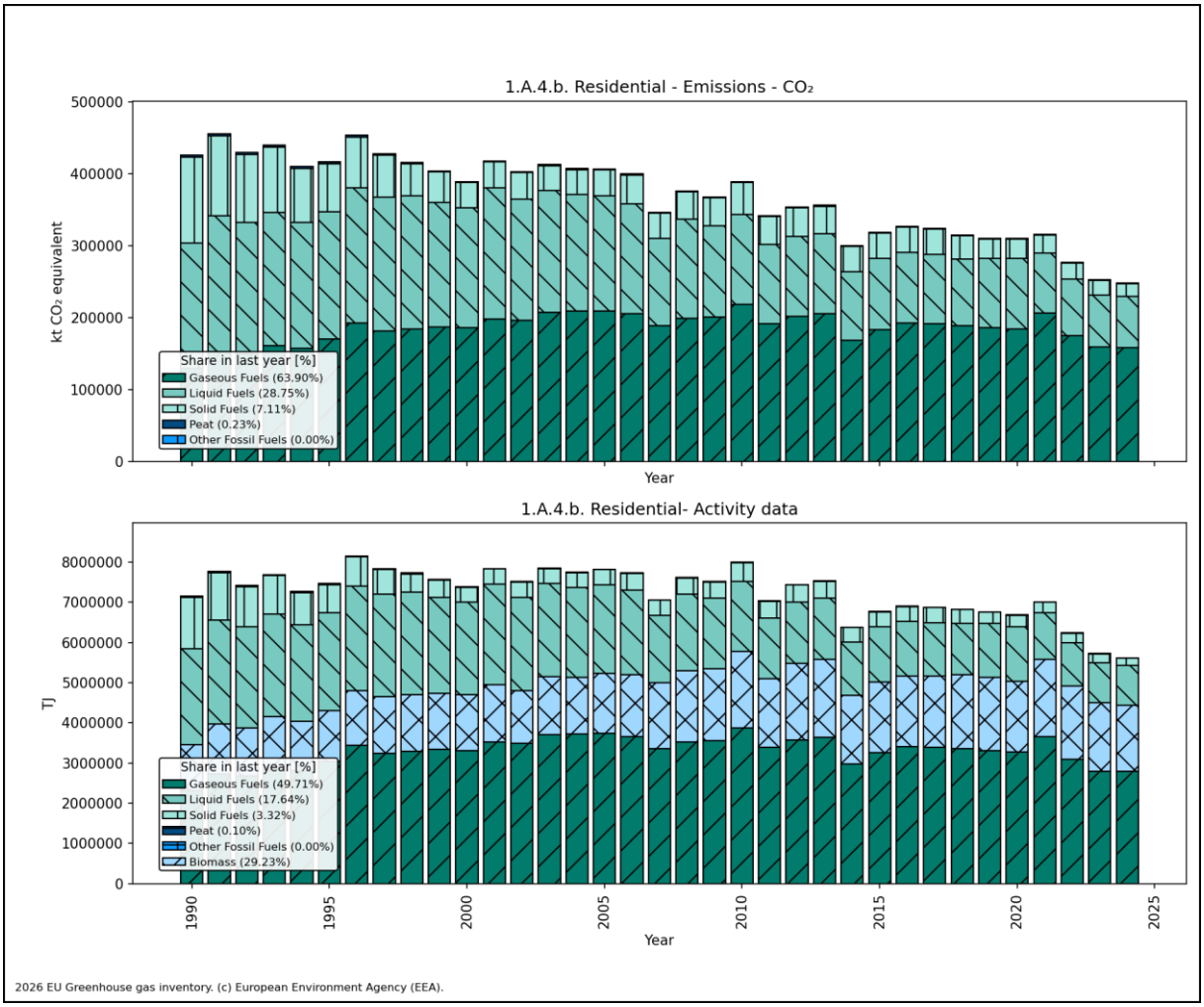
Almost of the Member States experienced decreasing trend in heating degree days due to the mild winter. Nevertheless, for most of the Member States trend in fuel consumption correlates with trend in heating degree days. The following Table 3.83: EU heating degree days 2023 and 2024 and 1.A.4.b trend in total fuel consumption. presents the (15°/18°) heating degree days in 2023 and 2024 for Member States and trend in 1.A.4.b total fuel consumption.

Table 3.83: EU heating degree days 2023 and 2024 and 1.A.4.b trend in total fuel consumption.

	2023	2024	Trend 2023 – 2024 [%]	Trend fuel consumption 1.A.4.b [%]
Austria	3 148	3 038	-3	-8
Belgium	2 363	2 384	1	0
Bulgaria	2 081	2 109	1	-18
Croatia	1 958	1 913	-2	-2
Cyprus	530	510	-4	-1
Czechia	2 922	2 780	-5	-7
Denmark	3 034	2 889	-5	-6
Estonia	3 985	3 668	-8	0
Finland	5 437	5 139	-5	-6
France	2 045	2 074	1	-1
Germany	2 661	2 569	-3	-1
Greece	1 376	1 310	-5	-8
Hungary	2 324	2 289	-2	-2
Ireland	2 397	2 598	8	1
Italy	1 689	1 614	-4	5
Latvia	3 755	3 438	-8	0
Lithuania	3 462	3 225	-7	2
Luxembourg	2 732	2 742	0	7
Malta	393	293	-25	-1
Netherlands	2 318	2 274	-2	-9
Poland	2 973	2 737	-8	-2
Portugal	1 047	982	-6	-2
Romania	2 507	2 485	-1	-3
Slovakia	2 842	2 669	-6	4
Slovenia	2 490	2 445	-2	-3
Spain	1 482	1 429	-4	-7
Sweden	5 180	4 798	-7	-7
EU (weighted)	2 821	2 698	-4	-2

Source: Eurostat and EEA 2026

Figure 3.126 1.A.4.b Residential: Total emission and activity trends



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CO_2 emissions from 1.A.4.b Residential

Between 1990 and 2024, CO_2 emissions from households decreased by 42% in the EU (Table 3.84). Main factors influencing CO_2 emissions from this source category are (1) outdoor temperature, (2) number and size of dwellings, (3) building codes, (4) thermal properties of building stock, (5) fuel split for heating and warm water, (6) use of renewable energy sources, e.g. biomass or solar panels, and (7) the use of district heating. Fuel consumption of households decreased by 22% between 1990 and 2024, with a fuel shift from coal and oil to natural gas and biomass. Overall, the recently mild winters are apparent on the lower amount of fuel combustion.

Table 3.84 1.A.4.b Residential: Member States' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	10 000	5 023	4 413	1.8%	-5 587	-56%	-610	-12%	-	-
Belgium	20 576	12 341	12 311	5.0%	-8 265	-40%	-30	0%	CS,M,NA,T1,T2	CS,D,NA
Bulgaria	2 887	252	272	0.1%	-2 616	-91%	19	8%	NA	NA
Croatia	2 029	1 416	1 455	0.6%	-574	-28%	38	3%	-	-
Cyprus	300	270	267	0.1%	-33	-11%	-3	-1%	NA,T1	D,NA
Czechia	18 375	5 603	5 084	2.1%	-13 291	-72%	-519	-9%	NA	NA
Denmark	4 996	930	883	0.4%	-4 114	-82%	-47	-5%	NA,T2,T3	CS,D,NA
Estonia	1 021	152	152	0.1%	-870	-85%	0	0%	T1,T2	CS,D
Finland	3 148	385	342	0.1%	-2 806	-89%	-43	-11%	NA,T2,T3	CS,NA
France	53 936	30 446	30 048	12.1%	-23 889	-44%	-398	-1%	T1,T2	CS,D,OTH,PS
Germany	128 636	78 293	76 863	31.0%	-51 773	-40%	-1 430	-2%	-	-
Greece	4 654	3 595	3 609	1.5%	-1 044	-22%	15	0%	NA	NA
Hungary	15 448	6 208	6 114	2.5%	-9 334	-60%	-94	-2%	NA	NA
Ireland	7 048	5 111	5 364	2.2%	-1 684	-24%	253	5%	NA,T2	CS,NA
Italy	55 788	36 519	36 812	14.8%	-18 975	-34%	293	1%	NA	NA
Latvia	1 182	385	400	0.2%	-782	-66%	15	4%	-	-
Lithuania	2 361	747	712	0.3%	-1 649	-70%	-35	-5%	NA,T2	CS,NA
Luxembourg	670	906	882	0.4%	212	32%	-24	-3%	NA	NA
Malta	95	30	28	0.0%	-67	-70%	-1	-5%	NA,T1	D,NA
Netherlands	20 793	11 337	11 061	4.5%	-9 732	-47%	-276	-2%	NA,T1,T2	CS,D,NA
Poland	35 222	27 578	25 659	10.4%	-9 564	-27%	-1 920	-7%	NA,T1,T2	CS,D,NA
Portugal	1 640	1 288	1 505	0.6%	-134	-8%	218	17%	NA	NA
Romania	8 871	6 903	6 965	2.8%	-1 906	-21%	62	1%	NA,T1,T2	CS,D,NA
Slovakia	6 773	2 611	2 506	1.0%	-4 267	-63%	-105	-4%	T2	CS
Slovenia	898	564	508	0.2%	-390	-43%	-57	-10%	NA,T1,T2	CS,D,NA
Spain	12 802	13 271	13 337	5.4%	535	4%	66	1%	NA,T2	CS,D,NA
Sweden	6 286	334	345	0.1%	-5 941	-95%	11	3%	T2	CS
EU	**426 437**	**252 498**	**247 895**	**100%**	**-178 542**	**-42%**	**-4 604**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations explained in the Chapter 'Units and abbreviations'.

1.A.4.b Residential – Liquid Fuels (CO_2)

In 2024 CO_2 from liquid fuels had a share of 29% CO_2 emissions within source category 1.A.4.b (compared to 41% in 1990). Between 1990 and 2024, emissions decreased by 59% (Table 3.85). Between 2023 and 2024 EU CO_2 emissions decreased by 2%.

Table 3.85 1.A.4.b Residential, liquid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	5 633	2 262	1 871	2.6%	-3 762	-67%	-391	-17%
Belgium	12 918	5 581	5 435	7.6%	-7 483	-58%	-146	-3%
Bulgaria	158	34	32	0.0%	-126	-80%	-2	-7%
Croatia	1 137	286	301	0.4%	-836	-74%	15	5%
Cyprus	300	270	267	0.4%	-33	-11%	-3	-1%
Czechia	239	154	157	0.2%	-82	-34%	3	2%
Denmark	3 937	274	255	0.4%	-3 682	-94%	-20	-7%
Estonia	244	27	19	0.0%	-225	-92%	-8	-29%
Finland	3 024	361	323	0.5%	-2 700	-89%	-38	-10%
France	30 915	10 363	10 458	14.7%	-20 457	-66%	95	1%
Germany	56 382	31 339	30 567	42.9%	-25 815	-46%	-773	-2%
Greece	4 565	2 721	2 773	3.9%	-1 792	-39%	52	2%
Hungary	3 540	188	173	0.2%	-3 367	-95%	-14	-8%
Ireland	1 172	2 997	3 241	4.5%	2 070	177%	244	8%
Italy	28 444	4 586	4 190	5.9%	-24 254	-85%	-396	-9%
Latvia	332	188	192	0.3%	-140	-42%	4	2%
Lithuania	397	236	205	0.3%	-192	-48%	-31	-13%
Luxembourg	474	419	419	0.6%	-55	-12%	1	0%
Malta	95	30	28	0.0%	-67	-70%	-1	-5%
Netherlands	837	157	153	0.2%	-684	-82%	-3	-2%
Poland	110	1 505	1 444	2.0%	1 334	1208%	-60	-4%
Portugal	1 640	693	903	1.3%	-737	-45%	210	30%
Romania	922	712	738	1.0%	-184	-20%	26	4%
Slovakia	93	17	12	0.0%	-81	-87%	-6	-33%
Slovenia	528	368	329	0.5%	-199	-38%	-39	-11%
Spain	9 855	6 433	6 491	9.1%	-3 364	-34%	59	1%
Sweden	6 200	275	285	0.4%	-5 915	-95%	11	4%
EU	**174 092**	**72 476**	**71 264**	**100%**	**-102 828**	**-59%**	**-1 212**	**-2%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level
Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.127 and Figure 3.128 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Fuel consumption in the EU decreased by 59% between 1990 and 2024. The CO_2 implied emission factor for liquid fuels was 71.91 t/TJ in 2024. Within the MS there is variation of specific fuels used, which is causing also the fluctuation of the IEF. Most often Residual fuel oil, LPG and other kerosene are used.

Figure 3.127 1.A.4.b Residential, liquid fuels: Emission trend and share for CO_2

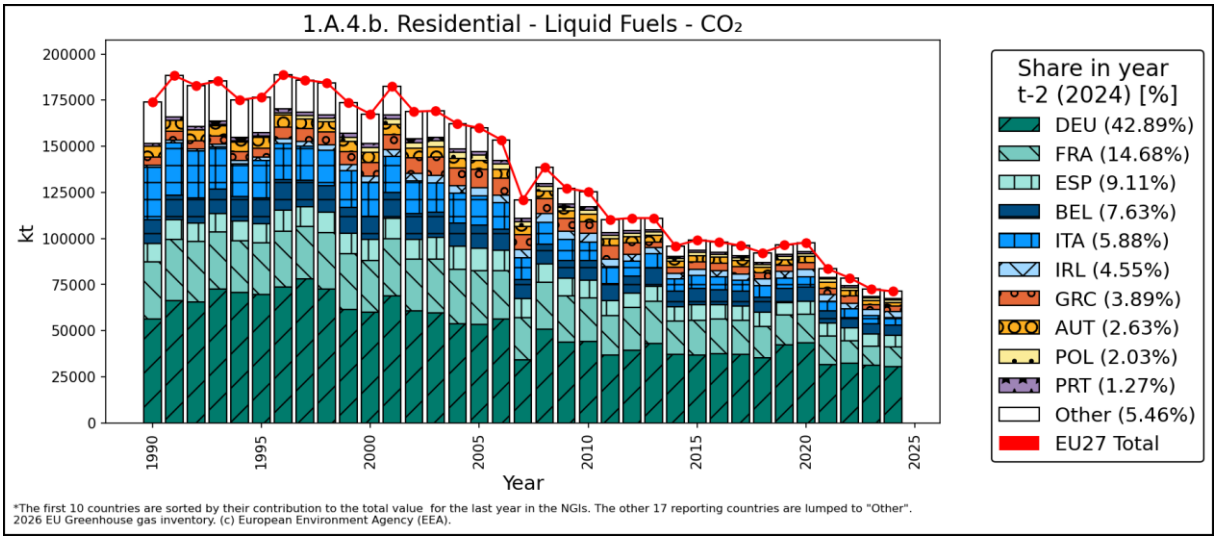
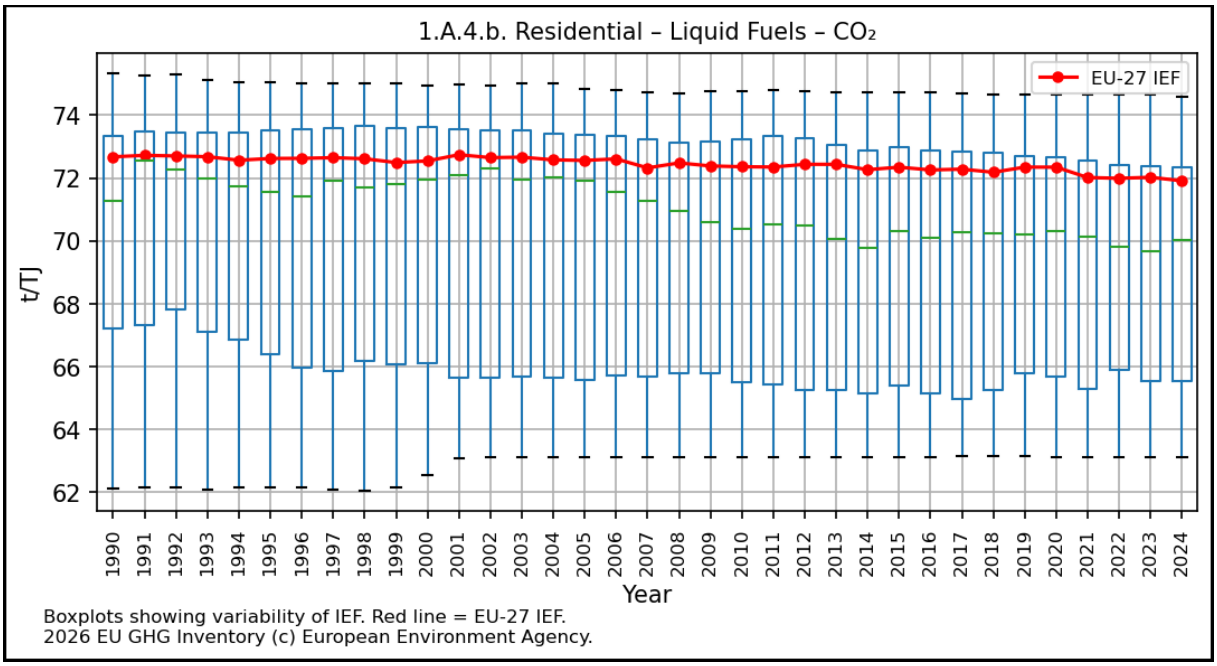


Figure 3.128 1.A.4.b Residential, liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.4.b Residential –Solid Fuels (CO_2)

In 2024, CO_2 from solid fuels had a share of 7% CO_2 emissions within source category 1.A.4.b (compared to 28% in 1990). Between 1990 and 2024 CO_2 emissions decreased by 85% (Table 3.86). Between 2023 and 2024 CO_2 emissions decreased by 14%. According to the methodology as described in chapter 3.6.4 98% of EU emissions are calculated by using higher tier methods in 2024.

Table 3.86 1.A.4.b Residential, solid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	2 511	25	16	0.1%	-2 494	-99%	-9	-35%
Belgium	1 796	59	56	0.3%	-1 741	-97%	-3	-6%
Bulgaria	2 730	53	50	0.3%	-2 680	-98%	-3	-6%
Croatia	436	4	4	0.0%	-432	-99%	0	7%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	16 038	1 957	1 487	8.4%	-14 551	-91%	-470	-24%
Denmark	72	NO	NO	-	-72	-100%	-	-
Estonia	337	1	1	0.0%	-336	-100%	0	0%
Finland	33	NO	NO	-	-33	-100%	-	-
France	1 957	77	80	0.5%	-1 877	-96%	3	4%
Germany	40 661	1 154	724	4.1%	-39 937	-98%	-431	-37%
Greece	89	16	9	0.1%	-79	-89%	-7	-43%
Hungary	8 083	136	99	0.6%	-7 984	-99%	-37	-27%
Ireland	2 483	406	430	2.4%	-2 053	-83%	24	6%
Italy	899	NO	NO	-	-899	-100%	-	-
Latvia	587	5	3	0.0%	-584	-100%	-2	-46%
Lithuania	1 440	55	66	0.4%	-1 374	-95%	11	20%
Luxembourg	26	1	1	0.0%	-26	-97%	0	-33%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	61	0	0	0.0%	-61	-100%	0	-9%
Poland	28 362	16 186	14 277	81.0%	-14 085	-50%	-1 909	-12%
Portugal	NO	NO	NO	-	-	-	-	-
Romania	2 729	155	180	1.0%	-2 550	-93%	25	16%
Slovakia	5 122	147	145	0.8%	-4 976	-97%	-1	-1%
Slovenia	345	NO	NO	-	-345	-100%	-	-
Spain	2 035	NO	NO	-	-2 035	-100%	-	-
Sweden	NO	NO	NO	-	-	-	-	-
EU	**118 831**	**20 437**	**17 628**	**100%**	**-101 203**	**-85%**	**-2 809**	**-14%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.129 and Figure 3.130 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Fuel consumption in the EU decreased by 85% between 1990 and 2024. The CO_2 implied emission factor for solid fuels was 94.50 t/TJ in 2024.

Figure 3.129 1.A.4.b Residential, solid fuels: Emission trend and share for CO_2

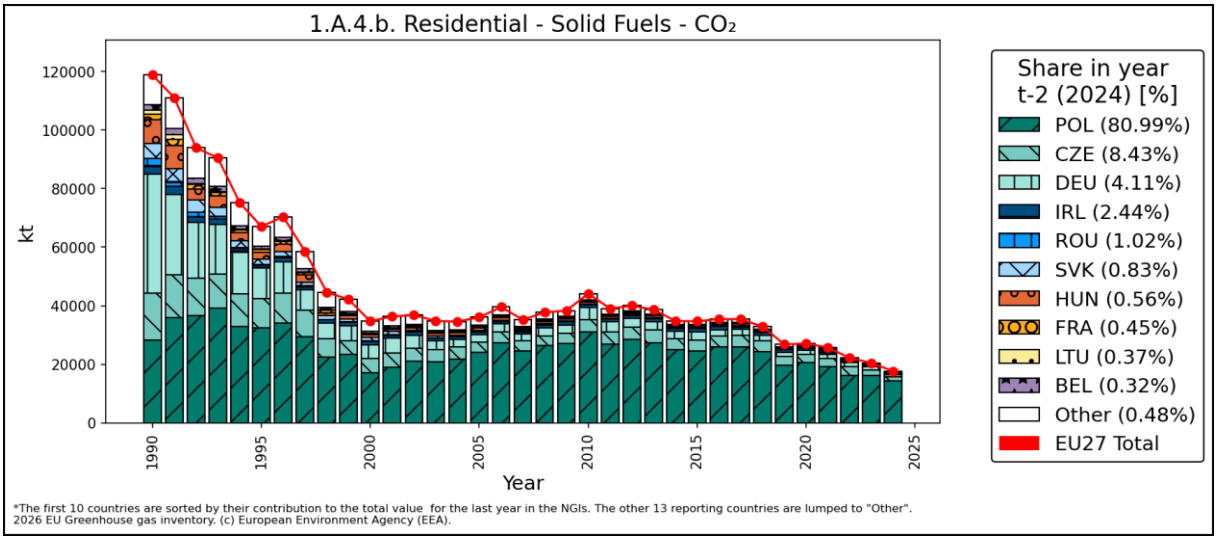
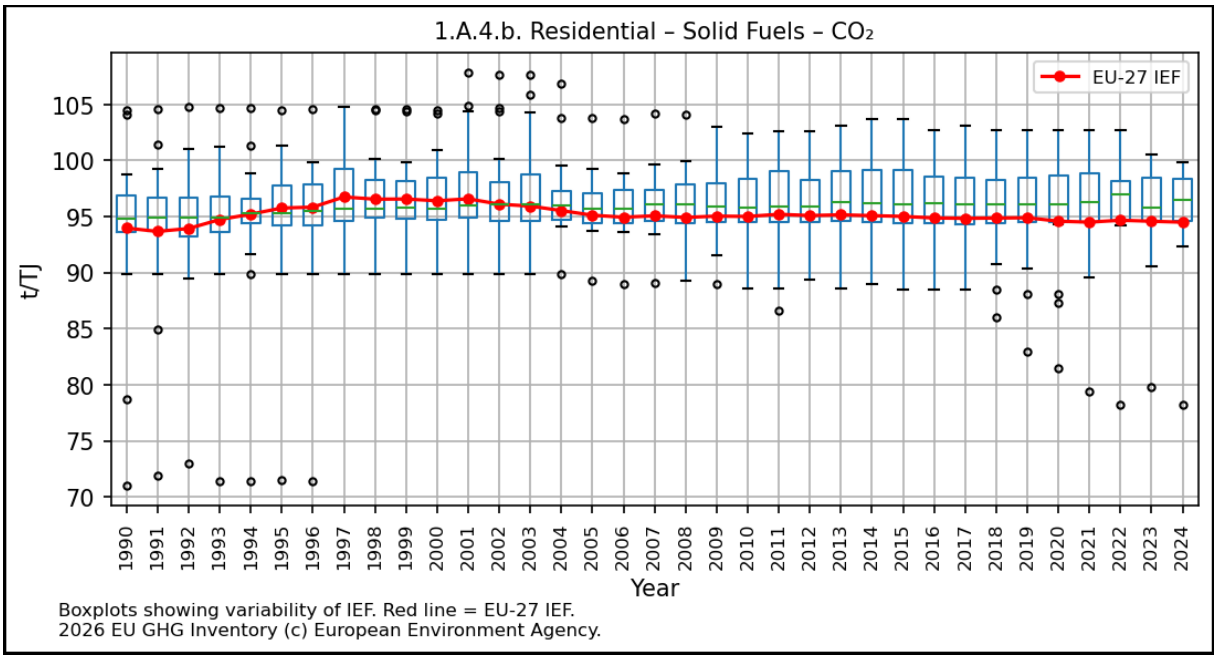


Figure 3.130 1.A.4.b Residential, solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.4.b Residential – Gaseous Fuels (CO_2)

In 2024, CO_2 from gaseous fuels had a share of 64% CO_2 emissions within source category 1.A.4.b (compared to 31% in 1990). Between 1990 and 2024, the emissions increased by 22% (Table 3.87). Between 2023 and 2024 EU emissions decreased by 519 kt CO_2 eq.

Table 3.87 1.A.4.b Residential, gaseous fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	1 856	2 735	2 524	1.6%	669	36%	-210	-8%
Belgium	5 862	6 700	6 820	4.3%	958	16%	120	2%
Bulgaria	NO	165	190	0.1%	190	∞	25	15%
Croatia	456	1 127	1 149	0.7%	693	152%	23	2%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	2 098	3 491	3 440	2.2%	1 341	64%	-52	-1%
Denmark	988	655	628	0.4%	-360	-36%	-28	-4%
Estonia	132	125	132	0.1%	0	0%	7	6%
Finland	25	20	14	0.0%	-11	-44%	-6	-28%
France	21 064	20 000	19 503	12.3%	-1 561	-7%	-497	-2%
Germany	31 564	45 799	45 572	28.8%	14 008	44%	-226	0%
Greece	NO	858	827	0.5%	827	∞	-31	-4%
Hungary	3 825	5 885	5 842	3.7%	2 017	53%	-43	-1%
Ireland	270	1 102	1 136	0.7%	866	321%	34	3%
Italy	26 444	31 933	32 622	20.6%	6 178	23%	689	2%
Latvia	221	192	205	0.1%	-16	-7%	13	7%
Lithuania	509	423	423	0.3%	-86	-17%	0	0%
Luxembourg	170	487	462	0.3%	292	172%	-25	-5%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	19 894	11 180	10 907	6.9%	-8 987	-45%	-273	-2%
Poland	6 750	9 888	9 937	6.3%	3 187	47%	50	1%
Portugal	NO	594	602	0.4%	602	∞	8	1%
Romania	5 220	6 036	6 047	3.8%	827	16%	11	0%
Slovakia	1 559	2 447	2 349	1.5%	790	51%	-98	-4%
Slovenia	25	196	179	0.1%	153	607%	-18	-9%
Spain	912	6 838	6 846	4.3%	5 934	650%	8	0%
Sweden	86	60	60	0.0%	-27	-31%	0	0%
EU	**129 929**	**158 936**	**158 417**	**100%**	**28 487**	**22%**	**-519**	**0%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.131 shows CO_2 emissions for EU and the Member States as well as the share of the Member States with the highest contributions. Fuel consumption in the EU increased by 22% between 1990 and 2024. The CO_2 implied emission factor for gaseous fuels was 56.72 t/TJ in 2024.

Figure 3.131 1.A.4.b Residential, gaseous fuels: Emission trend and share for CO_2

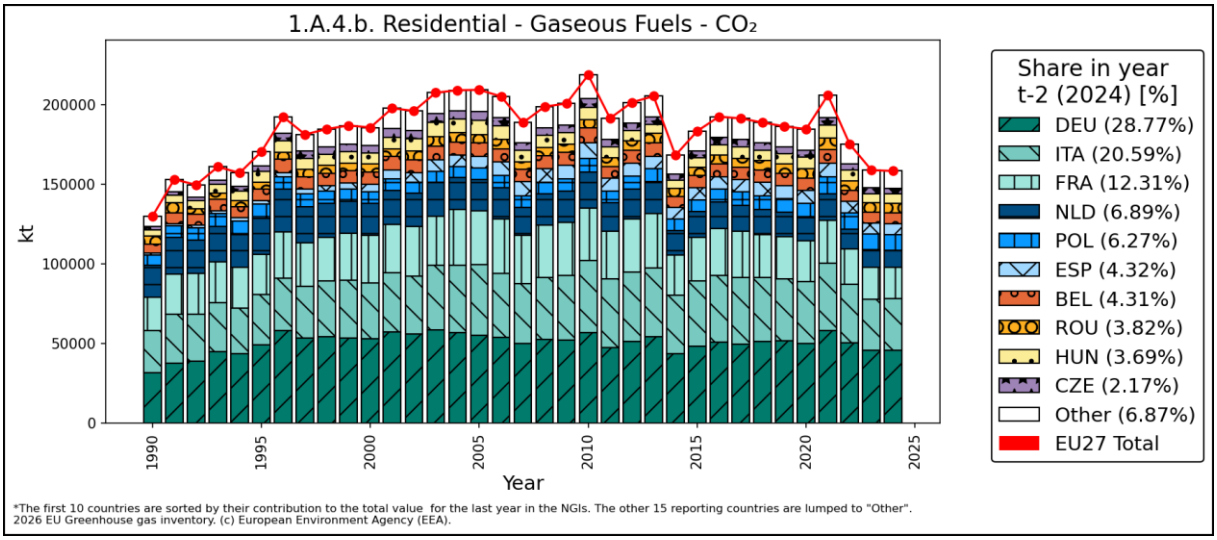
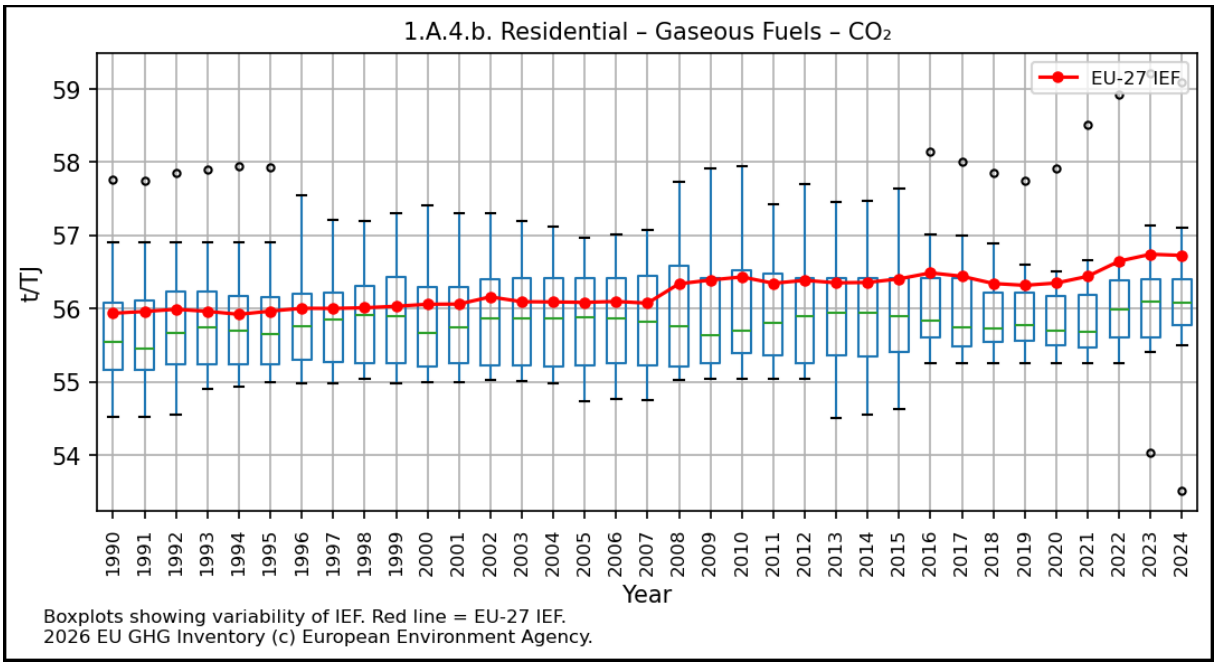


Figure 3.132 1.A.4.b Residential, gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



CH_4 emissions from 1.A.4.b Residential

CH_4 emissions mainly occur from incomplete biomass and coal combustion. CH_4 emissions from 1.A.4.b Residential accounted for 91% of total CH_4 emissions in 1.A and 0.6% of total GHG emissions in 1.A in 2024. Between 1990 and 2024, CH_4 emissions from households decreased by 37% in the EU (Table 3.88). Between 2023 and 2024 CH_4 emissions decreased by 5%.

Table 3.88 1.A.4.b Residential: Member States' contributions to CH_4 emissions and information on method applied and emission factor

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	511	259	248	1.9%	-263	-51%	-11	-4%	-	-
Belgium	263	290	290	2.2%	27	10%	-1	0%	CS,M,NA,T1	CR,D,NA
Bulgaria	293	211	164	1.3%	-129	-44%	-47	-22%	NA	NA
Croatia	396	346	328	2.5%	-69	-17%	-19	-5%	-	-
Cyprus	2	7	7	0.1%	5	221%	0	0%	NA,T1	D,NA
Czechia	1 697	861	777	6.0%	-920	-54%	-84	-10%	NA	NA
Denmark	152	81	74	0.6%	-78	-51%	-7	-9%	M,NA,T1,T2,T3	S,D,M,NA,OTH
Estonia	64	13	13	0.1%	-51	-79%	0	-1%	T1,T2	CS,D
Finland	166	176	167	1.3%	1	0%	-9	-5%	NA,T1,T2,T3	CR,CS,D,NA
France	5 111	2 163	2 063	16.0%	-3 047	-60%	-100	-5%	T1,T2	CS,D
Germany	2 783	840	814	6.3%	-1 969	-71%	-26	-3%	-	-
Greece	256	252	195	1.5%	-61	-24%	-56	-22%	NA	NA
Hungary	925	456	440	3.4%	-485	-52%	-16	-3%	NA	NA
Ireland	496	107	107	0.8%	-388	-78%	0	0%	NA,T1	D,NA
Italy	1 226	1 899	1 804	14.0%	578	47%	-95	-5%	NA	NA
Latvia	221	121	121	0.9%	-99	-45%	1	1%	-	-
Lithuania	196	84	94	0.7%	-102	-52%	10	12%	NA,T1,T2	CS,D,NA
Luxembourg	10	13	14	0.1%	4	40%	2	15%	NA	NA
Malta	0	1	0	0.0%	0	19%	0	-39%	NA,T1	D,NA
Netherlands	503	297	290	2.2%	-213	-42%	-7	-2%	NA,T1,T2	CS,D,NA
Poland	2 772	3 010	2 853	22.1%	81	3%	-157	-5%	NA,T1	D,NA
Portugal	479	240	229	1.8%	-250	-52%	-10	-4%	NA	NA
Romania	457	1 066	992	7.7%	535	117%	-75	-7%	NA,T1	D,NA
Slovakia	418	89	78	0.6%	-340	-81%	-11	-12%	T1	D
Slovenia	159	93	88	0.7%	-71	-45%	-5	-5%	NA,T1,T2	CS,D,NA
Spain	889	614	618	4.8%	-271	-30%	4	1%	NA,T2	D,NA
Sweden	115	51	51	0.4%	-65	-56%	0	0%	M,T2	CS
EU	**20 562**	**13 639**	**12 921**	**100%**	**-7 641**	**-37%**	**-717**	**-5%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations explained in the Chapter 'Units and abbreviations'.

1.A.4.b Residential – Biomass (CH_4)

In 2024 CH_4 from biomass had a share of 83% within source category on the total CH_4 emissions from 1.A.4.b (compared to 47% in 1990). Between 1990 and 2024 CH_4 emissions increased by 2% (Table 3.89). Between 2023 and 2024, CH_4 emissions decreased by 4%.

Table 3.89 1.A.4.b Residential, biomass: Member States' contributions to CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	261	246	237	2.2%	-24	-9%	-9	-4%
Belgium	109	266	265	2.5%	156	142%	0	0%
Bulgaria	61	205	159	1.5%	98	162%	-46	-23%
Croatia	354	342	323	3.0%	-31	-9%	-19	-5%
Cyprus	1	6	6	0.1%	5	423%	0	0%
Czechia	363	679	637	6.0%	273	75%	-42	-6%
Denmark	124	68	62	0.6%	-62	-50%	-7	-10%
Estonia	6	13	13	0.1%	6	98%	0	-1%
Finland	147	171	162	1.5%	15	10%	-9	-5%
France	4 764	2 057	1 958	18.3%	-2 805	-59%	-99	-5%
Germany	313	684	684	6.4%	370	118%	-1	0%
Greece	247	249	193	1.8%	-53	-22%	-56	-22%
Hungary	209	428	415	3.9%	207	99%	-13	-3%
Ireland	16	9	10	0.1%	-5	-34%	1	14%
Italy	1 115	1 856	1 761	16.5%	646	58%	-95	-5%
Latvia	162	119	119	1.1%	-43	-26%	1	1%
Lithuania	66	75	86	0.8%	20	31%	10	14%
Luxembourg	5	10	12	0.1%	6	114%	2	21%
Malta	NO	1	0	0.0%	0	∞	0	-44%
Netherlands	99	70	68	0.6%	-31	-31%	-2	-3%
Poland	327	1 539	1 552	14.5%	1 226	375%	13	1%
Portugal	476	238	227	2.1%	-248	-52%	-11	-4%
Romania	202	1 033	956	8.9%	753	372%	-78	-8%
Slovakia	34	70	60	0.6%	26	75%	-10	-15%
Slovenia	129	91	86	0.8%	-43	-33%	-5	-5%
Spain	729	576	580	5.4%	-149	-20%	4	1%
Sweden	107	48	48	0.5%	-59	-55%	0	0%
EU	**10 427**	**11 149**	**10 680**	**100%**	**253**	**2%**	**-469**	**-4%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviation'.

Figure 3.133 and Figure 3.134 show CH_4 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Biomass fuel consumption in the EU increased by 44% between 1990 and 2024. The CH_4 implied emission factor for biomass fuels was 232.29 kg/TJ in 2024.

The decreasing trend of IEF reflects replacement of old biomass boilers, stoves and open fireplaces by modern technologies (pellets, automatic boilers). These new technologies have lower CH_4 (as well as NMVOC) emissions from incomplete combustion. However, this change in improved technologies is not reflected by the Member States that are using the default emission factor value (300 kg/TJ) for the whole time series.

Figure 3.133 1.A.4.b Residential, biomass: Emission trend and share for CH_4

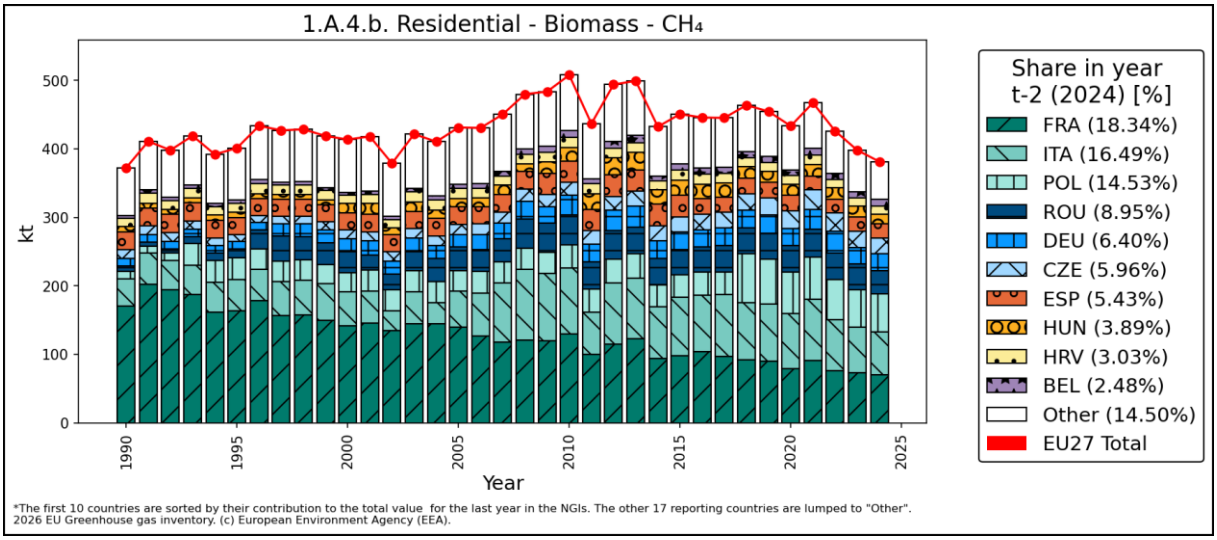
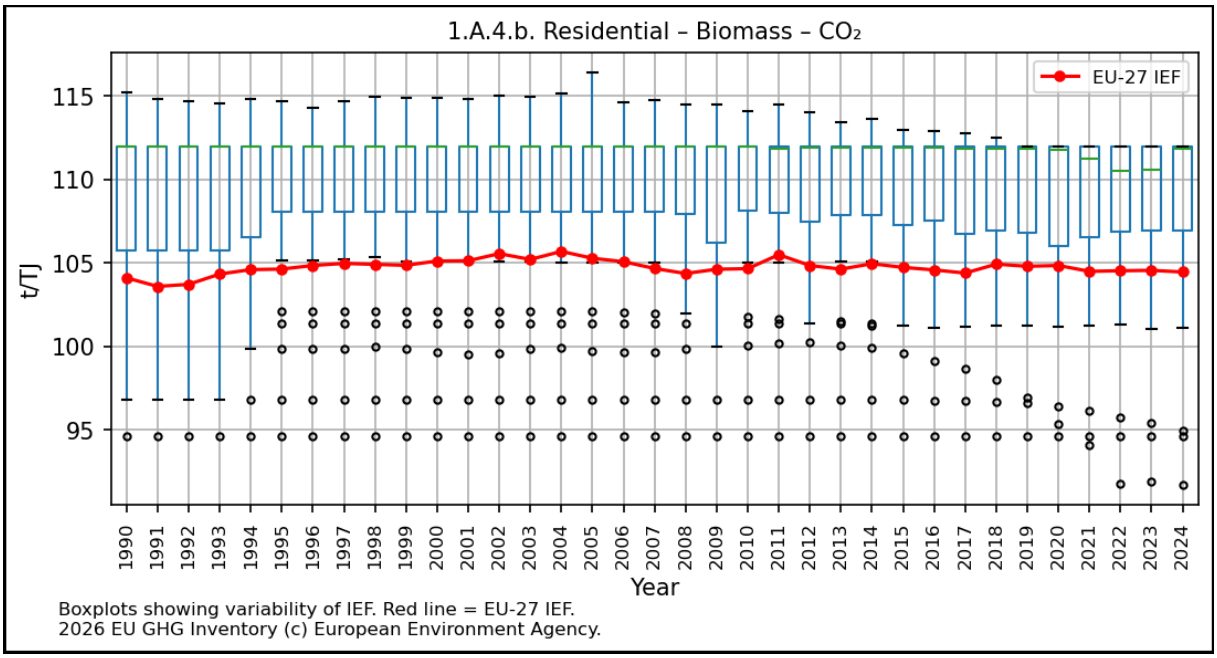


Figure 3.134 1.A.4.b Residential, biomass: Implied Emission Factors for CH_4 (in kg/TJ)



1.A.4.b Residential – Solid Fuels (CH_4)

In 2024, CH_4 from solid fuels had a share of 12% within source category on the total CH_4 emissions from 1.A.4.b (compared to 46% in 1990). Between 1990 and 2024 CH_4 emissions decreased by 82% (Table 3.89). All Member States reported decreasing emissions since 1990. Between 2023 and 2024 CH_4 emissions decreased by 13%.

Table 3.90: 1.A.4.b Residential, solid fuels: Member States' contributions to CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	224	2	1	0.1%	-222	-99%	-1	-36%
Belgium	123	4	4	0.2%	-119	-97%	0	-7%
Bulgaria	232	5	5	0.3%	-228	-98%	0	-8%
Croatia	37	0	0	0.0%	-37	-99%	0	7%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	1 328	173	132	8.5%	-1 197	-90%	-42	-24%
Denmark	6	NO	NO	-	-6	-100%	-	-
Estonia	30	0	0	0.0%	-29	-100%	0	0%
Finland	3	NO	NO	-	-3	-100%	-	-
France	174	7	7	0.5%	-167	-96%	0	4%
Germany	2 429	80	54	3.5%	-2 374	-98%	-25	-32%
Greece	8	1	1	0.1%	-7	-90%	-1	-43%
Hungary	693	11	8	0.5%	-685	-99%	-3	-27%
Ireland	220	35	37	2.4%	-183	-83%	2	6%
Italy	11	NO	NO	-	-11	-100%	-	-
Latvia	54	0	0	0.0%	-54	-100%	0	-46%
Lithuania	127	5	6	0.4%	-122	-95%	1	20%
Luxembourg	2	0	0	0.0%	-2	-97%	0	-33%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	0	0	0	0.0%	0	-100%	0	-10%
Poland	2 428	1 442	1 272	81.6%	-1 156	-48%	-170	-12%
Portugal	NO	NO	NO	-	-	-	-	-
Romania	239	16	19	1.2%	-220	-92%	3	19%
Slovakia	379	12	12	0.8%	-367	-97%	0	-2%
Slovenia	28	NO	NO	-	-28	-100%	-	-
Spain	130	NO	NO	-	-130	-100%	-	-
Sweden	NO	NO	NO	-	-	-	-	-
EU	**8 905**	**1 795**	**1 559**	**100%**	**-7 346**	**-82%**	**-236**	**-13%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.133 and Figure 3.134 show CH_4 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Solid fuel consumption in the EU decreased by 85% between 1990 and 2024. The CH_4 implied emission factor for solid fuels was 298.44 kg/TJ in 2024.

Figure 3.135: 1.A.4.b Residential, solid fuels: Emission trend and share for CH_4

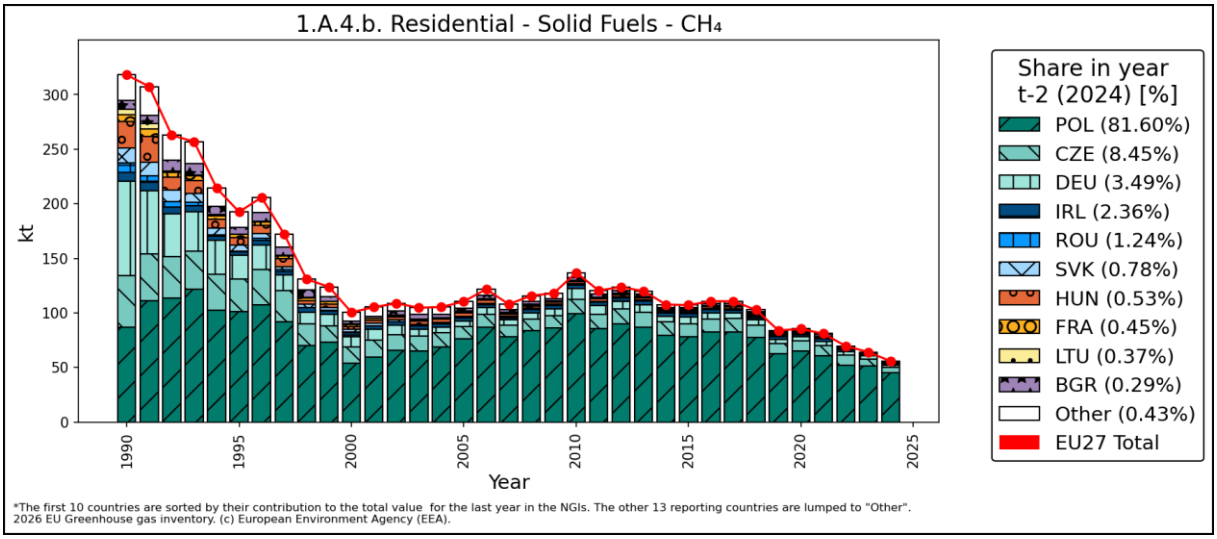
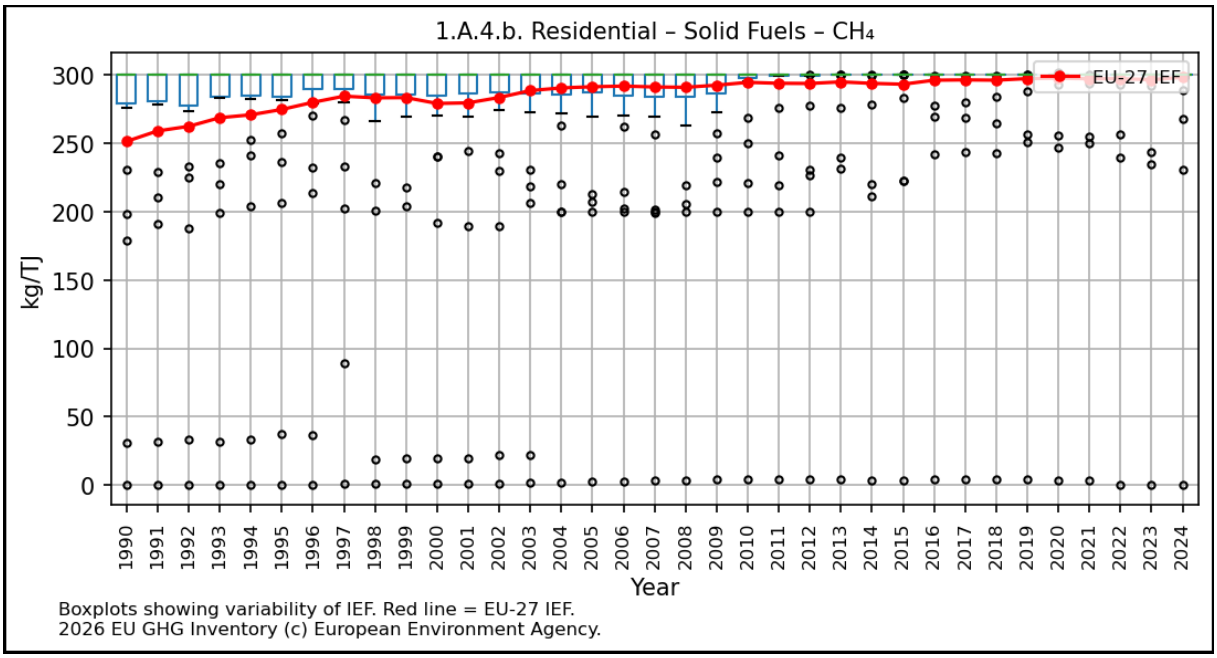


Table 3.91: 1.A.4.b Residential, solid fuels: Implied Emission Factors for CH_4 (in kg/TJ)



3.6.4.3 Agriculture/Forestry/Fisheries (1.A.4.c)

In this chapter informations about emission trends, Member States' contribution and activity data is provided for category 1.A.4.c, by fuels. CO_2 emissions from 1.A.4.c Agriculture/Forestry/Fisheries accounted for 2.8% of total EU GHG emissions from 1.A Fuel Combustion in 2024. Between 1990 and 2024, CO_2 emissions from 1.A.4.c Agriculture/Forestry/Fisheries decreased by 23% in the EU (Table 3.92).

Figure 3.136 shows the emission trend within source category 1.A.4.c, which is mainly dominated by CO_2 emissions from liquid fuels.

Figure 3.136 1.A.4.c Agriculture/Forestry/Fisheries: Total emission and activity trends

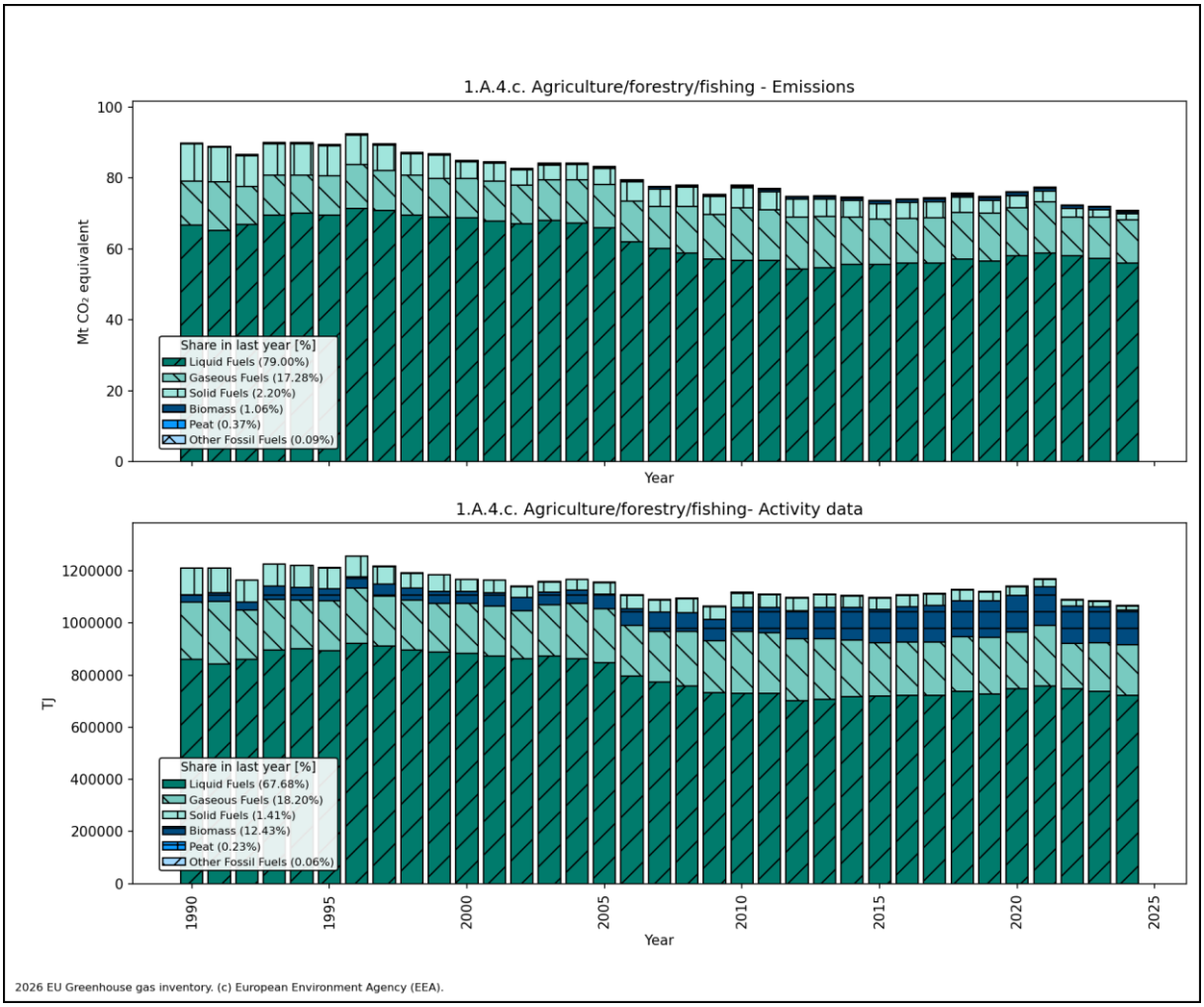


Table 3.92 1.A.4.c Agriculture/Forestry/Fisheries: Member States' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	1 251	823	806	1.2%	-445	-36%	-17	-2%	NA,T2	CS,D,NA
Belgium	3 037	2 387	2 498	3.8%	-539	-18%	111	5%	CS,M,NA,T1,T2	CS,D,NA
Bulgaria	1 649	456	446	0.7%	-1 203	-73%	-10	-2%	NA,T1,T2	CS,D,NA
Croatia	835	687	714	1.1%	-122	-15%	27	4%	NA,T1	D,NA
Cyprus	55	72	78	0.1%	23	41%	6	9%	NA,T1	D,NA
Czechia	3 673	1 146	1 193	1.8%	-2 480	-68%	47	4%	NA,T1,T2	CS,D,NA
Denmark	2 204	1 386	1 252	1.9%	-952	-43%	-134	-10%	NA,T1,T2,T3	CS,D,NA
Estonia	532	64	70	0.1%	-462	-87%	6	9%	NA,T1,T2	CS,D,NA
Finland	1 870	1 448	1 410	2.1%	-460	-25%	-39	-3%	NA,T1,T2,T3	CS,NA
France	11 226	10 895	10 965	16.7%	-261	-2%	70	1%	NA,T1,T2	D,NA,OTH,PS
Germany	11 360	7 266	7 263	11.0%	-4 096	-36%	-2	0%	CS,NA,T1,T2,T3	CS,NA
Greece	2 893	500	522	0.8%	-2 371	-82%	22	4%	NA,T2	CS,NA
Hungary	2 706	1 278	1 203	1.8%	-1 503	-56%	-75	-6%	NA,T1,T2	CS,D,NA
Ireland	747	723	740	1.1%	-8	-1%	17	2%	NA,T2	CS,D,NA
Italy	8 352	6 964	6 323	9.6%	-2 029	-24%	-641	-9%	NA,T2	CS,NA
Latvia	1 585	443	497	0.8%	-1 088	-69%	54	12%	NA,T1,T2	CS,D,NA
Lithuania	1 483	218	762	1.2%	-721	-49%	544	250%	NA,T2	CS,NA
Luxembourg	34	22	23	0.0%	-11	-34%	0	2%	NA,T1,T2	CS,D,NA
Malta	4	52	51	0.1%	47	1196%	-1	-2%	NA,T1	D,NA
Netherlands	9 889	7 170	7 384	11.2%	-2 505	-25%	214	3%	NA,T1,T2	CS,D,NA
Poland	8 505	9 773	8 233	12.5%	-272	-3%	-1 540	-16%	NA,T1,T2	CS,D,NA
Portugal	1 119	1 272	1 288	2.0%	169	15%	16	1%	NA,NO,T1,T2	CS,D,NA,NO
Romania	1 992	1 525	1 510	2.3%	-482	-24%	-15	-1%	NA,T1,T2	CS,D,NA
Slovakia	146	253	294	0.4%	148	101%	41	16%	NA,T1,T2	CS,NA
Slovenia	166	215	210	0.3%	44	26%	-5	-2%	NA,T1	D,NA
Spain	6 665	8 890	8 869	13.5%	2 204	33%	-20	0%	CR,NA,T1,T2,T3	CR,CS,D,NA
Sweden	1 655	911	1 201	1.8%	-454	-27%	290	32%	NA,T2	CS,NA
EU	**85 634**	**66 838**	**65 804**	**100%**	**-19 830**	**-23%**	**-1 033**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations explained in the Chapter 'Units and abbreviations'.

1.A.4.c Agriculture/Forestry/Fisheries – Liquid Fuels (CO_2)

In 2024, CO_2 from liquid fuels had a share of 62% within source category 1.A.4.c (compared to 76% in 1990). Between 1990 and 2024 CO_2 decreased by 16% (Table 3.93). Between 2023 and 2024 EU emissions decreased by 2%.

Table 3.93 1.A.4.c Agriculture/Forestry/Fisheries, liquid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	1 180	794	775	1.5%	-405	-34%	-19	-2%
Belgium	2 758	1 063	1 065	2.0%	-1 693	-61%	2	0%
Bulgaria	1 498	404	393	0.7%	-1 105	-74%	-11	-3%
Croatia	788	635	654	1.2%	-134	-17%	19	3%
Cyprus	55	72	78	0.1%	23	41%	6	9%
Czechia	1 537	1 036	1 074	2.0%	-463	-30%	38	4%
Denmark	1 841	1 351	1 219	2.3%	-621	-34%	-131	-10%
Estonia	504	61	67	0.1%	-437	-87%	6	10%
Finland	1 784	1 307	1 241	2.3%	-543	-30%	-66	-5%
France	10 905	10 507	10 599	20.0%	-307	-3%	92	1%
Germany	8 016	6 464	6 466	12.2%	-1 551	-19%	2	0%
Greece	2 882	497	518	1.0%	-2 364	-82%	21	4%
Hungary	2 084	1 080	1 041	2.0%	-1 043	-50%	-39	-4%
Ireland	747	723	740	1.4%	-8	-1%	17	2%
Italy	8 300	6 063	5 238	9.9%	-3 062	-37%	-825	-14%
Latvia	701	434	480	0.9%	-221	-31%	47	11%
Lithuania	1 173	169	713	1.3%	-460	-39%	544	323%
Luxembourg	34	22	23	0.0%	-12	-34%	0	2%
Malta	4	52	51	0.1%	47	1196%	-1	-2%
Netherlands	2 560	1 620	1 536	2.9%	-1 024	-40%	-84	-5%
Poland	4 725	7 940	6 863	12.9%	2 138	45%	-1 076	-14%
Portugal	1 119	1 251	1 265	2.4%	146	13%	14	1%
Romania	9	1 255	1 219	2.3%	1 210	12887%	-35	-3%
Slovakia	104	179	229	0.4%	124	119%	49	27%
Slovenia	166	215	210	0.4%	44	26%	-5	-2%
Spain	6 622	8 146	8 136	15.3%	1 514	23%	-10	0%
Sweden	1 465	904	1 196	2.3%	-269	-18%	291	32%
EU	**63 562**	**54 244**	**53 087**	**100%**	**-10 475**	**-16%**	**-1 156**	**-2%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.137 and Figure 3.138 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Liquid fuel consumption in the EU decreased by 12% between 1990 and 2024. The CO_2 implied emission factor for liquid fuels was 73.38 t/TJ in 2024.

Figure 3.137 1.A.4.c Agriculture/Forestry/Fisheries, liquid fuels: Emission trend and share for CO_2

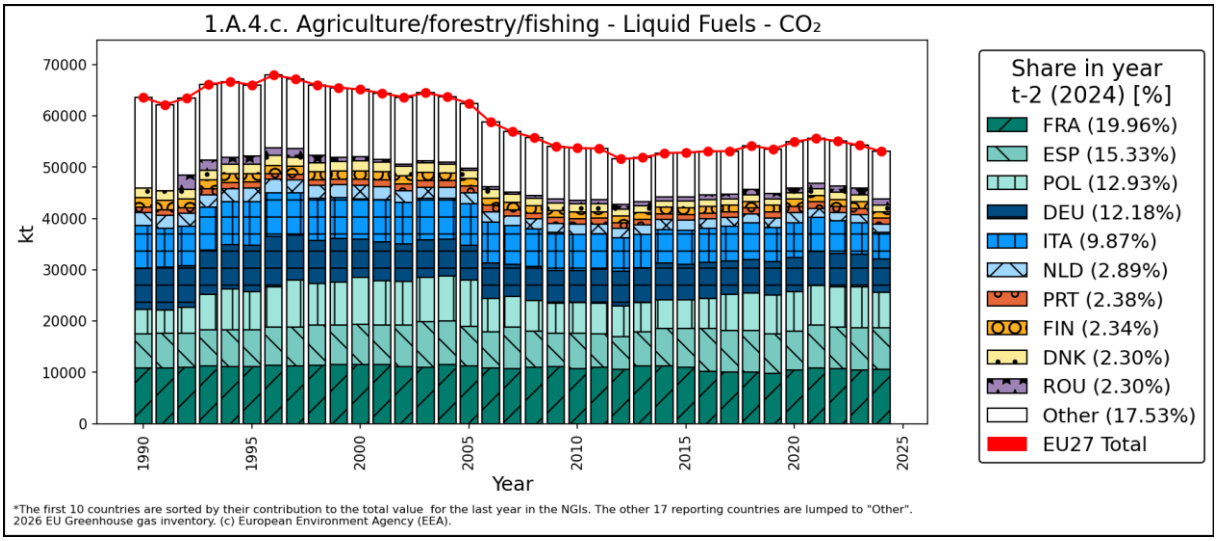
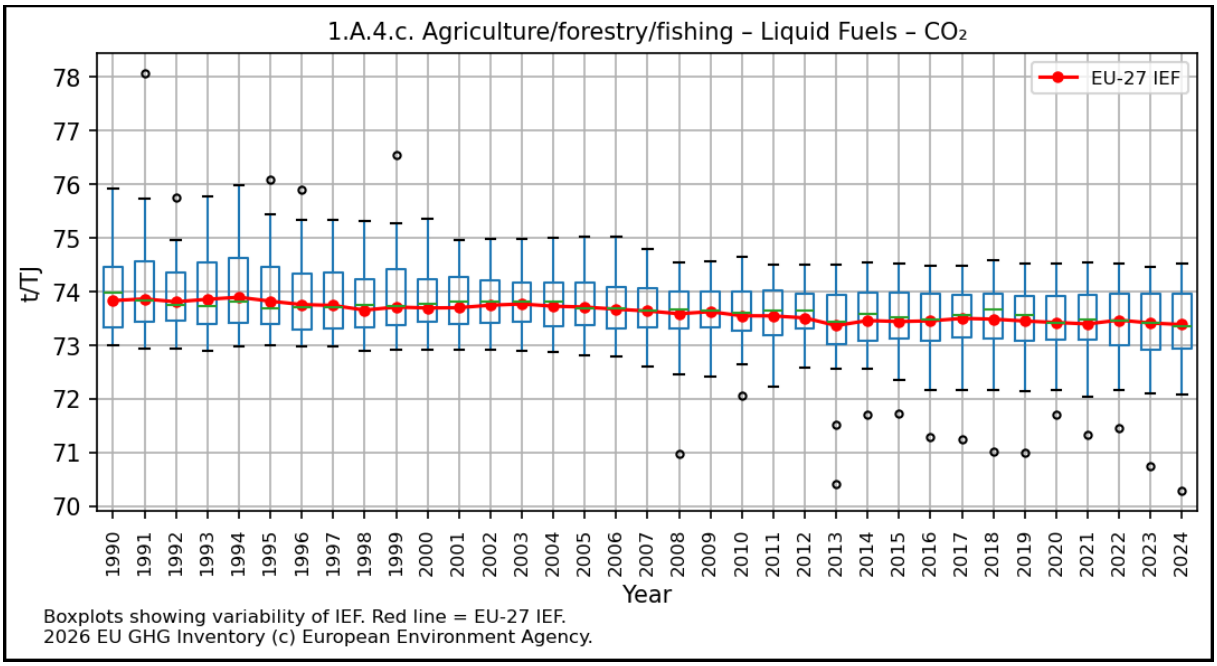


Figure 3.138 1.A.4.c Agriculture/Forestry/Fisheries, liquid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.4.c Agriculture/Forestry/Fisheries – Solid Fuels (CO_2)

In 2024 CO_2 from solid fuels had a share of 2% within source category 1.A.4.c (compared to 10% in 1990). Between 1990 and 2024, CO_2 decreased by 85% (Table 3.94). Between 2023 and 2024, EU emissions decreased by 24%.

Table 3.94 1.A.4.c Agriculture/Forestry/Fisheries, solid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	51	1	0	0.0%	-51	-99%	0	-46%
Belgium	212	16	16	1.1%	-196	-92%	0	0%
Bulgaria	151	30	30	2.1%	-121	-80%	0	0%
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	1 730	19	21	1.5%	-1 709	-99%	1	7%
Denmark	237	7	3	0.2%	-234	-99%	-4	-52%
Estonia	22	NO	NO	-	-22	-100%	-	-
Finland	13	6	NO	-	-13	-100%	-6	-100%
France	NO	NO	NO	-	-	-	-	-
Germany	2 861	NO	NO	-	-2 861	-100%	-	-
Greece	11	3	4	0.3%	-7	-64%	1	42%
Hungary	188	NO	NO	-	-188	-100%	-	-
Ireland	NO	NO	NO	-	-	-	-	-
Italy	NO	NO	NO	-	-	-	-	-
Latvia	99	NO	NO	-	-99	-100%	-	-
Lithuania	148	1	2	0.2%	-145	-98%	1	60%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	NO	NO	NO	-	-	-	-	-
Poland	3 755	1 739	1 266	88.7%	-2 489	-66%	-473	-27%
Portugal	NO	NO	NO	-	-	-	-	-
Romania	66	66	84	5.9%	18	27%	18	28%
Slovakia	1	1	0	0.0%	-1	-65%	0	-41%
Slovenia	NO	NO	NO	-	-	-	-	-
Spain	37	NO	NO	-	-37	-100%	-	-
Sweden	157	NO	NO	-	-157	-100%	-	-
EU	**9 740**	**1 889**	**1 427**	**100%**	**-8 313**	**-85%**	**-462**	**-24%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.139 and Figure 3.140 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Solid fuel consumption in the EU decreased by 85% between 1990 and 2024. The CO_2 implied emission factor for solid fuels was 94.96 t/TJ in 2024.

Figure 3.139 1.A.4.c Agriculture/Forestry/Fisheries, solid fuels: Emission trend and share for CO_2

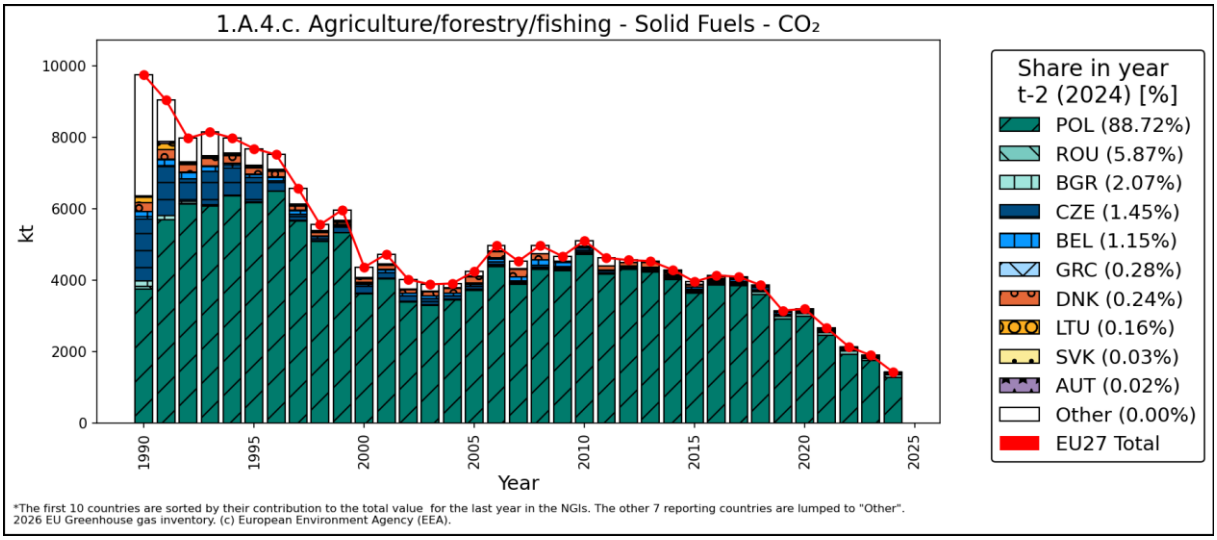
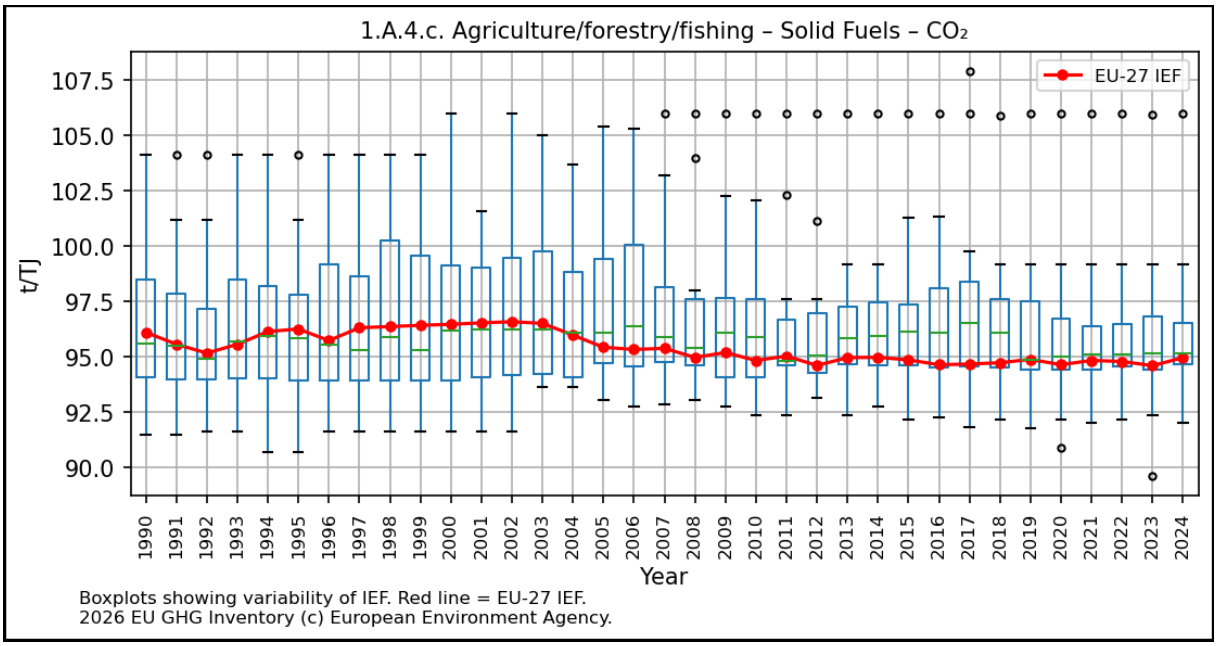


Figure 3.140 1.A.4.c Agriculture/Forestry/Fisheries, solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



1.A.4.c Agriculture/Forestry/Fisheries –Gaseous Fuels (CO_2)

In 2024, CO_2 from gaseous fuels had a share of 13% within source category 1.A.4.c (compared to 19% in 1990). Between 1990 and 2024 CO_2 emissions decreased by 11% (Table 3.95). Between 2023 and 2024, EU emissions increased by 5%.

Table 3.95 1.A.4.c Agriculture/Forestry/Fisheries, gaseous fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	20	26	29	0.3%	8	41%	3	10%
Belgium	67	1 308	1 417	12.9%	1 349	2000%	109	8%
Bulgaria	0	22	24	0.2%	23	11792%	1	6%
Croatia	48	52	60	0.5%	12	25%	8	15%
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	405	90	98	0.9%	-307	-76%	8	9%
Denmark	126	28	29	0.3%	-97	-77%	1	2%
Estonia	4	3	3	0.0%	-1	-18%	0	-6%
Finland	32	4	1	0.0%	-31	-97%	-3	-72%
France	320	351	329	3.0%	8	3%	-22	-6%
Germany	483	782	781	7.1%	299	62%	0	0%
Greece	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Hungary	433	198	162	1.5%	-271	-63%	-36	-18%
Ireland	NO	NO	NO	-	-	-	-	-
Italy	52	901	1 085	9.9%	1 033	1987%	184	20%
Latvia	782	10	17	0.2%	-766	-98%	7	73%
Lithuania	162	47	47	0.4%	-116	-71%	0	-1%
Luxembourg	NO	0	0	0.0%	0	∞	0	54%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	7 329	5 547	5 845	53.2%	-1 484	-20%	298	5%
Poland	25	94	103	0.9%	79	318%	10	10%
Portugal	NO	20	23	0.2%	23	∞	2	12%
Romania	1 917	139	123	1.1%	-1 794	-94%	-16	-11%
Slovakia	41	73	65	0.6%	24	59%	-8	-11%
Slovenia	NO	NO	NO	-	-	-	-	-
Spain	6	744	733	6.7%	727	11800%	-10	-1%
Sweden	33	3	3	0.0%	-30	-91%	0	0%
EU	**12 287**	**10 441**	**10 976**	**100%**	**-1 311**	**-11%**	**535**	**5%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
The information on methodologies and emission factors is not available from the JSON on fuels level Additional information is provided in Annex IX of the EU NID and in MS NIDs, which are also part of the EU submission.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.141 and Figure 3.142 show CO_2 emissions and implied emission factors for EU as well as the share of the Member States with the highest contributions. Gaseous fuel consumption in the EU decreased by 11% between 1990 and 2024. The CO_2 implied emission factor for gaseous fuels was 56.43 t/TJ in 2024.

Figure 3.141 1.A.4.c Agriculture/Forestry/Fisheries, gaseous fuels: Emission trend and share for CO_2

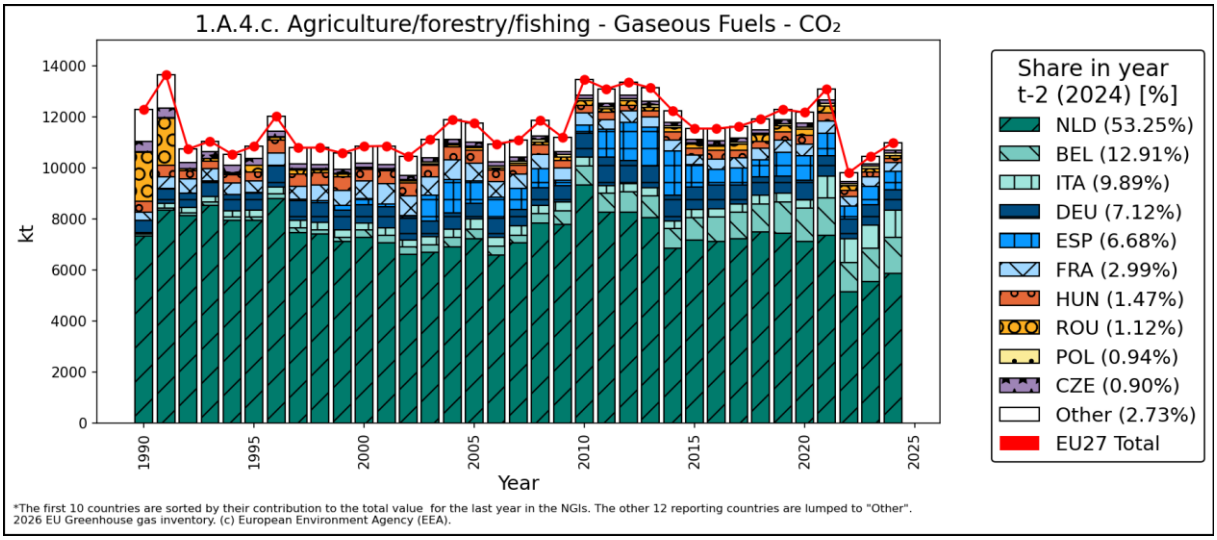
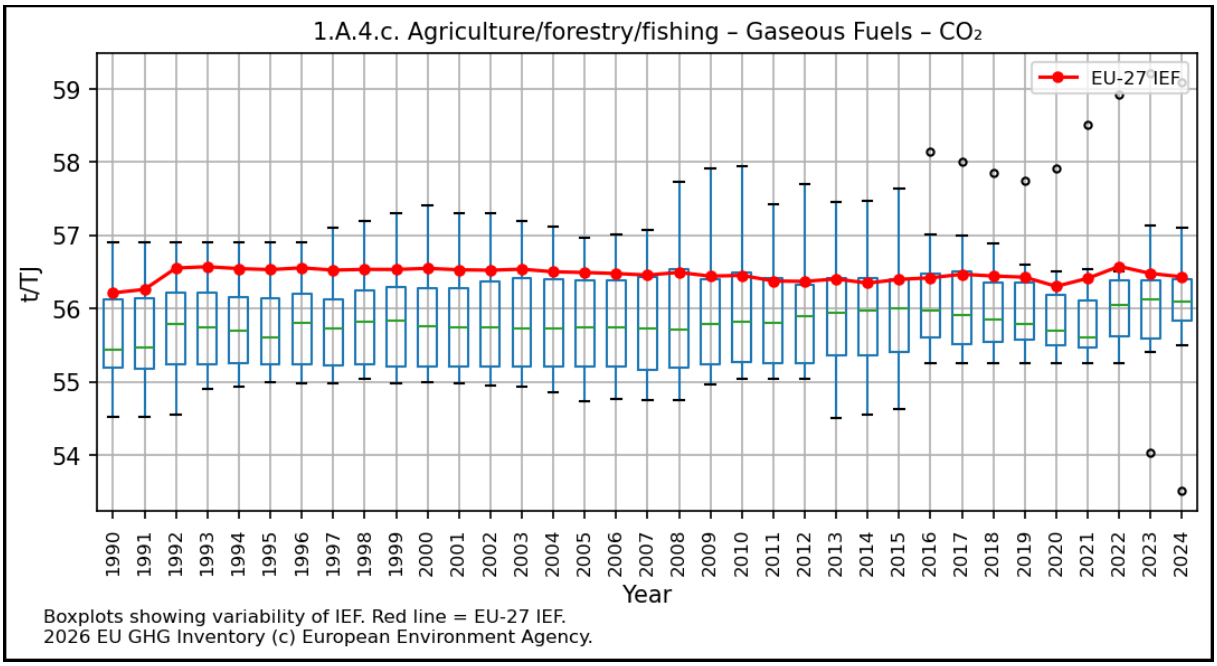


Figure 3.142 1.A.4.c Agriculture/Forestry/Fisheries, gaseous fuels: Implied Emission Factors for CO_2 (in t/TJ)



3.6.5 Other (CRT Source Category 1.A.5)

Source category 1.A.5. Other includes emissions from stationary and mobile military fuel use including aircraft. In 2024, category 1.A.5 contributed to 7 054 kt CO_2 equivalents of which 99.2% is CO_2, 0.2% CH_4 and 0.6% N_2O. There are two key categories this year; 1.A.5.a Stationary: Solid Fuels (CO_2) and 1.A.5.b Mobile: Liquid Fuels (CO_2).

Table 3.96: Key source categories for level and trend analyses and share of MS emissions using higher tier methods for sector 1.A.5. (Table excerpt)

Source category gas	kt CO_2 eq.		Trend	Level		share of higher Tier
	1990	2023		1990	2023	
1.A.5.a Stationary: Solid Fuels (CO_2)	6065	1	T	0	0	97 %
1.A.5.b Mobile: Liquid Fuels (CO_2)	8160	2584	0	L	0	83 %

Table 3.97 provides an overview of Member States' source allocation to Source Category 1.A.5 Other as reported in CRT Table1.A(a)s4.

Table 3.97 1.A.5. Other: Member States' allocation of sources

Member State	Source allocation to 1.A.5 Other
Austria	Stationary: Emissions are 'Not occurring' Mobile: Military use
Belgium	Stationary: Emissions are 'Not occurring' Mobile: Military use
Bulgaria	Stationary: Emissions are 'Not occurring' Mobile: Military aviation
Croatia	Stationary: Emissions are 'Not occurring' Mobile: Emissions are 'Not occurring' or 'Included elsewhere' (emissions from military aviation component and military water-borne component are reported under 1.A.3.b)
Cyprus	Stationary: Emissions reported from Liquid Fuels Mobile: aviation component
Czechia	Stationary: Emissions are 'Not occurring' Mobile: Other mobile sources not included elsewhere, Agriculture and Forestry and Fishing (emissions from aviation besides the public air transport, it is consumption of aviation fuels in the army in the state institutions (aerial vehicles from Integrated rescue system), or private air transport)
Denmark	Stationary: Emissions are 'Not occurring' Mobile: Military use, Recreational crafts
Estonia	Emissions are 'Not occurring'
Finland	Stationary: Includes emissions from non-specified consumption of fuels, military use and statistical corrections of fuel consumption Mobile: Emissions are 'Not occurring' or 'Included elsewhere' (emissions and fuel consumptions of all fuels from category 1A5b is reported in 1A5a due to confidentiality)
France	Stationary: Other non-specified Mobile: Emissions are 'Not occurring' or 'Included elsewhere' (under 1.A.5.a)
Germany	Stationary: Military use Mobile: Military use
Greece	Stationary: Emissions are 'Not occurring' Mobile: Other (not specified elsewhere)
Hungary	Stationary: Military use – Emissions from Gaseous Fuels Mobile: Military use – Emissions from Liquid Fuels
Ireland	Stationary: Emissions are 'Included elsewhere' (under 1.A.4.a) Mobile: Emissions are 'Included elsewhere' (under 1.A.3)
Iceland	Stationary: Other (not specified elsewhere) Mobile: Emissions are 'Not occurring'
Italy	Stationary: Emissions are 'Not occurring' Mobile: Military use
Latvia	Stationary: Emissions are 'Not occurring' Mobile: Aviation gasoline, diesel oil and jet kerosene, used in aircrafts and ships
Lithuania	Stationary: Emissions are 'Not occurring' Mobile: Military use
Luxembourg	Stationary: Building and Plant Site Fuel Powered Machinery. Emissions are reported for 1990-2003 and 'Not occurring' from 2004 on. Mobile: Military Vehicles
Malta	Stationary: Emissions are 'Not occurring' Mobile: Military use

Member State	Source allocation to 1.A.5 Other
Netherlands	Stationary: Emissions are 'Not occurring' Mobile: military use
Poland	Stationary: Emissions are 'Included elsewhere' (without specification of allocation) Mobile: Emissions are 'Not occurring'
Portugal	Stationary: Emissions are 'Not occurring' Mobile: Military aviation
Romania	Stationary: Other sectors - Not elsewhere specified Mobile: Emissions are 'Included elsewhere' (under 1.A.5.a)
Slovakia	Stationary: Other, emissions from fuel combustion in stationary sources that are not specified elsewhere Mobile: Military use Jet Kerosene, Gasoline, Diesel Oil
Slovenia	Stationary: Emissions are 'Not occurring' Mobile: Military use
Spain	Stationary: Emissions are 'Not occurring' or 'Included elsewhere' (Included in 1.A.4.a.i - Military reference activity data are not separated from civil data, and their emissions are estimated together with the same methodology) Mobile: Military use
Sweden	Stationary: Emissions are 'Not occurring' Mobile: Emissions are 'Included elsewhere'

Figure 3.143 shows the total trend within source category 1.A.5 and the dominating emission sources: CO_2 emissions from 1.A.5.b Mobile and from 1.A.5.a Stationary.

Figure 3.143 1.A.5 Other: Total and CO_2 emission and activity trends

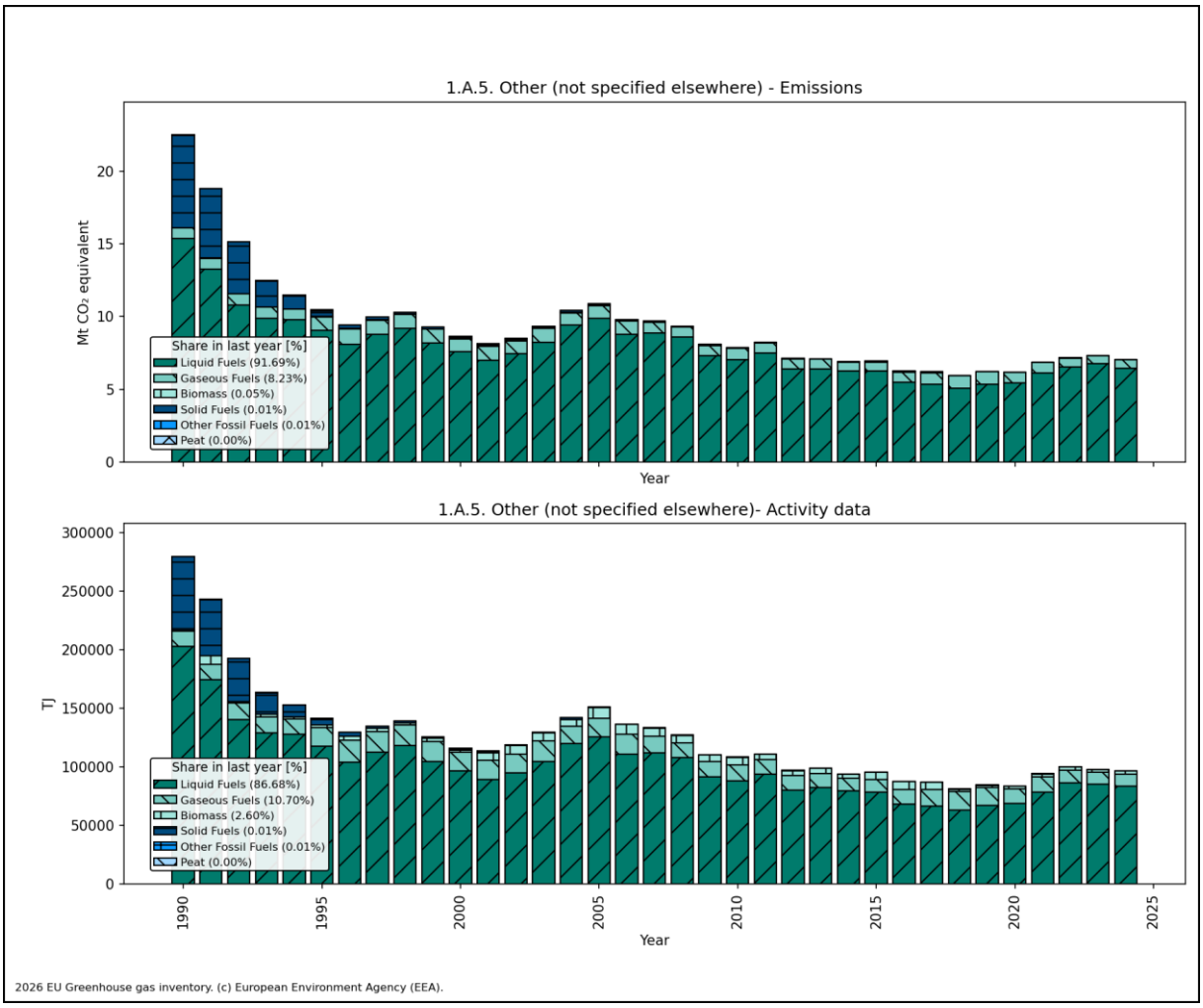


Table 3.98 shows total GHG and CO_2 emissions by Member State from 1.A.5. CO_2 emissions from 1.A.5 Other accounted for 0.4% of total EU GHG emissions in 1.A in 2024. Between 1990 and 2024, CO_2 emissions from this source decreased by 69% in the EU. Between 1990 and 2024, the largest reduction in absolute terms was reported by Germany, which was partly due to reduced military operations after the reunification. The German NID states that only military sources (incl. aircraft) are included in its inventory. Since 2014, the main contributor is France; contributing together 30% of CO_2 emissions in 2024. France includes in this category other non-specified sources from its national energy balance.

Table 3.98 1.A.5. Other: Member States' contributions to CO_2 emissions

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt	
	1990	2024	1990	2024
Austria	38	29	37	28
Belgium	173	92	172	91
Bulgaria	86	55	85	55
Croatia	IE,NO	IE,NO	IE,NO	IE,NO
Cyprus	11	23	11	23
Czechia	194	250	192	242
Denmark	171	159	167	157
Estonia	NO	NO	NO	NO
Finland	1 139	624	1 127	617
France	4 499	2 133	4 464	2 119
Germany	12 132	600	11 765	597
Greece	IE,NO	491	IE,NO	488
Hungary	388	82	385	81
Ireland	NO	NO	NO	NO
Italy	1 136	617	1 071	605
Latvia	NE,NO	24	NE,NO	24
Lithuania	0	47	0	47
Luxembourg	3	0	3	0
Malta	1	3	1	3
Netherlands	393	203	387	200
Poland	NO	NO	NO	NO
Portugal	97	55	96	54
Romania	1 230	1 151	1 222	1 147
Slovakia	479	72	476	71
Slovenia	32	4	32	4
Spain	301	338	298	335
Sweden	IE,NO	IE,NO	IE,NO	IE,NO
EU	**22 503**	**7 054**	**21 991**	**6 990**

Note: Croatia reports that 'military aviation component and military water-borne component' are included in 1.A.3.b.
Ireland reports that emissions of military use stationary combustion are included in 1.A.4.a and that emissions from 1.A.5.b military are included in 1.A.3
Poland reports emissions from stationary combustion as 'IE' without specification of the allocation.
Abbreviations explained in the Chapter 'Units and abbreviations'.

3.6.5.1 Stationary (1.A.5.a)

In this chapter information about emission trends, Member States' contribution, activity data, and emission factors is provided for category 1.A.5.a by fuels. CO_2 emissions from 1.A.5.a Stationary accounted for 0.2% of total GHG emissions in 1.A in 2024. Figure 3.144 shows the emission trend within the categories 1.A.5.a, which is mainly dominated by CO_2 emissions from solid and liquid fuels for 1990 to 1993 and dominated by liquid fuels from 1994 on. The reduction in the early 1990s was driven by CO_2 from solid fuels. Total emissions decreased by 68% in the period 1990 - 2024, mainly due to decreases in emissions from solid fuels (-100%) and liquid fuels (-45%).

Figure 3.144 1.A.5.a Stationary: Total and CO_2 emission and activity trends

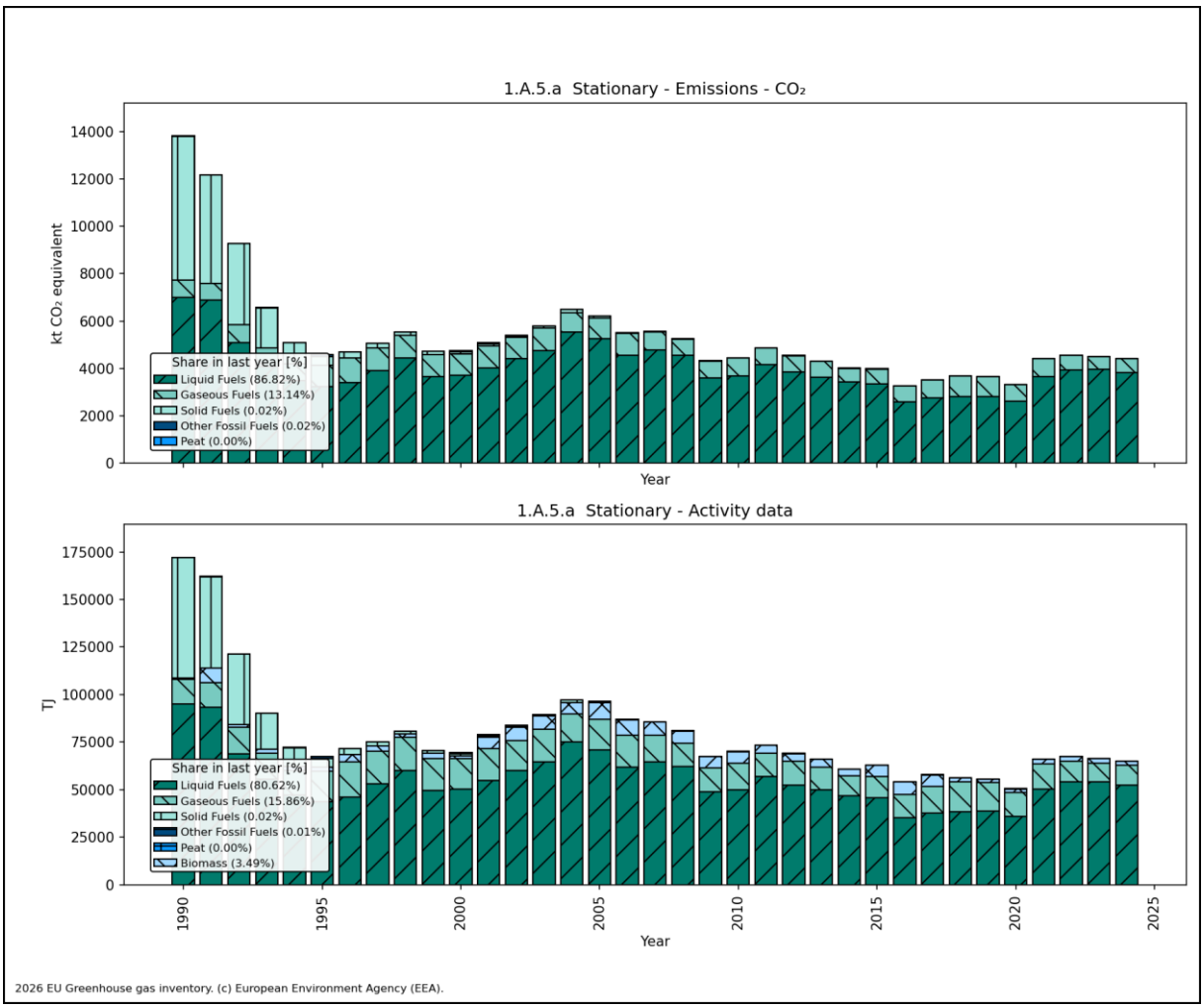


Table 3.99 1.A.5.a Stationary: Member States' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	NO	NO	-	-	-	-	-	NA	NA
Belgium	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
Bulgaria	NO	31	32	0.7%	32	∞	1	2%	NO	D
Croatia	NO	NO	NO	-	-	-	-	-	NA	NA
Cyprus	11	20	19	0.4%	8	77%	-1	-3%	NA,T1	D,NA
Czechia	NO	NO	NO	-	-	-	-	-	NA	NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	1 127	658	617	14.0%	-510	-45%	-41	-6%	NA,T2	CS,NA
France	4 464	2 130	2 119	48.1%	-2 346	-53%	-11	-1%	T1	CS,D,OTH,PS
Germany	6 227	393	374	8.5%	-5 853	-94%	-19	-5%	T2	CS
Greece	NO	NO	NO	-	-	-	-	-	NA	NA
Hungary	370	34	31	0.7%	-339	-92%	-3	-8%	-	CS,NA,NO
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	NO	NO	NO	-	-	-	-	-	NA	NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	3	NO	NO	-	-3	-100%	-	-	NA,NO	NA,NO
Malta	NA	NA	NA	-	-	-	-	-	NA	NA
Netherlands	NO	NO	NO	-	-	-	-	-	NA	NA
Poland	NO	NO	NO	-	-	-	-	-	NA	NA
Portugal	NO	NO	NO	-	-	-	-	-	IE	IE
Romania	1 222	1 183	1 147	26.0%	-74	-6%	-36	-3%	NA,T1,T2	CS,D,NA
Slovakia	406	61	66	1.5%	-340	-84%	5	8%	NA,T2	CS,NA
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
Sweden	NO	NO	NO	-	-	-	-	-	NA	NA
EU	**13 830**	**4 510**	**4 405**	**100%**	**-9 425**	**-68%**	**-104**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.
Spain reports, that military reference activity data are not separated from civil data and that those emissions are estimated together in 1.A.4.a.i by applying the same methodology.
Ireland reports that emissions of military use stationary combustion are included in 1.A.4.a.
Poland reports the emissions under category 1.A.4.c.

1.A.5.a Stationary – Liquid Fuels (CO_2)

In 2024, CO_2 from liquid fuels had a share of 87% within source category 1.A.5.a and the emissions were 3 825 kt CO_2. Between 1990 and 2024 CO_2 emissions decreased by 45%. (Table 3.100)

Table 3.100: 1.A.5.a Stationary, liquid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	NO	NO	-	-	-	-	-	-	-
Belgium	IE	IE	IE	-	-	-	-	-	-	-
Bulgaria	NO	27	28	0.7%	28	∞	1	2%	-	-
Croatia	NO	NO	NO	-	-	-	-	-	-	-
Cyprus	11	20	19	0.5%	8	77%	-1	-3%	T1	D
Czechia	-	-	-	-	-	-	-	-	-	-
Denmark	NO	NO	NO	-	-	-	-	-	-	-
Estonia	NO	NO	NO	-	-	-	-	-	-	-
Finland	1 036	592	562	14.7%	-474	-46%	-30	-5%	T2	CS
France	4 464	1 957	1 959	51.2%	-2 505	-56%	2	0%	-	-
Germany	1 166	177	108	2.8%	-1 057	-91%	-68	-39%	T2	CS
Greece	-	-	-	-	-	-	-	-	-	-
Hungary	259	NO	NO	-	-259	-100%	-	-	NA	NA
Ireland	NO	NO	NO	-	-	-	-	-	-	-
Italy	NO	NO	NO	-	-	-	-	-	-	-
Latvia	NO	NO	NO	-	-	-	-	-	-	-
Lithuania	NO	NO	NO	-	-	-	-	-	-	-
Luxembourg	3	NO	NO	-	-3	-100%	-	-	NA	NA
Malta	NA	NA	NA	-	-	-	-	-	-	-
Netherlands	NO	NO	NO	-	-	-	-	-	-	-
Poland	NO	NO	NO	-	-	-	-	-	-	-
Portugal	NO	NO	NO	-	-	-	-	-	-	-
Romania	37	1 183	1 147	30.0%	1 110	2974%	-36	-3%	T1,T2	CS,D
Slovakia	35	1	1	0.0%	-34	-96%	0	-4%	T2	CS
Slovenia	NO	NO	NO	-	-	-	-	-	-	-
Spain	IE	IE	IE	-	-	-	-	-	NA	NA
Sweden	NO	NO	NO	-	-	-	-	-	-	-
EU	**7 011**	**3 957**	**3 825**	**100%**	**-3 187**	**-45%**	**-132**	**-3%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'

1.A.5.a Stationary – Solid Fuels (CO_2)

In 2024 CO_2 from solid fuels had a share of 0.1% within source category 1.A.5.a (compared to 44% in 1990). Between 1990 and 2043, CO_2 emissions decreased by nearly 100% (Table 3.101). The main reason for the strong decline of emissions in the early 1990s was the closure of military barracks after the German reunification and the phase out of coal use for combustion in buildings.

Ireland reports that emissions of military use stationary combustion are included in 1.A.4.a. Spain reports, that military reference activity data are not separated from civil data and that those emissions are estimated together in 1.A.4.a.i by applying the same methodology.

Table 3.101 1.A.5.a Stationary, solid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	NO	NO	-	-	-	-	-	-	-
Belgium	NO	NO	NO	-	-	-	-	-	-	-
Bulgaria	NO	0	0	11.0%	0	∞	0	-17%	-	-
Croatia	NO	NO	NO	-	-	-	-	-	-	-
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	-	-	-	-	-	-	-	-	-	-
Denmark	NO	NO	NO	-	-	-	-	-	-	-
Estonia	NO	NO	NO	-	-	-	-	-	-	-
Finland	1	NO	NO	-	-1	-100%	-	-	NA	NA
France	NO	NO	NO	-	-	-	-	-	-	-
Germany	4 553	3	0	19.3%	-4 553	-100%	-3	-94%	T2	CS
Greece	-	-	-	-	-	-	-	-	-	-
Hungary	111	NO	NO	-	-111	-100%	-	-	NA	NA
Ireland	NO	NO	NO	-	-	-	-	-	-	-
Italy	NO	NO	NO	-	-	-	-	-	-	-
Latvia	NO	NO	NO	-	-	-	-	-	-	-
Lithuania	NO	NO	NO	-	-	-	-	-	-	-
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NA	NA	NA	-	-	-	-	-	-	-
Netherlands	NO	NO	NO	-	-	-	-	-	-	-
Poland	NO	NO	NO	-	-	-	-	-	-	-
Portugal	NO	NO	NO	-	-	-	-	-	-	-
Romania	1 184	NO	NO	-	-1 184	-100%	-	-	NA	NA
Slovakia	216	0	1	69.7%	-215	-100%	0	44%	T2	CS
Slovenia	NO	NO	NO	-	-	-	-	-	-	-
Spain	IE	IE	IE	-	-	-	-	-	NA	NA
Sweden	NO	NO	NO	-	-	-	-	-	-	-
EU	**6 065**	**4**	**1**	**100%**	**-6 064**	**-100%**	**-3**	**-72%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.145 shows CO_2 emissions for EU and some of the Member States.

Figure 3.145 1.A.5.a Stationary, solid fuels: Emission trend and share for CO_2

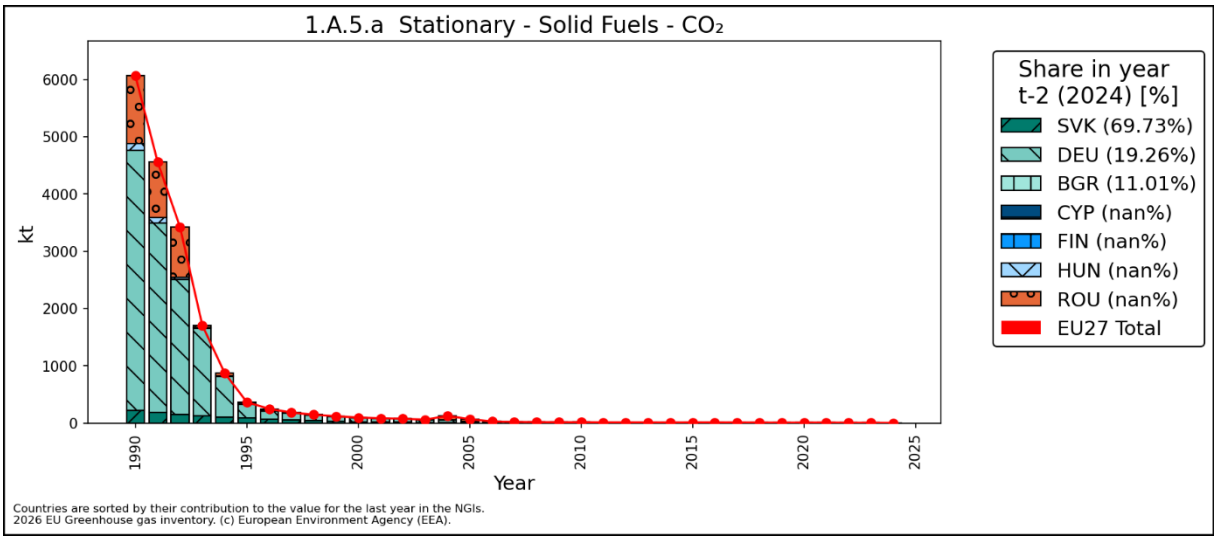
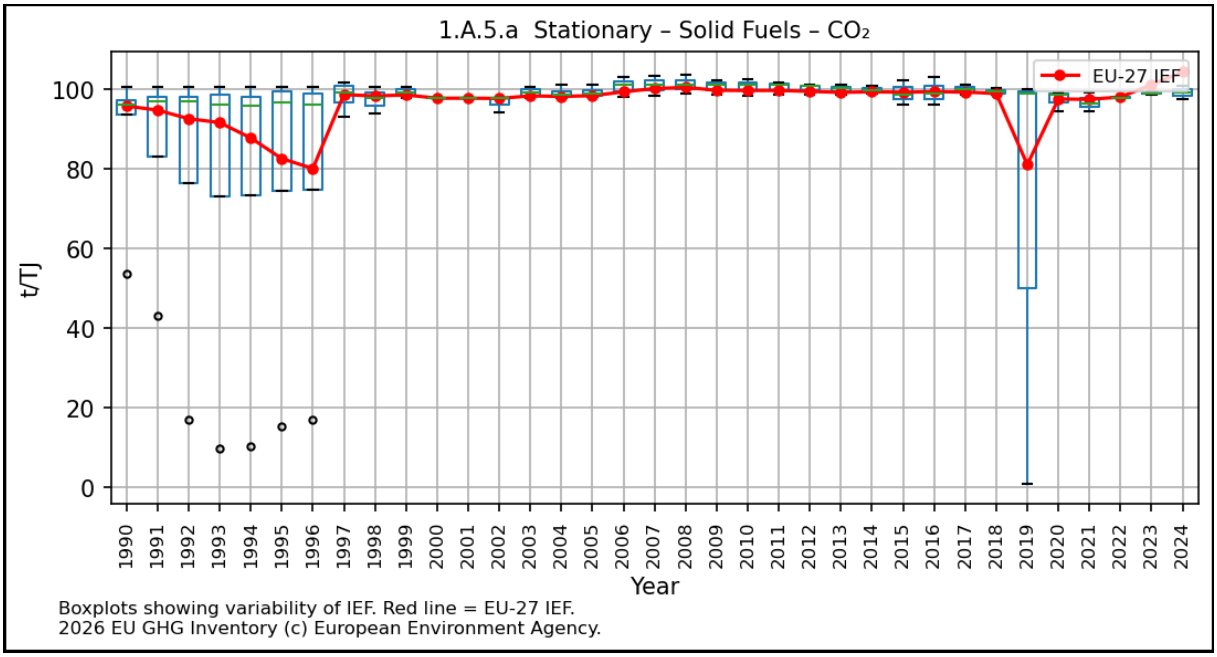


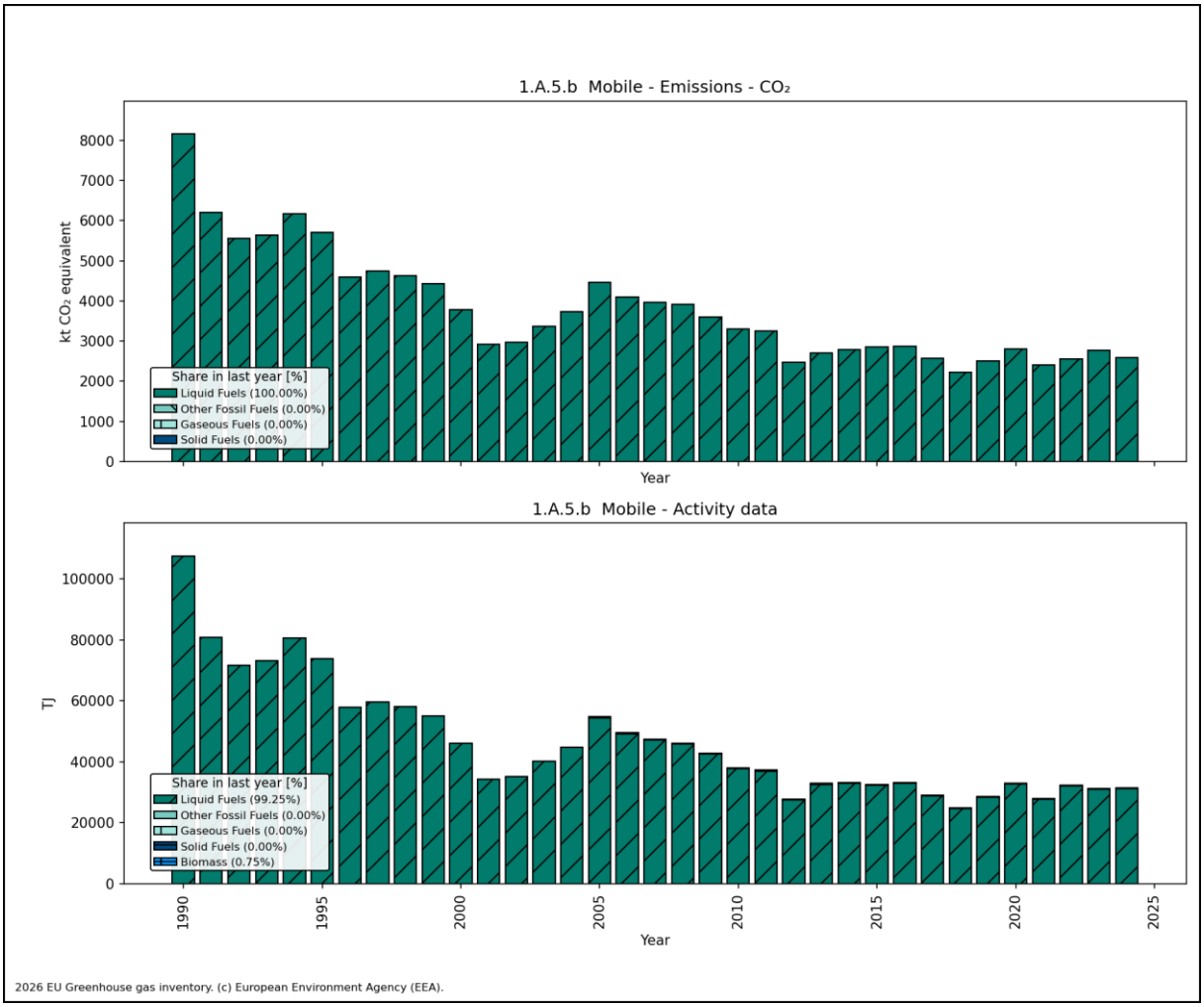
Figure 3.146 1.A.5.a Stationary, solid fuels: Implied Emission Factors for CO_2 (in t/TJ)



3.6.5.2 Mobile (1.A.5.b)

In this chapter information about emission trends, Member States' contribution and activity data is provided for category 1.A.5.b by fuels. CO_2 emissions from 1.A.5.b Mobile accounted for 0.1% of total EU GHG emissions in 1.A in 2024. Figure 3.147 shows the emission trend within the category 1.A.5.b, which is dominated by CO_2 emissions from liquid fuels. Total CO_2 emissions decreased by 52% and were 2 460 kt CO_2 in the year 2024.

Figure 3.147 1.A.5.b Mobile: Activity Data and CO_2 emission trends



The EU emissions increased by 9% between 2023 and 2024. “Included elsewhere” often indicates, that the country reports these emissions under 1.A.3 Transport or 1.A.5.a.

Table 3.102 1.A.5.b Mobile: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	37	28	28	1.2%	-9	-24%	0	0%	NA,T2	-
Belgium	172	89	91	3.7%	-81	-47%	3	3%	NA,T1	D,NA
Bulgaria	85	31	23	0.9%	-62	-73%	-8	-25%	-	-
Croatia	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
Cyprus	NA,NO	3	3	0.1%	3	∞	0	10%	NA,T1	D,NA
Czechia	192	189	198	8.1%	6	3%	9	5%	-	-
Denmark	48	93	92	3.7%	44	92%	-1	-1%	NA,T2	CS,D,NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
France	IE,NO	IE,NO	IE,NO	-	-	-	-	-	T1	CS,D,OTH,PS
Germany	2 685	170	213	8.7%	-2 472	-92%	43	25%	CS,D,M	CS
Greece	IE,NO	348	488	19.8%	488	∞	140	40%	NA,T1	-
Hungary	14	28	50	2.1%	36	249%	22	78%	NA,T2	CS,NA
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	1 071	364	605	24.6%	-466	-44%	241	66%	T2	CS
Latvia	NE,NO	24	24	1.0%	24	∞	0	-2%	-	D,NA
Lithuania	0	46	47	1.9%	46	12817%	1	2%	NA,T2	CS,NA
Luxembourg	0	0	0	0.0%	0	-14%	0	0%	NA,T1,T2	CS,D,NA
Malta	1	4	3	0.1%	2	305%	0	-13%	NA,T1	-
Netherlands	387	265	200	8.1%	-187	-48%	-65	-25%	NA,T2	CS,NA
Poland	NO	NO	NO	-	-	-	-	-	NA	NA
Portugal	96	49	54	2.2%	-42	-44%	5	11%	NA	NA
Romania	IE	IE	IE	-	-	-	-	-	NA	NA
Slovakia	0	0	0	0.0%	0	-91%	0	-25%	NA,T1	D,NA
Slovenia	32	4	4	0.2%	-28	-87%	0	-5%	NA,T1	D,NA
Spain	298	517	335	13.6%	38	13%	-182	-35%	CR,NA,T1,T2	CS,D,NA
Sweden	IE,NO	IE,NO	IE,NO	-	-	-	-	-	T2	CS
EU	**5 119**	**2 253**	**2 460**	**100%**	**-2 658**	**-52%**	**208**	**9%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Croatia reports emissions from military aviation and navy in category 1.A.3.b.
Finland reports emissions from military activities as 'IE' for reasons of confidentiality.
France and Romania report emissions in category 1.A.5.a
Ireland reports emission from military activities in category 1.A.3.
Abbreviations explained in the Chapter 'Units and abbreviations'.

1.A.5.b Mobile – Liquid Fuels (CO_2)

In 2024, CO_2 from liquid fuels had a share of 99.9% within source category 1.A.5.b throughout the whole period. Between 1990 and 2024 CO_2 decreased by 69% (Table 3.103 1.A.5.b Mobile, liquid fuels: Member States' contributions to CO2 emissions).

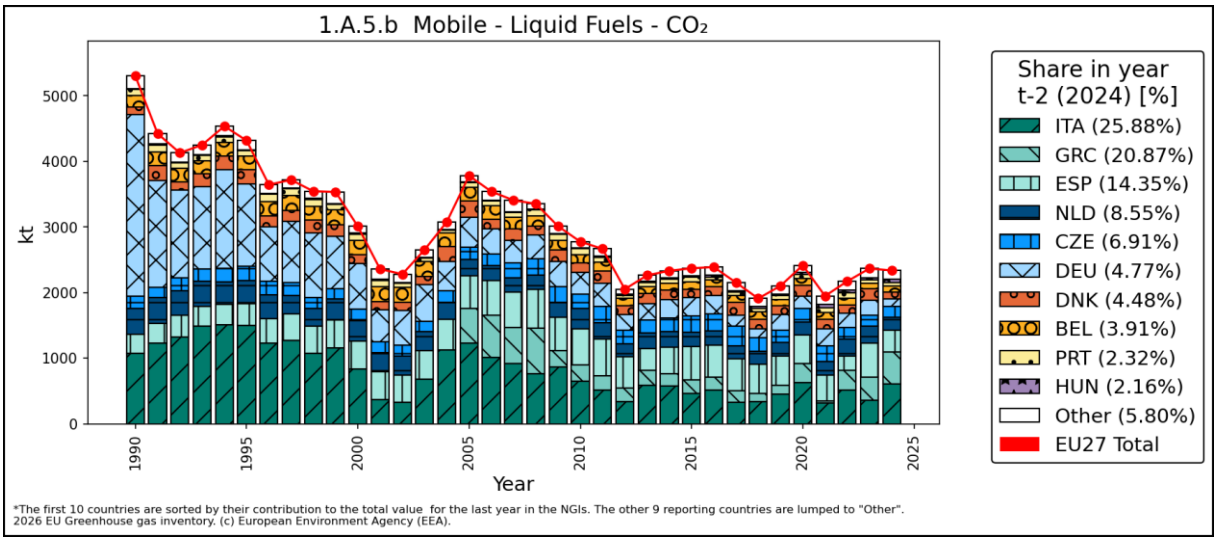
Table 3.103 1.A.5.b Mobile, liquid fuels: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	37	28	28	1.1%	-9	-24%	0	0%	T2	CS
Belgium	172	89	91	3.7%	-81	-47%	3	3%	T1	D
Bulgaria	85	31	23	0.9%	-62	-73%	-8	-25%	-	-
Croatia	IE	IE	IE	-	-	-	-	-	NA	NA
Cyprus	NO	3	3	0.1%	3	∞	0	10%	T1	D
Czechia	192	236	242	9.7%	50	26%	6	3%	T2	CS
Denmark	119	170	65	2.6%	-54	-45%	-105	-62%	T2	CS,D
Estonia	NO	NO	NO	-	-	-	-	-	-	-
Finland	IE	IE	IE	-	-	-	-	-	NA	NA
France	IE	IE	IE	-	-	-	-	-	-	-
Germany	5 538	464	223	9.0%	-5 315	-96%	-241	-52%	CS,D,M	CS
Greece	IE	348	488	19.6%	488	∞	140	40%	T1	D
Hungary	14	28	50	2.0%	36	249%	22	78%	T2	CS
Ireland	NO	NO	NO	-	-	-	-	-	-	-
Italy	1 071	364	605	24.3%	-466	-44%	241	66%	-	-
Latvia	NE	24	24	1.0%	24	∞	0	-2%	T1	D
Lithuania	0	46	47	1.9%	46	12817%	1	2%	T2	CS
Luxembourg	0	0	0	0.0%	0	-14%	0	0%	T2	CS
Malta	1	4	3	0.1%	2	305%	0	-13%	T1	D
Netherlands	387	265	200	8.0%	-187	-48%	-65	-25%	T2	CS
Poland	NO	NO	NO	-	-	-	-	-	-	-
Portugal	96	49	54	2.2%	-42	-44%	5	11%	T1	D
Romania	IE	IE	IE	-	-	-	-	-	NA	NA
Slovakia	0	0	0	0.0%	0	-91%	0	-25%	T1	CS
Slovenia	32	4	4	0.2%	-28	-87%	0	-5%	T1	D
Spain	298	517	335	13.5%	37	13%	-182	-35%	CR,T1	CS,D
Sweden	IE	IE	IE	-	-	-	-	-	T2	CS
EU	**8 043**	**2 671**	**2 487**	**100%**	**-5 555**	**-69%**	**-184**	**-7%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
*Information on methods and emission factors are identical with those described in Table **3.102** as emissions from this source only occur in liquid fuels*
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.148 shows CO_2 emissions for EU and the Member States.

Figure 3.148 1.A.5.b Mobile, liquid fuels: Emission trend and share for CO_2

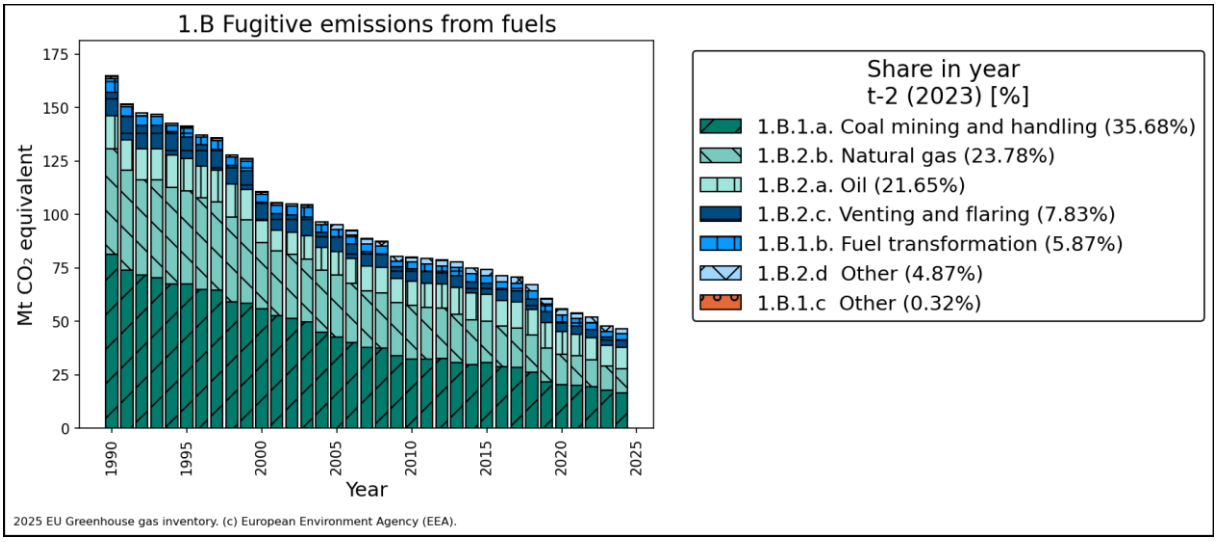


3.6.6 Fugitive emissions from fuels (CRT Source Category 1.B)

This chapter describes gaseous or volatile emissions, which occur during extraction, handling and consumption of fossil fuels. In the 2006 IPCC Guidelines fugitive emissions are defined as intentional or unintentional releases of gases from anthropogenic activities that in particular may arise from the production, processing, transmission, storage and use of fuels. Emissions from combustion are only included where it does not support productive activity (e.g., flaring of natural gases at oil and gas production facilities). Evaporative emissions from vehicles are included under Road Transport as Subsection 1A3b v (2006 IPCC Guidelines).

In 2024, in terms of CO_2 equivalents, about 63 % of emissions from source category 1.B were fugitive CH_4 emissions while 37 % were fugitive CO_2 emissions. Together, they represent 1.7 % of total GHG emissions in the EU. Fugitive GHG emissions have been steadily declining (Figure 3.149). Between 1990 and 2024, the total fugitive GHG emissions decreased by 72 %. This was mainly due to the decrease in underground mining activities: CH_4 emissions from underground mining activities have decreased by 81 % since 1990 (Figure 3.152) and decreases in CH_4 emissions from category 1B1ai1 underground mines are responsible for 45 % of the total decrease of fugitive emissions. Between 1990 and 2024, GHG emissions from 1.B.1 Solid Fuels decreased by 78 % (Figure 3.150), while emissions from 1.B.2 Oil and Natural Gas decreased by 65 %.

Figure 3.149 1.B Fugitive Emission from Fuel: GHG Emissions trend



Fugitive emissions include four key sources:

*Table 3.104: Key source categories for level and trend analyses and share of countries emissions using higher tier methods in sector 1.B (table **excerpt**)*

Source category gas	kt CO_2 equ.		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
1.B.1.a Coal mining and handling: no classification (CH_4)	80 725	16 543	T	L	L	74 %
1.B.2.a Oil: no classification (CH_4)	6 985	713	T	0	0	31%
1.B.2.a Oil: no classification (CO_2)	8 378	9 393	T	L	L	83 %
1.B.2.b Natural gas: no classification (CH_4)	47 075	10 391	T	L	L	70 %
1.B.2.c Venting and flaring: no classification (CH_4)	6 377	1 272	T	0	0	26%

The two largest key sources (CH_4 emissions from 1.B.1.a Coal Mining and Handling and 1.B.2.b Natural Gas) account together for 58 % of total fugitive GHG emissions.

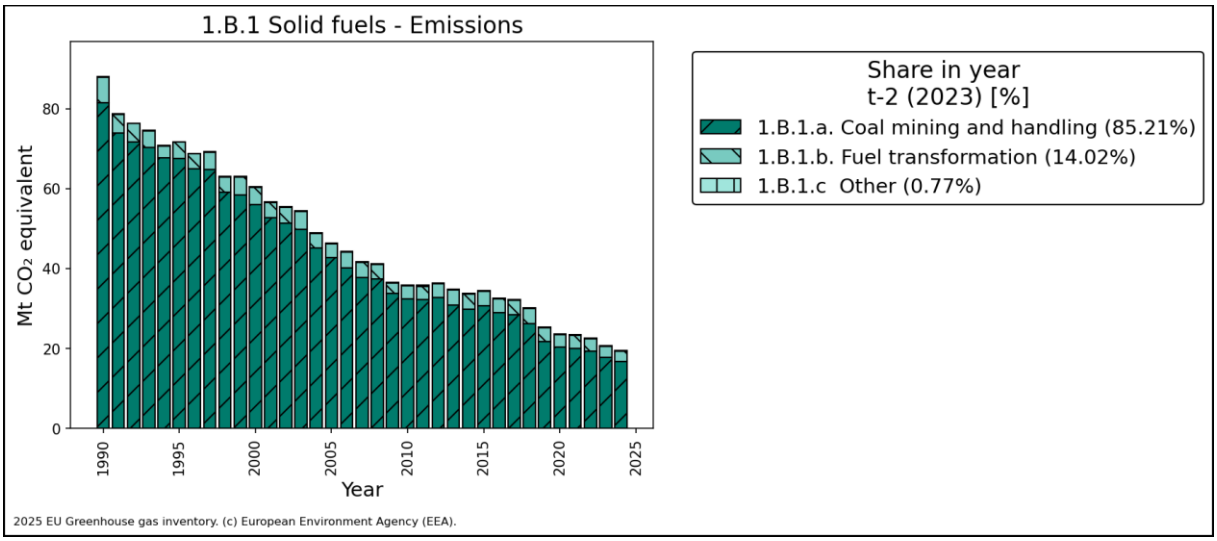
3.6.6.1 Fugitive emissions from Solid Fuels (1.B.1)

In the 2006 IPCC Guidelines fugitive emissions from solid fuels are defined as the intentional or unintentional release of greenhouse gases that may occur during the extraction, processing and delivery of fossil fuels to the point of final use. Combustion emissions from colliery methane recovered and used are excluded here and reported under Fuel Combustion Emissions. Coal mining data reported to the IEA include also peat extraction, which is not included in the CRT. Five countries (Denmark, Estonia, Finland, Latvia and Lithuania) have peat extraction but no coal mining.

In 2024 fugitive emissions from solid fuels accounted for 0.7 % of the total GHG emissions in the EU and 42 % of total fugitive emissions:

- 85 % of fugitive emissions from solid fuels were CH_4 emissions from coal mining. The emissions arise due to the natural production of methane when coal is formed. Methane is partly stored within the coal seam and escapes when mined. Most CH_4 emissions resulted from underground mines; surface mines were a smaller source,
- 14 % of fugitive emissions from solid fuels were emissions due to solid fuel transformation,
- Since 1990 fugitive CH_4 emissions from 1.B.1 Solid fuels have been steadily decreasing, caused by the reduction of coal mining activities.

Figure 3.150 1.B.1 Fugitive Emissions from Solid Fuels: Trend



In 2024 three countries, Poland, Germany and Romania represented 90 % of total fugitive GHG emissions from solid fuels (Table 3.105).

Table 3.105 1.B.1 Fugitive Emissions from Solid Fuels: Countries Contribution

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024
Austria	373	NA,IE,NO	IE,NA,NO	IE,NA,NO	373	IE,NA,NO
Belgium	485	37	0	IE,NA,NO	484	37
Bulgaria	2 244	535	64	12	2 180	523
Croatia	67	NO	NO	NO	67	NO
Cyprus	NO	NO	NO	NO	NO	NO
Czechia	9 164	539	542	61	8 621	478
Denmark	NO	NO	NO	NO	NO	NO
Estonia	NO	NO	NO	NO	NO	NO
Finland	NO	NO	NO	NO	NO	NO
France	5 387	18	NA,NO	NA,NO	5 387	18
Germany	30 412	778	1 833	700	28 579	78
Greece	1 266	161	NO	NO	1 266	161
Hungary	1 188	30	7	NA,NO	1 181	30
Ireland	62	19	NO	NO	62	19
Italy	148	25	0	NA,NO	148	25
Latvia	NO	NO	NO	NO	NO	NO
Lithuania	NO	NO	NO	NO	NO	NO
Luxembourg	NO	NO	NO	NO	NO	NO
Malta	NO	NO	NO	NO	NO	NO
Netherlands	123	70	110	65	12	5
Poland	27 896	15 290	4 188	1 795	23 707	13 495
Portugal	160	16	3	NO	157	16
Romania	5 881	1 407	NA,NO	NA,NO	5 881	1 407
Slovakia	815	216	20	9	795	208
Slovenia	505	260	101	92	404	168
Spain	1 832	141	18	119	1 815	22
Sweden	10	18	5	14	5	4
EU	**88 018**	**19 561**	**6 892**	**2 867**	**81 126**	**16 694**

Abbreviations explained in the Chapter 'Units and abbreviations'
Austria includes emissions from 1.B.1.b – production of coke oven coke – in 1.A.2.a Iron and Steel
Hungary reports fugitive methane emissions released during coal mining and handling under sector 1.A.2. Fugitive emissions from solid fuel transformation are included in sector 1.A.1.c.

Nearly all fugitive CH_4 emissions from solid fuels originate from coal mining and handling (1B1a). Between 1990 and 2022 these emissions decreased by 80 % (Table 3.106).

CH_4 recovery from coal mining

Romania is the only country that reports CH_4 recovery in category 1.B.1.a.i.1 (Mining activities) in the EU in 2024. The recovered CH_4 from Lupeni and Vulcan mines is included in '1.B.1.a Coal Mining and Handling, 1.B.1.a.i Underground Mines, 1.B.1.a.i.1 Mining Activities, Recovery / Flaring CH_4' category. [ROU NID, 2026]

CH_4 from Coal Mining (1.B.1.a)

Fugitive emissions from coal mining correspond to the total emissions from:

- underground mining (emissions from underground mines, brought to the surface by ventilation systems),
- surface mining (emissions primarily from the exposed coal surfaces and coal rubble, but also emissions associated with the release of pressure on the coal),
- post-mining (emissions from coal after extraction from the ground, which occur during preparation, transportation, storage, or final crushing prior to combustion),
- abandoned underground mines
- Flaring of drained methane or conversion of methane to CO_2
- Other.

CH_4 emissions from 1.B.1.a coal-mining accounted for 0.6 % of total GHG emissions in 2024 and for 35 % of all fugitive emissions in the EU. CH_4 emissions from this source decreased by 80 % in the EU between 1990 and 2024 and also decreased by -6 % between 2023 and 2024 (Table 3.106).

Table **3.106** shows that 74 % of EU emissions are calculated using higher tier methods. In cases where countries report a mix of Tier 1 and higher Tier methods, only emissions from subcategories of sector 1.B.1.a were taken into account, where the countries actually apply a higher tier method, according to the IPCC 2006 Guidelines.

Table 3.106 1.B.1.a Coal Mining: Countries contribution to CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	373	NA,NO	NA,NO	-	-373	-100%	-	-	NA	NA
Belgium	443	37	37	0.2%	-406	-92%	0	-1%	D,NA	D,NA
Bulgaria	2 163	678	522	3.2%	-1 641	-76%	-156	-23%	NA,T1,T2	CS,D,NA
Croatia	67	NO	NO	-	-67	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	8 621	487	475	2.9%	-8 146	-94%	-12	-3%	NA,T1,T2	CS,D,NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	NO	NO	NO	-	-	-	-	-	NA	NA
France	5 354	2	2	0.0%	-5 352	-100%	0	0%	NA,T2,T3	CS,NA
Germany	28 554	90	67	0.4%	-28 487	-100%	-23	-26%	NA,T2,T3	CS,NA
Greece	1 266	263	161	1.0%	-1 104	-87%	-101	-39%	NA,T1	D,NA
Hungary	1 181	30	30	0.2%	-1 151	-97%	0	-2%	NA,T1,T2	CS,D,NA
Ireland	62	19	19	0.1%	-43	-70%	0	-1%	NA,T1	D,NA
Italy	59	7	6	0.0%	-52	-89%	0	-5%	NA,T2	CS,NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	NO	NO	NO	-	-	-	-	-	NA	NA
Poland	23 581	13 989	13 409	81.1%	-10 172	-43%	-580	-4%	NA,T1,T2	CS,D,NA
Portugal	157	17	16	0.1%	-140	-89%	0	-1%	NA,NO,T1	D,NA,NO
Romania	5 834	1 467	1 407	8.5%	-4 427	-76%	-59	-4%	NA,T1,T2	D,NA
Slovakia	792	257	201	1.2%	-591	-75%	-57	-22%	NA,T1	D,NA
Slovenia	404	196	168	1.0%	-236	-58%	-28	-14%	NA,T2,T3	CS,D,NA,PS
Spain	1 815	23	22	0.1%	-1 792	-99%	-1	-4%	CS,NA,T2	CS,NA
Sweden	NO	NO	NO	-	-	-	-	-	-	-
EU	**80 725**	**17 562**	**16 543**	**100%**	**-64 181**	**-80%**	**-1 019**	**-6%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.

CH_4 from Underground mines (1.B.1.a.i)

In 2024, 88% of fugitive CH_4 emissions from coal mines were due to underground mines. Within the EU coal mining in underground mines decreased substantially between 1990 and 2024 (-81 %) (Table **3.107** and Figure 3.152).

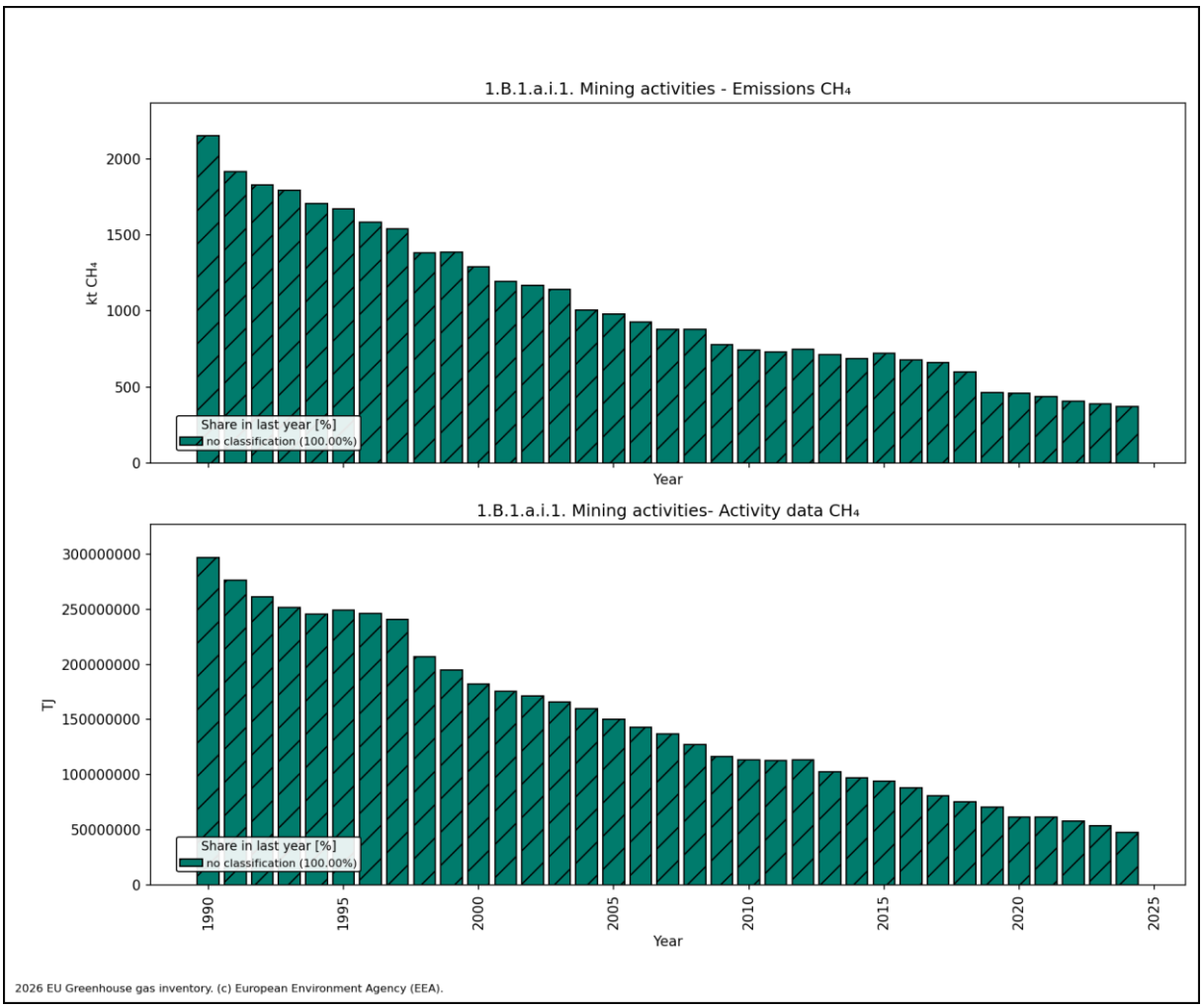
For detailed information on countries methodologies please see Annex III.

Table 3.107 1.B.1.a.1 Coal Mining – underground mining: Countries contribution to CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	335	NA,NO	NA,NO	-	-335	-100%	-	-	NA	NA
Belgium	443	37	37	0.3%	-406	-92%	0	-1%	D,NA	D,NA
Bulgaria	1 484	166	156	1.1%	-1 328	-89%	-10	-6%	NA,T2	CS,NA
Croatia	67	NO	NO	-	-67	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	8 356	388	393	2.7%	-7 962	-95%	5	1%	NA,T1,T2	CS,D,NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	NO	NO	NO	-	-	-	-	-	NA	NA
France	5 302	2	2	0.0%	-5 300	-100%	0	0%	NA,T2,T3	CS,NA
Germany	28 444	58	56	0.4%	-28 388	-100%	-2	-3%	NA,T3	CS,NA
Greece	NO	NO	NO	-	-	-	-	-	NA	NA
Hungary	1 181	30	30	0.2%	-1 151	-97%	0	-1%	NA,T1	D,NA
Ireland	62	19	19	0.1%	-43	-70%	0	-1%	NA,T1	D,NA
Italy	22	7	6	0.0%	-16	-71%	0	-5%	NA,T2	CS,NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	NO	NO	NO	-	-	-	-	-	NA	NA
Poland	21 933	13 011	12 410	84.9%	-9 523	-43%	-601	-5%	NA,T1,T2	CS,D,NA
Portugal	157	17	16	0.1%	-140	-89%	0	-1%	NA,NO,T1	D,NA,NO
Romania	5 226	1 110	1 103	7.5%	-4 122	-79%	-7	-1%	NA,T1,T2	D,NA
Slovakia	792	257	201	1.4%	-591	-75%	-57	-22%	NA,T1	D,NA
Slovenia	404	196	168	1.2%	-236	-58%	-28	-14%	NA,T2,T3	CS,D,NA,PS
Spain	1 814	23	22	0.2%	-1 791	-99%	-1	-4%	CS,NA,T2	CS,NA
Sweden	NO	NO	NO	-	-	-	-	-	-	-
EU	**76 020**	**15 324**	**14 621**	**100%**	**-61 399**	**-81%**	**-703**	**-5%**	**-**	**-**

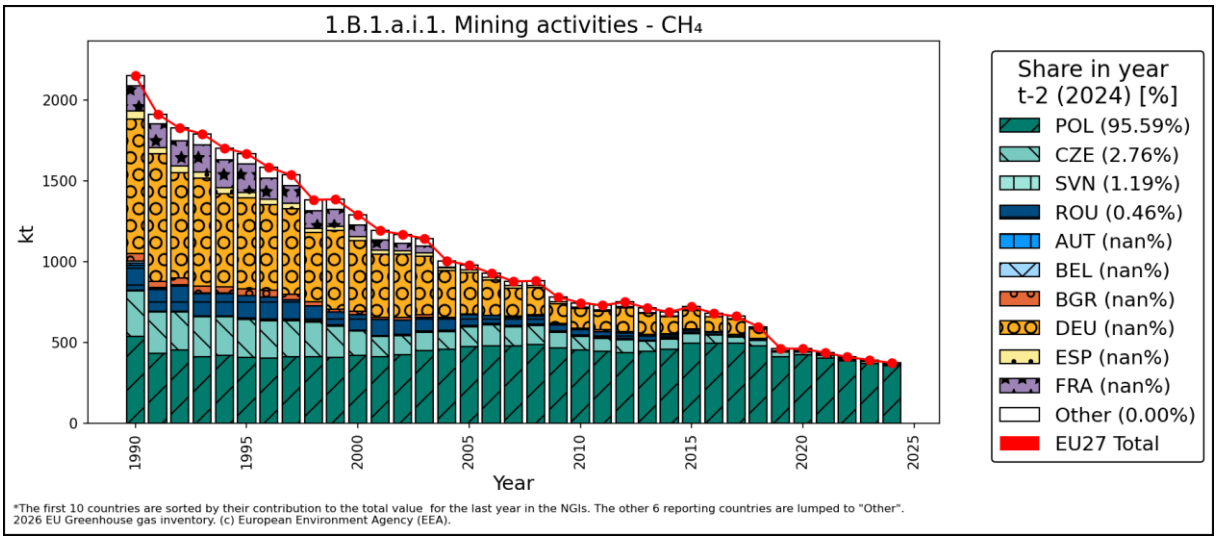
Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.151 1.B.1.a.i.1 Mining activities - Underground Mines: Emission trend and activity data for EU CH_4



CH_4 emissions from 1.B.1.a.i.1 – underground mines, mining activities are responsible for 71% of total GHG emissions from 1.B.1.a.i. The decrease of emissions is mainly caused by the closure of underground mining in Germany.

Figure 3.152 1.B.1.a.i.1 Mining activities - Underground Mines: Emission trend and share for EU-28 and the emitting countries of CH_4



CH_4 from Surface mines (1.B.1.a.ii)

In 2024, only 12% of CH_4 emissions from coal mining originate from surface mining. Overall, CH_4 emissions from the coal production of surface mines decreased by 59 % between 1990 and 2024 (Table **3.108** and Figure 3.153).

For detailed information on countries methodologies please see Table **3.108** and Annex III.

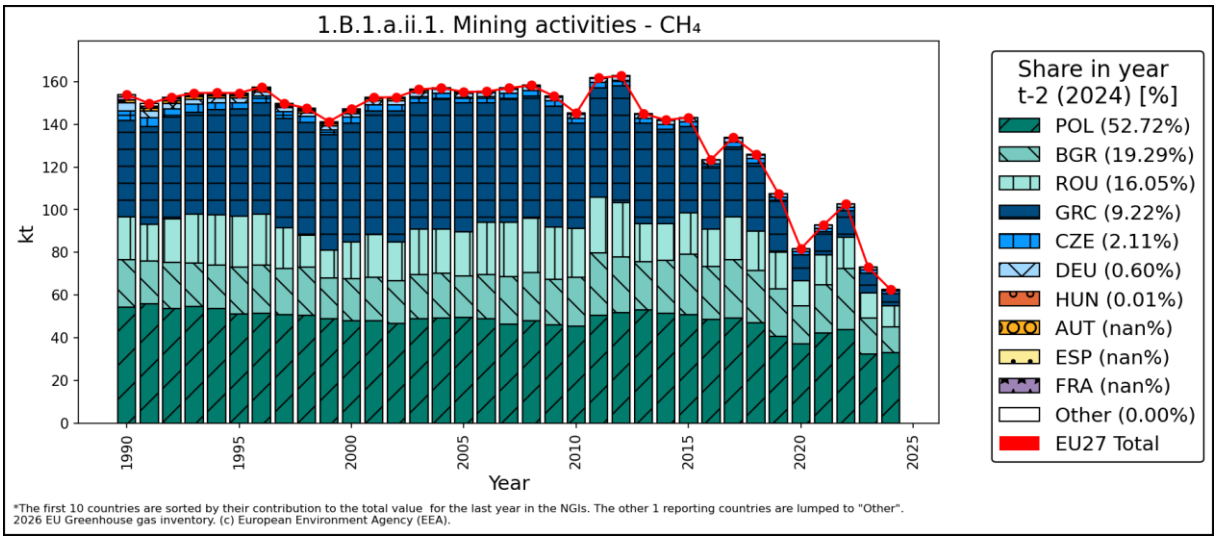
Table 3.108 1.B.1.a.ii Coal Mining – surface mining: Countries contribution to CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	38	NO	NO	-	-38	-100%	-	-	NA	NA
Belgium	NO	NO	NO	-	-	-	-	-	NA	NA
Bulgaria	679	511	366	19.0%	-313	-46%	-146	-29%	NA,T1,T2	D,NA
Croatia	NO	NO	NO	-	-	-	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	265	98	81	4.2%	-184	-69%	-17	-17%	NA,T1,T2	CS,D,NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	NO	NO	NO	-	-	-	-	-	NA	NA
France	53	NO	NO	-	-53	-100%	-	-	T2,T3	CS
Germany	110	31	11	0.5%	-99	-90%	-21	-66%	NA,T2	CS,NA
Greece	1 266	263	161	8.4%	-1 104	-87%	-101	-39%	NA,T1	D,NA
Hungary	NO	0	0	0.0%	0	∞	0	-33%	NA,T2	CS,NA
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	37	NO	NO	-	-37	-100%	-	-	NA	NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	NO	NO	NO	-	-	-	-	-	NA	NA
Poland	1 648	978	999	52.0%	-649	-39%	21	2%	NA,T1	D,NA
Portugal	NO	NO	NO	-	-	-	-	-	NA	NA
Romania	609	356	304	15.8%	-305	-50%	-52	-15%	NA,T1	D,NA
Slovakia	NO	NO	NO	-	-	-	-	-	NA	NA
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	1	NO	NO	-	-1	-100%	-	-	NA	NA
Sweden	NO	NO	NO	-	-	-	-	-	-	-
EU	**4 705**	**2 239**	**1 922**	**100%**	**-2 782**	**-59%**	**-316**	**-14%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.153 shows the emission trend and share of emitting countries of CH_4 emissions of subcategory 1.B.1.a.ii.1 – mining activities from surface mines, which are responsible for 89 % of total GHG emissions from 1.B.1.a.ii.

Figure 3.153 1.B.1.a.ii.1 Mining activities - Surface Mines: Emission trend and share for the emitting countries of CH_4



Emissions from Other (1.B.1.c)

Fugitive emissions from category 1.B.1.c (other) account for 0.3% of total fugitive emissions and 0.8% of emissions from solid fuels (1.B.1). Only 3 countries report fugitive emissions from this source (see Table 3.109)

Table 3.109 Description of subcategories in sector 1.B.1c for CO_2- and CH_4-emissions for reporting countries

Member state	Emission	Subcategory
Poland	CO_2, CH_4	Emissions from Coke Oven Gas Subsystem
Slovenia	CO_2	SO_2 scrubbing
Sweden	CO_2, CH_4	Flaring of gas

3.6.6.2 Fugitive emissions from oil and natural gas (1.B.2)

Fugitive emissions from oil and natural gas correspond to the total fugitive emissions from oil and natural gas activities. Fugitive emissions may arise from equipment leaks, evaporation losses, venting, flaring and accidental releases (2006 IPCC Guidelines).

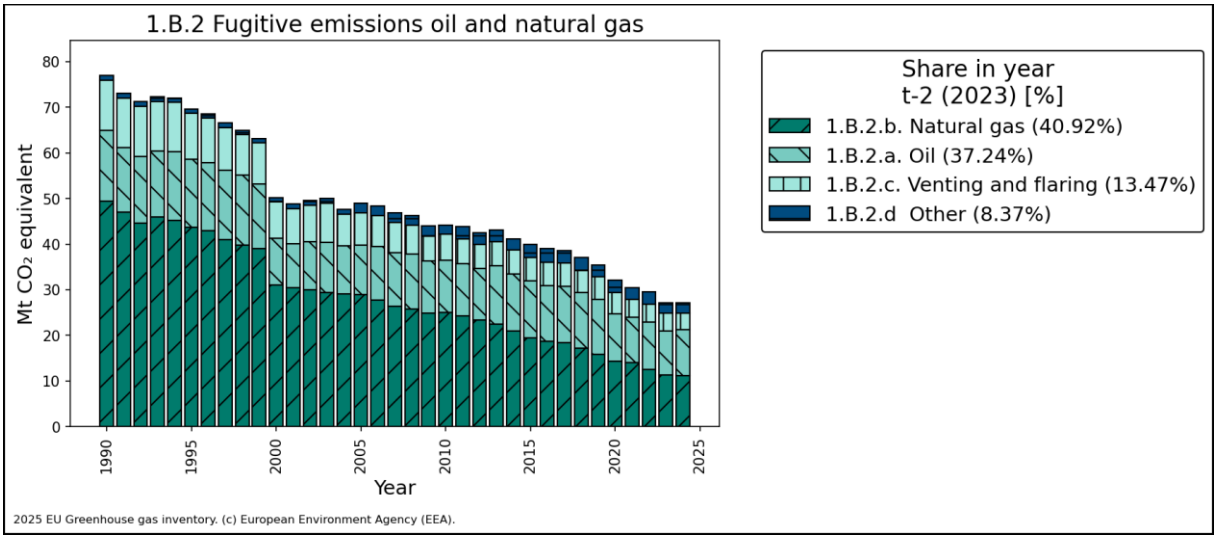
Fugitive emissions from 1.B.2 Oil and natural gas include all emissions from exploration, production, processing, transport, and handling of oil and natural gas. They account for 1 % of the total GHG emissions in 2024 and for 58 % (Figure 3.154) of all fugitive emissions in the EU.

Of all fugitive emissions from oil and natural gas, in 2024:

- 41 % were CH_4 emissions from natural gas (exploration, production, processing, transport and distribution)
- 35% were CO_2 emissions from oil (exploration, production, transport, refining and storage and distribution)
- 9 % were CO_2 emissions from venting and flaring
- 5 % were CH_4 emissions from venting and flaring

Fugitive emissions from oil and natural gas occur in all countries but Malta (Table 3.110). Total greenhouse gas emissions from 1.B.2 decreased by 65 % between 1990 and 2024 (Figure **3.154**). This trend was mainly due to the reduction of fugitive CH_4 emissions from natural gas activities, which decreased by 79 % over that period.

Figure 3.154 1.B.2-Fugitive Emissions Oil and Natural Gas: Trend



In 2024, 81% of all fugitive GHG emissions from oil and natural gas were emitted by four countries: Germany, Italy, Romania and Spain (Table 3.110).

Table 3.110 1.B.2 Fugitive emissions from oil and natural gas: Countries' contributions

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024
Austria	569	399	102	68	467	331
Belgium	759	241	84	72	675	169
Bulgaria	239	1 070	60	746	179	323
Croatia	986	384	583	243	403	141
Cyprus	0	NA,NO	NA,NO	NA,NO	0	NA,NO
Czechia	1 198	377	2	3	1 195	374
Denmark	670	211	341	111	329	100
Estonia	72	18	0	0	72	18
Finland	125	98	111	78	12	19
France	6 402	2 210	4 362	1 514	2 017	689
Germany	12 180	2 863	2 008	1 105	10 170	1 757
Greece	84	146	43	3	41	143
Hungary	2 622	1 344	478	152	2 143	1 192
Ireland	56	78	0	0	56	78
Italy	14 088	4 426	4 047	1 673	10 030	2 746
Latvia	277	95	0	0	277	95
Lithuania	321	290	24	201	297	89
Luxembourg	22	26	0	0	22	26
Malta	NO	NO	NO	NO	NO	NO
Netherlands	3 064	1 638	775	1 215	2 289	423
Poland	749	2 713	43	1 655	705	1 058
Portugal	58	1 238	54	1 178	2	58
Romania	27 793	3 179	1 177	770	26 613	2 408
Slovakia	2 337	385	57	31	2 280	354
Slovenia	56	42	0	0	56	42
Spain	2 101	3 619	1 738	3 375	363	220
Sweden	107	61	3	6	104	55
EU	**76 936**	**27 151**	**16 092**	**14 200**	**60 799**	**12 908**

Abbreviations explained in the Chapter 'Units and abbreviations'.

CO_2 from Oil (1.B.2.a)

Fugitive emissions from oil correspond to fugitive emissions from all sources associated with the exploration, production, transmission, upgrading and refining of crude oil and the distribution of crude oil products (2006 IPCC Guidelines).

CO_2 emissions from 1.B.2.a 'Fugitive emissions from oil' account for 0.3 % of total EU GHG emissions in 2024 and for 20 % of all fugitive emissions. Between 1990 and 2024, CO_2 emissions from this source increased by 5 % in the EU (Table 3.111). By contrast, during the same period 1990-2024, CH_4 emissions of this source category were reduced by 90 %.

Main contributor to these emissions in all countries is subcategory 1.B.2.a.4 (Oil – Refining/Storage). Table **3.111** shows that 83 % of EU CO_2 emissions from this source are calculated using higher tier methods. In cases where countries report a mix of Tier 1 and higher Tier methods only emissions from subcategories of sector 1.B.2.a were considered for the calculation, where the countries actually apply a higher tier method. Countries that report a Tier 1 method but a country specific or plant specific emission factor were calculated as a higher method, according to the IPCC 2006 Guidelines. For detailed information on countries methodologies please see Annex III.

Table 3.111 shows the Member States' contributions to the EU CO_2 emissions in this category. Increases are mainly driven by the reduction of CO_2 emissions from subcategory 1.B.2.a.4 (Oil – Refining/Storage).

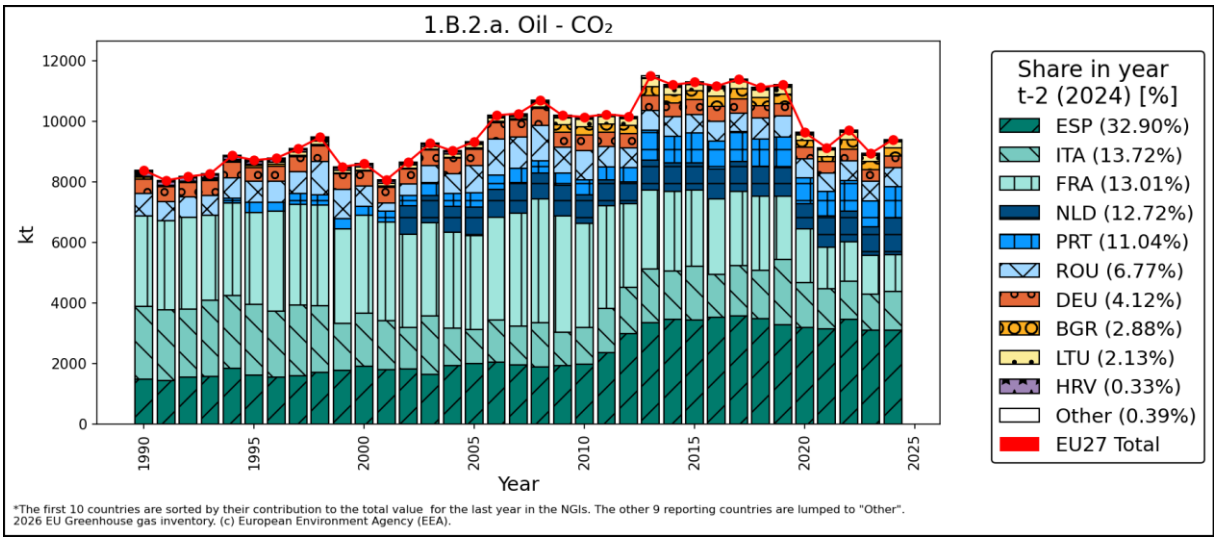
Table 3.111 1.B.2.a Fugitive CO_2 emissions from oil: Countries' contributions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	0.005	0.005	0.005	0.0%	0	2%	0.00004	1%	NA,T1	D,NA
Belgium	0.01	0.02	0.02	0.0%	0	23%	0.00038	2%	NA,T1	D,NA
Bulgaria	60	276	270	2.9%	210	352%	-6	-2%	NA,T1	D,NA
Croatia	158	33	31	0.3%	-127	-80%	-2	-7%	NA,T1	D,NA
Cyprus	NA,NO	NA,NO	NA,NO	-	-	-	-	-	NA	NA
Czechia	0.02	0.03	0.03	0.0%	0	31%	-0.001	-2%	NA,T1	D,NA
Denmark	5	0.1	0.1	0.0%	-5	-98%	0.040	58%	NA,T3	NA,PS
Estonia	NE,NO	NE,NO	NE,NO	-	-	-	-	-	NA	NA
Finland	NO	NO	NO	-	-	-	-	-	NA	NA
France	2 983	1 278	1 222	13.0%	-1 761	-59%	-56	-4%	T1,T2,T3	CS,D,PS
Germany	478	369	387	4.1%	-91	-19%	18	5%	NA,T1,T2	CS,D,NA
Greece	0.000039	0.000003	0.000003	0.0%	0	-92%	0	0%	NA,T1	D,NA
Hungary	5	0.4	0.5	0.0%	-5	-91%	0	7%	NA,T1	CS,NA
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	2 402	1 206	1 289	13.7%	-1 113	-46%	83	7%	NA,T1,T2	CS,D,NA
Latvia	NA,NO	NA,NO	NA,NO	-	-	-	-	-	NA	NA
Lithuania	23	197	200	2.1%	177	758%	3	1%	NA,T1,T3	D,NA,PS
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	0.02	935	1 194	12.7%	1 194	6636787%	260	28%	CS,NA,T1	D,NA,PS
Poland	2	9	9	0.1%	7	396%	-0.3	-3%	NA,T1	D,NA
Portugal	0.4	857	1 037	11.0%	1 036	243616%	180	21%	D,NA,NO,T1	D,NA,NO
Romania	746	657	636	6.8%	-110	-15%	-21	-3%	NA,T1,T2,T3	CS,D,NA,PS
Slovakia	40	31	27	0.3%	-12	-31%	-3	-11%	NA,T1	D,NA
Slovenia	0.03	0.06	0.05	0.0%	0	94%	-0.01	-12%	NA,T1	D,NA
Spain	1 477	3 090	3 090	32.9%	1 614	109%	-0.06	0%	NA,T1,T2	D,NA,PS
Sweden	NA,NE,NO	NA,NE,NO	NA,NE,NO	-	-	-	-	-	T3	PS
EU	**8 378**	**8 940**	**9 393**	**100%**	**1 015**	**12%**	**454**	**5%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'

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Figure 3.155 1.B.2.a Oil: Emission trend and share for the emitting countries of CO_2



CH_4 from Oil (1.B.2.a)

CH_4 emissions from 1.B.2.a 'Fugitive emissions from oil' account for 0.03 % of total EU GHG emissions in 2024 and for 1.5 % of all fugitive emissions. Between 1990 and 2024, CH_4 emissions from this source decreased by 90 % in the EU (Table 3.111).

Table 3.112 shows the Member States contributions to the EU CH_4 emissions in this category. 31% of reported CH_4 emissions from this category are calculated with a higher tier method.

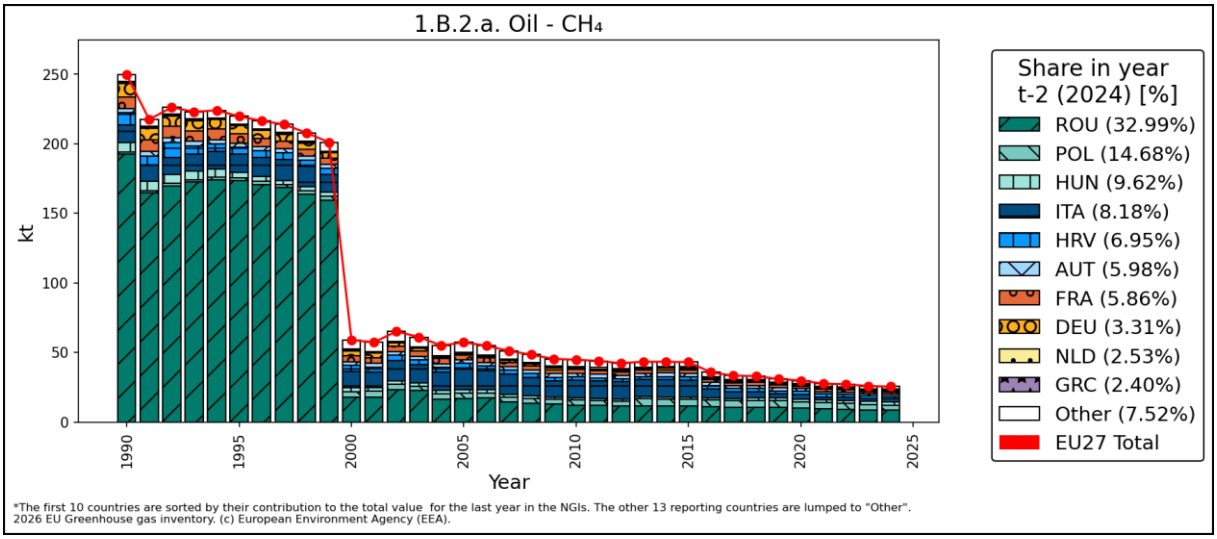
In Romania main contributions to CH_4 emissions come from subcategory 1.B.2.a.2 (Oil – Production). From 1990 to 2000 CH_4 emissions are estimated using a Tier 1 methodology with a default emission factor for developing countries of the 2006 IPCC Guidelines. From 2000 on the country applies a Tier 1 methodology with a default emission factor for developed countries, due to change of technology (ROU NID 2026). This also explains the outlier in ***Figure 3.156***. For detailed information on countries methodologies please see Annex III.

Table 3.112 1.B.2.a Fugitive CH_4 emissions from oil: Countries' contributions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	92	43	43	6.0%	-49	-54%	0.00635	0%	NA,T1	D,NA
Belgium	13	7	7	1.0%	-6	-43%	-0.15284	-2%	CS,D,NA	CS,D,NA
Bulgaria	14	8	9	1.3%	-5	-36%	1	7%	NA,T1	D,NA
Croatia	247	53	49	6.9%	-197	-80%	-3	-6%	NA,T1	D,NA
Cyprus	0	NA,NO	NA,NO	-	0	-100%	-	-	NA	NA
Czechia	11	4	4	0.6%	-7	-65%	0.148	4%	NA,T1,T2,T3	CS,D,NA
Denmark	48	11	12	1.6%	-36	-76%	0.678	6%	NA,T1,T2,T3	CS,D,NA,PS
Estonia	NE,NO	NE,NO	NE,NO	-	-	-	-	-	NA	NA
Finland	7	8	7	1.0%	0	3%	-1	-14%	NA,T1	D,NA
France	230	45	42	5.9%	-189	-82%	-3	-7%	T1,T2,T3	CS,D,PS
Germany	275	23	24	3.3%	-252	-91%	1	5%	NA,T1,T2	CS,D,NA
Greece	11	17	17	2.4%	6	57%	0	2%	NA,T1	D,NA
Hungary	200	60	69	9.6%	-131	-66%	8	14%	NA,T1	CS,NA
Ireland	0	0	0	0.0%	0	10%	0	-28%	NA,T1	D,NA
Italy	347	63	58	8.2%	-289	-83%	-5	-8%	NA,T1,T2	CS,D,NA
Latvia	NA,NO	NA,NO	NA,NO	-	-	-	-	-	NA	NA
Lithuania	5	2	2	0.3%	-2	-48%	0	0%	NA,T1	D,NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	23	15	18	2.5%	-5	-21%	3	16%	NA,T1,T1b	D,NA
Poland	39	108	105	14.7%	65	167%	-3.5	-3%	NA,T1,T2	D,NA
Portugal	2	2	2	0.3%	0	0%	0	23%	CR,NA,NO,OTH	CR,NA,NO,OTH
Romania	5 389	243	235	33.0%	-5 154	-96%	-8	-3%	NA,T1	D,NA
Slovakia	13	6	5	0.7%	-8	-61%	-1	-14%	NA,T1	D,NA
Slovenia	0	NA,NO	NA,NO	-	0	-100%	-	-	NA	NA
Spain	17	3	4	0.5%	-13	-79%	0.07	2%	NA,T1	D,NA
Sweden	1	1	1	0.2%	0	1%	0	0%	T1,T2	CS,D,PS
EU	**6 985**	**723**	**713**	**100%**	**-6 273**	**-90%**	**-11**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.156: 1.B.2.a Oil: Emission trend and share for the emitting countries of CH_4



CH_4 from Natural gas (1.B.2.b)

Fugitive emissions from natural gas correspond to emissions from all fugitive sources associated with the exploration, production, processing, transmission, storage and distribution of natural gas (associated and non-associated gas) (2006 IPCC Guidelines).

CH_4 emissions from 1.B.2.b 'Fugitive emissions from natural gas' account for 0.4 % of total EU GHG emissions in 2024 and for 22 % of all fugitive emissions in the EU. Between 1990 and 2024, CH_4 emissions from this source decreased by 78 % (Table 3.113).

The main sources of CH_4 emissions are subcategories Transmission and Storage -1B2biv (17% of CH_4 emissions in category 1B2b) and Distribution - 1B2bv (52% of CH_4 emissions in category 1B2b).

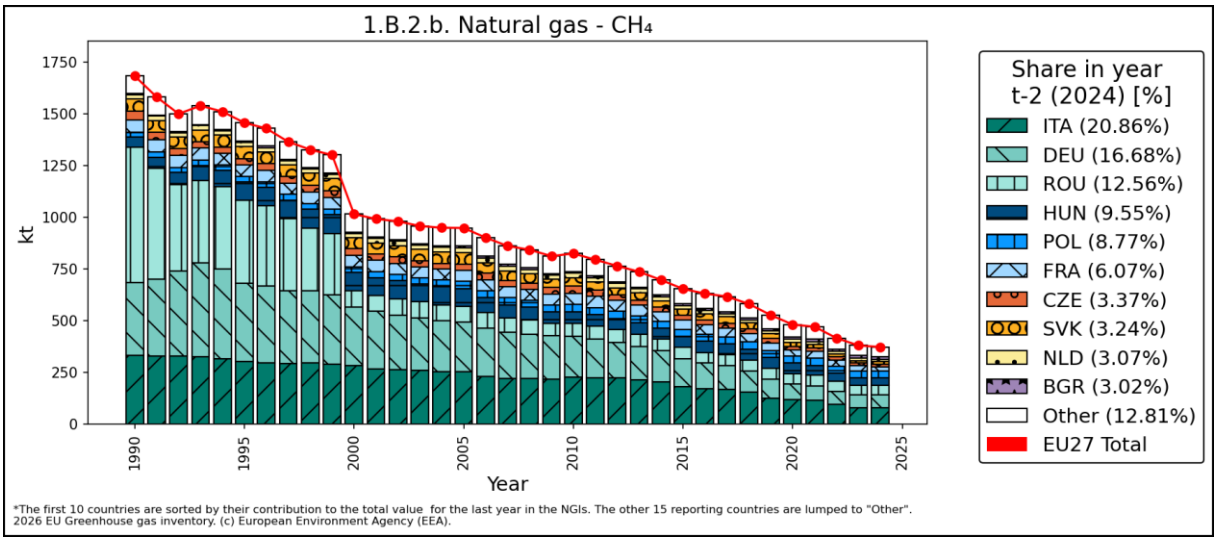
Emissions from natural gas production (1.B.2.b.2) and other operations on natural gas (1.B.2.b.6) are the main sources of CH_4 emissions in Romania in this category. From 1990 to 2000, CH_4 emissions are estimated to be using a Tier 1 methodology with a default emission factor for developing countries of the 2006 IPCC Guidelines. From 2000 on the country applies a Tier 1 methodology with a default emission factor for developed countries, due to change of technology. This also explains the outlier in Figure **3.157**. Table **3.113** shows that 70 % of EU emissions are calculated using higher tier methods. In cases where countries report a mix of Tier 1 and higher Tier methods only emissions from subcategories of sector 1.B.2.b were considered for the calculation, where the countries actually apply a higher tier method. Countries that report a Tier 1 method but a country specific or plant specific emission factor were counted as a higher Tier method, according to the IPCC 2006 Guidelines. For detailed information on countries methodologies, please see Annex III.

Table 3.113 1.B.2.b Fugitive CH_4 emissions from natural gas: Countries' contributions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	375	290	289	2.8%	-86	-23%	-1.96191	-1%	NA,T1,T2	CS,D,NA
Belgium	662	193	161	1.6%	-501	-76%	-32.24245	-17%	CS,NA	CS,NA
Bulgaria	165	307	314	3.0%	149	91%	7	2%	T1	D
Croatia	155	96	91	0.9%	-64	-41%	-5	-5%	NA,T1	D,NA
Cyprus	NO	NA,NO	NA,NO	-	-	-	-	-	NA	NA
Czechia	1 170	346	351	3.4%	-820	-70%	4.326	1%	NA,T1,T2,T3	CS,NA
Denmark	247	72	72	0.7%	-175	-71%	-0.001	0%	NA,T1,T2	CS,D,NA
Estonia	63	13	16	0.2%	-47	-74%	3	19%	NA,T1	D,NA
Finland	5	30	12	0.1%	7	148%	-18	-61%	NA,T1,T2	CS,D,NA,PS
France	1 703	731	631	6.1%	-1 072	-63%	-99	-14%	T2,T3	CS,PS
Germany	9 893	1 771	1 733	16.7%	-8 160	-82%	-38	-2%	NA,T2,T3	CS,NA
Greece	10	82	93	0.9%	83	804%	11	13%	NA,T1	D,NA
Hungary	1 403	968	993	9.6%	-410	-29%	25	3%	NA,T1,T2	CS,NA
Ireland	25	70	78	0.7%	53	216%	8	12%	NA,T2,T3	CS,NA,PS
Italy	9 225	2 169	2 167	20.9%	-7 058	-77%	-2	0%	NA,T2	CS,NA
Latvia	199	87	85	0.8%	-113	-57%	-2	-2%	NA,T3	CS,NA
Lithuania	292	104	86	0.8%	-206	-71%	-18	-17%	NA,T2,T3	CS,NA,PS
Luxembourg	22	24	26	0.2%	4	19%	1	6%	NA,T1	D,NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	597	357	319	3.1%	-278	-47%	-38	-11%	NA,T3	CS,NA
Poland	651	913	912	8.8%	261	40%	-1.1	0%	NA,T1	D,NA
Portugal	NO	53	54	0.5%	54	∞	1	1%	NA,NO,T2	CS,NA,NO
Romania	18 298	1 312	1 305	12.6%	-16 994	-93%	-7	-1%	NA,T1	D,NA
Slovakia	1 607	350	336	3.2%	-1 271	-79%	-14	-4%	NA,T1,T3	CS,D,M,NA
Slovenia	48	33	36	0.3%	-11	-24%	2.73	8%	NA,T1	D,NA
Spain	161	177	178	1.7%	17	11%	1.30	1%	CS,NA,T1	CS,D,NA
Sweden	103	55	53	0.5%	-49	-48%	-1	-3%	-	-
EU	**47 075**	**10 605**	**10 391**	**100%**	**-36 684**	**-78%**	**-214**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.157 1.B.2.b Natural Gas: Emission trend and share for the emitting countries of CH_4



CRT Tables do not include activity data for sector 1.B.2 because countries use different types of activity data in category 1B2a and 1B2b, which cannot be aggregated. Information on the type of activity data is provided in the member states NIDs and CRT tables.

CO_2 Emissions from Venting and Flaring (1.B.2.c)

Fugitive emissions from this source correspond to Emissions from venting and flaring of associated gas and waste gas/vapour streams at oil and gas facilities.

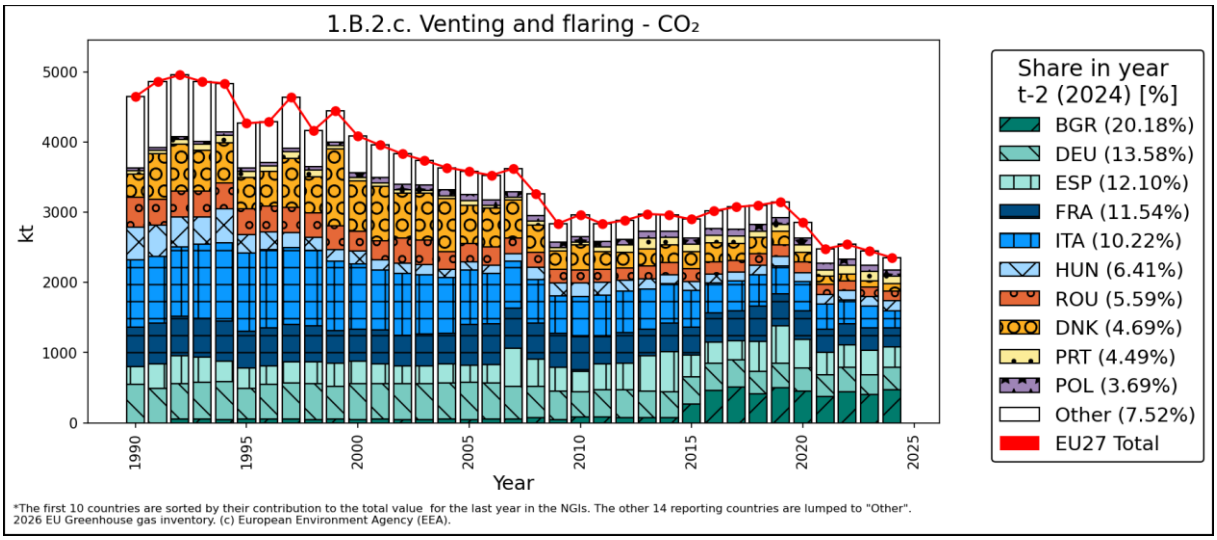
CO_2 emissions from 1.B.2.c – Venting and Flaring – account for 0.1% of total EU GHG emissions in 2024 and for 5 % of all fugitive emissions in the EU. Between 1990 and 2024 CO_2 emissions from this source decreased by 49 % (*Table 3.114*).

Table 3.114: 1.B.2.c Fugitive CO_2 emissions from Other emissions: Countries' contributions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	IE	IE	IE	-	-	-	-	-	NA	NA
Belgium	84	74	72	3.1%	-12	-14%	-1.34274	-2%	NA,T3	NA,PS
Bulgaria	IE,NO	399	475	20.2%	475	∞	76	19%	NA,T1	D,NA
Croatia	0	0	0	0.0%	0	-97%	0	0%	NA,T1	D,NA
Cyprus	NO	NA,NO	NA,NO	-	-	-	-	-	NA	NA
Czechia	2	3	3	0.1%	1	41%	0.000	0%	NA,T1	D,NA
Denmark	328	88	110	4.7%	-217	-66%	22.784	26%	NA,T3	NA,PS
Estonia	0	0	0	0.0%	0	-74%	0	19%	NA,T1	D,NA
Finland	111	86	78	3.3%	-33	-30%	-9	-10%	CS,NA	CS,NA
France	560	316	272	11.5%	-289	-52%	-44	-14%	T1,T2,T3	CS,D,PS
Germany	544	281	320	13.6%	-224	-41%	39	14%	NA,T2	CS,NA
Greece	43	3	3	0.1%	-40	-94%	0	2%	NA,T1	D,NA
Hungary	471	142	151	6.4%	-320	-68%	9	6%	NA,T1,T3	CS,D,NA
Ireland	IE,NO	0	0	0.0%	0	∞	0	32%	CS,NA,T3	CS,NA,PS
Italy	956	311	240	10.2%	-715	-75%	-71	-23%	NA,T1	D,NA
Latvia	0	0	0	0.0%	0	-87%	0	-28%	NA,T3	CS,NA
Lithuania	1	1	1	0.0%	0	54%	0	64%	NA,T1	D,NA
Luxembourg	0	0	0	0.0%	0	-38%	0	-26%	CS,NA	CS,NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	774	38	20	0.9%	-754	-97%	-18	-46%	NA,T2	NA,PS
Poland	40	87	87	3.7%	47	119%	-0.4	0%	NA,T1	D,NA
Portugal	52	130	106	4.5%	53	101%	-24	-19%	NA,T1	NA,PS
Romania	424	136	132	5.6%	-292	-69%	-5	-3%	NA,T1	D,NA
Slovakia	0	0	0	0.0%	0	-76%	0	62%	NA,T1	D,NA
Slovenia	0	0	0	0.0%	0	-96%	-0.01	-54%	NA,T1	D,NA
Spain	258	352	285	12.1%	27	10%	-67.56	-19%	CS,NA,T2	CS,D,NA,PS
Sweden	0	0	0	0.0%	0	9%	0	16%	T3	PS
EU	**4 646**	**2 446**	**2 354**	**100%**	**-2 293**	**-49%**	**-92**	**-4%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period
Austria includes CO_2 emissions from venting and flaring in 1.A.1b Petroleum refining
Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 3.158: 1.B.2.c Venting and Flaring: Emission trend and share for the emitting countries of CO_2



CH_4 Emissions from Venting and Flaring (1.B.2.c)

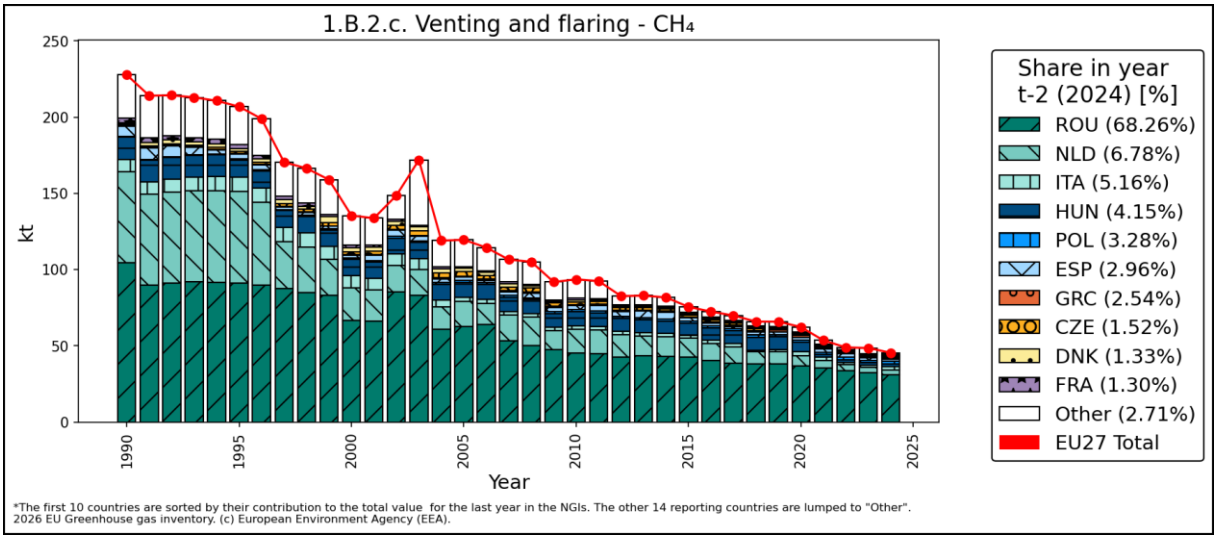
CH_4 emissions from 1.B.2.c – Venting and Flaring – account for 0.05% of total EU GHG emissions in 2024 and for 3 % of all fugitive emissions in the EU. Between 1990 and 2024 CO_2 emissions from this source decreased by 80 % (*Table 3.114*).

Table **3.113** shows that 26 % of EU emissions are calculated using higher tier methods. In cases where countries report a mix of Tier 1 and higher Tier methods only emissions from subcategories of sector 1.B.2.b were considered for the calculation, where the countries actually apply a higher tier method. Countries that report a Tier 1 method but a country specific or plant specific emission factor were counted as a higher Tier method, according to the IPCC 2006 Guidelines. For detailed information on countries methodologies, please see Annex III.

Table 3.115: 1.B.2.c Fugitive CH_4 emissions from Other emissions: Countries' contributions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	IE	IE	IE	-	-	-	-	-	NA	NA
Belgium	IE,NA,NO	0	0	0.0%	0	∞	0.11620	54%	NA,T1	D,NA
Bulgaria	IE,NO	0	0	0.0%	0	∞	0	18%	NA,T1	D,NA
Croatia	1	0	0	0.0%	-1	-97%	0	0%	NA,T1	D,NA
Cyprus	NO	NA,NO	NA,NO	-	-	-	-	-	NA	NA
Czechia	14	19	19	1.5%	6	41%	0.000	0%	NA,T1	D,NA
Denmark	34	11	17	1.3%	-17	-51%	6.183	58%	NA,T3	CS,NA,PS
Estonia	9	2	2	0.2%	-7	-74%	0	19%	NA,T1	D,NA
Finland	0	0	0	0.0%	0	-27%	0	-10%	CS,NA	CS,NA
France	84	22	17	1.3%	-68	-80%	-5	-24%	T1,T2,T3	CS,D,PS
Germany	2	1	1	0.0%	-1	-66%	0	20%	NA,T2	CS,NA
Greece	20	25	32	2.5%	13	65%	7	30%	NA,T1	D,NA
Hungary	406	55	53	4.1%	-353	-87%	-2	-3%	NA,T1,T3	CS,D,NA,PS
Ireland	32	0	0	0.0%	-32	-100%	0	-68%	CS,NA,T2,T3	CS,NA,PS
Italy	232	31	66	5.2%	-166	-72%	35	115%	NA,T2	CS,NA
Latvia	79	15	10	0.8%	-69	-87%	-5	-34%	NA,T3	CS,NA
Lithuania	0	0	0	0.0%	0	54%	0	64%	NA,T1	D,NA
Luxembourg	0	0	0	0.0%	0	26%	0	7%	CS,NA	CS,NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	1 670	108	86	6.8%	-1 584	-95%	-22	-20%	NA,T2	NA,PS
Poland	15	41	42	3.3%	26	173%	0.3	1%	NA,T1	D,NA
Portugal	1	2	2	0.1%	1	176%	0	-18%	D,NA	D,NA
Romania	2 926	899	868	68.3%	-2 058	-70%	-31	-3%	NA,T1	D,NA
Slovakia	659	75	13	1.0%	-647	-98%	-62	-83%	NA,T3	NA,PS
Slovenia	8	6	6	0.5%	-2	-25%	0.45	8%	NA,T1	D,NA
Spain	185	48	38	3.0%	-148	-80%	-10.11	-21%	CS,NA,T2	CS,D,NA
Sweden	0	0	0	0.0%	0	65%	0	1%	T2	CS
EU	**6 377**	**1 359**	**1 272**	**100%**	**-5 105**	**-80%**	**-87**	**-6%**	**-**	**-**

Figure 3.159: 1.B.2.c Venting and Flaring: Emission trend and share for the emitting countries of CH_4



Emissions from Other (1.B.2.d)

Fugitive emissions from other correspond to emissions from geothermal energy production and all other energy production that are not included in categories 1.B.1 and 1.B.2.

Fugitive emissions from this source account for 0.1% of the total EU GHG and have a share of 5% of total fugitive emissions. The description of the subcategories is presented in Table 3.116.

Table 3.116 Description of subcategories in sector 1.B.2.d for CO_2-, N_2O- and CH_4-emissions for reporting countries

Member state	Emission	Subcategory
Finland	CO_2, CH_4	Distribution of town gas
Greece	CO_2, N_2O	LPG transport
Hungary	CH_4, CO_2	Groundwater extraction
Italy	CH_4, CO_2, N_2O	Flaring in refineries, Geotherm
Portugal	CO_2	Geothermal

3.6.7 CO_2 capture and storage (1.C)

CO_2 capture and storage is not an EU key category (see Annex 1.1). Finland is the only Member State reporting captured CO_2 emissions in this category for the years 1993 to 2024.

The amount of CO_2 captured reflects the CO_2 captured in pulp and paper mills in Finland, where precipitated calcium carbonate (PCC) is formed and then used in the paper and paperboard industry. The final use of the CO_2 captured is considered as long-term storage except if the products are combusted. The resulting fossil CO_2 emissions from combustion of products containing PCC are considered in the corresponding categories in the greenhouse gas inventory of Finland. A detailed description of the methodology is provided in Finland's NID.

Captured CO_2 emissions reported in 1C 'CO_2 capture and storage' correspond to 0.002 % of total EU GHG emissions in 2024. The emissions captured increased between 1993 and 2024 by 5 872 %.

3.6.8 Energy – non-key categories

Table 3.117 provides an overview on the role of non-key categories in the Energy sector.

Table 3.117 Aggregated GHG emission from non-key categories in the energy sector

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.1.a Public electricity and heat production: Biomass (CH_4)	38.7	1 978.3	1 986.6	0.07%	1 948.0	5040%	8.4	0%
1.A.1.a Public electricity and heat production: Biomass (N_2O)	203.9	1 310.9	1 289.7	0.05%	1 085.8	533%	-21.2	-2%
1.A.1.a Public electricity and heat production: Gaseous Fuels (CH_4)	180.2	1 193.9	1 255.2	0.05%	1 075.0	596%	61.3	5%
1.A.1.a Public electricity and heat production: Gaseous Fuels (N_2O)	134.1	629.2	540.3	0.02%	406.2	303%	-89.0	-14%
1.A.1.a Public electricity and heat production: Liquid Fuels (CH_4)	157.3	25.5	23.9	0.00%	-133.4	-85%	-1.6	-6%
1.A.1.a Public electricity and heat production: Liquid Fuels (N_2O)	332.6	64.1	60.8	0.00%	-271.9	-82%	-3.3	-5%
1.A.1.a Public electricity and heat production: Other Fuels (CH_4)	17.3	41.6	41.9	0.00%	24.6	142%	0.3	1%
1.A.1.a Public electricity and heat production: Other Fuels (N_2O)	115.4	270.9	264.1	0.01%	148.7	129%	-6.9	-3%
1.A.1.a Public electricity and heat production: Peat (CH_4)	9.2	4.9	4.2	0.00%	-5.0	-54%	-0.7	-14%
1.A.1.a Public electricity and heat production: Peat (N_2O)	110.3	30.0	18.6	0.00%	-91.7	-83%	-11.4	-38%
1.A.1.a Public electricity and heat production: Solid Fuels (CH_4)	193.3	59.6	47.7	0.00%	-145.6	-75%	-11.9	-20%
1.A.1.a Public electricity and heat production: Solid Fuels (N_2O)	4 387.0	1 662.0	1 460.6	0.05%	-2 926.4	-67%	-201.5	-12%
1.A.1.b Petroleum refining: Biomass (CH_4)	2.1	0.2	0.2	0.00%	-1.9	-91%	0.0	18%
1.A.1.b Petroleum refining: Biomass (N_2O)	3.1	1.2	1.0	0.00%	-2.1	-68%	-0.2	-15%
1.A.1.b Petroleum refining: Gaseous Fuels (CH_4)	6.4	15.5	22.2	0.00%	15.8	246%	6.7	43%
1.A.1.b Petroleum refining: Gaseous Fuels (N_2O)	120.4	18.5	22.3	0.00%	-98.1	-81%	3.8	21%
1.A.1.b Petroleum refining: Liquid Fuels (CH_4)	81.2	50.1	48.4	0.00%	-32.8	-40%	-1.7	-3%
1.A.1.b Petroleum refining: Liquid Fuels (N_2O)	249.2	222.1	211.2	0.01%	-38.0	-15%	-10.8	-5%
1.A.1.b Petroleum refining: Other Fuels (CH_4)	6.5	0.2	0.5	0.00%	-6.0	-92%	0.3	122%
1.A.1.b Petroleum refining: Other Fuels (CO_2)	920.7	244.4	537.7	0.02%	-383.0	-42%	293.3	120%
1.A.1.b Petroleum refining: Other Fuels (N_2O)	8.6	2.0	2.1	0.00%	-6.5	-76%	0.1	6%
1.A.1.b Petroleum refining: Peat (CH_4)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.1.b Petroleum refining: Peat (CO_2)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.1.b Petroleum refining: Peat (N_2O)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.1.b Petroleum refining: Solid Fuels (CH_4)	0.6	0.0	0.0	0.00%	-0.6	-98%	0.0	51%
1.A.1.b Petroleum refining: Solid Fuels (CO_2)	3 633.0	92.3	121.6	0.00%	-3 511.4	-97%	29.4	32%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.1.b Petroleum refining: Solid Fuels (N_2O)	26.6	0.4	0.5	0.00%	-26.2	-98%	0.1	29%
1.A.1.c Manufacture of solid fuels and other energy industries: Biomass (CH_4)	147.0	124.4	124.4	0.00%	-22.6	-15%	-0.1	0%
1.A.1.c Manufacture of solid fuels and other energy industries: Biomass (N_2O)	4.3	44.7	44.0	0.00%	39.7	929%	-0.8	-2%
1.A.1.c Manufacture of solid fuels and other energy industries: Gaseous Fuels (CH_4)	76.3	36.1	30.9	0.00%	-45.3	-59%	-5.2	-14%
1.A.1.c Manufacture of solid fuels and other energy industries: Gaseous Fuels (N_2O)	15.9	23.0	24.1	0.00%	8.1	51%	1.0	4%
1.A.1.c Manufacture of solid fuels and other energy industries: Liquid Fuels (CH_4)	3.8	1.2	1.8	0.00%	-2.0	-53%	0.6	51%
1.A.1.c Manufacture of solid fuels and other energy industries: Liquid Fuels (CO_2)	3 139.8	1 123.8	1 702.1	0.06%	-1 437.7	-46%	578.3	51%
1.A.1.c Manufacture of solid fuels and other energy industries: Liquid Fuels (N_2O)	12.7	2.2	3.4	0.00%	-9.3	-73%	1.2	53%
1.A.1.c Manufacture of solid fuels and other energy industries: Other Fuels (CH_4)	5.5	0.0	0.0	0.00%	-5.5	-100%	0.0	0%
1.A.1.c Manufacture of solid fuels and other energy industries: Other Fuels (CO_2)	456.1	0.0	0.0	0.00%	-456.1	-100%	0.0	0%
1.A.1.c Manufacture of solid fuels and other energy industries: Other Fuels (N_2O)	8.1	0.0	0.0	0.00%	-8.1	-100%	0.0	0%
1.A.1.c Manufacture of solid fuels and other energy industries: Peat (CH_4)	0.1	0.0	0.0	0.00%	-0.1	-96%	0.0	-85%
1.A.1.c Manufacture of solid fuels and other energy industries: Peat (CO_2)	175.5	37.4	9.1	0.00%	-166.4	-95%	-28.4	-76%
1.A.1.c Manufacture of solid fuels and other energy industries: Peat (N_2O)	0.6	0.1	0.0	0.00%	-0.6	-94%	-0.1	-74%
1.A.1.c Manufacture of solid fuels and other energy industries: Solid Fuels (CH_4)	174.2	15.5	14.8	0.00%	-159.4	-91%	-0.7	-4%
1.A.1.c Manufacture of solid fuels and other energy industries: Solid Fuels (N_2O)	612.8	90.6	81.7	0.00%	-531.2	-87%	-8.9	-10%
1.A.2.a Iron and steel: Biomass (CH_4)	0.3	0.6	2.3	0.00%	2.0	676%	1.6	253%
1.A.2.a Iron and steel: Biomass (N_2O)	0.4	2.5	6.4	0.00%	6.0	1625%	3.9	156%
1.A.2.a Iron and steel: Gaseous Fuels (CH_4)	20.6	19.6	19.6	0.00%	-1.0	-5%	-0.1	0%
1.A.2.a Iron and steel: Gaseous Fuels (N_2O)	111.0	38.6	35.2	0.00%	-75.8	-68%	-3.4	-9%
1.A.2.a Iron and steel: Liquid Fuels (CH_4)	14.1	0.6	0.6	0.00%	-13.5	-96%	0.0	0%
1.A.2.a Iron and steel: Liquid Fuels (N_2O)	26.0	2.7	3.0	0.00%	-23.0	-89%	0.3	9%
1.A.2.a Iron and steel: Other Fuels (CH_4)	4.1	0.1	1.3	0.00%	-2.8	-68%	1.2	1039%
1.A.2.a Iron and steel: Other Fuels (CO_2)	655.4	16.1	227.9	0.01%	-427.5	-65%	211.8	1315%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.2.a Iron and steel: Other Fuels (N_2O)	5.2	0.2	1.7	0.00%	-3.5	-67%	1.5	987%
1.A.2.a Iron and steel: Peat (CH_4)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.2.a Iron and steel: Peat (CO_2)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.2.a Iron and steel: Peat (N_2O)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.2.a Iron and steel: Solid Fuels (CH_4)	240.0	105.5	98.2	0.00%	-141.7	-59%	-7.3	-7%
1.A.2.a Iron and steel: Solid Fuels (N_2O)	297.2	116.8	115.2	0.00%	-181.9	-61%	-1.6	-1%
1.A.2.b Non-ferrous metals: Biomass (CH_4)	0.0	0.6	1.5	0.00%	1.5	41798%	0.8	138%
1.A.2.b Non-ferrous metals: Biomass (N_2O)	0.0	0.8	1.9	0.00%	1.9	43521%	1.1	132%
1.A.2.b Non-ferrous metals: Gaseous Fuels (CH_4)	2.2	6.5	10.3	0.00%	8.1	360%	3.8	59%
1.A.2.b Non-ferrous metals: Gaseous Fuels (N_2O)	4.1	7.1	7.3	0.00%	3.1	75%	0.2	2%
1.A.2.b Non-ferrous metals: Liquid Fuels (CH_4)	4.2	0.9	0.6	0.00%	-3.6	-86%	-0.2	-28%
1.A.2.b Non-ferrous metals: Liquid Fuels (CO_2)	4 189.6	1 000.7	735.4	0.03%	-3 454.2	-82%	-265.4	-27%
1.A.2.b Non-ferrous metals: Liquid Fuels (N_2O)	10.7	3.3	2.8	0.00%	-7.9	-74%	-0.5	-15%
1.A.2.b Non-ferrous metals: Other Fuels (CH_4)	0.4	0.0	0.0	0.00%	-0.4	-100%	0.0	-31%
1.A.2.b Non-ferrous metals: Other Fuels (CO_2)	64.9	0.6	0.4	0.00%	-64.4	-99%	-0.2	-29%
1.A.2.b Non-ferrous metals: Other Fuels (N_2O)	0.5	0.0	0.0	0.00%	-0.5	-98%	0.0	-24%
1.A.2.b Non-ferrous metals: Peat (CH_4)	0.0	0.0	0.0	0.00%	0.0	-100%	0.0	0%
1.A.2.b Non-ferrous metals: Peat (CO_2)	6.5	0.0	0.0	0.00%	-6.5	-100%	0.0	0%
1.A.2.b Non-ferrous metals: Peat (N_2O)	0.0	0.0	0.0	0.00%	0.0	-100%	0.0	0%
1.A.2.b Non-ferrous metals: Solid Fuels (CH_4)	9.7	2.3	2.1	0.00%	-7.6	-78%	-0.1	-6%
1.A.2.b Non-ferrous metals: Solid Fuels (CO_2)	4 687.4	1 000.7	953.2	0.04%	-3 734.2	-80%	-47.5	-5%
1.A.2.b Non-ferrous metals: Solid Fuels (N_2O)	25.5	4.0	4.0	0.00%	-21.6	-84%	0.0	-1%
1.A.2.c Chemicals: Biomass (CH_4)	1.7	9.1	9.5	0.00%	7.7	449%	0.4	4%
1.A.2.c Chemicals: Biomass (N_2O)	7.2	28.0	31.7	0.00%	24.5	339%	3.7	13%
1.A.2.c Chemicals: Gaseous Fuels (CH_4)	55.8	356.3	303.0	0.01%	247.2	443%	-53.3	-15%
1.A.2.c Chemicals: Gaseous Fuels (N_2O)	40.6	38.8	36.4	0.00%	-4.2	-10%	-2.4	-6%
1.A.2.c Chemicals: Liquid Fuels (CH_4)	36.9	8.1	6.9	0.00%	-30.0	-81%	-1.2	-14%
1.A.2.c Chemicals: Liquid Fuels (N_2O)	131.0	38.3	33.2	0.00%	-97.8	-75%	-5.1	-13%
1.A.2.c Chemicals: Other Fuels (CH_4)	17.0	7.5	7.6	0.00%	-9.4	-55%	0.1	1%
1.A.2.c Chemicals: Other Fuels (CO_2)	2 961.8	1 195.4	1 173.4	0.04%	-1 788.4	-60%	-22.0	-2%
1.A.2.c Chemicals: Other Fuels (N_2O)	24.0	14.9	15.1	0.00%	-8.9	-37%	0.2	1%
1.A.2.c Chemicals: Peat (CH_4)	0.2	0.0	0.0	0.00%	-0.2	-100%	0.0	0%
1.A.2.c Chemicals: Peat (CO_2)	191.1	0.0	0.0	0.00%	-191.1	-100%	0.0	0%
1.A.2.c Chemicals: Peat (N_2O)	3.4	0.0	0.0	0.00%	-3.4	-100%	0.0	0%
1.A.2.c Chemicals: Solid Fuels (CH_4)	28.2	21.6	18.2	0.00%	-10.0	-35%	-3.4	-16%
1.A.2.c Chemicals: Solid Fuels (N_2O)	63.3	30.8	25.8	0.00%	-37.5	-59%	-4.9	-16%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.2.d Pulp, paper and print: Biomass (CH_4)	46.5	124.4	125.8	0.00%	79.3	171%	1.4	1%
1.A.2.d Pulp, paper and print: Biomass (N_2O)	180.0	368.1	393.7	0.01%	213.7	119%	25.6	7%
1.A.2.d Pulp, paper and print: Gaseous Fuels (CH_4)	35.9	81.3	74.5	0.00%	38.6	108%	-6.7	-8%
1.A.2.d Pulp, paper and print: Gaseous Fuels (N_2O)	25.7	29.6	29.9	0.00%	4.2	16%	0.3	1%
1.A.2.d Pulp, paper and print: Liquid Fuels (CH_4)	13.2	7.6	7.6	0.00%	-5.7	-43%	0.0	0%
1.A.2.d Pulp, paper and print: Liquid Fuels (N_2O)	32.7	7.5	6.8	0.00%	-25.9	-79%	-0.8	-10%
1.A.2.d Pulp, paper and print: Other Fuels (CH_4)	0.4	5.1	5.0	0.00%	4.7	1310%	-0.1	-1%
1.A.2.d Pulp, paper and print: Other Fuels (CO_2)	57.8	542.3	498.1	0.02%	440.3	762%	-44.2	-8%
1.A.2.d Pulp, paper and print: Other Fuels (N_2O)	0.6	7.3	6.9	0.00%	6.3	1084%	-0.4	-6%
1.A.2.d Pulp, paper and print: Peat (CH_4)	0.7	0.2	0.2	0.00%	-0.5	-75%	0.0	-4%
1.A.2.d Pulp, paper and print: Peat (CO_2)	1 117.6	262.9	248.3	0.01%	-869.4	-78%	-14.7	-6%
1.A.2.d Pulp, paper and print: Peat (N_2O)	8.7	1.6	1.5	0.00%	-7.2	-83%	-0.1	-4%
1.A.2.d Pulp, paper and print: Solid Fuels (CH_4)	15.7	2.6	2.1	0.00%	-13.6	-87%	-0.5	-20%
1.A.2.d Pulp, paper and print: Solid Fuels (N_2O)	35.3	6.7	3.4	0.00%	-31.9	-90%	-3.3	-49%
1.A.2.e Food processing, beverages and tobacco: Biomass (CH_4)	6.4	261.8	267.8	0.01%	261.4	4094%	6.0	2%
1.A.2.e Food processing, beverages and tobacco: Biomass (N_2O)	19.6	111.7	125.7	0.00%	106.1	541%	14.0	13%
1.A.2.e Food processing, beverages and tobacco: Gaseous Fuels (CH_4)	21.0	206.0	189.2	0.01%	168.3	802%	-16.7	-8%
1.A.2.e Food processing, beverages and tobacco: Gaseous Fuels (N_2O)	15.0	27.2	27.4	0.00%	12.4	82%	0.2	1%
1.A.2.e Food processing, beverages and tobacco: Liquid Fuels (CH_4)	18.6	3.2	2.8	0.00%	-15.8	-85%	-0.4	-12%
1.A.2.e Food processing, beverages and tobacco: Liquid Fuels (N_2O)	66.4	9.9	8.0	0.00%	-58.4	-88%	-2.0	-20%
1.A.2.e Food processing, beverages and tobacco: Other Fuels (CH_4)	0.0	0.5	0.6	0.00%	0.6	1832%	0.1	12%
1.A.2.e Food processing, beverages and tobacco: Other Fuels (CO_2)	4.8	58.7	66.2	0.00%	61.4	1287%	7.4	13%
1.A.2.e Food processing, beverages and tobacco: Other Fuels (N_2O)	0.0	0.7	0.8	0.00%	0.7	1632%	0.1	11%
1.A.2.e Food processing, beverages and tobacco: Peat (CH_4)	0.3	0.0	0.1	0.00%	-0.2	-76%	0.1	100%
1.A.2.e Food processing, beverages and tobacco: Peat (CO_2)	139.1	0.0	5.5	0.00%	-133.6	-96%	5.5	100%
1.A.2.e Food processing, beverages and tobacco: Peat (N_2O)	1.3	0.0	0.0	0.00%	-1.3	-99%	0.0	100%
1.A.2.e Food processing, beverages and tobacco: Solid Fuels (CH_4)	32.4	7.5	7.2	0.00%	-25.2	-78%	-0.3	-4%
1.A.2.e Food processing, beverages and tobacco: Solid Fuels (N_2O)	55.8	12.3	12.1	0.00%	-43.6	-78%	-0.1	-1%
1.A.2.f Non-metallic minerals: Biomass (CH_4)	24.5	73.3	65.0	0.00%	40.5	166%	-8.4	-11%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.2.f Non-metallic minerals: Biomass (N_2O)	49.0	138.1	138.4	0.01%	89.4	182%	0.3	0%
1.A.2.f Non-metallic minerals: Gaseous Fuels (CH_4)	29.8	64.7	54.5	0.00%	24.7	83%	-10.2	-16%
1.A.2.f Non-metallic minerals: Gaseous Fuels (N_2O)	122.0	116.3	115.2	0.00%	-6.8	-6%	-1.1	-1%
1.A.2.f Non-metallic minerals: Liquid Fuels (CH_4)	59.9	28.1	26.8	0.00%	-33.1	-55%	-1.3	-5%
1.A.2.f Non-metallic minerals: Liquid Fuels (N_2O)	635.7	284.4	281.1	0.01%	-354.6	-56%	-3.3	-1%
1.A.2.f Non-metallic minerals: Other Fuels (CH_4)	4.9	81.7	85.1	0.00%	80.3	1655%	3.4	4%
1.A.2.f Non-metallic minerals: Other Fuels (N_2O)	12.5	168.9	174.5	0.01%	162.0	1297%	5.6	3%
1.A.2.f Non-metallic minerals: Peat (CH_4)	0.0	0.0	0.0	0.00%	0.0	-87%	0.0	-61%
1.A.2.f Non-metallic minerals: Peat (CO_2)	26.9	10.2	3.9	0.00%	-22.9	-85%	-6.2	-61%
1.A.2.f Non-metallic minerals: Peat (N_2O)	0.1	0.1	0.0	0.00%	-0.1	-80%	0.0	-61%
1.A.2.f Non-metallic minerals: Solid Fuels (CH_4)	138.4	19.2	17.3	0.00%	-121.1	-87%	-1.9	-10%
1.A.2.f Non-metallic minerals: Solid Fuels (N_2O)	392.7	66.0	63.2	0.00%	-329.4	-84%	-2.8	-4%
1.A.2.g Other: Biomass (CH_4)	100.0	199.8	200.4	0.01%	100.4	100%	0.6	0%
1.A.2.g Other: Biomass (N_2O)	173.9	416.0	418.1	0.02%	244.2	140%	2.2	1%
1.A.2.g Other: Gaseous Fuels (CH_4)	80.3	299.0	288.0	0.01%	207.7	258%	-11.0	-4%
1.A.2.g Other: Gaseous Fuels (N_2O)	141.0	201.5	208.6	0.01%	67.6	48%	7.1	4%
1.A.2.g Other: Liquid Fuels (CH_4)	104.6	32.7	30.6	0.00%	-74.1	-71%	-2.1	-6%
1.A.2.g Other: Liquid Fuels (N_2O)	969.0	812.0	797.5	0.03%	-171.5	-18%	-14.5	-2%
1.A.2.g Other: Other Fuels (CH_4)	13.3	6.7	7.8	0.00%	-5.5	-41%	1.1	17%
1.A.2.g Other: Other Fuels (N_2O)	25.7	45.7	46.9	0.00%	21.3	83%	1.2	3%
1.A.2.g Other: Peat (CH_4)	0.1	0.0	0.1	0.00%	0.0	-12%	0.0	13%
1.A.2.g Other: Peat (CO_2)	21.5	39.5	42.7	0.00%	21.2	99%	3.1	8%
1.A.2.g Other: Peat (N_2O)	0.2	0.2	0.2	0.00%	0.0	11%	0.0	1%
1.A.2.g Other: Solid Fuels (CH_4)	122.3	5.2	4.5	0.00%	-117.8	-96%	-0.7	-14%
1.A.2.g Other: Solid Fuels (N_2O)	644.9	71.6	59.1	0.00%	-585.8	-91%	-12.5	-17%
1.A.3.a Domestic aviation: Aviation Gasoline (CH_4)	2.3	0.6	0.7	0.00%	-1.7	-72%	0.1	10%
1.A.3.a Domestic aviation: Aviation Gasoline (CO_2)	445.8	117.4	136.6	0.01%	-309.2	-69%	19.1	16%
1.A.3.a Domestic aviation: Aviation Gasoline (N_2O)	6.6	2.5	2.6	0.00%	-4.0	-61%	0.0	2%
1.A.3.a Domestic aviation: Biomass (CH_4)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	28%
1.A.3.a Domestic aviation: Biomass (N_2O)	0.0	0.2	0.3	0.00%	0.3	100%	0.1	47%
1.A.3.a Domestic aviation: Jet Kerosene (CH_4)	7.5	5.5	5.5	0.00%	-2.0	-26%	0.1	1%
1.A.3.a Domestic aviation: Jet Kerosene (N_2O)	91.0	96.5	97.2	0.00%	6.2	7%	0.7	1%
1.A.3.b Road transportation: Biomass (CH_4)	0.0	74.0	79.6	0.00%	79.6	855421%	5.6	8%
1.A.3.b Road transportation: Biomass (N_2O)	0.1	640.5	589.4	0.02%	589.3	468104%	-51.1	-8%
1.A.3.b Road transportation: Diesel Oil (CH_4)	560.0	214.5	213.8	0.01%	-346.2	-62%	-0.7	0%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.3.b Road transportation: Gaseous Fuels (CH_4)	10.4	65.5	65.8	0.00%	55.4	533%	0.3	1%
1.A.3.b Road transportation: Gaseous Fuels (N_2O)	1.3	32.4	33.6	0.00%	32.3	2408%	1.3	4%
1.A.3.b Road transportation: Gasoline (CH_4)	5 587.9	698.6	713.6	0.03%	-4 874.3	-87%	15.1	2%
1.A.3.b Road transportation: Gasoline (N_2O)	3 389.8	615.5	627.6	0.02%	-2 762.2	-81%	12.1	2%
1.A.3.b Road transportation: Liquefied Petroleum Gases (LPG) (CH_4)	46.9	57.5	55.9	0.00%	9.0	19%	-1.6	-3%
1.A.3.b Road transportation: Liquefied Petroleum Gases (LPG) (N_2O)	15.6	79.7	72.6	0.00%	56.9	364%	-7.1	-9%
1.A.3.b Road transportation: Other Fuels (CH_4)	0.0	4.1	4.4	0.00%	4.4	100%	0.3	6%
1.A.3.b Road transportation: Other Fuels (CO_2)	0.6	2 589.4	2 518.6	0.09%	2 518.0	388842%	-70.7	-3%
1.A.3.b Road transportation: Other Fuels (N_2O)	0.0	18.6	17.9	0.00%	17.9	100%	-0.7	-4%
1.A.3.b Road transportation: Other Liquid Fuels (CH_4)	1.2	0.0	0.0	0.00%	-1.1	-96%	0.0	3%
1.A.3.b Road transportation: Other Liquid Fuels (CO_2)	443.0	61.2	65.4	0.00%	-377.6	-85%	4.2	7%
1.A.3.b Road transportation: Other Liquid Fuels (N_2O)	0.4	0.9	0.9	0.00%	0.6	165%	0.1	7%
1.A.3.c Railways: Biomass (CH_4)	0.0	0.2	0.2	0.00%	0.2	2152573%	0.0	8%
1.A.3.c Railways: Biomass (N_2O)	0.0	2.3	2.1	0.00%	2.1	100%	-0.2	-9%
1.A.3.c Railways: Gaseous Fuels (CH_4)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	-12%
1.A.3.c Railways: Gaseous Fuels (CO_2)	0.0	7.0	6.2	0.00%	6.2	100%	-0.8	-12%
1.A.3.c Railways: Gaseous Fuels (N_2O)	0.0	0.1	0.1	0.00%	0.1	100%	0.0	-12%
1.A.3.c Railways: Liquid Fuels (CH_4)	19.1	4.8	4.7	0.00%	-14.4	-75%	-0.1	-2%
1.A.3.c Railways: Liquid Fuels (N_2O)	596.4	140.3	135.2	0.01%	-461.3	-77%	-5.1	-4%
1.A.3.c Railways: Other Fuels (CH_4)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	7%
1.A.3.c Railways: Other Fuels (CO_2)	0.0	5.9	5.5	0.00%	5.5	100%	-0.5	-8%
1.A.3.c Railways: Other Fuels (N_2O)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	5%
1.A.3.c Railways: Solid Fuels (CH_4)	17.1	0.6	0.8	0.00%	-16.3	-95%	0.1	24%
1.A.3.c Railways: Solid Fuels (CO_2)	663.3	32.2	32.5	0.00%	-630.8	-95%	0.3	1%
1.A.3.c Railways: Solid Fuels (N_2O)	2.8	0.1	0.1	0.00%	-2.7	-95%	0.0	0%
1.A.3.d Domestic navigation: Biomass (CH_4)	0.0	3.2	3.1	0.00%	3.1	100%	-0.1	-4%
1.A.3.d Domestic navigation: Biomass (N_2O)	0.0	1.9	2.2	0.00%	2.2	100%	0.3	18%
1.A.3.d Domestic navigation: Gas/Diesel Oil (CH_4)	26.9	19.3	20.7	0.00%	-6.2	-23%	1.4	7%
1.A.3.d Domestic navigation: Gas/Diesel Oil (N_2O)	195.4	172.6	177.0	0.01%	-18.4	-9%	4.4	3%
1.A.3.d Domestic navigation: Gaseous Fuels (CH_4)	0.0	20.6	43.4	0.00%	43.4	100%	22.8	111%
1.A.3.d Domestic navigation: Gaseous Fuels (CO_2)	0.0	79.9	153.8	0.01%	153.8	100%	73.9	93%
1.A.3.d Domestic navigation: Gaseous Fuels (N_2O)	0.0	0.5	0.9	0.00%	0.9	100%	0.3	65%
1.A.3.d Domestic navigation: Gasoline (CH_4)	48.7	30.5	31.6	0.00%	-17.2	-35%	1.1	4%
1.A.3.d Domestic navigation: Gasoline (CO_2)	1 546.0	1 309.3	1 357.0	0.05%	-189.0	-12%	47.8	4%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.3.d Domestic navigation: Gasoline (N_2O)	6.0	6.9	7.1	0.00%	1.1	18%	0.2	4%
1.A.3.d Domestic navigation: Other Fuels (CH_4)	0.0	0.3	0.4	0.00%	0.4	100%	0.1	20%
1.A.3.d Domestic navigation: Other Fuels (CO_2)	0.0	16.4	19.4	0.00%	19.4	100%	3.0	18%
1.A.3.d Domestic navigation: Other Fuels (N_2O)	0.0	0.1	0.1	0.00%	0.1	100%	0.0	19%
1.A.3.d Domestic navigation: Other Liquid Fuels (CH_4)	0.2	0.3	0.3	0.00%	0.1	67%	0.0	2%
1.A.3.d Domestic navigation: Other Liquid Fuels (CO_2)	16.2	32.7	33.8	0.00%	17.6	109%	1.1	3%
1.A.3.d Domestic navigation: Other Liquid Fuels (N_2O)	0.1	0.2	0.2	0.00%	0.1	74%	0.0	4%
1.A.3.d Domestic navigation: Residual Fuel Oil (CH_4)	20.2	12.9	13.4	0.00%	-6.8	-34%	0.5	4%
1.A.3.d Domestic navigation: Residual Fuel Oil (N_2O)	60.3	36.6	37.6	0.00%	-22.7	-38%	1.0	3%
1.A.3.e Other transportation: Biomass (CH_4)	0.0	0.1	0.0	0.00%	0.0	100%	0.0	-77%
1.A.3.e Other transportation: Biomass (N_2O)	0.0	0.7	0.3	0.00%	0.3	100%	-0.4	-57%
1.A.3.e Other transportation: Gaseous Fuels (CH_4)	11.1	8.4	5.2	0.00%	-5.9	-53%	-3.2	-38%
1.A.3.e Other transportation: Gaseous Fuels (CO_2)	4 591.5	3 326.5	2 672.5	0.10%	-1 919.0	-42%	-654.0	-20%
1.A.3.e Other transportation: Gaseous Fuels (N_2O)	21.0	21.9	16.9	0.00%	-4.1	-20%	-5.0	-23%
1.A.3.e Other transportation: Liquid Fuels (CH_4)	2.2	0.3	0.3	0.00%	-1.9	-85%	0.0	-4%
1.A.3.e Other transportation: Liquid Fuels (CO_2)	1 405.3	841.5	905.3	0.03%	-500.0	-36%	63.8	8%
1.A.3.e Other transportation: Liquid Fuels (N_2O)	31.3	12.0	12.5	0.00%	-18.8	-60%	0.4	4%
1.A.3.e Other transportation: Other Fuels (CH_4)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.3.e Other transportation: Other Fuels (CO_2)	0.0	0.6	0.4	0.00%	0.4	100%	-0.2	-29%
1.A.3.e Other transportation: Other Fuels (N_2O)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.3.e Other transportation: Solid Fuels (CH_4)	0.5	0.0	0.0	0.00%	-0.5	-100%	0.0	0%
1.A.3.e Other transportation: Solid Fuels (CO_2)	54.7	0.0	0.0	0.00%	-54.7	-100%	0.0	0%
1.A.3.e Other transportation: Solid Fuels (N_2O)	0.6	0.0	0.0	0.00%	-0.6	-100%	0.0	0%
1.A.4.a Commercial/institutional: Biomass (CH_4)	160.6	488.1	477.1	0.02%	316.6	197%	-11.0	-2%
1.A.4.a Commercial/institutional: Biomass (N_2O)	37.1	166.8	167.5	0.01%	130.4	351%	0.7	0%
1.A.4.a Commercial/institutional: Gaseous Fuels (CH_4)	101.8	188.2	185.8	0.01%	84.0	83%	-2.4	-1%
1.A.4.a Commercial/institutional: Gaseous Fuels (N_2O)	87.3	121.0	121.9	0.00%	34.7	40%	1.0	1%
1.A.4.a Commercial/institutional: Liquid Fuels (CH_4)	148.8	49.2	51.6	0.00%	-97.1	-65%	2.4	5%
1.A.4.a Commercial/institutional: Liquid Fuels (N_2O)	257.7	76.0	72.0	0.00%	-185.7	-72%	-4.0	-5%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.4.a Commercial/institutional: Other Fuels (CH_4)	9.5	19.2	23.1	0.00%	13.6	144%	3.8	20%
1.A.4.a Commercial/institutional: Other Fuels (N_2O)	16.0	142.0	142.3	0.01%	126.3	791%	0.3	0%
1.A.4.a Commercial/institutional: Peat (CH_4)	0.7	0.2	0.2	0.00%	-0.5	-74%	0.0	-12%
1.A.4.a Commercial/institutional: Peat (CO_2)	232.8	39.4	30.2	0.00%	-202.7	-87%	-9.2	-23%
1.A.4.a Commercial/institutional: Peat (N_2O)	0.9	0.1	0.1	0.00%	-0.8	-88%	0.0	-26%
1.A.4.a Commercial/institutional: Solid Fuels (CH_4)	1 641.1	7.2	4.1	0.00%	-1 637.0	-100%	-3.1	-43%
1.A.4.a Commercial/institutional: Solid Fuels (N_2O)	129.5	9.0	5.9	0.00%	-123.7	-95%	-3.1	-35%
1.A.4.b Residential: Biomass (N_2O)	1 519.3	2 154.2	2 066.8	0.08%	547.5	36%	-87.4	-4%
1.A.4.b Residential: Gaseous Fuels (CH_4)	589.5	506.4	499.5	0.02%	-90.0	-15%	-6.9	-1%
1.A.4.b Residential: Gaseous Fuels (N_2O)	224.1	259.1	262.1	0.01%	38.0	17%	2.9	1%
1.A.4.b Residential: Liquid Fuels (CH_4)	351.9	136.0	136.1	0.01%	-215.8	-61%	0.2	0%
1.A.4.b Residential: Liquid Fuels (N_2O)	532.0	170.0	165.4	0.01%	-366.6	-69%	-4.6	-3%
1.A.4.b Residential: Other Fuels (CH_4)	0.0	0.3	0.3	0.00%	0.3	100%	0.0	19%
1.A.4.b Residential: Other Fuels (CO_2)	0.0	6.6	7.7	0.00%	7.7	100%	1.0	16%
1.A.4.b Residential: Other Fuels (N_2O)	0.0	0.0	0.1	0.00%	0.1	100%	0.0	16%
1.A.4.b Residential: Peat (CH_4)	288.1	51.9	46.5	0.00%	-241.7	-84%	-5.5	-11%
1.A.4.b Residential: Peat (CO_2)	3 585.1	643.5	578.7	0.02%	-3 006.3	-84%	-64.8	-10%
1.A.4.b Residential: Peat (N_2O)	13.4	2.3	2.1	0.00%	-11.3	-85%	-0.2	-10%
1.A.4.b Residential: Solid Fuels (N_2O)	785.8	101.5	83.2	0.00%	-702.6	-89%	-18.3	-18%
1.A.4.c Agriculture/forestry/fishing: Biomass (CH_4)	111.1	607.0	591.2	0.02%	480.1	432%	-15.8	-3%
1.A.4.c Agriculture/forestry/fishing: Biomass (N_2O)	20.6	161.2	160.0	0.01%	139.4	677%	-1.2	-1%
1.A.4.c Agriculture/forestry/fishing: Gaseous Fuels (CH_4)	86.4	1 195.3	1 263.2	0.05%	1 176.8	1362%	67.9	6%
1.A.4.c Agriculture/forestry/fishing: Gaseous Fuels (N_2O)	7.5	9.3	10.4	0.00%	2.9	39%	1.1	12%
1.A.4.c Agriculture/forestry/fishing: Liquid Fuels (CH_4)	217.3	90.8	86.1	0.00%	-131.2	-60%	-4.6	-5%
1.A.4.c Agriculture/forestry/fishing: Liquid Fuels (N_2O)	2 927.6	2 932.7	2 818.7	0.11%	-108.8	-4%	-114.0	-4%
1.A.4.c Agriculture/forestry/fishing: Other Fuels (CH_4)	0.0	0.1	0.1	0.00%	0.1	100%	0.0	10%
1.A.4.c Agriculture/forestry/fishing: Other Fuels (CO_2)	0.0	65.6	61.8	0.00%	61.8	100%	-3.8	-6%
1.A.4.c Agriculture/forestry/fishing: Other Fuels (N_2O)	0.0	3.5	3.5	0.00%	3.5	100%	0.0	0%
1.A.4.c Agriculture/forestry/fishing: Peat (CH_4)	1.0	7.1	9.0	0.00%	8.0	838%	1.9	27%
1.A.4.c Agriculture/forestry/fishing: Peat (CO_2)	45.0	197.7	251.7	0.01%	206.7	460%	54.0	27%
1.A.4.c Agriculture/forestry/fishing: Peat (N_2O)	0.2	0.7	0.9	0.00%	0.7	437%	0.2	26%
1.A.4.c Agriculture/forestry/fishing: Solid Fuels (CH_4)	743.3	165.0	124.2	0.00%	-619.1	-83%	-40.8	-25%
1.A.4.c Agriculture/forestry/fishing: Solid Fuels (N_2O)	33.8	7.9	5.9	0.00%	-27.9	-83%	-2.0	-25%
1.A.5.a Stationary: Biomass (CH_4)	0.7	3.3	3.0	0.00%	2.3	340%	-0.3	-8%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.A.5.a Stationary: Biomass (N_2O)	0.3	0.6	0.6	0.00%	0.3	132%	0.0	-6%
1.A.5.a Stationary: Gaseous Fuels (CH_4)	0.5	0.8	0.7	0.00%	0.2	49%	0.0	-6%
1.A.5.a Stationary: Gaseous Fuels (CO_2)	729.7	548.7	578.9	0.02%	-150.8	-21%	30.2	6%
1.A.5.a Stationary: Gaseous Fuels (N_2O)	1.1	0.7	0.7	0.00%	-0.3	-32%	0.0	1%
1.A.5.a Stationary: Liquid Fuels (CH_4)	8.0	5.3	5.3	0.00%	-2.8	-34%	0.0	0%
1.A.5.a Stationary: Liquid Fuels (CO_2)	7 011.2	3 956.6	3 824.6	0.14%	-3 186.6	-45%	-132.0	-3%
1.A.5.a Stationary: Liquid Fuels (N_2O)	41.3	17.4	17.0	0.00%	-24.3	-59%	-0.5	-3%
1.A.5.a Stationary: Other Fuels (CH_4)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	10%
1.A.5.a Stationary: Other Fuels (CO_2)	0.0	0.7	0.7	0.00%	0.7	100%	0.1	10%
1.A.5.a Stationary: Other Fuels (N_2O)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	8%
1.A.5.a Stationary: Peat (CH_4)	0.3	0.0	0.0	0.00%	-0.3	-100%	0.0	0%
1.A.5.a Stationary: Peat (CO_2)	24.0	0.0	0.0	0.00%	-24.0	-100%	0.0	0%
1.A.5.a Stationary: Peat (N_2O)	0.1	0.0	0.0	0.00%	-0.1	-100%	0.0	0%
1.A.5.a Stationary: Solid Fuels (CH_4)	284.4	0.2	0.0	0.00%	-284.4	-100%	-0.2	-93%
1.A.5.a Stationary: Solid Fuels (N_2O)	19.4	0.0	0.0	0.00%	-19.4	-100%	0.0	-36%
1.A.5.b Mobile: Biomass (CH_4)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	8%
1.A.5.b Mobile: Biomass (N_2O)	0.0	0.1	0.1	0.00%	0.1	100%	0.0	8%
1.A.5.b Mobile: Gaseous Fuels (CH_4)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.5.b Mobile: Gaseous Fuels (CO_2)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.5.b Mobile: Gaseous Fuels (N_2O)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.5.b Mobile: Liquid Fuels (CH_4)	42.0	3.4	4.0	0.00%	-38.0	-91%	0.6	18%
1.A.5.b Mobile: Liquid Fuels (N_2O)	113.9	31.8	32.5	0.00%	-81.4	-71%	0.7	2%
1.A.5.b Mobile: Other Fuels (CH_4)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	-20%
1.A.5.b Mobile: Other Fuels (CO_2)	0.0	0.1	0.1	0.00%	0.1	100%	0.0	-12%
1.A.5.b Mobile: Other Fuels (N_2O)	0.0	0.0	0.0	0.00%	0.0	100%	0.0	-12%
1.A.5.b Mobile: Solid Fuels (CH_4)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.5.b Mobile: Solid Fuels (CO_2)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.A.5.b Mobile: Solid Fuels (N_2O)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.B.1.a Coal mining and handling: no classification (CO_2)	751.1	149.0	124.7	0.00%	-626.4	-83%	-24.3	-16%
1.B.1.a Coal mining and handling: no classification (N_2O)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
1.B.1.b Fuel transformation: no classification (CH_4)	274.5	64.4	65.3	0.00%	-209.2	-76%	0.9	1%
1.B.1.b Fuel transformation: no classification (CO_2)	6 133.8	2 801.9	2 677.6	0.10%	-3 456.2	-56%	-124.3	-4%
1.B.1.b Fuel transformation: no classification (N_2O)	0.1	0.1	0.1	0.00%	0.1	100%	0.0	-6%
1.B.1.c Other: no classification (CH_4)	126.5	85.0	85.6	0.00%	-41.0	-32%	0.5	1%
1.B.1.c Other: no classification (CO_2)	6.9	56.0	64.4	0.00%	57.5	831%	8.4	15%
1.B.1.c Other: no classification (N_2O)	0.0	0.0	0.0	0.00%	0.0	146%	0.0	156%
1.B.2.a Oil: no classification (N_2O)	21.2	5.4	5.2	0.00%	-16.0	-75%	-0.2	-4%
1.B.2.b Natural gas: no classification (CO_2)	2 385.1	746.9	718.5	0.03%	-1 666.6	-70%	-28.5	-4%
1.B.2.c Venting and flaring: no classification (CH_4)	6 376.8	1 359.4	1 272.1	0.05%	-5 104.8	-80%	-87.3	-6%
1.B.2.c Venting and flaring: no classification (CO_2)	4 646.5	2 446.2	2 353.8	0.09%	-2 292.7	-49%	-92.4	-4%
1.B.2.c Venting and flaring: no classification (N_2O)	14.1	8.4	31.7	0.00%	17.6	126%	23.3	280%
1.B.2.d Other: no classification (CH_4)	361.6	541.5	533.0	0.02%	171.4	47%	-8.5	-2%
1.B.2.d Other: no classification (CO_2)	682.3	1 789.4	1 734.0	0.07%	1 051.7	154%	-55.4	-3%

	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 1. Energy in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
1.B.2.d Other: no classification (N_2O)	9.5	6.8	6.4	0.00%	-3.1	-33%	-0.4	-6%
1.C CO_2 transport and storage: Fuels (CO_2)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%

3.7 Uncertainties

Table 3.118 shows the total EU uncertainty estimates for the sector 'Energy' (excluding 1A3 'Transport' and 1B 'Fugitive') for the relevant gases for each source category. For those emissions for which no split by source category was available, uncertainty estimates were made for stationary combustion as a whole. The highest level uncertainty was estimated for CH_4 from 1A1c and the lowest for CO_2 from 1A2e. With regard to trend CH_4 from 1A1a shows the highest uncertainty estimates, CO_2 from 1A2a the lowest. The results of this year's uncertainty analysis are very similar to the results in 2025. For a description of the Tier 1 uncertainty analysis carried out for the EU see Chapter 1.6.

Table 3.118 Sector 1 Energy (excl. 1A3b and 1B): Uncertainty estimates

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
1.A.1.a Public electricity and heat production	CO_2	589 928	238 875	-60%	2%	1.2%
1.A.1.a Public electricity and heat production	CH_4	275	2 786	912%	53%	499.1%
1.A.1.a Public electricity and heat production	N_2O	2 510	1 611	-36%	15%	6.9%
1.A.1.b Petroleum refining	CO_2	60 156	48 858	-19%	5%	1.4%
1.A.1.b Petroleum refining	CH_4	36	20	-44%	16%	37.7%
1.A.1.b Petroleum refining	N_2O	208	77	-63%	24%	23.6%
1.A.1.c Manufacture of solid fuels and other energy industries	CO_2	71 194	15 859	-78%	7%	4.6%
1.A.1.c Manufacture of solid fuels and other energy industries	CH_4	114	122	6%	108%	10.6%
1.A.1.c Manufacture of solid fuels and other energy industries	N_2O	590	122	-79%	24%	19.8%
1.A.2.a Iron and Steel	CO_2	54 013	37 331	-31%	5%	0.6%
1.A.2.a Iron and Steel	CH_4	86	66	-23%	26%	5.5%
1.A.2.a Iron and Steel	N_2O	206	92	-55%	35%	45.5%
1.A.2.b Non-ferrous Metals	CO_2	2 352	1 101	-53%	2%	5.5%
1.A.2.b Non-ferrous Metals	CH_4	2	1	-62%	33%	29.9%
1.A.2.b Non-ferrous Metals	N_2O	15	3	-82%	50%	45.5%
1.A.2.c Chemicals	CO_2	25 158	6 823	-73%	2%	2.0%
1.A.2.c Chemicals	CH_4	20	25	24%	49%	49.6%
1.A.2.c Chemicals	N_2O	32	30	-4%	94%	48.2%
1.A.2.d Pulp, Paper and Print	CO_2	5 330	2 348	-56%	3%	1.3%
1.A.2.d Pulp, Paper and Print	CH_4	22	25	15%	25%	7.4%
1.A.2.d Pulp, Paper and Print	N_2O	83	99	19%	33%	12.9%

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
1.A.2.e Food Processing, Beverages and Tobacco	CO_2	8 594	4 813	-44%	2%	1.6%
1.A.2.e Food Processing, Beverages and Tobacco	CH_4	13	18	44%	58%	65.7%
1.A.2.e Food Processing, Beverages and Tobacco	N_2O	35	12	-66%	61%	32.1%
1.A.2.f Non-metallic minerals	CO_2	29 850	16 996	-43%	3%	1.6%
1.A.2.f Non-metallic minerals	CH_4	77	45	-42%	27%	17.4%
1.A.2.f Non-metallic minerals	N_2O	215	151	-30%	38%	16.6%
1.A.2.g Other	CO_2	164 966	71 709	-57%	3%	1.6%
1.A.2.g Other	CH_4	211	247	17%	26%	10.2%
1.A.2.g Other	N_2O	1 043	581	-44%	29%	14.8%
1.A.4.a Commercial/Institutional	CO_2	86 559	35 743	-59%	6%	4.7%
1.A.4.a Commercial/Institutional	CH_4	1 788	257	-86%	47%	89.5%
1.A.4.a Commercial/Institutional	N_2O	236	115	-52%	75%	22.1%
1.A.4.b Residential	CO_2	202 757	113 687	-44%	6%	2.3%
1.A.4.b Residential	CH_4	5 071	2 900	-43%	52%	54.3%
1.A.4.b Residential	N_2O	968	581	-40%	58%	41.8%
1.A.4.c Agriculture/forestry/fishing	CO_2	33 564	22 610	-33%	5%	1.8%
1.A.4.c Agriculture/forestry/fishing	CH_4	501	1 633	226%	41%	105.5%
1.A.4.c Agriculture/forestry/fishing	N_2O	249	347	39%	64%	26.0%
1.A.5 Other	CO_2	21 689	6 120	-72%	4%	3.3%
1.A.5 Other	CH_4	336	13	-96%	44%	47.0%
1.A.5 Other	N_2O	174	48	-72%	86%	27.3%
1.A (where no subsector data were submitted)	*all*	25 433	26 953	6%	2%	2.1%
1.A.1 (where no subsector data were submitted)	*all*	714 313	329 616	-54%	12%	13.0%
1.A.2 (where no subsector data were submitted)	*all*	422 210	207 156	-51%	7%	3.7%
1.A.3 (where no subsector data were submitted)	*all*	122 896	183 313	49%	4%	2.4%
1.A.4 (where no subsector data were submitted)	*all*	378 933	251 499	-34%	5%	2.5%
1.A.5 (where no subsector data were submitted)	*all*	0	0	0%	0%	0.0%
Total - 1.A (where no subsector data were submitted)	**all**	**25 433**	**26 953**	**5.98%**	**2.43%**	**2.12%**
Total - 1.A.1	**all**	**1 439 324**	**637 945**	**-55.68%**	**6.06%**	**6.48%**
Total - 1.A.2	**all**	**714 535**	**349 673**	**-51.06%**	**4.32%**	**2.22%**
Total - 1.A.3	**all**	**659 596**	**786 376**	**19.22%**	**2.35%**	**0.65%**
Total - 1.A.4	**all**	**710 628**	**429 372**	**-39.58%**	**3.60%**	**1.66%**
Total - 1.A.5	**all**	**22 199**	**6 181**	**-72.16%**	**3.64%**	**3.27%**
Total - 1.A	**all**	**3 571 714**	**2 236 501**	**-37.38%**	**2.20%**	**2.67%**

Note: Emissions are in kt CO_2 equivalents; trend uncertainty is presented as percentage points; the sum of the source category emissions may not be the total sector emissions because uncertainty estimates are not available for all source categories.

Table 3.119 the total EU uncertainty estimates for the sector 1.B 'Fugitive emissions' and the uncertainty estimates for the relevant gases for each source category. The highest level uncertainties were estimated for N_2O from 1B2 and the lowest for CO_2 from 1B1; the highest trend uncertainties were estimated for N_2O from 1B2, the lowest for CO_2 from 1B1.

The uncertainty assessment shows notable changes compared to the previous EU GHG inventory submission. Recalculations of emissions/removals, revisions of uncertainties and changes in the resolution of the Member States' uncertainty reporting all influence the sector uncertainties. Therefore, changes in uncertainty estimates between submissions can hardly be attributed to a single cause. Nonetheless, a large part of the of decrease in 1B level uncertainties can be attributed to Romania's recalculation in 1B1a CH_4. The rise in trend uncertainties is also partly driven by this recalculation (a higher difference between 1990 and 2024 emissions leads to higher trend uncertainties). An additional contributing factor is Germany's revision of 1B1 CH_4 uncertainty estimation, which has a higher effect on the trend uncertainty than the level uncertainty. This is because Germany's share of 1B1a CH_4 emissions declined from 35% in 1990 to 0.5% in 2024. For more detailed information on Member States' uncertainties please refer to the Member States' submissions.

Table 3.119 1B Fugitive Emissions: Uncertainty estimates

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
1.B.1 Solid Fuels	CO_2	6 874	2 748	-60.0%	14.9%	8.3%
1.B.1 Solid Fuels	CH_4	77 897	16 486	-78.8%	53.9%	21.5%
1.B.1 Solid Fuels	N_2O	0	0	102.1%	54.2%	52.8%
1.B.2. Oil and Natural Gas and other emissions from energy production	CO_2	12 045	12 527	4.0%	70.5%	31.4%
1.B.2. Oil and Natural Gas and other emissions from energy production	CH_4	50 406	9 942	-80.3%	60.5%	19.1%
1.B.2. Oil and Natural Gas and other emissions from energy production	N_2O	34	13	-63.2%	108.3%	54.1%
1.B (werhe no subsector data were submitted)	*all*	17 697	4 997	-71.8%	39.9%	38.8%
Total - 1.B	**all**	**164 953**	**46 712**	**-71.7%**	**34.9%**	**12.7%**

Note: Emissions are in kt CO_2 equivalents; trend uncertainty is presented as percentage points; the sum of the source category emissions may not be the total sector emissions because uncertainty estimates are not available for all source categories.

Table 3.120 shows the total EU uncertainty estimates for the sector 1A3 'Transport' and the uncertainty estimates for the relevant gases for each source category. The highest level uncertainty was estimated for N_2O from 1A3d and the lowest for CO_2 from 1A3b. With regard to trend N_2O from 1A3e shows the highest uncertainty estimates, CO_2 from 1A3b the lowest. The results of this year's uncertainty analysis are very similar to the results in 2024.

Table 3.120 1A3 Transport: Uncertainty estimates for EU

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
1.A.3.a Domestic aviation	CO_2	9,376	10,179	8.57%	9.32%	3.89%
1.A.3.a Domestic aviation	CH_4	8	4	-54.62%	92.01%	35.07%
1.A.3.a Domestic aviation	N_2O	73	58	-21.47%	185.05%	33.58%
1.A.3.b Road transport	CO_2	487 083	569 544	16.93%	2.90%	0.48%
1.A.3.b Road transport	CH_4	4 636	776	-83.26%	24.27%	6.67%
1.A.3.b Road transport	N_2O	3 913	6 792	73.60%	36.18%	16.18%

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
1.A.3.c Railways	CO_2	9 355	2 713	-71.00%	4.84%	2.65%
1.A.3.c Railways	CH_4	32	5	-84.69%	75.19%	20.83%
1.A.3.c Railways	N_2O	398	109	-72.50%	84.76%	38.81%
1.A.3.d Domestic navigation	CO_2	15 919	9 998	-37.19%	29.64%	12.21%
1.A.3.d Domestic navigation	CH_4	41	74	82.13%	54.87%	37.39%
1.A.3.d Domestic navigation	N_2O	185	163	-11.94%	229.88%	12.27%
1.A.3.e Other transportation	CO_2	5 622	2 623	-53.34%	4.32%	1.79%
1.A.3.e Other transportation	CH_4	13	5	-65.32%	60.77%	21.59%
1.A.3.e Other transportation	N_2O	47	19	-58.45%	82.22%	53.27%
1.A.3 (where no subsector data were submitted)	*all*	122,896	183,313	49.16%	4.00%	2.28%
Total - 1.A.3	**all**	**659,596**	**786,376**	**19.22%**	**2.35%**	**0.65%**

Note: Emissions are in kt CO_2 equivalents; trend uncertainty is presented as percentage points; the sum of the source category emissions may not be the total sector emissions because uncertainty estimates are not available for all source categories.

3.8 Sector-specific quality assurance and quality control

There are several activities for improving the quality of GHG emissions from energy: Before and during the compilation of the EU GHG inventory, several checks are made of the Member States data in particular for time series consistency of emissions and implied emission factors, comparisons of implied emission factors across Member States and checks of internal consistency. Table 3.121 summarizes the main checks carried out on Member States' submissions.

Table 3.121 Quality checks carried out on Member States' submissions

Issue	Check
Completeness	Check categories where Member States report the notation key NE for potential underestimations Check categories where Member States report a notation key and 20 or more Member States report emissions and assess if there are potential over- or underestimates All years, but focus on last reporting year and also 1990 Focus on EU key categories
Time series of emissions	Check time series consistency of Member States' emission estimates for potential over- and underestimates: All years, but focus on last reporting year and also 1990 Focus on EU key categories
Time series of IEFs	Check time series consistency of Member States' IEFs for potential over- and underestimates: All years, but focus on last reporting year and also 1990 Focus on EU key categories
Outlier checks of IEFs	Compare IEFs across Member States and assess if there are potential over- and underestimations of emissions Compare Member States' IEFs with (range of) default EF from 2006 IPCC GL All years, but focus on last reporting year and also 1990 Focus on EU key categories
Recalculations	Check categories where Member States provide recalculations and focus on those of more than 0.05% of national total emissions for each main gas and assess if there are potential over- or underestimates. Also explanations for recalculations were checked either from MS Annexes or NID. All years, but focus on last reporting year and also 1990 Focus on EU key categories

Issue	Check
Follow-up from 2025	Check if issues that were classified as "Unresolved" or "Partly resolved" in 2025 have been resolved by Member States in 2026.
Implementation of UNFCCC recommendations	Check if recommendations from the latest UNFCCC review reports have been implemented by Member States.
Reporting of non-energy use of fossil fuels	Check plausibility of reporting in CRF table 1A(d) as compares reporting in CRF table 1A(b), 1A(c) and the IPPU sector.

After the preparation of the EU GHG inventory, the EU carries out internal reviews and or capacity building activities in order to improve the GHG inventory estimates. In 2005, an EU internal review was carried out for the first time. Since 2012 the EU internal reviews are carried out in the context of the ESD / ESR reviews (see chapter 1.5.4).

In addition, every year after the ESD review capacity building activities are organized. In 2022, the energy-related webinar had 82 participants from 26 countries. Main issues discussed at the webinar were:

- Difference between CRF and Eurostat AD for subcategory 1.A.4.b
- Use of NCVs and CO_2 EFs from EU ETS reports to non-industrial sectors (1.A.4)
- High CO_2 IEF of other fuels (MSW)
- Adjustment of energy balance data to reflect EU- ETS data

In 2023, 2024 and 2025, capacity building activities were organised bilaterally with interested countries.

EU ETS data

Since the inventory 2005 plant-specific data is available from the EU Emission Trading Scheme (EU ETS). This information has been used by EU Member States for quality checks and as input for calculating total CO_2 emissions for the sectors Energy and Industrial Processes in this report (see Section 1.4.2). During the ESR review and during the initial checks consistency checks have been carried out between EU ETS data and the inventory estimates.

Eurostat energy data

During the initial checks carried out before the compilation of the EU GHG inventory Eurostat energy data is used for cross checking the sectoral and reference approach of the MS submissions. This cross check between the European energy reporting system and the EU GHG inventory system is an important QA/QC element of the EU GHG inventory compilation.

The quality of the EU GHG inventory is directly affected by the quality of Member States and EU energy statistics systems. EU energy statistics are collected by Eurostat on the basis of the EU energy statistics regulation[28]. The energy statistics regulation was adopted as part of the energy package and establishes a common framework for the production, transmission, evaluation and dissemination of comparable energy statistics in the EU.

This regulation aims at collecting detailed statistical data on energy flows by energy commodity at annual and monthly level. It ensures harmonised and coherent reporting of national energy data, which is indispensable for the assessment of EU energy policies and targets. The content and structure of this regulation reflects the essence of the existing European statistical system, a system that is part of the international energy statistical system, and is in direct link with the national statistical structures (classifications) and methodologies. It also has concrete links to other statistical domains, such as

[28] REGULATION (EC) No 1099/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2008 on energy statistics as amended by Commission Regulation (EU) No 147/2013 of 13 February 2013.

economic, environment, trade and business statistics. These links provide an additional dimension in safeguarding data quality assurance.

The European energy statistics system and the quality of the EU inventory are directly affected by this regulation that:

- ensures a stable and institutional basis for energy statistics in the EU
- guarantees long-term availability of energy data for EU policies
- reinforces available resources for the production of the basic energy statistics at national level

The energy statistics regulation helps improving the QA/QC of the EU inventory as it:

- makes available more detailed energy statistics by fuel
- allows the estimation of CO_2 emissions from energy with the reference and sectoral approach
- assures the quality of the underlying energy statistics
- improves timeliness of energy statistics
- provides a formal legal framework assuring consistency between national and Eurostat data

Moreover, Article 6, paragraph 2 stipulates that:

'Every reasonable effort shall be undertaken to ensure coherence between energy data declared in the energy statistics regulation, and data declared in accordance with Commission Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol'.

In addition, Annex V of the Governance Regulation in conjunction with Article 17 of the Commission Implementing Regulation 2020/1208 requires Member States to report to the European Commission textual information on the comparison between the reference approach calculated on the basis of the data included in the greenhouse gas inventory and the reference approach calculated on the basis of the data reported pursuant to the Energy Statistics Regulation. Member States with differences of more than +/- 2% in the total national apparent fossil fuel consumption have to provide quantitative information and explanations for the year X-2 in accordance with the tabular format set out in Annex XIV of the Commission Implementing Regulation.

Eurocontrol data

Since 2010 there have been framework contracts in place between the European Commission and Eurocontrol, the European Organization for the Safety of Air Navigation, related to the improvement of GHG and air pollutant emission inventories submitted by the EU Member States to the UNFCCC and UNECE. The aim has been to assist the MS in improving their annual emission inventories, i.e. by providing better estimates of fuel split in domestic/international aviation using real flight data from Eurocontrol. In the framework of this cooperation, the European Environment Agency, with its ETC CM (European Topic Centre on Climate Change Mitigation) work programs, compares the MS inventory submissions with Eurocontrol data and produces a report where the outcome of these comparisons is presented and discussed.

The most recent data provided by Eurocontrol was in Aug.-Sep. 2025, following the information that has been given in previous years related to fuel consumption and emissions for CO_2, CH_4, N_2O and other pollutants for domestic and international aviation, covering the period from 2005 to 2024. The main update of the Aug.-Sep. 2025 version of data was the provision of data for year 2024. Eurocontrol uses a bottom-up modelling approach with the Advanced Emissions Model (AEM). This is a Tier 3b methodology based on information of flight plan and trajectories. Flight plan data is only available for flights under Instrumental Flight Rules (IFR). Flights under Visual Flight Rules (VFR) are not included in the dataset of Eurocontrol.

The latest version of the report with the comparison of MS inventories (15 Jan. 2026 submission) with Eurocontrol data for years 2005-2024 has been prepared and delivered in Febr. 2026. Main checks included domestic and international fuel consumption for jet kerosene and aviation gasoline; in addition, domestic share and implied emission factors (IEFs) CO_2, CH_4, and N_2O for both jet kerosene and aviation gasoline. A general observation that can be made from the comparisons performed in the framework of this report is that in most cases the Eurocontrol values present small differences compared to the GHG inventories reported by the Member States. Higher differences are observed in a few cases, i.e. for individual countries and for a specific fuel/data category. Specifically, at EU-27 level:

- Domestic kerosene consumption values from Eurocontrol are higher than MS GHG inventories for years 2005-2017 (differences from 27% to 36%). For years 2018-2024, small differences are observed (from 0% to 4%).
- Domestic aviation gasoline Eurocontrol values are very low, i.e. slightly higher than 0 for all years; hence, there are big differences with MS inventories (from -92% to -85%).
- International kerosene consumption values from Eurocontrol are higher than MS GHG inventories for years 2005-2017 (differences from 8% to 15%). For years 2018-2024, small differences are observed (from -5% to -1%) and Eurocontrol values are in general lower than MS GHG inventories.
- Eurocontrol values of domestic share in total (i.e., domestic + international) kerosene consumption are higher than MS GHG inventories for all years (differences from 3% to 21%).
- Total kerosene consumption values from Eurocontrol are higher than MS GHG inventories for years 2005-2017 (differences from 11% to 17%). For years 2018-2024, small differences are observed (from -5% to -1%) and Eurocontrol values are in general lower than MS GHG inventories.

Methodological differences: There are possible general methodological differences between Eurocontrol and MS GHG inventories. For example, in domestic aviation gasoline, the relevant Eurocontrol methodology is based exclusively on flights under IFR; small aircrafts, which mostly use aviation gasoline, usually fly under VFR and, therefore, are not sufficiently covered. Another significant difference is that the Eurocontrol values strictly refer to aviation activities, i.e., flights, and the fuel consumed in these activities is modelled for individual trajectories. While in the MS GHG inventories, the fuel consumption has to be adapted to the national energy balances.

Military aviation: This source is strictly excluded from Eurocontrol and as clarified in the CRT tables, domestic aviation should not include emissions from military aviation. The emissions from military mobile sources should be reported under category 1.A.5.b (Other mobile military use).

Domestic share: Domestic share in total (i.e. domestic + international) fuel consumption is an important indicator for the aviation sector. Some MS mention in their NIDs that their national energy balances provide separately the fuel sold for domestic and international flights or that the fuel consumption at individual airports is defined as being used for domestic or international flights. In any case, Eurostat and Eurocontrol (which has detailed information for the origin/destination pairs of most flights) can be used to derive this indicator.

Tier method: A possible inconsistency may exist in the definition of Tier method reported by countries in their NIDs. For example, Tier 1 from the IPCC guidelines considers only the use of fuel from national energy statistics, whereas in the EMEP/EEA Guidebook the Tier 1 method already separates between LTO and cruise phase. It is proposed to report information based on the IPCC guidelines in order to allow for a consistent overview of applied methodologies. Specifically:

- Tier 1: Fuel consumption data split by domestic and international aviation.
- Tier 2: LTO data from number of flights (2a) or from flights by aircraft type (2b).

- Tier 3: LTO data for individual aircrafts and data on the origin/destination pairs of flights (3a) and on air traffic movements (3b).

Table 3.122 provides an overview of how the Eurocontrol data has been used by MS.

Table 3.122 Use of Eurocontrol data by Member States

	Use of Eurocontrol data for kerosene consumption				
	For comparison / verification	For planned improvements	Indirect use	Direct use	How has the time series consistency been ensured?
Austria	-	-	-	-	-
Belgium			Data per airport, to make distribution of emissions in the regions possible	In Flemish region for international flights. In Wallonia, for N_2O and CH_4	
Bulgaria			LTO per aircraft type for years		
Croatia	-	-	-	-	-
Cyprus				For domestic and international flights	Trend of domestic share from Eurocontrol data has been applied to years after 2005
Czechia				Emissions calculated with Eurocontrol IEFs	
Denmark			List of aircraft types provided by Eurocontrol		
Estonia	-	-	-	-	-
Finland				For domestic flights from 2005 onwards	Own model (ILMI) has been used for years before 2005 and partly until 2008; since 2010 the model was not updated; no specific adaptation
France	Not mentioned, numbers match very closely				
Germany	Yes				
Greece				For domestic and international flights	
Hungary				For domestic flights	Fuel use (and, consequently, emissions) for years before 2005 has been adapted with built-in extrapolation procedures; same share of kerosene use from Eurocontrol 2005-2015 for domestic flights has been applied for years 1985-2004
Ireland				Fuel consumption based on origin and destination data for domestic air travel provided by Eurocontrol	
Italy	Yes			Domestic	
Latvia	Yes				
Lithuania					
Luxembourg	-	-	-	-	-
Malta				Domestic aviation	
Netherlands	-	-	-	-	-

	Use of Eurocontrol data for kerosene consumption				
	For comparison / verification	For planned improvements	Indirect use	Direct use	How has the time series consistency been ensured?
Poland				For share of domestic flights	Due to lack of Eurocontrol data for years prior to 2005, the share of domestic use for years prior to 1988-2004 was assumed as a 5-years average from Eurocontrol data for years 2005-2009
Portugal					
Romania	-	-	-	-	-
Slovakia				Eurocontrol data on the number of flights, fuel consumption and domestic share was used	For years 1990-2004, summary information from Eurocontrol database was used (emission factors and domestic share)
Slovenia				For domestic flights, since 2017 data on fuel consumption from Eurocontrol	Only a small amount of domestic flights has been recorded by Eurocontrol; no adaptation for years 1990-2004
Spain				For domestic and international flights	An adaptation model has been applied to link results based on national statistics with Eurocontrol
Sweden	-	-	-	-	-

3.9 Sector-specific recalculations

The following table presents the recalculation of the key categories identified for the energy sector, including the level of recalculations made by Member States contributing the most to the EU recalculations of the specific category.

Table 3.123 Sector 1 -Energy: Recalculation of key categories

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 equ.	Change in %	Main contributing countries	Change in kt CO_2 equ.	Change in %	Main contributing countries
1.A.1.a. Public electricity and heat production: Gaseous Fuels (CO_2)	-0.00	NA	no recalculations	-793.43	-0.49%	ROU: -1 686 DEU: 1250 ITA: -309
1.A.1.a. Public electricity and heat production: Liquid Fuels (CO_2)	0.00	NA	no recalculations	123.77	1%	DEU: 141
1.A.1.a. Public electricity and heat production: Other Fuels (CO_2)	-	NA	no recalculations	-56.31	0%	DEU: -101 DNK: 44
1.A.1.a. Public electricity and heat production: Peat (CO_2)	-	NA	no recalculations	-	0%	no recalculations
1.A.1.a. Public electricity and heat production: Solid Fuels (CO_2)	-	NA	no recalculations	-710.89	0%	FRA: -310 ROU: -395
1.A.1.b. Petroleum refining: Gaseous Fuels (CO_2)	-10.36	-0.2%	FIN: -49 SWE: 38	215.59	1%	DEU: 186 NLD: 46
1.A.1.b. Petroleum refining: Liquid Fuels (CO_2)	290.06	0.3%	SWE: 290	-754.34	-1%	ROU: -595 FIN: -98 NLD:-47
1.A.1.c. Manufacture of solid fuels and other energy industries: Gaseous Fuels (CO_2)	-0.00	NA	no recalculations	442.65	6%	DEU: 405 DNK: 101 ROU: -30
1.A.1.c. Manufacture of solid fuels and other energy industries: Solid Fuels (CO_2)	-	NA	no recalculations	545.85	3%	DEU: 544
1.A.2.a. Iron and steel: Gaseous Fuels (CO_2)	11.13	0.0%	FRA: 11	-121.02	-1%	ROU: -47 ESP: -36 BEL: -27
1.A.2.a. Iron and steel: Liquid Fuels (CO_2)	-0.12	0.0%	FRA: 0.12	16.38	2%	FRA: 30 NLD: -8 DNK: -4
1.A.2.a. Iron and steel: Solid Fuels (CO_2)	-0.00	0.0%	no recalculations	-1501.20	-3%	IT: -1103 DEU: -511 AT: 103
1.A.2.b. Non-ferrous metals: Gaseous Fuels (CO_2)	2.87	0.1%	FRA: 2.9	-83.10	-1%	ROU: -72 ESP: -13 FRA: 17
1.A.2.c. Chemicals: Gaseous Fuels (CO_2)	185.65	0.4%	FRA: 178 AT: 12	625.38	2%	SWE: 367 BEL: 393 FRA: 302
1.A.2.c. Chemicals: Liquid Fuels (CO_2)	-0.00	0.0%	no recalculations	-393.20	-4%	FRA: -313 IT: -87
1.A.2.c. Chemicals: Solid Fuels (CO_2)	-	0.0%	no recalculations	125.22	2%	FRA: 116 NLD: 5 CZE: 4
1.A.2.d. Pulp, paper and print: Gaseous Fuels (CO_2)	7.91	0.1%	FRA: 8	-227.58	-2%	FRA: -184 ESP: -61 ROU: -29
1.A.2.d. Pulp, paper and print: Liquid Fuels (CO_2)	-0.00	0.0%	no recalculations	-393.20	-4%	DNK: 11 POL: -10
1.A.2.d. Pulp, paper and print: Solid Fuels (CO_2)	-0.00	0.0%	no recalculations	0.19	0.0%	CZE: 0.4 SVN: -0.3
1.A.2.e. Food processing, beverages and tobacco: Gaseous Fuels (CO_2)	13.27	0.1%	FRA: 13	-479.38	-2%	FRA: -406 BEL: 69 ROU: -82
1.A.2.e. Food processing, beverages and tobacco: Liquid Fuels (CO_2)	-0.00	0.0%	no recalculations	-31.55	-1%	POL: -126 DNK: 54 FRA: 51
1.A.2.e. Food processing, beverages and tobacco: Solid Fuels (CO_2)	0.00	0.0%	no recalculations	-52.85	-2%	DEU: -39 FRA: -7 NLD: -4

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 equ.	Change in %	Main contributing countries	Change in kt CO_2 equ.	Change in %	Main contributing countries
1.A.2.f. Non-metallic minerals: Gaseous Fuels (CO_2)	13.35	0.0%	FRA: 13	-570.48	-2%	FRA: -281 DEU: -103 ESP: -105
1.A.2.f. Non-metallic minerals: Liquid Fuels (CO_2)	-0.29	0.0%	FRA: -0.2	-156.25	-1%	DEU: -61 POL: -64 PRT: -69
1.A.2.f. Non-metallic minerals: Other Fuels (CO_2)	-0.03	0.0%	FRA: -0.03	-48.27	0%	BEL: -26 FRA: -15 LUX: -7
1.A.2.f. Non-metallic minerals: Solid Fuels (CO_2)	0.43	0.0%	DNK: 0.4	-363.07	-4%	ROU: -273 DEU: -100 IRL: -28
1.A.2.g. Other: Gaseous Fuels (CO_2)	16.68	0.0%	FRA: 17	-349.59	-1%	DEU: -751 ITA: 328 FRA: 224
1.A.2.g. Other: Liquid Fuels (CO_2)	-521.72	-0.6%	NLD: -524 IRL: 2 SWE: 0	211.55	1%	FRA: 1063 POL: -547 DEU: -222
1.A.2.g. Other: Other Fuels (CO_2)	-0.00	0.0%	no recalculations	-282.65	-6%	DEU: -326 AUT: 39 FRA: 4
1.A.2.g. Other: Solid Fuels (CO_2)	-0.43	0.0%	DNK: -0.4	-984.95	-13%	ROU: -273 DEU: -100 IRL: -28
1.A.3.a. Domestic aviation: Jet Kerosene (CO_2)	0.28	0.0%	NLD: 0.5 FRA: -0.1	-10.54	0%	FRA: -10
1.A.3.b. Road transportation: Diesel Oil (CO_2)	-55.83	0.0%	SWE: -56 FRA: +0.5	-176.08	0%	POL: 756 DEU: -502 NLD: -356 CYP: -96
1.A.3.b. Road transportation: Diesel Oil (N_2O)	52.26	3.9%	FRA: 45 AUT: 3 BGR: 3	1148.62	20.1%	DNK: 173 AUT: 163 CZE: 135
1.A.3.b. Road transportation: Gaseous Fuels (CO_2)	0.00	0.0%	no recalculations	-10.63	0%	FRA: -13 NLD: -9 EST: 4
1.A.3.b. Road transportation: Gasoline (CH_4)	25.04	0.5%	FRA: 19 AUT: 6 CZE: -5	20.98	3.1%	AUT: 14 FRA: -5 FIN: 3
1.A.3.b. Road transportation: Gasoline (CO_2)	-76.97	0.0%	POL: -51 SWE: -37 NLD: 15	-157.56	0%	DEU: -111 POL: -28 BEL: -26
1.A.3.b. Road transportation: Liquefied Petroleum Gases (LPG) (CO_2)	0.00	0.0%	no recalculations	-0.62	0%	CYP: -1 IRL: 1 DEU: 0
1.A.3.b. Road transportation: Other Fuels (CO_2)	0.04	7.2%	CYP: 0.04	-2.51	0%	ITA: 9 IRL: -6 BEL: -4
1.A.3.c. Railways: Liquid Fuels (CO_2)	0.00	0.0%	no recalculations	36.25	1%	FRA: 45 DNK: -9 BEL: 0.4
1.A.3.d. Domestic navigation: Gas/Diesel Oil (CO_2)	-59.46	-0.4%	FRA: -46 DNK: -8 BEL: -4	32.45	0%	NLD: 127 ITA: -118 FRA: 44
1.A.3.d. Domestic navigation: Residual Fuel Oil (CO_2)	724.35	9.2%	FRA: 722 DNK: 2	178.18	3%	FRA: 148 ITA: 37 DNK: -4
1.A.4.a. Commercial/institutional: Gaseous Fuels (CO_2)	-103.24	-0.2%	FRA: -103	-1022.47	-1%	DEU: -794 DNK: -139 NLD: -63
1.A.4.a. Commercial/institutional: Liquid Fuels (CO_2)	40.81	0.1%	NLD: 41	-2454.19	-12%	FRA: -2570 NLD: 342 DEU: -158
1.A.4.a. Commercial/institutional: Other Fuels (CO_2)	-0.00	0.0%	no recalculations	-1939.19	-31%	ITA: -1853 FRA: -5 NLD: 1

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 equ.	Change in %	Main contributing countries	Change in kt CO_2 equ.	Change in %	Main contributing countries
1.A.4.a. Commercial/institutional: Solid Fuels (CO_2)	0.00	0.0%	no recalculations	0.11	0%	IRL: 0.1
1.A.4.b. Residential: Biomass (CH_4)	-8.95	-0.1%	SVK: -6 AUT: -3	-226.16	-2.0%	ITA: -394 FRA: 275 SVK: -81
1.A.4.b. Residential: Gaseous Fuels (CO_2)	0.05	0.0%	IRL: 0.05	-572.61	0%	DEU: -637 FRA: 111 NLD: -29
1.A.4.b. Residential: Liquid Fuels (CO_2)	-17.49	0.0%	NLD: -16 IRL: -1 SWE: 0	1479.24	2%	DEU: 985 FRA: 767 IRL: -125
1.A.4.b. Residential: Solid Fuels (CH_4)	0.00	0.0%	no recalculations	0.42	0.02%	IRL: 0.6 AUT: -0.2
1.A.4.b. Residential: Solid Fuels (CO_2)	-	0.0%	no recalculations	5.70	0%	IRL: 8 AUT: -2 BEL: 0
1.A.4.c. Agriculture/forestry/fishing: Gaseous Fuels (CO_2)	0.00	0.0%	no recalculations	-61.09	-1%	NLD: -60 SWE: -5 FRA: 4
1.A.4.c. Agriculture/forestry/fishing: Liquid Fuels (CO_2)	-2014.19	-3.1%	ESP: -2030 NLD: 15 SWE: 1	-2893.45	-5%	ESP: -3169 FRA: 859 DEU: -611
1.A.4.c. Agriculture/forestry/fishing: Solid Fuels (CO_2)	0.00	0.0%	no recalculations	-6.71	0%	BEL: -7
1.A.5.a Stationary: Solid Fuels (CO_2)	-	0.0%	no recalculations	-0.09	-2%	DEU: -0.09
1.A.5.b Mobile: Liquid Fuels (CO_2)	72.64	0.9%	NLD: 73	45.94	2%	NLD: 41 DEU: 34 CZE: -21
1.B.1.a. Coal mining and handling: no classification (CH_4)	-1474.46	-1.8%	CZE: -785 ROU: -690	-4377.04	-20.0%	ROU: -4153 POL: -245 SVK: 130
1.B.2.a. Oil: no classification (CH_4)	-7.86	-0.1%	SWE: -12 DEU: 5	-4.81	-0.7%	ITA: -5 DEU: 3 CZE: -3
1.B.2.a. Oil: no classification (CO_2)	-254.82	-3.0%	SWE: -255	-1.63	0%	ITA: -1 DEU: -0.5
1.B.2.b. Natural gas: no classification (CH_4)	69.86	0.1%	SVK: 219 POL: -193 ROU: 174	-670.34	-5.9%	POL: -371 BEL: -276 CZE: -56
1.B.2.c Venting and flaring: no classification (CH_4)	-288.49	-4.3%	POL: -321 ITA: 33	-1254.10	-48%	POL: -1234 ITA: -20

3.10 Sector-specific improvements

Information across sectors has been streamlined to provide a harmonised approach across the whole NID. Any recommendations for improvement of earlier UNFCCC reviews have been continuously followed up and implemented.

Improvements planned for the next reporting are continuing the efforts to ensure consistency between CRT/JSON files and NID, and the provision of sufficient information to meet transparency requirements.

4 INDUSTRIAL PROCESSES AND PRODUCT USE (CRT SECTOR 2)

This chapter starts with an overview of emission trends in CRT Sector 2 Industrial Processes and Product Use. This sector covers the following sub-sectors:

- Mineral Industry (CRT Source Category 2.A)
- Chemical Industry (CRT Source Category 2.B)
- Metal Industry (CRT Source Category 2.C)
- Non-Energy Products from Fuels and Solvent Use (CRT Source Category 2.D)
- Electronics Industry (CRT Source Category 2.E)
- Product Uses as Substitutes for Ozone Depleting Substances (CRT Source Category 2.F)
- Other Product Manufacture and Use (CRT Source Category 2.G)
- Other (CRT Source Category 2.H)

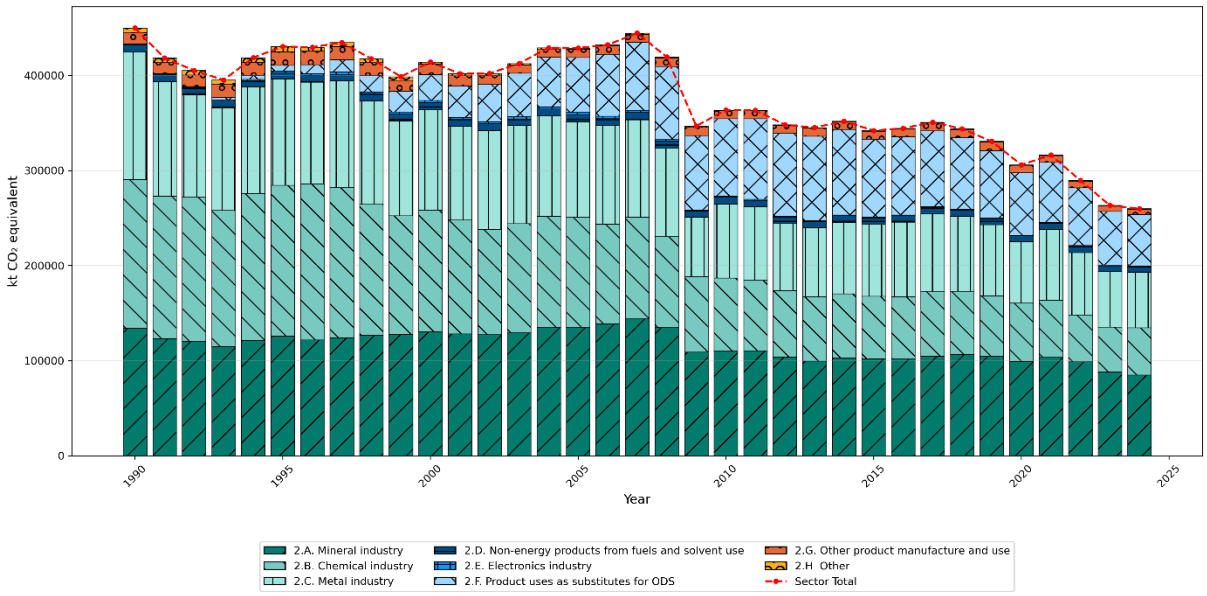
For each Union key category, overview tables are presented including the Member States' contributions to the key categories in terms of level and trend, and information on methodologies and emission factors.

4.1 Overview of sector

CRT Sector 2 Industrial Processes and Product Use is the third largest sector contributing 9.3 % to total net EU GHG emissions in 2024. The most important GHGs from this sector are CO_2 (7.0 % of total net GHG emissions), HFCs (1.9 %) and N_2O (0.2 %).

The emissions from the IPPU sector decreased by 42 % from 450 Mt CO_2eq in 1990 to 260 Mt CO_2eq in 2024 (*Figure 1.1*). In 2024, these emissions were 1.3 % below the 2023 level. The largest annual decrease in emissions was observed between 2008 and 2009, driven by reductions in cement production and a significant drop in the iron and steel production as a consequence of the economic crisis.

Figure 1.1: CRT Sector 2 Industrial Processes and Product Use: EU GHG emissions for 1990–2024 in kt CO_2 equivalents



The key categories in this sector are:

- 2.A.1 Cement Production: no classification (CO_2)
- 2.A.2 Lime Production: no classification (CO_2)
- 2.A.4 Other Process Uses of Carbonates: no classification (CO_2)
- 2.B.1 Ammonia Production: no classification (CO_2)
- 2.B.2 Nitric Acid Production: no classification (N_2O)
- 2.B.3 Adipic Acid Production: no classification (N_2O)
- 2.B.8 Petrochemical and Carbon Black Production: no classification (CO_2)
- 2.B.9 Fluorochemical Production: no classification (Unspecified mix of HFCs and PFCs)
- 2.B.10 Other chemical industry: no classification (CO_2)
- 2.C.1 Iron and Steel Production: no classification (CO_2)
- 2.C.3 Aluminium Production: no classification (PFCs)
- 2.F.1 Refrigeration and Air conditioning: no classification (HFCs)

4.2 Overview of trends in the IPPU sector

The IPPU sector showed an overall decrease in GHG emissions, with major declines occurring in 2009 and in the years following 2018. Among the IPPU subsectors, N_2O emissions from the chemical industry showed the largest emission decrease, with a reduction of 76 % between 1990 and 2024. Emissions from subsector 2.E – product uses as substitutes for ODS – became relevant after 1990 and started decreasing in recent years.

In this section we analyze the contribution of different source categories to the overall trend of emissions from the IPPU sector in the EU. *Table* 1.1 shows the main categories on an aggregated level, visualising that CO_2 emissions from 2A Mineral Industry had the highest share in 2024, but decreased like almost all other categories compared to 1990. The only category showing an increase is HFC emissions from refrigeration and air conditioning, which played a very minor role in 1990.

Table 1.1 CRT Sector 2 Industrial processes and Product Use: Emissions in CO_2 equivalents (kt) for 1990 and 2024, absolute and relative change of GHG emissions and share of key categories 1990–2024

GREENHOUSE GAS SOURCE CATEGORIES	1990 (kt)	2024 (kt)	absolute change (Mt)	% change (in Mt)	share 2024
2.F.1 - Refrigeration and Air conditioning - HFCs	5	49687	50	1065514%	19%
2.D - Non-energy Products from Fuels and Solvent Use - CO2	8000	6047	-2	-24%	2%
2.B - Chemical Industry - CO2	58365	45793	-13	-22%	18%
2.A - Mineral Industry - CO2	133996	84847	-49	-37%	33%
2.C - Metal Industry - CO2	114930	57753	-57	-50%	22%
2.B - Chemical Industry - N2O	78460	2562	-76	-97%	1%
Other	56182	13177	-43	-77%	5%
Total IPPU	**449938**	**259866**	**-190**	**-42%**	**100%**

Note: Colors visualize decreases (green), increases (red) and the share in sectoral total emissions (yellow). All "other" IPPU categories are calculated by subtracting the presented categories from the sector total.

4.3 Source categories and methodological issues

This section presents for each EU key source in CRT Sector 2 an overview of the Member States' contributions to the key source in terms of level and trend, information on methodologies, emission factors and completeness. Detailed information on national methods and circumstances is available in the Member States' national inventory documents.

4.3.1 Mineral industry (CRT Source Category 2A)

The mineral industry includes three key categories:

Table 4.1: Key source categories for level and trend analyses and share of MS emissions using higher tier methods for 2A Mineral industry

Source category gas	kt CO_2 equ.		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
2.A.1 Cement production: no classification (CO_2)	95237	58710	0	L	L	100 %
2.A.2 Lime production: no classification (CO_2)	23870	13865	0	L	L	99.95 %
2.A.4 Other process uses of carbonates: no classification (CO_2)	11044	7514	0	L	L	87.99 %

The mineral industry is dominated by cement production which contributes approx. 70 % of emissions. Cement production emissions occur during the production of clinker, an intermediate component in the cement manufacturing process. The source category 2A2 Lime production accounts for approx. 17 % of mineral industry emissions. CO_2 is emitted during the calcination of the calcium carbonate in limestone or dolomite. The source category 2A4 Other process uses of carbonates accounts for 9 % of the mineral industry emissions and is composed of several sources with independent estimation methods. The remaining 4 % of emissions stem from 2A3 Glass production. All emissions from cement production are estimated using higher tiers. Under categories 2A2 and 2A4, some EU Member States use Tier 1 methods in cases where these are not a key category.

Mineral industry emissions decreased during the 2009 economic crisis. They showed additional, less pronounced decreases as a consequence of reduced economic activities during the COVID-19 pandemic in 2020 and as a result of the energy crisis in 2022-2022. Overall, these emissions have fallen by 37 % since 1990 (Figure **4.1** and Table **4.2**).

Figure 4.1 2A Mineral industry CO_2 emissions

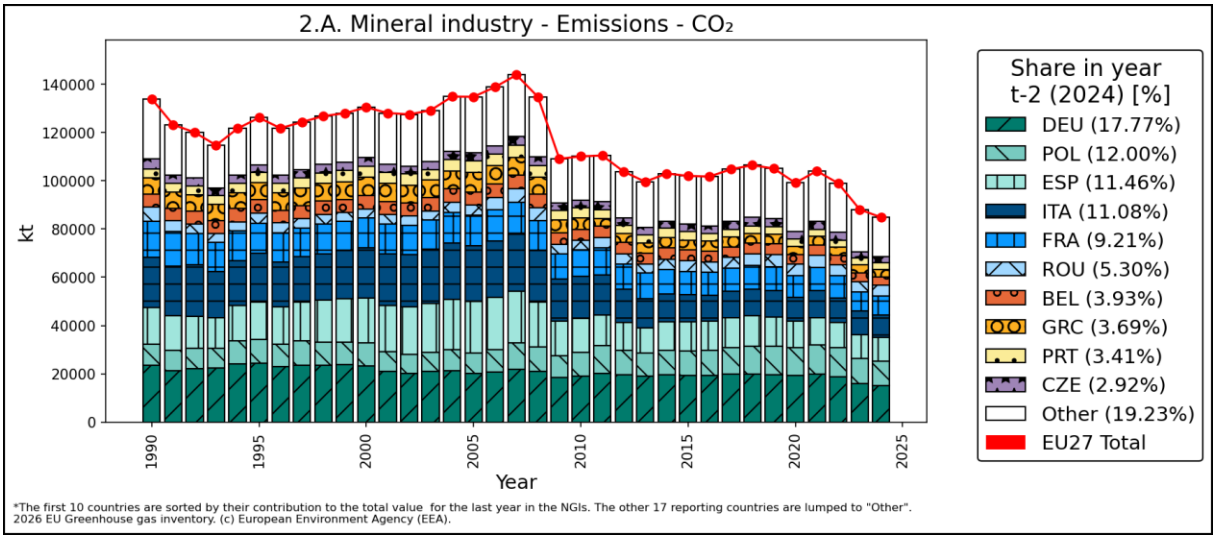


Table 4.2 2A Mineral industry: Member States total GHG and CO_2 emissions

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt	
	1990	2024	1990	2024
Austria	3 138	2 442	3 138	2 442
Belgium	5 320	3 333	5 320	3 333
Bulgaria	3 278	2 040	3 278	2 040
Croatia	1 298	1 126	1 298	1 126
Cyprus	717	802	717	802
Czechia	4 082	2 476	4 082	2 476
Denmark	919	939	919	939
Estonia	603	34	603	34
Finland	1 218	586	1 218	586
France	14 938	7 817	14 938	7 817
Germany	23 522	15 080	23 522	15 080
Greece	6 775	3 134	6 775	3 134
Hungary	2 890	716	2 890	716
Ireland	1 117	1 654	1 117	1 654
Italy	20 720	9 402	20 720	9 402
Latvia	537	434	537	434
Lithuania	2 130	595	2 130	595
Luxembourg	593	167	593	167
Malta	1	0	1	0
Netherlands	1 411	958	1 411	958
Poland	8 855	10 179	8 855	10 179
Portugal	3 648	2 893	3 648	2 893
Romania	6 083	4 497	6 083	4 497
Slovakia	2 714	1 898	2 714	1 898
Slovenia	694	528	694	528
Spain	15 120	9 724	15 120	9 724
Sweden	1 673	1 395	1 673	1 395
EU	**133 996**	**84 847**	**133 996**	**84 847**

Abbreviations are explained in the Chapter 'Units and abbreviations'.
For consistency reasons with other sub-sectors, this table shows GHG emissions in CO_2 equivalents and emissions of CO_2 separately. As there are no N_2O or CH_4 emissions in this category, the two sets of columns in this table contain the same numbers.

4.3.1.1 2A1 Cement production

CO_2 emissions from Cement production contributed 1.9 % of total GHG emissions in the EU (without LULUCF) in 2024. In that year, emissions were approx. 4 % below 2023 levels and approx. 38 % below 1990 levels (Figure 4.2 and Table **4.3**). This source is a key category of CO_2 emissions in terms of emissions level and trend.

Figure 4.2 2A1 Cement production: EU CO_2 emissions

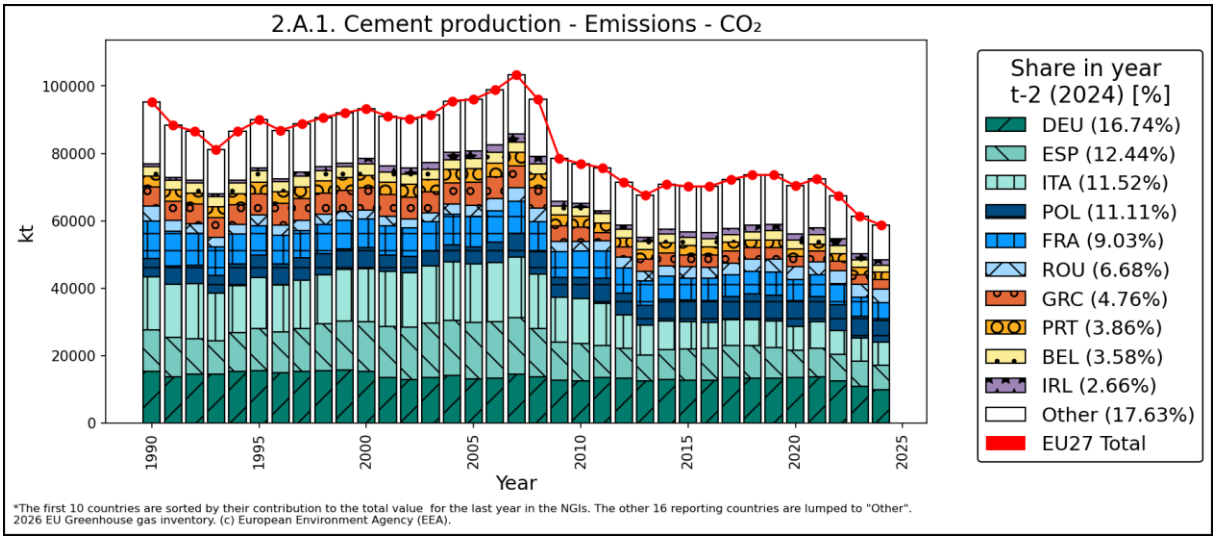


Table 4.3 2A1 Cement production: Member States' contributions to CO_2 emissions

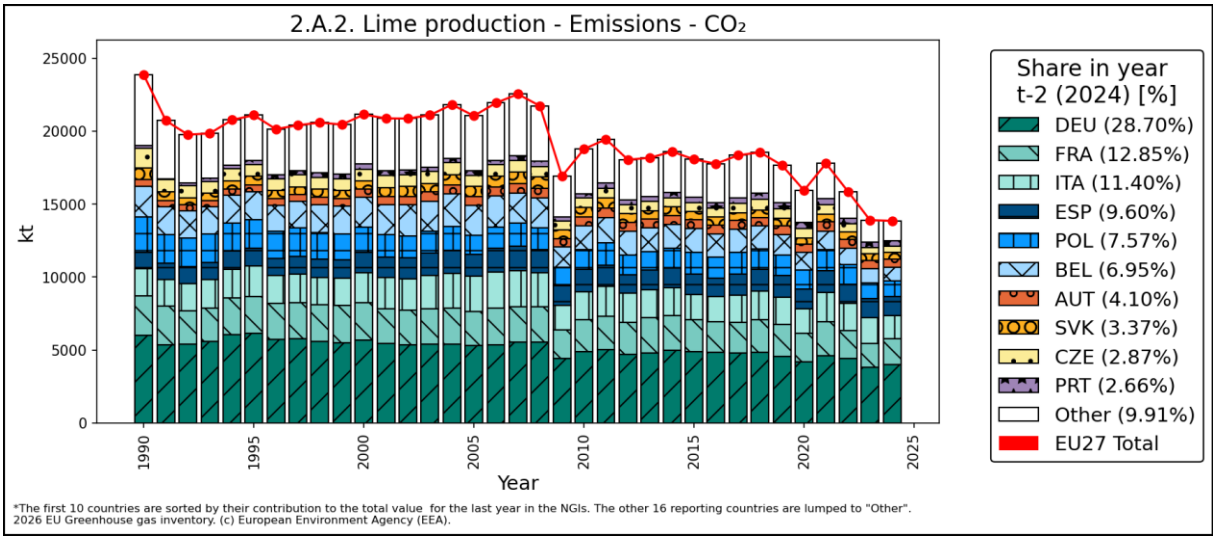
Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	2 033	1 543	1 424	2.4%	-609	-30%	-119	-8%	T3	PS
Belgium	2 824	2 181	2 103	3.6%	-721	-26%	-78	-4%	T3	PS
Bulgaria	2 142	1 046	1 087	1.9%	-1 056	-49%	41	4%	T2	PS
Croatia	1 086	1 118	995	1.7%	-92	-8%	-123	-11%	T2,T3	PS
Cyprus	668	938	778	1.3%	110	17%	-160	-17%	CS	CS
Czechia	2 489	1 483	1 450	2.5%	-1 039	-42%	-33	-2%	T3	PS
Denmark	775	982	870	1.5%	95	12%	-112	-11%	T3	PS
Estonia	483	NO	NO	-	-483	-100%	-	-	NA	NA
Finland	729	445	330	0.6%	-399	-55%	-115	-26%	T3	PS
France	10 937	5 609	5 303	9.0%	-5 634	-52%	-306	-5%	T2,T3	CS,PS
Germany	15 297	10 765	9 831	16.7%	-5 466	-36%	-935	-9%	T2	CS
Greece	5 762	2 998	2 794	4.8%	-2 968	-52%	-204	-7%	T3	PS
Hungary	1 751	544	543	0.9%	-1 207	-69%	-1	0%	T3	PS
Ireland	884	1 835	1 559	2.7%	675	76%	-276	-15%	T3	PS
Italy	15 846	6 860	6 762	11.5%	-9 084	-57%	-98	-1%	T2	CS,PS
Latvia	346	532	426	0.7%	81	23%	-105	-20%	T2	PS
Lithuania	1 668	498	576	1.0%	-1 092	-65%	78	16%	T2	PS
Luxembourg	539	241	139	0.2%	-400	-74%	-102	-42%	T2	CS,PS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	416	NO	NO	-	-416	-100%	-	-	NA	NA
Poland	5 453	6 602	6 520	11.1%	1 066	20%	-82	-1%	T2	CS
Portugal	3 176	2 077	2 265	3.9%	-911	-29%	189	9%	T3	PS
Romania	4 445	3 721	3 921	6.7%	-524	-12%	200	5%	CS,T2	PS
Slovakia	1 464	1 294	1 270	2.2%	-195	-13%	-24	-2%	T2	PS
Slovenia	470	455	462	0.8%	-8	-2%	7	2%	T3	PS
Spain	12 279	7 480	7 302	12.4%	-4 977	-41%	-178	-2%	T3	CS
Sweden	1 272	C	C	-	-	-	-	-	T3	PS
EU	**93 965**	**61 247**	**58 710**	**100%**	**-35 255**	**-38%**	**-2 537**	**-4%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions. EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.

4.3.1.2 2A2 Lime production

CO_2 emissions from 2A2 Lime production account for 0.5 % of total EU emissions (without LULUCF) in 2024. Between 1990 and 2024, CO_2 emissions from this category decreased by 44 %, but they remained at the same level compared to 2023 (Figure 4.3 and Table **4.4**).

Figure 4.3 2A2 Lime production: EU CO_2 emissions



.Table 4.4 2A2 Lime production: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	456	583	568	4.1%	112	24%	-15	-3%	T3	PS
Belgium	2 097	991	964	7.0%	-1 133	-54%	-27	-3%	T3	PS
Bulgaria	390	235	226	1.6%	-164	-42%	-9	-4%	T2	D
Croatia	157	97	96	0.7%	-61	-39%	-1	-1%	T3	PS
Cyprus	5	6	7	0.0%	2	30%	1	16%	T1	D
Czechia	1 337	417	398	2.9%	-939	-70%	-19	-4%	T3	PS
Denmark	51	8	1	0.0%	-50	-98%	-7	-87%	T2	CS
Estonia	119	19	22	0.2%	-97	-82%	3	15%	T2	PS
Finland	401	253	188	1.4%	-213	-53%	-66	-26%	T3	CS
France	2 712	1 622	1 782	12.9%	-930	-34%	160	10%	T1,T2,T3	CS,D,PS
Germany	5 987	3 830	3 980	28.7%	-2 007	-34%	149	4%	T2	D
Greece	404	150	161	1.2%	-243	-60%	10	7%	CS	PS
Hungary	614	64	47	0.3%	-567	-92%	-17	-27%	T3	PS
Ireland	214	97	93	0.7%	-121	-56%	-3	-4%	T3	PS
Italy	1 877	1 780	1 580	11.4%	-297	-16%	-199	-11%	T2	CS,PS
Latvia	122	NO	NO	-	-122	-100%	-	-	NA	NA
Lithuania	210	2	2	0.0%	-209	-99%	0	16%	T2	D
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	1	NO	NO	-	-1	-100%	-	-	NA	NA
Netherlands	163	189	166	1.2%	4	2%	-22	-12%	CS	D
Poland	2 461	1 037	1 050	7.6%	-1 411	-57%	13	1%	T2	CS
Portugal	206	376	369	2.7%	163	79%	-7	-2%	T1,T3	D,OTH,PS
Romania	1 450	325	325	2.3%	-1 124	-78%	0	0%	T2	CS,D
Slovakia	795	475	467	3.4%	-328	-41%	-8	-2%	T2	PS
Slovenia	200	43	40	0.3%	-160	-80%	-3	-6%	T3	PS
Spain	1 109	1 309	1 332	9.6%	223	20%	23	2%	T3	PS
Sweden	332	C	C	-	-	-	-	-	T3	D
EU	**23 538**	**13 908**	**13 865**	**100%**	**-9 674**	**-41%**	**-44**	**0%**	-	-

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their

national inventory submissions. EU trends for 2023 and 2024 in this table do not include emissions from Sweden for confidentiality reasons (C), and the EU sum for 1990 does not include Sweden for timeline consistency reasons.

4.3.1.3 2A4 Other process uses of carbonates

CO_2 emissions from 2A4 Other process uses of carbonates contributed 0.2 % of total EU emissions (without LULUCF) in 2023. Emissions from this category in 2024 were 32 % below 1990 levels and 4 % below 2023 levels (Table **4.5**).

Table 4.5 2A4 Other process uses of carbonates: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	610	405	415	5.5%	-195	-32%	11	3%	NA,T1,T3	D,NA,PS
Belgium	136	175	138	1.8%	2	1%	-37	-21%	NA,T3	CS,NA,PS
Bulgaria	607	645	649	8.6%	42	7%	5	1%	NA,T1,T2	D,NA,PS
Croatia	11	13	13	0.2%	2	14%	-1	-4%	NA,T3	NA,PS
Cyprus	44	16	17	0.2%	-27	-62%	1	5%	CS,NA,T1	CS,D,NA
Czechia	114	564	496	6.6%	382	336%	-68	-12%	NA,T1,T3	D,NA,PS
Denmark	77	60	59	0.8%	-18	-23%	-1	-2%	CS,NA,T3	CS,D,NA
Estonia	NA,NO	4	5	0.1%	5	∞	1	33%	NA,T1,T2	D,NA,PS
Finland	67	65	67	0.9%	0	0%	2	4%	NA,T1,T3	CS,D,NA
France	487	385	369	4.9%	-118	-24%	-16	-4%	T1,T2,T3	CS,D,PS
Germany	1 458	584	506	6.7%	-952	-65%	-78	-13%	NA,T1,T2	CS,D,NA
Greece	590	201	176	2.3%	-413	-70%	-25	-12%	CS,T1	CS,D
Hungary	449	123	112	1.5%	-337	-75%	-10	-8%	NA,T2,T3	CS,D,NA,PS
Ireland	5	2	2	0.0%	-3	-65%	0	-11%	NA,T3	NA,PS
Italy	2 544	534	526	7.0%	-2 018	-79%	-8	-2%	NA,T2	CS,NA,PS
Latvia	69	5	6	0.1%	-63	-91%	1	17%	NA,T2	NA,PS
Lithuania	240	10	10	0.1%	-229	-96%	0	5%	NA,T1,T2	CS,D,NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	0	0	0	0.0%	0	-19%	0	-8%	NA,T1	D,NA
Netherlands	690	700	734	9.8%	44	6%	34	5%	NA,T1	D,NA
Poland	771	2 121	2 027	27.0%	1 256	163%	-94	-4%	NA,T1,T2	CS,D,NA
Portugal	197	113	114	1.5%	-83	-42%	0	0%	NA,T1,T3	NA,OTH,PS
Romania	38	197	187	2.5%	149	389%	-10	-5%	NA,OTH,T2,T3	D,NA,PS
Slovakia	447	210	149	2.0%	-298	-67%	-61	-29%	NA,T3	NA,PS
Slovenia	20	15	15	0.2%	-5	-24%	0	1%	NA,T2	D,NA
Spain	1 358	715	718	9.6%	-639	-47%	4	1%	T1,T2,T3	CS,D,PS
Sweden	15	4	3	0.0%	-12	-80%	-1	-29%	T3	D
EU	**11 044**	**7 866**	**7 514**	**100%**	**-3 530**	**-32%**	**-351**	**-4%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Presented methods and emission factor information refer to the last inventory year. Abbreviations are explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.

4.3.2 Chemical industry (CRT Source Category 2B)

The chemical industry includes six key categories, which are presented in Table 4.6.

Table 4.6: Key source categories for level and trend analyses and share of MS emissions using higher tier methods for 2B Chemical Industry

Source category	kt CO_2 equ		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
2.B.1 Ammonia production: no classification (CO_2)	31655	16042	T	L	L	98.3 %
2.B.2 Nitric acid production: no classification (N_2O)	40387	1599	T	L	0	100 %
2.B.3 Adipic acid production: no classification (N_2O)	33558	46	T	L	0	100 %
2.B.8 Petrochemical and carbon black production: no classification (CO_2)	13689	13327	T	L	L	93.3 %
2.B.9 Fluorochemical production: no classification (HFCs)	12809	67	T	L	0	100 %
2.B.10. Other: no classification (CO_2)	9209	13752	T	L	L	41.6 %

The key categories 2B1 Ammonia production accounts for approx. 32 % of the total GHG emissions in the chemical industry, followed by 2B8 Petrochemical and carbon black production and 2B10 Other chemical industry with approx. 29 % each. As categories 2B8 and 2B10 comprise a variety of emission sources, including minor ones, several countries use Tier 1 methods to estimate emissions from some of these sources. Figure 4.4 shows the time series of chemical industry CO_2 emissions. Notable declines in emissions occurred during the 2009 economic crisis, and in 2022-2023 due to high prices of fuels and feedstocks, such as natural gas.

Figure 4.4 2B Chemical industry CO_2 emissions

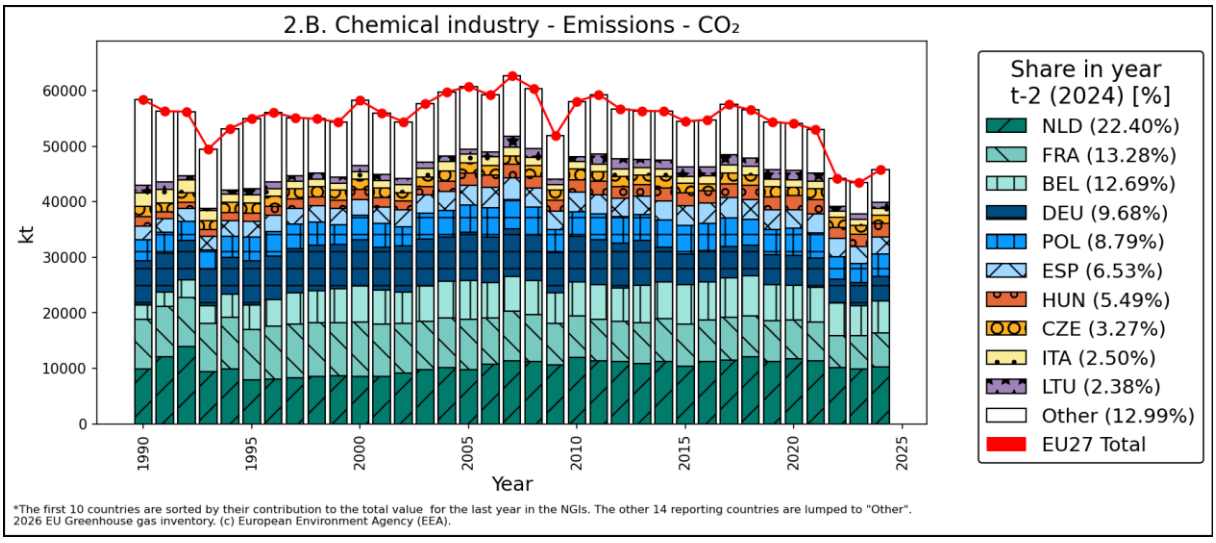


Table 4.7 shows chemical industry CO_2, CH_4, N_2O and total GHG emissions in CO_2 equivalents. Total CO_2 emissions also include F-gas emissions. Between 1990 and 2024 overall GHG emissions from the chemical industry sector have decreased markedly, largely due to the significant reduction in N_2O emissions which have decreased by approx. 97 %.

Table 4.7 2B Chemical industry: EU CO_2, N_2O, CH_4 and total emissions as CO_2 equivalents

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt		N2O emissions in kt CO2 equivalents		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024	1990	2024
Austria	1 494	525	674	451	780	25	41	49
Belgium	9 563	6 143	2 590	5 813	3 385	314	20	14
Bulgaria	4 762	1 076	3 283	979	1 465	97	15	NA,NO
Croatia	1 428	142	751	128	671	13	6	IE,NE,NO
Cyprus	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Czechia	2 825	1 665	1 783	1 499	1 002	114	41	52
Denmark	892	38	1	3	892	34	NA,NO	NA,NO
Estonia	308	NO	308	NO	NO	NO	NO	NO
Finland	1 750	1 213	330	1 089	1 415	122	5	2
France	35 281	6 379	8 937	6 079	20 798	203	125	28
Germany	27 628	5 014	8 058	4 433	19 075	148	378	424
Greece	2 621	907	681	903	948	4	1	NA,NO
Hungary	4 472	2 594	1 704	2 514	2 748	39	20	41
Ireland	1 875	NO	990	NO	885	NO	NO	NO
Italy	9 626	1 352	2 524	1 145	5 707	26	69	3
Latvia	NO	NO	NO	NO	NO	NO	NO	NO
Lithuania	2 061	1 234	1 261	1 089	794	145	6	NO
Luxembourg	NO	NO	NO	NO	NO	NO	NO	NO
Malta	0	0	0	0	NA,NO	NA,NO	NA,NO	NA,NO
Netherlands	21 129	11 101	9 833	10 258	6 288	450	310	338
Poland	6 991	4 488	3 802	4 023	3 144	424	45	40
Portugal	1 898	51	1 409	15	460	36	29	NO
Romania	9 324	569	5 591	521	3 677	45	56	3
Slovakia	1 834	992	761	955	1 073	37	0	0
Slovenia	88	62	83	62	NA,NO	NA,NO	5	NA,NO
Spain	7 610	3 373	2 430	2 990	2 539	280	94	103
Sweden	1 297	848	582	843	714	5	1	0
EU	**156 757**	**49 765**	**58 365**	**45 793**	**78 460**	**2 562**	**1 265**	**1 098**

Note: Presented methods and emission factor information refer to the last inventory year. Abbreviations are explained in the Chapter 'Units and abbreviations'. Emissions from F-gases are not shown in separate columns but are included in the total GHG emissions.

4.3.2.1 2B1 Ammonia production

In most facilities, anhydrous ammonia is produced by catalytic steam reforming of natural gas or fuel oil. At plants using this process, CO_2 is primarily released during regeneration of the CO_2 scrubbing solution, with additional but relatively minor emissions resulting from condensate stripping.

CO_2 emissions from ammonia production contributed 0.5 % of total EU emissions (without LULUCF) in 2024. Emissions have decreased by approx. 49 % since 1990, but most recently they increased by 13 % between 2023 and 2024 (Figure 4.5 and Table 4.8). The particularly low emission levels in 2022 and 2023 can largely be explained by a decline in ammonia production as a consequence of high natural gas prices.

Figure 4.5 2B1 Ammonia production: CO_2 emissions

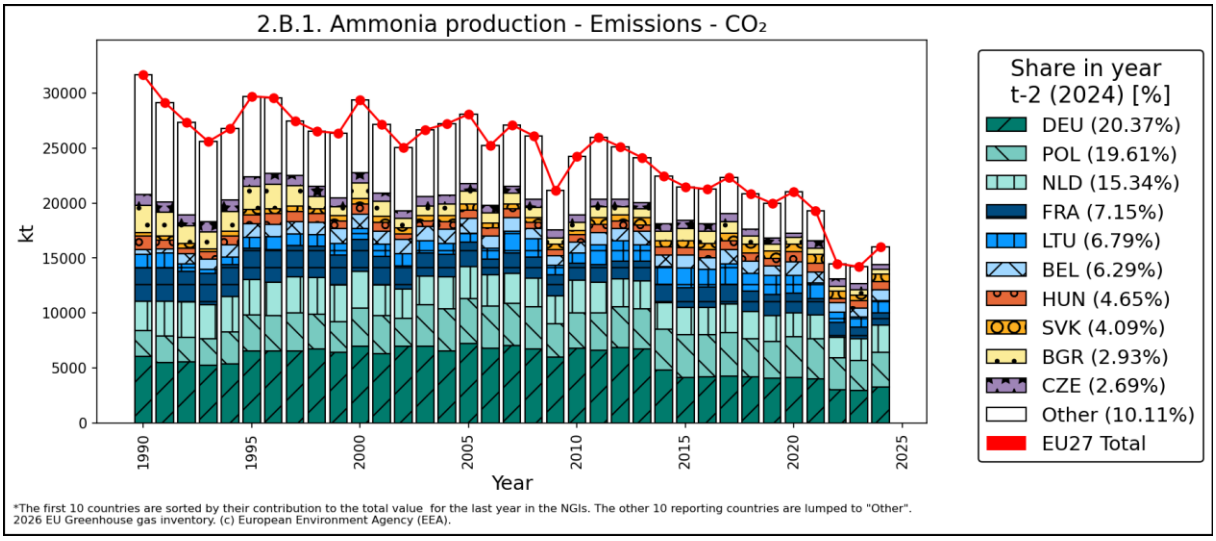


Table 4.8 2B1 Ammonia production: Member States' contributions to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	498	415	309	1.9%	-189	-38%	-106	-26%	T3	PS
Belgium	423	856	1 008	6.3%	586	139%	152	18%	T3	D,PS
Bulgaria	2 508	493	469	2.9%	-2 038	-81%	-24	-5%	T2	PS
Croatia	559	202	128	0.8%	-430	-77%	-74	-36%	T3	PS
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	991	545	431	2.7%	-560	-57%	-114	-21%	T2	CS
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	308	NO	NO	-	-308	-100%	-	-	NA	NA
Finland	93	NO	NO	-	-93	-100%	-	-	NA	NA
France	3 056	1 053	1 147	7.2%	-1 909	-62%	94	9%	T2,T3	CS,PS
Germany	6 025	2 932	3 267	20.4%	-2 758	-46%	335	11%	T3	PS
Greece	652	148	275	1.7%	-377	-58%	127	86%	T1a	CS
Hungary	1 200	663	746	4.7%	-454	-38%	84	13%	T3	PS
Ireland	990	NO	NO	-	-990	-100%	-	-	NA	NA
Italy	1 892	386	390	2.4%	-1 501	-79%	5	1%	T2	PS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	1 237	922	1 089	6.8%	-148	-12%	167	18%	T3	CS
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	2 695	1 979	2 460	15.3%	-235	-9%	482	24%	T3	CS
Poland	2 344	2 723	3 146	19.6%	801	34%	422	16%	T2	CS
Portugal	763	NO	NO	-	-763	-100%	-	-	NO	NO
Romania	4 690	98	230	1.4%	-4 459	-95%	132	135%	T3	PS
Slovakia	332	510	656	4.1%	324	98%	146	29%	T3	PS
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	400	284	289	1.8%	-110	-28%	6	2%	T3	PS
Sweden	NO	NO	NO	-	-	-	-	-	-	-
EU	**31 655**	**14 207**	**16 042**	**100%**	**-15 613**	**-49%**	**1 835**	**13%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Presented methods and emission factor information refer to the last inventory year. Abbreviations are explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.

4.3.2.2 2B2 Nitric acid production

N_2O can be emitted in the production of nitric acid as a by-product of the high temperature catalytic oxidation of ammonia. Emissions in the EU have decreased by 96 % since 1990. All countries have had marked emission reductions from this source, notably from 2008 onwards, when N_2O emissions from nitic acid production were included in the EU ETS. The substantial decrease is largely due to technical measures that have been implemented at all nitric acid plants. Special catalysts and improvement of the process efficiency led to a continuation of the declining trend in emissions. In 2024, emissions increased by 4 % due to expanded production compared to the previous year (Figure **4.6** and Table 4.9). In 2024, N_2O emissions from nitric acid production contributed 0.01 % of total EU emissions (without LULUCF).

Figure 4.6 2B2 Nitric acid production N_2O emissions

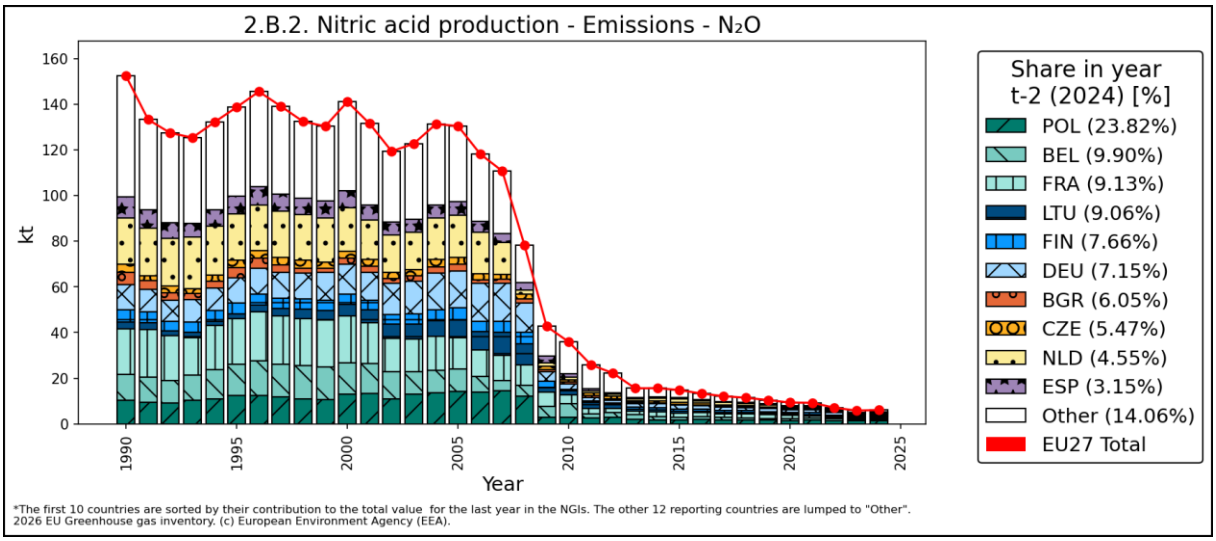


Table 4.9 2B2 Nitric acid production: Member States' contributions to N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	780	27	25	1.6%	-755	-97%	-2	-8%	T3	PS
Belgium	3 043	148	158	9.9%	-2 884	-95%	10	7%	T3	PS
Bulgaria	1 465	75	97	6.1%	-1 368	-93%	22	29%	T3	PS
Croatia	671	18	13	0.8%	-657	-98%	-4	-24%	T3	PS
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	933	82	87	5.5%	-845	-91%	5	6%	T3	PS
Denmark	892	NO	NO	-	-892	-100%	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	1 415	106	122	7.7%	-1 293	-91%	17	16%	T3	PS
France	5 274	196	146	9.1%	-5 128	-97%	-50	-25%	T2,T3	CS,PS
Germany	2 897	167	114	7.1%	-2 782	-96%	-53	-32%	T3	PS
Greece	948	7	4	0.3%	-944	-100%	-2	-35%	CS	CS
Hungary	2 748	28	39	2.5%	-2 708	-99%	11	40%	T3	PS
Ireland	885	NO	NO	-	-885	-100%	-	-	NA	NA
Italy	1 783	25	21	1.3%	-1 762	-99%	-4	-15%	T3	D,PS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	794	108	145	9.1%	-649	-82%	37	34%	T3	PS
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	5 411	68	73	4.5%	-5 338	-99%	5	7%	T2	PS
Poland	2 704	337	381	23.8%	-2 323	-86%	44	13%	T2	CS
Portugal	460	24	36	2.2%	-424	-92%	12	50%	T1,T3	D,PS
Romania	3 089	15	45	2.8%	-3 044	-99%	30	206%	T3	PS
Slovakia	1 073	47	37	2.3%	-1 036	-97%	-10	-22%	T3	PS
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	2 428	55	50	3.2%	-2 377	-98%	-4	-8%	T3	PS
Sweden	696	5	5	0.3%	-691	-99%	-1	-18%	T2	PS
EU	**40 387**	**1 537**	**1 599**	**100%**	**-38 788**	**-96%**	**62**	**4%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Presented methods and emission factor information refer to the last inventory year. Abbreviations explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.

4.3.2.3 2B3 Adipic acid production

Adipic acid production emits N_2O as a by-product when a cyclohexanone/cyclohexanol mixture is oxidized by nitric acid. N_2O emissions from adipic acid production have been reduced through catalytic and thermal abatement technologies and now account for less than 0.01% of total EU emissions (without LULUCF). Between 1990 and 2024, N_2O emissions from this source decreased by 99.9 % (Figure 4.7 and Table **4.10**). Emissions in 2024 were 30 % lower than in 2023.

Figure 4.7 2B3 Adipic acid production N_2O emissions

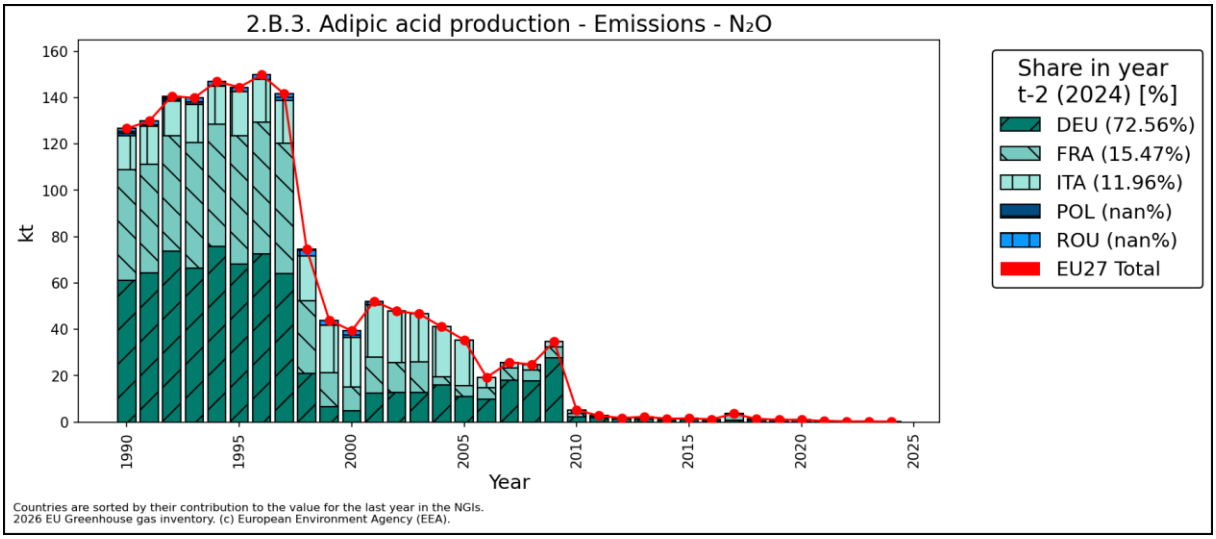


Table 4.10 2B3 Adipic acid production: Member States' contributions to N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
France	12 656	10	7	15.5%	-12 649	-100%	-3	-28%	T2,T3	CS,PS
Germany	16 178	34	33	72.6%	-16 145	-100%	0	-1%	T3	PS
Italy	3 914	22	6	12.0%	-3 909	-100%	-17	-75%	T3	D,PS
Poland	318	NO	NO	-	-318	-100%	-	-	NA	NA
Romania	490	NO	NO	-	-490	-100%	-	-	NA	NA
EU	**33 558**	**66**	**46**	**100%**	**-33 512**	**-100%**	**-20**	**-30%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Presented methods and emission factor information refer to the last inventory year. Abbreviations explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.

4.3.2.4 2B8 Petrochemical and carbon black production

The European Union has a significant petrochemical industry, with production of all chemicals included in the 2006 IPCC Guidelines. Eighteen countries report CO_2 emissions from this category for at least part of the period 1990-2024 with this source being a key category of CO_2 emissions in terms of emissions level and trend.

CO_2 emissions from 2B8 Petrochemical and carbon black production increased by 2 % between 2023 and 2024 and are now approx. 3 % below 1990 levels. They contributed 0.4 % of total EU emissions (without LULUCF) in 2024. Trends vary widely between countries, due to increases and decreases in production of the various chemicals over the past decades.

Figure 4.8 2B8 Petrochemical and carbon black production: EU CO_2 emissions

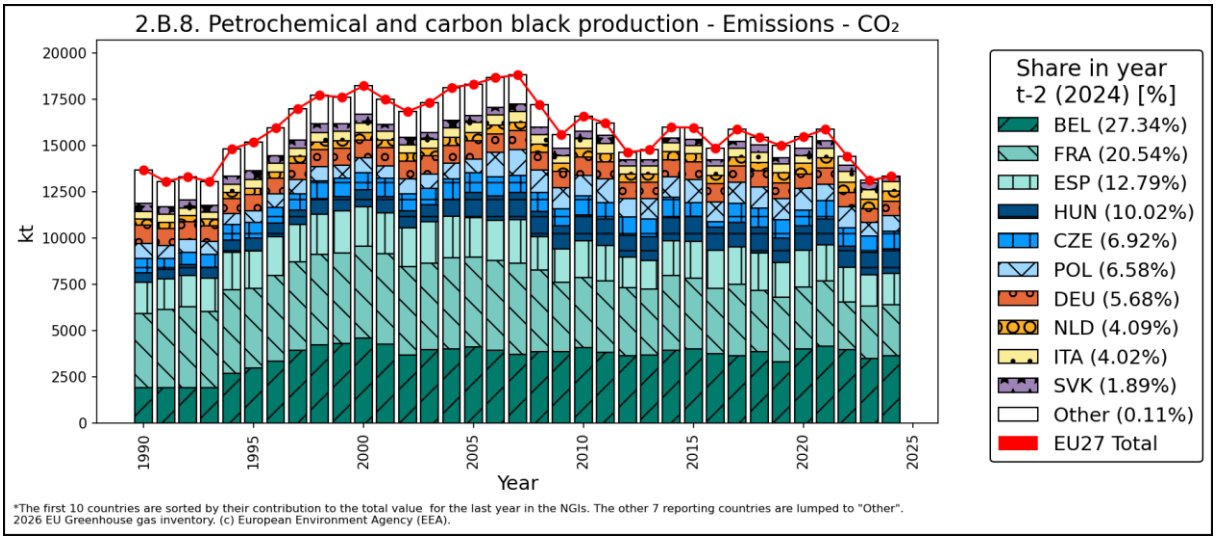


Table 4.11: 2B8 Petrochemical and carbon black production: Member States' contribution to CO_2 emissions

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
Belgium	1 882	3 494	3 644	27.3%	1 762	94%	150	4%	NA,T3	NA,PS
Bulgaria	346	NA,NO	NA,NO	-	-346	-100%	-	-	NA	NA
Croatia	192	IE,NO	IE,NO	-	-192	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	792	889	923	6.9%	130	16%	34	4%	NA,T1,T3	D,NA,PS
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	IE,NO	IE,NO	IE,NO	-	-	-	-	-	NA	NA
France	4 036	2 820	2 737	20.5%	-1 299	-32%	-83	-3%	T2,T3	CS,PS
Germany	974	736	757	5.7%	-217	-22%	21	3%	T1,T2	CS,D
Greece	29	NO	NO	-	-29	-100%	-	-	NA	NA
Hungary	504	1 198	1 336	10.0%	832	165%	138	12%	NA,T3	NA,PS
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	422	529	536	4.0%	114	27%	7	1%	NA,T2	CR,NA,PS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	24	NO	NO	-	-24	-100%	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	336	485	545	4.1%	209	62%	60	12%	CS,NA	CS,NA
Poland	806	751	878	6.6%	71	9%	127	17%	NA,T1	D,NA
Portugal	645	140	15	0.1%	-631	-98%	-125	-90%	NA,T1	D,NA
Romania	571	NO	NO	-	-571	-100%	-	-	NA	NA
Slovakia	429	376	252	1.9%	-176	-41%	-124	-33%	NA,T2	CS,NA,PS
Slovenia	16	NO	NO	-	-16	-100%	-	-	NA	NA
Spain	1 684	1 707	1 705	12.8%	21	1%	-2	0%	NA,T1,T3	D,NA,PS
Sweden	IE,NA,NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-	-	-
EU	**13 689**	**13 125**	**13 327**	**100%**	**-361**	**-3%**	**203**	**2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Presented methods and emission factor information refer to the last inventory year. Abbreviations explained in the Chapter 'Units and abbreviations'.
This table lists methods and emission factors in the latest inventory year, as provided by Members States in their national inventory submissions.

4.3.2.5 Chemical industry – Fluorochemical production (CRT Source Category 2.B.9)

In this subcategory, by-product emissions and fugitive emissions from fluorochemical production are to be reported. Emissions from this subcategory decreased significantly since 1990 following the closure of several production sites in the EU, the installation of abatement technology, as well as process optimization.

As regards by-product emissions, HFCs account for major shares. Overall, the generation of HFC-23 as a by-product during the manufacture of HCFC-22, HFC-32 and other fluorocarbons is particularly relevant due to its high global warming potential. HFC-23 is also in scope of the Kigali Amendment to the Montreal Protocol and thereby subject to reporting obligations to the Ozone Secretariat.

HFC-23 is primarily generated during the fluorination of chloroform (trichloromethane, CHCl3 or R20). Since chloroform is a feedstock for chlorodifluoromethane (HCFC-22 or R22), HFC-23 is a by-product during the manufacture of this chemical which is nowadays mainly used as feedstock. The HFC-23 yield amounts to 2-3% of the amount of R22 produced. In addition, where R22 is used as an intermediate product or feedstock, this may also lead to HFC-23 by-production. This is the case e.g. for some production pathways of difluoromethane (HFC-32 or R32). HFC-32 is widely used as a single substance refrigerant, especially in stationary air conditioning and heat pump systems, but is also a component of several frequently used refrigerant blends such as the R407 series (10-30% R32) and R410A (50% R32). Production of these blends may therefore also involve HFC-23 by-production. (EU Commission, 2015)

It is estimated that in 1990 the HFC-23 released from HCFC-22 plants was at most 4 percent of the global production of HCFC-22 (U.S. EPA, 2001), in the absence of abatement measures. Before the mid-1990s, ten HCFC-22 plants were operated in Europe. At that time, HFC-23 by-product emissions were partly captured and processed, but emissions were also high. In the late 1990s, HFC-23 emissions accounted for about half of the EU's F-gas emissions. Due to the closure of several HCFC production plants (e.g. in Greece, Spain) and the installation of abatement systems in the remaining facilities, HFC-23 emissions were largely reduced since then.

In fluorochemical manufacture, also other fluorinated greenhouse gases can occur as by-products including e.g. PFCs such as CF_4, C_2F_6, C_3F_8, C_4F_{10}, C_5F_{12}, C_6F_{14} as well as SF_6. The type and amount of these by-product emissions depend on the applied production pathway and installed abatement technology.

Fugitive emissions are also released during the production process of F-gases. Hence, certain amounts of emissions of all types of F-gases that are manufactured in the EU are reported in this subcategory. In the last decades, the production processes have been optimized in all facilities so that fugitive emissions were significantly reduced.

Figure 4.9 2B9 Fluorochemical production HFCs emissions

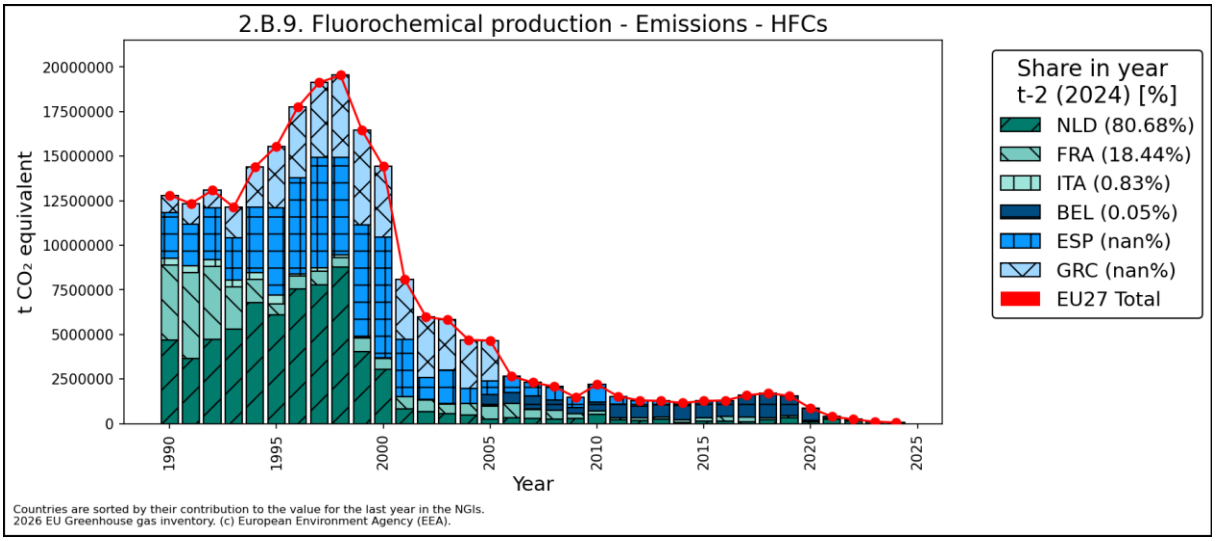


Table 4.12: 2B9 Fluorochemical production – HFCs: Countries' contributions to HFC emissions and information on method applied, activity data and emission factor

Member State	HFCs Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Belgium	NO	1	0	0.1%	0	∞	-1	-95%	NA,T3	NA,PS
France	4 202	19	12	18.4%	-4 190	-100%	-7	-36%	NA,T3	NA,PS
Greece	991	NO	NO	-	-991	-100%	-	-	NA	NA
Italy	372	1	1	0.8%	-371	-100%	0	-20%	CS,NA	NA,PS
Netherlands	4 697	82	54	80.7%	-4 643	-99%	-28	-34%	NA,T2	CS,NA
Spain	2 547	NO	NO	-	-2 547	-100%	-	-	NA	NA
EU	**12 809**	**102**	**67**	**100%**	**-12 743**	**-99%**	**-35**	**-35%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Presented methods and emission factor information refer to the last inventory year. Abbreviations explained in the Chapter 'Units and abbreviations'.

4.3.2.6 2B10 Other chemical industry

Sixteen countries reported CO_2, CH_4 or N_2O emissions in this category which contributed 13.9 Mt CO_2eq or 0.5 % of total EU emissions (without LULUCF). Between 1990 and 2024, CO_2 emissions from this source increased by 51 % while CH_4 and N_2O emissions decreased by 75 % and 39 %, respectively. This category contains a wide range of emissions and sources as shown in Table 4.13.

Table 4.13 2B10 Other: CO_2, CH_4 and N_2O emissions for 1990 and 2024

Member State	Category	CO_2 emissions [kt]	CH_4 emissions [kt]	N_2O emissions [kt]	CO_2 emissions [kt]	CH_4 emissions [kt]	N_2O emissions [kt]
		1990			2024		
Austria	CO_2 from nitric acid production	0.41	NA	NA	0.35	NA	NA

Member State	Category	CO_2 emissions [kt]	CH_4 emissions [kt]	N_2O emissions [kt]	CO_2 emissions [kt]	CH_4 emissions [kt]	N_2O emissions [kt]
		1990			2024		
	Other chemicals bulk production	138.15	0.34	NA	108.58	0.18	NA
Belgium	Other non-specified	285.15	0.71	0.09	1097.06	0.51	0.31
Czechia	Other non energy use in chemical industry	IE	NO	NO	136.47	NO	NO
	Non selective catalytic reduction	IE	NO	NO	8.88	NO	NO
Denmark	Production of catalysts	0.57	NA	NA	3.32	NA	0.13
Finland	Hydrogen production	168.78	NO	NO	975.77	NO	NO
	Phosphoric Acid Production	24.54	NO	NO	30.88	NO	NO
	Limestone and dolomite use	36.52	NO	NO	80.03	NO	NO
	Chemicals production	6.71	NO	NO	1.89	NO	NO
France	Other chemical industry	1258.79	0.11	1.82	1943.23	0.07	0.10
Germany	Other	NA	0.14	IE	NA	0.04	IE
Greece	Hydrogen production	NO	NO	NO	628.10	NA	NA
Hungary	Hydrogen production	NO	NO	NO	431.91	NA	NA
Malta	Calcium carbide use	0.17	NA	NA	0.00	NA	NA
Netherlands	N_2O from acrylonitrile production	NA	NA	0.82	NA	NA	1.16
	Other process emissions	6738.86	0.31	0.01	7253.46	0.37	0.01
Romania	Hydrogen production	18.74	NO	NO	283.98	NO	NO
Slovakia	Tertiary oxide reduction	NO	NO	NO	0.05	NO	NO
Slovenia	Hydrogen production	17.43	NA	NA	12.16	NA	NA
Spain	Hydrogen production	NO	NA	NA	756.10	NA	NA
Sweden	Pharmaceutical industry	NA	NE	0.05	C	NE	NE
	Other organic chemical products	456.91	0.03	0.00	C	0.01	0.00
	Base chemicals for plastic industry	16.23	0.00	0.01	20.79	0.00	0.00
	Other inorganic chemical products	40.87	0.00	0.01	107.28	0.00	0.00
Total		**9208.8**	**1.6**	**2.8**	**13880.3**	**1.2**	**1.7**

Note: Abbreviations are explained in the Chapter 'Units and abbreviations'.

4.3.3 Metal Industry (CRT Source Category 2C)

This source category includes two key sources for level and trend, namely CO_2 emissions from 2C1 Iron and Steel Production and PFC emissions from 2C3 Aluminium Production (*Table 4.14*).

Table 4.14: Key source categories for level and trend analyses and share of MS emissions using higher tier methods for sector 2C (Table excerpt).

Source category gas	kt CO_2 equ.		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
2.C.1 Iron and steel production: no classification (CO_2)	103487	53489	T	L	L	100%
2.C.3 Aluminium production: no classification (PFCs)	17234	202	T	L	0	100%

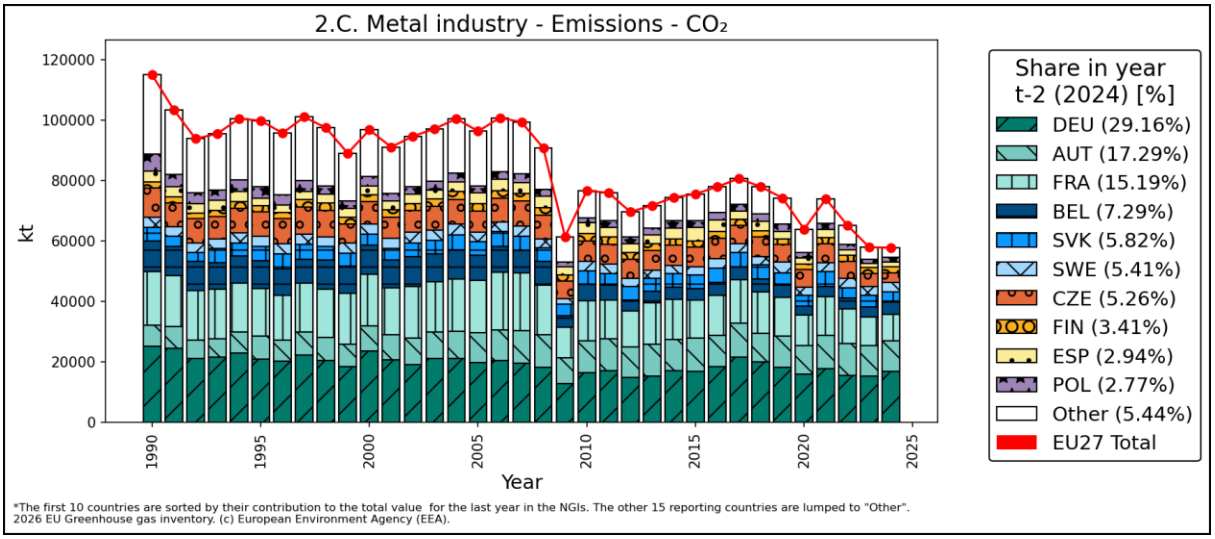
Table 4.15 summarises information by countries on total GHG emissions, CO_2, N_2O, CH_4 and HFC, PFC, NF_3 and SF_6 emissions from Metal Production. Between 1990 and 2024, GHG emissions decreased by 57% and CO_2 emissions from 2C Metal Production decreased by 50%.

Table 4.15: Contributions to total GHG, CO_2, CH_4, HFC, PFC and SF_6 emissions

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt		N2O emissions in kt CO2 equivalents		CH4 emissions in kt CO2 equivalents		HFC emissions in kt CO2 equivalents		PFC emissions in kt CO2 equivalents		NF3 emissions in kt CO2 equivalents		SF6 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024	1990	2024	1990	2024	1990	2024	1990	2024	1990	2024
Austria	8 304	9 995	7 016	9 987	NA	NA	6	6	-	-	1 032	NO	-	-	249	2
Belgium	10 107	4 219	10 092	4 211	NA,NO	NA,NO	15	8	NO	NO	NO	NO	-	-	-	-
Bulgaria	1 633	200	1 603	200	NA	NA	30	NA,NO	NO	NO	NO	NO	NO	NO	NO	NO
Croatia	1 458	12	336	12	NO	NO	4	NA,NO	NO	NO	1 117	NO	NO	NO	-	-
Cyprus	NA,NO	NO	NA,NO	NO	NA	-	NA,NO	NO	NA,NO	NO	NO	NO	NO	NO	NA	-
Czechia	9 812	3 045	9 795	3 037	NA	NA	17	8	NO	NO	NO	NO	NO	NO	NO	NO
Denmark	61	0	30	0	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	31	NO
Estonia	1	3	1	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Finland	1 976	1 971	1 976	1 971	NO	NO	0	0	NO	NO	NO	NO	NO	NO	NO	NO
France	21 791	8 821	17 679	8 773	NO	NO	158	18	NO	NO	3 211	30	NO	NO	743	NO
Germany	27 901	17 067	25 080	16 841	24	13	15	7	NA,NO	7	2 597	84	NO	NO	186	115
Greece	1 183	475	1 012	415	NO	NO	0	0	NO	NO	171	59	NO	NO	NO	NO
Hungary	3 663	15	3 317	15	NA	NA	8	0	NA,NO	NA,NO	338	NA,NO	NA	NA	NA,NO	NA,NO
Ireland	26	NO	26	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Italy	6 232	1 416	4 378	1 385	NA	NO	76	28	NO	4	1 778	NO	-	-	NO	NO
Latvia	70	NO	70	NO	NO	NO	0	NO	NO	NO	NO	NO	NO	NO	NO	NO
Lithuania	17	0	17	0	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Luxembourg	985	88	985	88	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	-	-
Malta	NO	NO	NO	NO	-	-	NO	NO	NO	NO	NO	NO	NO	NO	-	-
Netherlands	2 826	6	452	6	NA	NA	IE,NA,NE, NO	IE,NA,NE, NO	NO	NO	2 374	NA,NO	NA	NA	NA	NA
Poland	5 805	1 607	5 652	1 597	NO	NO	26	10	NO	NO	127	NO	NO	NO	NO	NO
Portugal	447	81	446	81	NO	NO	1	NE,NO	NA,NO	NO	NA,NO	NO	NO	NO	NA,NO	NO
Romania	15 782	888	13 228	886	NO	NO	24	1	NO	NO	2 530	1	NO	NO	NA,NO	NA,NO
Slovakia	4 815	3 379	4 586	3 364	1	1	14	14	-	-	214	NO	-	-	-	-
Slovenia	530	54	343	54	NO	NO	0	NA,NO	NO	NO	187	NO	NO	NO	NO	NO
Spain	4 615	1 722	3 537	1 700	NA	NA	32	20	NA,NO	NA,NO	1 046	3	NO	NO	NA,NO	NA,NO
Sweden	3 829	3 152	3 273	3 127	NA	NA	22	0	NO	1	511	24	-	-	24	NO
EU	**133 868**	**58 218**	**114 930**	**57 753**	**25**	**14**	**449**	**120**	**NA,NO**	**12**	**17 234**	**202**	**NA,NO**	**NA,NO**	**1 232**	**117**

Note: Total GHG emissions given in this table include CO_2, N_2O, CH_4, HFC, PFC and SF_6. Abbreviations explained in the Chapter 'Units and abbreviations'.

Figure 4.10: 2C Metal Industry CO_2 – Trend in the EU



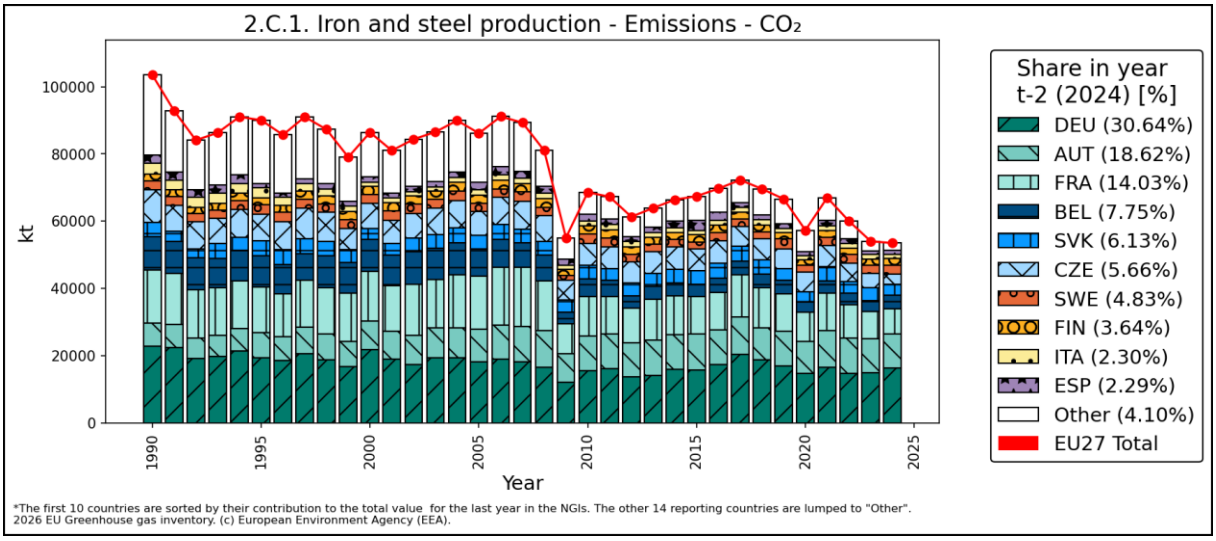
4.3.3.1 2C1 Iron and steel production

This source category includes emissions from the iron and steel industry. Crude iron is produced by the reduction of iron oxide ores mostly in blast furnaces, using coke or other forms of carbon as fuel and reducing agent. In most iron furnaces, the process is aided by the use of carbonate fluxes (limestone). Additional emissions occur as the limestone or dolomite flux releases CO_2 during reduction of pig iron in the blast furnace. Coke plays the dual role of fuel and reducing agent. Countries use different methods for the allocation of emissions between energy (CRT 1A2a) and non-energy (CRT 2C1) uses, which are described in Table 4.16.

CO_2 emissions from 2C1 Iron and Steel Production amounted to approximately 1.92% of total GHG emissions (including indirect CO_2 and LULUCF, but without international aviation) in 2024.

The overall emission trend between 1990 and 2024 roughly follows the trend of the production figures (see Figure 4.11). Between 1990 and 2024, overall CO_2 emissions from iron and steel production decreased by 48% (Table 4.16). Between 2023 and 2024, emissions have been reduced by 1%, which corresponds to an absolute reduction of 529 kt CO_2, which is a small reduction compared to the ones observed in the most recent years.

Figure 4.11 2C1 Iron and steel production: CO_2 emissions



For the whole timeseries, CO_2 emissions from iron and steel industry are reported by all countries except Cyprus, Estonia and Malta. Denmark, Ireland and Latvia reported emissions from this sector in 1990, but no longer since 2019. All countries follow higher-tier methods and most use country or plant specific methods (seeTable 4.16).

Table 4.16 2C1 Iron and Steel Production: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	6 840	10 085	9 962	18.6%	3 121	46%	-123	-1%	NA,T3	NA,PS
Belgium	10 048	3 249	4 146	7.8%	-5 902	-59%	897	28%	CS,NA,T3	NA,PS
Bulgaria	1 283	12	13	0.0%	-1 270	-99%	2	13%	NA,T2	CS,NA
Croatia	44	18	12	0.0%	-32	-73%	-6	-35%	NA,T3	NA,PS
Cyprus	NA,NO	NA,NO	NO	-	-	-	-	-	NA	NA
Czechia	9 782	4 334	3 026	5.7%	-6 756	-69%	-1 309	-30%	CS,NA,T2	CS,D,NA,PS
Denmark	30	NO	NO	-	-30	-100%	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	1 967	1 953	1 950	3.6%	-18	-1%	-4	0%	CS,NA,T3	CS,NA
France	15 789	8 115	7 506	14.0%	-8 283	-52%	-608	-7%	T2,T3	CS,PS
Germany	22 810	14 930	16 386	30.6%	-6 424	-28%	1 456	10%	NA,T2	CS,NA
Greece	105	65	68	0.1%	-36	-35%	3	5%	NA,T3	NA,PS
Hungary	3 155	297	15	0.0%	-3 140	-100%	-282	-95%	NA,T3	NA,PS
Ireland	26	NO	NO	-	-26	-100%	-	-	NA	NA
Italy	3 124	1 324	1 232	2.3%	-1 892	-61%	-92	-7%	NA,T2	CR,CS,NA,PS
Latvia	70	NO	NO	-	-70	-100%	-	-	NA	NA
Lithuania	17	0	0	0.0%	-17	-100%	0	-19%	NA,T2	D,NA
Luxembourg	985	87	86	0.2%	-899	-91%	0	0%	CS,NA,T2	CS,NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	44	9	6	0.0%	-38	-87%	-3	-35%	NA,T2	NA,PS
Poland	4 959	998	1 111	2.1%	-3 848	-78%	113	11%	NA,T2	CS,NA
Portugal	440	61	66	0.1%	-374	-85%	4	7%	NA,NO,T1,T3	D,NA,NO,PS
Romania	12 621	1 243	765	1.4%	-11 856	-94%	-479	-38%	NA,T3	CS,NA
Slovakia	4 168	3 734	3 278	6.1%	-890	-21%	-456	-12%	NA,T2	NA,PS
Slovenia	44	44	49	0.1%	5	12%	5	10%	NA,T3	NA,PS
Spain	2 501	1 059	1 227	2.3%	-1 274	-51%	168	16%	NA,T2	CS,NA,PS
Sweden	2 637	2 404	2 586	4.8%	-51	-2%	182	8%	NA,T3	NA,PS
EU	**103 487**	**54 021**	**53 489**	**100%**	**-49 998**	**-48%**	**-532**	**-1%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

For this category (2C1 – Iron and steel), it is not relevant to analyse an average IEF across countries because of their varying emission allocation (the split between process and combustion related emissions for pig iron production, which is an important sub-category) (see Table.4.17).

Table.4.17 2C1a Steel Production: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	6 821	10 045	9 927	21.6%	3 106	46%	-117	-1%	T3	PS
Belgium	8 445	3 174	4 069	8.9%	-4 376	-52%	894	28%	CS,T3	PS
Bulgaria	1 283	12	13	0.0%	-1 270	-99%	2	13%	T2	CS
Croatia	20	18	12	0.0%	-8	-40%	-6	-35%	T3	PS
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	IE	IE	IE	-	-	-	-	-	NA	NA
Denmark	30	NO	NO	-	-30	-100%	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	1 967	1 953	1 950	4.2%	-18	-1%	-4	0%	CS,T3	CS
France	15 789	8 087	7 475	16.3%	-8 314	-53%	-612	-8%	T2,T3	CS,PS
Germany	22 810	14 930	16 386	35.7%	-6 424	-28%	1 456	10%	T2	CS
Greece	105	65	68	0.1%	-36	-35%	3	5%	T3	PS
Hungary	348	38	14	0.0%	-334	-96%	-24	-63%	T3	PS
Ireland	26	NO	NO	-	-26	-100%	-	-	NA	NA
Italy	1 346	1 059	1 033	2.3%	-313	-23%	-26	-2%	T2	CR,CS,PS
Latvia	70	NO	NO	-	-70	-100%	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	404	87	86	0.2%	-318	-79%	0	0%	CS,T2	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	43	9	6	0.0%	-37	-87%	-3	-35%	T2	PS
Poland	IE	IE	IE	-	-	-	-	-	NA	NA
Portugal	73	61	66	0.1%	-7	-10%	4	7%	T1,T3	D,PS
Romania	12 621	1 243	765	1.7%	-11 856	-94%	-479	-38%	T3	CS
Slovakia	4 150	3 730	3 275	7.1%	-875	-21%	-455	-12%	T2	PS
Slovenia	44	44	49	0.1%	5	12%	5	10%	T3	PS
Spain	1 045	540	551	1.2%	-494	-47%	11	2%	T2	CS,PS
Sweden	158	135	138	0.3%	-19	-12%	3	3%	T3	PS
EU	**77 597**	**45 230**	**45 883**	**100%**	**-31 714**	**-41%**	**653**	**1%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

Table.4.18 2C1b Pig Iron Production: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	IE	IE	IE	-	-	-	-	-	NA	NA
Belgium	IE	IE	IE	-	-	-	-	-	NA	NA
Bulgaria	IE	NO	NO	-	-	-	-	-	NA	NA
Croatia	24	NO	NO	-	-24	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	IE	IE	IE	-	-	-	-	-	NA	NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	NO	NO	NO	-	-	-	-	-	NA	NA
France	IE	IE	IE	-	-	-	-	-	T2,T3	CS,PS
Germany	IE	IE	IE	-	-	-	-	-	NA	CS
Greece	NO	NO	NO	-	-	-	-	-	NA	NA
Hungary	2 427	185	1	0.0%	-2 426	-100%	-184	-99%	T3	PS
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	1 778	265	199	7.3%	-1 579	-89%	-66	-25%	T2	CR,CS,PS
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	200	NO	NO	-	-200	-100%	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	IE	IE	IE	-	-	-	-	-	NA	NA
Poland	1 043	142	50	1.8%	-993	-95%	-93	-65%	T2	CS
Portugal	298	NO	NO	-	-298	-100%	-	-	NA	NA
Romania	IE	IE	IE	-	-	-	-	-	NA	NA
Slovakia	IE	IE	IE	-	-	-	-	-	NA	NA
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	246	223	252	9.2%	6	3%	29	13%	T2	CS
Sweden	2 094	2 036	2 235	81.7%	141	7%	199	10%	T3	PS
EU	**8 109**	**2 852**	**2 737**	**100%**	**-5 372**	**-66%**	**-114**	**-4%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

Emissions from 2C1c 'Direct Reduced Iron Production' and 2C1e 'Pellet Production' are only reported by Sweden, numerical values for historic years and confidential data in recent years.

Table 4.19 2C1d Sinter Production: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	IE	IE	IE	-	-	-	-	-	NA	NA
Belgium	1 589	70	71	13.8%	-1 518	-96%	1	1%	CS,T3	PS
Bulgaria	IE	NO	NO	-	-	-	-	-	NA	NA
Croatia	NO	NO	NO	-	-	-	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	IE	IE	IE	-	-	-	-	-	NA	NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	IE	IE	IE	-	-	-	-	-	NA	NA
France	IE	IE	IE	-	-	-	-	-	T2,T3	CS,PS
Germany	IE	IE	IE	-	-	-	-	-	NA	NA
Greece	NO	NO	NO	-	-	-	-	-	NA	NA
Hungary	380	74	NO	-	-380	-100%	-74	-100%	NA	NA
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	NA	NA	NA	-	-	-	-	-	NA	NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	380	NO	NO	-	-380	-100%	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	IE	IE	IE	-	-	-	-	-	NA	NA
Poland	841	183	272	53.0%	-569	-68%	89	49%	T2	CS
Portugal	69	NO	NO	-	-69	-100%	-	-	NA	NA
Romania	IE	IE	IE	-	-	-	-	-	NA	NA
Slovakia	IE	IE	IE	-	-	-	-	-	NA	NA
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	538	144	171	33.3%	-367	-68%	27	18%	T2	CS
Sweden	222	NO	NO	-	-222	-100%	-	-	-	-
EU	**4 019**	**471**	**514**	**100%**	**-3 506**	**-87%**	**43**	**9%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

Table 4.20 2C1f Other Production: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	20	40	34	0.9%	15	76%	-6	-15%	T3	PS
Belgium	14	4	6	0.2%	-8	-55%	2	52%	CS,T3	PS
Bulgaria	NA	NA	NA	-	-	-	-	-	NA	NA
Croatia	NO	NO	NO	-	-	-	-	-	NA	NA
Cyprus	NA	NA	-	-	-	-	-	-	-	-
Czechia	9 782	4 334	3 026	76.3%	-6 756	-69%	-1 309	-30%	CS	CS,D,PS
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	NO	NO	NO	-	-	-	-	-	NA	NA
France	NO	28	32	0.8%	32	∞	4	14%	T2,T3	CS,PS
Germany	NO	NO	NO	-	-	-	-	-	NA	NA
Greece	NA	NA	NA	-	-	-	-	-	NA	NA
Hungary	NO	NO	NO	-	-	-	-	-	NA	NA
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	NO	NO	NO	-	-	-	-	-	NA	NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	17	0	0	0.0%	-17	-100%	0	-19%	T2	D
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	-	-	-	-	-	-	-	-	-	-
Netherlands	1	NO	NO	-	-1	-100%	-	-	NA	NA
Poland	929	477	610	15.4%	-320	-34%	133	28%	T2	CS
Portugal	NO	NO	NO	-	-	-	-	-	NO	NO
Romania	NO	NO	NO	-	-	-	-	-	NA	NA
Slovakia	18	4	3	0.1%	-16	-86%	-1	-30%	T2	PS
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	672	151	253	6.4%	-420	-62%	101	67%	T2	PS
Sweden	NA	NA	NA	-	-	-	-	-	NA	NA
EU	**11 454**	**5 038**	**3 963**	**100%**	**-7 490**	**-65%**	**-1 075**	**-21%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

As shown in the previous tables, several countries use the notation key "IE" for some subcategories. This can be explained by the fact that they apply carbon balances with several processes occurring within the same industrial plant, which makes differentiation into the various subcategories complex. For example, several countries include emissions from the production of pig iron (which occurs at integrated iron and steel production plants) under "steel production".

According to the 2006 IPCC guidelines, all emissions related to the use of solid fuels in iron and steel production (except eventual iron and steel gases sold to operators from other sectors) should be reported under category 2.C.1, irrespective of their role as reducing agent or fuel for energy use.

However, some countries report emissions from combustion of steelwork gases under 1A2a instead of 2C1 because this can be interpreted as emissions meant for energy supply.

Thus, for an overview of total emissions it seems to be more convenient to take into account all emissions covered by the combined category 1A2a + 2C1. Resulting emissions for this combined category are given in Table 4.21.

Table 4.21 CO_2 Emissions (2024) from iron and steel production: 1A2a, 2C1 and combined (sum of both categories). The column "Share 2C1" denotes the ratio of emissions under 2C1 and combined emissions.

Member State	CO_2 emissions in kt			Share in EU emissions in 2024	Share 2C1
	1A2a	2C1	Combined		
Austria	1 680	9 962	11 642	10%	86%
Belgium	1 067	4 146	5 213	4%	80%
Bulgaria	108	13	122	0%	11%
Croatia	254	12	266	0%	4%
Cyprus	0	NO	0	0%	-
Czech Republic	897	3 026	3 922	3%	77%
Denmark	84	NO	84	0%	-
Estonia	1	NO	1	0%	-
Finland	770	1 950	2 719	2%	72%
France	3 254	7 506	10 760	9%	70%
Germany	33 166	16 386	49 553	41%	33%
Greece	100	68	168	0%	41%
Hungary	56	15	71	0%	21%
Ireland	2	NO	2	0%	-
Italy	7 674	1 232	8 906	7%	14%
Latvia	0	NO	0	0%	-
Lithuania	NO	0	0	0%	100%
Luxembourg	259	86	346	0%	25%
Malta	0	NO	0	0%	-
Netherlands	4 596	6	4 602	4%	0%
Poland	3 580	1 111	4 691	4%	24%
Portugal	104	66	170	0%	39%
Romania	383	765	1 148	1%	67%
Slovakia	2 446	3 278	5 724	5%	57%
Slovenia	168	49	217	0%	22%
Spain	4 604	1 227	5 831	5%	21%
Sweden	1 033	2 586	3 619	3%	71%
EU	**66290**	**53489**	**119778**	**100%**	**45%**

Note: Abbreviations are explained in the Chapter 'Units and abbreviations'.

It can be seen that the ratio of emissions under 2C1 and combined emissions (see column "Share 2C1" in Table 4.21) varies significantly across countries. This indicates that the boundary between 1A2a and 2C1 is not uniformly interpreted by countries. The ten countries with largest combined CO_2 emissions from iron and steel production allocate their emissions in the following ways in 2024:

- Germany: 33% of emissions are reported under 2C1 in 2024. This category comprises process-related CO_2 emissions (including emissions from carbonate use). However, emissions from energy-related use of top gas and converter gas are reported under the respective sub-categories of sector 1.
- France: France accounts for emissions related to use of solid fuels (and steelwork gases) into 2C1, based on EU ETS reported emissions, to be compliant with the 2006 IPCC Guidelines. 70% of emissions are allocated in 2C1 in 2024. Some other sites included in iron and steel branch but not producing steel (e.g., grey iron) are included in 1A2a, based on energy balances.
- Austria: 86% of emissions are reported under 2C1 in 2024. Generally, all emissions from iron and steel production are reported under this category, irrespective of their role as reducing agent or fuel, but emissions related to the coke oven gas and to natural gas in on-site power plants are reported under category 1A2a.

- Italy: Major share of emissions (86% in 2024) is reported under 1A2a. CO_2 emissions due to the consumption of coke, coal and other reducing agents used in the iron and steel industry have been accounted for as fuel consumption and reported in the energy sector. In sector 2C1, emissions are reported from carbonates used in sinter plants and in basic oxygen furnaces, emissions related to steel and pig iron scraps and emissions from graphite electrodes consumed in electric arc furnaces.
- Czech Republic: 77% of emissions are reported under category 2C1 in 2024. It also includes emissions from limestone and dolomite use.
- Spain: Major share of emissions (69%) is reported under 1A2a in 2024. All emissions related to steelwork gas combustion are included in 1A2a, except for the ones which are flared (2C1), burned in coke ovens (1A1c) or sold to electricity producers (1A1a).
- Slovakia: 57% of emissions are reported in 2C1 in 2024. Due to the difficult disaggregation between emissions originated from pig iron, sinter and steel productions, total CO_2 emissions from production processes were allocated directly in steel production category (2C1a).
- Poland: 24% of CO_2 emissions are reported in 2C1 in 2024, including steel production (basic oxygen furnaces and electric arc furnaces), pig iron production, sinter production, based on carbon-mass balance approaches.
- Belgium: 80% of CO_2 emissions are reported in 2C1 in 2024, where all solid fuel consumptions in installations other than boilers (1A1a and 1A2a) and coke ovens (1A1c) are considered, in line with IPCC guidelines.

4.3.3.2 2C3 Aluminium production

Two PFCs, tetrafluoromethane (CF_4) and hexafluoroethane (C_2F_6), are known to be emitted from the process of primary aluminium smelting. These PFCs are formed during the phenomenon known as the anode effect, when the aluminium oxide concentration in the reduction cell electrolyte is low.

Information on CO_2 emissions from Aluminium production can be found at the end of this section.

Table 4.22 summarises information by countries on emission trends for the key source PFCs from category 2C3 Aluminium Production. PFC emissions from 2C3 Aluminium production are rather marginal in recent years, and account for 0.007 % of total EU GHG emissions (including indirect CO_2 and LULUCF, but without international aviation) in 2024. Between 1990 and 2024, PFC emissions from this source decreased by 98.8% (i.e., 17,032 kt CO_2e). All six MS reporting PFC emissions under this category in 2024 apply Tier 2 or 3 methodologies (Germany here is reported as NA due to a problem of reporting but applies a Tier 2 method according to Annex IX).

Table 4.22 2C3 Aluminium Production: Countries' contributions to PFC emissions and information on method applied and emission factor

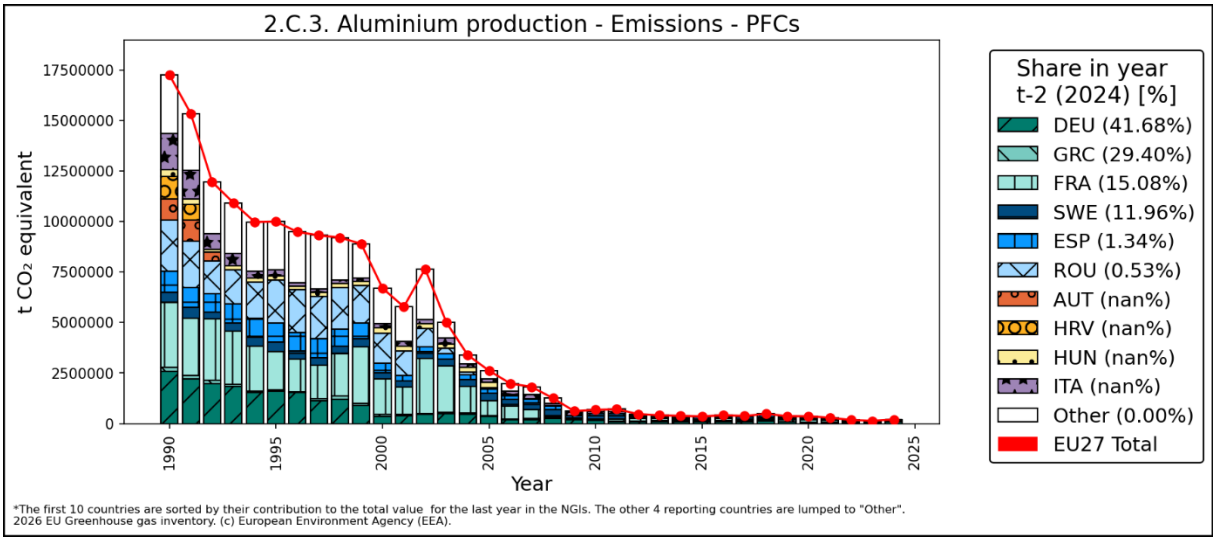
Member State	PFCs Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	1 032	NO	NO	-	-1 032	-100%	-	-	NA	NA
Belgium	NO	NO	NO	-	-	-	-	-	NA	NA
Bulgaria	-	-	-	-	-	-	-	-	NA	NA
Croatia	1 117	NO	NO	-	-1 117	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	NO	NO	NO	-	-	-	-	-	NA	NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	-	-	-	-	-	-	-	-	NA	NA
France	3 211	26	30	15.1%	-3 181	-99%	5	18%	T3	PS
Germany	2 597	15	84	41.7%	-2 513	-97%	69	448%	NA	NA
Greece	171	64	59	29.4%	-112	-65%	-4	-7%	NA,T3	NA,PS
Hungary	338	NO	NO	-	-338	-100%	-	-	NA	NA
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	1 778	NO	NO	-	-1 778	-100%	-	-	NA	NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	2 374	NO	NA,NO	-	-2 374	-100%	-	-	NA	NA
Poland	127	NO	NO	-	-127	-100%	-	-	NA	NA
Portugal	NA,NO	NO	NO	-	-	-	-	-	NO	NO
Romania	2 530	1	1	0.5%	-2 529	-100%	0	32%	NA,T2	D,NA,PS
Slovakia	214	0	NO	-	-214	-100%	0	-100%	NA	NA
Slovenia	187	1	NO	-	-187	-100%	-1	-100%	NA	NA
Spain	1 046	NA,NO	3	1.3%	-1 044	-100%	3	∞	NA,T2	D,NA
Sweden	511	31	24	12.0%	-487	-95%	-7	-23%	T2	D
EU	**17 234**	**138**	**202**	**100%**	**-17 032**	**-99%**	**64**	**47%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

All countries contributed significantly to the major reduction observed for the PFC emissions from this source between 1990 and 2024. The decreasing trend of PFC emissions from this key source between 1990 and 2024 is due to production stop or decline as well as to process improvements. The emission peak in 2002 (see

Figure 4.12) can be explained by technological changes and sub-optimal conditions of operation (in France and in the Netherlands).

Figure 4.12 2C3 Aluminium Production: PFC emissions



Besides PFC emissions, aluminium production is a source of CO_2 emissions. Of the nine countries which reported CO_2 emissions from aluminium production for 2024, one uses a Tier 1a method, two use a Tier 2 method whereas the six others use a Tier 3 method (France is in T3). Two countries use default emission factors, two use country-specific emission factors and five use plant-specific emission factors (France is in PS)(Table 4.23). Information on activity data can be found in the CRT tables. Further details, e.g. on assumptions made by the various countries, can be found in the countries' NIDs.

Table 4.23 2C3 Aluminium Production: Countries' contributions to CO_2 emissions and information on method applied and emission factor

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	150	5	6	0.4%	-144	-96%	2	40%	T3	PS
Belgium	NO	NO	NO	-	-	-	-	-	NA	NA
Bulgaria	NO	NO	NO	-	-	-	-	-	NA	NA
Croatia	119	NO	NO	-	-119	-100%	-	-	NA	NA
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	NO	NO	NO	-	-	-	-	-	NA	NA
Denmark	NO	NO	NO	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	NO	NO	NO	-	-	-	-	-	NA	NA
France	534	605	669	42.7%	136	25%	64	11%	-	-
Germany	1 012	259	303	19.3%	-709	-70%	44	17%	T3	CS
Greece	225	299	298	19.0%	72	32%	-1	0%	CS	CS
Hungary	128	NO	NO	-	-128	-100%	-	-	NA	NA
Ireland	NO	NO	NO	-	-	-	-	-	NA	NA
Italy	359	NO	NO	-	-359	-100%	-	-	NA	NA
Latvia	NO	NO	NO	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	408	0	0	0.0%	-408	-100%	0	-95%	T1a	D
Poland	78	NO	NO	-	-78	-100%	-	-	NA	NA
Portugal	NO	NO	NO	-	-	-	-	-	NO	NO
Romania	268	106	111	7.1%	-158	-59%	5	4%	T3	PS
Slovakia	121	7	17	1.1%	-105	-86%	10	143%	T3	PS
Slovenia	170	2	NO	-	-170	-100%	-2	-100%	NA	NA
Spain	610	NO	0	0.0%	-610	-100%	0	∞	T2,T3	D,PS
Sweden	133	171	163	10.4%	30	23%	-8	-5%	T3	PS
EU	**4 317**	**1 453**	**1 567**	**100%**	**-2 750**	**-64%**	**114**	**8%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

4.3.4 Non-energy products from fuels and solvent use (CRT Source Category 2D)

This source category includes greenhouse gas emissions from non-energy products from fuel and solvent use. In 2024, this source category is not a key-category. However, this sector used to be a key category therefore this section is kept in the EU NID. *Table*.4.24 summarises information by countries on total GHG emissions. Between 1990 and 2024, GHG emissions from 2D non-energy products from fuels and solvent use decreased by 24.4%.

Table.4.24: 2D Non-energy products from fuels and solvent use: countries' contributions to total GHG, CO_2, N_2O- and CH_4 emissions

Member State	GHG emissions in kt CO2 equivalents		CO2 emissions in kt		N2O emissions in kt CO2 equivalents		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024	1990	2024
Austria	363	169	363	169	NA	NA	NA	NA
Belgium	202	130	202	130	NA,NO	NA	NA,NO	NA
Bulgaria	82	14	82	14	NA,NO	NA,NO	NA,NO	NA,NO
Croatia	192	62	192	62	NA,NO	NA	NA,NO	NA
Cyprus	1	5	1	5	NA,NE,NO	NA,NE	NA,NE,NO	NA,NE
Czechia	126	119	126	119	NA,NO	NA,NO	NA,NO	NA,NO
Denmark	72	93	71	92	0	0	0	1
Estonia	36	28	36	28	NO	NO	NO	NO
Finland	220	121	218	120	1	1	0	0
France	1 050	789	1 047	786	1	3	2	0
Germany	2 983	1 860	2 982	1 859	1	1	NA	NA
Greece	129	70	129	70	NA,NO	NA,NO	NA,NO	NA,NO
Hungary	225	95	225	95	NA,NO	NA,NO	NA,NO	NA,NO
Ireland	42	64	42	64	NO	NO	NO	NO
Italy	370	313	370	313	NA,NO	NA,NO	NA,NO	NA,NO
Latvia	44	47	44	47	NA,NO	NA,NO	NA,NO	NA,NO
Lithuania	7	20	7	20	NO	NO	NO	NO
Luxembourg	21	21	21	21	NO	NO	NO	NO
Malta	4	7	4	7	NA,NO	NA	NA,NO	NA
Netherlands	190	389	190	388	NO	NO	0	0
Poland	213	315	213	315	NA,NO	NA,NO	NA,NO	NA,NO
Portugal	279	190	279	190	NO	NO	NO	NO
Romania	727	387	727	387	NA,NO	NA,NO	NA,NE,NO	NA,NE,NO
Slovakia	50	43	50	43	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
Slovenia	8	15	8	15	NA,NO	NA	NA,NO	NA
Spain	191	417	191	417	NA,NO	NA	NA,NO	NA
Sweden	180	270	180	270	NA	NA	NA	NA
EU	**8 006**	**6 053**	**8 000**	**6 047**	**4**	**4**	**3**	**2**

Abbreviations explained in the Chapter 'Units and abbreviations'.

4.3.5 Electronics Industry (CRF Source Category 2.E)

2.E Electronics Industry includes the following subcategories: 2.E.1 Integrated Circuit or Semiconductor, 2.E.2 TFT Flat Panel Display, 2.E.3 Photovoltaics, 2.E.4 Heat Transfer Fluid and 2.E.5 Other.

Out of these, the most important emission source in Europe is the production of integrated circuits and semiconductors (2.E.1), which also represents a growing and strongly promoted industry sector. F-gases, particularly PFCs, SF_6 and NF_3 (all of which with a very high global warming potential), are used for plasma etching and wafer cleaning as well as cleaning of the chamber walls of thin-film deposition (TFD) and diffusion tools after processing substrates. In recent years some abatement measures and process optimizations to reduce emissions were implemented, but no functional alternative to the processes using high-GWP gases is yet available thus replacements have been rarely made. To promote economic development and general digitalization, particularly the large-scale introduction of electric vehicles, considering supply chain failures of recent years, efforts are made to strengthen the EU electronics industry. Due to that context, this industry is also exempted from most bans and restrictions of the EU-F Gas regulation at the moment, thus production as well as emissions are expected to increase.

Emissions from photovoltaics industry and heat transfer fluids (HTFs) are reported by very few Member States only. Currently, there is no manufacture of TFT (thin-film transistors) flat panel displays in the EU.

4.3.6 Product uses as substitutes for ODS (CRT Source Category 2.F)

This emission source results from the use of halocarbons, mainly HFCs, as alternatives to ozone depleting substances (ODS) which are being phased out under the Montreal Protocol. HFCs were first introduced to the EU market at the end of 1990; their use increased strongly over the following two decades. Due to their high global warming potential, HFC emissions became significant with growing use. Therefore, HFCs are addressed by EU F-gas policy framework which includes the so-called MAC Directive, which bans the use of HFCs with a GWP >150 in new passenger cars since 2017, and the recently revised EU F-gas Regulation No. 2024/573. Measures of the latter regulation include restrictions of the bulk supply of HFCs on the EU market since 2015 (the so called HFC phase out) which refers to a stepwise reduction of placing on the market of HFCs in the EU leading to the termination of use in 2050. This scheme resulted in an intended price increase for HFCs on the EU market, which pushes alternatives, particularly low GWP refrigerants and natural refrigerants. The regulation also entails F-gas bans for certain uses as well as restrictions for applications. Furthermore, the regulation requires recovery and reclaim or destruction of used HFCs to reduce emissions from disposal and related producer responsibility schemes. Other important measures refer to training and certification of technical personnel, containment, labelling, and reporting.

The main application of HCFs is in refrigeration and air conditioning, other uses include foam blowing, fire protection, aerosols and solvents. There is also minor PFC use in category 2.F (see PFC column in table 1 below) but generally PFCs are mainly used in electronics industry (2.E). SF_6 and NF_3 are not used in this subcategory.

The source category 2.F Product uses as substitutes for ODS includes two key categories which occur in all countries: Refrigeration and air conditioning (2.F.1) and aerosols (2.F.4, KC only with LULUCF), particularly metered dose inhalers (MDIs) prescribed e.g. in asthma treatment. The use of HFCs as foam blowing agents (2.F.2) and fire extinguishing agents (2.F.3) was a main source of emissions in the first decade of the millennium but decreased in recent years due to bans and restrictions at EU level of the F-gas Regulation and national legislation.

Table.4.25: Key categories for sector 2F (Table excerpt)

Source category gas	kt CO_2 equ.		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
2.F.1 Refrigeration and air-conditioning: no classification (HFCs)	5	49 687	T	0	L	100%

For 2.F Product uses as substitutes for ODS, Table 4.26 summarizes information by Member States on emission trends of total GHG emissions, HFCs and PFCs. It should be noted that some F-gas emissions in this category are reported as “unspecified mix of HFCs and PFCs”, these are not shown in the table but are included in the column “GHG emissions”.

Table 4.26 2F Product uses as substitutes for ODS in 1990 and 2024: Member States and EU GHG emissions from this category and their split into HFC and PFC emissions

Member State	GHG emissions in kt CO2 equivalents		HFC emissions in kt CO2 equivalents		PFC emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024
Austria	NO	1 296	NO	1 296	NO	0
Belgium	NO	1 690	NO	1 690	NO	NO
Bulgaria	NO	714	NO	714	NO	NO
Croatia	NO	2 048	NO	2 048	NO	NO
Cyprus	NE,NO	408	NE,NO	408	NO	NO
Czechia	NO	3 492	NO	3 491	NO	0
Denmark	NO	269	NO	269	NO	0
Estonia	NO	186	NO	186	NO	NO
Finland	0	611	0	610	NO	1
France	IE,NO	8 513	IE,NO	8 513	NO	NO
Germany	NA,IE,NO	6 905	IE,NA,NO	6 901	IE,NA,NO	4
Greece	NO	4 071	NO	4 049	NO	22
Hungary	0	1 522	0	1 519	NO	3
Ireland	NO	521	NO	521	NO	NO
Italy	NA,NO	6 674	NA,NO	6 660	NA,NO	14
Latvia	NO	248	NO	248	NO	NO
Lithuania	NO	482	NO	482	NO	NO
Luxembourg	0	38	0	38	NO	NO
Malta	IE,NO	202	IE,NO	202	NO	0
Netherlands	IE,NO	798	IE,NO	798	NO	NO
Poland	NO	3 726	NO	3 717	NO	9
Portugal	NA,NO	1 888	NA,NO	1 888	NA,NO	NO
Romania	NO	1 901	NO	1 901	NO	0
Slovakia	NO	428	NO	428	NO	0
Slovenia	NO	304	NO	304	NO	NO
Spain	NA,NO	4 422	NA,NO	4 345	NO	0
Sweden	6	707	6	707	NO	NO
EU	**6**	**54 062**	**6**	**53 932**	**NA,IE,NO**	**52**

Abbreviations explained in the Chapter 'Units and abbreviations'. Spain also reports emissions of "unspecified mix of HFCs and PFCs" for 2.F.1.a Commercial refrigeration and 2.F.1.c Industrial refrigeration in 2024 (77 kt CO_2 eq)

F-gas emissions from 2.F Product uses as substitutes for ODS account for 1.9% of total EU-27 GHG emissions (including LULUCF and direct emissions) in 2024. HFC emissions account for almost all of 2.F emissions (>99%) and were about 9000 times higher in 2024 than in 1990. The main reason for this is the phase-out of ODS such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons under the Montreal Protocol implemented by the EU ODS Regulation, and the replacement of these substances by HFCs in many applications such as refrigeration, air conditioning, foam production, fire protection and as aerosol propellants. Moreover, the refrigeration and air conditioning sector has grown significantly in Europe in the last decades.

Table.4.27 presents HFC-gas emissions from the sub-categories of 2.F Product uses as substitutes for ODS by country. As can be seen from the table, 2.F.1 Refrigeration and Air Conditioning is by far the largest sub-category accounting for approx. 92% (EU-27) of HFC emissions. While ODS were formerly widely used

as aerosols and foam blowing agents, HFC emissions from subcategories 2.F.2 Foam blowing agents and 2.F.3 Fire Protection only contribute about 2% each in 2024 and emissions from 2.F.4 Aerosols/Metered Dose Inhalers range at 3.6%.

Table.4.27 2F Product uses as substitutes for ODS: Countries' sub-categories of HFC emissions (kt CO_2 equivalents) in 2024

Member State	**2.F Product uses as substitutes**	2.F.1 Refrigeration and air conditioning	2.F.2 Foam blowing agents	2.F.3 Fire protection	2.F.4 Aerosols	2.F.5 Solvents	2.F.6 Other applications
Austria	**1 296**	1 240	14	13	28	NO	-
Belgium	**1 690**	1 596	36	12	46	NO	NO
Bulgaria	**631**	609	NO	11	11	-	-
Croatia	**2 048**	2 018	15	6	9	-	-
Cyprus	**408**	394	1	9	3	NO	NO
Czech Republic	**3 491**	3 451	4	34	3	NO	NO
Denmark	**269**	257	0	NO	11	NO	NO
Estonia	**186**	181	1	3	2	-	-
Finland	**610**	590	4	IE,NA,NO	16	NO	NO
France	**8 513**	7 764	151	28	541	29	IE,NO
Germany	**6 901**	6 301	84	57	459	IE,NO	NO
Greece	**4 049**	3 735	131	143	40	-	-
Hungary	**1 537**	1 401	100	6	30	NO	NO
Ireland	**521**	415	NO	49	56	NO	NO
Italy	**6 660**	5 613	341	517	189	-	-
Latvia	**248**	243	0	0	5	NO	NO
Lithuania	**482**	455	15	4	8	NO	NO
Luxembourg	**38**	36	1	NO	1	NO	NO
Malta	**197**	194	2	1	0	NO	NO
Netherlands	**798**	687	IE,NO	IE,NO	IE,NO	IE,NO	112
Poland	**3 717**	3 572	62	79	3	1	NO
Portugal	**1 818**	1 687	53	59	20	NO	NO
Romania	**1 901**	1 844	1	2	55	NO	NO
Slovakia	**428**	381	2	36	10	NO	-
Slovenia	**304**	293	1	0	9	NO	NO
Spain	**4 345**	3 879	32	61	373	NO	NO
Sweden	**707**	683	8	0	16	-	-
EU-27	**53 793**	**49 519**	**1 057**	**1 129**	**1 946**	**30**	**112**

Abbreviations explained in the Chapter 'Units and abbreviations'. Note: NLD reports HFC emissions from 2.F.2, 2.F.3, 2.F.4 and 2.F.5 in 2.F.6.

Table 4.28 shows the contribution of each country to EU-27 HFC emissions from 2.F.1 as well as information on the method applied, activity data and emission factor.

Table 4.28 2F1 Refrigeration and Air conditioning: Member States' contributions to HFC emissions and information on method applied, activity data and emission factor

Member State	HFCs Emissions in kt CO2 equiv.				Share in EU-27 Emissions in 2024	Change 1990-2024		Change 1995-2024		Change 2023-2024		Method	Emission factor Information
	1990	1995	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	40	1 309	1 240	2.5%	1 240	∞	1 201	3012%	-68	-5%	NA,T2	CS,NA
Belgium	NO	87	1 794	1 596	3.2%	1 596	∞	1 509	1726%	-198	-11%	NA,T2	CS,D,NA,PS
Bulgaria	NO	3	645	693	1.4%	693	∞	690	22803%	49	8%	NA,T2	D,NA
Croatia	NO	21	1 899	2 018	4.1%	2 018	∞	1 997	9407%	120	6%	T2	CS,D
Cyprus	NO	28	388	394	0.8%	394	∞	366	1286%	6	2%	T2	D
Czechia	NO	87	3 532	3 451	6.9%	3 451	∞	3 364	3872%	-81	-2%	T2	CS
Denmark	NO	45	249	257	0.5%	257	∞	212	467%	8	3%	NA,T2	CS,D,NA
Estonia	NO	10	185	180	0.4%	180	∞	171	1766%	-5	-3%	T2	CS
Finland	0	146	672	590	1.2%	590	5022906%	444	304%	-82	-12%	T2	CS,D
France	NO	350	8 621	7 764	15.6%	7 764	∞	7 413	2117%	-858	-10%	T2	CS
Germany	NA,NO	546	6 462	6 301	12.7%	6 301	∞	5 755	1054%	-161	-2%	T2	CS,D
Greece	NO	40	3 971	3 735	7.5%	3 735	∞	3 695	9249%	-236	-6%	IE,T2	D,IE
Hungary	0	22	1 405	1 401	2.8%	1 401	65085493%	1 379	6141%	-4	0%	NA,T2	CS,D,NA
Ireland	NO	4	433	415	0.8%	415	∞	411	9608%	-18	-4%	NA,T2	CS,NA
Italy	NO	606	6 607	5 613	11.3%	5 613	∞	5 007	826%	-994	-15%	T2	CS,D
Latvia	NO	16	242	243	0.5%	243	∞	227	1432%	0	0%	T2	CS,D,OTH
Lithuania	NO	5	449	455	0.9%	455	∞	449	8374%	5	1%	T2	CS,D,PS
Luxembourg	0	3	35	36	0.1%	36	56017635%	33	1105%	1	3%	NA,T2	CS,M,NA,PS
Malta	NO	0	204	199	0.4%	199	∞	199	11598796%	-5	-2%	NA,T2	CS,NA
Netherlands	NO	44	700	687	1.4%	687	∞	643	1473%	-13	-2%	CS,NA,T2	CS,NA
Poland	NO	16	3 744	3 572	7.2%	3 572	∞	3 557	22875%	-172	-5%	NA,T2	D,NA
Portugal	NA,NO	28	1 758	1 767	3.6%	1 767	∞	1 739	6142%	9	1%	T2	D,NO
Romania	NO	2	1 968	1 844	3.7%	1 844	∞	1 842	101705%	-124	-6%	T2	CS,D
Slovakia	NO	10	399	381	0.8%	381	∞	370	3630%	-18	-5%	T2	CS
Slovenia	NO	3	293	293	0.6%	293	∞	290	10712%	0	0%	NA,T2	CS,D,NA
Spain	NA,NO	NA,NO	3 302	3 879	7.8%	3 879	∞	3 879	∞	577	17%	T2	CS
Sweden	5	122	732	683	1.4%	678	14585%	561	461%	-50	-7%	T2	CS,D
EU	**5**	**2 285**	**52 001**	**49 687**	**100%**	**49 683**	**1065514%**	**47 402**	**2074%**	**-2 313**	**-4%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

HFC emissions from 2.F.1 increased enormously since 1990 (Table 4.28 and Figure 4.13 to Figure.4.16) but decreased in 2024 by 4.4% compared to 2023 (EU), mainly as a result of the measures of the EU F-gas Regulation.

France, Germany and Italy together were responsible for almost 40% of total EU emissions from this source in 2024.

Figure 4.13 2F1 Refrigeration and Air conditioning: EU HFC emissions

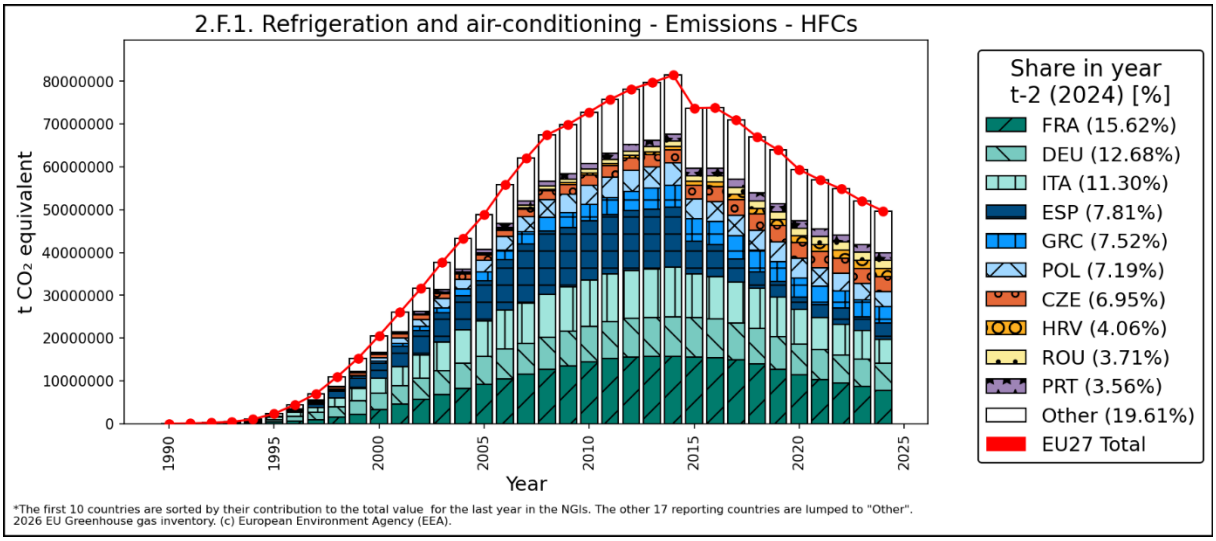


Figure 4.14 shows that emissions in sector 2.F.1 decreased again in 2024.

The main HFCs reported in this subcategory are HFC-32, HFC-125, HFC-134a and HFC-143a. They can be used as pure substances (such as HFC-32 and HFC-134a) and in mixtures (e.g. a refrigerant blend commonly used in stationary air conditioning is called “R410A” and is composed of 50% HFC-32 and 50% HFC-125).

Major developments in category 2.F.1 are driven by the subcategories 2.F.1.a Commercial refrigeration, 2.F.1.e Mobile air conditioning and 2.F.1.f Stationary air conditioning.

Emission plots for these prominent subcategories are provided in the following graphs. Please note that several Member States include not only emissions from commercial refrigeration in subcategory 2.F.1.a but also from industrial refrigeration and partly stationary air conditioning.

After a peak in 2014, emissions from 2.F.1.a decreased steadily from 2015 onwards. This is in line with the policies and measures of the EU F-gas Regulation No. 2024/573 and preceding F-gas regulations.

Figure 4.14 2F1a Commercial refrigeration: EU-27 HFC emissions

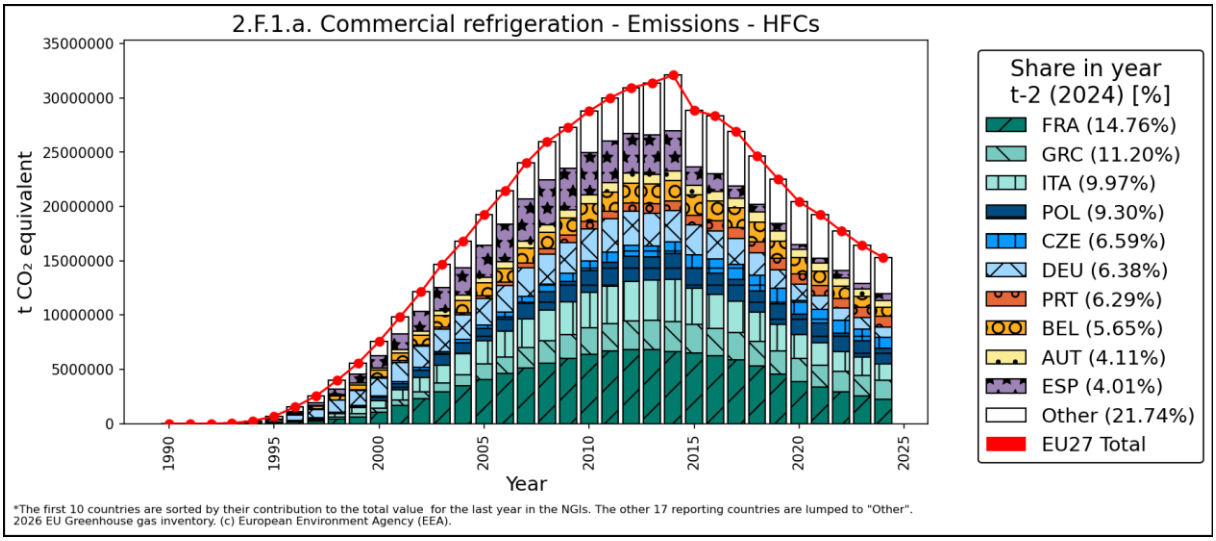
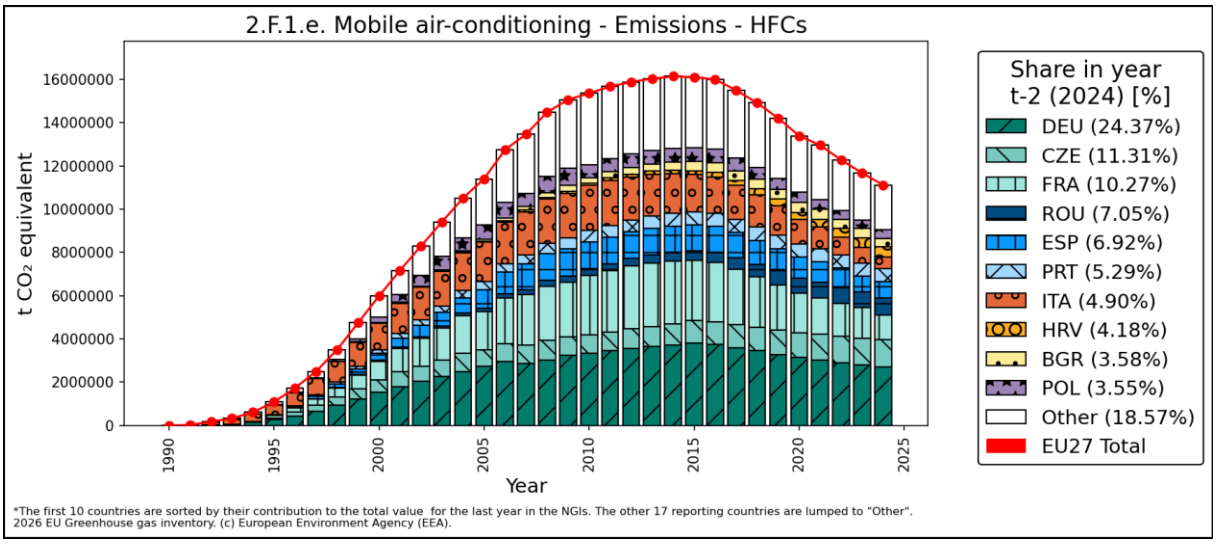


Figure.4.15shows emission trends for mobile air-conditioning:

Figure.4.15: 2F1e Mobile air conditioning: EU-27 HFC emissions

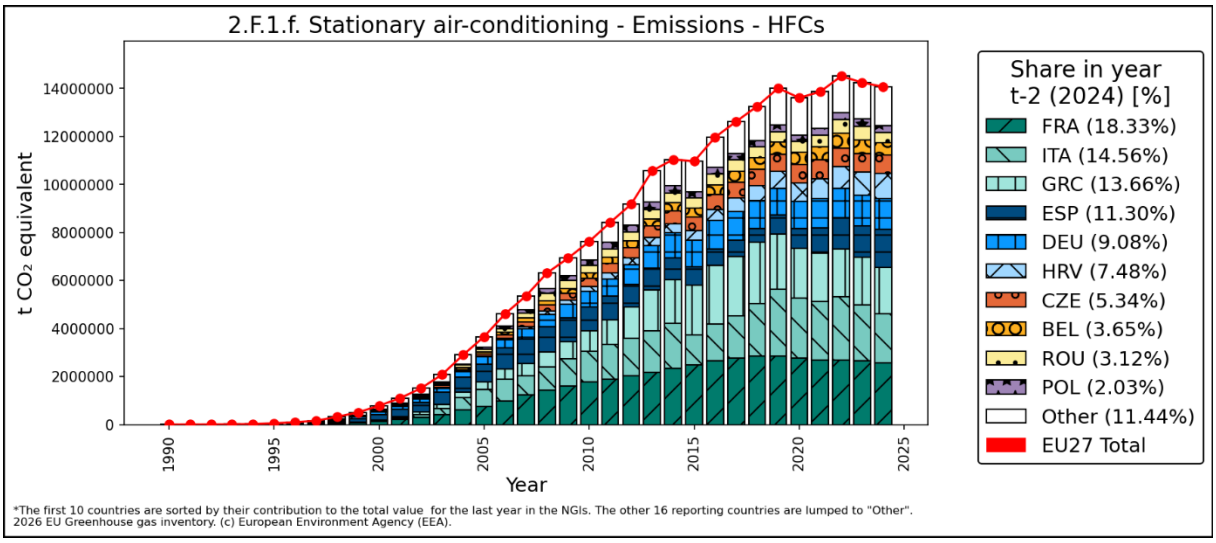


Emissions from 2.F.1.e decreased in all years from 2017 onwards. This relates to the introduction of the low-GWP refrigerants R1234yf and R744 in air-conditioning systems of new passenger cars.

Figure.4.16 below shows an increase for sector 2.F.1.f emissions until 2022. This development reflects the growing use of air conditioning equipment, particularly in Southern Europe, and the delayed shift to HFCs alternatives in this subcategory. Emissions in 2020 decreased slightly, which might be a consequence of the COVID-19 pandemic, when e.g. installations of new equipment were postponed. In 2021 and 2022, emissions from 2.F.1.f increased again due to continued growth of the sector but subsequently continue

with a decreasing trend, which might be due to the shift to low-GWP refrigerants in certain product groups but also low numbers of heat pump installations in many EU Member States.

Figure.4.16: 2F1f Stationary air conditioning: EU-27 HFC emissions



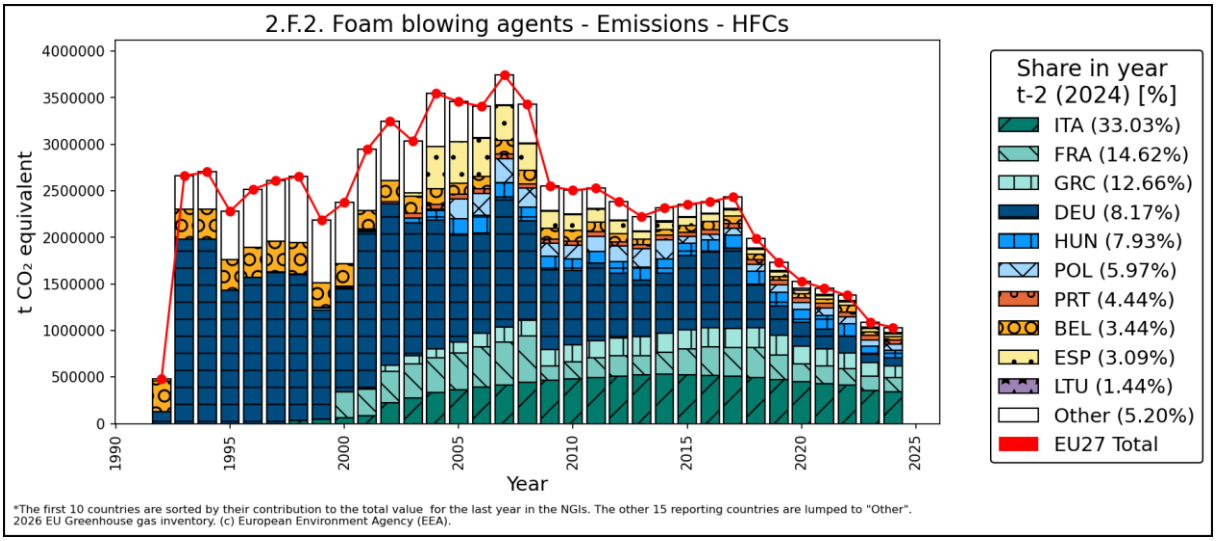
HFC emissions from 2.F.2 started in the early 1990s and were on the highest level around 2005. As the F-gas Regulation limits the use of F-gases for this subcategory, foam manufacturers converted their production to non-HFC blowing agents (usually hydrocarbons) which resulting in declining emissions since 2017 (Table.4.29 and Figure 4.17).

Table.4.29 2F2 Foam Blowing: Countries' contributions to HFC emissions and information on method applied, activity data and emission factor

Member State	HFCs Emissions in kt CO2 equiv.				Share in EU-27 Emissions in 2024	Change 1990-2024		Change 1995-2024		Change 2023-2024		Method	Emission factor Information
	1990	1995	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	275	14	14	1.4%	14	∞	-261	-95%	0	-1%	NA,T2	D,NA
Belgium	NO	324	41	36	3.4%	36	∞	-289	-89%	-5	-12%	NA,T2	CS,D,NA,PS
Bulgaria	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Croatia	NO	NO	15	15	1.4%	15	∞	15	∞	-1	-6%	CS,NA	D,NA
Cyprus	NE,NO	NE,NO	1	1	0.1%	1	∞	1	∞	0	5%	CS,NA	CS,NA
Czechia	NO	0	3	4	0.4%	4	∞	4	29854%	1	46%	NA,T1	D,NA
Denmark	NO	192	0	0	0.0%	0	∞	-192	-100%	0	-14%	NA,T2	CS,D,NA
Estonia	NO	17	1	1	0.1%	1	∞	-16	-95%	0	-20%	T2	CS
Finland	NO	0	5	4	0.4%	4	∞	4	806%	-1	-17%	NA,T2	D,NA
France	NO	NO	153	151	14.6%	151	∞	151	∞	-3	-2%	T2	CS
Germany	IE,NA,NO	1 433	84	84	8.2%	84	∞	-1 349	-94%	0	0%	T2	CS,D
Greece	NO	NO	148	131	12.7%	131	∞	131	∞	-17	-12%	NA,T2	D,NA
Hungary	NO	NO	92	82	7.9%	82	∞	82	∞	-10	-11%	NA,T2	CS,NA
Ireland	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Italy	NO	NO	357	341	33.0%	341	∞	341	∞	-16	-5%	NA,T2	D,NA
Latvia	NO	0	0	0	0.0%	0	∞	0	-98%	0	-85%	NA,T1a	D,NA
Lithuania	NO	NO	15	15	1.4%	15	∞	15	∞	0	0%	NA,T2	D,NA
Luxembourg	NO	9	1	1	0.1%	1	∞	-8	-89%	0	-4%	NA,T1	CS,NA
Malta	IE,NO	IE,NO	2	2	0.2%	2	∞	2	∞	0	17%	NA,T1	D,NA
Netherlands	IE,NO	IE,NO	IE,NO	IE,NO	-	-	-	-	-	-	-	NA	NA
Poland	NO	NO	65	62	6.0%	62	∞	62	∞	-4	-6%	NA,T2	D,NA
Portugal	NA,NO	1	45	46	4.4%	46	∞	45	5372%	1	2%	T2	D
Romania	NO	NO	1	1	0.0%	1	∞	1	∞	0	-1%	NA,T2	D,NA
Slovakia	NO	NO	2	2	0.2%	2	∞	2	∞	0	-1%	NA,T2	D,NA
Slovenia	NO	27	1	1	0.1%	1	∞	-26	-96%	0	-4%	NA,T2	D,NA
Spain	NO	NO	34	32	3.1%	32	∞	32	∞	-2	-6%	NA	NA
Sweden	NO	NO	9	8	0.8%	8	∞	8	∞	-1	-8%	T2	PS
EU	**NE,NA,IE,NO**	**2 280**	**1 090**	**1 032**	**100%**	**1 032**	**∞**	**-1 248**	**-55%**	**-58**	**-5%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.
NLD reports HFC emissions from 2.F.2, 2.F.3, 2.F.4 and 2.F.5 in 2.F.6.

Figure 4.17 2F2 Foam Blowing Agents: EU-27 HFC emissions



Emissions from subcategory 2.F.3 Fire protection arise on the one hand from assembly, leakage and decommissioning, and on the other hand from releases in the case of fires and false alarms.

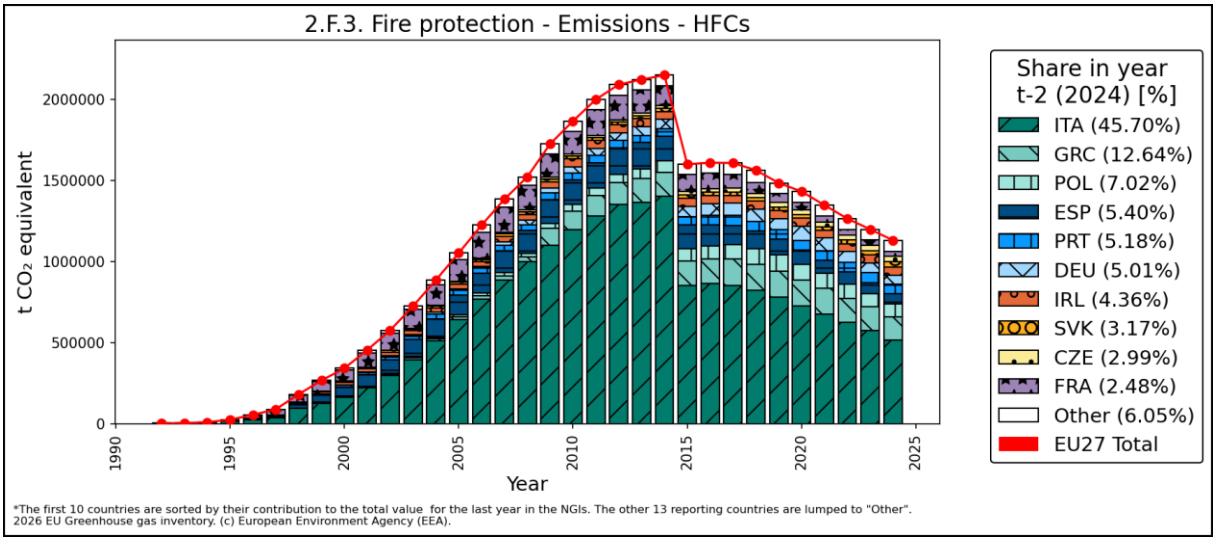
Table.4.30 2F3 Fire protection: Countries' contributions to HFC emissions and information on method applied, activity data and emission factor

Member State	HFCs Emissions in kt CO2 equiv.				Share in EU-27 Emissions in 2024	Change 1990-2024		Change 1995-2024		Change 2023-2024		Method	Emission factor Information
	1990	1995	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	NO	11	13	1.2%	13	∞	13	∞	3	24%	T2	D
Belgium	NO	1	10	12	1.1%	12	∞	12	1951%	3	31%	T2	CS,D,PS
Bulgaria	NO	NO	11	12	1.1%	12	∞	12	∞	1	9%	T2	NA
Croatia	NO	0	6	6	0.5%	6	∞	5	2638%	0	-1%	T1,T2	D,PS
Cyprus	NE,NO	0	10	10	0.8%	10	∞	9	23170%	0	-1%	CS	CS
Czechia	NO	NO	32	34	3.0%	34	∞	34	∞	1	4%	D	D
Denmark	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Estonia	NO	NO	2	3	0.2%	3	∞	3	∞	0	11%	T2	CS
Finland	NO	NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-	-	-	NA	NA
France	NO	5	33	28	2.5%	28	∞	23	508%	-5	-15%	T1	CS
Germany	NA,NO	NA,NO	59	57	5.0%	57	∞	57	∞	-2	-3%	CS	CS,D
Greece	NO	NO	144	143	12.6%	143	∞	143	∞	-1	-1%	CS	D
Hungary	NO	NO	6	6	0.5%	6	∞	6	∞	0	-4%	T1	D
Ireland	NO	NO	49	49	4.4%	49	∞	49	∞	0	0%	T2	CS
Italy	NO	16	575	517	45.7%	517	∞	501	3193%	-59	-10%	T2	CS
Latvia	NO	NO	0	0	0.0%	0	∞	0	∞	0	0%	T2	D
Lithuania	NO	NO	4	4	0.4%	4	∞	4	∞	0	-8%	T1b	D
Luxembourg	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Malta	NO	NO	1	1	0.0%	1	∞	1	∞	-1	-54%	CS	D
Netherlands	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Poland	NO	NO	83	79	7.0%	79	∞	79	∞	-4	-5%	T2	D
Portugal	NA,NO	NO	63	58	5.2%	58	∞	58	∞	-5	-7%	T2	D
Romania	NO	NO	2	2	0.2%	2	∞	2	∞	0	-5%	T2	D
Slovakia	NO	2	27	36	3.2%	36	∞	34	1547%	9	32%	T1a	CS
Slovenia	NO	NO	2	0	0.0%	0	∞	0	∞	-2	-86%	T2	CS,D
Spain	NO	1	67	61	5.4%	61	∞	60	7148%	-6	-9%	-	-
Sweden	NO	NO	0	0	0.0%	0	∞	0	∞	0	13%	T1	CS
EU	**NE,NA,NO**	**24**	**1 198**	**1 130**	**100%**	**1 130**	**∞**	**1 106**	**4576%**	**-68**	**-6%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.
NLD reports HFC emissions from 2.F.2, 2.F.3, 2.F.4 and 2.F.5 in 2.F.6.

HFC emissions from 2.F.3 (Emissions from subcategory 2.F.3 Fire protection arise on the one hand from assembly, leakage and decommissioning, and on the other hand from releases in the case of fires and false alarms. Table.4.30 and Figure 4.18) increased from 1995 until about 2017. This development was caused by the phase-out of ozone depleting substances, especially halons, as fire extinguishing agents under the Montreal Protocol and the subsequent introduction of HFCs and other ODS alternatives as replacements. The EU F-gas Regulation sets out bans for the placing on the market of new equipment using PFCs (from 2007), HFC-23 (from 2016) and all other HFCs (from 2025) resulting in a shift to other chemicals or not-in-kind alternatives, e.g. water mist, fluorinated ketones etc. However, due to the relatively long lifetime of equipment, the instant effect of the bans on emissions is small, the observed trend is a continuous decline due to stock replacements with alternatives, e.g. from 2023 to 2024 emissions decreased by about 6%.

Figure 4.18 2F3 Fire Protection, EU-27: HFC emissions



HFC emissions from 2.F.4 Aerosols peaked in 2006 following increased use of medical aerosols throughout Europe, particularly metered dose-inhalers for asthma treatment (Table 4.31 and Figure 4.19).

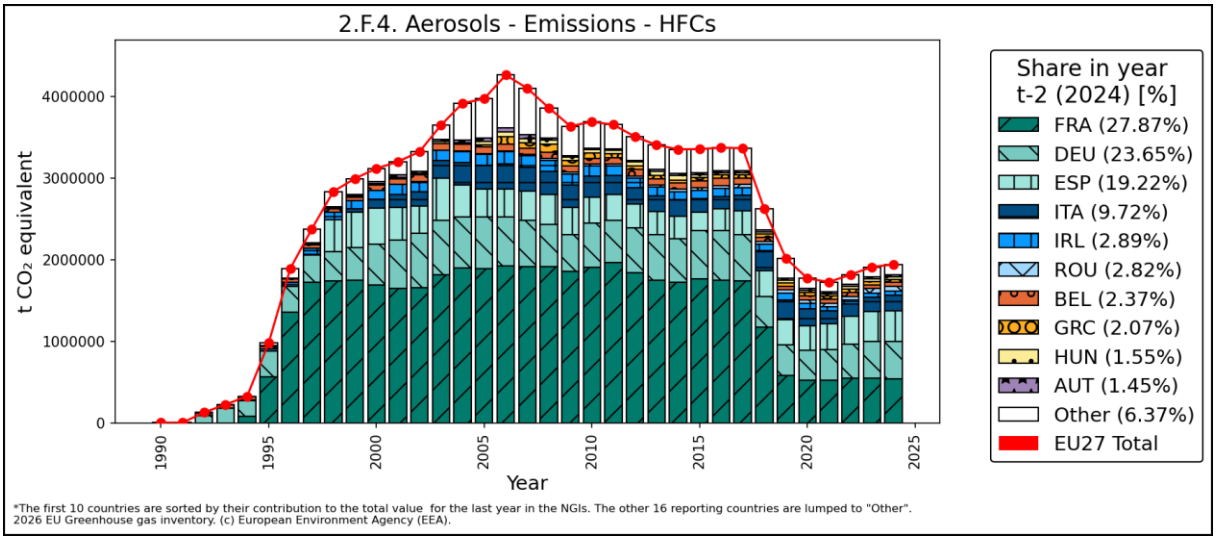
Table 4.31 2F4 Aerosols/ Metered Dose Inhalers: Countries' contributions to HFC emissions and information on method applied, activity data and emission factor

Member State	HFCs Emissions in kt CO2 equiv.				Share in EU-27 Emissions in 2024	Change 1990-2024		Change 1995-2024		Change 2023-2024		Method	Emission factor Information
	1990	1995	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	4	24	28	1.5%	28	∞	24	590%	4	15%	T1,T2	D
Belgium	NO	38	46	46	2.4%	46	∞	8	22%	0	1%	NA,T2	CS,D,NA,PS
Bulgaria	NO	NO	11	9	0.5%	9	∞	9	∞	-2	-20%	NA	NA
Croatia	NO	NO	9	9	0.5%	9	∞	9	∞	0	-2%	NA,T1a	D,NA
Cyprus	NO	0	3	3	0.2%	3	∞	3	719604%	0	2%	CS,NA	CS,NA
Czechia	NO	0	3	3	0.1%	3	∞	3	26190944%	0	2%	NA	D,NA
Denmark	NO	NO	12	11	0.6%	11	∞	11	∞	0	-1%	NA,T2	D,NA
Estonia	NO	0	2	2	0.1%	2	∞	2	4656%	0	-6%	NA,T2	CS,NA
Finland	NO	2	17	16	0.8%	16	∞	14	654%	-1	-6%	T2	D
France	NO	566	543	541	27.9%	541	∞	-25	-4%	-2	0%	NA,T2	CS,NA
Germany	IE,NO	311	457	459	23.6%	459	∞	148	47%	2	0%	NA,T2	CS,NA
Greece	NO	0	40	40	2.1%	40	∞	40	138215%	0	0%	T2	D
Hungary	NO	NO	30	30	1.6%	30	∞	30	∞	0	-1%	NA,T2	CS,NA
Ireland	NO	25	54	56	2.9%	56	∞	31	125%	2	4%	NA,T1,T2	CS,NA
Italy	NA,NO	NA,NO	174	189	9.7%	189	∞	189	∞	15	8%	NA,T2	CS,NA
Latvia	NO	0	5	5	0.3%	5	∞	5	9538%	0	2%	NA,T1a	D,NA
Lithuania	NO	1	9	8	0.4%	8	∞	8	974%	0	-4%	T1a	D
Luxembourg	NO	1	1	1	0.0%	1	∞	-1	-37%	0	2%	NA,T2	CS,NA
Malta	NO	NO	0	0	0.0%	0	∞	0	∞	0	-4%	NA,T1	CS,NA
Netherlands	IE,NO	IE,NO	IE,NO	IE,NO	-	-	-	-	-	-	-	NA	NA
Poland	NO	NO	0	3	0.2%	3	∞	3	∞	3	2785%	NA	NA
Portugal	NA,NO	25	16	17	0.9%	17	∞	-8	-32%	0	2%	NA,T2	D,NA
Romania	NO	NO	53	55	2.8%	55	∞	55	∞	2	4%	NA,T2	D,NA
Slovakia	NO	NO	10	10	0.5%	10	∞	10	∞	0	-1%	NA,T1a	D,NA
Slovenia	NO	NO	8	9	0.5%	9	∞	9	∞	1	7%	NA,T2	D,NA
Spain	NO	NO	364	373	19.2%	373	∞	373	∞	9	2%	NA,T2	CS,NA
Sweden	1	7	15	16	0.8%	15	1122%	9	139%	0	3%	T2	D
EU	**1**	**980**	**1 909**	**1 941**	**100%**	**1 939**	**149188%**	**961**	**98%**	**31**	**2%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.
NLD reports HFC emissions from 2.F.2, 2.F.3, 2.F.4 and 2.F.5 in 2.F.6.

After that peak, emissions remained rather stable until 2017. In 2018 and 2019, emissions from technical aerosols dropped as the EU F-gas Regulation banned the placing on the market of technical aerosols containing HFCs with GWP of 150 or more, except when required to meet national safety standards. From 2019 onwards, emissions from this subcategory have been ranging at stable levels.

Figure 4.19: 2F4 Aerosols/Metered Dose Inhalers: EU-27 HFC emissions



Only few companies are relevant in terms of HFC emissions from subcategories 2.F.5 Solvents and 2.F.6 Other applications, thus, for confidentiality reasons, MS report emissions together with other subcategories and no further details can be provided in this report.

4.3.7 Other product manufacture and use (CRT Source Category 2G)

This category comprises SF_6 use and minor uses of PFCs and also HFCs in applications not covered by 2.E. and 2.F.

SF_6 is a particularly potent greenhouse gas that is used predominantly in insulated switchgear for transportation and distribution of electric power (2.G.1). However, main emission source still is 2.G.2.c soundproof windows, although use in new windows has been banned emissions still occur at destruction at end-of life. Emissions from 2.G.2 also occur from other product use such as military applications (SF_6), particle accelerators (SF_6), applications of adiabatic properties - shoes and tyres (SF_6, PFCs), and medical and cosmetic applications (SF_6, PFCs).

4.3.8 Other (CRF Source Category 2.H)

Table.4.32: Key categories for sector 2H (Table excerpt)

Source category gas	kt CO_2 equ.		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
2.H Other: no classification (Unspecified mix of HFCs and PFCs)	4960	139	T	0	0	100%

In 2026, 2.H Other: Unspecified mix of HFCs and PFCs became a key category due to its declining trend. Only one MS reports emissions in this category, covering the sum of emissions from applications where confidentiality constraints do not allow to report emissions separately. Applications include, among others, military activities and rare applications in industry.

Figure 4.20: 2H – Other: Member States' contributions to unspecified mix of HFCs and PFCs emissions

Member State	Unspecified mix of HFCs and PFCs Emissions in kt CO2 equiv.				Share in EU-27 Emissions in 2024	Change 1990-2024		Change 1995-2024		Change 2023-2024		Method	Emission factor Information
	1990	1995	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	-	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Bulgaria	NA	NA	NA	NA	-	-	-	-	-	-	-	NA	NA
Croatia	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Cyprus	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Czechia	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Denmark	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Finland	NO	NO	NO	NO	-	-	-	-	-	-	-	NO	NO
France	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Germany	4 960	5 167	106	139	100.0%	-4 821	-97%	-5 029	-97%	33	31%	NA,NO	NA,NO
Greece	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	NO	NO	NO	-	-	-	-	-	-	-	-	-	-
Ireland	NA	NA	NA	NA	-	-	-	-	-	-	-	NA	NA
Italy	-	-	-	-	-	-	-	-	-	-	-	-	-
Latvia	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Lithuania	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Malta	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Netherlands	NO	NO	NO	-	-	-	-	-	-	-	-	-	-
Poland	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Portugal	-	-	-	-	-	-	-	-	-	-	-	NO	NO
Romania	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Slovakia	-	-	-	-	-	-	-	-	-	-	-	-	-
Slovenia	NO	NO	NO	NO	-	-	-	-	-	-	-	NA	NA
Spain	NA	NA	NA	NA	-	-	-	-	-	-	-	NA	NA
Sweden	-	-	-	-	-	-	-	-	-	-	-	-	-
EU	**4 960**	**5 167**	**106**	**139**	**100%**	**-4 821**	**-97%**	**-5 029**	**-97%**	**33**	**31%**	**-**	**-**

4.3.9 IPPU – non-key categories

Table 4.33 provides an overview on the role of non-key categories in the IPPU sector.

Table 4.33 Aggregated GHG emission from non-key categories in the IPPU sector

EU	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 2. IPPU in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
2.A.3 Glass production: no classification (CO_2)	3 845.2	3 576.1	3 378.7	1.06%	-466.5	-12%	-197.3	-6%
2.B.1 Ammonia production: no classification (CH_4)	2.1	2.5	2.3	0.00%	0.2	11%	-0.2	-9%
2.B.1 Ammonia production: no classification (N_2O)	0.3	0.3	0.4	0.00%	0.1	46%	0.1	28%
2.B.10 Other: no classification (CH_4)	45.6	38.3	33.1	0.01%	-12.5	-27%	-5.2	-13%
2.B.10 Other: no classification (HFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.B.10 Other: no classification (N_2O)	745.7	437.8	452.0	0.14%	-293.7	-39%	14.3	3%
2.B.10 Other: no classification (NF3)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.B.10 Other: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.B.10 Other: no classification (SF_6)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.B.10 Other: no classification (Unspecified mix of HFCs and PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.B.3 Adipic acid production: no classification (CO_2)	26.5	12.2	11.2	0.00%	-15.2	-58%	-0.9	-8%
2.B.4 Caprolactam, glyoxal and glyoxylic acid production: no classification (CO_2)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.B.4 Caprolactam, glyoxal and glyoxylic acid production: no classification (N_2O)	3 769.7	508.7	465.3	0.15%	-3 304.4	-88%	-43.4	-9%
2.B.5 Carbide production: no classification (CH_4)	6.2	4.6	5.0	0.00%	-1.2	-19%	0.4	9%
2.B.5 Carbide production: no classification (CO_2)	1 798.9	135.8	151.5	0.05%	-1 647.5	-92%	15.6	12%
2.B.6 Titanium dioxide production: no classification (CO_2)	21.5	87.2	118.9	0.04%	97.4	452%	31.7	36%
2.B.7 Soda ash production: no classification (CO_2)	1 966.0	1 527.0	1 548.0	0.49%	-418.0	-21%	20.9	1%
2.B.8 Petrochemical and carbon black production: no classification (CH_4)	1 211.4	1 072.7	1 057.4	0.33%	-154.1	-13%	-15.3	-1%
2.B.9 Fluorochemical production: no classification (NF3)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.B.9 Fluorochemical production: no classification (PFCs)	3 955.4	209.1	179.4	0.06%	-3 776.0	-95%	-29.7	-14%
2.B.9 Fluorochemical production: no classification (SF_6)	1 902.2	77.6	65.0	0.02%	-1 837.2	-97%	-12.5	-16%
2.B.9 Fluorochemical production: no classification (Unspecified mix of HFCs and PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.C.1 Iron and steel production: no classification (CH_4)	419.8	113.6	108.2	0.03%	-311.6	-74%	-5.4	-5%
2.C.2 Ferroalloys production: no classification (CH_4)	28.7	11.7	11.9	0.00%	-16.7	-58%	0.3	2%
2.C.2 Ferroalloys production: no classification (CO_2)	4 659.8	1 081.2	1 233.7	0.39%	-3 426.1	-74%	152.5	14%

EU	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 2. IPPU in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
2.C.3 Aluminium production: no classification (CO_2)	4 316.6	1 453.2	1 567.0	0.49%	-2 749.6	-64%	113.9	8%
2.C.3 Aluminium production: no classification (SF_6)	14.1	0.0	0.0	0.00%	-14.1	-100%	0.0	0%
2.C.4 Magnesium production: no classification (CO_2)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.C.4 Magnesium production: no classification (HFCs)	0.0	15.3	11.9	0.00%	11.9	100%	-3.4	-22%
2.C.4 Magnesium production: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.C.4 Magnesium production: no classification (SF_6)	474.7	85.7	117.1	0.04%	-357.6	-75%	31.4	37%
2.C.5 Lead production: no classification (CO_2)	391.6	211.8	215.4	0.07%	-176.2	-45%	3.5	2%
2.C.6 Zinc production: no classification (CO_2)	1 610.3	650.1	766.0	0.24%	-844.3	-52%	115.9	18%
2.C.7 Other: no classification (CH_4)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.C.7 Other: no classification (CO_2)	464.8	413.2	481.9	0.15%	17.0	4%	68.6	17%
2.C.7 Other: no classification (HFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.C.7 Other: no classification (N_2O)	24.5	13.7	13.9	0.00%	-10.6	-43%	0.2	2%
2.C.7 Other: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.C.7 Other: no classification (SF_6)	742.7	2.0	0.0	0.00%	-742.7	-100%	-2.0	-100%
2.C.7 Other: no classification (Unspecified mix of HFCs and PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.D.1 Lubricant use: no classification (CH_4)	2.1	0.4	0.4	0.00%	-1.7	-80%	0.0	-2%
2.D.1 Lubricant use: no classification (CO_2)	3 030.8	1 859.6	1 855.0	0.58%	-1 175.8	-39%	-4.6	0%
2.D.1 Lubricant use: no classification (N_2O)	2.9	3.0	3.1	0.00%	0.2	8%	0.1	5%
2.D.2 Paraffin wax use: no classification (CH_4)	0.2	0.5	0.5	0.00%	0.3	147%	0.0	-2%
2.D.2 Paraffin wax use: no classification (CO_2)	640.3	998.0	1 031.2	0.32%	391.0	61%	33.2	3%
2.D.2 Paraffin wax use: no classification (N_2O)	0.7	1.2	1.2	0.00%	0.6	86%	0.1	6%
2.D.3 Other: no classification (CH_4)	0.3	0.7	0.7	0.00%	0.4	121%	0.0	6%
2.D.3 Other: no classification (CO_2)	4 329.0	2 963.4	2 926.1	0.92%	-1 402.8	-32%	-37.3	-1%
2.D.3 Other: no classification (N_2O)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.1 Integrated circuit or semiconductor: no classification (HFCs)	68.6	26.3	24.6	0.01%	-44.0	-64%	-1.7	-6%
2.E.1 Integrated circuit or semiconductor: no classification (N_2O)	0.7	35.3	38.6	0.01%	37.9	5721 %	3.3	9%
2.E.1 Integrated circuit or semiconductor: no classification (NF3)	21.9	81.0	87.7	0.03%	65.8	301%	6.7	8%
2.E.1 Integrated circuit or semiconductor: no classification (PFCs)	392.2	446.2	400.2	0.13%	8.0	2%	-46.1	-10%

EU	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 2. IPPU in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
2.E.1 Integrated circuit or semiconductor: no classification (SF_6)	245.0	193.6	187.2	0.06%	-57.8	-24%	-6.3	-3%
2.E.2 TFT flat panel display: no classification (HFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.2 TFT flat panel display: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.3 Photovoltaics: no classification (HFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.3 Photovoltaics: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.4 Heat transfer fluid: no classification (HFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.4 Heat transfer fluid: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.4 Heat transfer fluid: no classification (Unspecified mix of HFCs and PFCs)	0.0	28.7	32.7	0.01%	32.7	100%	4.0	14%
2.E.5 Other: no classification (NF3)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.5 Other: no classification (SF_6)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.E.5 Other: no classification (Unspecified mix of HFCs and PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.1 Refrigeration and air-conditioning: no classification (NF3)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.1 Refrigeration and air-conditioning: no classification (PFCs)	0.0	49.7	43.7	0.01%	43.7	100%	-6.0	-12%
2.F.1 Refrigeration and air-conditioning: no classification (SF_6)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.1 Refrigeration and air-conditioning: no classification (Unspecified mix of HFCs and PFCs)	0.0	32.7	76.9	0.02%	76.9	100%	44.2	135%
2.F.2 Foam blowing agents: no classification (HFCs)	0.0	1 089.8	1 032.1	0.32%	1 032.1	100%	-57.6	-5%
2.F.2 Foam blowing agents: no classification (NF3)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.2 Foam blowing agents: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.2 Foam blowing agents: no classification (SF_6)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.2 Foam blowing agents: no classification (Unspecified mix of HFCs and PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.3 Fire protection: no classification (HFCs)	0.0	1 198.0	1 130.4	0.36%	1 130.4	100%	-67.6	-6%
2.F.3 Fire protection: no classification (PFCs)	0.0	9.1	8.7	0.00%	8.7	100%	-0.5	-5%
2.F.4 Aerosols: no classification (HFCs)	1.3	1 909.4	1 940.8	0.61%	1 939.5	1491 88%	31.3	2%
2.F.4 Aerosols: no classification (NF3)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.4 Aerosols: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.4 Aerosols: no classification (SF_6)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%

EU	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 2. IPPU in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
2.F.4 Aerosols: no classification (Unspecified mix of HFCs and PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.5 Solvents: no classification (HFCs)	0.0	26.0	30.1	0.01%	30.1	100%	4.1	16%
2.F.5 Solvents: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.6 Other applications: no classification (HFCs)	0.0	120.1	111.7	0.04%	111.7	100%	-8.5	-7%
2.F.6 Other applications: no classification (NF3)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.6 Other applications: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.6 Other applications: no classification (SF_6)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.F.6 Other applications: no classification (Unspecified mix of HFCs and PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.G.1 Electrical equipment: no classification (HFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.G.1 Electrical equipment: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.G.1 Electrical equipment: no classification (SF_6)	2 344.3	1 498.5	1 399.1	0.44%	-945.2	-40%	-99.4	-7%
2.G.2 SF_6 and PFCs from other product use: no classification (PFCs)	205.9	161.6	155.3	0.05%	-50.6	-25%	-6.3	-4%
2.G.2 SF_6 and PFCs from other product use: no classification (SF_6)	4 276.2	1 987.3	1 802.0	0.57%	-2 474.2	-58%	-185.3	-9%
2.G.3 N_2O from product uses: no classification (N_2O)	4 412.2	2 127.8	2 293.0	0.72%	-2 119.2	-48%	165.2	8%
2.G.4 Other: no classification (CH_4)	65.3	70.6	68.0	0.02%	2.7	4%	-2.6	-4%
2.G.4 Other: no classification (CO_2)	144.5	115.1	115.2	0.04%	-29.3	-20%	0.1	0%
2.G.4 Other: no classification (HFCs)	0.0	4.3	4.2	0.00%	4.2	100%	0.0	-1%
2.G.4 Other: no classification (N_2O)	4.0	10.3	10.2	0.00%	6.2	153%	-0.1	-1%
2.G.4 Other: no classification (PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.G.4 Other: no classification (Unspecified mix of HFCs and PFCs)	0.0	0.0	0.0	0.00%	0.0	0%	0.0	0%
2.H Other: no classification (CH_4)	6.8	9.3	9.5	0.00%	2.7	39%	0.2	2%
2.H Other: no classification (CO_2)	92.0	64.9	71.0	0.02%	-20.9	-23%	6.2	10%
2.H Other: no classification (HFCs)	0.0	4.1	3.6	0.00%	3.6	41589%	-0.5	-12%
2.H Other: no classification (N_2O)	56.7	76.4	78.3	0.02%	21.6	38%	1.9	2%
2.H Other: no classification (PFCs)	0.2	1.0	0.7	0.00%	0.5	243%	-0.3	-31%
2.H Other: no classification (SF_6)	7.7	4.3	2.5	0.00%	-5.2	-68%	-1.8	-41%

4.4 Methodological issues and uncertainties

4.4.1 Methodological issues

The previous section presented for each EU key source in Sector 2 an overview of the Member States' contributions to the key source in terms of level and trend, information on methodologies, emission factors and completeness. Detailed information on national methods and circumstances is available in the Member States' national inventory reports.

4.4.2 Gap filling of Activity data

It is important to explain the reasons why the EU is not always able to provide EU-level AD or IEFs but has instead opted to transparently document what the MS have reported (see MS NIDs).

Countries use different methodological approaches to calculate emissions. In some cases, a calculation of EU-level implied emission factors, based on a number of countries, is performed. In those cases where (a) more than 75% of the emissions are calculated on basis of consistent activity data, and (b) the IEF has a reasonable degree of consistency (i.e. standard deviation divided by mean < 50%) we gap-filled activity data in the CRT. In these cases we are confident that the IEF included in the CRT provides reliable information to reviewers and adds to the transparency of the EU inventory. In all other cases we believe that an IEF in the CRT would be misleading because it would be based on a limited number of countries or based on very different methodological approaches which cannot be meaningfully aggregated. Due to the significant amount of time required, the CRT only includes gap filled activity data for 2024 and only for the EU key categories where the criteria above apply. In 2025 the following categories have been gap-filled:

- Clinker production 2.A.1
- Lime production 2.A.2
- Ammonia Production 2.B.1
- Nitric Acid Production 2.B.2

The method for gap filling includes four steps:

1. Emissions have been aggregated for those MS that are using the same activity data and that are reporting activity data and emissions (i.e. not using notation keys for either activity data or emissions. Usually the geographical coverage of these MS is smaller than EU.
2. These emissions have been divided by the aggregated activity data of those MS in order to derive an IEF for those MS.
3. The total emissions of the EU have been divided by this IEF in order to derive a gap-filled estimate for activity data for EU.

Table 4.34 shows the results for the gap filling of activity data for the four categories.

Table 4.34 Documentation of gap filling of activity data

Category	2024			
	Activity data Description	(kt)	IEF (t/t)	Emissions (kt CO_2 eq.)
2A1	Clinker production	113 723	0.52	58710

Category	2024			
	Activity data Description	(kt)	IEF (t/t)	Emissions (kt CO_2 eq.)
2A2	Lime Production	19 385	0.72	13865
2B1	Ammonia Production	11371	1.41	16 042
2B2	Nitric Acid Production	15200	0.11	1599

4.4.3 Uncertainties

Table 4.35 shows the total EU uncertainty estimates for the sector 'Industrial processes' and the uncertainty estimates for the relevant gases of each source category. The highest level uncertainty was estimated for PFCs from 2.F (152 %) and the lowest for CO_2 from 2.A (3.5 %). With regard to trend, HFC from 2.F shows the highest uncertainty estimates, CO_2 from 2.A the lowest.

Table 4.35 Sector 2 Industrial processes: Uncertainty estimates for the EU

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
2.A Mineral Industry	CO_2	133 996	84 847	-36.7%	3.5%	0.9%
2.A Mineral Industry	CH_4	0	0	0.0%	0.0%	0.0%
2.A Mineral Industry	N_2O	0	0	0.0%	0.0%	0.0%
2.B Chemical Industry	CO_2	58 365	45 793	-21.5%	10.9%	1.3%
2.B Chemical Industry	CH_4	1 103	992	-10.1%	27.7%	9.1%
2.B Chemical Industry	N_2O	75 921	2 283	-97.0%	14.5%	3.6%
2.B Chemical Industry	HFC	10 262	67	-99.3%	12.3%	10.7%
2.B Chemical Industry	PFC	3 955	179	-95.5%	49.6%	10.5%
2.B Chemical Industry	Unspecified mix of HFCs and PFCs	0	0	0.0%	0.0%	0.0%
2.B Chemical Industry	SF_6	1 902	65	-96.6%	36.6%	21.3%
2.B Chemical Industry	NF3	0	0	0.0%	0.0%	0.0%
2.C Metal Industry	CO_2	114 930	57 753	-49.7%	5.1%	1.7%
2.C Metal Industry	CH_4	416	101	-75.8%	47.9%	5.5%
2.C Metal Industry	N_2O	25	14	-43.4%	63.3%	28.3%
2.C Metal Industry	HFC	0	12	Inf	22.8%	Inf
2.C Metal Industry	PFC	13 530	198	-98.5%	6.4%	6.5%
2.C Metal Industry	Unspecified mix of HFCs and PFCs	0	0	0.0%	0.0%	0.0%
2.C Metal Industry	SF_6	1 046	2	-99.8%	7.1%	21.7%
2.C Metal Industry	NF3	0	0	0.0%	0.0%	0.0%
2.D Non-energy products from fuels and solvent use	CO_2	7 613	5 562	-26.9%	36.9%	13.4%

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
2.D Non-energy products from fuels and solvent use	CH_4	3	2	-38.8%	59.1%	60.0%
2.D Non-energy products from fuels and solvent use	N_2O	4	4	22.8%	75.9%	38.8%
2.E Electronics industry	CO_2	0	0	0.0%	0.0%	0.0%
2.E Electronics industry	CH_4	0	0	0.0%	0.0%	0.0%
2.E Electronics industry	N_2O	0	0	0.0%	0.0%	0.0%
2.E Electronics industry	HFC	68	21	-68.5%	8.7%	34.0%
2.E Electronics industry	PFC	392	319	-18.7%	8.2%	12.0%
2.E Electronics industry	Unspecified mix of HFCs and PFCs	0	0	0.0%	0.0%	0.0%
2.E Electronics industry	SF_6	245	168	-31.2%	13.1%	65.9%
2.E Electronics industry	NF3	22	67	205.0%	14.3%	29.4%
2.F Product uses as substitutes for ODS	CO_2	0	0	0.0%	0.0%	0.0%
2.F Product uses as substitutes for ODS	CH_4	0	0	0.0%	0.0%	0.0%
2.F Product uses as substitutes for ODS	N_2O	0	0	0.0%	0.0%	0.0%
2.F Product uses as substitutes for ODS	HFC	6	35 067	588004.5%	34.8%	137476.4%
2.F Product uses as substitutes for ODS	PFC	0	26	Inf	151.6%	Inf
2.F Product uses as substitutes for ODS	Unspecified mix of HFCs and PFCs	0	0	0.0%	0.0%	0.0%
2.F Product uses as substitutes for ODS	SF_6	0	0	0.0%	0.0%	0.0%
2.F Product uses as substitutes for ODS	NF3	0	0	0.0%	0.0%	0.0%
2.G Other product manufacture and use	CO_2	145	115	-20.3%	11.6%	2.8%
2.G Other product manufacture and use	CH_4	65	68	4.2%	37.8%	7.7%
2.G Other product manufacture and use	N_2O	2 306	1 716	-25.6%	10.1%	3.0%
2.G Other product manufacture and use	HFC	0	1	Inf	20.7%	Inf
2.G Other product manufacture and use	PFC	206	155	-24.6%	22.4%	5.5%
2.G Other product manufacture and use	Unspecified mix of HFCs and PFCs	0	0	0.0%	0.0%	0.0%
2.G Other product manufacture and use	SF_6	2 246	1 293	-42.4%	34.9%	18.2%
2.G Other product manufacture and use	NF3	0	0	0.0%	0.0%	0.0%
2.H Other	CO_2	92	71	-22.6%	7.1%	5.8%
2.H Other	CH_4	7	9	39.4%	20.1%	7.9%
2.H Other	N_2O	57	78	38.3%	19.9%	7.6%
2.H Other	HFC	0	3	39576.5%	60.4%	23913.3%
2.H Other	PFC	0	1	242.7%	60.6%	147.1%

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
2.H Other	Unspecified mix of HFCs and PFCs	0	0	0.0%	0.0%	0.0%
2.H Other	SF_6	8	3	-67.5%	64.0%	43.2%
2.H Other	NF3	0	0	0.0%	0.0%	0.0%
2 (where no subsector data were submitted)	*all*	21 004	22 809	8.6%	25.8%	19.1%
Total - 2	**all**	**449 938**	**259 866**	**-42.2%**	**8.9%**	**2.2%**

N*ote: Emissions are in kt CO_2 equivalents; trend uncertainty is presented as percentage points; the sum of the source category emissions may not be the total sector emissions because uncertainty estimates are not available for all source categories*

4.5 Sector-specific quality assurance and quality control

There are several arrangements for improving the quality of GHG emissions in the IPPU sector: (1) Before and during the compilation of the EU GHG inventory, several checks are made of the Member States data in particular for time series consistency of emissions and implied emission factors, comparisons of implied emission factors across countries and checks of internal consistency.

Specifically for subsector 2.C, activity data in iron and steel production are compared with data from the World Steel association. Additional focus is put on the introduction of alternatives to F-gases in the quality checks of Member States' submissions. This is relevant in the context of the HFC phase-down under the EU F-gas Regulation.

Internal reviews are carried out in the time period between the inventory submission and the start of the next inventory preparation cycle. In 2025 a comprehensive review of all GHG inventories of the EU Member States was carried out with a focus on the years 2021-2023, in order to determine the annual emission allocations for the years 2026 to 2030 under the Effort Sharing Regulation. The next internal review of the GHG inventories of all Member States is scheduled for 2027.

4.6 Sector-specific recalculations

The following tables present the recalculation of the key categories identified for the Industrial Processes sector, including the level of recalculations made by Member States contributing the most to the EU recalculations of the specific category.

Table 4.36 Sector 2 -Industrial Processes: Recalculation of key categories

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 eq.	Change in %	Main contributing countries	Change in kt CO_2 eq.	Change in %	Main contributing countries
2.A.1. Cement production: no classification (CO_2)	-	0.0%	no recalculations	49.14	0%	ITA: 115 FRA: -67 LVA: 1
2.A.2. Lime production: no classification (CO_2)	-54.41	-0.2%	DNK: -54	-366.60	-3%	FRA: -305 DNK: -52 AUT: -5

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 eq.	Change in %	Main contributing countries	Change in kt CO_2 eq.	Change in %	Main contributing countries
2.A.4. Other process uses of carbonates: no classification (CO_2)	-24.16	-0.2%	PRT: -23 FRA: -1	-11.03	0%	GRC: -15 DEU: -11 AUT: 9
2.B.1. Ammonia production: no classification (CO_2)	30.46	0.1%	AUT: 30	394.20	3%	POL: 426 AUT: -32 NLD: 0
2.B.10. Other: no classification (CO_2)	39.36	0.4%	FIN: 53 FRA: -13	-409.71	-3%	BEL: -622 FIN: 157 FRA: 95
2.B.2. Nitric acid production: no classification (N_2O)	-388.93	-1.0%	FRA: -389	3.12	0.2%	POL: 3
2.B.3. Adipic acid production: no classification (N_2O)	-	0.0%	no recalculations	-	0%	no recalculations
2.B.8. Petrochemical and carbon black production: no classification (CO_2)	85.98	0.6%	FRA: 86	203.11	2%	BEL: 246 FRA: -43
2.B.9. Fluorochemical production: no classification (Unspecified mix of HFCs and PFCs)	-4669.71	-20.0%	DEU: -4670	-17.55	-4%	DEU: -18
2.C.1. Iron and steel production: no classification (CO_2)	0.04	0.0%	FRA: 0.04	-373.63	-1%	ESP: -597 DEU: 311 AUT: -103
2.H Other: no classification (Unspecified mix of HFCs and PFCs)	4669.71	1567.9%	DEU: 4670	42.28	58%	DEU: 42

Table 4.37 Sector 2F - Recalculation of key categories

EU key categories	Change in 1995			Change in 2023		
	Change in kt CO_2 eq.	Change in %	Main contributing countries	Change in kt CO_2 eq.	Change in %	Main contributing countries
2.F.1. Refrigeration and air-conditioning: no classification (HFCs)	66.94	3.0%	FRA: 66 BEL: 1	753.78	1%	FRA: 1012 NLD: 240 GRC: -200

4.7 Sector-specific improvements

In 2024, the reporting has been amended to be in line with the new CRT reporting tables, as well as the NID outline. Descriptions of categories have been aligned accordingly. Information across sectors has been streamlined to provide a harmonised approach across the whole NID. Any recommendations for improvement of earlier UNFCCC reviews have been continuously followed up and implemented (see Chapter 10.4).

Continuing improvements include efforts to ensure consistency between CRT/JSON files and NID, and the provision of sufficient information to meet transparency requirements.

5 AGRICULTURE (CRT SECTOR 3)

Half of the European Union's land is farmed. This fact alone highlights the importance of farming for the EU's natural environment. Farming and nature exercise a profound influence over each other. Farming has contributed over the centuries to creating and maintaining a variety of valuable semi-natural habitats. Today these shape the majority of the EU's landscapes and are home to many of the EU's richest wildlife. Farming also supports a diverse rural community that is not only a fundamental asset of European culture, but also plays an essential role in maintaining the environment in a healthy state[29].

The links between the richness of the natural environment and farming practices are complex. While many valuable habitats in Europe are maintained by extensive farming, and a wide range of wild species rely on this for their survival, agricultural practices can also have an adverse impact on natural resources. Pollution of soil, water and air, fragmentation of habitats and loss of wildlife can be the result of inappropriate agricultural practices and land use.

Agriculture in Europe is determined by the Common Agricultural Policy (CAP) of the European Union. The CAP dates from 1957, and its foundations are entrenched in the Treaty of Rome. Initially, the emphasis of the CAP was to increase agricultural productivity, partly for food security reasons, but also to ensure that the EU had a viable agricultural sector and that consumers had a stable supply of affordable food (Gay et al., 2005). With the MacSharry reform of 1992 several steps were taken by the EU to shift CAP subsidies away from price and market support towards direct support for farmers. This was further pursued with the Agenda 2000 reform, as signified by the shift in focus towards the maintenance and enhancement of the rural environment and the growing recognition of agriculture as a multifunctional activity. In environmental terms, the focus is on less-favoured areas and areas with environmental restrictions, and on agricultural production methods designed to protect the environment and to maintain the countryside.

However, price support and income payments, together with milk quotas, remained the dominant support measures. The 2003 CAP reform made further progress in the direction initiated by the Agenda 2000 reform, by aiming to make European agriculture more market oriented and giving a stronger focus to environmental protection. With the CAP reform, cross-compliance became an obligatory element of the CAP. Cross compliance links direct payments to respecting a number of statutory management requirements and to maintain all agricultural land in good agricultural and environmental conditions (EC 2003)[30].

- "Statutory management requirements" (SMR, Annex III of Regulation (EC) No 1782/2003) which are set in 19 community legislative acts on environment, food safety, animal health and welfare.
- The obligation to maintaining land in good agricultural and environmental conditions (GAECs) and maintaining permanent pasture at level at 1.5.2004. Definitions of GAEC are specified at national or regional level and should warrant appropriate soil protection, ensure a minimum level of maintenance of soil organic matter and soil structure and avoid the deterioration of habitats.

In 2013, the Council of the EU Agriculture Ministers adopted four Basic Regulations for a reformed CAP following a CAP Health Check[31] in 2008 and a Commission Communication on the CAP towards 2020[32] in

29 http://ec.europa.eu/agriculture/envir/index_en.htm

30 http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32003R1782

31 http://ec.europa.eu/agriculture/healthcheck/index_en.htm

32 https://ec.europa.eu/agriculture/cap-post-2013_en

2011. The four legislative texts that regulate the post-2013 CAP are (i) Rural Development: Regulation 1305/2013[33]; (ii) "Horizontal" issues such as funding and controls: Regulation 1306/2013[34]; (iii) Direct payments for farmers: Regulation 1307/2013[35]; (iv) Market measures: Regulation 1308/2013[36].

With the adoption of the 2013 CAP reform, the environment concerns received an enhanced focus being materialised by explicitly linking the agricultural support to "agricultural practices beneficial to the climate and environment" (so called 'CAP greening'). Agro-environmental indicators have been identified as useful tools to perform this task, especially since they allow for the assessment of territorial impacts. The monitoring and evaluation of CAP performance is carried out through indicators (EC 2006[37], 2001[38], 2000[39]). Green direct payments account for 30 % of EU countries' direct payment budgets. Farmers receiving an area-based payment have to make use of various straightforward, non-contractual practices that benefit the environment and the climate. These require action each year. They include:

- diversifying crops;
- maintaining permanent grassland; and
- dedicating 5 % of arable land to ecologically beneficial elements ('ecological focus areas').

the CAP 2023-27 entered into force on 1 January 2023. Support for farmers and rural stakeholders across the 27 EU countries is based on the CAP 2023-27 legal framework and the choices detailed in the national CAP Strategic Plans, approved by the Commission. Each EU country elaborated its own CAP Strategic Plan, including the anticipated intervention strategies, and the CAP instruments each EU country will use from 2023 to 2027 to achieve the CAP objectives. The approved Plans are designed to make a significant contribution to the ambitions of the European Green Deal, Farm to Fork Strategy and Biodiversity Strategy.

The **Nitrates Directive** (Council Directive 91/676/EEC) is the SMR with the largest impact on greenhouse gas emissions from agriculture. The directive aims at reducing and preventing water pollution caused by nitrates from agricultural sources with the goal that nitrate concentrations in groundwater will not exceed 50 mg NO_3^- l^{-1} and listing codes of good practice (Annex II A) to be implemented by the farmers on a voluntary basis. Nitrate vulnerable zones (NVZ) must be designated on the basis of monitoring results which indicate that the groundwater and surface waters in these zones are or could be affected by nitrate pollution from agriculture. The action program must contain mandatory measures relating to: (i) periods when application of animal manure and fertilizers are prohibited; (ii) capacity of and facilities for storage of animal manure; and (iii) limits to the amounts of animal manure and fertilizers applied to land.

The action programmes need to be implemented by farmers within NVZs on a compulsory basis. These programmes must include measures already included in Codes of Good Agricultural Practice, which

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33 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0487:0548:en:PDF

34 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0549:0607:en:PDF

35 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0608:0670:en:PDF

36 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:347:0671:0854:en:PDF

37 EC (2006). Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy. Communication from the Commission to the Council and the European Parliament. COM (2006) 508 final. Commission of the European Communities, Brussels.

38 EC (2001). Statistical Information needed for Indicators to monitor the Integration of Environmental concerns into the Common Agricultural Policy. Communication from the Commission to the Council and the European Parliament. COM (2001) 144 final. Commission of the European Communities.

39 EC (2000). Indicators for the Integration of Environmental Concerns into the Common Agricultural Policy. Commission of the European Communities.

become mandatory, and other measures, such as limitation of fertilizer application (mineral and organic), taking into account crop needs and all nitrogen inputs and soil nitrogen supply, with maximum amount of livestock manure to be applied. Every four years countries are required to report on nitrates concentrations in groundwaters and surface waters; eutrophication of surface waters; assessment of the impact of action programme(s) on water quality and agricultural practices; revision of NVZs and action programme(s); estimation of future trends in water quality. This has affected NH_3 and N_2O emissions in most countries.

Beside the environmentally-targeted directives, also the first pillar of the CAP (dealing with market support in contrast to pillar two covering rural development measures) had a strong impact on the greenhouse gas emissions from agriculture in Europe, namely through the milk quota system, which lead to a strong reduction of animal numbers in the dairy sector to compensate for the increasing animal performance during the last decades. The milk quota system ended in 2015.

Other important policies affecting greenhouse gas emissions from agriculture, particularly by addressing the abatement of air pollution through the control of NO_x and NH_3 emissions include, amongst others:

- The 1999 Gothenburg Protocol under the Convention on Long Range Transboundary Air Pollution (CLRTAP[40]) to 'Abate Acidification, Eutrophication and Ground-level Ozone', revised in 2012 setting national emission reduction commitments to be achieved by 2020 and beyond;
- The National Emission Ceilings Directive (NEC - Directive 2016/2284/EC[41]) sets upper limits for each country for the total emissions in 2010 of the four pollutants responsible for acidification, eutrophication and ground-level ozone pollution. It has been updated in 2016[42] setting new objectives for EU air policy for 2020 and 2030;
- The Industrial Emission Directive (IED[43][44]), which was established in 1996, and aims at minimizing pollution from point sources, i. e., intensive animal production facilities (pig and poultry farms, with more than 2000 fattening pigs (over 30 kg); more than 750 sows or more than 40,000 head of poultry). These are required under the directive to apply control techniques for preventing NH_3 emissions according to Best Available Technology (BAT). In April 2022, the Commission proposed to revise the former Industrial Emissions Directive to modernize it and make it more efficient in line with the European Green Deal objectives of zero pollution, climate neutrality and resource efficiency. This updated Directive entered in force on 2024. Member States will have 22 months to transpose the revised IED.

Legislation related with animal health may also affect emissions through changes in specific parameters. That is the case of Spain, where CH_4 emissions from enteric fermentation from swine decreased, partly due to the ban of the use of growth-promoting antibiotics in animal feeding that resulted in a radical change in feeding conditions.

Structural changes are caused also by the general development of countries. For example, in Finland, the membership in the EU resulted in changes in the economic structure followed by an increase in the average farm size and a decrease in the number of small farms (Pipatti, 2001), causing also a decrease in the livestock numbers for most animal types.

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40 http://www.unece.org/env/lrtap/multi_h1.html

41 https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1554903780611&uri=CELEX:32016L2284

42 http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016L2284&from=EN

43 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0075

44 http://ec.europa.eu/environment/industry/stationary/index.htm

5.1 Overview of sector

In the year 2024, CH_4, N_2O and CO_2 emissions from CRT sector 3 Agriculture were 57.8 %, 69.3 %, and 0.43 % of total CH_4, N_2O and CO_2 EU emissions, respectively. Total emissions from agriculture were 359 Mt CO_2-eq with contributions from CH_4, N_2O, and CO_2 of 226 Mt CO_2-eq, 124 Mt CO_2-eq and 9 Mt CO_2-eq, respectively.

Figure 5.1 shows the development of total GHG emissions from agriculture from 487 Mt CO_2-eq in 1990 to 359 Mt CO_2-eq in 2024. The reduction of emissions in absolute was most pronounced for CH_4 with a decrease of 76 Mt CO_2-eq, followed by N_2O and CO_2 with respectively a decrease of 48 Mt CO_2-eq and 5 Mt CO_2-eq. The cut was most pronounced before 2010 with a total reduction of 22 % between 1990 and 2010, followed by a rather stable period (2010-2021) and a further decrease by 5 % between 2021 and 2024.

The largest reductions occurred in CH_4 emissions from enteric fermentation and direct N_2O from agricultural soils, mainly because of the decreasing use of fertilizer and manure and declining cattle numbers in most countries.

Figure 5.1 EU GHG emissions for 1990-2024 from CRT Sector 3: 'Agriculture' in CO_2 equivalents (kt)

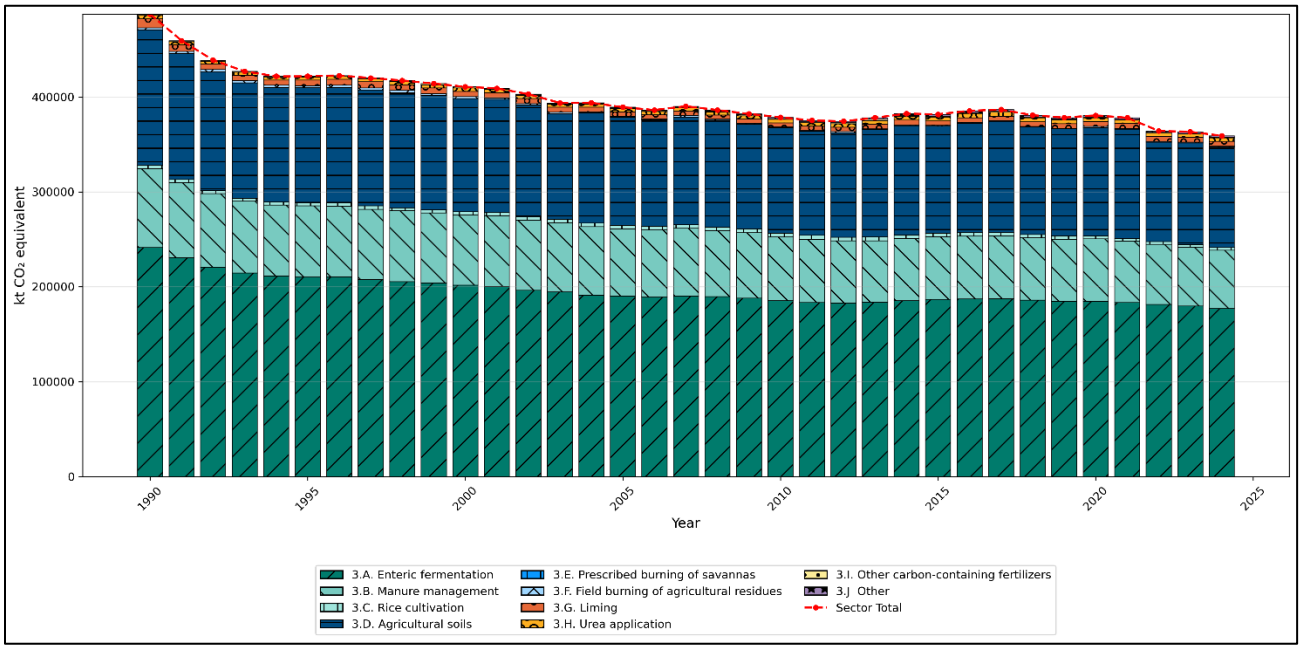


Table 5.1 Sector 3 Agriculture: Share of major categories and all remaining categories in 2024 for EU

GREENHOUSE GAS SOURCE CATEGORIES	1990 (kt)	2024 (kt)	absolute change (Mt)	% change (in Mt)	share 2024
3.A.2 - Enteric Fermentation - Sheep - CH4	23713	15160	-9	-36%	4%
3.B.2 - N2O and NMVOC Emissions - Farming - N2O	27744	17617	-10	-37%	5%
3.D.2 - Agricultural Soils - Farming - N2O	31511	21334	-10	-32%	6%
3.B.1 - Farming - CH4	55164	43615	-12	-21%	12%
3.D.1 - Agricultural Soils - Direct N2O Emissions From Managed Soils - N2O	111566	84483	-27	-24%	24%
3.A.1 - Enteric Fermentation - Cattle - CH4	205067	151843	-53	-26%	42%
Other	32488	25033	-7	-23%	7%
Total Agriculture	**487254**	**359086**	**-128**	**-26%**	**100%**

5.2 Overview of emission trends

In this section we analyze the contribution of the different emission categories to the overall trend of emissions from the EU agricultural sector. Table 5.2 shows the different emission categories, their contribution to total emissions in the EU sector and their contribution to the trend 1990-2024 and 2023-2024. A negative share of the trend means that the emissions in that category are evolving in the opposite direction to those of the EU.

Total emissions from agriculture have decreased by 26 % compared to 1990, and 50 % of this reduction is due to sector 3.A. Another important sector in determining long-term emission trends is 3.D.1 which accounts for 21 % of the total decrease in agricultural emissions, followed by 3.B-CH_4 (9.0 %), 3.D.2 (7.9 %) and 3.B-N_2O (7.9 %), while all the other categories contribute less. The decrease in emissions is mainly due to the decrease in the cattle population and the decrease in the quantities applied of fertilizers, both synthetic and organic.

Table 5.2 Contribution of the different emission categories to the total trend in emissions from the agricultural sector, compared to the share of emissions of those categories from the total of the sector

Emission category	Gas	Contribution to total agricultural emissions (2024)	Share of trend 1990-2024	Share of trend 2023-2024
3.A	CH_4	49%	50%	59%
3.B	CH_4	12%	9%	20%
3.B	N_2O	5%	8%	4%
3.C	CH_4	1%	0%	-10%
3.D.1	N_2O	24%	21%	16%
3.D.2	N_2O	6%	8%	14%
3.F	CH_4	0.18%	1%	-1%
3.F	N_2O	0.05%	0.20%	0%
3.G	CO_2	1.45%	3%	-1%
3.H	CO_2	0.99%	0.06%	0%
3.I	CO_2	0.17%	0.40%	0%
3.J	CH_4	0.40%	-1%	0%
3.J	N_2O	0.03%	-0.07%	0%

For the whole sector, there was a very slight decrease of emissions between 2023 and 2024 (1.1 % of total emissions). The main contributor to the total decrease in agricultural emissions from last year is category 3.A (59 % of the total trend), followed by 3.B CH_4 (20 %) and 3.D.1 (16 %). Some categories show an opposite trend (increased emissions): 3.C.

5.3 Source categories and methodological issues

In this section, we present the information relevant for EU key categories in the sector 3 Agriculture.

The data presented in Table 5.3 shows emissions from key categories in the base year and in the last reported year, whether they are identified as key due to the level or to the trend in emissions and the share of emissions in the category which are calculated using a Tier 2 or Tier 3 method or using country specific emission factors.

CH_4 emissions from enteric fermentation – mainly from cattle - are usually calculated with sophisticated methods. For indirect N_2O emissions from managed soils, the implementation of higher tier is more complex, a lot of countries are still using Tier 1 method. For CO_2 emissions from liming, all Member States are using a Tier 1 method.

Table 5.3 Key categories for the EU (Agriculture - sector excerpt). Emissions in kt CO_2 eq.

key category (gas)	kt CO_2 eq.		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
3.A Enteric fermentation: no classification (CH_4)	241599	177328	T	L	L	96.3%
3.B Manure management: no classification (CH_4)	55153	43594	T	L	L	95%
3.B Manure management: no classification (N_2O)	27744	17611	0	L	L	68.4%
3.D.1 Direct N_2O emissions from managed soils: Direct N_2O Emissions From Managed Soils (N_2O)	111572	84475	T	L	L	56.0%
3.D.2 Indirect N_2O emissions from managed soils: no classification (N_2O)	31511	21370	0	L	L	62.5%
3.G.1 Limestone $CaCO_3$: no classification (CO_2)	6702	4659	0	0	L	0%

Other source categories are not identified as key sources in the analysis at EU level and are therefore not further discussed here. Emissions from source category J - other agriculture emissions are reported only from Germany (digestion of energy crops).

Many countries recognize that in the agriculture sector emissions from the different categories are inherently linked and are best estimated in a comprehensive model that covers not only greenhouse gases (CH_4 and N_2O) in a consistent manner, but also ammonia. Estimations of ammonia emissions are required for reporting under the Convention on Long-Range Transboundary Air Pollution and are needed to estimate indirect N_2O emissions. Hence, several countries have developed comprehensive models covering consistently different source categories and different gases.

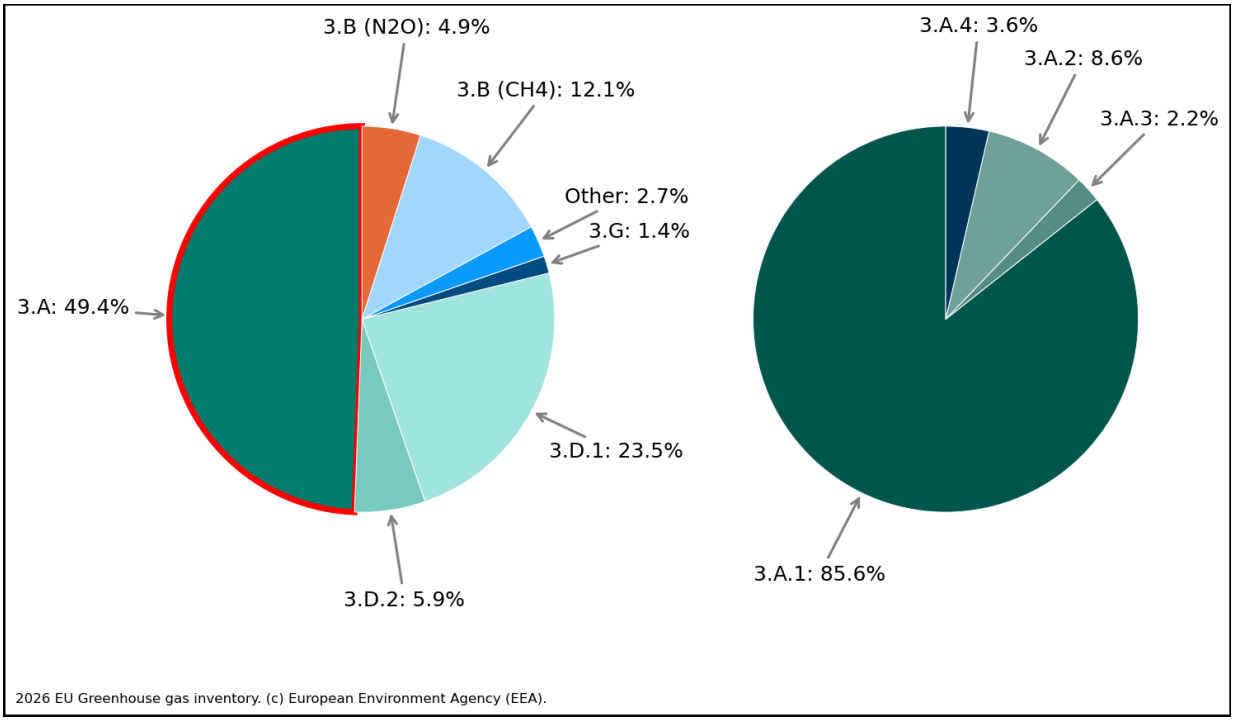
5.3.1 Enteric fermentation (CRT Source Category 3.A)

In 2024 CH_4 emissions in source category *3.A - Enteric Fermentation* in the EU were 177 328 kt CO_2 equivalent. This corresponds to 6.4 % of total EU GHG emissions and 45.3 % of total EU CH_4 emissions.

They make 49.4 % of total agricultural emissions and 78.5 % of total agricultural CH_4 emissions. It is thus the largest GHG source in agriculture and the largest source of CH_4 emissions.

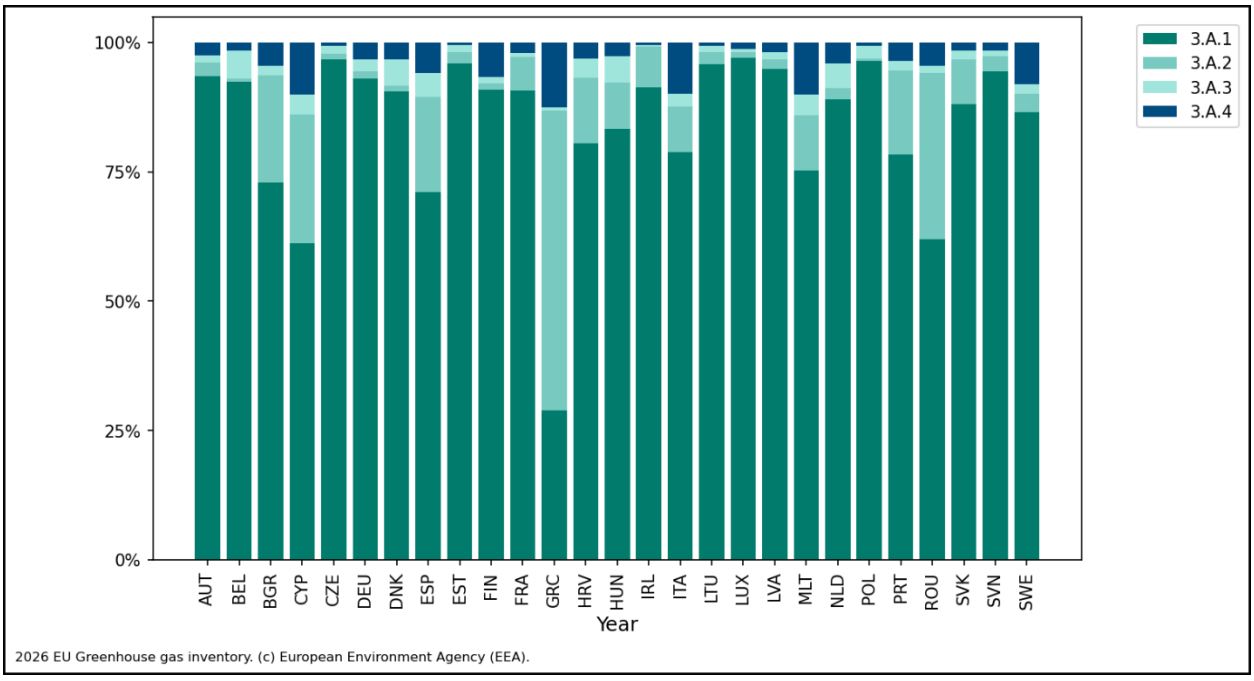
The main sub-categories are 3.A.1 (Cattle) and 3.A.2 (Sheep) as shown in Figure 5.2. Regarding the origin of emissions in the different countries, Figure 5.3 shows the distribution of CH_4 emissions from enteric fermentation by livestock category in all countries. Each bar represents the total emissions of a country in the current emission category, with colours distinguishing the subcategories.

Figure 5.2 Share of source category 3.A on total EU agricultural emissions (left panel) and decomposition into its sub-categories (right panel). The percentages refer to the emissions in the year 2024.



In the left panel, some minor differences in the numbers might be present due to automatic rounding of numbers.

Figure 5.3 Decomposition of emissions in source category 3.A - Enteric Fermentation into its sub-categories by country in the year 2024.



CH_4 emissions from 3.A *Enteric Fermentation* are shown in Table 5.4 by country, and the total EU for the first and the last year of the inventory (1990 and2024) is provided. Between 1990 and 2024, CH_4 emission in this source category decreased by 27 % or 64.2 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 1.4 %.

Table 5.4 3.A - Enteric Fermentation: Countries' contributions to total EU-CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	5 085	4 298	4 263	2,4%	-822	-16%	-35	-1%	T2	CS
Belgium	5 374	4 266	4 125	2,3%	-1 249	-23%	-141	-3%	NA,T1,T2	CS,D,NA
Bulgaria	6 312	1 731	1 678	0,9%	-4 634	-73%	-52	-3%	T1,T2	CS,D
Croatia	2 336	969	979	0,6%	-1 357	-58%	10	1%	T1,T2,T3	CS,D
Cyprus	221	336	341	0,2%	121	55%	5	2%	NA,T1,T2	CS,D,NA
Czechia	6 523	3 614	3 698	2,1%	-2 825	-43%	84	2%	T1,T2	CS,D
Denmark	4 341	3 864	3 876	2,2%	-465	-11%	12	0%	NA,T1,T2	CS,D,NA,OTH
Estonia	1 421	610	611	0,3%	-810	-57%	1	0%	NA,T1,T2	CS,D,NA
Finland	2 714	2 107	2 076	1,2%	-638	-24%	-32	-2%	,NA,OTH,T1,T2	CS,D,NA,OTH
France	46 779	36 885	36 545	20,6%	-10 234	-22%	-340	-1%	T2,T3	CS
Germany	37 624	26 428	25 848	14,6%	-11 776	-31%	-580	-2%	T1,T2,T3	CS,D
Greece	4 603	4 242	4 134	2,3%	-469	-10%	-108	-3%	T1,T2	CS,D
Hungary	4 108	2 255	2 258	1,3%	-1 850	-45%	3	0%	T1,T2	CS,D
Ireland	12 480	13 062	12 705	7,2%	225	2%	-357	-3%	CS,D,NA,T1,T2	CS,D,NA
Italy	17 174	14 314	13 488	7,6%	-3 687	-21%	-826	-6%	T1,T2	CS,D
Latvia	2 488	885	867	0,5%	-1 622	-65%	-19	-2%	T1,T2	CS,D
Lithuania	4 880	1 743	1 719	1,0%	-3 161	-65%	-24	-1%	NA,T1,T2	CS,D,NA,OTH
Luxembourg	404	418	404	0,2%	0	0%	-14	-3%	T1a,T2	CS,D
Malta	59	40	40	0,0%	-19	-32%	0	0%	NA,T1,T2	CS,D,NA
Netherlands	10 394	9 335	9 157	5,2%	-1 237	-12%	-178	-2%	NA,T1,T2,T3	CS,D,NA
Poland	22 008	14 607	14 950	8,4%	-7 058	-32%	344	2%	NA,T1,T2	CS,D,NA
Portugal	3 942	3 915	3 800	2,1%	-141	-4%	-115	-3%	T1,T2	CS,D
Romania	16 797	8 302	8 371	4,7%	-8 426	-50%	69	1%	NA,T1,T2	CS,D,NA
Slovakia	3 086	1 057	1 047	0,6%	-2 039	-66%	-10	-1%	NA,T1,T2	CS,D,NA
Slovenia	1 067	976	975	0,5%	-92	-9%	-1	0%	NA,T1,T2	CS,D,NA
Spain	15 623	16 180	16 098	9,1%	476	3%	-81	-1%	CS,NA,T1,T2,T3	CS,D,NA
Sweden	3 687	3 316	3 257	1,8%	-430	-12%	-60	-2%	CS,T1	CS,D
EU	**241 529**	**179 754**	**177 310**	**100%**	**-64 219**	**-27%**	**-2 444**	**-1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

CH_4 emissions by country from *3.A.1 - Cattle Enteric Fermentation* are shown in Table 5.5 and total EU for the first and the last year of the inventory (1990 and 2024) is provided. Values are given in kt CO_2-eq. Between 1990 and 2024, CH_4 emission in this source category decreased by 26 % or 53.2 Mt CO_2-eq.

Table 5.5 3.A.1 - Cattle: Countries' contributions to GHG- CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	4 871	4 023	3 989	2,6%	-882	-18%	-35	-1%	T2	CS
Belgium	5 061	3 951	3 809	2,5%	-1 252	-25%	-142	-4%	T2	CS
Bulgaria	3 313	1 262	1 224	0,8%	-2 089	-63%	-38	-3%	T2	CS
Croatia	2 052	780	789	0,5%	-1 264	-62%	8	1%	T2,T3	CS
Cyprus	113	210	209	0,1%	96	84%	-1	-1%	T1,T2	CS,D
Czechia	6 213	3 495	3 576	2,4%	-2 637	-42%	81	2%	T2	CS
Denmark	4 031	3 505	3 513	2,3%	-518	-13%	7	0%	T2	CS,D
Estonia	1 355	583	586	0,4%	-769	-57%	3	1%	T2	CS,D
Finland	2 491	1 915	1 884	1,2%	-606	-24%	-30	-2%	T2	CS
France	41 854	33 490	33 168	21,8%	-8 686	-21%	-322	-1%	T3	CS
Germany	35 462	24 658	24 055	15,8%	-11 407	-32%	-603	-2%	T2,T3	CS,D
Greece	1 423	1 301	1 197	0,8%	-226	-16%	-104	-8%	T2	CS,D
Hungary	3 221	1 883	1 881	1,2%	-1 340	-42%	-2	0%	T2	CS
Ireland	10 817	11 877	11 600	7,6%	784	7%	-276	-2%	CS,T2	CS
Italy	14 405	11 261	10 639	7,0%	-3 765	-26%	-622	-6%	T2	CS
Latvia	2 372	843	823	0,5%	-1 549	-65%	-20	-2%	T2	CS
Lithuania	4 717	1 669	1 647	1,1%	-3 071	-65%	-22	-1%	T2	CS
Luxembourg	397	406	393	0,3%	-4	-1%	-14	-3%	T2	CS
Malta	49	30	30	0,0%	-19	-39%	0	0%	T2	CS
Netherlands	9 179	8 284	8 149	5,4%	-1 030	-11%	-136	-2%	T2,T3	CS
Poland	19 759	14 060	14 412	9,5%	-5 348	-27%	352	3%	T2	CS
Portugal	2 755	3 078	2 980	2,0%	225	8%	-98	-3%	T2	CS
Romania	12 595	5 147	5 188	3,4%	-7 408	-59%	41	1%	T2	CS
Slovakia	2 760	930	923	0,6%	-1 837	-67%	-7	-1%	T2	CS
Slovenia	1 029	923	920	0,6%	-109	-11%	-3	0%	T2	CS
Spain	9 545	11 563	11 442	7,5%	1 897	20%	-122	-1%	CS,T2	CS
Sweden	3 230	2 872	2 820	1,9%	-409	-13%	-52	-2%	CS	CS
EU	**205 067**	**154 000**	**151 843**	**100%**	**-53 224**	**-26%**	**-2 157**	**-1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

CH_4 emissions by country from *3.A.2 - Sheep Enteric Fermentation* are shown in Table 5.6 and the total EU for the first and the last year of the inventory (1990 and 2023) is provided. Values are given in kt CO_2-eq. Between 1990 and 2024, CH_4 emission in this source category decreased by 36 % or 8.6 Mt CO_2-eq.

Table 5.6 3.A.2 - Sheep: Countries' contributions to total EU-CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	86	109	109	0,7%	24	28%	0	0%	T2	CS
Belgium	32	23	26	0,2%	-6	-18%	3	13%	T1	D
Bulgaria	2 560	359	348	2,3%	-2 212	-86%	-11	-3%	T2	CS
Croatia	168	124	124	0,8%	-44	-26%	0	0%	T1	D
Cyprus	65	79	85	0,6%	20	31%	6	7%	T1	D
Czechia	96	40	40	0,3%	-56	-58%	0	1%	T1	D
Denmark	44	36	39	0,3%	-5	-12%	2	7%	T2	D
Estonia	36	15	12	0,1%	-23	-65%	-3	-17%	T1	D
Finland	24	30	28	0,2%	4	17%	-2	-5%	CS	CS
France	3 957	2 396	2 377	15,7%	-1 580	-40%	-18	-1%	T3	CS
Germany	651	369	365	2,4%	-286	-44%	-5	-1%	T1	CS,D
Greece	2 300	2 390	2 391	15,8%	91	4%	1	0%	T2	CS,D
Hungary	439	203	201	1,3%	-238	-54%	-2	-1%	T1	D
Ireland	1 577	1 079	999	6,6%	-579	-37%	-80	-7%	CS,T2	CS
Italy	1 709	1 356	1 181	7,8%	-528	-31%	-175	-13%	T2	CS
Latvia	37	18	16	0,1%	-21	-58%	-2	-11%	T1	D
Lithuania	21	42	41	0,3%	20	99%	-1	-2%	T2	CS
Luxembourg	3	4	4	0,0%	2	61%	0	5%	T1a	D
Malta	4	4	4	0,0%	0	5%	0	4%	T2	CS
Netherlands	429	224	197	1,3%	-232	-54%	-27	-12%	T1	D
Poland	932	62	67	0,4%	-865	-93%	5	7%	T1	D
Portugal	888	630	616	4,1%	-272	-31%	-14	-2%	T2	CS
Romania	3 100	2 643	2 690	17,7%	-410	-13%	47	2%	T2	CS
Slovakia	204	95	90	0,6%	-113	-56%	-5	-5%	T2	CS
Slovenia	5	29	29	0,2%	24	476%	0	0%	T1	D
Spain	4 246	2 953	2 967	19,6%	-1 279	-30%	15	0%	CS,T2	CS
Sweden	102	122	115	0,8%	12	12%	-8	-6%	T1	D
EU	**23 713**	**15 434**	**15 160**	**100%**	**-8 553**	**-36%**	**-273**	**-2%**	**-**	**-**

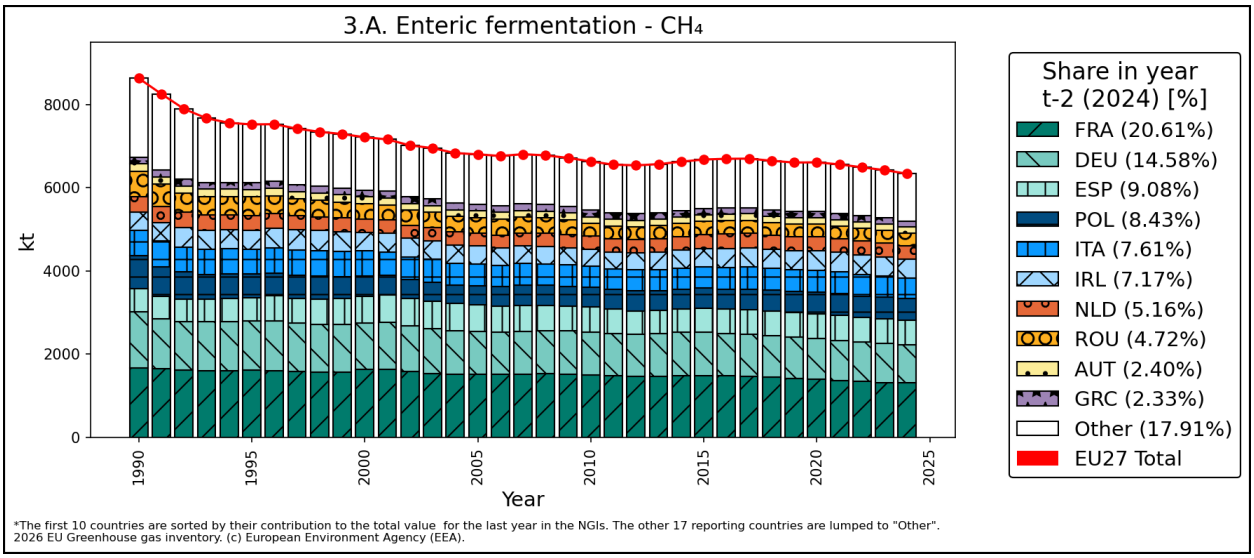
Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

5.3.1.1 Trends in Emissions and Activity Data

3.A - Enteric Fermentation - Emissions

Emissions in source category *3.A - Enteric Fermentation* decreased considerably in the EU by 27 % or 64.2 Mt CO_2-eq in the period 1990 to 2024. Figure 5.4 shows the trend of emissions indicating the countries contributing most to EU total. The figure represents the trend in CH_4 emissions from enteric fermentation for the different countries along the inventory period.

Figure 5.4 3.A: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024.



3.A.1 - Cattle - Emissions

Emissions in source category *3.A.1 - Cattle* decreased considerably in the EU by 26 % or 53.2 Mt CO_2-eq in the period 1990 to 2024.

Figure 5.5 shows the trend of emissions in source category *3.A.1.a - Dairy Cattle*, indicating the countries contributing most to EU total. Figure 5.6 shows the trend of emissions in source category *3.A.1.b - Non-Dairy Cattle*, indicating the countries contributing most to EU total.

Figure 5.5 3.A.1.a Dairy Cattle: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024

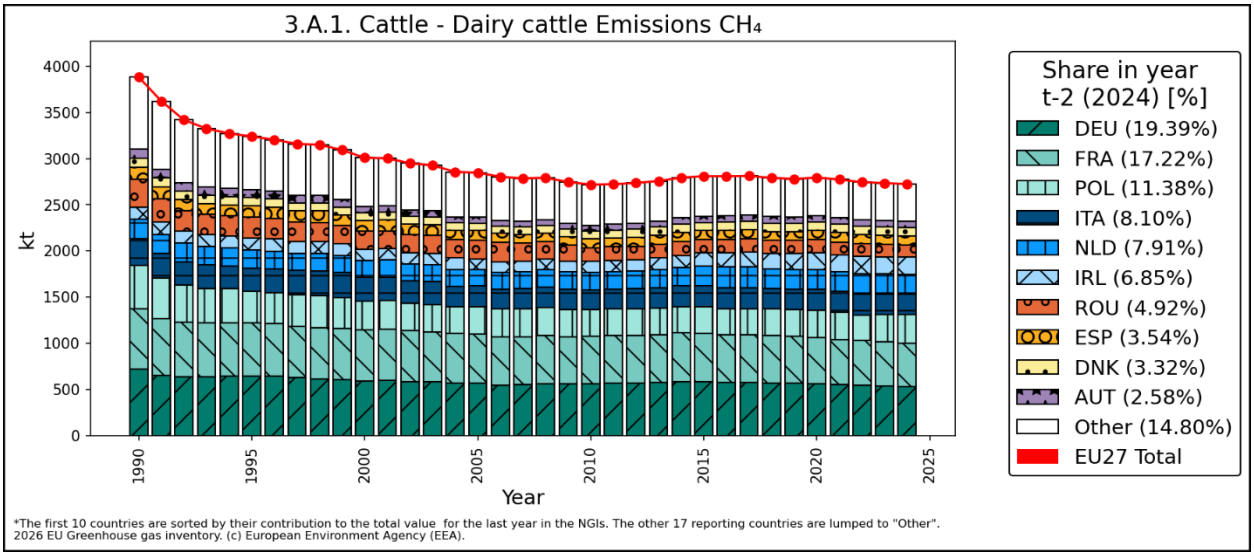
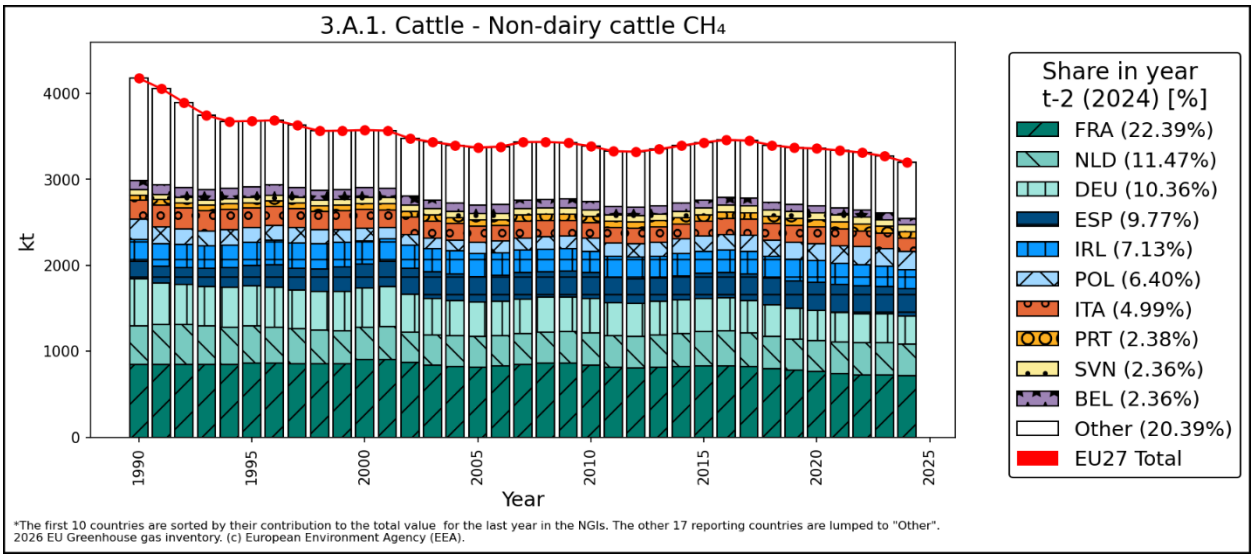


Figure 5.6 3.A.1.b Non-Dairy Cattle: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.A.1 - Cattle - Population

The main driver for the decrease of CH_4 emissions from enteric fermentation is the decrease in animal numbers that we can see in Figure 5.7, which represents a strong decrease in the EU in the period 1990 to 2024. Figure 5.8 shows the population of dairy cattle and Figure 5.9 the population of non-dairy cattle.

Figure 5.7 3.A.1 Cattle: Trend in cattle population in the EU and the countries contributing most to EU values including their share to EU population in 2024

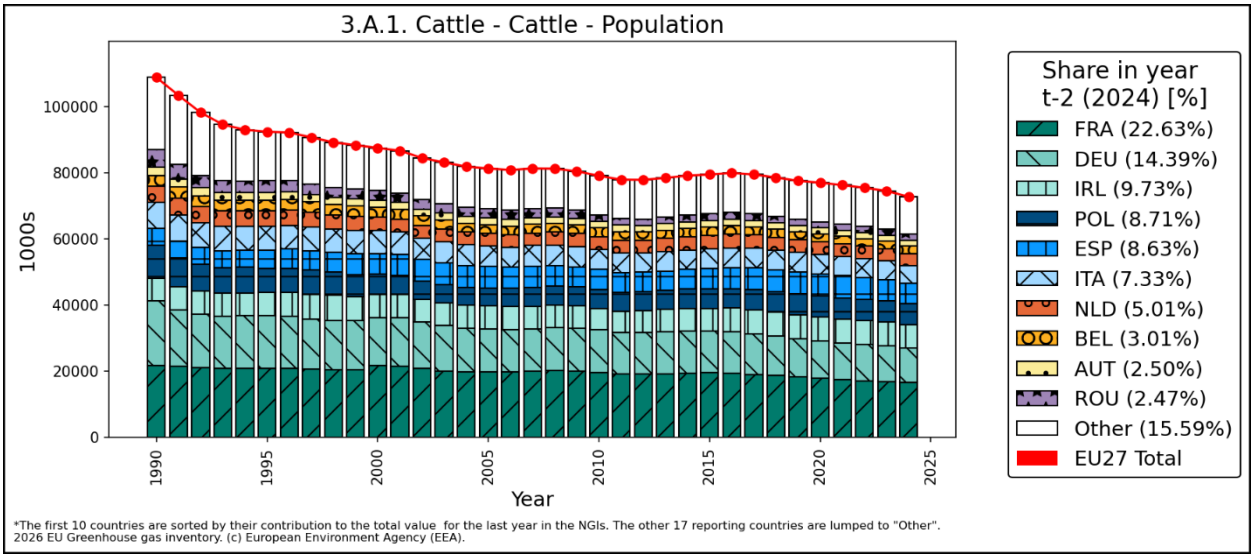


Figure 5.8 3.A.1 Dairy cattle: Trend in dairy cattle population in the EU and the countries contributing most to EU values including their share to EU population in 2024

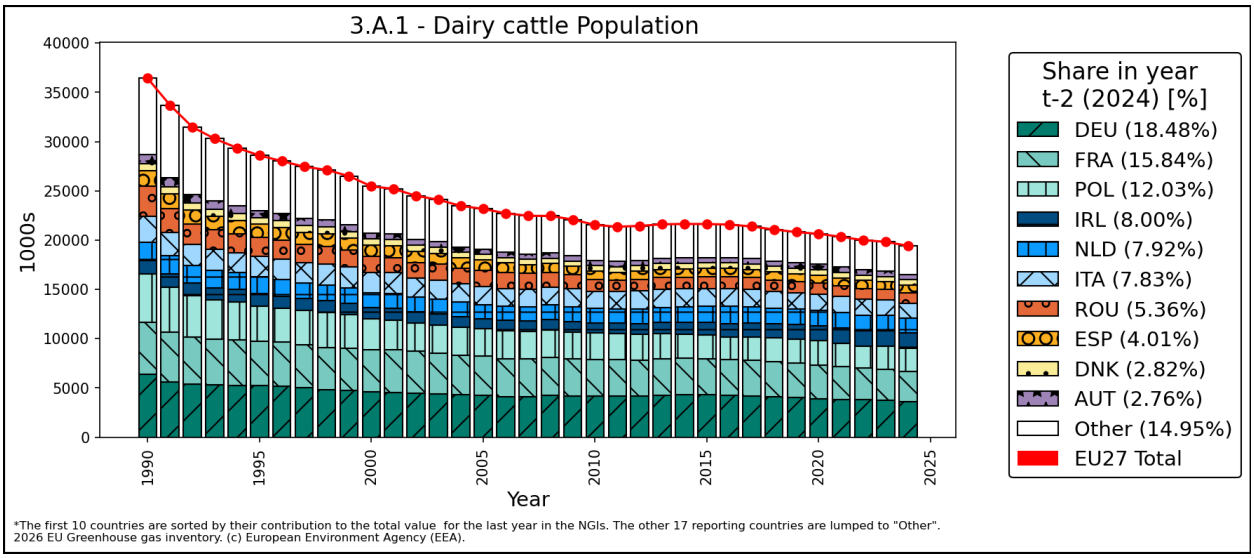
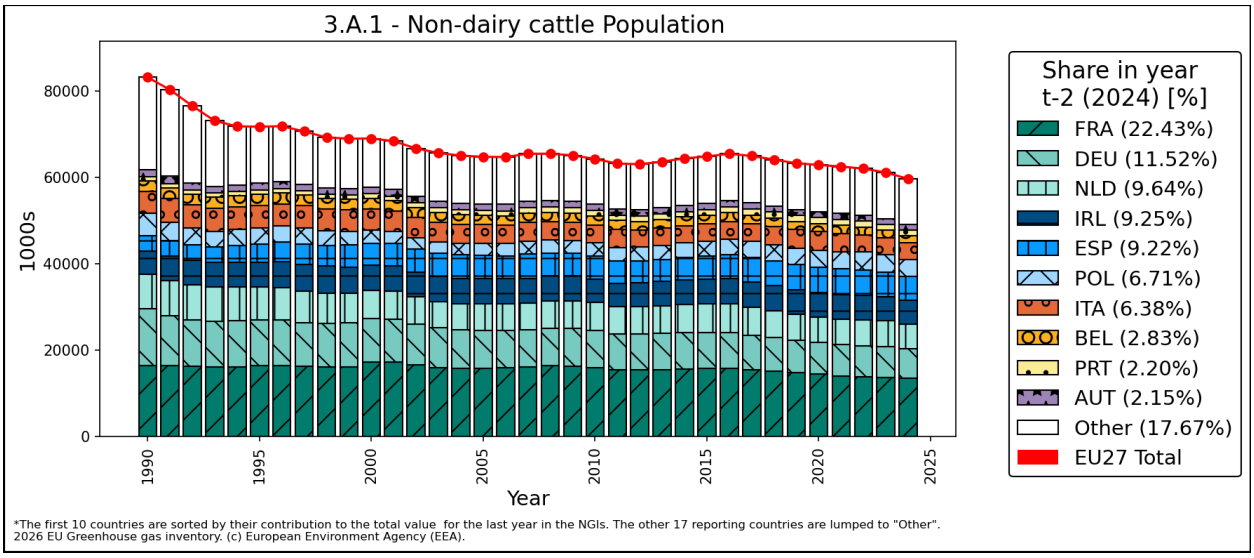


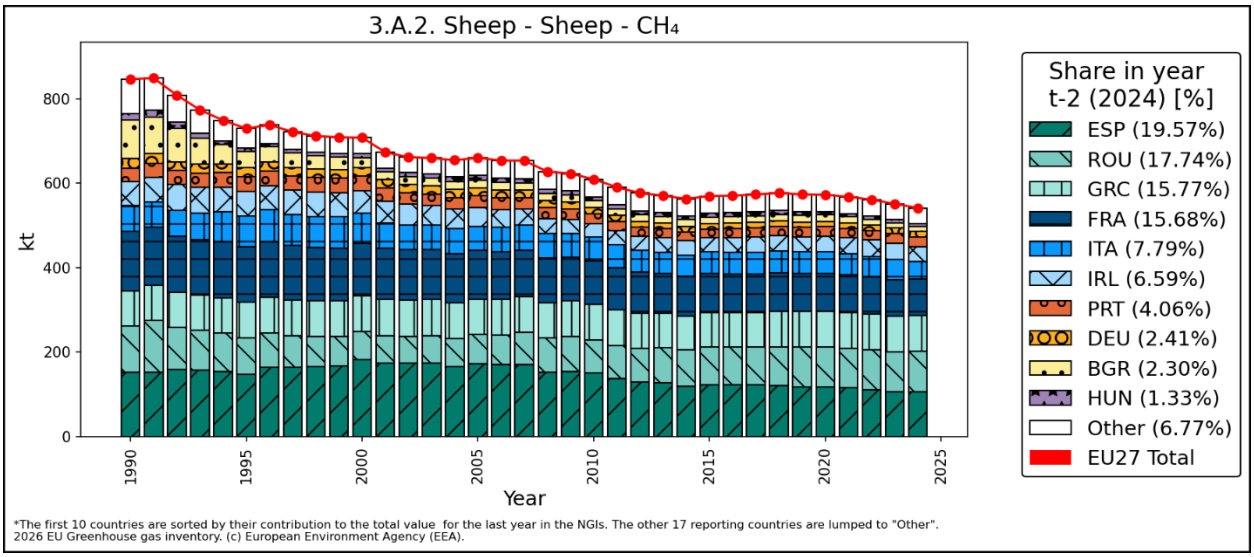
Figure 5.9 3.A.1 Non-dairy cattle: Trend in non-dairy cattle population in the EU and the countries contributing most to EU values including their share to EU population in 2024



3.A.2 - Sheep - Emissions

Emissions in source category *3.A.2 - Sheep* decreased strongly in the EU by 36 % or 8.6 Mt CO_2-eq in the period 1990 to 2024. Figure 5.10 shows the trend of emissions indicating the countries contributing most to EU total.

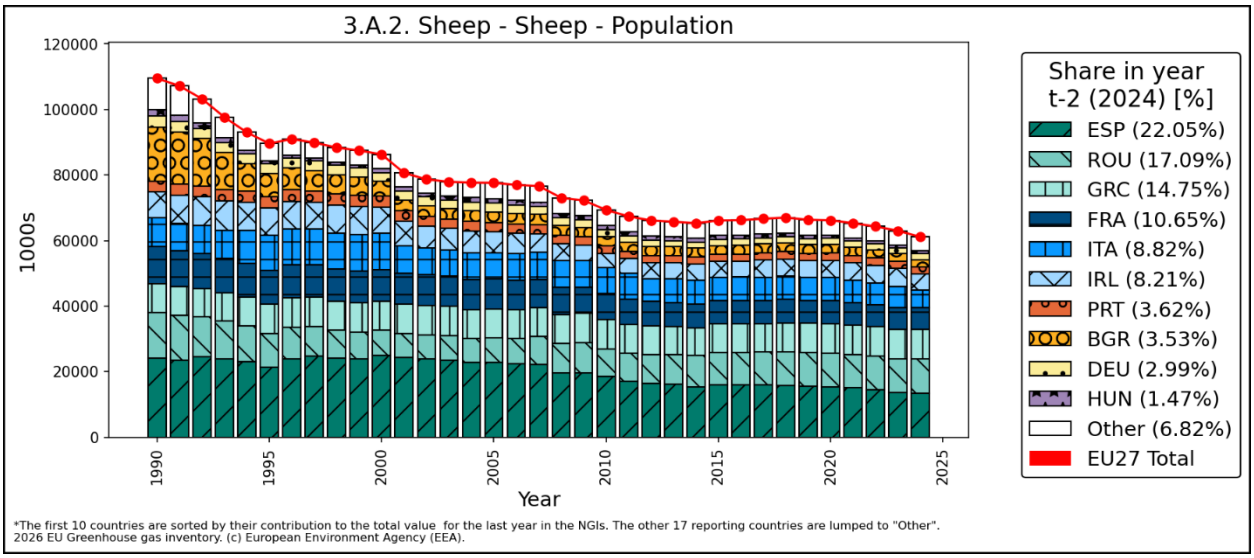
Figure 5.10 3.A.2: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.A.2 - Sheep - Population

The main driver for the decrease of CH_4 emissions from enteric fermentation for sheep was the decrease in animal numbers shown in Figure 5.11.

Figure 5.11 3.A.2: Trend in sheep population in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



5.3.1.2 Implied EFs and Methodological Issues

Information for cattle, sheep and swine are reported using national classification of the animals. For example, it is possible to report cattle numbers using one of two options:

- Option A distinguishes ‘Dairy Cattle’ and ‘Non-Dairy Cattle’.
- Option B distinguishes ‘Mature Dairy Cattle’, ‘Other Mature Cattle’ and ‘Growing Cattle’.

To obtain values that can be aggregated to EU level, data reported under Option B were converted to Option A categories. ‘Mature Dairy Cattle’ is taken for ‘Dairy Cattle’ and the other two categories under Option B are used for ‘Non-Dairy Cattle’.

In case data were aggregated, this was done on the basis of a weighted average using population data as weighting factors.

In the cases for ‘Sheep’ and ‘Swine’, all animal types reported by countries are aggregated to one single parent category using the same approach.

In this section we discuss the Implied Emission Factor for the main animal types. Furthermore, we present data on the average gross energy intake and - for dairy cattle - also the milk yield.

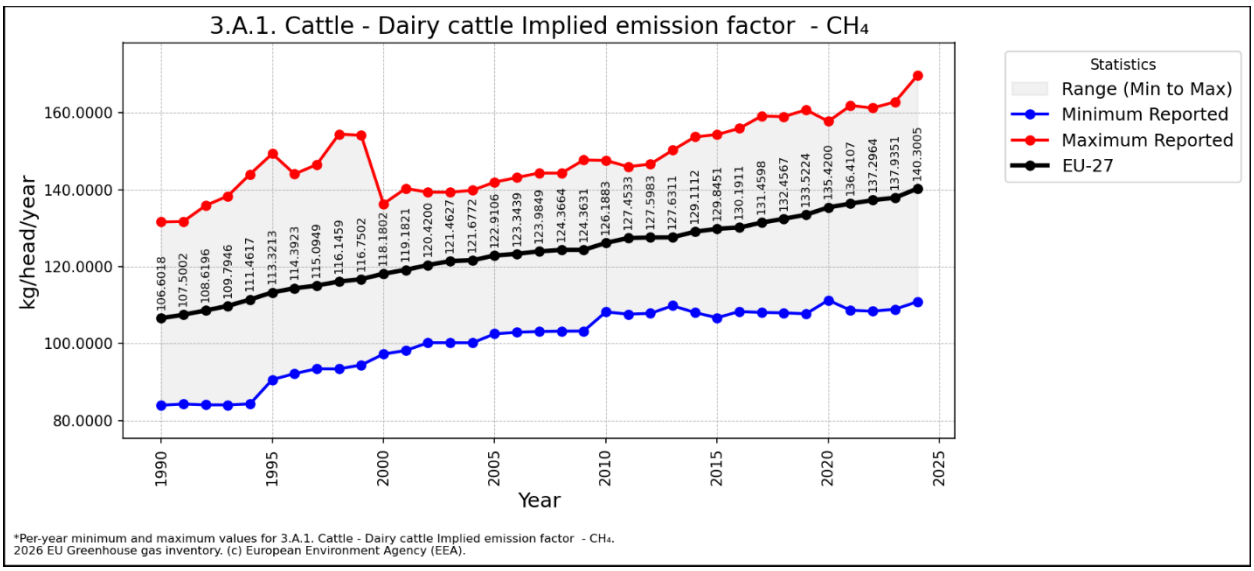
3.A.1 - Cattle - Implied emission factor

For cattle, the analysis is conducted per subcategory.

3.A.1.a - Dairy Cattle - Implied emission factor

The implied emission factor for CH_4 emissions in source category *3.A.1.a - Dairy Cattle* increased in the EU strongly between 1990 and 2024. Figure 5.12 shows the trend of the implied emission factor indicating also the range of values used by the countries.

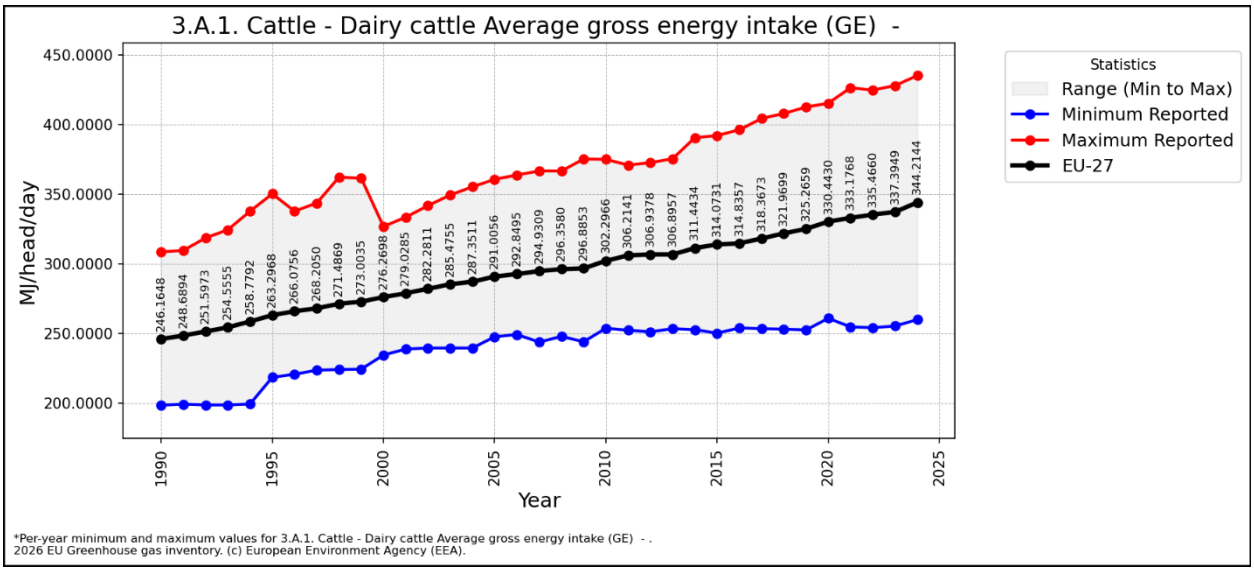
Figure 5.12 3.A.1.a - Dairy Cattle: Trend in implied emission factor and range of values reported by countries



3.A.1.a - Dairy Cattle - Gross energy

The gross energy, a parameter used for calculating CH_4 emissions in source category *3.A.1.a - Dairy Cattle*, increased in the EU strongly between 1990 and 2024. Figure 5.13 shows the trend of the gross energy indicating also the range of values used by the countries

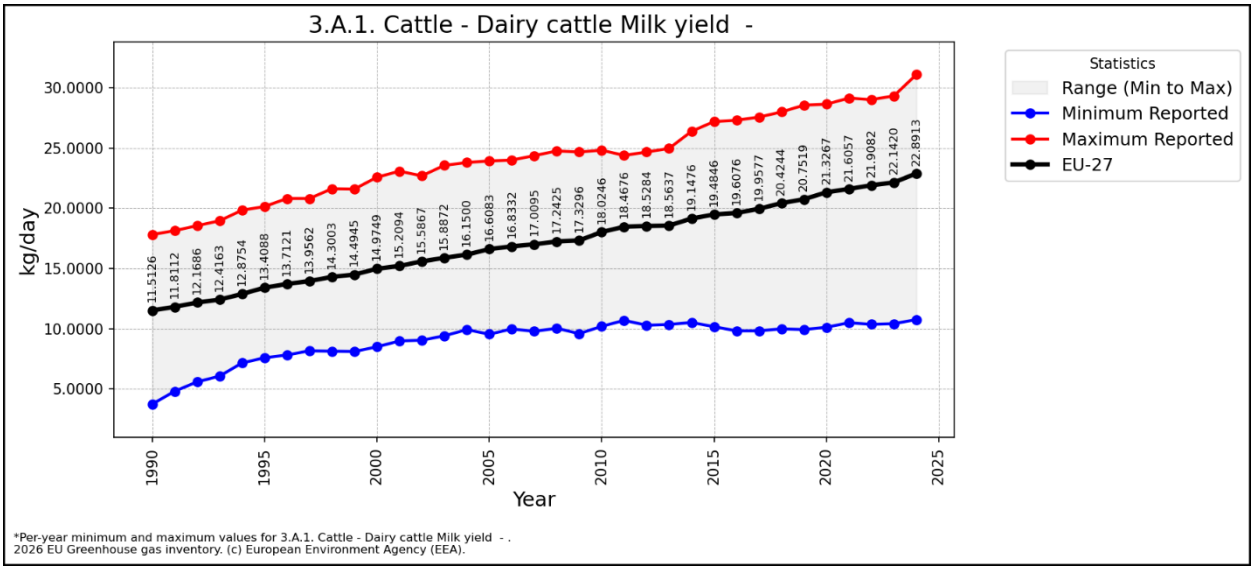
Figure 5.13 3.A.1.a - Dairy Cattle: Trend in gross energy and range of values reported by countries



3.A.1.a - Dairy Cattle - Milk yield

The milk yield, a parameter used for calculating CH_4 emissions in source category *3.A.1.a - Dairy Cattle*, increased in the EU very strongly between 1990 and 2024. Figure 5.14 shows the trend of the milk yield indicating also the range of values used by the countries.

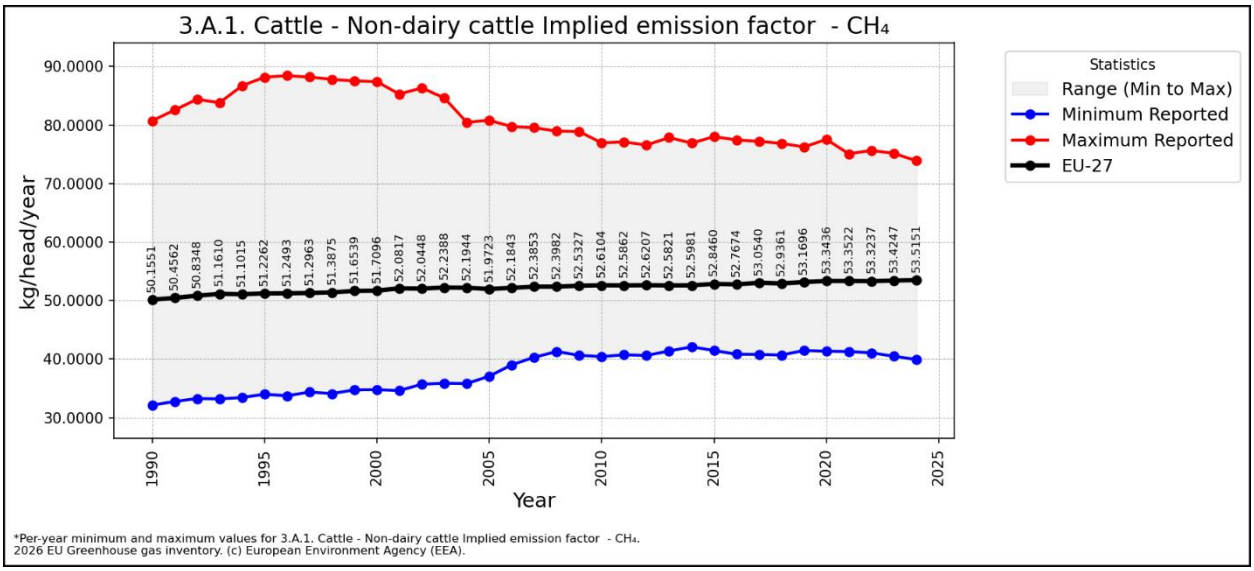
Figure 5.14 3.A.1.a - Dairy Cattle: Trend in milk yield and range of values reported by countries



3.A.1.b - Non-Dairy Cattle - Implied emission factor

The implied emission factor for CH_4 emissions in source category *3.A.1.b - Non-Dairy Cattle* increased in the EU moderately between 1990 and 2024. Figure 5.15 shows the trend of the implied emission factor indicating also the range of values used by the countries.

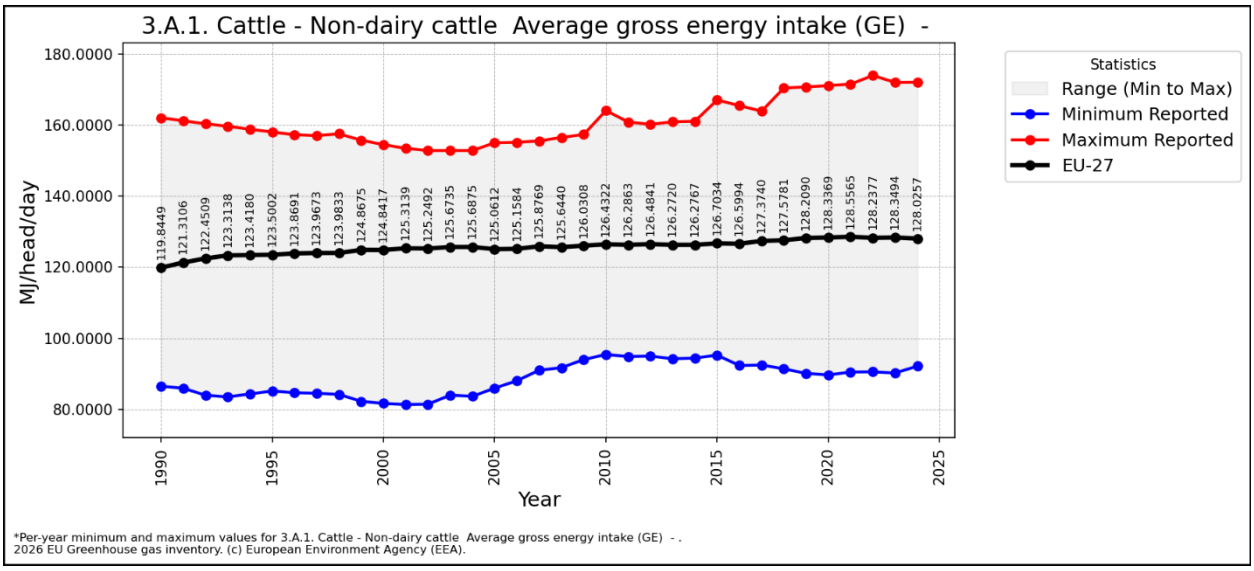
Figure 5.15 3.A.1.b - Non-Dairy Cattle: Trend in implied emission factor and range of values reported by countries



3.A.1.b - Non-Dairy Cattle - Average gross energy intake

The average gross energy intake, a parameter used for calculating CH_4 emissions in source category *3.A.1.b - Non-Dairy Cattle*, increased in the EU moderately between 1990 and 2024. Figure 5.16 shows the trend of the average gross energy intake indicating also the range of values used by the countries.

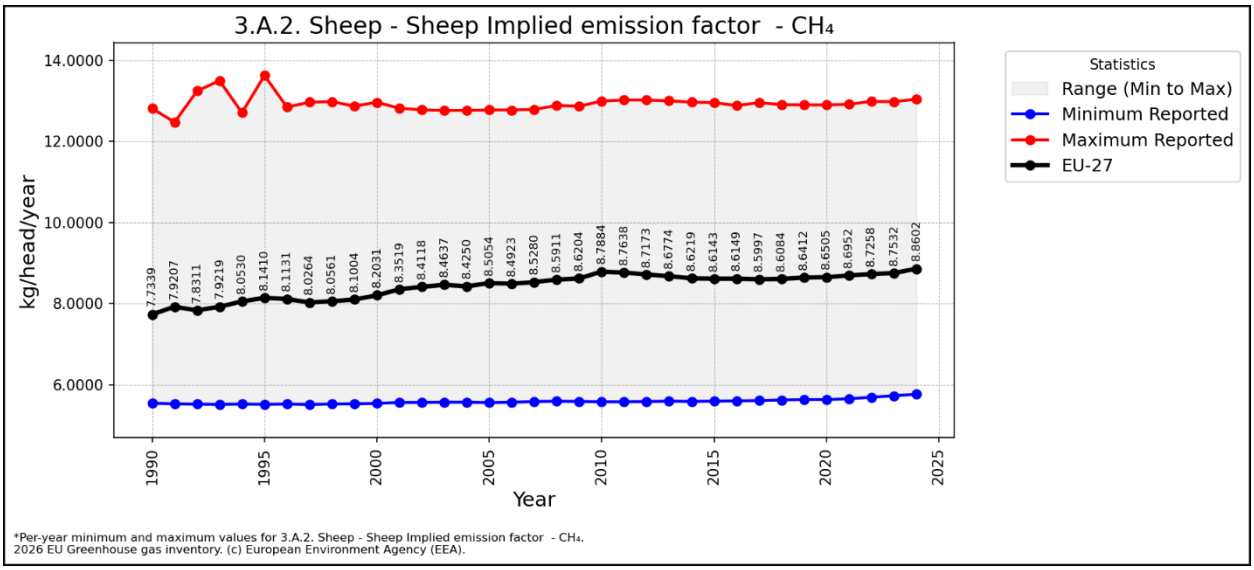
Figure 5.16 3.A.1.b - Non-Dairy Cattle: Trend in average gross energy intake and range of values reported by countries



3.A.2 - Sheep - Implied emission factor

The implied emission factor for CH_4 emissions in source category *3.A.2 - Sheep* increased in the EU moderately between 1990 and 2024. Figure 5.17 shows the trend of the implied emission factor indicating also the range of values used by the countries.

Figure 5.17 3.A.2 - Sheep: Trend in implied emission factor and range of values reported by countries

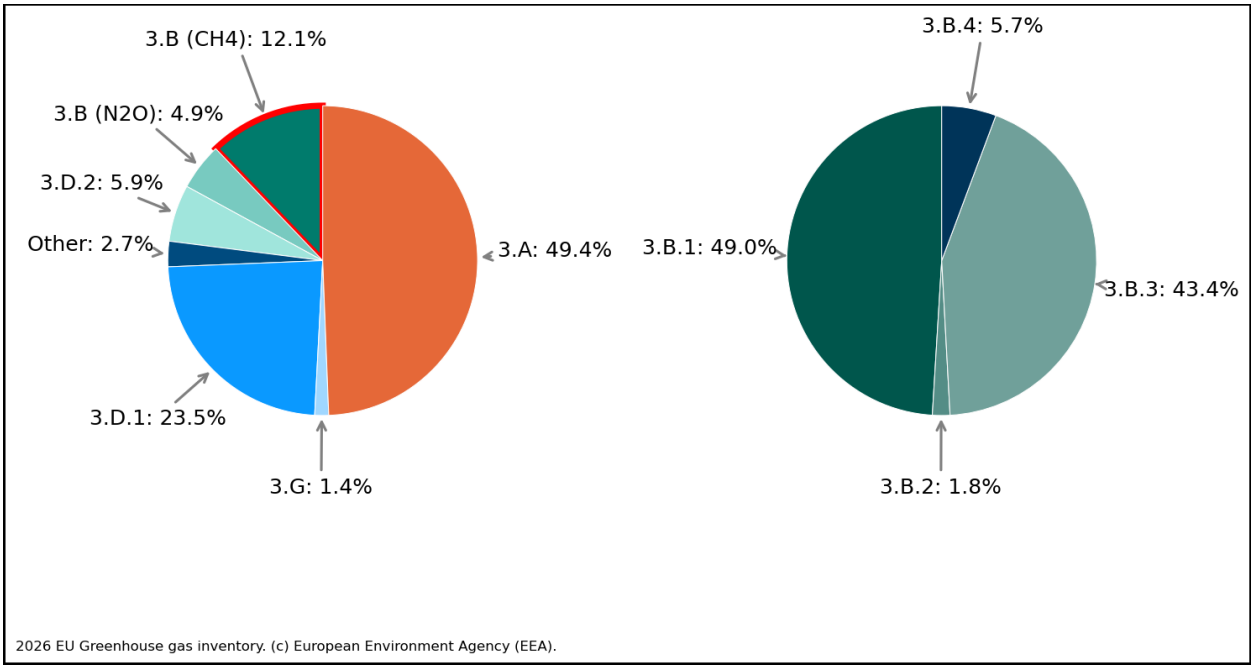


5.3.2 Manure Management - CH_4 (CRT Source Category 3B)

In 2024 CH_4 emissions in source category *3.B - Manure Management* in the EU were 43 615kt CO_2 equivalent. This corresponds to 1.4% of total EU GHG emissions and 11.2 % of total EU CH_4 emissions.

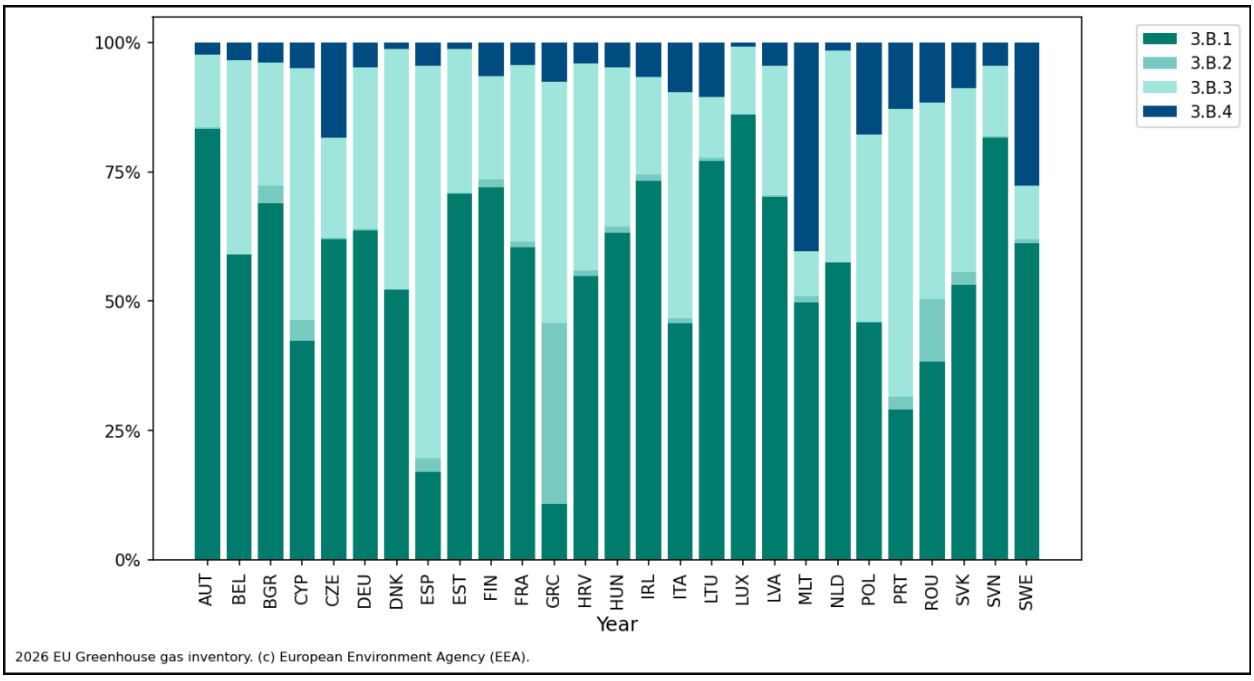
They make 12.1 % of total agricultural emissions and 19.3 % of total agricultural CH_4 emissions. The main sub-categories are Cattle (3.B.1) and Swine (3.B.3) as shown in Figure 5.18. Regarding the origin of emissions in the different countries, Figure 5.19 shows the distribution of CH_4 emissions from manure management by livestock category in all countries. Each bar represents the total emissions of a country in the current emission category, with colours distinguishing the subcategories.

Figure 5.18 Share of source category 3.B on total EU agricultural emissions (left panel) and decomposition into its sub-categories (right panel). The percentages refer to the emissions in the year 2024.



In the left panel, some minor differences in the numbers might be present due to automatic rounding of numbers.

Figure 5.19 Decomposition of emissions in source category 3.B - Manure Management into its sub-categories by country in the year 2024.



CH_4 emissions by country and for the total EU from 3.B *Manure Management* are shown in Table 5.7 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, CH_4 emission in this source category decreased by 21 % or 11.5 Mt CO_2-eq. From 2022 to 2024 emissions in the current category decreased by 1.9 %.

Table 5.7 3.B - Manure Management: Countries' contributions to EU-CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	684	815	816	1,9%	132	19%	1	0%	T2	CS,D
Belgium	1 526	1 320	1 298	3,0%	-228	-15%	-22	-2%	NA,T1,T2	CS,D,NA
Bulgaria	1 252	363	358	0,8%	-894	-71%	-5	-1%	T1,T2	CS,D
Croatia	408	305	314	0,7%	-93	-23%	10	3%	T2	CS,D
Cyprus	114	75	75	0,2%	-39	-34%	0	0%	T1,T2	D
Czechia	1 539	355	371	0,9%	-1 168	-76%	17	5%	T1,T2	CS,D
Denmark	2 964	3 094	3 071	7,0%	107	4%	-23	-1%	T2,T3	CS,D
Estonia	186	165	161	0,4%	-25	-14%	-4	-2%	NA,T1,T2	CS,D,NA
Finland	528	520	534	1,2%	6	1%	14	3%	T2	CS
France	6 800	6 444	6 398	14,7%	-402	-6%	-46	-1%	T2	CS,D
Germany	8 488	6 287	6 227	14,3%	-2 262	-27%	-61	-1%	T2	CS,D
Greece	939	748	742	1,7%	-196	-21%	-6	-1%	T1,T2	CS,D
Hungary	1 240	638	634	1,5%	-606	-49%	-4	-1%	T1,T2	CS,D
Ireland	1 815	1 889	1 861	4,3%	46	3%	-28	-2%	NA,T1,T2	CS,D,NA
Italy	5 308	4 519	4 098	9,4%	-1 210	-23%	-421	-9%	T1,T2	CS,D
Latvia	237	105	109	0,2%	-128	-54%	4	4%	T1,T2	CS,D
Lithuania	750	250	246	0,6%	-504	-67%	-4	-2%	NA,T1,T2	CS,D,NA
Luxembourg	79	88	86	0,2%	7	9%	-2	-2%	T1,T2	CS
Malta	10	6	6	0,0%	-4	-41%	0	-1%	NA,T1,T2	CS,D,NA
Netherlands	6 155	3 760	3 689	8,5%	-2 467	-40%	-72	-2%	NA,T1,T2	CS,D,NA
Poland	2 338	1 583	1 618	3,7%	-720	-31%	35	2%	T1,T2	CS,D
Portugal	907	818	811	1,9%	-97	-11%	-7	-1%	T1,T2	CS,D
Romania	2 077	660	674	1,5%	-1 403	-68%	14	2%	NA,T1,T2	CS,D,NA
Slovakia	719	102	103	0,2%	-615	-86%	1	1%	T1,T2	CS
Slovenia	371	192	191	0,4%	-180	-48%	0	0%	T1,T2	CS,D
Spain	7 462	9 024	8 784	20,1%	1 322	18%	-240	-3%	T1,T2	CS,D
Sweden	267	340	338	0,8%	72	27%	-1	0%	T1,T2	CS,D
EU	**55 164**	**44 463**	**43 615**	**100%**	**-11 549**	**-21%**	**-848**	**-2%**	**-**	**-**

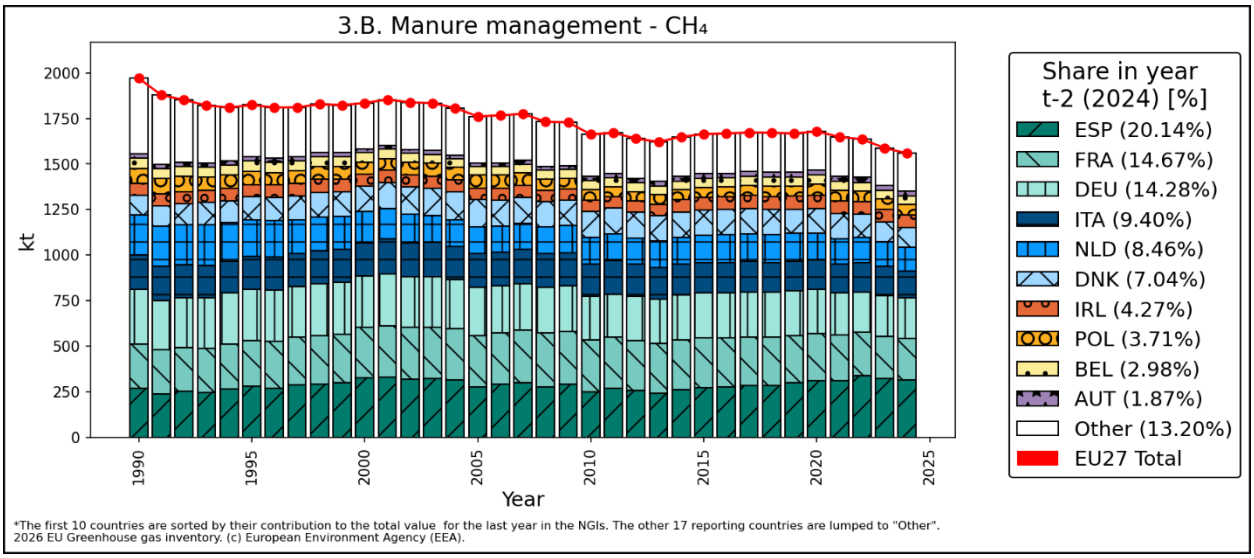
Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

5.3.2.1 Trends in Emissions and Activity Data

3.B- Manure Management - CH_4 Emissions

CH_4 emissions in source category *3.B- Manure Management* decreased considerably in the EU by 21 % or 11.5 Mt CO_2-eq in the period 1990 to 2024. Figure 5.20 shows the trend of emissions indicating the countries contributing most to the EU total.

Figure 5.20 3.B: Trend in CH_4 emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.B. 1 - Cattle - Emissions

In 2024 CH_4 emissions in source category *3.B.1 - Cattle* in the EU were 21385 kt CO_2 equivalent. It represents 6.0 % of total agricultural emissions and 9.5 % of total agricultural CH_4 emissions. Figure 5.21 and Figure 5.22 show the trend of emissions for Dairy and Non-Dairy Cattle indicating the countries contributing most to EU.

CH_4 emissions by country and for the total EU from 3.B.1 *Manure Management* are shown in Table 5.8 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, CH_4 emission in this source category decreased by 19.4 % or 5.1 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 1.9%.

Table 5.8 3.B.1 - Cattle: Countries' contributions to total EU-CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	485	680	680	3,2%	195	40%	1	0%	T2	CS,D
Belgium	913	780	767	3,6%	-146	-16%	-14	-2%	T2	CS
Bulgaria	510	255	247	1,2%	-263	-52%	-8	-3%	T2	CS
Croatia	216	168	172	0,8%	-44	-20%	4	2%	T2	CS,D
Cyprus	19	32	32	0,1%	13	65%	0	-1%	T2	D
Czechia	810	225	230	1,1%	-580	-72%	5	2%	T2	CS,D
Denmark	1 475	1 615	1 602	7,5%	127	9%	-13	-1%	T2,T3	CS
Estonia	60	117	114	0,5%	54	90%	-3	-3%	T2	CS,D
Finland	349	368	384	1,8%	35	10%	17	5%	T2	CS
France	4 463	3 884	3 865	18,1%	-598	-13%	-19	0%	T2	CS,D
Germany	5 205	4 087	3 968	18,6%	-1 237	-24%	-118	-3%	T2	CS
Greece	137	90	81	0,4%	-56	-41%	-9	-10%	T2	CS,D
Hungary	680	406	400	1,9%	-280	-41%	-6	-1%	T2	CS
Ireland	1 417	1 398	1 362	6,4%	-56	-4%	-37	-3%	T2	CS
Italy	3 060	2 020	1 874	8,8%	-1 186	-39%	-147	-7%	T2	CS
Latvia	124	78	76	0,4%	-48	-38%	-1	-1%	T2	CS
Lithuania	286	190	190	0,9%	-96	-34%	0	0%	T2	CS
Luxembourg	67	77	74	0,3%	7	10%	-3	-4%	T2	CS
Malta	6	3	3	0,0%	-3	-52%	0	0%	T2	CS
Netherlands	1 801	2 123	2 119	9,9%	318	18%	-4	0%	T2	CS
Poland	1 074	721	744	3,5%	-331	-31%	22	3%	T2	CS
Portugal	222	241	235	1,1%	13	6%	-6	-2%	T2	CS,D
Romania	732	256	258	1,2%	-474	-65%	2	1%	T2	CS
Slovakia	194	55	55	0,3%	-139	-72%	0	0%	T2	CS
Slovenia	199	157	156	0,7%	-43	-22%	-1	-1%	T2	CS,D
Spain	1 848	1 555	1 490	7,0%	-358	-19%	-65	-4%	T2	CS,D
Sweden	171	211	207	1,0%	36	21%	-4	-2%	T2	CS
EU	**26 526**	**21 792**	**21 385**	**100%**	**-5 141**	**-19%**	**-407**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.21 3.B.1.a: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024

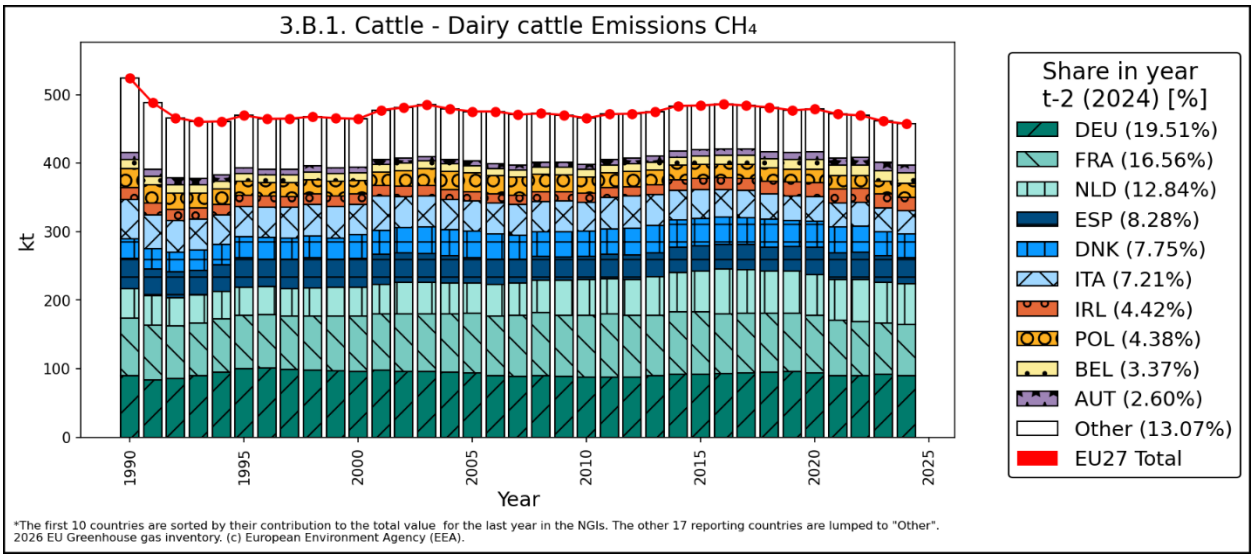
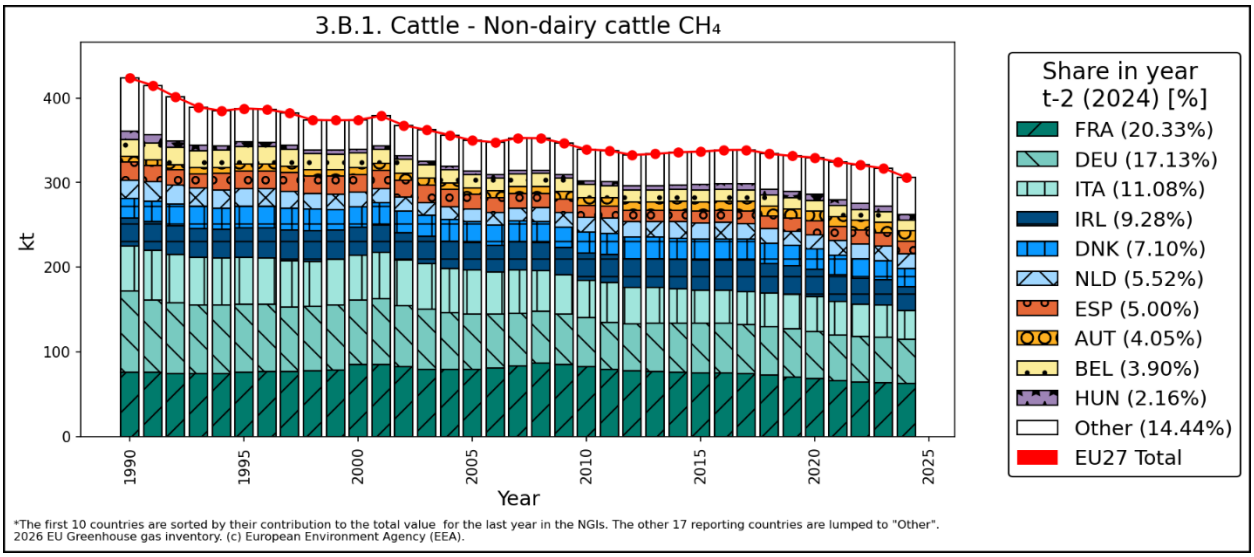


Figure 5.22 3.B.1.b: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.B.1 - Cattle - Activity Data

The main activity data for CH_4 emissions from manure management - cattle are the animal numbers. Cattle numbers are already discussed under source category 3.A Enteric Fermentation and therefore not further discussed here. Other relevant activity data are the allocation by climate region and the allocation by manure management system (MMS).

3.B.3 - Swine - Emissions

In 2024 CH_4 emissions in source category *3.B.3 - Swine* in the EU were 18950 kt CO_2 equivalent. It represents 5.3 % of total agricultural emissions and 8.4 % of total agricultural CH_4 emissions.

CH_4 emissions by country and for the total EU from 3.B.3 *Manure Management* are shown in Table 5.9 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, CH_4 emission in this source category decreased by 23 % or 5.7 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 2.5 %.

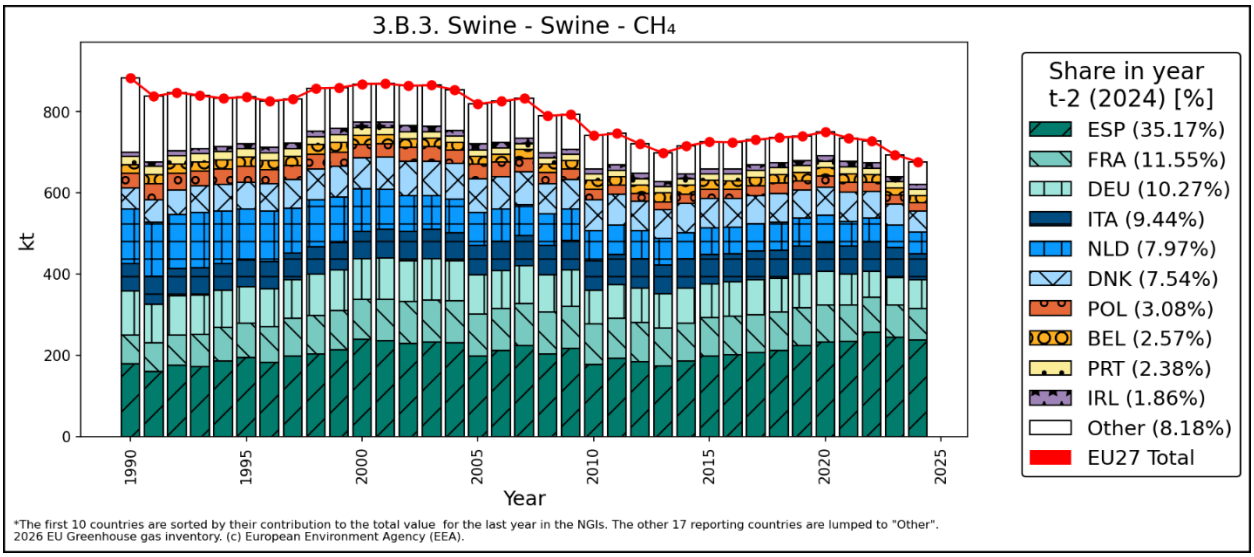
Figure 5.23 shows the trend of emissions indicating the countries contributing most to EU total.

Table 5.9 3.B.3 - Swine: Countries' contributions to total EU-GHG and CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	186	114	115	0,6%	-71	-38%	1	1%	T2	CS,D
Belgium	599	496	487	2,6%	-111	-19%	-8	-2%	T2	CS
Bulgaria	609	81	85	0,5%	-523	-86%	4	6%	T2	CS
Croatia	158	120	126	0,7%	-33	-21%	6	5%	T2	CS,D
Cyprus	89	37	37	0,2%	-52	-59%	0	0%	T2	D
Czechia	612	67	72	0,4%	-540	-88%	5	7%	T2	CS,D
Denmark	1 431	1 438	1 429	7,5%	-3	0%	-9	-1%	T2,T3	CS
Estonia	116	45	45	0,2%	-71	-61%	-1	-1%	T2	CS,D
Finland	97	101	106	0,6%	9	9%	5	5%	T2	CS
France	1 982	2 223	2 189	11,6%	207	10%	-34	-2%	T2	CS,D
Germany	3 045	1 892	1 945	10,3%	-1 100	-36%	53	3%	T2	CS
Greece	484	343	346	1,8%	-137	-28%	3	1%	T1	D
Hungary	453	193	195	1,0%	-257	-57%	2	1%	T2	CS
Ireland	286	345	352	1,9%	67	23%	8	2%	T2	CS,D
Italy	1 909	2 067	1 789	9,4%	-121	-6%	-278	-13%	T2	CS
Latvia	98	22	27	0,1%	-70	-72%	5	23%	T2	CS
Lithuania	369	30	29	0,2%	-340	-92%	-1	-4%	T2	CS
Luxembourg	11	10	11	0,1%	0	3%	1	8%	T1	CS
Malta	1	1	1	0,0%	-1	-63%	0	4%	NA,T2	CS,NA
Netherlands	3 773	1 570	1 511	8,0%	-2 262	-60%	-59	-4%	T2	CS
Poland	1 022	602	584	3,1%	-438	-43%	-18	-3%	T1	D
Portugal	567	452	451	2,4%	-116	-20%	-1	0%	T2	CS,D
Romania	1 143	247	257	1,4%	-886	-78%	10	4%	T2	CS
Slovakia	501	36	37	0,2%	-464	-93%	1	3%	T2	CS
Slovenia	134	24	26	0,1%	-108	-81%	2	8%	T1	D
Spain	5 002	6 852	6 664	35,2%	1 662	33%	-188	-3%	T2	CS,D
Sweden	42	34	35	0,2%	-7	-16%	2	5%	T2	CS
EU	**24 717**	**19 441**	**18 950**	**100%**	**-5 767**	**-23%**	**-491**	**-3%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

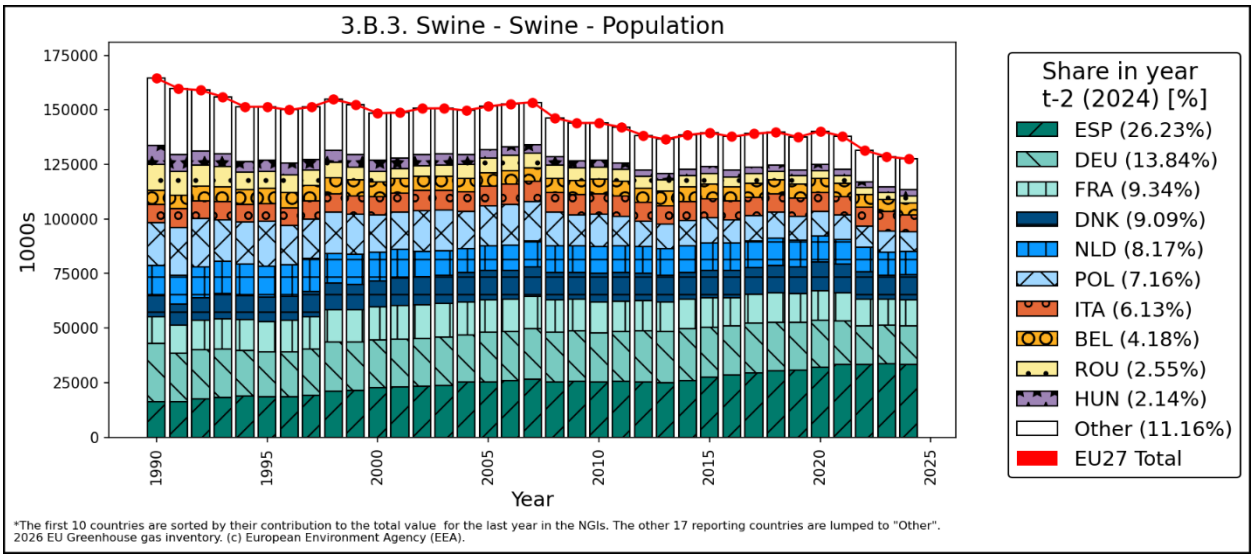
Figure 5.23 3.B.3: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.B.3 - Swine - Population

The main activity data for CH_4 emissions from manure management - swine are the animal numbers. Swine population decreased considerably in the EU in the period 1990 to 2024. Figure 5.24 shows the trend of swine population indicating the countries contributing most to EU total.

Figure 5.24 3.B.3: Trend in swine population in the EU and the countries contributing most to EU values including their share to EU population in 2024



5.3.2.2 Implied EFs and methodological issues

In this section, we discuss the implied emission factor for category 3.B for the main animal types.

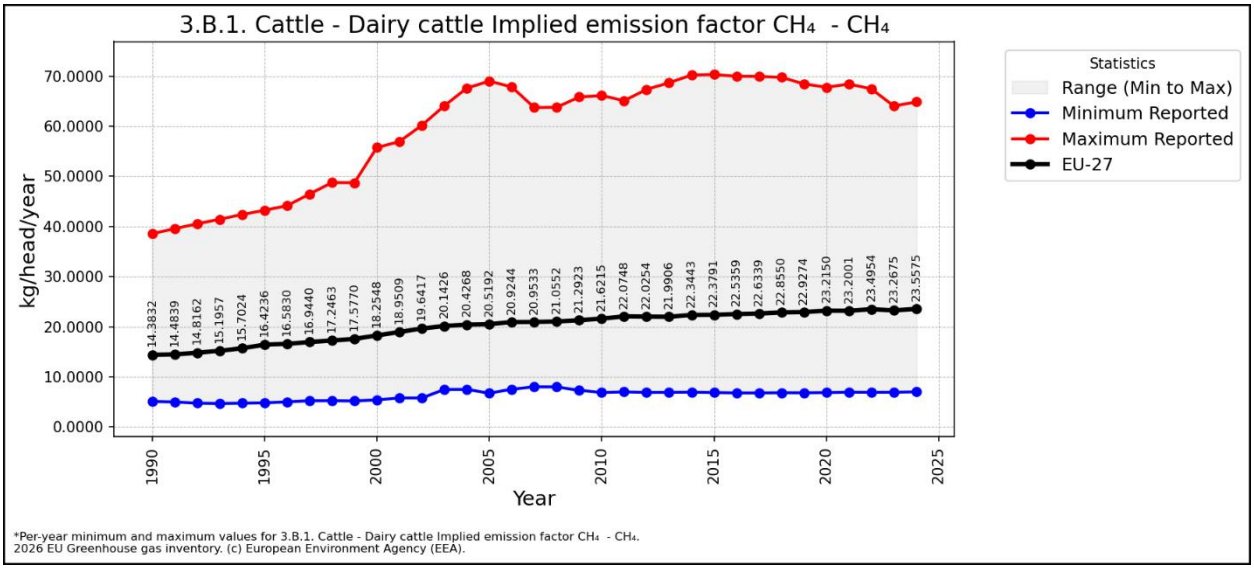
3.B.1 - Cattle - Implied emission factor

For cattle, the analysis is conducted per subcategory.

3.B.1.a - Dairy Cattle - Implied emission factor

The implied emission factor for CH_4 emissions in source category *3.B.1.a - Dairy Cattle* increased in the EU very strongly between 1990 and 2023. Figure 5.25 shows the trend of the implied emission factor indicating also the range of values used by the countries.

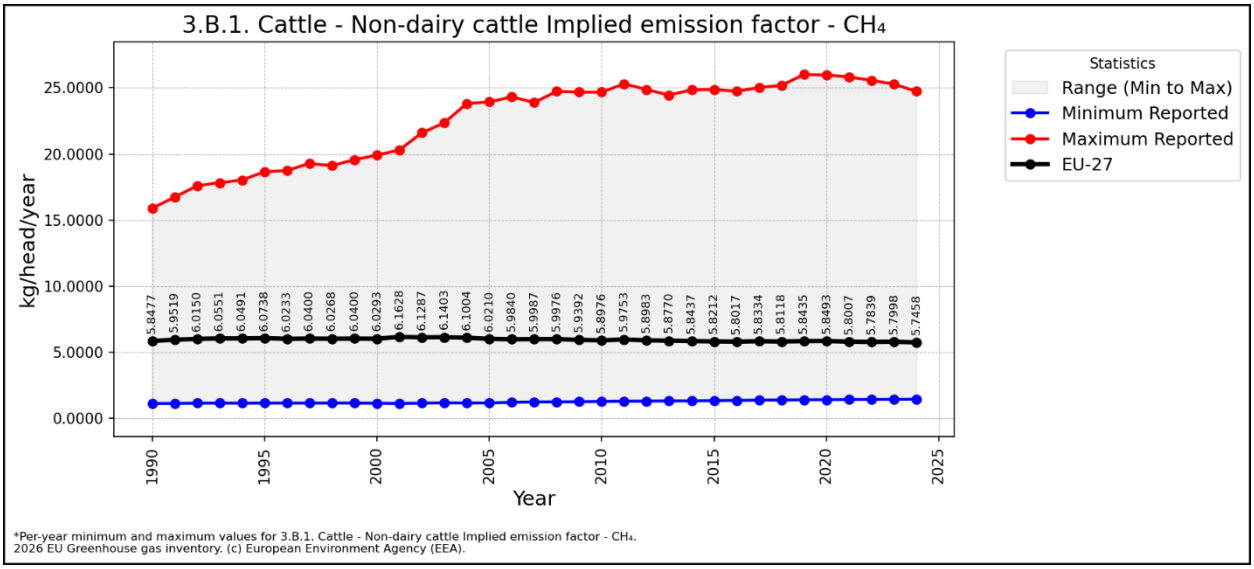
Figure 5.25 3.B 1.a - Dairy Cattle: Trend in implied emission factor and range of values reported by countries



3.B.1.b - Non-Dairy Cattle - Implied emission factor

The implied emission factor for CH_4 emissions in source category *3.B.1.b - Non-Dairy Cattle* remains quite stable between 1990 and 2024. Figure 5.26 shows the trend of the implied emission factor indicating also the range of values used by the countries.

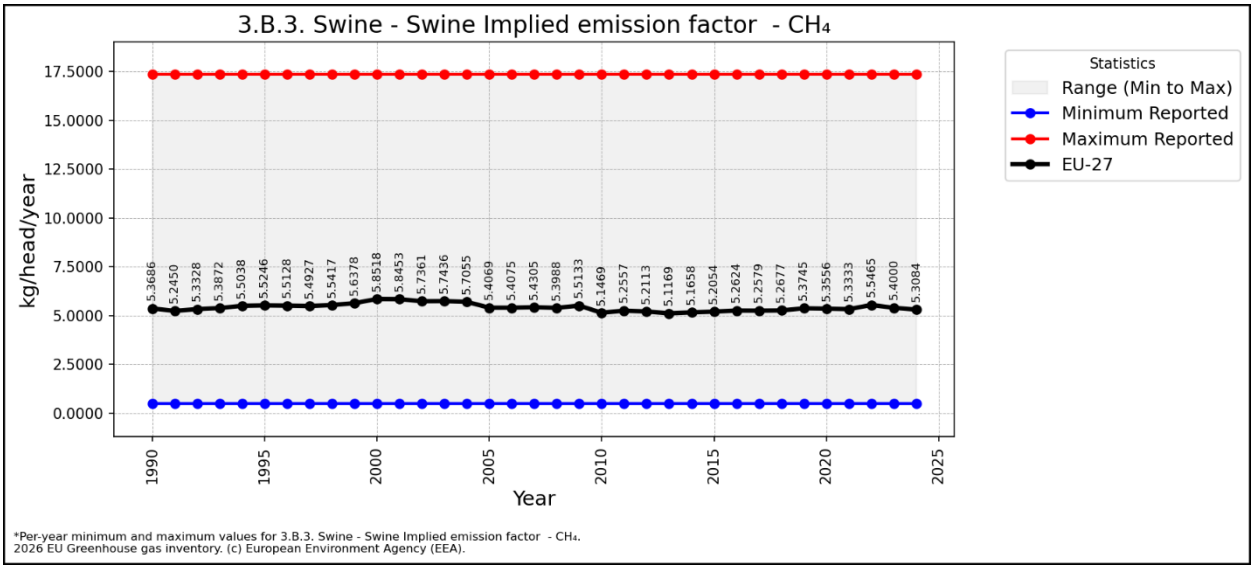
Figure 5.26 3.B.1.b - Non-Dairy Cattle: Trend in implied emission factor and range of values reported by countries



3.B. 3 - Swine - Implied emission factor

The implied emission factor for CH_4 emissions in source category *3.B.3 - Swine* decreased in the EU moderately between 1990 and 2024. Figure 5.27 shows the trend of the implied emission factor indicating also the range of values used by the countries.

Figure 5.27 3.B.3 - Swine: Trend in implied emission factor and range of values reported by countries

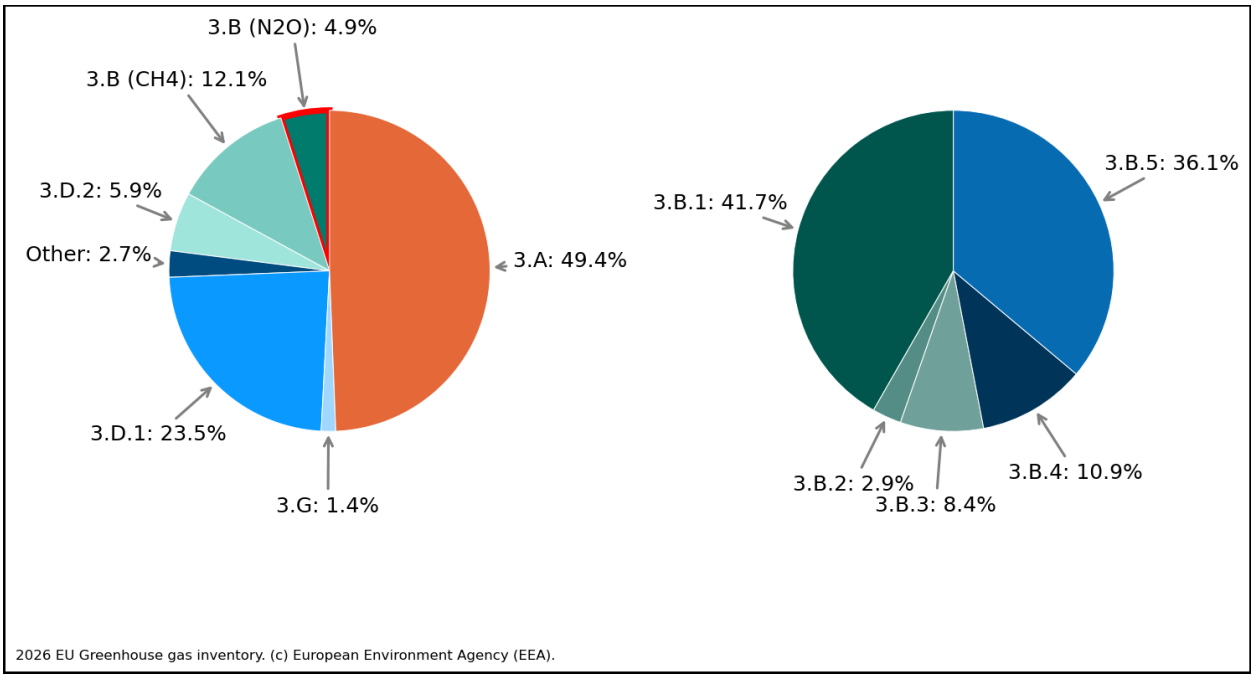


5.3.3 Manure Management - N_2O (CRT Source Category 3B)

In 2024 N_2O emissions in source category *3.B- Manure Management* in the EU were 17 617kt CO_2 equivalent. This corresponds to 0.63 % of total EU GHG emissions and 9.9 % of total EU N_2O emissions. They make 4.9 % of total agricultural emissions and 14.2 % of total agricultural N_2O emissions. The main sub-categories are Cattle (3.B.1) and Indirect Emissions (3.B.5), but substantial emissions are also reported for Swine (3.B.3) and Other Livestock (3.B.4), as presented in Figure 5.28.

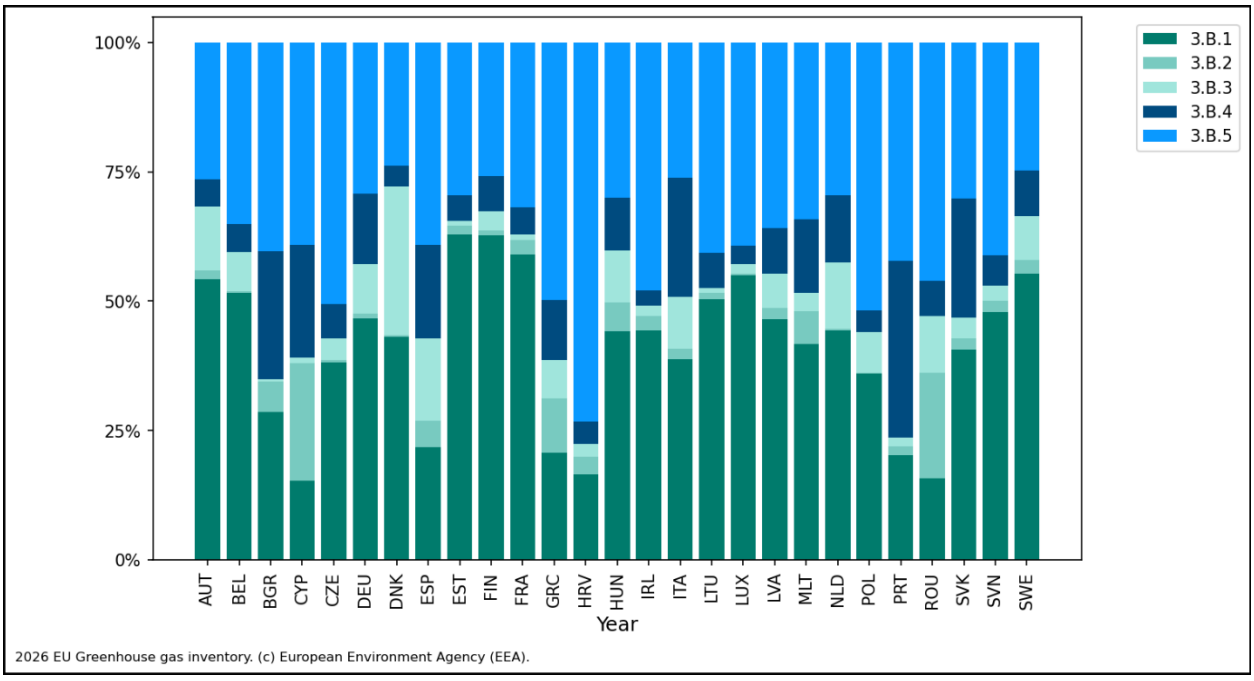
Regarding the origin of emissions in the different countries, Figure 5.29 shows the distribution of N_2O emissions from manure management by subcategory in all countries. Each bar represents the total emissions of a country in the current emission category, with colours distinguishing the subcategories.

Figure 5.28 Share of source category 3.B-N_2O on total EU agricultural emissions (left panel) and decomposition into its sub-categories (right panel). The percentages refer to the emissions in the year 2024.3.B.1-3.B.4: emissions by animal types (cattle, sheep, swine, other livestock); 3.B.5:Indirect emissions from manure management.



In the left panel, some minor differences in the numbers might be present due to automatic rounding of numbers.

Figure 5.29 Decomposition of N_2O emissions in source category 3.B.2 - Manure Management into its sub-categories by country in the year 2024.



N_2O emissions by country and for the total EU from 3.B *Manure Management* are shown in Table 5.10 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, N_2O emission in this source category decreased by 37 % or 10.1 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 0.8 %.

Table 5.10 3.B - Manure Management: Countries' contributions to total EU-N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	659	462	461	2,6%	-197	-30%	0	0%	T2	CS,D
Belgium	649	456	448	2,5%	-200	-31%	-8	-2%	NA,T2	D,NA
Bulgaria	818	259	248	1,4%	-569	-70%	-10	-4%	T1,T2	D
Croatia	268	88	89	0,5%	-179	-67%	2	2%	T2	CS,D
Cyprus	59	68	70	0,4%	11	20%	2	3%	T1	D
Czechia	976	379	390	2,2%	-585	-60%	12	3%	T1,T2	D
Denmark	919	505	501	2,8%	-418	-45%	-3	-1%	T2	D
Estonia	100	57	55	0,3%	-46	-46%	-2	-4%	NA,T1,T2	CS,D,NA
Finland	381	278	270	1,5%	-111	-29%	-8	-3%	NA,T2	D,NA
France	3 855	2 762	2 729	15,5%	-1 126	-29%	-33	-1%	T2	CS,D
Germany	4 482	2 867	2 841	16,1%	-1 642	-37%	-27	-1%	T2	CS,D
Greece	335	279	269	1,5%	-66	-20%	-11	-4%	D	D
Hungary	758	356	372	2,1%	-386	-51%	16	4%	T1,T2	CS,D
Ireland	620	563	548	3,1%	-71	-12%	-15	-3%	NA,T2	CS,D,NA
Italy	3 076	2 002	1 863	10,6%	-1 214	-39%	-139	-7%	T2	CS,D
Latvia	252	61	60	0,3%	-192	-76%	-1	-2%	T2	D
Lithuania	498	142	141	0,8%	-357	-72%	-2	-1%	NA,T1,T2	D,NA
Luxembourg	39	33	33	0,2%	-6	-15%	0	-1%	T2	CS
Malta	18	12	12	0,1%	-6	-33%	0	-1%	T1,T2	CS,D
Netherlands	838	667	663	3,8%	-174	-21%	-4	-1%	NA,T1	CS,NA
Poland	3 624	2 475	2 569	14,6%	-1 055	-29%	94	4%	T1,T2	CS,D
Portugal	239	201	200	1,1%	-39	-16%	-1	0%	NO,T2	CS,D,NO
Romania	1 677	780	797	4,5%	-880	-52%	17	2%	NA,T1,T2	D,NA
Slovakia	555	208	211	1,2%	-344	-62%	3	2%	T1,T2	CS
Slovenia	81	57	58	0,3%	-23	-29%	1	2%	T1,T2	CS,D
Spain	1 543	1 469	1 450	8,2%	-93	-6%	-19	-1%	T1,T2	D
Sweden	428	278	269	1,5%	-158	-37%	-9	-3%	CS,T2	CS,D
EU	**27 744**	**17 765**	**17 617**	**100%**	**-10 127**	**-37%**	**-147**	**-1%**	**-**	**-**

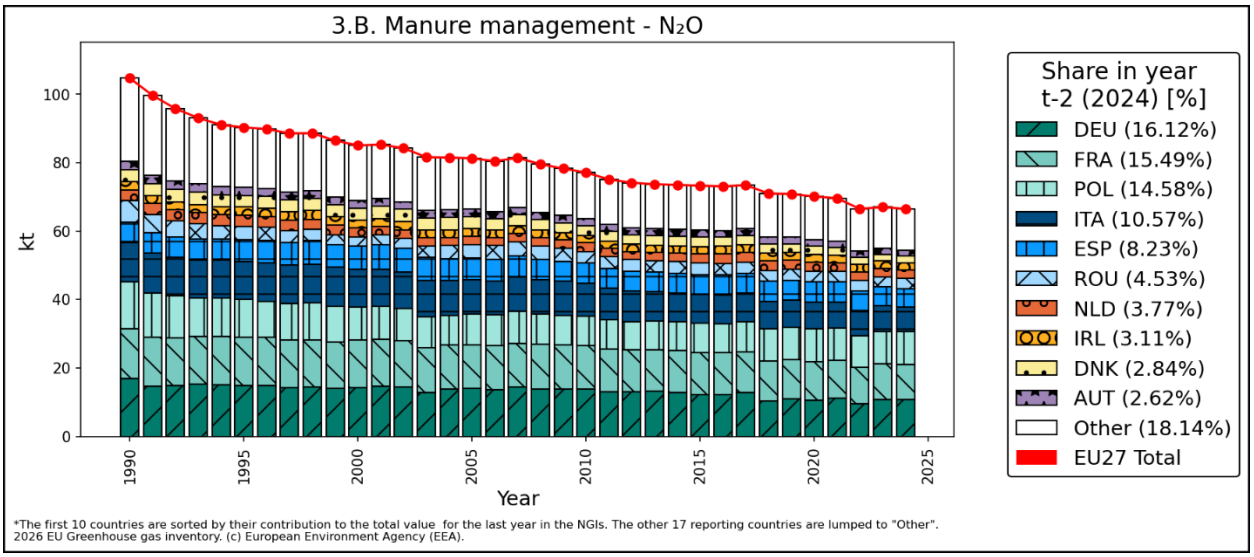
Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

5.3.3.1 Trends in Emissions and Activity Data

3.B.- Manure Management - Emissions

N_2O Emissions in source category *3.B - Manure Management* decreased strongly in the EU in the period 1990 to 2024. Figure 5.30 shows the trend of emissions indicating the countries contributing most to EU total.

Figure 5.30 3.B Manure Management: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.B. 1 - Cattle - Emissions

In 2024 N_2O emissions in source category *3.B.1 - Cattle* in the EU were 7350 kt CO_2 equivalent. It represents 2 % of total agricultural emissions and 5.9 % of total agricultural N_2O emissions. Figure 5.31 and Figure 5.32 show the trend of emissions indicating the countries contributing most to the EU total.

N_2O emissions by country and for the total EU from 3.B.1 *Manure Management* are shown in Table 5.11 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, N_2O emission in this source category decreased by 39 % or 4.7 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 2.0 %.

Table 5.11 3.B.1 - Cattle: Countries' contributions to total EU-N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	403	252	250	3,4%	-153	-38%	-1	-1%	T2	D
Belgium	367	237	231	3,1%	-135	-37%	-6	-3%	T2	D
Bulgaria	189	73	71	1,0%	-118	-62%	-2	-3%	T2	D
Croatia	80	15	15	0,2%	-65	-82%	0	1%	T2	CS,D
Cyprus	7	11	11	0,1%	3	45%	0	-1%	T1	D
Czechia	370	146	149	2,0%	-222	-60%	3	2%	T2	D
Denmark	280	219	216	2,9%	-64	-23%	-3	-1%	T2	D
Estonia	54	36	34	0,5%	-20	-36%	-1	-4%	T2	CS,D
Finland	220	171	169	2,3%	-51	-23%	-2	-1%	T2	D
France	2 290	1 639	1 610	21,9%	-680	-30%	-29	-2%	T2	CS,D
Germany	2 381	1 363	1 324	18,0%	-1 057	-44%	-39	-3%	T2	CS,D
Greece	78	62	56	0,8%	-23	-29%	-6	-9%	D	D
Hungary	248	155	164	2,2%	-84	-34%	9	6%	T2	CS
Ireland	298	251	243	3,3%	-56	-19%	-8	-3%	T2	CS,D
Italy	1 645	793	722	9,8%	-923	-56%	-70	-9%	T2	CS,D
Latvia	107	29	28	0,4%	-80	-74%	-2	-5%	T2	D
Lithuania	186	71	71	1,0%	-115	-62%	0	0%	T2	D
Luxembourg	23	18	18	0,2%	-5	-22%	0	-1%	T2	CS
Malta	8	5	5	0,1%	-3	-40%	0	-1%	T2	CS
Netherlands	306	289	295	4,0%	-11	-4%	5	2%	T1	CS
Poland	1 255	902	924	12,6%	-331	-26%	22	2%	T2	CS
Portugal	70	42	40	0,5%	-29	-42%	-1	-3%	T2	CS,D
Romania	294	126	126	1,7%	-168	-57%	0	0%	T2	D
Slovakia	260	87	86	1,2%	-174	-67%	-1	-1%	T2	CS
Slovenia	33	28	28	0,4%	-5	-16%	0	0%	T1,T2	CS,D
Spain	325	324	315	4,3%	-10	-3%	-10	-3%	T2	D
Sweden	251	154	149	2,0%	-102	-41%	-5	-3%	CS,T2	CS,D
EU	**12 029**	**7 498**	**7 350**	**100%**	**-4 679**	**-39%**	**-148**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.31 3.B.1.a - Dairy cattle: Trend in N_2O emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024

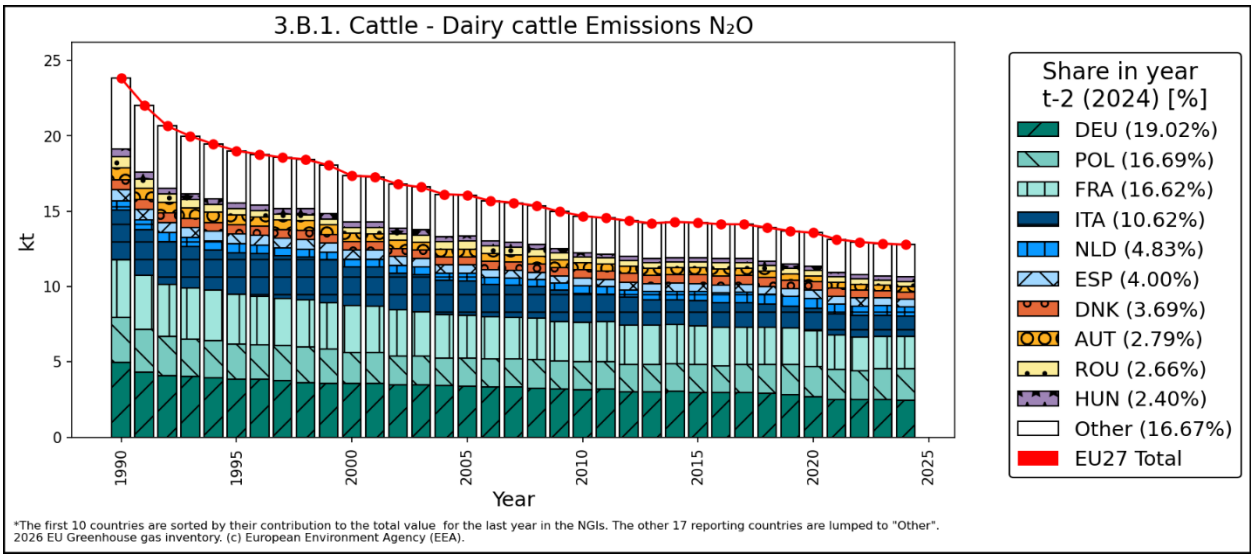
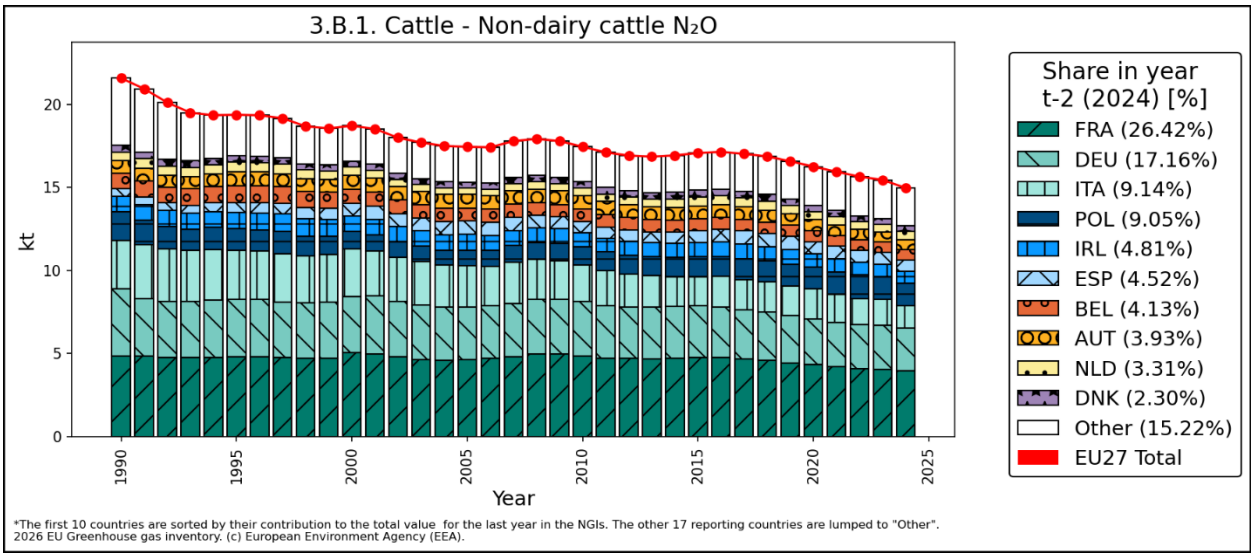


Figure 5.32 3.B.1.b - Non-dairy cattle: Trend in N_2O emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.B. 1 - Cattle - population

One of the main activity data for N_2O emissions from manure management - cattle is the animal numbers. Cattle numbers are already discussed under source category 3.A Enteric Fermentation and therefore not further discussed here. Other relevant activity data are the allocation by manure management system (MMS).

3.B.3 - Swine - Emissions

In 2024 N_2O emissions in source category *3.B.3 - Swine* in the EU were 1475 kt CO_2 equivalent. It represents 0.4% of total agricultural emissions and 1.2% of total agricultural N_2O emissions. Figure 5.33 shows the trend of emissions indicating the countries contributing most to the EU total.

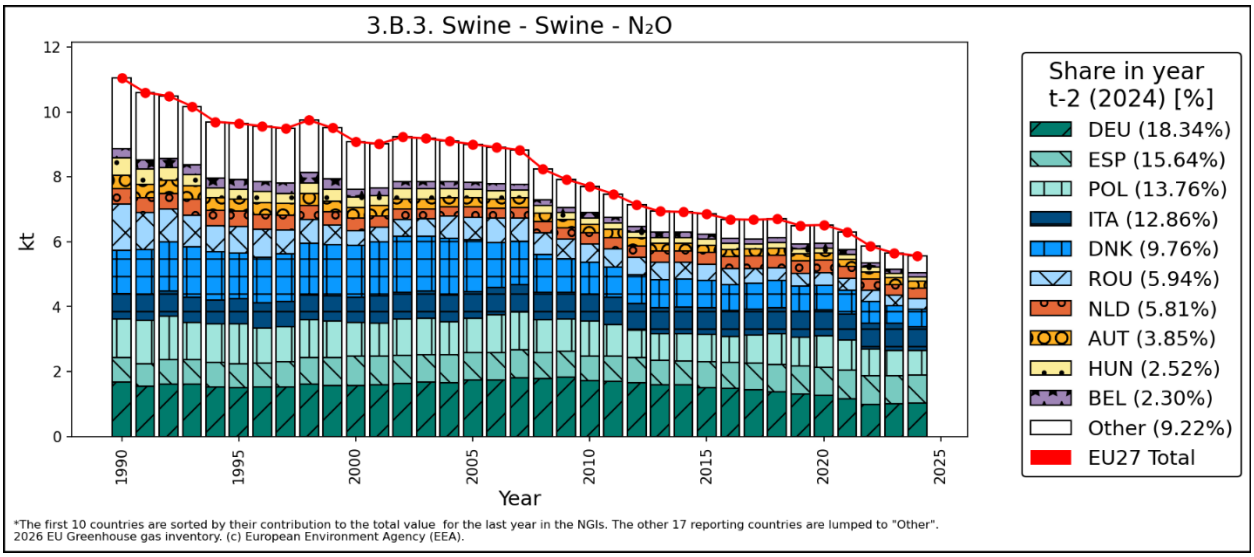
Total N_2O emissions by country and for the total EU from 3.B.3 *Manure Management* are shown in Table 5.12 for the first and the last year of the inventory (1990 and 2023). Values are given in kt CO_2-eq. Between 1990 and 2023, N_2O emission in this source category decreased by 50 % or 1.5 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 1.5 %.

Table 5.12 3.B.3 - Swine: Countries' contributions to total EU-N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	111	56	57	3,8%	-54	-49%	1	2%	T2	D
Belgium	75	34	34	2,3%	-41	-55%	0	0%	T2	D
Bulgaria	9	1	1	0,1%	-7	-84%	0	6%	T2	D
Croatia	25	2	2	0,1%	-22	-91%	0	2%	T2	CS,D
Cyprus	1	1	1	0,0%	0	4%	0	0%	T1	D
Czechia	113	15	16	1,1%	-96	-85%	1	7%	T1,T2	D
Denmark	355	144	144	9,8%	-211	-59%	0	0%	T2	D
Estonia	2	1	1	0,0%	-2	-75%	0	-27%	T2	CS,D
Finland	38	10	10	0,7%	-28	-73%	0	-1%	T2	D
France	79	30	30	2,1%	-48	-61%	0	1%	T2	CS,D
Germany	445	264	270	18,3%	-174	-39%	6	2%	T2	CS,D
Greece	28	20	20	1,4%	-8	-28%	0	1%	D	D
Hungary	141	35	37	2,5%	-104	-74%	3	7%	T2	CS
Ireland	9	11	11	0,8%	2	24%	0	3%	T2	CS,D
Italy	210	221	190	12,9%	-20	-10%	-32	-14%	T2	CS,D
Latvia	36	3	4	0,3%	-32	-89%	1	30%	T2	D
Lithuania	98	1	1	0,1%	-97	-99%	0	-7%	T1	D
Luxembourg	1	1	1	0,0%	0	-43%	0	6%	T2	CS
Malta	1	0	0	0,0%	-1	-64%	0	3%	T1	D
Netherlands	125	88	86	5,8%	-39	-31%	-2	-2%	T1	CS
Poland	314	208	203	13,8%	-111	-35%	-5	-2%	T2	CS
Portugal	10	4	4	0,2%	-6	-62%	0	0%	NO	NO
Romania	375	84	88	5,9%	-288	-77%	4	4%	T2	D
Slovakia	66	8	9	0,6%	-58	-87%	0	2%	T2	CS
Slovenia	6	1	2	0,1%	-5	-73%	0	20%	T1	D
Spain	199	230	231	15,6%	32	16%	1	0%	T2	D
Sweden	57	24	23	1,6%	-34	-59%	-1	-3%	CS,T2	CS,D
EU	**2 926**	**1 497**	**1 475**	**100%**	**-1 451**	**-50%**	**-23**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.33 3.B.3 - Swine: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.B. 4 - Other Livestock - Emissions

In 2024 N_2O emissions in source category *3.B.4 - Other Livestock* in the EU were 1912 kt CO_2 equivalent. It represents 0.5% of total agricultural emissions and 1.5 % of total agricultural N_2O emissions.

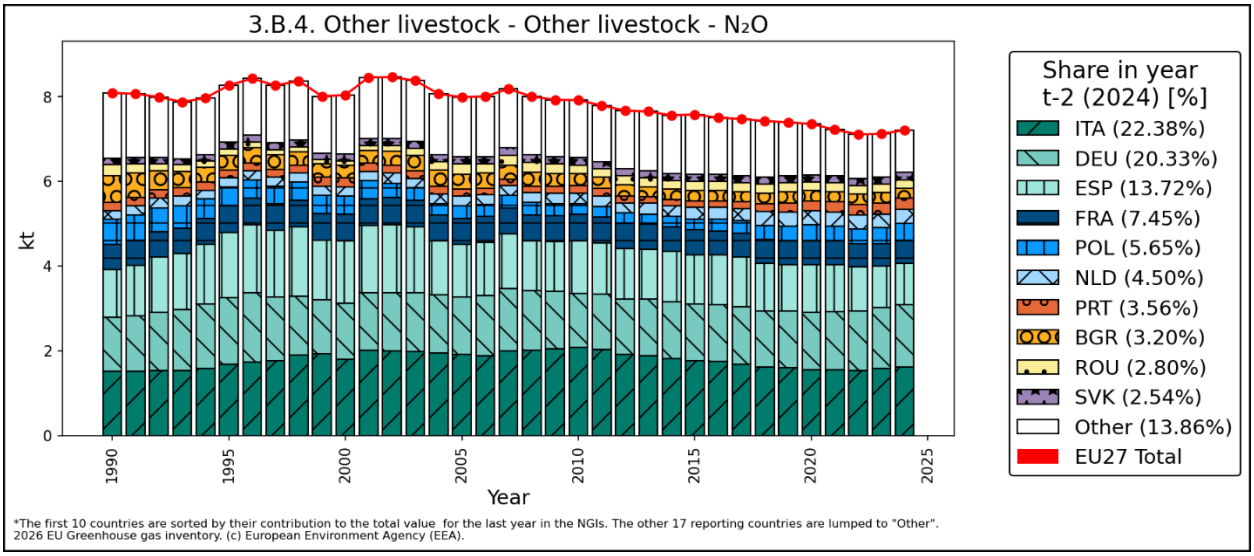
Total N_2O emissions by country and for the total EU from 3.B.4 *Manure Management* are shown in Table 5.13 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, N_2O emission in this source category decreased by 11 % or 232 kt CO_2-eq. From 2023 to 2024 emissions in the current category increased by 1.3 %. Figure 5.34 shows the trend of emissions indicating the countries contributing most to EU total.

Table 5.13 3.B.4 - Other Livestock: Countries' contributions to total EU-N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	11	25	25	1,3%	14	130%	0	0%	T2	D
Belgium	9	23	24	1,2%	15	165%	0	2%	NA,T2	D,NA
Bulgaria	164	66	61	3,2%	-103	-63%	-5	-7%	T1,T2	D
Croatia	13	4	4	0,2%	-9	-70%	0	3%	T2	CS,D
Cyprus	15	15	15	0,8%	0	0%	1	3%	T1	D
Czechia	56	24	26	1,3%	-30	-54%	2	9%	T1,T2	D
Denmark	40	21	21	1,1%	-20	-49%	0	-2%	T2	D
Estonia	12	3	3	0,1%	-9	-77%	0	-4%	NA,T1	D,NA
Finland	30	23	18	1,0%	-12	-39%	-4	-19%	NA,T2	D,NA
France	157	141	142	7,4%	-15	-9%	2	1%	T2	CS,D
Germany	339	381	389	20,3%	49	15%	8	2%	-	-
Greece	53	31	31	1,6%	-22	-41%	0	-1%	D	D
Hungary	92	39	38	2,0%	-53	-58%	-1	-3%	T1,T2	CS,D
Ireland	16	16	16	0,8%	0	2%	0	-1%	NA,T2	CS,D,NA
Italy	400	419	428	22,4%	28	7%	9	2%	T2	CS,D
Latvia	18	6	5	0,3%	-13	-70%	0	-5%	-	-
Lithuania	14	10	10	0,5%	-5	-33%	-1	-8%	NA,T1	D,NA
Luxembourg	0	1	1	0,1%	1	141%	0	1%	-	-
Malta	1	2	2	0,1%	1	90%	0	-1%	T1	CS,D
Netherlands	54	87	86	4,5%	32	60%	-1	-1%	NA,T1	CS,NA
Poland	158	97	108	5,6%	-50	-32%	11	11%	T1,T2	CS,D
Portugal	53	67	68	3,6%	15	28%	1	1%	T2	CS,D
Romania	71	52	54	2,8%	-17	-24%	2	3%	NA,T1,T2	D,NA
Slovakia	40	45	49	2,5%	9	22%	4	8%	T1,T2	CS
Slovenia	4	3	3	0,2%	0	-3%	0	0%	T1	D
Spain	298	261	262	13,7%	-36	-12%	1	0%	T1,T2	D
Sweden	26	25	24	1,2%	-3	-10%	-1	-6%	T2	D
EU	**2 144**	**1 888**	**1 912**	**100%**	**-232**	**-11%**	**24**	**1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.34 3.B.4 - Other Livestock: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.B.5 - Manure Management - Indirect Emissions - Emissions

In 2024 N_2O emissions in source category *3.B.5 - Manure Management - Indirect Emissions - Indirect N_2O emissions* in the EU were 6363 kt CO_2 equivalent. It represents 1.8 % of total agricultural emissions and 5.1 % of total agricultural N_2O emissions. Those emissions include emissions from atmospheric deposition and leaching and run-off.

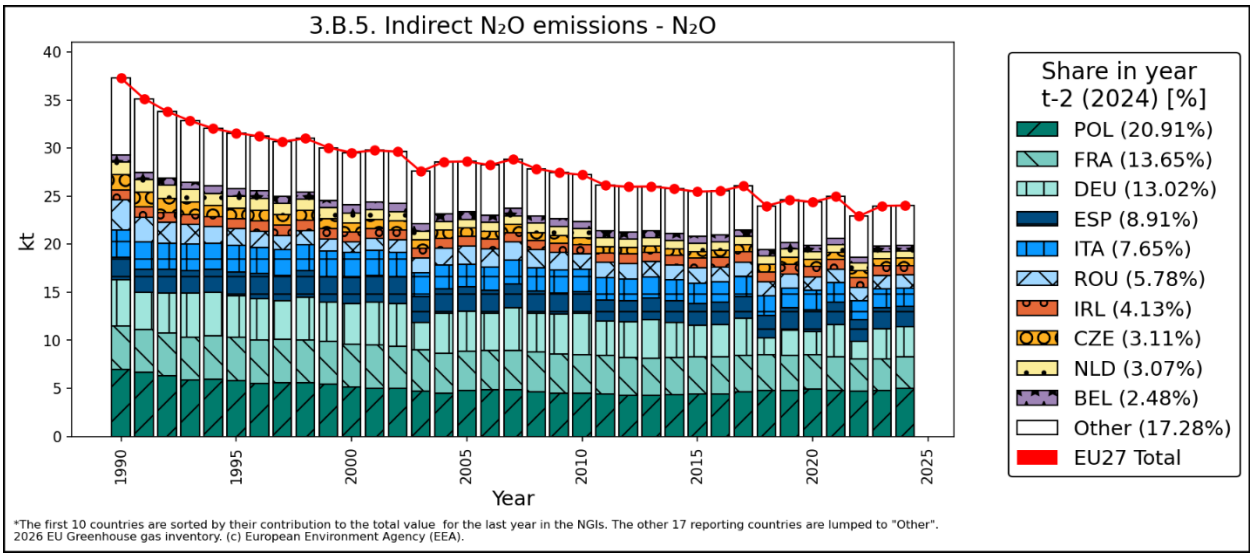
Total N_2O emissions by country and for the total EU from 3.B.5 *Manure Management - Indirect Emissions* are shown in Table 5.14 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, N_2O emission in this source category decreased by 36 % or 3.5 Mt CO_2-eq. From 2023 to 2024 emissions in the current category increased by 0.1 %. Figure 5.35 shows the trend of emissions indicating the countries contributing most to EU total.

Table 5.14 3.B.5 - Manure Management - Indirect Emissions: Countries' contributions to total EU- N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	127	122	122	1,9%	-5	-4%	0	0%	T2	D
Belgium	196	160	158	2,5%	-38	-19%	-3	-2%	T1	D
Bulgaria	348	103	100	1,6%	-248	-71%	-3	-3%	T1	D
Croatia	147	64	65	1,0%	-82	-56%	2	2%	T1	D
Cyprus	23	27	27	0,4%	4	19%	1	2%	T1	D
Czechia	433	192	198	3,1%	-235	-54%	6	3%	T1,T2	D
Denmark	243	119	119	1,9%	-123	-51%	0	0%	T2	D
Estonia	30	17	16	0,3%	-14	-47%	-1	-4%	T2	CS,D
Finland	91	71	70	1,1%	-21	-23%	-2	-3%	T2	D
France	1 196	874	869	13,7%	-327	-27%	-5	-1%	-	-
Germany	1 266	830	829	13,0%	-438	-35%	-1	0%	-	-
Greece	149	139	134	2,1%	-15	-10%	-5	-4%	D	D
Hungary	248	107	111	1,8%	-137	-55%	4	4%	T1,T2	CS,D
Ireland	273	269	263	4,1%	-10	-4%	-6	-2%	T1	D
Italy	762	525	487	7,6%	-275	-36%	-38	-7%	T2	CS,D
Latvia	86	22	21	0,3%	-65	-75%	0	-1%	CS	D
Lithuania	199	58	57	0,9%	-141	-71%	-1	-1%	T1	D
Luxembourg	14	13	13	0,2%	-1	-6%	0	-1%	T2	D
Malta	7	4	4	0,1%	-3	-40%	0	-2%	T1	D
Netherlands	347	202	196	3,1%	-151	-44%	-6	-3%	CS	CS
Poland	1 848	1 265	1 331	20,9%	-517	-28%	66	5%	T1	D
Portugal	96	85	84	1,3%	-11	-12%	0	0%	T1,T2	D
Romania	820	358	368	5,8%	-453	-55%	10	3%	T1	D
Slovakia	180	63	64	1,0%	-116	-64%	0	1%	T1	D
Slovenia	38	23	24	0,4%	-15	-38%	1	3%	T1	D
Spain	621	579	567	8,9%	-54	-9%	-12	-2%	T2	D
Sweden	89	68	67	1,0%	-22	-25%	-1	-2%	-	-
EU	**9 876**	**6 357**	**6 363**	**100%**	**-3 513**	**-36%**	**5**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.35 3.B.5 - Manure Management - Indirect Emissions: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



5.3.3.2 Implied EFs and Methodological Issues

In this section, we discuss the implied emission factor for the main animal types. Furthermore, we present data on the nitrogen excretion rate for the different animal types.

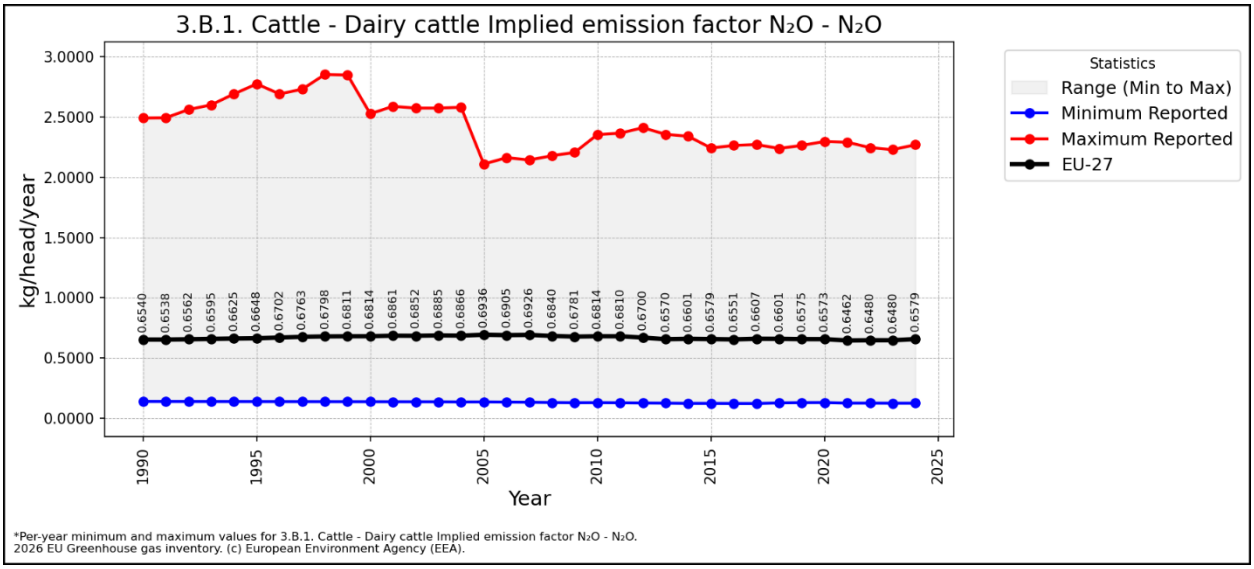
3.B.1 - Cattle - Implied emission factor

For cattle, the analysis is conducted per subcategory.

3.B.1.a - Dairy Cattle - Implied emission factor

The implied emission factor for N_2O emissions in source category *3.B.1.a - Dairy Cattle* increased in the EU between 1990 and 2024. Figure 5.36 shows the trend of the implied emission factor indicating also the range of values used by the countries. This increase is mainly explained by the increase in the nitrogen excreted per head.

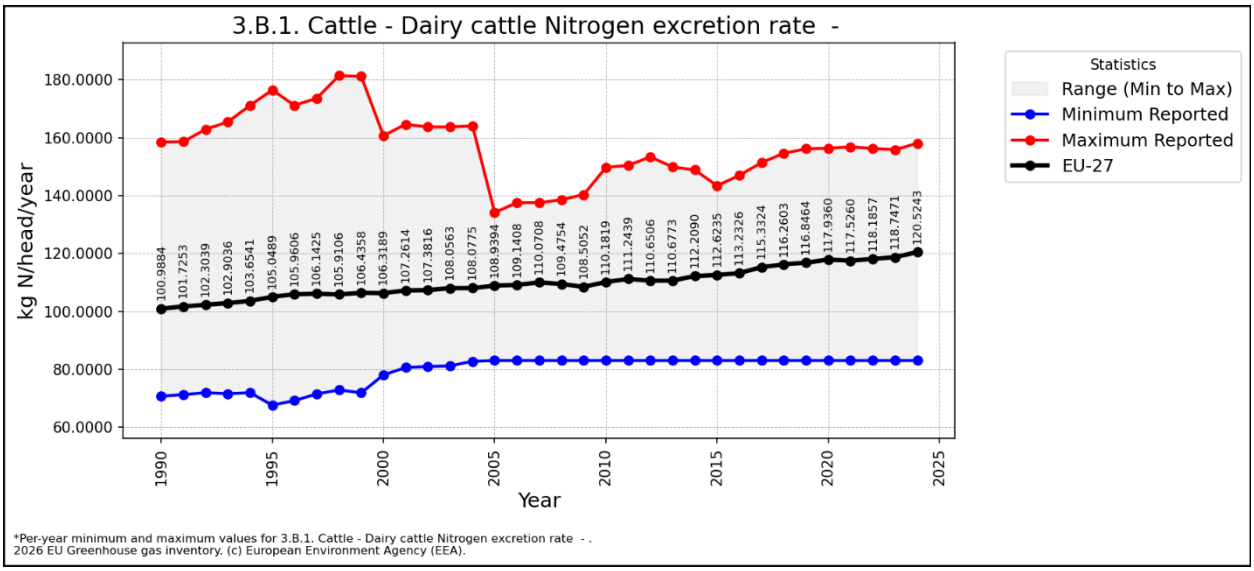
Figure 5.36 3.B.1.a - Dairy Cattle: Trend in implied emission factor and range of values reported by countries



3.B.1.a - Dairy Cattle - Nitrogen excretion rate

The nitrogen excretion rate, a parameter used for calculating N_2O emissions in source category *3.B.1.1 - Dairy Cattle*, increased in the EU considerably between 1990 and 2024. Figure 5.37 shows the trend of the nitrogen excretion rate indicating also the range of values used by the countries.

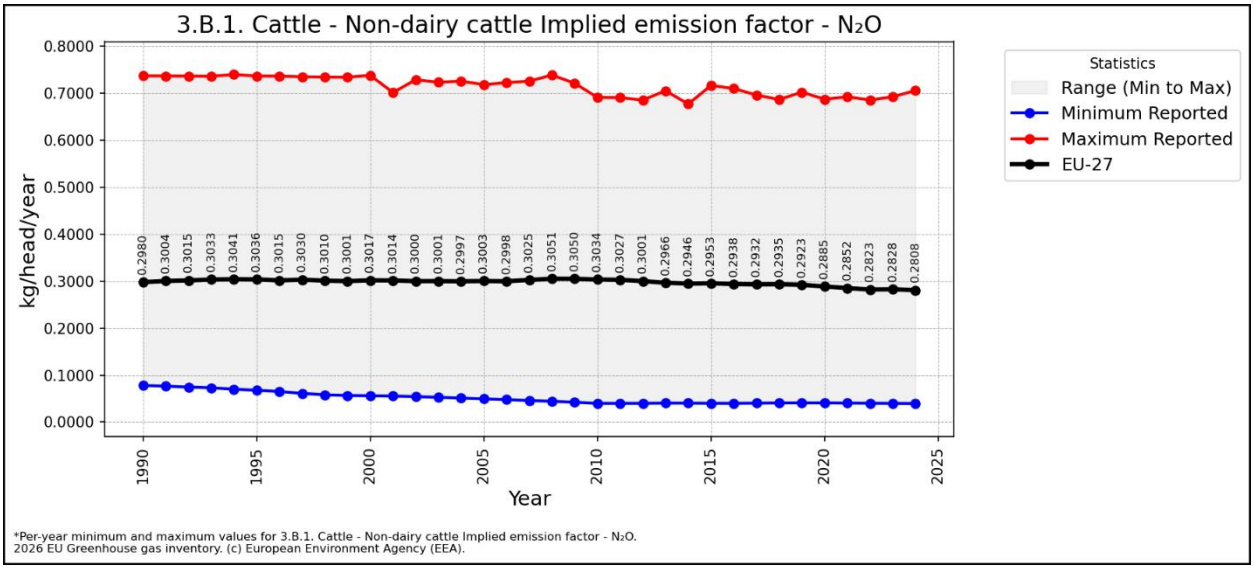
Figure 5.37 3.B.1.a - Dairy Cattle: Trend in nitrogen excretion rate and range of values reported by countries



3.B.1.b - Non-Dairy Cattle - Implied emission factor

The implied emission factor for N_2O emissions in source category *3.B.1.b - Non-Dairy Cattle* decreased slightly in the EU between 1990 and 2024. Figure 5.38 shows the trend of the implied emission factor indicating also the range of values used by the countries. As mentioned for dairy cattle, one of the main drivers involved in the implied emission factor is the nitrogen excretion rate.

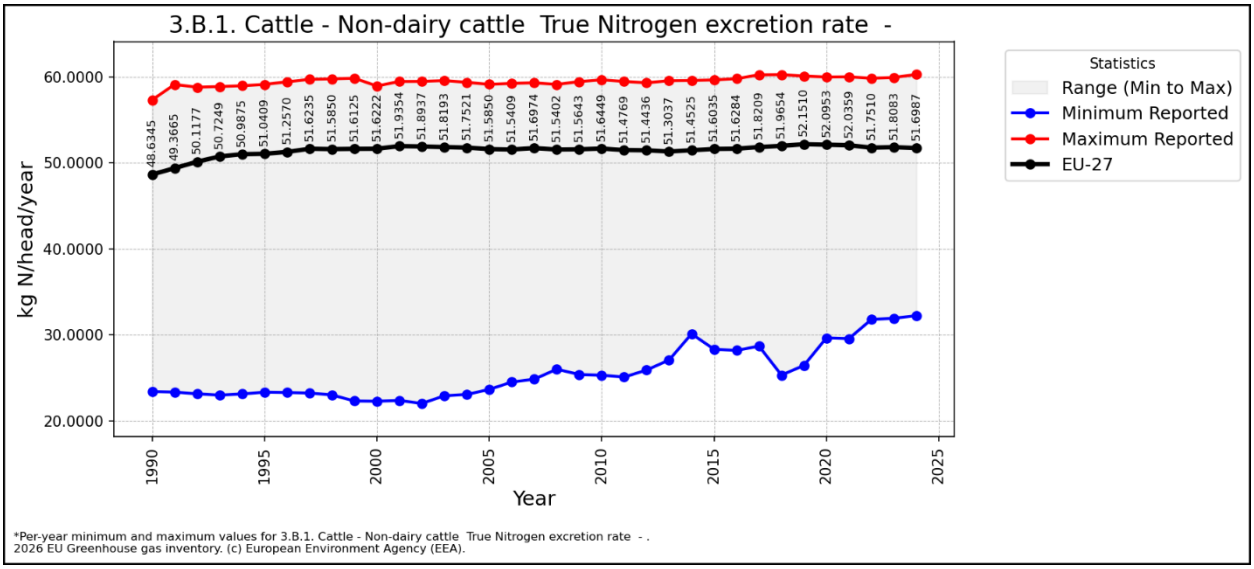
Figure 5.38 3.B.1.b - Non-Dairy Cattle: Trend in implied emission factor and range of values reported by countries



3.B.1.b - Non-Dairy Cattle - Nitrogen excretion rate

The nitrogen excretion rate, a parameter used for calculating N_2O emissions in source category *3.B.1.b - Non-Dairy Cattle*, increased in the EU moderately between 1990 and 2024. Figure 5.39 shows the trend of the nitrogen excretion rate indicating also the range of values used by the countries.

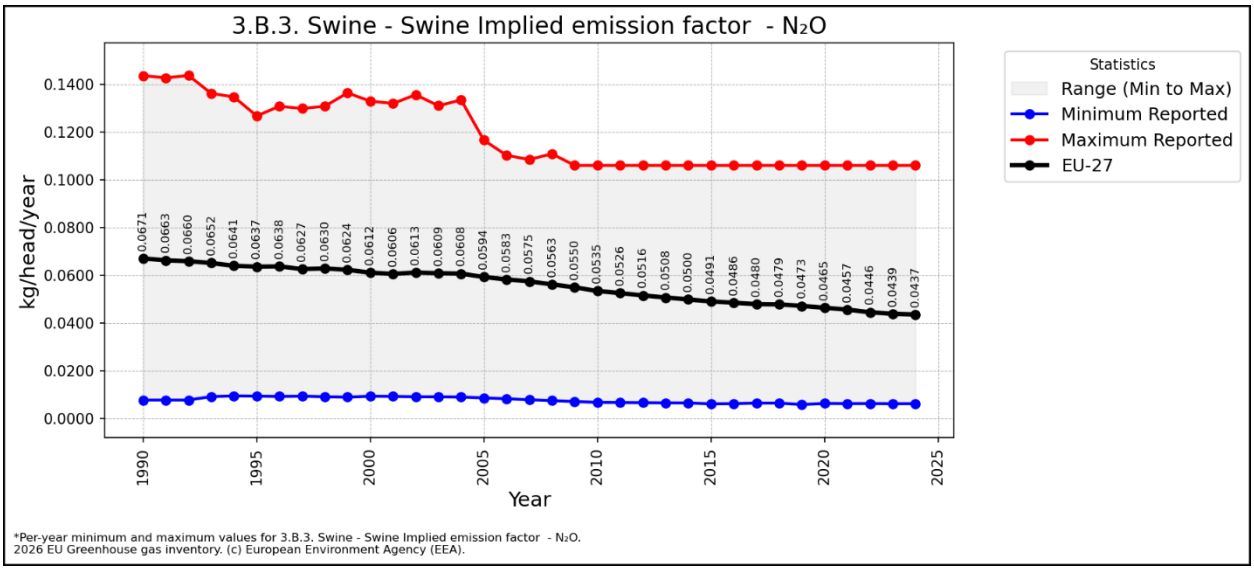
Figure 5.39 3.B.1.b - Non-Dairy Cattle: Trend in nitrogen excretion rate and range of values reported by countries



3.B.3 - Swine - Implied emission factor

The implied emission factor for N_2O emissions in source category *3.B.3 - Swine* decreased in the EU between 1990 and 2024. Figure 5.40 shows the trend of the implied emission factor indicating also the range of values used by the countries.

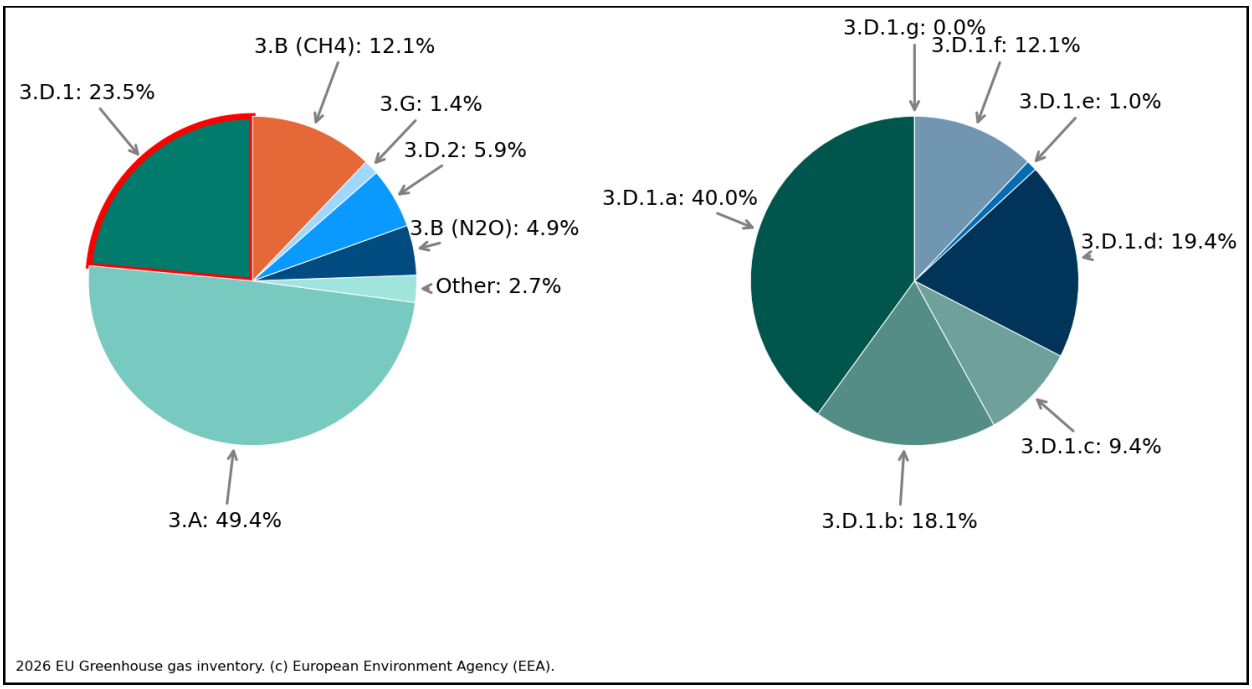
Figure 5.40 3.B.3 - Swine: Trend in implied emission factor and range of values reported by countries



5.3.4 Direct Emissions from Managed Soils - N_2O (CRT Source Category 3D1)

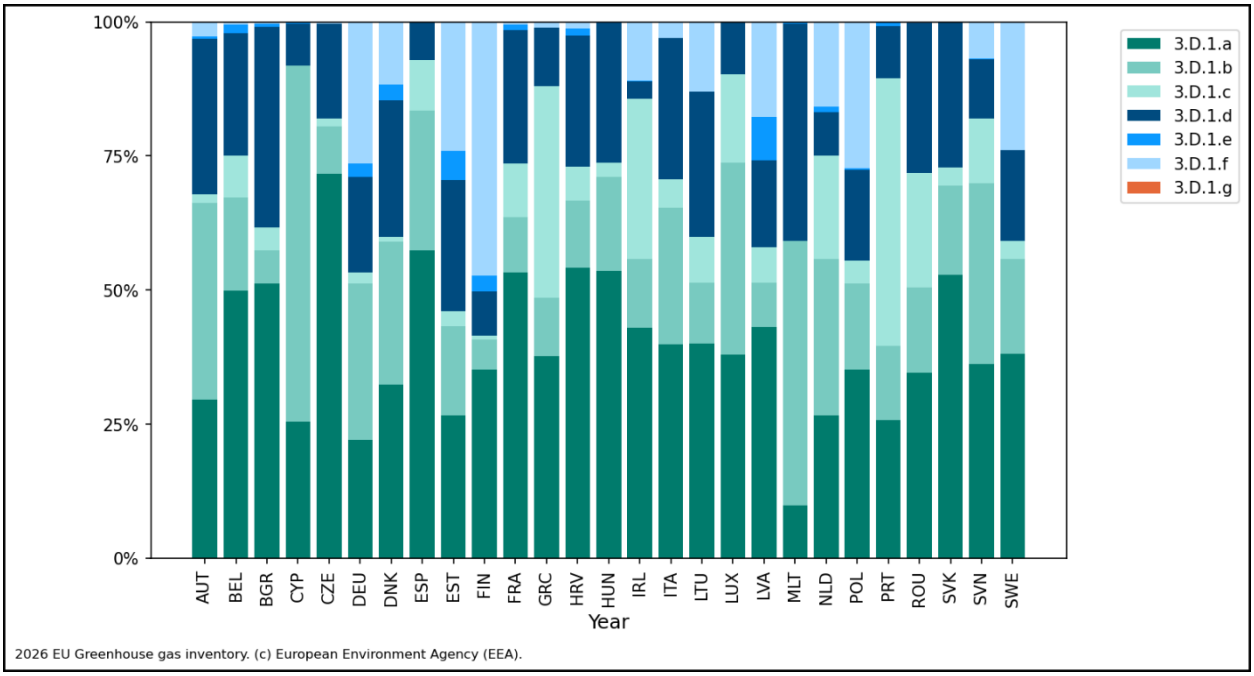
In 2024 N_2O emissions in source category *3.D.1 - Direct N_2O Emissions From Managed Soils* in the EU were 84483 kt CO_2 equivalent. This corresponds to 3.0 % of total EU GHG emissions and 47.3 % of total EU N_2O emissions. They make 23.5 % of total agricultural emissions and 68.3 % of total agricultural N_2O emissions. The main sub-categories are 3.D.1.a (Inorganic N Fertilizers), 3.D.1.b (Organic N Fertilizers) and 3.D.1.d (Crop Residues) as shown in Figure 5.41. Regarding the origin of emissions in the different countries, Figure 5.42 shows the distribution of direct N_2O emissions from managed soils by emission source in all countries. Each bar represents the total emissions of a country in the current emission category, with colours distinguishing the subcategories.

Figure 5.41 Share of source category 3.D.1 on total EU agricultural emissions (left panel) and decomposition into its sub-categories (right panel). The percentages refer to the emissions in the year 2024. Categories 3.D.1.a-3.D.1.e: direct N_2O emissions by N source (inorganic fertilizers, organic fertilizers, urine and dung deposited by grazing animals, crop residues and mineralization of soil organic matter); category 3.D.1.f: cultivation of histosols.



In the left panel, some minor differences in the numbers might be present due to automatic rounding of numbers.

Figure 5.42 Decomposition of emissions in source category 3.D.1 - Direct N_2O Emissions From Managed Soils into its sub-categories by country in the year 2024. 3.D.1.a inorganic N fertilizers, 3.D.1.b organic N fertilizers, 3.D.1.c urine and dung deposited by grazing animals, 3.D.1.d crop residues incorporated in the soil, 3.D.1.e mineralisation/immobilisation associated with loss/gain of soil organic matter, and 3.D.1.f cultivation of organic soils (histosols).



Total N_2O emissions by country and for the total EU from 3.D.1 *Direct N_2O Emissions From Managed Soils* are shown in Table 5.15 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, N_2O emission in this source category decreased by 24.3% or 27.1 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 0.8 %.

Table 5.15 3.D.1 - Direct N_2O Emissions From Managed Soils: Countries' contributions to total EU- N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	1 594	1 392	1 405	1,7%	-190	-12%	13	1%
Belgium	2 412	1 651	1 592	1,9%	-820	-34%	-59	-4%
Bulgaria	3 747	2 749	2 594	3,1%	-1 153	-31%	-155	-6%
Croatia	952	671	699	0,8%	-254	-27%	28	4%
Cyprus	41	35	34	0,0%	-7	-17%	-1	-2%
Czechia	2 193	1 625	2 084	2,5%	-109	-5%	459	28%
Denmark	4 250	2 870	2 995	3,5%	-1 255	-30%	124	4%
Estonia	834	556	568	0,7%	-266	-32%	12	2%
Finland	3 165	2 871	3 053	3,6%	-112	-4%	182	6%
France	17 566	14 558	14 379	17,0%	-3 188	-18%	-180	-1%
Germany	15 552	12 802	12 041	14,3%	-3 512	-23%	-762	-6%
Greece	3 320	2 036	2 083	2,5%	-1 237	-37%	48	2%
Hungary	3 086	2 409	2 634	3,1%	-452	-15%	224	9%
Ireland	3 635	3 169	3 232	3,8%	-403	-11%	63	2%
Italy	5 146	4 344	4 203	5,0%	-944	-18%	-141	-3%
Latvia	1 390	761	797	0,9%	-594	-43%	35	5%
Lithuania	2 070	1 270	1 299	1,5%	-771	-37%	29	2%
Luxembourg	123	93	92	0,1%	-31	-25%	-1	-1%
Malta	15	9	8	0,0%	-7	-46%	-1	-6%
Netherlands	6 341	3 701	3 646	4,3%	-2 695	-43%	-55	-1%
Poland	14 881	11 569	11 253	13,3%	-3 628	-24%	-316	-3%
Portugal	1 600	1 482	1 502	1,8%	-99	-6%	19	1%
Romania	8 989	5 515	5 306	6,3%	-3 683	-41%	-209	-4%
Slovakia	1 371	804	458	0,5%	-913	-67%	-345	-43%
Slovenia	305	282	281	0,3%	-24	-8%	-1	0%
Spain	4 548	3 955	4 227	5,0%	-322	-7%	272	7%
Sweden	2 437	1 969	2 019	2,4%	-418	-17%	51	3%
EU	**111 566**	**85 148**	**84 483**	**100%**	**-27 083**	**-24%**	**-665**	**-1%**

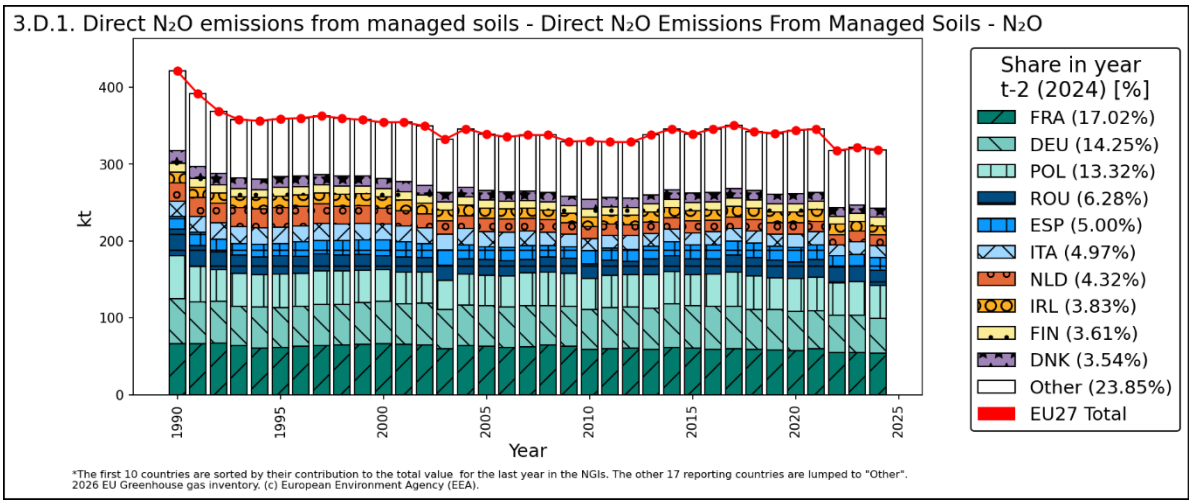
Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

5.3.4.1 Trends in Emissions and Activity Data

3.D.1 - Direct N_2O Emissions From Managed Soils - Emissions

Emissions in source category *3.D.1 - Direct N_2O Emissions From Managed Soils* decreased considerably in the EU in the period 1990 to 2023. Figure 5.43 shows the trend of emissions indicating the countries contributing most to EU total.

Figure 5.43 3.D.1 Direct N_2O Emissions From Managed Soils: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



The main driving forces of direct N_2O emissions from agricultural soils are the use of nitrogen fertiliser and animal manure. N_2O emissions from agricultural land can be decreased by overall efficiency improvements of nitrogen uptake by crops, which should lead to lower fertiliser consumption on agricultural land. The decrease of fertiliser use is partly due to the effects of the 1992 reform of the Common Agricultural Policy and the resulting shift from production-based support mechanisms to direct area payments in arable production. This has tended to lead to an optimisation and overall reduction in fertiliser use. In addition, reduction in fertiliser use is also due to directives such as the Nitrate Directive and to the extensification measures included in the Agro-Environment Programmes (EC, 2001).

Another policy affecting GHG emissions, in this case through the application of sewage sludge, is the Urban Wastewater Treatment Directive[45].

3.D.1.a - Direct N_2O emissions from inorganic N fertilizers - Emissions

Emissions in source category *3.D.1.a - Direct N_2O Emissions From Inorganic N fertilizers* decreased considerably in the EU by 33 % or 17.0 Mt CO_2-eq in the period 1990 to 2024. Figure 5.44 shows the trend of emissions indicating the countries contributing most to EU total. N_2O emissions by country and for the total EU from *3.D.1.a Direct N_2O Emissions From Inorganic N fertilizers* are shown in Table 5.16 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. From 2022 to 2024 emissions in the current category increased by 0.9 %.

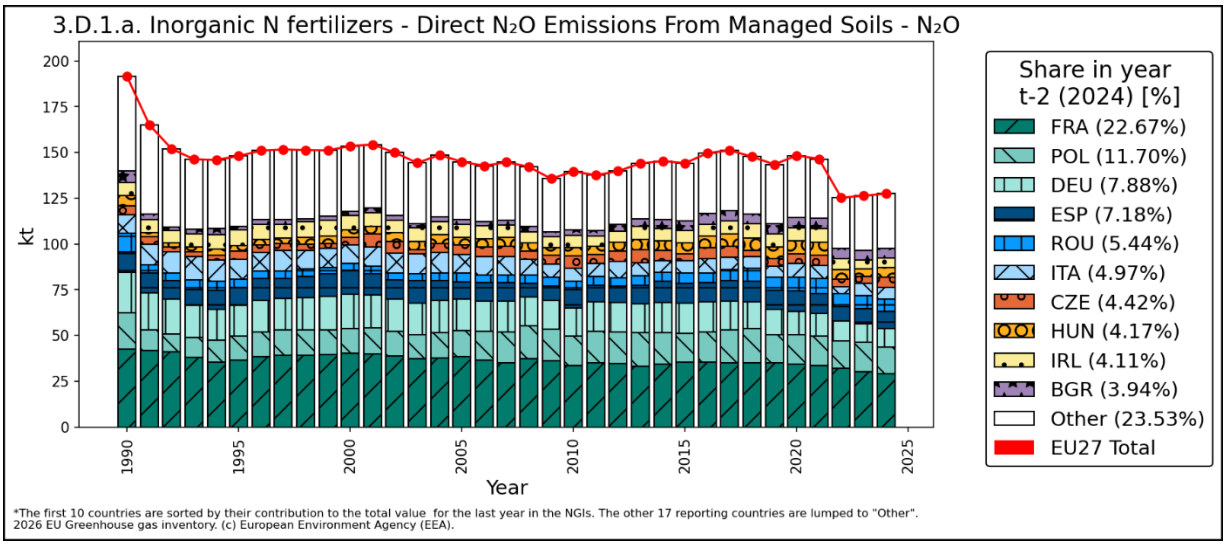
[45] http://ec.europa.eu/environment/water/water-urbanwaste/legislation/directive_en.htm

Table 5.16 3.D.1.a - Direct N_2O Emissions from Inorganic N fertilizers: Countries' contributions to total EU- N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	583	391	415	1,2%	-168	-29%	24	6%	T1	D
Belgium	1 401	833	794	2,4%	-607	-43%	-39	-5%	T1	D
Bulgaria	1 649	1 419	1 330	3,9%	-319	-19%	-90	-6%	T1	D
Croatia	447	362	378	1,1%	-69	-15%	17	5%	T1	D
Cyprus	16	9	9	0,0%	-7	-44%	0	-5%	T2	CS
Czechia	1 295	1 022	1 493	4,4%	198	15%	471	46%	T2	D
Denmark	1 667	861	971	2,9%	-696	-42%	110	13%	T1	D
Estonia	300	160	151	0,4%	-149	-50%	-9	-6%	T1	D
Finland	1 522	924	1 073	3,2%	-449	-30%	149	16%	T1	D
France	11 260	7 976	7 655	22,7%	-3 605	-32%	-321	-4%	T2	D
Germany	5 787	2 676	2 661	7,9%	-3 126	-54%	-15	-1%	T2	CS
Greece	1 766	726	786	2,3%	-980	-55%	60	8%	T1	D
Hungary	1 491	1 106	1 410	4,2%	-81	-5%	304	27%	T1	D
Ireland	1 919	1 287	1 387	4,1%	-533	-28%	100	8%	T2	CS
Italy	2 657	1 706	1 678	5,0%	-979	-37%	-29	-2%	T2	CS,D
Latvia	547	334	343	1,0%	-204	-37%	9	3%	T1	D
Lithuania	883	530	520	1,5%	-363	-41%	-10	-2%	T1	D
Luxembourg	67	34	35	0,1%	-32	-48%	1	4%	T1	CS
Malta	2	1	1	0,0%	-2	-68%	0	-18%	T1	D
Netherlands	1 762	951	969	2,9%	-793	-45%	18	2%	T2	CS
Poland	5 305	4 330	3 952	11,7%	-1 353	-26%	-378	-9%	T1	D
Portugal	648	351	387	1,1%	-261	-40%	36	10%	T1	CS,D
Romania	2 732	1 931	1 837	5,4%	-895	-33%	-94	-5%	T1	D
Slovakia	1 002	540	242	0,7%	-760	-76%	-298	-55%	T2	CS
Slovenia	113	104	102	0,3%	-11	-10%	-2	-2%	T1	D
Spain	2 974	2 150	2 426	7,2%	-548	-18%	275	13%	CS,T1	D
Sweden	935	766	770	2,3%	-165	-18%	4	0%	T2	CS
EU	**50 730**	**33 482**	**33 774**	**100%**	**-16 956**	**-33%**	**292**	**1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.44 3.D.1.a - Direct N_2O Emissions from Inorganic N fertilizers: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.D.1.a- Direct N_2O emissions from inorganic N fertilizers - Application of inorganic fertilizers

Application of inorganic fertilizers decreased strongly in the EU in the period 1990 to 2024.

In the new reporting format, the unit for N input on soils has been updated from kilograms of N to tons of N. However, some Member States reported data in the previous unit, which disrupted the compilation and analysis of data at the EU level. Thus, activity data is not reported here.

This issue was pointed out during the previous UNFCCC review. Efforts will be made to ensure that Member States report data in the appropriate unit, to ensure consistent compilation and analysis at EU level.

3.D.1.b - Direct N_2O emissions from organic N fertilizers - Emissions

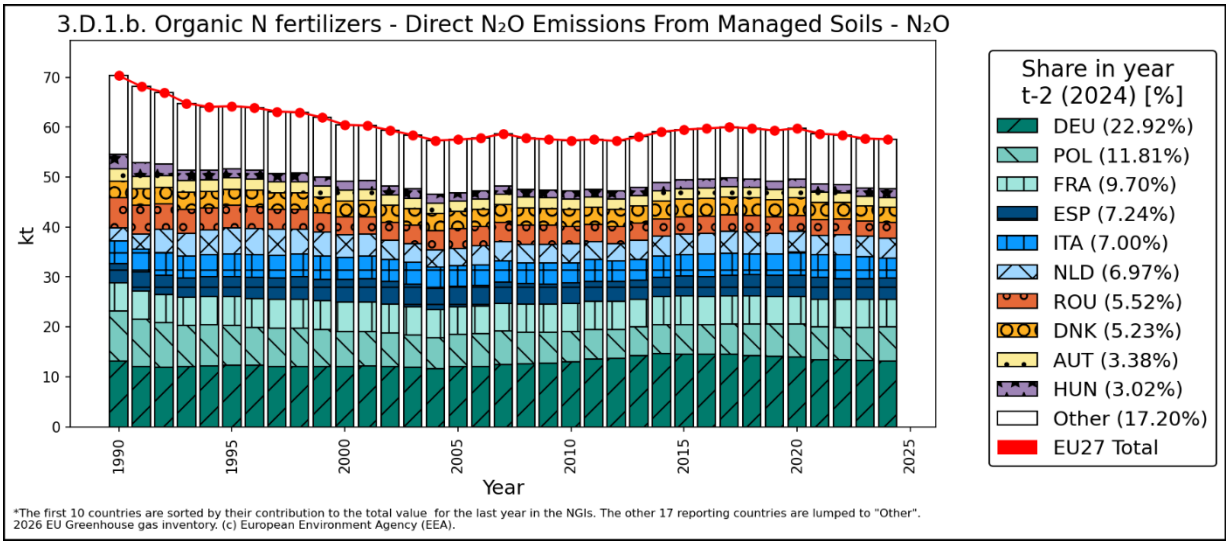
Emissions in source category *3.D.1.b - Direct N_2O Emissions from organic N fertilizers* decreased considerably in the EU by 18 % or 3.4 Mt CO_2-eq in the period 1990 to 2024. Figure 5.45 shows the trend of emissions indicating the countries contributing most to EU total. N_2O emissions by country and for the total EU from *3.D.1.b Direct N_2O Emissions From organic N fertilizers* are shown in Table 5.17 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 0.2 %.

Table 5.17 3.D.1.b - Direct N_2O Emissions From organic N fertilizers: Countries' contributions to total EU- N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	633	518	516	3,4%	-116	-18%	-2	0%	CS,T1	D
Belgium	482	281	278	1,8%	-204	-42%	-3	-1%	T1,T2	D
Bulgaria	606	165	161	1,1%	-446	-74%	-4	-3%	NA,T1	D,NA
Croatia	210	86	88	0,6%	-122	-58%	2	2%	NA,T1	D,NA
Cyprus	18	22	23	0,1%	4	25%	1	4%	T2	CS
Czechia	314	179	185	1,2%	-129	-41%	6	3%	T2	D
Denmark	888	800	798	5,2%	-90	-10%	-3	0%	CS,T1	D
Estonia	127	86	95	0,6%	-33	-26%	9	10%	T1	D
Finland	209	174	172	1,1%	-37	-18%	-1	-1%	T1	D
France	1 518	1 492	1 481	9,7%	-37	-2%	-12	-1%	T2	D
Germany	3 495	3 530	3 498	22,9%	3	0%	-32	-1%	T2	CS
Greece	292	232	225	1,5%	-67	-23%	-7	-3%	NA,T1	D,NA
Hungary	788	410	461	3,0%	-327	-41%	52	13%	T1	D
Ireland	417	423	414	2,7%	-3	-1%	-9	-2%	NA,T1	D,NA
Italy	1 203	1 170	1 068	7,0%	-135	-11%	-103	-9%	T2	CS,D
Latvia	213	66	66	0,4%	-148	-69%	0	-1%	T1	D
Lithuania	354	149	148	1,0%	-206	-58%	-2	-1%	T1	D
Luxembourg	33	33	33	0,2%	0	1%	0	-1%	T1,T2	CS
Malta	9	4	4	0,0%	-5	-54%	0	-10%	NA,T1	D,NA
Netherlands	691	1 083	1 064	7,0%	373	54%	-19	-2%	T1,T1b	CS,D
Poland	2 635	1 733	1 803	11,8%	-832	-32%	70	4%	NA,T1	CS,D,NA
Portugal	256	206	207	1,4%	-48	-19%	1	0%	T1	CS,D
Romania	1 599	822	842	5,5%	-757	-47%	19	2%	T1	D
Slovakia	165	81	77	0,5%	-88	-54%	-5	-6%	NA,T2	CS,NA
Slovenia	123	94	95	0,6%	-29	-23%	1	1%	NA,T1	D,NA
Spain	1 019	1 100	1 104	7,2%	85	8%	4	0%	CS,T1	D
Sweden	335	353	357	2,3%	23	7%	4	1%	T1,T2	CS,D
EU	**18 632**	**15 294**	**15 260**	**100%**	**-3 372**	**-18%**	**-34**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.45 3.D.1.b- Direct N_2O Emissions From Organic N fertilizers: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.D.1.b - Direct N_2O emissions from organic N fertilizers - amount of N applied

N from applied organic N fertilizers decreased in the EU in the period 1990 to 2024.

In the new reporting format, the unit for N input on soils has been updated from kilograms of N to tons of N. However, some Member States reported data in the previous unit, which disrupted the compilation and analysis of data at the EU level. Thus, activity data is not reported here.

This issue was pointed out during the previous UNFCCC review. Efforts will be made to ensure that Member States report data in the appropriate unit, to ensure consistent compilation and analysis at EU level.

3.D.1.c - Urine and Dung Deposited by Grazing Animals - Emissions

In 2024 N_2O emissions in source category *3.D.1.c - Urine and Dung Deposited by Grazing Animals* in the EU were 7958 kt CO_2 equivalent. It represents 2.2 % of total agricultural emissions and 6.4 % of total agricultural N_2O emissions.

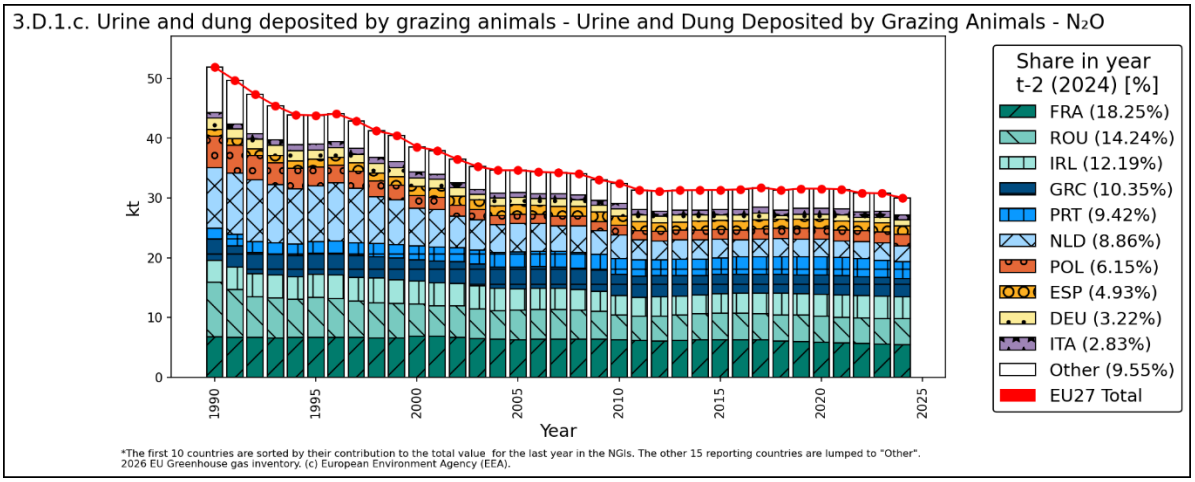
Total N_2O emissions by country and for the total EU from 3.D.1.c *Grazing Animals* are shown in Table 5.18 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, N_2O emission in this source category decreased by 42 % or 5.8 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 2.4 %. Figure 5.46 shows the trend of emissions indicating the countries contributing most to EU total.

Table 5.18 3.D.1.c - Urine and Dung Deposited by Grazing Animals: Countries' contributions to total EU-GHG and N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	29	23	23	0,3%	-7	-23%	0	-1%	T2	D
Belgium	212	129	124	1,6%	-88	-42%	-5	-4%	T1	D
Bulgaria	630	115	111	1,4%	-519	-82%	-4	-4%	T1	D
Croatia	120	44	44	0,6%	-76	-63%	0	0%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	33	30	32	0,4%	-1	-4%	1	4%	T1	D
Denmark	60	25	25	0,3%	-35	-58%	-1	-2%	T2	D
Estonia	67	17	16	0,2%	-50	-76%	-1	-6%	T1	D
Finland	45	22	21	0,3%	-23	-52%	0	-1%	T1	D
France	1 780	1 467	1 452	18,2%	-327	-18%	-15	-1%	T1,T2	D
Germany	512	263	256	3,2%	-256	-50%	-6	-2%	T1	D
Greece	943	835	824	10,3%	-120	-13%	-11	-1%	T1	D
Hungary	172	89	70	0,9%	-102	-59%	-19	-21%	T1	D
Ireland	977	992	970	12,2%	-7	-1%	-22	-2%	T1,T2	CS,D
Italy	233	255	225	2,8%	-8	-3%	-30	-12%	T1,T2	CS,D
Latvia	133	55	53	0,7%	-81	-60%	-2	-3%	T1	D
Lithuania	377	113	111	1,4%	-266	-70%	-2	-2%	T1	D
Luxembourg	19	16	15	0,2%	-4	-20%	0	-2%	T2	CS
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	2 693	766	705	8,9%	-1 988	-74%	-60	-8%	T1	D
Poland	1 413	482	489	6,1%	-924	-65%	8	2%	T1	CS,D
Portugal	479	774	750	9,4%	271	57%	-24	-3%	T1	D
Romania	2 421	1 124	1 133	14,2%	-1 287	-53%	10	1%	T1	D
Slovakia	24	20	15	0,2%	-9	-36%	-4	-22%	T2	CS
Slovenia	17	34	34	0,4%	17	99%	0	0%	T1	D
Spain	293	400	393	4,9%	100	34%	-7	-2%	CS,T1	D
Sweden	67	67	66	0,8%	-1	-2%	-1	-2%	T1	D
EU	**13 748**	**8 155**	**7 958**	**100%**	**-5 789**	**-42%**	**-196**	**-2%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.46 3.D.1.c - Urine and Dung Deposited by Grazing Animals: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.D.1.d – Direct N_2O emissions from crop residues – Emissions

In 2024 N_2O emissions in source category *3.D.1.d – Direct N_2O emissions from crop residues* in the EU were 16374 kt CO_2 equivalent. It represents 4.6 % of total agricultural emissions and 13.2 % of total agricultural N_2O emissions.

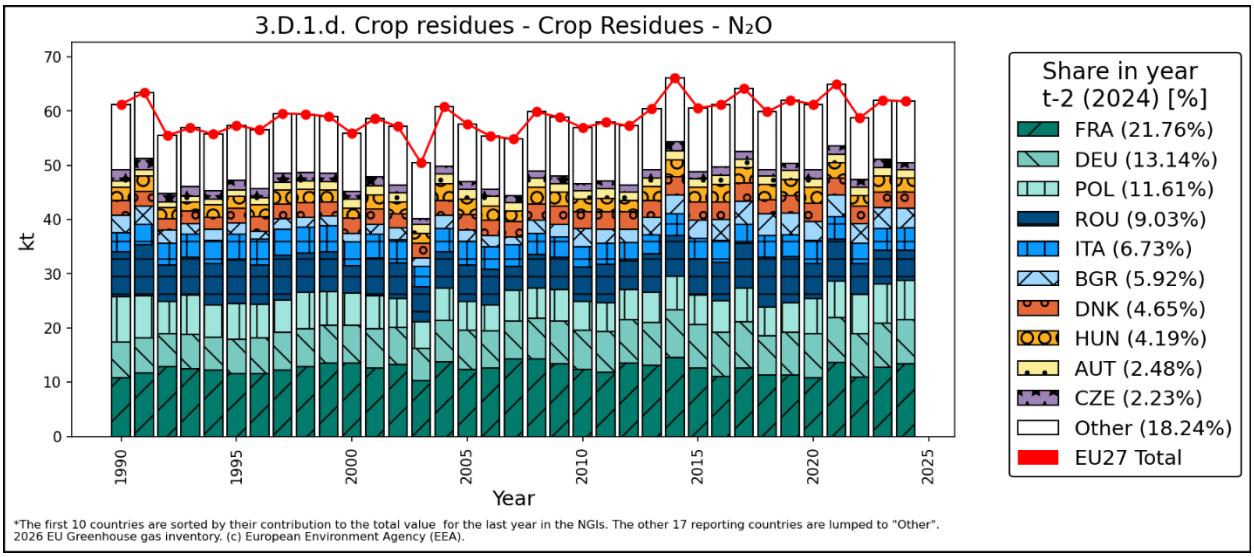
Total N_2O emissions by country and for the total EU from 3.D.1.d *Direct N_2O emissions from crop residues* are shown in Table 5.19 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, N_2O emission in this source category increased by 0.9 % or 0.1 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 0.4 %. Figure 5.47 shows the trend of emissions indicating the countries contributing most to EU total.

Table 5.19 3.D.1.d – Direct N_2O emissions from crop residues: Countries' contributions to total EU- N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	310	415	407	2,5%	97	31%	-8	-2%	T1	D
Belgium	283	374	363	2,2%	80	28%	-11	-3%	T1	D
Bulgaria	843	1 027	970	5,9%	127	15%	-57	-6%	T1	D
Croatia	166	162	171	1,0%	4	2%	9	6%	T1	D
Cyprus	8	4	3	0,0%	-5	-65%	-1	-26%	T1	D
Czechia	542	385	366	2,2%	-176	-33%	-19	-5%	T2	D
Denmark	735	751	762	4,7%	27	4%	11	1%	CS,T1	D
Estonia	168	128	139	0,8%	-29	-17%	11	8%	T1	D
Finland	203	242	253	1,5%	50	25%	11	5%	T2	D
France	2 857	3 374	3 563	21,8%	706	25%	188	6%	T2	D
Germany	1 744	2 169	2 151	13,1%	408	23%	-18	-1%	T2	CS
Greece	297	221	227	1,4%	-70	-24%	6	3%	T1	D
Hungary	634	799	686	4,2%	53	8%	-113	-14%	T1	D
Ireland	133	100	101	0,6%	-31	-24%	1	1%	T1	D
Italy	921	1 082	1 102	6,7%	181	20%	20	2%	T2	CS,D
Latvia	136	118	129	0,8%	-6	-5%	11	10%	T1	D
Lithuania	291	310	351	2,1%	60	21%	41	13%	T2	D
Luxembourg	5	10	9	0,1%	4	89%	-1	-12%	T1	CS
Malta	4	3	3	0,0%	0	-11%	0	2%	T1	D
Netherlands	420	295	292	1,8%	-128	-31%	-4	-1%	T1b	CS
Poland	2 218	1 913	1 901	11,6%	-318	-14%	-12	-1%	T1	CS,D
Portugal	218	140	146	0,9%	-71	-33%	6	4%	T1	D
Romania	2 222	1 623	1 479	9,0%	-743	-33%	-144	-9%	T1	D
Slovakia	181	163	124	0,8%	-56	-31%	-39	-24%	T2	CS
Slovenia	32	31	31	0,2%	-1	-2%	0	1%	T1	D
Spain	263	304	304	1,9%	42	16%	0	0%	CS,T1	D
Sweden	402	295	342	2,1%	-61	-15%	47	16%	T2	CS
EU	**16 233**	**16 437**	**16 374**	**100%**	**142**	**1%**	**-63**	**0%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 5.47 3.D.1.d – Direct N_2O emissions from crop residues: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



5.3.4.2 Implied EFs and Methodological Issues

In this section we discuss the implied emission factor for the main N sources contributing to direct N_2O emissions from managed soils.

The figures showing the trend of the implied emission factor indicating also the range of values used by the countries have not been integrated this year as some Member States had issues with the reporting units that have been updated.

As mentioned earlier, this issue was pointed out during the previous UNFCCC review. Efforts will be made to ensure that Member States report data in the appropriate unit, to ensure consistent compilation and analysis at EU level.

3.D.1.a - Direct N_2O Emissions From Inorganic N fertilizers - Implied emission factor

No further analysis because of issues with reporting units.

3.D.1.b - Direct N_2O Emissions From Organic N fertilizers - Implied emission factor

No further analysis because of issues with reporting units.

3.D.1.c - Urine and Dung Deposited by Grazing Animals - Implied emission factor

No further analysis because of issues with reporting units.

3.D.1.d – Crop residues - Implied emission factor

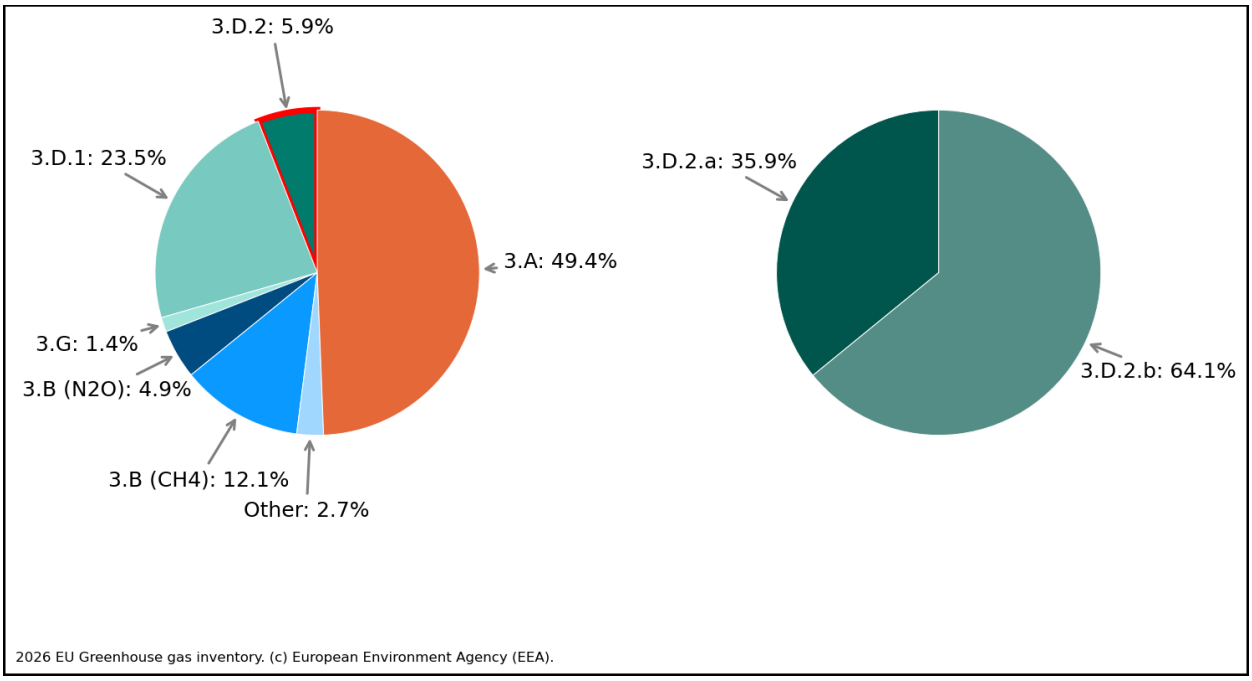
No further analysis because of issues with reporting units.

5.3.5 Indirect Emissions from Managed Soils - N_2O (CRT Source Category 3D2)

In 2024 N_2O emissions in source category *3.D.2 - Indirect Emissions from Managed Soils* in the EU were 21333 kt CO_2 equivalent. This corresponds to 0.8 % of total EU GHG emissions and 12.0 % of total EU N_2O emissions. They make 5.9 % of total agricultural emissions and 17.2 % of total agricultural N_2O emissions. Those emissions include emissions from atmospheric deposition and leaching and run-off.

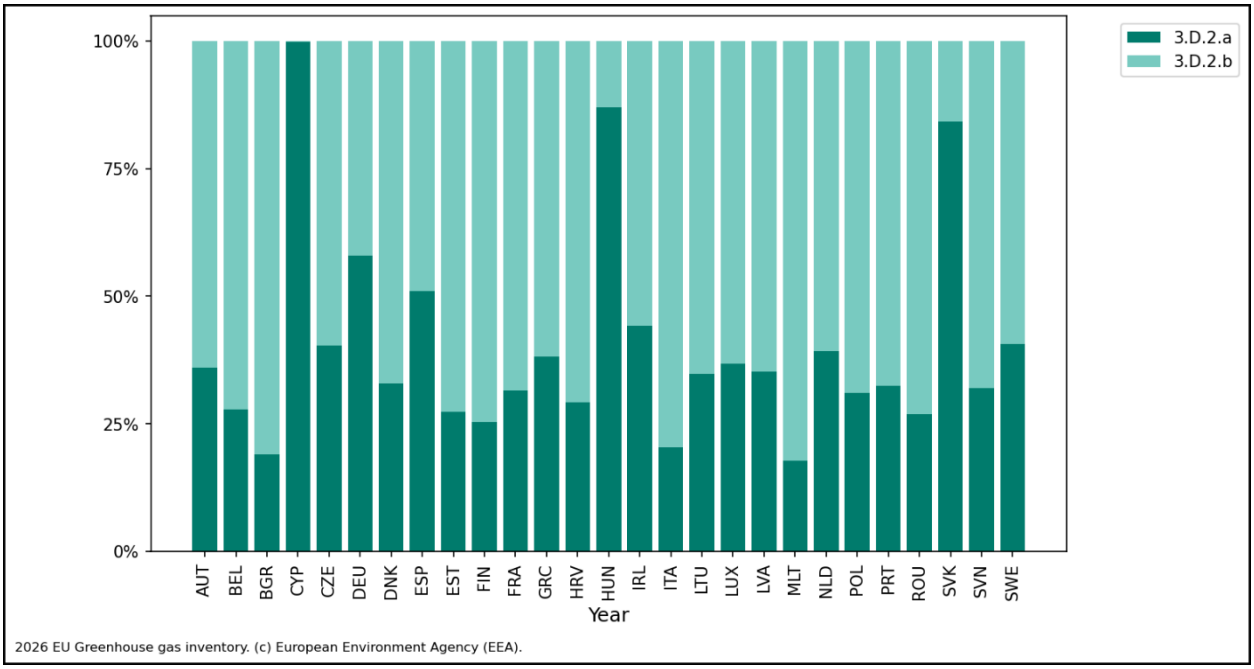
The main sub-categories are 3.D.2.b (Nitrogen Leaching and Run-off), and 3.D.2.a (Atmospheric Deposition) as shown in Figure 5.48. Figure 5.49 shows, for each country, how indirect N_2O emissions from managed soils are distributed by reported emission source. Each bar represents the total emissions of a country in the current emission category, with colours distinguishing the subcategories.

Figure 5.48 Share of source category 3.D.2 on total EU agricultural emissions (left panel) and decomposition into its sub-categories (right panel). The percentages refer to the emissions in the year 2024.



In the left panel, some minor differences in the numbers might be present due to automatic rounding of numbers.

Figure 5.49 Decomposition of emissions in source category 3.D.2 - Indirect Emissions from Managed Soils into its sub-categories by country in the year 2024. 3.D.2.a Atmospheric Deposition and 3.D.2.b Nitrogen Leaching and Run-off.



Total N_2O emissions by country and for the total EU from 3.D.2 *Indirect Emissions from Managed Soils* are shown in Table 5.20 for the first and the last year of the inventory (1990 and 2024). Values are given in kt CO_2-eq. Between 1990 and 2024, N_2O emission in this source category decreased by 32 % or 10.2 Mt CO_2-eq. From 2023 to 2024 emissions in the current category decreased by 2.7 %.

Table 5.20 3.D.2 - Indirect Emissions from Managed Soils: Countries' contributions to total EU-GHG and N_2O emissions

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	466	370	366	1,7%	-100	-22%	-4	-1%	CS,T1	D
Belgium	1 182	695	665	3,1%	-517	-44%	-30	-4%	T1,T2	D
Bulgaria	1 155	754	712	3,3%	-443	-38%	-42	-6%	T1	D
Croatia	310	210	218	1,0%	-92	-30%	8	4%	T1	D
Cyprus	17	17	17	0,1%	1	3%	0	2%	T1	D
Czechia	437	450	580	2,7%	142	32%	130	29%	T1,T2	D
Denmark	1 406	708	722	3,4%	-684	-49%	14	2%	T2	D
Estonia	211	129	131	0,6%	-80	-38%	3	2%	T1	D
Finland	390	275	299	1,4%	-92	-23%	23	8%	T2	D
France	5 242	4 432	4 407	20,7%	-835	-16%	-25	-1%	T1,T2	D
Germany	4 740	2 846	2 432	11,4%	-2 308	-49%	-414	-15%	T2,T3	D
Greece	1 148	719	734	3,4%	-414	-36%	15	2%	T1	D
Hungary	301	166	192	0,9%	-109	-36%	26	16%	T1	D
Ireland	758	654	669	3,1%	-89	-12%	16	2%	T1	CS,D
Italy	2 710	2 137	2 114	9,9%	-596	-22%	-23	-1%	T2	CS,D
Latvia	277	141	151	0,7%	-126	-46%	10	7%	T1	D
Lithuania	397	210	211	1,0%	-186	-47%	1	0%	T1	D
Luxembourg	58	45	44	0,2%	-14	-24%	-1	-2%	T1,T2	D
Malta	5	3	3	0,0%	-2	-48%	0	-7%	T1	D
Netherlands	1 438	501	490	2,3%	-948	-66%	-11	-2%	T1	D
Poland	3 700	2 689	2 594	12,2%	-1 105	-30%	-95	-4%	T1	D
Portugal	459	377	390	1,8%	-69	-15%	12	3%	T1,T2	D
Romania	2 226	1 367	1 312	6,2%	-914	-41%	-55	-4%	T1	D
Slovakia	611	302	110	0,5%	-500	-82%	-192	-64%	T1,T2	CS,D
Slovenia	117	98	99	0,5%	-17	-15%	1	1%	T1	D
Spain	1 453	1 381	1 432	6,7%	-21	-1%	51	4%	CS,T2	D
Sweden	297	241	239	1,1%	-58	-20%	-2	-1%	CS	D
EU	**31 511**	**21 916**	**21 334**	**100%**	**-10 177**	**-32%**	**-582**	**-3%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.

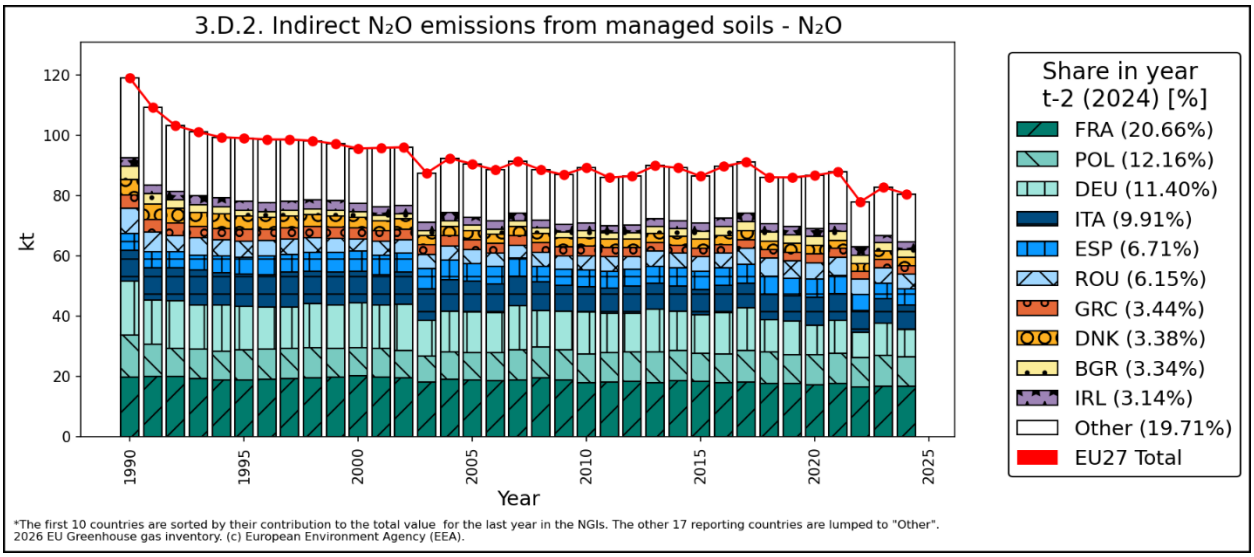
Abbreviations are explained in the Chapter 'Units and abbreviations'.

5.3.5.1 Trends in Emissions and Activity Data

3.D.2 - Indirect Emissions from Managed Soils - Emissions

Emissions in source category *3.D.2 - Indirect Emissions from Managed Soils* decreased strongly in the EU in the period 1990 to 2024. Figure 5.50 shows the trend of emissions indicating the countries contributing most to EU total.

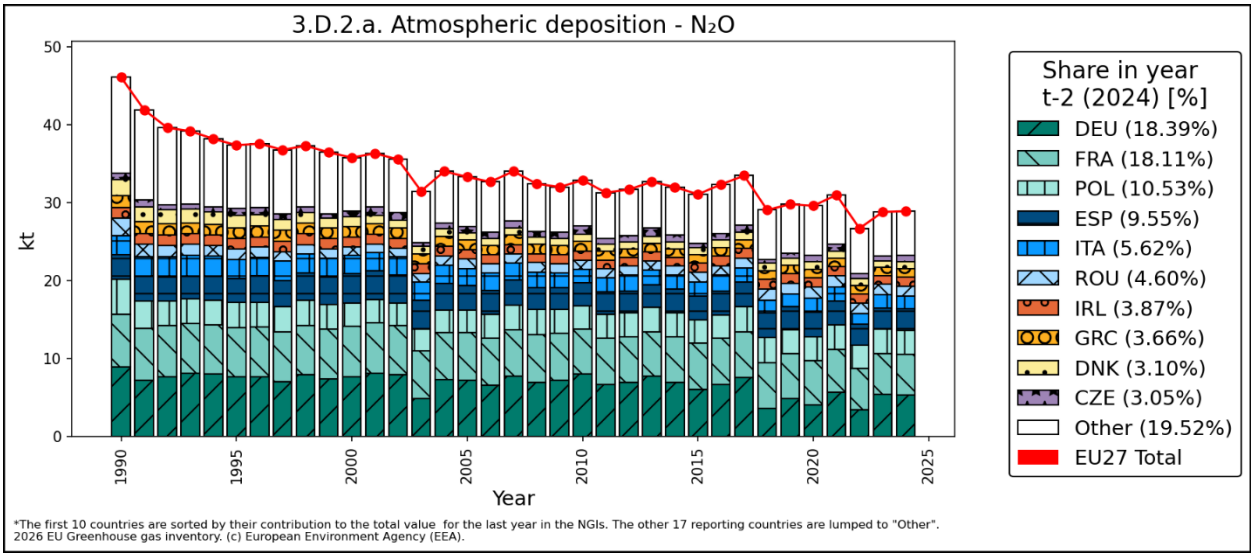
Figure 5.50 3.D.2 Indirect Emissions from Managed Soils: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024.



3.D.2.a - Indirect N_2O Emissions from Atmospheric Deposition - Emissions

Emissions in source category *3.D.2.a - Indirect N_2O Emissions from Atmospheric Deposition* decreased strongly in the EU by 37 % or 4.6 Mt CO_2-eq in the period 1990 to 2024. Figure 5.51 shows the trend of emissions indicating the countries contributing most to EU total.

Figure 5.51 3.D.2.a - Indirect N_2O Emissions from Atmospheric Deposition: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



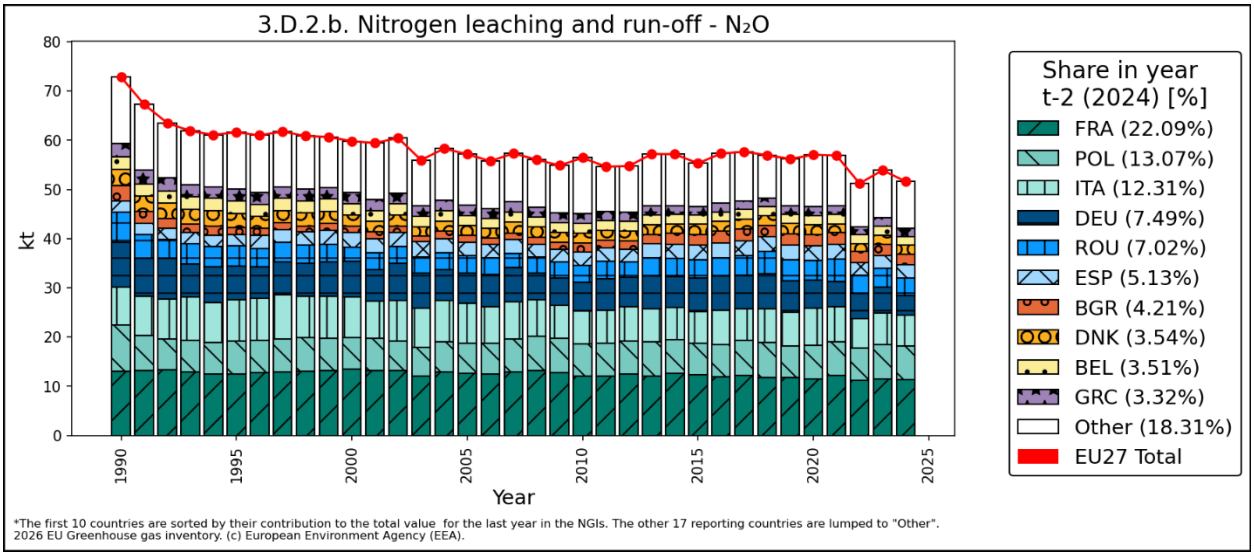
3.D.2.a - Indirect N_2O Emissions from Atmospheric Deposition - Volatilized N from agricultural N inputs

Volatilized N from agricultural N inputs decreased in the EU in the period 1990 to 2024.

3.D.2.b - Indirect N_2O Emissions from Nitrogen leaching and run-off - Emissions

Emissions in source category *3.D.2.b - Indirect N_2O Emissions from Nitrogen leaching and run-off* decreased considerably in the EU by 29 % or 5.6 Mt CO_2-eq in the period 1990 to 2024. Figure 5.52 shows the trend of emissions indicating the countries contributing most to EU total.

Figure 5.52 3.D.2.b - Indirect N_2O Emissions from Nitrogen leaching and run-off: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



3.D.2.b- Indirect N_2O Emissions from Nitrogen leaching and run-off - N from fertilizers and other agricultural inputs that is lost through leaching and run-off

N from fertilizers and other agricultural inputs that is lost through leaching and run-off decreased considerably in the EU in the period 1990 to 2024.

5.3.5.2 Implied EFs and Methodological Issues

In this section we discuss the implied emission factor for the main N sources contributing to indirect N_2O emissions from managed soils

5.3.6 Limestone $CaCO_3$ - CO_2 (CRT Source Category 3.G.1)

In 2024 CO_2 emissions in source category *3.G.1 - Limestone* in the EU were 4659 kt CO_2 equivalent. This corresponds to 0.2 % of total EU GHG emissions and 0.2 % of total EU CO_2 emissions. They make 1.3 % of total agricultural emissions and 50 % of total agricultural CO_2 emissions.

CO_2 emissions from *3.G.1 Limestone* are shown in Table 5.21 by country, and the total EU for the first and the last year of the inventory (1990 and 2024) is provided. Values are given in kt CO_2-eq. Between 1990 and 2024, CO_2 emissions in this source category decreased by 30 % or 2.0 Mt CO_2-eq. From 2023 to 2024 emissions in the current category increased by 0.9 %.

Table 5.21 *3.G.1 – CO_2 Emissions from Limestone : Countries' contributions to total EU-GHG and CO_2 emissions*

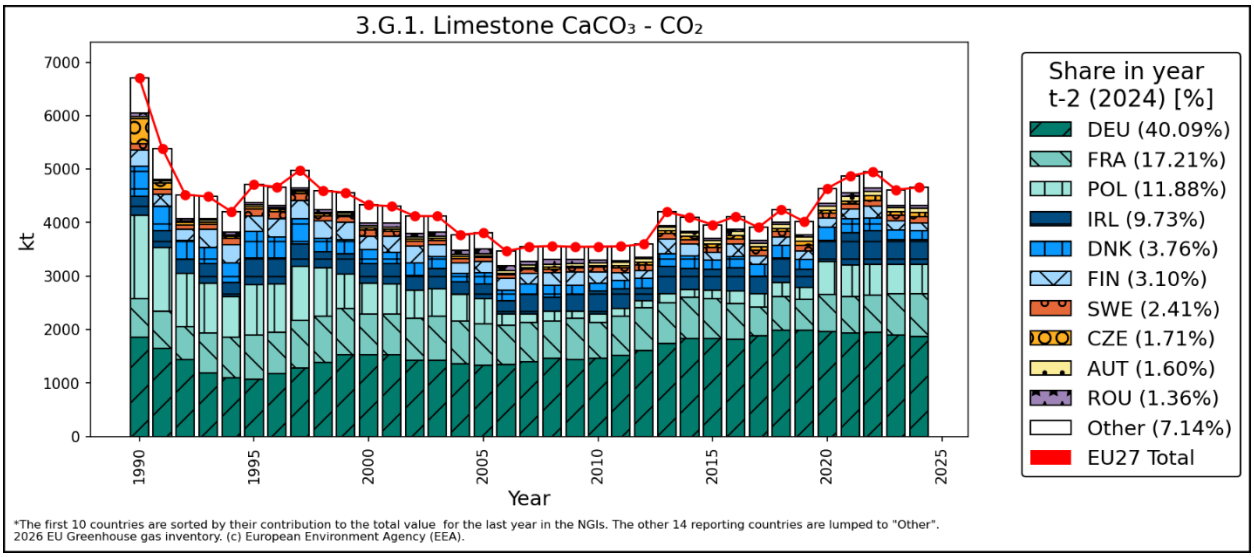
Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	37	78	75	1,6%	38	103%	-3	-4%	T1	D
Belgium	78	62	62	1,3%	-16	-21%	0	-1%	T1	D
Bulgaria	29	25	25	0,5%	-4	-14%	0	0%	T1	D
Croatia	NO	3	7	0,1%	7	∞	4	127%	T1	D
Cyprus	NO	NO	NO	-	-	-	-	-	NA	NA
Czechia	471	62	80	1,7%	-391	-83%	18	29%	T1	D
Denmark	565	183	175	3,8%	-390	-69%	-8	-4%	T1	D
Estonia	12	25	25	0,5%	13	106%	0	1%	T1	D
Finland	302	160	145	3,1%	-157	-52%	-16	-10%	T1	D
France	727	776	802	17,2%	75	10%	26	3%	T1	D
Germany	1 850	1 896	1 868	40,1%	17	1%	-29	-2%	T1	D
Greece	NO	NO	NO	-	-	-	-	-	NA	NA
Hungary	140	4	1	0,0%	-138	-99%	-2	-67%	T1	D
Ireland	355	458	454	9,7%	98	28%	-4	-1%	T1	D
Italy	1	3	2	0,0%	1	173%	-1	-29%	T1	D
Latvia	171	44	47	1,0%	-125	-73%	3	6%	T1	D
Lithuania	21	41	61	1,3%	41	198%	20	49%	T1	D
Luxembourg	NO	1	1	0,0%	1	∞	0	3%	T1	D
Malta	NO	NO	NO	-	-	-	-	-	NA	NA
Netherlands	26	23	26	0,6%	1	2%	4	16%	T1	D
Poland	1 562	553	553	11,9%	-1 009	-65%	0	0%	T1	D
Portugal	6	8	11	0,2%	5	87%	3	39%	T1	D
Romania	67	45	63	1,4%	-3	-5%	18	39%	T1	D
Slovakia	44	9	8	0,2%	-36	-82%	-1	-16%	T1	D
Slovenia	44	17	18	0,4%	-26	-60%	1	4%	T1	D
Spain	82	27	39	0,8%	-43	-52%	12	45%	T1	D
Sweden	113	112	112	2,4%	0	0%	0	0%	T1	D
EU	**6 702**	**4 615**	**4 659**	**100%**	**-2 043**	**-30%**	**44**	**1%**	**-**	**-**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.

Abbreviations are explained in the Chapter 'Units and abbreviations'.

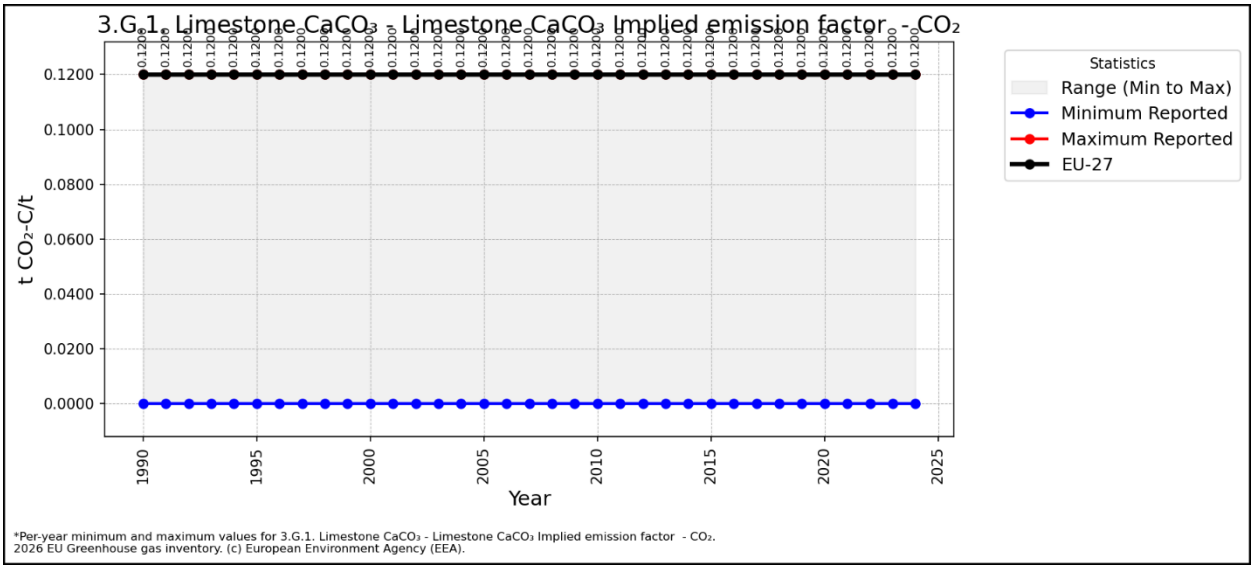
Figure 5.53 shows the trend of emissions indicating the countries contributing most to EU total. The figure represents the trend in CO_2 emissions from limestone for the different countries along the inventory period.

Figure 5.53 3.G.1: Trend in emissions in the EU and the countries contributing most to EU values including their share to EU emissions in 2024



The implied emission factor for CO_2 emissions is constant through time as the Tier 1 method is applied by all Member States, using the default emission factor provided by the IPCC.

Figure 5.54 3.G.1: Trend in implied emission factor and range of values reported by countries



5.3.7 Agriculture - non-key categories

Table 5.22 Non-key categories in agriculture

EU	Aggregated GHG emissions in kt CO_2 equ.			Share in sector 3. Agriculture in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 equ.	%	kt CO_2 equ.	%
3.C.1 Irrigated: no classification (CH4)	3 410.8	2 561.9	2 975.3	0.8%	-436	-13%	413.4	16%
3.C.2 Rain-fed: no classification (CH4)	0.0	0.0	0.0	0.0%	0	0%	0.0	0%
3.C.3 Deep water: no classification (CH4)	0.0	0.0	0.0	0.0%	0	0%	0.0	0%
3.C.4 Other: no classification (CH4)	0.0	0.0	0.0	0.0%	0	0%	0.0	0%
3.E Prescribed burning of savannas: no classification (CH4)	0.0	0.0	0.0	0.0%	0	0%	0.0	0%
3.E Prescribed burning of savannas: no classification (N2O)	0.0	0.0	0.0	0.0%	0	0%	0.0	0%
3.E.1 Forest land (specify ecological zone): no classification (CH4)	0.0	0.0	0.0	0.0%	0	0%	0.0	0%
3.E.1 Forest land (specify ecological zone): no classification (N2O)	0.0	0.0	0.0	0.0%	0	0%	0.0	0%
3.E.2 Grassland (specify ecological zone): no classification (CH4)	0.0	0.0	0.0	0.0%	0	0%	0.0	0%
3.E.2 Grassland (specify ecological zone): no classification (N2O)	0.0	0.0	0.0	0.0%	0.0	0%	0.0	0%
3.F.1 Cereals: Cereals (CH4)	1 350.8	549.0	611.2	0.2%	-740	-55%	62.2	11%
3.F.1 Cereals: Cereals (N2O)	355.3	152.5	170.4	0.0%	-185	-52%	17.9	12%
3.F.2 Pulses: Pulses (CH4)	1.4	0.2	0.2	0.0%	-1	-85%	0.0	-2%
3.F.2 Pulses: Pulses (N2O)	0.4	0.1	0.1	0.0%	0	-79%	0.0	-6%
3.F.3 Tubers and roots: Tubers and Roots (CH4)	219.3	2.3	2.4	0.0%	-217	-99%	0.1	4%
3.F.3 Tubers and roots: Tubers and Roots (N2O)	56.9	1.0	1.1	0.0%	-56	-98%	0.1	5%
3.F.4 Sugar cane: Sugar Cane (CH4)	8.5	1.5	1.2	0.0%	-7	-86%	-0.3	-23%
3.F.4 Sugar cane: Sugar Cane (N2O)	2.1	0.4	0.3	0.0%	-2	-86%	-0.1	-23%
3.F.5 Other: Other Agricultural residues (CH4)	111.1	44.6	44.7	0.0%	-66	-60%	0.2	0%
3.F.5 Other: Other Agricultural residues (N2O)	29.2	15.4	14.9	0.0%	-14	-49%	-0.5	-3%
3.G.1 Limestone $CaCO_3$: no classification (CO2)	6 701.7	4 615.4	4 658.9	1.2%	-2 043	-30%	43.5	1%
3.G.2 Dolomite $CaMg(CO_3)_2$: no classification (CO2)	2 733.9	552.2	547.2	0.1%	-2 186.8	-80%	-5.0	-1%
3.H Urea application: no classification (CO2)	3 648.7	3 581.9	3 567.0	0.9%	-82	-2%	-14.9	0%
3.I Other carbon-containing fertilizers: no classification (CO2)	1 109.0	576.1	593.6	0.2%	-515	-46%	17.5	3%
3.J Other: no classification (CH4)	0.3	1 445.3	1 445.3	0.38%	1 445	460916%	0.0	0%
3.J Other: no classification (CO2)	0.0	0.0	0.0	0.00%	0	0%	0.0	0%
3.J Other: no classification (N2O)	0.1	92.7	92.7	0.02%	93	87108%	0.0	0%

5.4 Uncertainties

Table 5.23 shows the total EU uncertainty estimates for the sector Agriculture and the uncertainty estimates for the relevant gases of each source category. The highest-level uncertainty was estimated for N_2O from 3D and the lowest for CH_4 from sector 3A. With regard to the uncertainty on trend N_2O from sector 3J shows the highest uncertainty estimates, CH_4 from sector 3A the lowest. For a description of the Tier 1 uncertainty analysis carried out for the EU see Chapter 1.6.

Table 5.23 Sector Agriculture: EU uncertainty estimates

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
3.A Enteric Fermentation	CO2	0	0	0.0%	0.0%	0.0%
3.A Enteric Fermentation	CH4	241 529	177 310	-26.6%	12.0%	1.5%
3.A Enteric Fermentation	N2O	0	0	0.0%	0.0%	0.0%
3.B Manure Mangement	CO2	0	0	0.0%	0.0%	0.0%
3.B Manure Mangement	CH4	55 164	43 615	-20.9%	22.6%	1.9%
3.B Manure Mangement	N2O	27 744	17 617	-36.5%	58.0%	10.7%
3.C Rice Cultivation	CO2	0	0	0.0%	0.0%	0.0%
3.C Rice Cultivation	CH4	3 411	2 975	-12.8%	29.3%	18.0%
3.C Rice Cultivation	N2O	0	0	0.0%	0.0%	0.0%
3.D Agricultural Soils	CO2	0	0	0.0%	0.0%	0.0%
3.D Agricultural Soils	CH4	0	0	0.0%	0.0%	0.0%
3.D Agricultural Soils	N2O	143 076	105 817	-26.0%	66.6%	9.4%
3.E Prescribed burning of savannas	CO2	0	0	0.0%	0.0%	0.0%
3.E Prescribed burning of savannas	CH4	0	0	0.0%	0.0%	0.0%
3.E Prescribed burning of savannas	N2O	0	0	0.0%	0.0%	0.0%
3.F Field Burning of Agricultural Residues	CO2	0	0	0.0%	0.0%	0.0%
3.F Field Burning of Agricultural Residues	CH4	806	655	-18.7%	50.2%	5.9%
3.F Field Burning of Agricultural Residues	N2O	227	186	-18.1%	49.3%	6.1%
3.G Liming	CO2	9 353	5 167	-44.8%	20.6%	5.8%
3.G Liming	CH4	0	0	0.0%	0.0%	0.0%
3.G Liming	N2O	0	0	0.0%	0.0%	0.0%
3.H Urea application	CO2	3 211	3 114	-3.0%	22.2%	4.1%
3.H Urea application	CH4	0	0	0.0%	0.0%	0.0%
3.H Urea application	N2O	0	0	0.0%	0.0%	0.0%
3.I Other carbon-containing fertilizers	CO2	964	526	-45.4%	16.2%	4.4%
3.I Other carbon-containing fertilizers	CH4	0	0	0.0%	0.0%	0.0%
3.I Other carbon-containing fertilizers	N2O	0	0	0.0%	0.0%	0.0%
3.J Other	CO2	0	0	0.0%	0.0%	0.0%
3.J Other	CH4	0	1 445	460915.7%	22.4%	103063.9%
3.J Other	N2O	0	93	87107.7%	94.7%	82467.8%
3 (where no subsector data were submitted)	all	1 768	565	-68.1%	23.6%	20.1%
Total - 3	**all**	**487 254**	**359 086**	**-26.3%**	**20.9%**	**2.9%**

Note: Emissions are in kt CO_2 equivalents; trend uncertainty is presented as percentage points; the sum of the source category emissions may not be the total sector emissions of the EU-NID because uncertainty estimates are not available for all source categories in each of this EU countries

5.5 Sector-specific quality assurance and quality control and verification

This section gives an overview of the QA/QC procedures applied specifically for the agriculture sector of the EU GHG inventory. It first gives an overview of the development of the agriculture QA/QC system with an outlook of further improvements to be discussed and/or implemented in coming years. A brief description of the QA/QC procedures used to process the data and interact with the countries is given. A brief summary of selected activities that have been carried out in the past to improve and/or verify national and EU wide GHG emissions from agriculture in the frame of the EU GHG inventory system is found in the inventory report of 2020[21].

Main improvements in the 2026 submission

In the 2026 submission, the completeness of reporting with new CRT tables was strongly improved. Further improvements in response to UNFCCC reviews are documented in chapter 10.4.

5.5.1 QA/QC system in the agriculture sector

5.5.1.1 Quality checks

Several quality checks are performed. The checks include:

- **Recommendations**: Country were checked if they had implemented last years' recommendations from the ESD review and from the UNFCCC review.
- **Check on NEs**[23] and empty cells has been done by extracting all reported 'NE's from the data base.
- **Notation keys**: we identified emission categories where a country reported a notation key, while 22 or more countries reported emission estimates, in order to assess the potential over/underestimations (these also contained in NE checks and reporting of identical values as in previous submission).
- **Outliers in activity data and emissions**: Data were checked on outliers in AD and emissions. For each source category the share of AD and emissions by the countries to total EU values were determined. A share above 95 % was further assessed and in case this was not linked to a source category which is dominated by single countries (such as emissions from buffalo, which are dominated by Italy) the country was notified.
- **Check on erroneous units**: In several case, countries report background data using different units (e.g. fractions instead of percent values or vice versa; values per day instead of per year of vice versa; absolute values instead of values per head etc.). While these inconsistencies do not influence the reported emission estimates, a harmonization (at EU level) is important to ensure correct comparison of countries' values and a correct calculation of EU background data. An automated check[24] is carried out detecting *three* cases which can easily be recognised. Other 'mistakes' in units used were detected following the outlier analysis (see below). The countries were notified via the review tool and in many cases corrections have already been implemented.
- **Within-country outliers**: within-country outliers in IEFs and other parameters are detected on the basis of the distribution of the values provided[25]. We used the method based on the mean values and the standard deviation. Specifically, those values were identified as outliers which were more distant from than 1.5 time the standard deviation in the data from the mean (both in positive and negative direction). As an additional criterium, the relation to the median was used. In case the value was within 10 % of the median it was not considered as an outlier. This removed cases where a country uses a country-specific parameter while most countries use the default value.
- **Identification of potentially significant issues**: For each of the outliers identified it was determined whether or not this could be a potentially significant issue based on the criterium of a share of 0.5 % of national total GHG emissions. The 'size' of the possible over- or under-estimation was quantified comparing the reported value with an estimate using the median IEF or parameter as reported by all countries[26]. All outliers were 'manually' cross-checked and analysed. Countries were notified on the results of the analysis.
- **Time series outliers/inconsistencies**: Time series outliers were detected on the basis of the same method as also used for the within-country-outlier check. Basis for the underlying distribution

of data in this case, however, was not the values reported from all countries during the whole time series, but only the data reported by the country assessed. Only growth rates larger than ±3 % could qualify as 'outliers'. However, this generated a large number of potential outliers which require further assessment. The following types of 'issues' were identified, which might be linked either to an inconsistent time series or be the consequence of 'real' trends:

Period outphased: Relative constant trend with few years above/below the trend that 'looks plausible'.

Trend break: Timeseries in steps, in a stair shape: a few similar values, then a jump, and the same again.

One break group trend: Regular timeseries with a different trend for a group of years, and a step when jumping from/coming back to the general trend.

Inflection point: Trend suddenly changes from a specific year from which the growth of the values changes sign.

Single outlier: One or few isolated year(s) where the value is out of the general trend

Smooth group trend change: A series of years where the trend changes compared to the rest of the time series, but without any jumps

Trend jump: There is a jump at some point in the time trend but it continues running parallel to the first section, after the jump.

Jump and shape: There is a jump at some point in the time trend and, after the jump, the trend changes shape

- **Sector-specific checks**: Several checks were performed tailored to the reporting in the sector agriculture. First, the data are checked on consistency in reporting of activity data throughout the tables. Further, several other tests are performed:

  Difference between the sum of nitrogen excreted and reported in the different manure management system (MMS) versus the total reported nitrogen excreted.

  Difference between the total nitrogen excreted and the product of animal population and nitrogen excretion rate.

  Difference of the sum of N handled in MMS over animal type vs. total N handled in each MMS.

  Check of the reported IEF per MMS with the total N excreted and the reported emissions.

  Check that the sum of manure allocated to climate regions adds up to 100 % over all MMS and climate regions.

  Check that compares the Manure 'managed' in Pasture Range and Paddock in category 3.B N_2O with AD in 3.D.1.c (Urine and Dung Deposited by Grazing Animals). The sum of FPRP over all animal types should therefore equal the AD in category 3.D.1.c.

  Comparison of the fraction of N lost in MMS (via volatilization of NH_3+NO_x) versus total managed manure. According to IPCC Table 50.22[29] most of the loss fractions are between 20% and 45% of N in managed manure and N loss ratios are identified that are higher than 45% or lower than 20%.

Comparison of the manure 'managed' and not lost as NH_3+NO_x+N_2 or leaching in MMS (3B2) with Animal manure applied to soil (3D12a). Manure available for application is obtained from N managed in MMS and not lost (FracLOSSMS) according to IPCC Table 10.23[30] plus any addition of bedding material. In the new reporting format, N_2 losses must be reported with NH_3 and NO_x losses. Thus, FAM is expected to be equal to N managed in MMS minus N lost as NH_3+NO_x+N2+leaching unless bedding material has been accounted for, or if manure is exported. In case of crop residues as bedding material care has to be taken to avoid double counting.

- **Recalculation**: Countries were asked for justifications of recalculations of more than 0.5% of national total emissions (excluding LULUCF) and above or below the mean recalculations across all MS ±1.5 standard deviations.

5.5.1.2 Issues identified during the initial checks

A slightly higher number of issues has been identified (157 for 2026) compared to last year (149 were identified for 2025):

- 21 completeness issues (related to 'NE'/'empty'/'notation keys')
- 4 country-outlier issues
- 26 agricheck issues
- 70 previous recommendations (ESD and UNFCCC review)
- 14 recalculation issues
- 18 consistency issues in Annexe IX
- 4 reporting issues (e.g.: unit issue in table 3D)

5.5.1.3 Calculation of EU background data

EU-wide background data were calculated as weighted averages of the parameters provided by the countries, using activity data (animal numbers in category 3A and 3B and N input in category 3D) as weighting factors.

5.5.1.4 Compilation of the chapter agriculture for the EU-GHG inventory report

The presented data was automatically generated using an automated process from the member state submitted data. This minimizes the risk of transcription or copying errors but does not eliminate completely the existence of errors.

5.6 Sector-specific recalculations

The following table presents the recalculation of the key categories identified for the waste sector, including the level of recalculations made by Member States contributing the most to the EU recalculations of the specific category.

Table 5.24 Sector Agriculture: Recalculation of key categories

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 eq.	Change in %	Main contributing countries	Change in kt CO_2 eq.	Change in %	Main contributing countries
3.A. Enteric fermentation: no classification (CH_4)	871.02	0.4%	BGR: 933 ROU: -398 DEU: 320	270.59	0.2%	DEU: 249 BGR: 123 GRC: 122
3.B. Manure management: no classification (CH_4)	-809.17	-1.4%	ESP: -594 ITA: -116 HRV: -84	-477.52	-1.1%	ITA: -329 ESP: 82 DNK: -70
3.B. Manure management: no classification (N_2O)	503.21	1.8%	ITA: 558 ESP: -105 BEL: 97	121.15	0.7%	ITA: 304 DEU: -134 ESP: -109
3.D.1. Direct N_2O emissions from managed soils: Direct N_2O Emissions From Managed Soils (N_2O)	-1643.40	-1.5%	ITA: -2837 DEU: 667 SVK: 569	-1403.65	-1.6%	ITA: -2942 FRA: 679 DEU: 524
3.D.2. Indirect N_2O emissions from managed soils: no classification (N_2O)	-1496.69	-4.5%	CZE: -713 ROU: -708 DEU: -192	-449.40	-2.0%	ROU: -382 CZE: -285 FRA: 144
3.G.1. Limestone $CaCO_3$: no classification (CO_2)	- 0.02	0.0%	BE: -0-02	- 23.88	-1%	DEU: -17 SVN: -12 NLD: 6

5.7 Sector-specific improvements

In 2024, the reporting has been amended to be in line with the new CRT reporting tables, as well as the NID outline. Descriptions of categories have been aligned accordingly. Information across sectors has been streamlined to provide a harmonised approach across the whole NID. Any recommendations for improvement of earlier UNFCCC reviews have been continuously followed up and implemented (see Chapter 10.4).

Continuing improvements include efforts to ensure consistency between CRT/JSON files and NID, and the provision of sufficient information to meet transparency requirements.

6 LAND USE, LAND–USE CHANGE AND FORESTRY (CRT SECTOR 4)

6.1 Overview of the sector

Within the EU GHG inventory, the LULUCF sector shows higher removals by sinks than emissions by sources; as a result, the sector represents a net carbon sink.

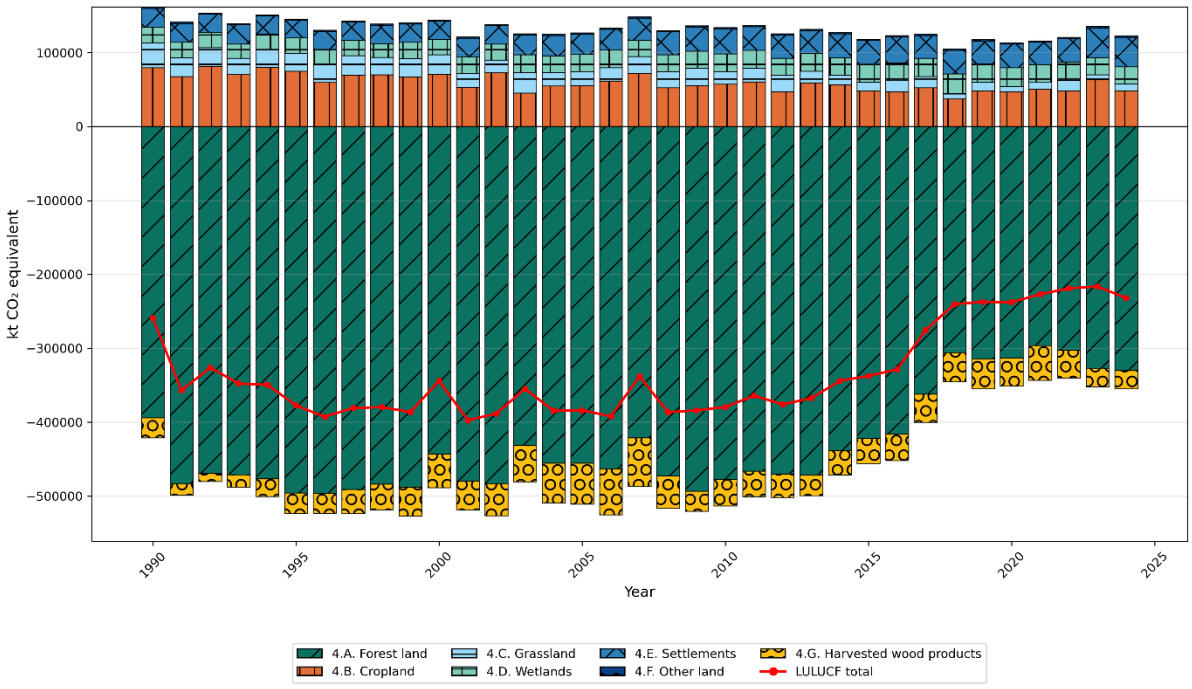
In terms of land use categories, a net carbon sink is reported under Forest land. In addition, Harvested Wood Products also result in a net carbon sink for the EU GHG inventory. Other land use categories are net sources: Cropland is the largest source of emissions, followed by the conversion of lands to Settlements. Grasslands, along with the other categories, represent a smaller source of emissions.

In 2024, the LULUCF sector of the EU results in a total net sink of -260 772 kt CO_2, which represents a decrease of 10% as compared to the net sink reported for the year 1990 (Table 6.1).

Within the LULUCF sector, the carbon pool Harvested Wood Products is reported in 2024 as a net carbon sink of -24 818 kt CO_2. On the other hand, emissions of CH_4 and N_2O in 2024 represent about 11% of annual net carbon sink.

In terms of CO_2 equivalent, *LULUCF* results for the year 2024 in -230 985 kt CO_2 equivalent.

Figure 6.1 Sector 4 LULUCF: EU GHG net emissions (+) / removals (-) for 1990–2024, CO_2 eq. (kt).



Source: EU MS submissions 2026, CRT table 4

Table 6.1: Sector 4. LULUCF: individual Member States contributions to net CO_2 removals

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	-13 942	6 497	3 207	-1.2%	17 149	123%	-3 290	-51%
Belgium	-2 852	-424	-654	0.3%	2 198	77%	-230	-54%
Bulgaria	-16 391	-7 789	-8 112	3.1%	8 279	51%	-324	-4%
Croatia	-6 394	-5 697	-4 556	1.7%	1 839	29%	1 142	20%
Cyprus	-77	-168	-172	0.1%	-95	-122%	-4	-2%
Czechia	-9 563	-3 789	-4 661	1.8%	4 902	51%	-872	-23%
Denmark	5 984	-1 202	-596	0.2%	-6 579	-110%	606	50%
Estonia	-4 205	2 319	1 729	-0.7%	5 934	141%	-590	-25%
Finland	-31 931	4 513	7 388	-2.8%	39 318	123%	2 875	64%
France	-28 806	-40 943	-42 811	16.4%	-14 004	-49%	-1 868	-5%
Germany	26 822	62 632	48 207	-18.5%	21 385	80%	-14 425	-23%
Greece	-2 392	-4 622	-4 582	1.8%	-2 190	-92%	39	1%
Hungary	-3 314	-5 413	-6 402	2.5%	-3 088	-93%	-990	-18%
Ireland	2 043	-935	-1 322	0.5%	-3 364	-165%	-387	-41%
Italy	-14 267	-58 218	-64 610	24.8%	-50 343	-353%	-6 392	-11%
Latvia	-13 205	-79	1 140	-0.4%	14 344	109%	1 218	1550%
Lithuania	-4 265	-6 684	-8 203	3.1%	-3 938	-92%	-1 519	-23%
Luxembourg	2	-678	-637	0.2%	-639	-38905%	41	6%
Malta	-15	-3	1	0.0%	16	107%	4	135%
Netherlands	3 119	2 567	2 978	-1.1%	-140	-5%	411	16%
Poland	-43 557	-42 426	-27 628	10.6%	15 929	37%	14 798	35%
Portugal	4 343	-640	277	-0.1%	-4 066	-94%	916	143%
Romania	-22 762	-32 952	-32 929	12.6%	-10 167	-45%	23	0%
Slovakia	-9 306	-7 198	-5 037	1.9%	4 269	46%	2 161	30%
Slovenia	-4 688	-4 441	-4 490	1.7%	198	4%	-50	-1%
Spain	-37 669	-52 975	-52 375	20.1%	-14 706	-39%	600	1%
Sweden	-61 294	-47 715	-55 922	21.4%	5 372	9%	-8 208	-17%
EU	**-288 584**	**-246 461**	**-260 772**	**100%**	**27 812**	**10%**	**-14 312**	**-6%**

Note: Highlighted cells mark the three Member States with the highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations.

The overall trend of the LULUCF sector is largely driven by the Forest Land category.

The forest land category has with some interannual variations contributed with a sink of 450 to 500 $MtCO_2$/year during the period 1990 – 2013 after which there has been a decline to a sink of just over 300 $MtCO_2$ by 2018 followed by an increase in 2023 and 2024 to around 330 $MtCO_2$. The trend can be explained by a combination of factors: 1) forest stands are aging with increasing carbon stock and net annual increment is declining; 2) increased harvesting partly as a response to economic drivers and partly as a response to adverse impacts of climate change that have impacted forest health negatively, leading to declining carbon stocks. 3) Forest fires and the impact from drought have reduced the forest sink in several countries; 4) higher temperatures accelerating decay processes of carbon stored in soils and dead organic

matter; and 5) annual rate of afforestation has decreased compared to 50-70 years ago contributing to #1 above.

Inter-annual variations are well assumed in the emission-trend of the LULUCF sector and are mainly related to natural disturbance events. Major windstorms that took place in central-western Europe (e.g,1990, 2000, 2005, 2007 and 2009) and severe wildfires (e.g.,1990, 2003, 2005, 2007, 2017 and 2022) in Mediterranean countries are reflected in Figure 6.1. In recent years, central Europe suffered the effects of droughts that were followed by bark beetle infestations, which required important salvage logging efforts. These events have contributed to the trend of GHGs in this sector.

Natural disturbances also explain the sharp change in the sink observed in the base year, which result largely from the reporting of Germany. As explained by the Party, in spring 1990, Germany was impacted by a storm that caused an unprecedented number of windfalls (about 70 million m^3 of wood), and this explains the notably low LULUCF sink in 1990 for Germany that is reflected in the EU trend.

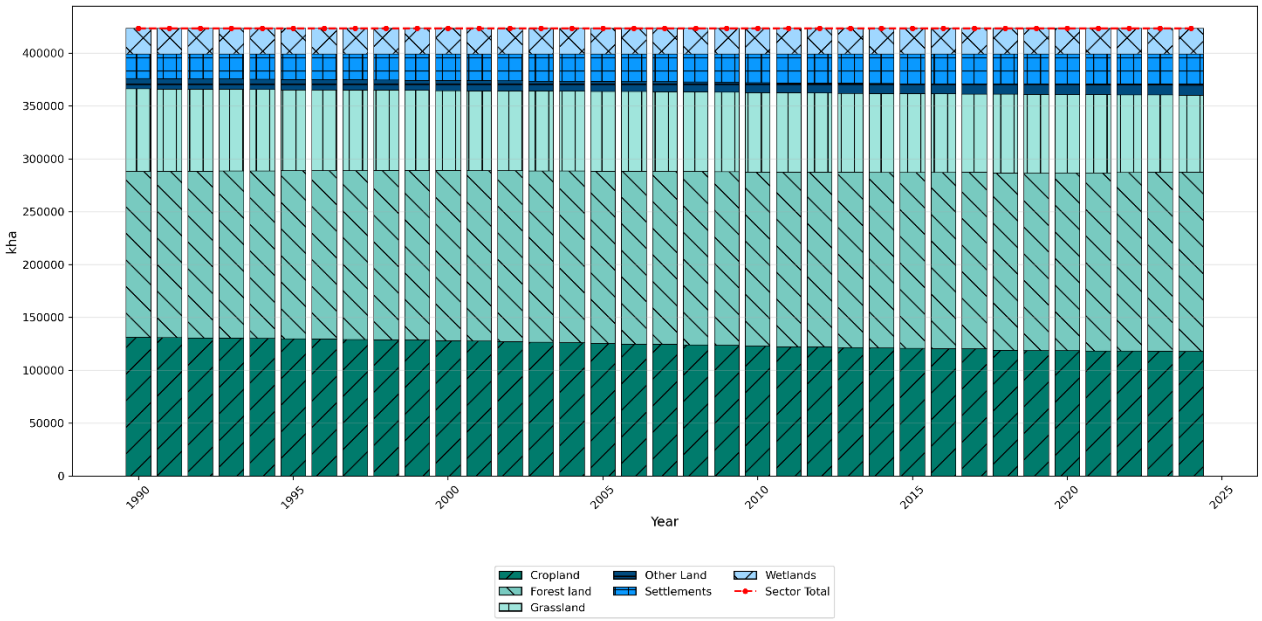
Additional category-specific information on trends and inter-annual variability is provided in the following sections of this chapter.

Although the LULUCF sector results in a net carbon sink at the level of EU, the sector is reported by countries ranging from a net source to a large net sink. Compared to 1990, individual inventories report this year in some cases a significant increase in the carbon sink, while in other cases there is a substantial reduction.

At the EU level, the LULUCF sector offsets about 8% of the total emissions from other sectors (“Total without LULUCF”), with significant differences among MS.

The total reported area in the EU GHG inventory as the sum of the different land use categories is ca. 423 000 kha. The trends on these categories (Figure 6.2) are in line with the trends known from other EU statistics (e.g., Eurostat). However, absolute numbers may be slightly different due to different definitions used under each dataset.

Figure 6.2 Total area for each of the land use categories (kha), as reported by EU MS in 2026.



Source: EU MS submissions 2026, CRT table 4.1

6.1.1 Coverage of Carbon Pools

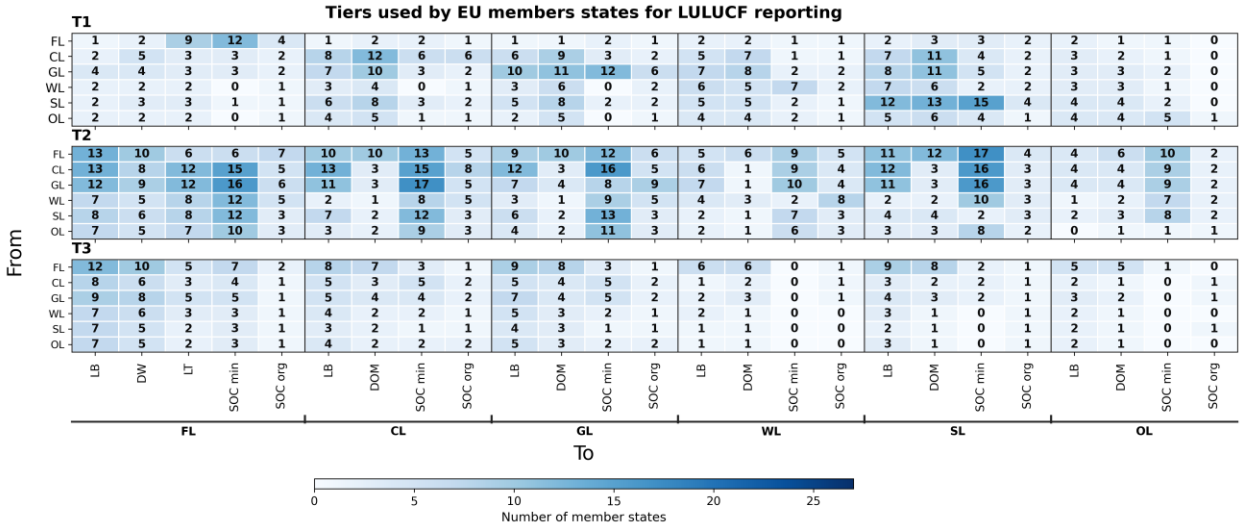
LULUCF reporting covers the carbon pools, living biomass (below and above ground), dead wood, litter and soil organic carbon in mineral and organic soils as well as harvested wood products. In some case countries report a notation key, NO, NA, NE or IE, as appropriate.

Whenever the Tier 1 assumption of “equilibrium” for carbon stock changes is implemented, countries used the notation key NO, NE, or NA. Efforts have been devoted, and are ongoing to follow a former recommendation from the UN ERT on the use of NA when the assumption of equilibrium is applied. As a result, more MS are now using the notation key NA. Nevertheless, it should be noted a full harmonization on the use of the notation key NA across MS is not possible since some countries have received from their UN ERT a different recommendation on which notation key should be used in this case.

6.1.2 Methodological tiers by category

Overview of tiers used by Member States by sub-category for all pools is shown in Figure 6.3 below. The table covers 26 out of the 27 Member States. The numbers in the table indicate how many Member States use a specific tier for a given pool in a sub-category. For land use conversions, there can be more than one tier used and, in this case, only the higher tier is shown in the table.

Figure 6.3 Tiers used by EU Member States by sub-category for all pools.



6.2 Overview of emission trends

In this section, we analyze the contribution of the different categories to the overall trend of net emissions/removals from the EU LULUCF sector. Table 6.2 shows the role of the different categories, their contribution to total net emissions/removals in the EU LULUCF sector, and their contribution to the trend 1990-2024 and 2022-2024. A negative share of the trend means that the net emissions in that category are evolving in the opposite direction to those of the EU.

Table 6.2 Contribution of the different emission categories to the total trend in emissions from the LULUCF sector, compared to the share of emissions of those categories from the total of the sector

Emission category	Contribution to total LULUCF removals/emissions (2024)	Share of trend 1990-2024	Share of trend 2023-2024
4.A	142%	236%	21%
4.B	-21%	-114%	98%
4.C	-4	-91%	-20%
4.D	-10%	8%	2%
4.E	-17%	54%	3%
4.F	-1%	-1%	-1%
4.G	11%	8%	-3%

6.3 Land use definitions

6.3.1 Forest land

Table 6.3 Thresholds used by EU MS for the forest definition

Country	Crown cover (%)	Height (m)	Area (ha)	Minimal width (m)
Austria	30	2	0.05	10
Belgium	20	5	0.5	-
Bulgaria	10	5	0.1	10
Croatia	10	2	0.1	-
Cyprus	10	5	0,3	-
Czechia	30	2	0.05	-
Denmark	10	5	0.5	20
Estonia	30	2	0.5	-
Finland	10	5	0.25	20
France	10	5	0.5	20
Germany	10	5	0.1	-
Greece	25	2	0.3	-
Hungary	30	5	0,5	-
Ireland	20	5	0.1	20
Italy	10	5	0.5	-
Latvia	20	5	0.1	20
Lithuania	30	5	0.1	10
Luxembourg	10	5	0.5	-
Malta	30	5	1	-
Netherlands	20	5	0.5	30
Poland	10	2	0.1	10
Portugal	10	5	1	20
Romania	10	5	0.25	20
Slovakia	20	5	0.3	20
Slovenia	10	5	0.25	-
Spain	20	3	1.0	25
Sweden	10	5	0.5	-

Additional information used by the countries to define the area of forests is provided in the table below:

Table 6.4 Additional qualitative criteria used to define forests complementing quantitative thresholds.

Country	Forest land definition
Austria	Permanently unstocked basal areas that are directly connected with forest in terms of space and forestry enterprise and contribute directly to its management (such as forestall hauling systems, wood storage places, forest glades, forest roads) also represent forests. Areas which are used in short rotation with a rotation period of up to thirty years as well as forest arboretums, forest seed orchards. Christmas tree plantations and plantations of woody plants for the purpose of obtaining fruits such as walnut or sweet chestnut do not account as forests. Rows of trees (except shelter belts for wind protection) and areas with woody plants in a park structure are not forest land.
Belgium	This category includes all land with woody vegetation consistent with thresholds used to define forest land as described in paragraph 6.1 of the NIR. It also includes systems with vegetation that currently fall below, but are expected to exceed, the threshold of the forest land category.
Bulgaria	Areas of natural forest regeneration outside urban areas with a size of more than 0.1 ha also represent “forest”. Forests are also: areas which are in a process of recovering and are still under the parameters, but it is expected to reach forest crown cover over 10% and tree height 5 meters; areas, which as the result of anthropogenic factors or natural reasons are temporarily deforested, but will be reforested; protective forest belts, as well as tree lines with an area over 0.1 ha and width over 10 meters; cork oak stands. City parks with trees, forest shelter belts, and single row trees do not fall under the category “forests.

Country	Forest land definition
Croatia	Forest includes land under forest management (forest land without tree cover): Productive Forest land without tree cover, non-productive forest land without tree cover, barren wooded land (e.g., forest roads wider than 3 meters, quarries)
Cyprus	Forests include forest roads, cleared tracts, firebreaks and other small open areas within the forest as well as reforested areas or burnt areas or other areas that temporarily have low plant cover due to human intervention or natural causes, but does not include municipal parks and gardens.
Czechia	Forests exclude the areas of permanently unstocked cadastral forest land, such as forest roads, forest nurseries and land under power transmission lines.
Denmark	Temporarily non-wooded areas, fire breaks and other small open areas, that are an integrated part of the forest, are also included. Christmas trees are also included.
Estonia	All temporarily unstocked forest areas and regeneration areas which have yet to reach a crown density of 30 per cent and a tree height of 2 meters are also included as forest, as are areas which are temporarily unstocked as a result of human intervention such as harvesting, or natural causes (fires, etc.) but which are expected to revert to forest.
Finland	Parks and yards are excluded regardless of whether they meet the forest definition.
France	Forest roads, forest openings less than 20 m wide (e.g., for fire control), windbreaks and forest belts, as well as the poplar plantations and short rotations woody crops, if the criteria for Forest land are met. 5% of France's European forests are unmanaged on lands such as strong slopes or used for loisir, esthétique, cultural or military. Also, 40% of France's dependencies Forest land is considered as unmanaged.
Germany	Any area of ground covered by forest vegetation, irrespective of the information in the relevant cadastral survey or similar records. "Forest" also refers to cutover or thinned areas, forest tracks, firebreaks, openings and clearings, forest glades, feeding grounds for game, landings, rides located in the forest, further areas linked to and serving the forest including areas with recreation facilities, overgrown heaths and moorland, overgrown former pastures, alpine pastures, and rough pastures, as well as areas of dwarf pines and green alders. Heaths, moorland, pastures, alpine pastures, and rough pastures are considered to be overgrown if the natural forest cover has reached an average age of five years and if at least 50% of the area is covered by forest. Forested areas of less than 1,000 m2 located in farmland or in developed regions, narrow thickets less than 10 m wide, watercourses up to 5 m wide do not break the continuity of a forest area.
Greece	No additional criteria are used.
Hungary	Forest land (includes FL-FL, L-FL sub-categories) includes areas covered by trees, as well as roads and other areas that are under forest management but that are not covered by trees.
Ireland	All public and private plantation forests. Includes recently clear-felled areas. Tree grown for fruits or flowers, and shrub species (furze, rhododendron) are excluded. Includes open areas within forest boundaries.
Italy	Forest roads, cleared tracts, firebreaks and other open areas within the forest as well as protected forest areas are included in forest. Plantations, mainly poplars, characterized by short rotation coppice system and used for energy crops are included and also other plantation as chestnut and cork oak, have been included in forest land.
Latvia	Young natural stands and all plantations established for the forestry purposes, which have to reach a crown density of 20 % or tree height of 5 m are considered under forest land; as well as the areas normally forming part of the forest area, which are temporarily unstocked as a result of human intervention or natural causes, but which are expected to revert to forest.
Lithuania	Tree lines up to 10 meters of width in fields, at roadsides, water bodies, in living areas and cemeteries or planted at the railways protection zones as well as single trees and bushes, parks planted and grown by man in urban and rural areas are not defined as forests.
Malta	No additional criteria are used.
Luxembourg	Permanently unstocked basal areas that are directly connected with forest in terms of space and forestry enterprise and contribute directly to its management (such as forestal hauling systems, wood storage places, forest glades, forest roads) also represent forests. Areas which are used in short rotation with a rotation period of up to thirty years as well as forest arboretums, forest seed orchards, Christmas tree plantations and plantations of woody plants for the purpose of obtaining fruits such as walnut or sweet chestnut do not account as forests but represent cropland. Rows of trees (except shelter belts for wind protection) and areas with woody plants in a park structure are not forest land.
Netherlands	The Netherlands has chosen to define the land-use category "Forest Land" as all land with woody vegetation, now or expected in the near future (e.g., clear-cut areas to be replanted, young afforestation areas)
Poland	Young stands and all plantations that have yet to reach a crown density of 10 percent, or a tree height of 2 m are included under forest. Areas normally forming part of the forest area that are temporarily un-stocked as a result of human intervention, such as harvesting or natural causes such as wind-throw, but which are expected to revert to forest are also included.
Portugal	Forests (areas occupied by forests and woodlands which can be used for the production of timber or other forest products) and agro-forestry areas (annual crops or grazing land under the wooded cover of forestry species). The forest trees are under normal climatic conditions higher than 5 m with at least 30% canopy closure.
Romania	It comprises deciduous forest, coniferous forest, mixt forests, clear-cut areas and nurseries, as defined by presence of deciduous trees, coniferous trees, deciduous and resinous trees, dead trees, clear-cuts and forest nursery.

Country	Forest land definition
Slovakia	This category includes the land covered by all tree species serving for the fulfilment of forest functions and the lands on which the forest stands were temporarily removed with aim of their regeneration or establishment of forest nurseries or forest seed plantation.
Slovenia	It includes abandoned agricultural land with natural expansion of forest. Abandoned agricultural land on area more than 0.5 ha, which have been abandoned for more than 20 years, with minimal tree height 5.00 m and have a tree crown cover between up to 75 % are defined as forests.
Spain	Any land having woody vegetation with no agricultural use/activities fulfilling the threshold of forest and any other land which is expected achieve these parameters (including for “dehesa” where tree cover meets the thresholds)
Sweden	Land which hosts a potential yield of stem-wood exceeding one cubic meter per hectare and year. Meanwhile, the Land which hosts a potential yield of stem-wood lower than one cubic metre per hectare and year are classified as mire (under Wetlands). Permanent forest roads (width>5m) are not considered as forest land. All country forests are considered managed.

6.3.2 Cropland

Table 6.5 Definitions of lands included under the category 4B: Cropland.

Country	*Definition*
Austria	Arable land, including annual and perennial crops (rotation period of up to thirty years), as well as forest arboretums, forest seed orchards, Christmas tree plantations and orchards (e.g., walnut, or sweet chestnut) and rows of trees and areas with woody plants in parks and green areas, and house garden.
Belgium	Tillage land and agroforestry systems with vegetation falling below the thresholds for forests.
Bulgaria	Cropland consists of annual crops (cornfields and kitchen gardens) and perennials (vineyards, fruit and berry plantation and nurseries). Arable land is the land worked regularly, generally under a system of crop rotation - area with annual crops, set - aside area as well as area with seeds and seedlings. Perennial crops include fruit and berry plantation, vineyards and other permanent crops, nurseries for wine, fruits, ornamental plants, forest trees etc. The orchard is a uniformly kept plantation (by annual pruning and regular treatment for protection from diseases and insects) of fruit trees (pip- trees, stone-trees and nut-trees).
Croatia	Cropland category includes non-irrigated arable land, permanently irrigated arable land, vineyards, fruit trees and berry plantations, olive groves, annual crops associated with permanent crops (Complex cultivation patterns).
Cyprus	This category contains cropped land, including lands with woody vegetation (i.e., fruit trees) where the vegetation does not meet the definition of forest. In particular, this category includes land principally occupied by agriculture, including arable land, annual and permanent crops as well as vineyards, fruit trees and berry plantations, olive groves and other similar types of cultivation.
Czechia	Cropland is predominantly represented by arable land (92.6%), while the remaining area includes hop-fields, vineyards, gardens and orchards.
Denmark	Annual crops, wooden perennial crops, hedgerows and “other agricultural area” (i.e., small undefined areas lying inside the cropland area). It includes farmlands, commercial plantations with perennial crops (fruit trees, orchards and willow), house gardens, hedgerows (perennial trees/bushes not meeting the forest definition) in the agricultural landscape, as well as willow plantations on agricultural land for bioenergy purposes.
Estonia	Cropland is arable land, area where annual or perennial crops are growing (incl. fallow, orchards, short-term and long-term cultural grasslands and temporary greenhouses). It does not include built garden land under 0.3 ha (that is included in Settlements). Abandoned cropland is classified as cropland until it has not lost arable land features – changes in soil and vegetation have not taken place and the land is still usable as cropland without the implementation of specific treatments.
Finland	Arable crops, grass covered (for less than 5 years), set-aside, permanent horticultural crops, greenhouses, and kitchen gardens.
France	Annual crops, temporary pastures (which last for maximum 6 annual harvests) and permanent crops (orchards, vineyards, olives, etc.).
Germany	Annual crops and cropland with perennial crops (long-lived crops: fruit crops, osiers, poplars, Christmas tree farms, nurseries) and lands for cultivation of vegetables, fruit and flowers.
Greece	Annual and perennial crops, temporary fallow land and perennial woody crops, i.e., tree crops and vineyards.
Hungary	Cropland contains arable lands, vegetable gardens, orchards and the vineyard areas, as well as set-aside croplands. Arable lands are any land area under regular cultivation irrespective of the rate or method of soil cultivation and whether the area is under crop production or not due to any reason, such as temporary inland waters or fallow. Areas under tree nurseries (including ornamental and orchard tree nurseries, vineyard nurseries, forest tree nurseries excluding those for the own requirements of forestry companies grown in the forest), permanent

Country	*Definition*
	crops (e.g., alfalfa and strawberries), herbs and aromatic crops are included. Vegetable gardens are areas around residential houses where, in addition to meeting the owners' demand may produce some surplus of low amount which is usually traded. Orchards are land under fruit trees and bushes that may include several fruit species (e.g.: apples, pears, cherries, etc.). Included are non-productive orchards and orchards of systematic layout in vegetable gardens if the area is 200 m² or above in case of berries and 400 m² or above in case of fruit trees. Vineyards are areas where grapes are planted in equal row width and planting space and include non-productive areas and vineyards in vegetable gardens (e.g., trellises) if grapes are planted in equal row width and planting space, and the size of the area is at least 200 m². Set-aside cropland is land that is abandoned but not converted to any other land use.
Ireland	Permanent crops and tillage land, including set-aside, as recorded by annual statistics.
Italy	Annual crops and perennial woody crops (e.g., woody plantations, that don't meet national forest definition, olive groves or vineyards).
Latvia	The cropland refers to the area of arable land, including orchards and extensively managed arable lands. Cropland also includes animal feeding glades, which according to national land use classification belong to forest land.
Lithuania	The area of cropland comprises of the area under arable crops as well as orchards and berry plantations. Arable land is continuously managed or temporary unmanaged land, used and suitable to use for cultivation of agricultural crops, also fallows, inspects, plastic cover greenhouses, strawberry and raspberry plantations, areas for production of flowers and decorative plants. Arable land set aside to rest for one or several years (<5 years) before being cultivated again as part of an annual crop-pasture rotation is still included under cropland. Orchards and berry plantations are areas planted with fruit trees and fruit bushes (apple-trees, pear-trees, plum-trees, cherry-trees, currants, gooseberry, quince and others).
Luxemburg	Agro-forestry systems where tree cover falls below the forest thresholds, respectively covered by permanent crops, annual crops, artificial meadows (not permanent) and lands temporarily set aside.
Malta	In Malta cropland can be split into three types: arable area which is cultivated under a system of crop rotation; kitchen gardens that include small plots of cultivated land, in which most of the products are intended for consumption by the farmer; land under permanent crops where the crop occupies the same land for a period of time, normally 5 years or more. For inventory purposes, local cropland was split into two: annual crops and perennial woody crops. The main perennial crops considered for this inventory are vines, being the most cultivated crop.
Netherlands	Arable and tillage land, including rice-fields, and agro-forestry systems where the vegetation structure falls below the thresholds for forest and nurseries (including tree nurseries).
Poland	Agricultural land considered as cropland consists of arable land includes land, which is cultivated, i.e., sowed and fallow land. Arable land should be maintained in good agricultural condition. Cultivated arable land is understood as land sowed or planted with agricultural or horticultural products, willow and hops plantations, area of greenhouses, area under cover and area of less than 1000 m^2, planted with fruit trees and bushes, as well as green manure, fallow land includes arable land which are not used for production purposes but are maintained in good agricultural condition; orchards include land with the area of at least 1000 m^2, planted with fruit trees and bushes.
Portugal	Rain-fed annual crops (without irrigation and fallow-land integrated into crop-rotations), irrigated annual crops (under irrigation, greenhouses), rice cultivation lands, wine yards, olives and other species of woody crops
Romania	Cropland includes agricultural lands, i.e., lands covered or temporary uncovered by agricultural crops (major crops and horticultural plants cultures). It includes 3 groups (non-woody crops, woody crops and other wooded land and trees outside forests (which do not meet the forest definition parameters, e.g., forest belts which are narrower than 20m) with 9 categories: orchard, vineyard, shrubs, cultivated land agricultural, temporary fallow land, deciduous tree, coniferous tree, deciduous and resinous trees and dead trees.
Slovakia	Cropland includes lands for growing cereals, root-crops, industrial crops, vegetables and other kinds of agricultural crops; perennial woody crops; lands temporary overgrown with grass or used for growing of fodder lasting several years; hotbeds and greenhouses if they are built up on the arable land; fallow land which is arable land left for regeneration for one growing season during which were not sow specific crops or just crops for green manure, eventually it is covered by spontaneous vegetation, which would be ploughed in.
Slovenia	Annual: arable land breeds more than 2 meters and grows the non-woody vegetation (cereals, potatoes, forage crops, vegetable crops, oilseed, ornamental plants, herbs, strawberries, hop fields) and agricultural fallow ground. Also, temporary meadows and greenhouses. Perennial: permanent crops on arable land such as vineyards, extensive and intensive orchards, olive groves, nursery (for grapevines, fruit and forest trees), forest plantations and forest trees on agricultural land.
Spain	Annual crops and fallow land, perennial crops (olive groves, wines and other woody crops) and mix of annual and permanent crops (except when they qualify as forest land, i.e., in "dehesa").
Sweden	Regularly tilled agricultural land.

6.3.3 Grassland

Table 6.6 Definitions of lands included under the category 4C: Grassland.

Country	*Definition*
Austria	Meadows cut once/twice/several times, cultivated pastures, litter meadows, rough pastures, alpine meadows and pastures and abandoned grassland.
Belgium	Rangelands and pastureland that is not considered under cropland. It also includes systems with vegetation that fall below the threshold of forest land category and are not expected to exceed it, without human intervention.
Bulgaria	Grassland includes the permanent grasslands – natural meadows, low productive grasslands, permanent lawns and grassland which are not used for production purposes.
Croatia	Grassland includes pastures, land principally occupied by agriculture, with significant areas of natural vegetation, natural grasslands, moors and heathland, sclerophyllous vegetation.
Cyprus	This category includes rangelands and pastureland that are not considered Cropland. It also includes systems with woody vegetation and other non-grass vegetation such as bushes and sclerophyllous vegetation that fall below the threshold values used in the Forest Land category. The category also includes all pastures, natural grassland and scarcely vegetated areas.
Czechia	Grassland as defined in this inventory is mostly used as pastures for cattle and meadows for growing feed. Additionally, the fraction of permanently unstocked cadastral FL is also included under Grassland. This is because it predominantly has the attributes of Grassland (such as land under power transmission lines).
Denmark	Land defined as grazing land under LPIS, heath land which may or may not be used for sheep grazing, as well as all other areas not meeting the definitions of forest land. The area of grassland is divided in “grazing land” and “other grassland”.
Estonia	Grassland includes rangelands and pasture, land that is not considered cropland nor forest land: land with perennial grasses that is proper for mow and pasture, smaller fallows and former cultural grasslands that have lost arable land features and grassland from wild lands (natural grassland). Overgrown wooded pasture with canopy cover between 30 and 50% is classified as grassland or forest, depending on the mainland-use purpose. The national land cover class ‘bushes’ (area covered with natural or wildered cultivated bush and shrub species where canopy cover is over 50%) is included into GL.
Finland	Grassland includes areas of extensive grass, ditches associated with agricultural land, areas of bioenergy plants and abandoned arable land. In this context, abandoned arable land refers to fields that are no longer used for agricultural production and where natural reforestation is possible or is already taking place.
France	Land covered by natural and seeded herbaceous for more than 5 years. Includes areas covered trees and bushes being under the forest definition or not included under land category.
Germany	Meadow and pasture areas that cannot be considered cropland. Includes land covered with trees and shrubs that does not fall within the definition of "forest", as well as natural grassland and recreational areas.
Greece	Rangeland and pasture with vegetation that falls below the threshold of national forest definition and are not expected to exceed that without human intervention. Pastures that have been fertilized or sown are considered as cropland.
Hungary	Grassland includes meadows, i.e., land under grass (artificial planting included) where the production is utilized by cutting, irrespective of whether it is used for grazing sometimes, and pasture, i.e., land under grass (artificial planting included) that is utilized for grazing irrespective of whether it is used for cutting sometimes. Grassland includes areas with trees which are utilized for grazing and unmanaged grasslands which are not in use for agricultural purposes.
Ireland	Improved grassland (pasture and areas used for the harvesting of hay and silage) and unimproved grassland (rough grazing) in use as recorded by annual statistics.
Italy	Grazing lands, forage crops, permanent pastures, and set-aside lands since 1970, all shrub lands (data derived from NFI) and other woodlands that do not fulfil forest definition.
Latvia	The grassland category consists of lands used as pastures, as well as glades and bushland which do not fit to forest definition, vegetated areas on non-forest lands complying to forest definition where land use type can be easily switched back to grassland without legal requirement of transformation of the land use, but except grassland used in forage production and extensively managed cropland.
Lithuania	Grassland includes meadows and natural pastures planted with perennial grasses or naturally developed, on a regular basis used for moving and grazing. Grasslands cultivated for less than 5 years, in order to increase ground vegetation, still remain grasslands.
Luxemburg	All grasslands that are not considered as cropland including systems with vegetation or tree cover below forest threshold, natural grassland, recreational areas as well as agricultural systems. It includes one cut meadows; two and more cut meadows, cultivated pastures, litter meadows, rough pastures and pastures and abandoned grassland.

Country	*Definition*
Malta	This category is split into other grassland and maquis. On the basis of expert judgement, it was decided that maquis will be included in this category. The data of this category was derived from the Corine Land Cover 1996, 2000, 2006 under the sclerophyllous vegetation and Grassland.
Netherlands	Under Grassland (non-TOF) any type of terrain which is predominantly covered by grass vegetation is reported. It also includes vegetation that falls below the threshold used in the forest land category and is not expected to exceed the threshold used in the forest land category. It is further stratified in: 'Grassland vegetation', 'Nature', 'Orchards'. Trees outside forests (TOF) are wooded areas that comply with the forest definition except for their surface area (< 0.5 ha or less than 30 m width). These represent fragmented forest plots as well as groups of trees in parks and nature terrains and most woody vegetation lining roads and fields.
Poland	Grassland consists of permanent meadow and pastures include land permanently covered with grass, but does not include arable land sown with grass as part of crop rotation; permanent meadow is understood as the land permanently covered with grass and mown in principle in mountain area; also, the area permanent pastures are understood as the land permanently covered with grass not mown but grazed in principle in mountain area; also the area of grazed pastures and meadows.
Portugal	Lands covered by permanent herbaceous cover.
Romania	Grassland includes land whose destination is grazing or mowing hay for livestock production, as well as other wooded land and trees outside forests (which do not meet forest definition parameters, e.g., forest belts which are narrower than 20m). It includes pastures, hayfields in hilly and mountainous areas and meadows in lowlands.
Slovakia	This category includes permanent grasslands and meadows used for the pasture or hay production, which is not considered as cropland.
Slovenia	Agricultural areas grown by grass and other herbs that are regularly cut or grazed. These areas are not in tillage or fallow ground. Included are areas covered with some of forest trees (less than 50 trees/ha) and the alpine pastures too. In this class there are swamp pastures and meadows on organic or mineral-organic soils, where the groundwater rises few times in the year. It includes also uncultivated agriculture land.
Spain	Pastureland, including grazing land not included in cropland. It includes also pastures and meadows in the dehesa (forested pasture) that do not comply with the definition of forest.
Sweden	Agricultural land that is not regularly tilled. This corresponds to natural grazing land. All grasslands are assumed managed.

6.3.4 Wetlands

Table 6.7 Definitions of lands included under the category 4D: Wetlands.

Country	*Definition*
Austria	Rivers, lakes, mires and peat areas (protected areas, in general) as classified by national statistical system.
Belgium	Land covered or saturated by water for all or part of the year (e.g., peatland) and that does not fall into the other land category. It includes reservoirs as a managed subdivision and natural rivers and lakes as unmanaged subdivisions.
Bulgaria	Wetlands category - wetlands surface water areas are included (wetlands) – covered with water or water saturated lands (throughout the year or partially in the year) which does not fall in the other categories. These are natural or artificial watercourses serving as water drainage channels, natural or artificial stretches of water, coastal lagoons, wetlands areas and peatbogs.
Croatia	Inland marshes, salt marshes, salines, intertidal flats, water courses, water bodies, coastal lagoons
Cyprus	This category contains areas of land that is covered or saturated by water for all or part of the year and that does not fall into the Forest Land, Cropland, Grassland or Settlements categories. In particular, it contains inland and salt marshes, water courses and water bodies.
Czechia	Category Wetlands includes riverbeds, and water reservoirs such as lakes and ponds, wetlands and swamps.
Denmark	Permanent wetlands, wetlands for peat extraction and re-established anthropogenic wetlands. Several subdivisions may be distinguished: unmanaged fully water covered wetlands (lakes and rivers); unmanaged partly water covered wetlands (fens and bogs); managed drained land for peat extraction; managed partly water covered wetlands (re-established wetlands on primarily former cropland and grassland).
Estonia	Land permanently saturated by water and/or areas where the peat layer is at least 30 cm, and the minimum potential tree height does not conform to the forest land definition. It does include smaller bog holes.
Finland	Inland waters (reservoirs, natural lakes and rivers), peat extraction areas and peatlands which do not fulfil the definition of other land uses.

Country	*Definition*
Germany	Reporting in the wetlands category primarily covers emissions from organic soils that are released during peat extraction, covering: CO_2 losses from extraction areas, and during extraction and spreading of peat. Also, it includes (but they are not estimated) the few non-drained semi-natural bogs that have been largely free of anthropogenic impacts, flooded lands, water-storage facilities (dams, reservoirs, etc.) and settling basins that are used for energy production, irrigation, shipping and recreation, and that are flooded or drained, or that otherwise have large water-level fluctuations.
Greece	Land that is covered or saturated by water for all or the greatest part of the year (e.g., lakes, reservoirs, marshes), riverbed (including torrent beds) and that does not fall into the forest land, cropland, grassland or settlements categories.
France	Lands covered or saturated by water all year long or part of it.
Hungary	Wetland includes the wetlands and water bodies as defined by the CORINE land-cover databases and contain inland marshes (low-lying land usually flooded in winter, and more or less saturated by water all year round), peat bogs (peat land consisting mainly decomposed moss and vegetable matter), water courses (natural or artificial watercourses including those serving as water drainage) and water bodies (natural or artificial lakes, ponds etc.).
Ireland	Natural unexploited wetlands and areas commercially exploited for public and private extraction of peat and areas used for domestic harvesting of peat.
Italy	Lands covered or saturated by water, for all or part of the year, have been included in this category (MAMB, 1992). Reservoirs or water bodies regulated by human activities have not been considered.
Latvia	Wetlands category includes all inland water bodies (rivers, ponds, and lakes), swamps (constantly wet areas where height of trees cannot reach more than 5 m in height and ground vegetation consists mostly of sphagnum and different sword grasses), flood-lands (small areas) and alluvial lands (larger flood-lands).
Lithuania	Wetlands include peat extraction areas and peat lands which do not fulfil the definition of other categories. Water bodies and swamps (bogs) are also included under this category. Peat extraction areas are considered as managed land.
Luxemburg	Land that is covered or saturated by water for all or part of the year (e.g., peat land, reservoirs) and that does not fall into other categories.
Malta	In the Maltese islands wetlands are mostly saline.
Netherlands	Land covered or saturated with water for all or part of the year and does not fall into the other land category. It includes reservoirs as a managed sub-division and natural lakes and rivers as unmanaged, including natural open water in rivers, but also man-made open water in channels, ditches and artificial lakes.
Poland	Wetland consists of marine internal; surface flowing waters, which covers land under waters flowing in rivers, mountain streams, channels, and other water courses, permanently or seasonally and their sources as well as land under lakes and artificial water reservoirs. from or to which the water course flow; land under surface lentic water which covers land under water in lakes and reservoirs other than those described above, land under ponds including water reservoirs (excluding lakes and dam reservoirs for water level adjustment) including ditches and areas adjacent and related to ponds; land under ditches including open ditches acting as land improvement facilities for land used.
Portugal	Inland wetlands, coastal wetlands, salt marshes, saline and intertidal flats.
Romania	Wetlands includes all lands covered by water (rivers, ponds, dams, swimming pools, etc.) and land affected by humidity (caused by water stagnation, marshy areas, etc.), with the exception of agricultural land. It contains two sections (waters and wetlands) and 11 categories (permanent streams, temporary streams, lakes, dams, floating vegetation, hydrophilic vegetation (stubble etc.), harbours, temporarily flooded areas, bogs, channels and piers.
Slovakia	The wetlands include artificial reservoirs and dam lakes, natural lakes, rivers and swamps.
Slovenia	Wetlands are defined as land that is temporarily or permanently saturated by water. Wetlands include lands such as fens, marshes, bogs and reeds and are not under agricultural use. Inland water bodies (major rivers, lakes and water reservoirs) are also part of Wetlands. Although there are small areas of raised bogs, all Wetlands are assumed managed.
Spain	Includes the lands covered or saturated by water all year long or part of it.
Sweden	Wetlands is assumed unmanaged (mires and areas saturated by fresh water) and managed (cca 10 000 ha used for peat extraction).

6.3.5 Settlements

Table 6.8 Definitions of lands included under the category 4E: Settlements.

Country	*Definition*
Austria	Includes buildings land: sealed, partly sealed and unsealed areas; parks and gardens; roads and railway tracks; excavation areas, and other not further differentiated settlement area.
Belgium	All developed land, including transportation infrastructure and human settlements of any size (i.e., including roadsides) unless they are already included under other categories.
Bulgaria	The Settlements refer to all classes of urban formation. These are areas that are functionally or administratively associated with public or private land in cities, villages or other settlement types.
Croatia	Continuous and discontinuous urban fabric area, industrial or commercial units, road and rail networks and associated land, port areas, airports, mineral extraction sites, dump sites, construction sites, green urban areas, sport and leisure facilities.
Cyprus	All developed land, including transportation infrastructure and human settlements of any size. It contains industrial and commercial units, urban areas, port areas, airports, construction, mineral extraction and waste dump sites.
Czechia	Settlements include two categories built-up areas and courtyards and other lands. Other lands include all types of land-use were included with the exception of “unproductive land”, which corresponds to category 4.F Other Land. Hence, the Settlements category also includes all land used for infrastructure, as well as that of industrial zones and city parks.
Denmark	Urban cores, industrial areas, roads, high and low build-up areas. Low build-up areas are characterized as single-family houses surrounded by gardens, graveyards, sports facilities, etc. (estimates are reported only for low build-up areas).
Estonia	Built-up areas, with roads, streets and squares, traffic and power lines, urban parks, industrial and manufacturing land, sports facilities, airports, legal waste down points, construction sites and buildings with up to 0.3 ha of garden yard (including permanent greenhouses), and open cast areas (except peat extraction areas) are included into this land-use category
Finland	Combined area of NFI built-up land, traffic lines and power lines. Includes parks, yards, farm roads and barns.
France	Artificialized land (settlements, parks, roads and infrastructure, etc.).
Germany	Open settlement and transport areas.
Greece	Developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other land-use categories.
Hungary	Settlements comprise the urban areas, industrial, commercial and transport units, as well as mines, dump and construction sites and artificial non-agricultural vegetated areas.
Ireland	Urban areas, roads, airports and the footprint of industrial commercial/institutional and residential buildings.
Italy	Artificial surfaces, transportation infrastructures (urban and rural), power lines and human settlements of any size, comprising also parks.
Latvia	According to national definitions settlements include land under buildings including yards and gardens as well as land necessary to maintain and to access those buildings; land under roads including buffer zones; forest infrastructure excluding ditches and other wetlands, but including seed orchards, forest nurseries and firebreaks; other infrastructure – buffer zones of industrial networks, quarries etc.
Lithuania	All urban territories, power lines, traffic lines and roads are included under this category as well as orchards and berry plantations planted in small size household areas and only used for householders’ meanings.
Luxemburg	Developed land, including transportation and any size of human settlement unless already included under other category.
Malta	The land-use category Settlements includes all classes of urban tree formations, namely trees grown along roads and streets, in public and private gardens, and in cemeteries, airports, construction sites, dumpsites, industrial or commercial units, port areas and sport and leisure facilities.
Netherlands	Developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories.
Poland	Settlements consists of: residential areas include land not used for agricultural and forest production, put under dwelling buildings, devices functionally related to dwelling buildings (yards, drives, passages, playgrounds adjacent to houses), as well as gardens adjacent to houses; industrial areas include land put under buildings and devices serving the purpose of industrial production; other built-up areas include land put under buildings and devices related to administration; undeveloped urbanised areas include land that is not built over, allocated in spatial management plans to building development and excluded from agricultural and forest production; recreational and resting areas comprise the following types of land not put under buildings; areas of recreational centres,. children playgrounds, beaches, arranged parks, squares, lawns (outside street lanes); areas of historical

Country	*Definition*
	significance: ruins of castles, strongholds, etc.; sport grounds: stadiums, football fields, ski-jumping take-offs, toboggan-run, sports rifle ranges, public baths etc.; area for entertainment purposes: amusement, grounds, funfairs etc.; zoological and botanical gardens; areas of non-arranged greenery, not listed under woodlands or land planted with trees or shrubbery; transport areas including land put under: roads; stopping yards next to railway stations, bus stations and airports, maritime and river ports and other ports, as well as universal accesses to unloading platforms and storage yards; railway grounds; other transport grounds.
Portugal	Includes all artificial territories, including cities and villages, industry, roads and railway, ports and airports.
Romania	Settlements has 3 groups (urban/rural, buildings and infrastructure) and includes: fenced and constructed areas, sealed lands (e.g., car parks, roundabouts, platforms), urban/rural lawns, playgrounds in green areas, beach lawn and other areas with lawn, dwellings, industrial and administration buildings (e.g., banks, churches, railway stations, restaurants), warehouses, huts, ruins, greenhouses, graveyards, dirt roads, trails, rail roads and roads (street, sidewalk, square), bridges and dams.
Slovakia	The settlements include all developed land, including transportation infrastructure and human settlements of any size.
Slovenia	Settlements are all piece of land where the buildings, roads, parking places, mines, stone pits and all other infrastructure are in human use.
Spain	All developed land, transport infrastructure and establishments of any size, unless they are included in other categories.
Sweden	Infrastructure such as roads and railways, power lines, municipality areas, gardens and gravel pits.

6.3.6 Other land

Table 6.9 Definitions of lands included under the category 4F: Other land.

Country	*Definition*
Austria	Area with i) rocks and screes, ii) glaciers and iii) unmanaged alpine dwarf shrub heaths. It is calculated as the difference of total country area and all other land uses, showing max 2% difference by relevant cadastral data.
Belgium	Bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other five categories.
Bulgaria	Other land category includes bare soil, rock and all area that do not fall into any of other five land-use categories.
Croatia	Other land category represents a difference between the total area of Croatia and sum of all other land use categories.
Cyprus	Bare soil, rock, beaches, dunes and sand plains and all land areas that do not fall into any of the other five categories.
Czechia	Other land is not represented by any land use category within the Czech conditions and the national system of land use representation and land use change identification.
Denmark	Unmanaged area like moors, fens, beaches, sand dunes and other areas without human interference.
Estonia	Land areas that do not fall into any of the other five land-use categories.
Finland	Mineral soils on poorly productive forest land, which do not fulfil the threshold values for forest, unproductive lands on mineral soils on rocky lands and treeless mountain areas.
France	All lands that do not correspond to any other land use categories (e.g., rock areas). Other lands (flush rocks, etc.) cover around 0.9 million hectares, and are the lowest source of emissions due to low soil disturbance. This is land with no significant carbon stock, neither in soils nor in biomass.
Germany	Waste and swaths/aisles, glacier areas, scree slopes and sand bars and other land which cannot be allocated under other land categories. "Other land" consists of areas that are neither influenced nor cultivated by people.
Greece	All land areas that do not fall into any of other land-use categories (e.g., rocky areas, bare soil, mine and quarry land).
Hungary	Other Land includes comprises any area not included in another categories.
Ireland	Residual lands that are determinate when all other land use areas have been determined.
Italy	Other Land includes comprises any area not included in another categories. It is included to match overall consistency of country land area.
Latvia	According to the national land use statistics other lands include unmanaged lands, wetlands and settlements (1 459.3 mill. ha in 2008). Instead of the official statistics since 2009 the NFI is used to estimate area of other lands. It is assumed that other lands are dunes not covered by woody vegetation.

Country	*Definition*
Lithuania	All other land which is not assigned to any other category such as quarries, sand - dunes and rocky areas is defined as Other land.
Luxemburg	This category includes bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other five categories. It allows the total of identified land areas to match the national area.
Malta	This category includes bare soil, rock, and all unmanaged land areas that do not fall into any of the other five categories. Mineral extraction sites in Malta are included under this land-use category.
Netherlands	Surfaces of bare soil which are not included in any other category like: bare sands and the earliest stages of succession from sand in the coastal areas (beaches, dunes and sandy roads) or uncultivated land alongside rivers. It does not include bare areas that emerge from shrinking and expanding water surfaces (which are included in wetlands).
Poland	Other Land includes comprises any area not included in another categories. It is included to match overall consistency of country land area.
Portugal	Shrubland - includes all lands covered in woody vegetation that do not meet the forest or permanent crop definitions and Other land - includes all lands that do not meet the previous definitions, such as lands covered in rocks, sand dunes, etc.
Romania	Other land includes following categories: rocky areas, excavations, stone quarries (active, closed), stony debris, gravel/sand/earth pits, drilling perimeters and locally degraded lands.
Slovakia	Other land represents bare soil, rock and all unmanaged land areas that do not fall into any of the other categories.
Slovenia	Other land includes non-forest land covered with vegetation lover than 2 m or covered less than 75%, which is not used in agriculture. There are inbuilt areas with little or no vegetation as rocks, sands, sand banks (bigger than 5000 m2), waste and other opened areas. This is all land that is not classified in other land use definitions.
Spain	Bare soil, rock areas, ice and other areas of land that do not fall into any of the other land category.
Sweden	Waste land and most of the mountain area in northwest Sweden. It is assumed unmanaged.

6.4 Source categories and methodological issues

6.4.1 Country-specific approaches

6.4.1.1 Information on approaches used for representing land areas and on land-use databases used for the inventory preparation

Most EU Member States use several land-use datasets for representing land, this includes national datasets as well as EU datasets such as Corine Land Cover and the Land Parcel Information System (LPIS). Some Member States use data from their National Forest Inventory for the forest land category and in a few cases, it also covers non-forest land.

Most Member States have a national soil sampling survey with less frequent sampling allowing identification of mineral and organic soils.

6.4.1.2 Information on approached used for natural disturbance

The EU GHG inventory includes all emissions and removals on managed land regardless of whether fluxes can be attributed to a natural disturbance event.

6.4.1.3 Information on approaches used for reporting harvested wood products

The methods and data sources for estimating carbon stock changes in HWPs are consistent with methodologies provided by 2006 IPCC GL. Individual inventories implement the IPCC Approach B (i.e., production approach) to provide estimates on HWPs consistently with the reporting of the carbon pool under the and subsequently according to EU Regulations No 2018/841. The EC has devoted efforts to avoid double counting by ensuring that all MS used approach B.

6.4.2 Category: Forest land (CRT 4.A)

6.4.2.1 Overview of the Forest land category

Forest land category is by large the main driver in the LULUCF sector. In terms of area, it represents about 40% of the entire territory. Based on individual submissions reported this year, total forest area reached 169 518 kha in 2024, which represents an increase of 7.4% compared with 1990.

About 5.9% of the total forest area is represented by lands under conversion to forest land. This trend of increasing forest land area, which is also reflected in different official statistics of the EU, is a result of the expansion of forests due to less grazing pressure and the abandonment of agricultural activities, which promote natural forest expansion. But an important driver behind the forest area increase has been also the promotion of national afforestation programs, including grant-aid.

Figure 6.4

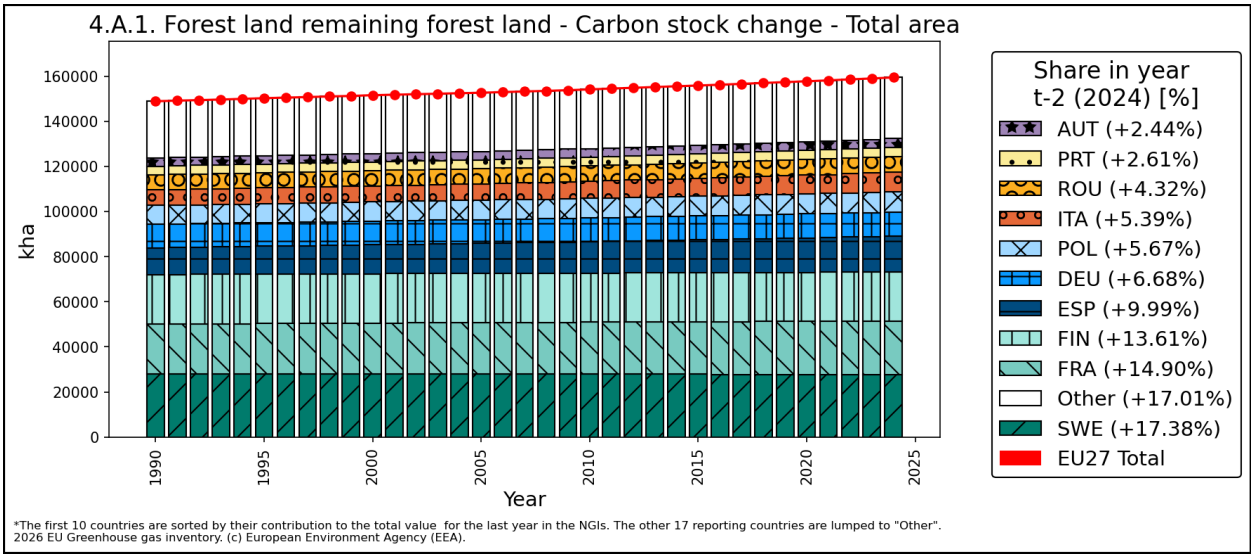
The area of forest land converted to other land uses is in most years between 100 000 and 150 000 hectares, and in terms of area compensated by new afforested areas and natural forest expansion leading to the annual increase in total forest area.

6.4.2.2 Forest Land remaining Forest Land (CRT 4A1)

Overview of Forest Land remaining Forest Land category

As with the main category, the area of Forest Land remaining Forest Land reported for the inventory year increased by 6.6% as compared with 1990. However, at the level of individual submissions there are significant differences.

Figure 6.4 Trend of activity data in subcategory 4A1 "Forest land remaining Forest Land" in EU



For this inventory year, the total land area reported under the sub-category 4.A1 by EU MS reached 159 595 kha, out of which about 83% is attributed to the 10 MS with the higher contribution.

In terms of GHG emissions the category 4.A1 resulted in a net sink of -270 983 kt CO_2, decreasing by 21% as compared to 1990. The largest contributors are Sweden, France and Italy.

Table 6.10 4A1 Forest Land remaining Forest Land: EU contributions to net CO_2 emissions (+)/removals (-) (CRT table 4)

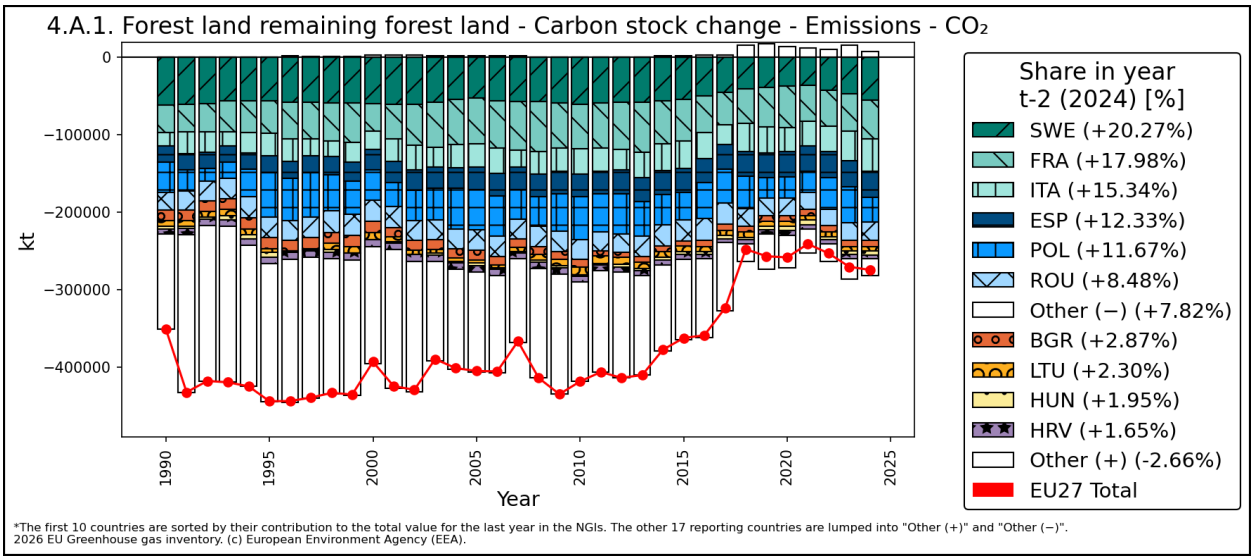
Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	-10 624	6 282	4 023	-1.5%	14 647	138%	-2 259	-36%
Belgium	-1 907	-1 302	-1 310	0.5%	597	31%	-8	-1%
Bulgaria	-13 584	-7 890	-7 882	2.9%	5 702	42%	8	0%
Croatia	-6 467	-5 554	-4 381	1.6%	2 086	32%	1 173	21%
Cyprus	-59	-170	-174	0.1%	-115	-194%	-4	-2%
Czechia	-8 191	-1 437	-2 282	0.8%	5 909	72%	-845	-59%
Denmark	-431	-2 803	-2 451	0.9%	-2 020	-468%	352	13%
Estonia	-5 365	739	-111	0.0%	5 254	98%	-850	-115%
Finland	-37 322	-5 449	-1 927	0.7%	35 396	95%	3 523	65%
France	-32 427	-47 839	-49 227	18.2%	-16 800	-52%	-1 389	-3%
Germany	-26 042	8 047	2 502	-0.9%	28 544	110%	-5 546	-69%
Greece	-1 310	-1 680	-1 745	0.6%	-435	-33%	-64	-4%
Hungary	-3 045	-4 285	-5 356	2.0%	-2 311	-76%	-1 070	-25%
Ireland	-628	961	982	-0.4%	1 610	256%	22	2%
Italy	-17 396	-38 922	-42 093	15.5%	-24 698	-142%	-3 171	-8%
Latvia	-17 829	-355	-384	0.1%	17 445	98%	-29	-8%
Lithuania	-6 205	-4 867	-5 151	1.9%	1 054	17%	-284	-6%
Luxembourg	-10	-609	-573	0.2%	-562	-5582%	36	6%
Malta	0	0	0	0.0%	0	-226%	0	0%
Netherlands	-1 301	-1 758	-1 766	0.7%	-465	-36%	-9	0%
Poland	-39 254	-46 350	-32 020	11.8%	7 234	18%	14 330	31%
Portugal	4 411	400	1 053	-0.4%	-3 358	-76%	653	163%
Romania	-23 200	-22 609	-23 199	8.6%	1	0%	-590	-3%
Slovakia	-6 294	-6 076	-3 835	1.4%	2 459	39%	2 241	37%
Slovenia	-4 583	-4 232	-4 224	1.6%	359	8%	8	0%
Spain	-20 788	-33 529	-33 829	12.5%	-13 041	-63%	-300	-1%
Sweden	-62 044	-46 935	-55 623	20.5%	6 421	10%	-8 688	-19%
EU	**-341 896**	**-268 222**	**-270 983**	**100%**	**70 913**	**21%**	**-2 762**	**-1%**

Note: Highlighted cells mark the three Member States with the highest share in the EU sector total (yellow), the highest decrease (green) and the highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations.

For the year 2024, apart from Austria, Germany, Ireland, and Portugal, individual submissions report a net sink under Forest Land remaining Forest Land.

Important changes in terms of reported amounts, as compared with 1990, are both due to the increase in harvesting rates, but also, the impact of natural disturbances in forest, which result in significant salvage logging practices. Also, higher temperatures lead to loss of previously stored carbon due to faster decay rates and less net increment likely also linked to drought and negative impacts on forest health. Three Member States, Germany, Finland, Latvia all report significant fewer net removals in 2024 compared to 1990, while Italy, France and Spain all report significant more net removals when comparing 2024 with 1990. Comparing 2024 with 2023 shows also large changes including for Italy and Sweden that all have more net removals in 2024 and for Poland and Slovakia that all have fewer net removals in 2024 compared to 2023.

Figure 6.5 Trend of emissions (+)/removals (-) in subcategory 4A1 "Forest land remaining Forest Land" in EU (kt CO_2)



Inter-annual variations in this subcategory are closely related to natural disturbances. In this respect, wildfires, in southern European countries, and windstorms and insect infestations, in several central European countries, resulted in a significant source of GHG emissions directly emitted to the atmosphere, or lagged emissions, via the transfer of carbon to other pools that are reflected in the trend at EU level.

Portugal and Italy report for the year 2017 enormous areas of forests and grasslands affected by wildfires. Noteworthy is also the significant impact that Germany reports from the massive storm "Vivian" that caused an estimated loss, due to windfalls, of about 70 Mm^3 of wood in 1990.

The emissions of CO_2 from biomass burning are, in many cases, implicitly reported in CRT table 4.A, as part of the "stock-change" approach used to report carbon stock changes, while related non-CO_2 emissions are reported in CRT table 4(IV).

Estimation of emissions from forest fires is made with default methods in case of small emissions or with higher Tiers, involving country-specific information, where such emissions have a significant share within the overall carbon budget of the country.

In general, emissions from natural disturbances that do not necessarily result in instantaneous carbon oxidation (e.g., insect outbreaks) are not easy to quantify as an annual biomass loss, and therefore they are practically not explicitly mentioned in the individual national inventory reports but reflected in the long-term estimation through the national forest inventories with an impact that last several years.

This can be seen from Germany that based on new inventory data has reported a significant shift from a sink to a source for their forest for the period 2018-2024 due to an unprecedented drought and a bark-beetle outbreak experienced in its forests.

Among individual inventories with the largest inter-annual variability in GHG estimates that affect the EU trend of this category are:

- Forest fires (e.g., Portugal in 1990, 2003, 2005 and 2017; Italy in 1990, 1993, 2007, 2017 and 2021; Greece 2007 and 2023; Spain 2022; France 2003 and 2022).

- Windstorms (e.g., Germany 1990, France in 1999 and 2009, and Denmark in 2000, Sweden in 2005, Italy in 2018).
- Drought followed by bark beetle infestation (Czechia 2018-2022 and Germany 2018-2023).

Methodological issues for Forest Land remaining Forest Land category

The definition of forest land is reported by all individual submissions (Table 6.3; Table 6.4). The consistency of these definitions with the land representation system is ensured within the national inventory systems in terms of time and space. The forest definitions among countries slightly differ in terms of the quantitative parameters (i.e., crown cover, tree height and minimum area) used to define a land as forest.

In general, these forest definitions are consistent with definitions used by countries under other international reporting frameworks (e.g., Global Forest Resources Assessments FRA (FAO)). For forest administrative purposes, forest lands without tree coverage may be included or not in the forest area, and thus, additional qualitative criteria complement the forest definition. As an example, the definitions may include a reference to forest roads, un-stocked forest areas, nurseries, willow crops, etc.

Few countries have changed their forest definition since 1990, but recalculations of the entire time-series ensured the consistency on activity data. The overall effect of different forest definitions on carbon stock changes at EU level is difficult to assess because it depends on several factors (e.g., land fragmentation, land use change frequency, transition period, land registry systems, GHG estimation methodology, etc.), but it is considered small. Ultimately, the implementation of country-specific forest definitions contributes to ensuring that the large variety of forest ecosystems, and their management practices, that are in Europe are all considered in the GHG inventories.

National forest inventories provide fundamental data inputs for both the estimation of areas, and the estimation of forest carbon stocks, and their changes. In very few cases, this information is also taken, or complemented, from data from forest management plan databases (especially when countries experience difficulties getting information for the first years of the time series).

Data collection approach of national forest inventories is typically based on repeated measurements of parameters on permanent sampling plots, but the sampling design differs among MS in terms of sample size, and frequency of the field surveys. The availability of annual data is barely available for this sector. Partly because it is not cost-efficient to increase the sampling frequency of some parameters since some changes are not captured on an annual basis. Countries have devoted efforts to meeting reporting requirements and to ensure the consistency of the time series. Annual values are usually obtained by interpolation and extrapolation of available data sets. The main data source for forest areas, the national forest inventories, are in many instances complemented with auxiliary information in the form of national statistics (i.e. surveys) or remotely sensed products (i.e. satellite images, aerial photographs). In this sense, not only for forests, but with a wider focus on acquiring data to monitoring lands and information for a better management, the result of some EU programs is already used by countries to improve their LULUCF reporting information (e.g., Copernicus products or Corine Land Cover data)

Furthermore, countries usually have disaggregated forest areas in various subdivisions according to available datasets. The breakdown criteria differ across countries, although they are consistent across time series. The aim is to differentiate and stratify the forest to capture the impact that specific strata features have on the GHG estimates. Main strata are based on forest types (e.g. broadleaved/coniferous; evergreen/deciduous; species based classification – beech, oak, pine, spruce, etc.); climate conditions (e.g. temperate moist or temperate dry,); soil and site type (e.g. lowlands, mountains), administrative or

geographical boundaries (e.g. northern, southern territories), and management type (e.g. coppice, high forest).

For instance, forest inventories define above-ground biomass carbon pool according to the threshold of minimal diameter of the vegetation that is measured (i.e. DBH– diameter at breast height) up to 7,5 cm. Concerning the below-ground biomass, the information on what exactly is included on this carbon pool is sparse. Dead wood mostly differs in terms of decay time and thresholds of diameters and height/length of wood pieces included in the pool. Litter is either independently assessed or included with soils. In soil organic carbon, carbon stock changes are computed according to various methods and transition periods. Usually, carbon stock in understory biomass is only accounted in principle for estimating forest fires emissions.

Table 6.11 IPCC Method used for estimating carbon stock changes in forest aboveground biomass.

Country	IPCC method
Austria	*Gain-loss*
Belgium	*Stock-difference*
Bulgaria	*Stock-difference*
Croatia	*Gain-loss*
Cyprus	*Gain-loss*
Czechia	*Gain-loss*
Denmark	*Stock-difference*
Estonia	*Gain-loss*
Finland	*Gain-loss*
France	*Gain-loss*
Germany	*Stock-difference*
Greece	*Stock-difference*
Hungary	*Stock-difference*
Ireland	*Gain-loss*
Italy	*Gain-loss*
Latvia	*Gain-loss*
Lithuania	*Stock-difference*
Luxemburg	*Gain-loss*
Malta	*Gain-loss*
Netherlands	*Gain-loss*
Poland	*Stock-difference*
Portugal	*Gain-loss*
Romania	*Gain-loss*
Slovakia	*Gain-loss*
Slovenia	*Stock-difference*
Spain	*Stock-difference*
Sweden	*Stock-difference*

Data sources for the estimation of carbon stock changes in living biomass also differ among countries, upon data availability. Nowadays, NFIs represent the primary source of information for most of MS, while others rely on other forestry statistics and yield tables. In addition, forest fire statistics complement both data sources. Data collection and data analysis programs are ongoing in most countries to further improve the completeness and accuracy of the estimates, primarily of carbon stock changes.

When they are estimated, countries mainly rely on data collected during the national forest inventories. However, it should be noted that the widespread use of the tier 1 assumption is due to the lack of appropriate data, and the high costs associated with systems that would allow a proper collection of this information, in other cases also to the very high uncertainty of the existing data.

Nevertheless, an increasing number of countries document ongoing efforts to estimate emissions and removals from dead organic matter and mineral soils in forest. This has resulted in more countries reporting for the first time carbon stock changes in these pools using country-specific data.

When data on soil organic carbon content is available from two measurement cycles, they are often directly used for estimating carbon stock changes using stock difference approaches. In a few cases, data is also integrated in models. Moreover, depending on the availability of datasets in individual countries, carbon stock changes in dead organic matter are often disaggregated between dead wood and litter or some countries include their estimates within soil organic carbon pool.

Carbon stock changes in mineral soils under forest land remaining forest land in this submission are quantitatively estimated generally as a net sink of carbon. Higher tree mortality and increased harvesting levels have added more harvest residues and stumps that increase both the dead wood and the soil organic carbon pool.

Most of the countries report absence or insignificant areas of organic soils under this land use subcategory. However, when organic soils are present, they are reported in most cases as a net source of emissions.

6.4.2.3 Land converted to Forest Land (CRT 4.A2)

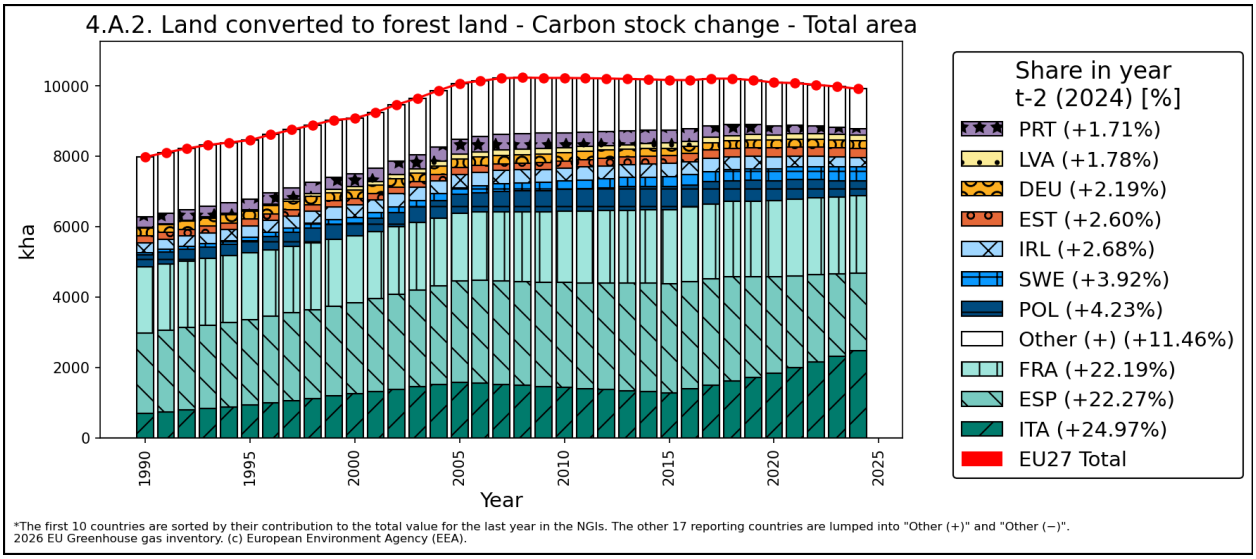
Overview of Land converted to Forest Land category

In this submission, the area reported under this subcategory represents 5.9% of the total Forest Land area. (Figure 6.6).

Most of the new forest lands are converted from Grassland and Cropland areas, and although within the overall forest land category they have a low share in terms of areas, they contribute by 19.7% to the total carbon sink of the European forests. This high percentage both illustrates the stronger growth of younger stands that in most cases are not yet subject to harvesting but also that many older stands with taller trees and more biomass per hectare tend to be more impacted by natural disturbances.

In term of areas, Spain, Italy and France together contribute with about 69.4% of the total areas being converted to forest land.

Figure 6.6 Trend of activity data in subcategory 4A2 “Land converted to Forest Land” in EU (kha)



This subcategory has been always reported as a net carbon sink at the EU level. In this submission, it reaches -65 457 kt CO_2, which represents an increase of the sink by 10% compared with 1990. (Figure 6.7; Table 6.12).

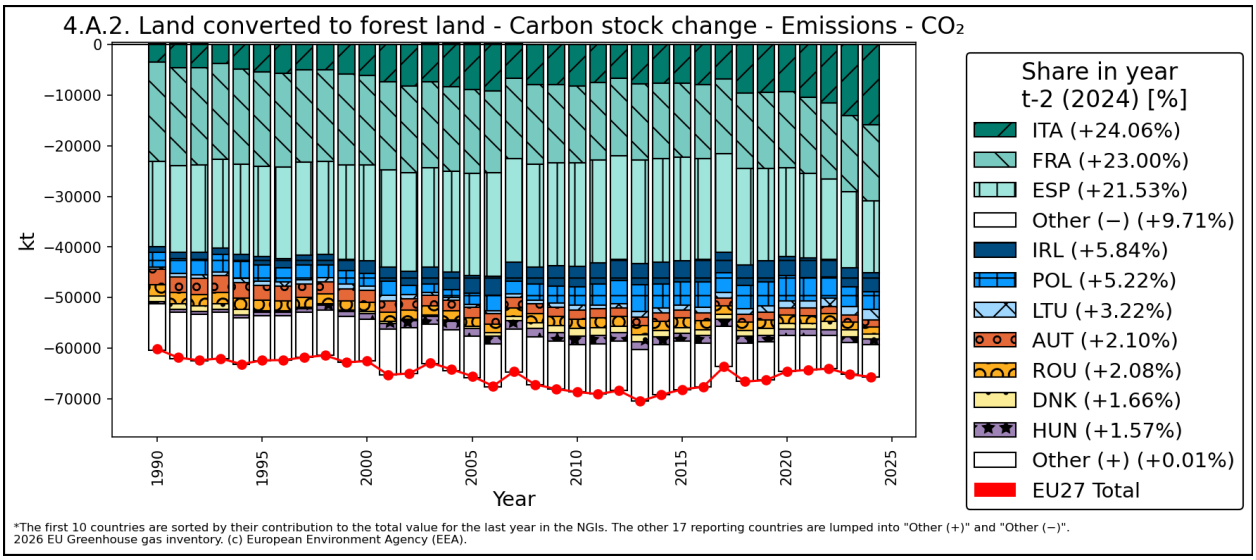
Table 6.12 4A2 Land converted to Forest Land: EU contributions to net CO_2 emissions (+)/removals (-) (CRT table 4)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	-2 959	-1 402	-1 381	2.1%	1 578	53%	21	2%
Belgium	-11	-669	-689	1.1%	-678	-6128%	-21	-3%
Bulgaria	-2 782	-181	-260	0.4%	2 522	91%	-79	-44%
Croatia	-33	-329	-325	0.5%	-292	-893%	4	1%
Cyprus	0	-19	-20	0.0%	-19	-20142%	-1	-5%
Czechia	-208	-621	-633	1.0%	-425	-204%	-12	-2%
Denmark	-1 075	-1 482	-1 092	1.7%	-17	-2%	390	26%
Estonia	-362	-646	-629	1.0%	-267	-74%	17	3%
Finland	-208	-168	-227	0.3%	-19	-9%	-60	-36%
France	-19 645	-15 117	-15 097	23.1%	4 548	23%	20	0%
Germany	-879	-930	-854	1.3%	25	3%	76	8%
Greece	NE,NO	-18	-16	0.0%	-16	-∞	2	12%
Hungary	-373	-1 063	-1 033	1.6%	-660	-177%	29	3%
Ireland	-1 028	-3 791	-3 836	5.9%	-2 808	-273%	-45	-1%
Italy	-3 409	-13 990	-15 795	24.1%	-12 386	-363%	-1 804	-13%
Latvia	-36	-468	-473	0.7%	-437	-1209%	-5	-1%
Lithuania	-449	-1 590	-2 019	3.1%	-1 570	-350%	-429	-27%
Luxembourg	-43	-10	-9	0.0%	34	80%	1	13%
Malta	NO	-1	0	0.0%	0	-∞	0	80%
Netherlands	-920	-678	-669	1.0%	251	27%	9	1%
Poland	-2 894	-3 877	-3 428	5.2%	-534	-18%	449	12%
Portugal	-1 188	-894	-792	1.2%	396	33%	102	11%
Romania	-2 291	-1 444	-1 362	2.1%	928	41%	82	6%
Slovakia	-2 291	-328	-345	0.5%	1 946	85%	-17	-5%
Slovenia	-233	-76	-74	0.1%	158	68%	2	2%
Spain	-16 564	-14 892	-14 043	21.5%	2 520	15%	848	6%
Sweden	182	-256	-355	0.5%	-537	-295%	-99	-39%
EU	**-59 698**	**-64 938**	**-65 457**	**100%**	**-5 759**	**-10%**	**-520**	**-1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

As shown in Table 6.12, some MS reported significant changes in this subcategory as compared with 1990, for instance, Italy and Ireland with more net removals and France, Bulgaria and Spain with less net removals.

Figure 6.7 Trend of emissions (+)/removals (-) in subcategory 4A2 "Land converted to Forest Land" in EU (kt CO_2)



For this year, about 69.1% of total carbon sink reported in the subcategory 4A.2 was reported by France, Italy and Spain.

Methodological issues for Land converted to Forest Land category

Methods used to identify and represent the areas converted to forests, as well as to report the associated GHG emissions and CO_2 removals from these areas, are generally the same as the ones used for subcategory 4.A1. Nevertheless, different parameters are involved under each subcategory due to differences among others in growth rates and management practices of these young forests.

Most countries use the default of 20 years for land converted to forest before it is reported under Forest land remaining Forest land, but a few countries in the northern part of Europe use a 30-year period before land converted to forest land is transferred to Forest land remaining forest land.

Most countries have developed land identification systems that are able to identify and track land use conversions to, and from, forests. Mainly, as already mentioned, these methods are based on information collected by the national forest inventories on systematic sampling grids, and that, in many cases, is complemented by auxiliary information on the form of satellites images, remote sensing analysis, aerial photography, or national registries.

Estimates of GHG emissions and CO_2 removals from this subcategory are usually reported using tier 2 methods involving country-specific data collected during the national forest inventory. Under this subcategory, living biomass and dead organic matter carbon pools are in most cases reported as a net carbon sink. Mineral soils are reported either as a net source or a net sink of emissions depending on whether there is presence or absence of disturbed soil on new forest areas (i.e., natural regeneration or, soils management practices that enhance carbon oxidation).

Concerning organic soils, countries have reported this carbon pool as a net source of emissions whenever new forest areas were established in this type of soil.

Nevertheless, it should be noted that the heterogeneity in approaches used by the countries under 4A2 suggests caution in interpreting differences in the implied carbon stock change factors among carbon pools. For instance, possible reasons for differences may include the length of the time series on activity data and their starting point, the use of time-averaged annual biomass growth, or the quantity of CO_2 emissions estimated from the land that is converted to forests, including lagged emissions.

6.4.3 Cropland (CRT 4B)

6.4.3.1 Overview of the Cropland category

Subject to intensive agriculture practices, the Cropland category is an important contributor to the EU GHG budget. This category, which includes arable lands for annual crops, permanent crops, set aside lands and rice fields.

Based on individual submissions reported this year, Cropland areas covered in 2024 a total of 117 961 kha, which represent 28% of the lands reported by EU MS. However, the category shows a steady decreasing trend. For this inventory year the area is about 11% less than in the year 1990,

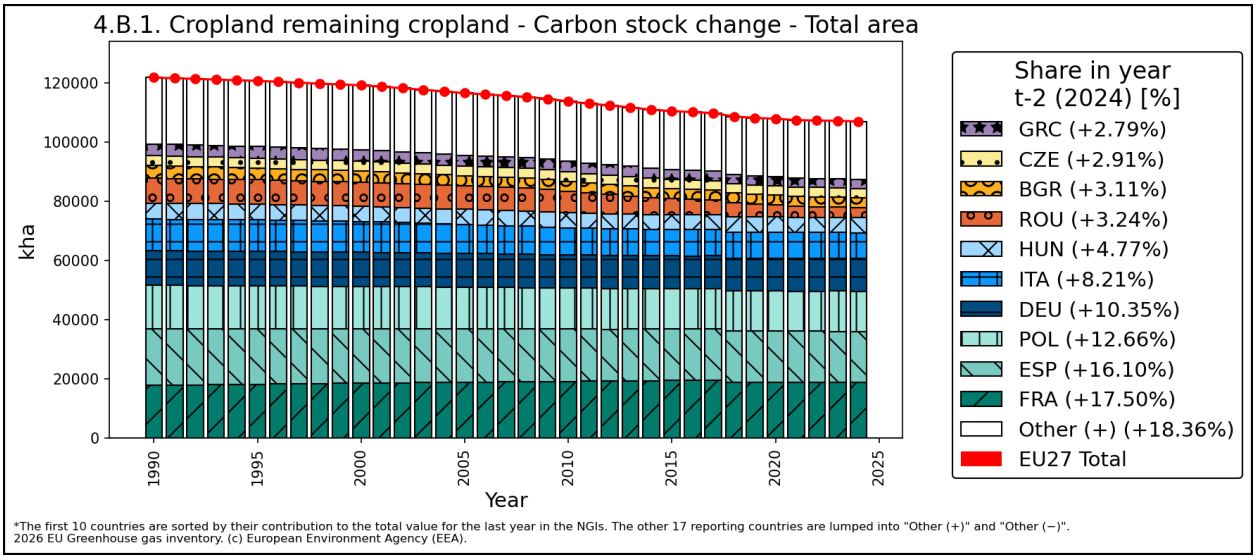
6.4.3.2 Cropland remaining Cropland (CRT 4B1)

Overview of Cropland remaining Cropland category

In line with the overall category, this subcategory has constantly decreased since 1990 (Figure 6.8).

The overall trend of this subcategory is driven by 10 MS which together contribute to about 81.6% of the total area, and more specifically, France, Spain, Poland, and Germany which represent more than half of the area reported under this subcategory.

Figure 6.8 Trend of activity data in subcategory 4B1 "Cropland remaining Cropland" in EU (kha)



In terms of emissions, at the EU level this subcategory has been always reported as a net source of GHG emissions.

For the year 2024, based on individual submissions, GHG emissions from Cropland remaining Cropland reached 11 584 kt CO_2 which represents a decrease of 64% as compared to 1990 (Table 6.13).

This trend is mainly driven by Denmark, Germany and Spain that report fewer net emissions in 2024 compared to 1990. At the same time some Member States, Finland, France and Poland report more net emissions in 2024 compared to 1990 (Table 6.13). In general, emissions are the result of the oxidation of soil organic matter, which are particularly important in those MS with the presence of cultivated areas on organic soils.

Nevertheless, some MS report a considerable carbon sink in Cropland remaining Cropland. For instance, Spain, Poland and Lithuania report a substantial net carbon sink in mineral soils and, in some cases, also in the living biomass carbon pool. This is generally justified by the implementation of IPCC methodologies (i.e. tier 1 and tier 2) that result in a net sink when current management practices of soils add more organic matter to the soil than those implemented 20 years before. In addition, net carbon

sinks may occur in countries with significant areas of woody crops (i.e., orchards, vineyards, Christmas trees, fruits, bushes, and olive trees) that provide a net sink resulting from carbon accumulation in the living biomass pool.

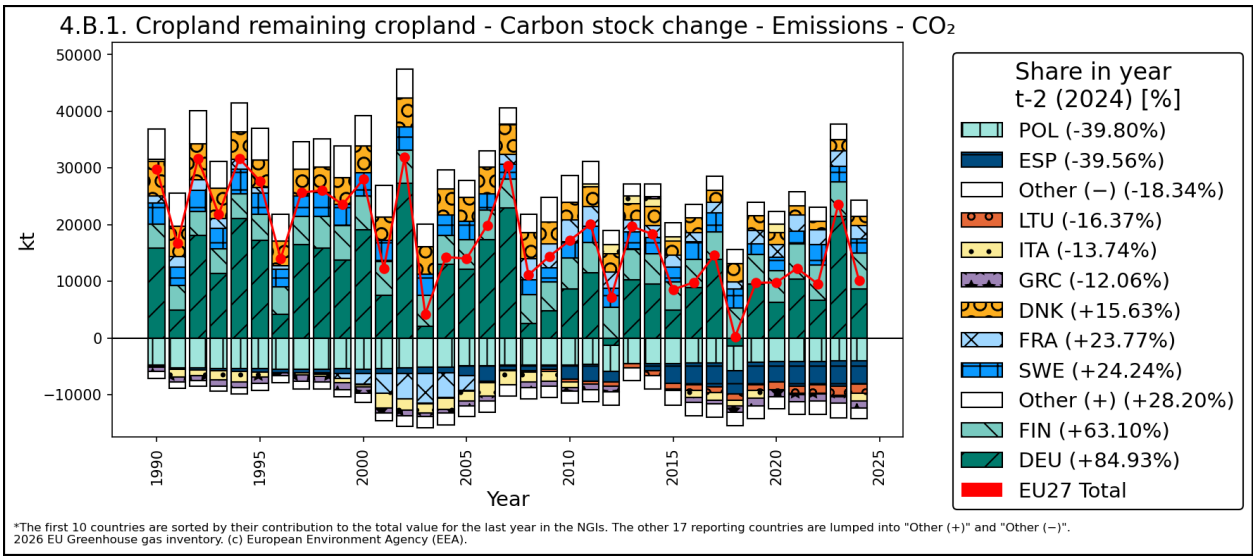
Table 6.13 4B1 Cropland remaining Cropland: EU-27 contributions to net CO_2 emissions (+)/removals (-) (CRT table 4)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	201	244	253	2.2%	52	26%	9	4%
Belgium	483	360	341	2.9%	-142	-29%	-19	-5%
Bulgaria	228	241	217	1.9%	-11	-5%	-24	-10%
Croatia	89	143	146	1.3%	57	64%	3	2%
Cyprus	2	0	1	0.0%	-1	-57%	1	212%
Czechia	-13	-22	-26	-0.2%	-13	-106%	-4	-19%
Denmark	6 289	2 043	1 646	14.2%	-4 643	-74%	-397	-19%
Estonia	578	815	818	7.1%	240	41%	3	0%
Finland	4 332	6 090	6 407	55.3%	2 076	48%	317	5%
France	1 509	3 062	2 732	23.6%	1 223	81%	-330	-11%
Germany	15 823	21 442	8 623	74.4%	-7 199	-46%	-12 819	-60%
Greece	-818	-1 163	-1 225	-10.6%	-406	-50%	-62	-5%
Hungary	22	-14	-40	-0.3%	-61	-283%	-25	-176%
Ireland	-48	82	11	0.1%	59	122%	-71	-87%
Italy	1 117	491	-671	-5.8%	-1 789	-160%	-1 162	-237%
Latvia	2 189	56	143	1.2%	-2 046	-93%	87	154%
Lithuania	-14	-1 510	-1 597	-13.8%	-1 584	-11542%	-87	-6%
Luxembourg	0	-76	-79	-0.7%	-79	-31162%	-3	-4%
Malta	0	-1	-1	0.0%	-1	-1254%	0	15%
Netherlands	1 570	952	1 097	9.5%	-472	-30%	145	15%
Poland	-4 804	-4 067	-4 041	-34.9%	763	16%	26	1%
Portugal	385	-541	-513	-4.4%	-898	-233%	28	5%
Romania	197	-1 287	-629	-5.4%	-825	-420%	658	51%
Slovakia	-925	-678	-533	-4.6%	392	42%	145	21%
Slovenia	50	60	58	0.5%	8	16%	-3	-4%
Spain	-207	-4 437	-4 017	-34.7%	-3 810	-1843%	421	9%
Sweden	3 691	2 747	2 462	21.3%	-1 230	-33%	-286	-10%
EU	**31 926**	**25 032**	**11 584**	**100%**	**-20 342**	**-64%**	**-13 448**	**-54%**

Note: Highlighted cells mark the three Member States *with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.*

Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 6.9 Trend of emissions (+)/removals (-) in subcategory 4B1 "Cropland remaining Cropland" in EU (kt CO_2)



Methodological issues for Cropland remaining Cropland category

Lands included under this category generally are in line with the IPCC definition (Table 6.5). However, there could be national particularities (e.g., treatment of some woody crops) that result in small differences among countries.

In some cases, because of the absence of annual information on activity data, coupled with the fact that management practices include crops-rotation cycles and fallow lands, some cropland areas may not be clearly separated from grassland areas. In these cases, countries have defined the number of years before a land is shifted from/to cropland and grassland.

Overall, following the IPCC approach, the carbon pool living biomass is assumed in balance for annual crops, while carbon stock changes are reported for conversions among annual and woody crops. Concerning carbon stock changes in woody crops, countries often implement the IPCC approach, either by using country-specific data on biomass accumulation from growth and maturity cycles, or by using default data. Carbon stock changes in dead organic matter are in most cases reported following the IPCC assumption that the dead organic matter stocks are not present in croplands, or they are in equilibrium. In some cases, however, some MS have reported this pool as a net sink or as a net source.

With regard to carbon stock changes in soils, these have been reported under mineral soils as either a net source or a net sink of carbon. The final net result is typically associated with an increase or decrease of the intensity in the soil management practices along the time series. On the contrary, as reported by all countries, for cultivated organic soils the net result of carbon stock changes is associated with a source of CO_2 emissions. Methodologies for reporting this carbon pool follow, in most cases, IPCC tier 1 or tier 2 approaches, where carbon stock changes are estimated as the difference on the carbon stock in soils at two moments in time. In some cases, carbon stock changes have been estimated by using models.

Applied tier 2 methods rely often on the use of country-specific soil organic carbon reference values along with IPCC default values for relative change factors (i.e., for Fmg, Flu, Fi). In some cases, IPCC default relative change factors have been slightly modified to adapt them to national circumstances, but changes rely more on expert judgment than on a statistical analysis or systematic measurements. Parameters to estimate carbon stock change for living biomass of permanent crops vary depending on the types of crops and management practices across Europe, from North (i.e., bush-type currant crops) to South (i.e., olives trees and agroforestry systems).

6.4.3.3 Land converted to Cropland (CRT 4B2)

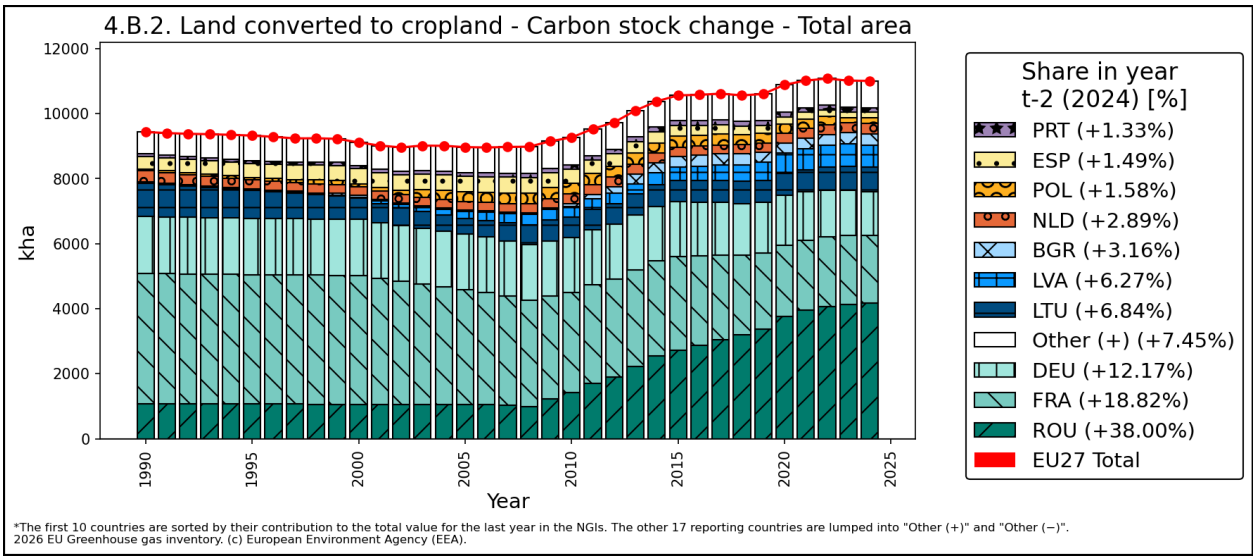
Overview of Land converted to Cropland category.

In terms of area, this subcategory represents 9.3% of the total cropland areas reported at the level of EU MS. However, it accounts for 74% of the net CO_2 emissions that are reported in Cropland.

In overall, for this inventory year the area increased by 17% as compared with 1990 (Figure 6.10).

Main conversions of lands to Cropland take place from areas of Grassland and Forest land. The trend in this subcategory is mainly driven by Romania, France and Germany, which report more than 69% of total area of new Croplands, often associated with rotation of crops and grasses on the same land.

Figure 6.10 Trend of activity data in subcategory 4B2 "Land converted to Cropland" in EU (kha)



In terms of emissions, this subcategory is reported as a net source of emissions that for the current inventory year reaches 33 351 Kt CO_2. This represents a decrease of 22% as compared to 1990 (Table 6.14). The largest emissions are reported by France, which reports about 33 % of the total emissions in this subcategory; followed by Germany with 25%.

Table 6.14 4B2 Land converted to Cropland: EU contributions to net CO_2 emissions (+)/ removals (-) (CRT table 4)

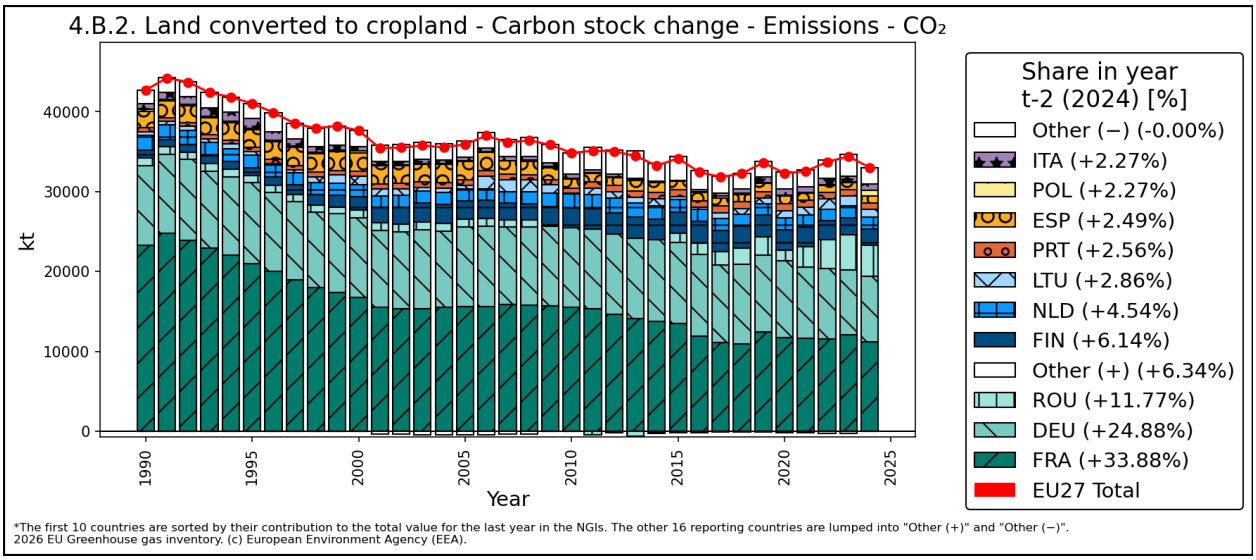
Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	173	169	190	0.6%	18	10%	21	13%
Belgium	43	499	503	1.5%	460	1080%	4	1%
Bulgaria	49	609	502	1.5%	454	934%	-106	-17%
Croatia	21	92	89	0.3%	67	314%	-3	-3%
Cyprus	0	6	6	0.0%	6	2232%	0	0%
Czechia	268	114	114	0.3%	-154	-58%	0	0%
Denmark	63	74	38	0.1%	-26	-40%	-37	-49%
Estonia	278	195	197	0.6%	-80	-29%	3	1%
Finland	931	2 147	2 025	6.1%	1 094	118%	-122	-6%
France	23 309	12 047	11 182	33.5%	-12 127	-52%	-865	-7%
Germany	9 967	8 138	8 210	24.6%	-1 757	-18%	72	1%
Greece	16	17	34	0.1%	18	115%	18	105%
Hungary	26	139	116	0.3%	90	343%	-23	-16%
Ireland	NO	NO	NO	-	-	-	-	-
Italy	749	749	749	2.2%	0	0%	0	0%
Latvia	21	-239	92	0.3%	70	326%	330	138%
Lithuania	783	1 547	1 287	3.9%	504	64%	-260	-17%
Luxembourg	78	0	0	0.0%	-78	-100%	-1	-224%
Malta	4	3	5	0.0%	1	29%	2	65%
Netherlands	1 838	1 458	1 498	4.5%	-340	-18%	41	3%
Poland	246	81	750	2.2%	504	205%	669	822%
Portugal	466	841	846	2.5%	380	82%	4	0%
Romania	962	4 399	3 886	11.7%	2 924	304%	-513	-12%
Slovakia	466	35	27	0.1%	-440	-94%	-8	-23%
Slovenia	197	62	64	0.2%	-134	-68%	1	2%
Spain	2 037	848	822	2.5%	-1 215	-60%	-26	-3%
Sweden	-4	684	121	0.4%	124	3497%	-563	-82%
EU	**42 986**	**34 712**	**33 351**	**100%**	**-9 635**	**-22%**	**-1 361**	**-4%**

Note: Highlighted cells mark the three Member States with highest *share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.*

Abbreviations are explained in the Chapter 'Units and abbreviations'.

As in other land use subcategories that involve the conversion of areas, the trends in the time series of emissions from Land converted to Cropland have been driven by the activity data.

Figure 6.11 Trend of emissions (+)/ removals (-) in subcategory 4B2 "Land converted to Cropland" in EU (kt CO_2)



Methodological issues for Land converted to Cropland.

For estimating and reporting carbon stock changes in this subcategory, the countries generally use the IPCC default methodology. However, implementation of country-specific or default emissions factors depends on which type of land is being converted to Cropland, and the estimated carbon pool.

Usually, it is assumed that the carbon stored in living biomass and dead organic matter is lost in the year of the conversion, while for soil organic carbon in mineral soils, following IPCC methodology, countries often apply a 20-year transition period before the carbon stock of the soils converted to cropland reach the equilibrium.

In recent years, improvements have been implemented also in this subcategory, including the use of higher methods (as requested by the ERT), which have resulted in an overall increase in accuracy and completeness of the sector.

6.4.4 Grassland (CRT 4C)

6.4.4.1 Overview of Grassland category (CRT 4C)

Under this category are included lands covered by natural and artificial meadows, range lands, moors and forage crops. They can be subject to economic activities (e.g., grazing lands) or be considered unmanaged lands. In several instances, Grassland areas cover also woody lands (i.e., trees and shrub lands) when they do not fall into the thresholds used to define forest lands.

In overall, Grassland is reported as net source of emissions.

Based on individual submissions, for the current inventory year total Grassland covers 72 802 kha. This represents 17% of the total territory of EU. However, as for Cropland, these areas have constantly decreased, and nowadays these ecosystems cover 7.1% less area than in the base year.

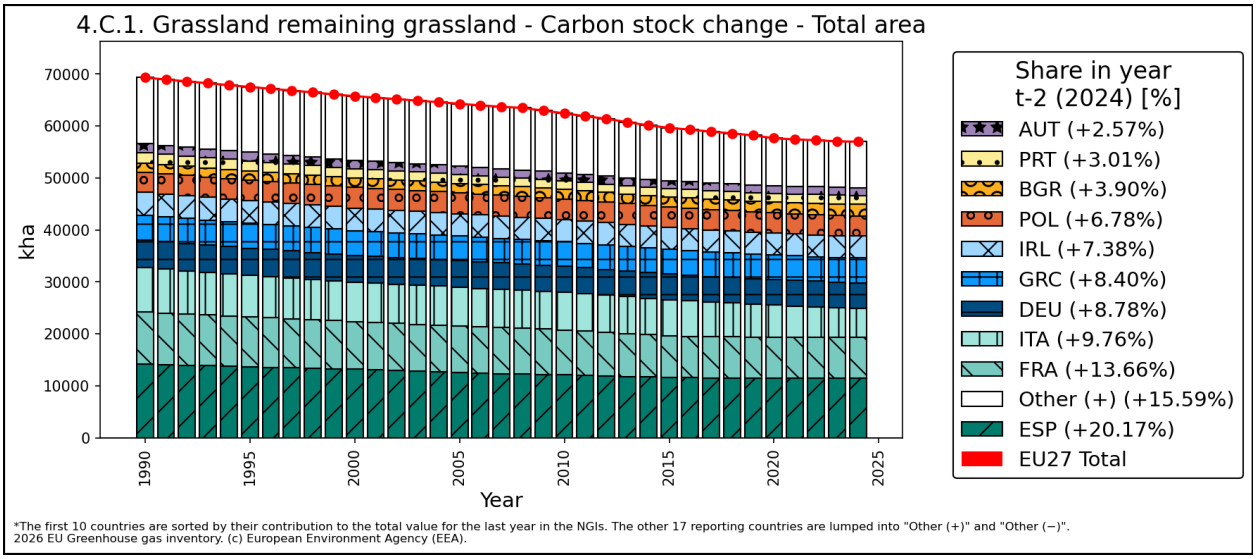
6.4.4.2 Grassland remaining Grassland (CRT 4.C1)

Overview of Grassland remaining Grassland category

Following the general trend of these lands, this subcategory has also constantly decreased since 1990, and in 2024 (Figure 6.12).

Spain, France and Italy report together about 43.6% of the total area of Grassland remaining Grassland, while the 10 MS with the larger contribution account for about 84.4% of the total area.

Figure 6.12 Trend of activity data in subcategory 4C1 "Grassland remaining Grassland" in EU (kha)



In terms of emissions, this subcategory has always resulted in a net source at the level of EU. In the current inventory year, the reported emissions reached 27 408 kt CO_2, which represents a decrease of 30% as compared with the year 1990 (Table 6.15).

Nevertheless, individual inventories have reported this subcategory either as a net source or as a net sink of carbon.

As in the case of cropland areas, the net result of the carbon stock change in grassland depends on the one hand on whether these areas are subject to agricultural activities, and particularly if they occur in organic soil areas, but also on the presence or absence of significant woody biomass and the intensity and variation of management practices over the years.

Table 6.15 4C1 Grassland remaining Grassland: EU contributions to net CO_2 emissions (+)/removals (-) (CRT table 4)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	371	371	371	1.4%	0	0%	0	0%
Belgium	-133	109	105	0.4%	238	178%	-4	-4%
Bulgaria	116	79	77	0.3%	-39	-33%	-2	-2%
Croatia	2	2	2	0.0%	0	0%	0	0%
Cyprus	-23	-16	-14	-0.1%	9	37%	1	9%
Czechia	60	-407	-408	-1.5%	-467	-783%	0	0%
Denmark	511	722	905	3.3%	394	77%	184	25%
Estonia	-177	-53	-57	-0.2%	120	68%	-3	-6%
Finland	766	503	512	1.9%	-254	-33%	9	2%
France	-885	-647	-562	-2.1%	323	37%	85	13%
Germany	26 696	23 555	25 264	92.2%	-1 432	-5%	1 709	7%
Greece	0	0	0	0.0%	0	70%	0	11%
Hungary	25	-95	-70	-0.3%	-95	-375%	26	27%
Ireland	2 258	1 104	1 071	3.9%	-1 187	-53%	-33	-3%
Italy	5 448	-1 932	-2 171	-7.9%	-7 620	-140%	-239	-12%
Latvia	1 318	458	600	2.2%	-718	-54%	143	31%
Lithuania	1 113	986	1 012	3.7%	-101	-9%	26	3%
Luxembourg	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Malta	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Netherlands	1 772	1 581	1 844	6.7%	71	4%	263	17%
Poland	-293	1 023	1 019	3.7%	1 313	448%	-4	0%
Portugal	966	-1 483	-755	-2.8%	-1 721	-178%	729	49%
Romania	-73	-283	-234	-0.9%	-161	-219%	49	17%
Slovakia	22	3	2	0.0%	-20	-89%	-1	-29%
Slovenia	217	-225	-212	-0.8%	-429	-197%	13	6%
Spain	-8	-34	-33	-0.1%	-25	-340%	1	2%
Sweden	-799	-859	-862	-3.1%	-64	-8%	-4	0%
EU	**39 272**	**24 462**	**27 408**	**100%**	**-11 864**	**-30%**	**2 946**	**12%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.

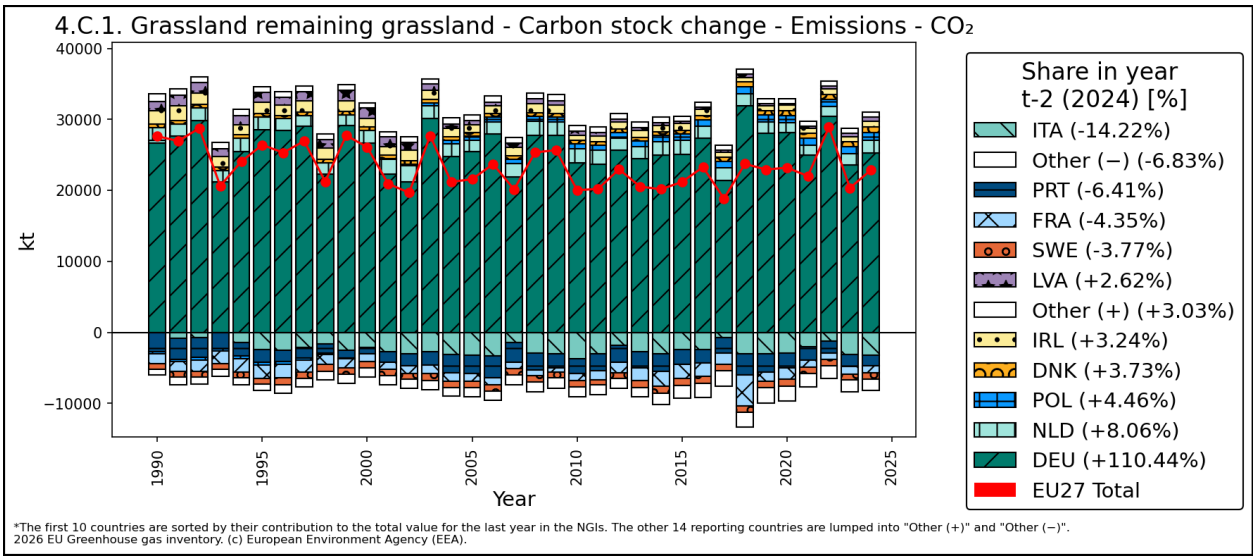
Abbreviations are explained in the Chapter 'Units and abbreviations'.

The EU trend in net emissions from this subcategory is largely affected by Germany and Netherlands (Figure 6.13).

While some MS report a sink such as Italy and Portugal due to increasing carbon stocks in living biomass while other MS report this subcategory as a source of CO_2 emissions mostly due to the occurrence of organic soils.

In Mediterranean countries, this subcategory shows significant inter-annual variability driven by wildfires affecting woody biomass in grassland areas. These episodes, at present occurring erratically, are expected to increase because of the climate change.

Figure 6.13 Trend of emissions (+)/removals (-) in subcategory 4C1 "Grassland remaining Grassland" in EU (kt CO_2)



Methodological issues for Grassland remaining Grassland category

Despite different eco-regions and management approaches among the countries, Grassland definitions show a good match with the IPCC land use definition (Table 6.6). One of the most significant differences that should be considered when comparing implied emissions factors is the presence or absence of reported unmanaged grassland and the presence or absence of woody vegetation.

In general, there is a widespread use of the Tier 1 method for reporting carbon stock changes in living biomass and dead organic matter, which assumes no net carbon stock changes for these pools. However, some countries have developed country-specific data and (or) methodologies to assess the changes in these pools (e.g., Italy, Latvia, and Sweden). When this is the case, these pools are generally reported as a net sink that is associated with the presence of woody biomass on grassland areas.

Under mineral soils, a significant number of individual submissions have demonstrated that there are no changes over time in the type of management practices that impact carbon storage in the soils. In a few cases also the absence of managed soils was argued. In these cases, quantitative estimates were not provided, and the notation keys were used instead. However, some other countries report this carbon pool using IPCC methodology, with country-specific or default data.

For those countries that report the presence of organic soils areas under managed grassland, this carbon pool is reported as a net source of emissions that result from the oxidation of the soil organic matter (Table 6.15).

6.4.4.3 Land converted to Grassland (CRT 4C2)

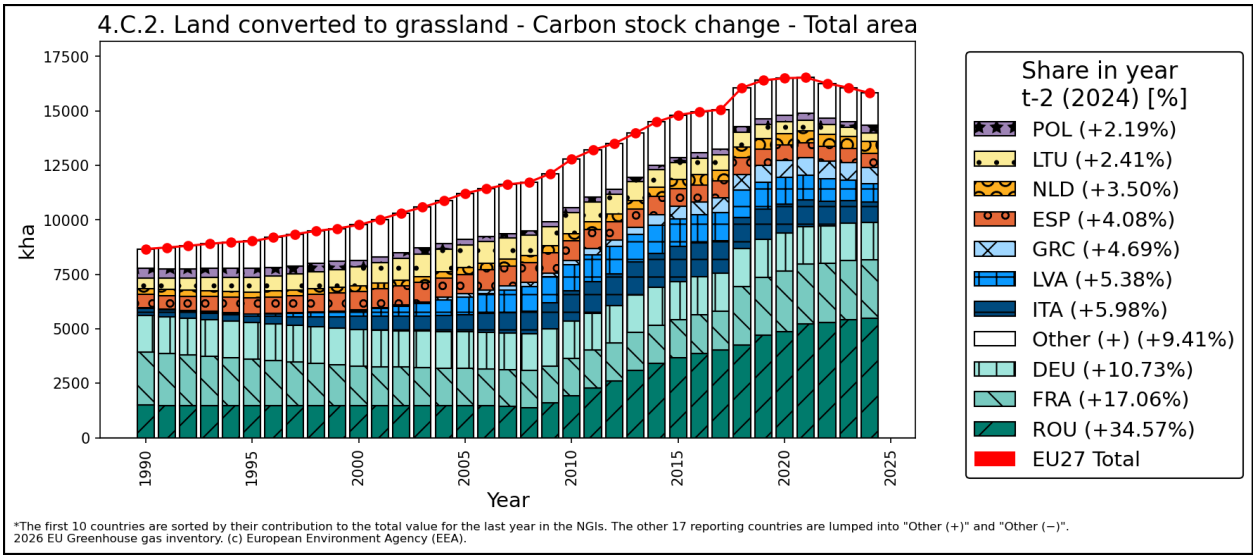
Overview of Land converted to Grassland category.

In terms of area, this subcategory represents 21.7% of the total grassland areas; however, the carbon sink reported offsets about 87% of the emissions resulting from grassland remaining grassland.

The area reported under this subcategory has increased by 45% compared to the area reported in 1990 under this category (Figure 6.14). Main conversions to grassland areas have origin in former croplands and, to a lesser extent, on forests land.

The main drivers of the EU trend on new grassland areas originate from the reporting of Romania, France and Germany, which together report 62% of the total area converted to Grassland.

Figure 6.14 Trend of activity data in subcategory 4C2 “Land converted to Grassland” in EU-27 (kha)



In terms of emissions, lands converted to Grassland represent in the current inventory year a total net sink of -23 888 kt CO_2, which corresponds to an increase of about 95% compared to the year 1990 (Table 6.16).

The trend in GHG emissions for this subcategory is by far driven by Romania followed by Germany and Italy, in all cases, the net sink reported under this category is the result of carbon sequestration in mineral soils. By contrary, final net emissions, as reported for several countries, as for instance Latvia and Sweden, are associated with emissions from the conversion of Forest land, and to a lesser extent, from woody crops to Grassland.

Table 6.16 4C2 Land converted to Grassland: EU contributions to the net CO_2 emissions (+)/removals (-) (CRT table 4)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	422	226	214	-0.9%	-208	-49%	-12	-5%
Belgium	42	-130	-146	0.6%	-189	-448%	-17	-13%
Bulgaria	-917	-586	-546	2.3%	371	41%	41	7%
Croatia	-8	-239	-233	1.0%	-224	-2663%	6	2%
Cyprus	0	2	2	0.0%	2	430%	0	0%
Czechia	-253	-406	-416	1.7%	-162	-64%	-10	-2%
Denmark	72	63	63	-0.3%	-8	-12%	1	1%
Estonia	-146	-227	-200	0.8%	-53	-37%	27	12%
Finland	268	163	141	-0.6%	-127	-47%	-22	-13%
France	-3 702	-685	-371	1.6%	3 331	90%	315	46%
Germany	-4 176	-3 974	-3 795	15.9%	382	9%	180	5%
Greece	0	-2 071	-1 935	8.1%	-1 935	-6899399%	135	7%
Hungary	-5	24	23	-0.1%	27	585%	-1	-6%
Ireland	2	37	25	-0.1%	23	1215%	-12	-33%
Italy	-1 124	-4 023	-3 675	15.4%	-2 550	-227%	348	9%
Latvia	668	811	736	-3.1%	68	10%	-75	-9%
Lithuania	-388	-180	-252	1.1%	137	35%	-72	-40%
Luxembourg	-69	-4	-3	0.0%	66	95%	1	20%
Malta	-22	-6	-5	0.0%	17	79%	1	22%
Netherlands	-807	-678	-737	3.1%	71	9%	-59	-9%
Poland	809	297	-236	1.0%	-1 045	-129%	-533	-180%
Portugal	NO	-94	-56	0.2%	-56	-∞	38	41%
Romania	-1 580	-13 195	-11 899	49.8%	-10 318	-653%	1 296	10%
Slovakia	-204	-28	-20	0.1%	184	90%	8	27%
Slovenia	-717	40	49	-0.2%	766	107%	8	21%
Spain	-788	-1 089	-1 012	4.2%	-224	-28%	77	7%
Sweden	404	1 055	393	-1.6%	-11	-3%	-663	-63%
EU	**-12 220**	**-24 896**	**-23 888**	**100%**	**-11 668**	**-95%**	**1 007**	**4%**

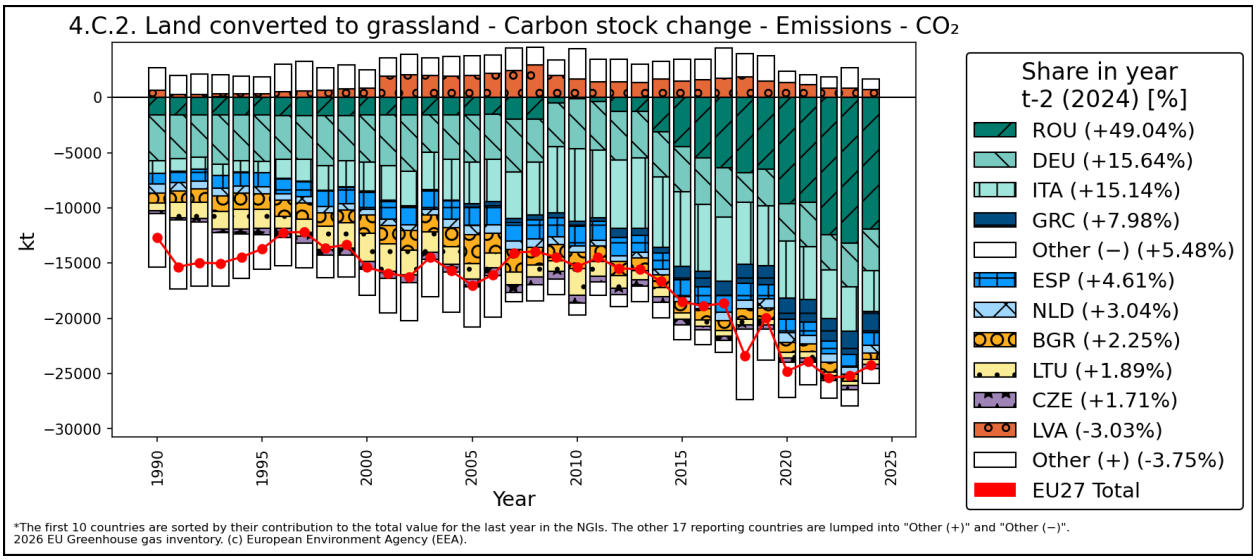
Note: Highlighted cells mark the three Member *States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.*

Abbreviations are explained in the Chapter 'Units and abbreviations'.

Major changes in the time series of emissions from Land converted to Grassland have been reported by Romania, Italy and France, mainly driven by the activity data.

New grassland areas are associated with the abandonment of cropland areas that result in a larger carbon sink reported in mineral soils. By contrast, some countries report a significant decrease in the carbon sink in these lands driven by the decrease in these areas but also when they are affected by wildfires in specific years.

Figure 6.15 Trend of emissions (+)/removals (-) in subcategory 4C2 "Land converted to Grassland" in EU 27 (kt CO_2)



Methodological issues for Land converted to Grassland category.

For estimating and reporting carbon stock changes in this subcategory, IPCC default methodology is generally used. The implementation of country-specific emission factors or default factors depends on which type of lands are being converted to Grassland, and on the estimated carbon pool. For instance, while some countries only consider a gross quantity of carbon loss from the conversion of forest lands to grassland, some others provide a net estimate on this carbon pool, by also considering one year of growth after the establishment of the grassland.

Usually, it is assumed that the carbon stored in living biomass and dead organic matter is lost in the year of the conversion, while for soil organic carbon in mineral soils, following IPCC methodology, countries often apply a 20-year transition period before the carbon stock of the soils converted to Grassland reach equilibrium.

Efforts devoted by the countries to assess soils organic carbon contents in these areas, have resulted in more accurate quantification of the carbon stock change that occurs in managed grassland and as a result of the conversion to and from grasslands.

6.4.5 Wetlands, Settlements and Other land (CRT Tables 4D, 4E, 4F)

6.4.5.1 Wetlands (CRT 4D)

In terms of area, Wetlands represent 23 543 kha, which represents 6% of the total EU area. The category has shown a constant slight increase, resulting in about 2% more area in the reporting year, as compared to the base year.

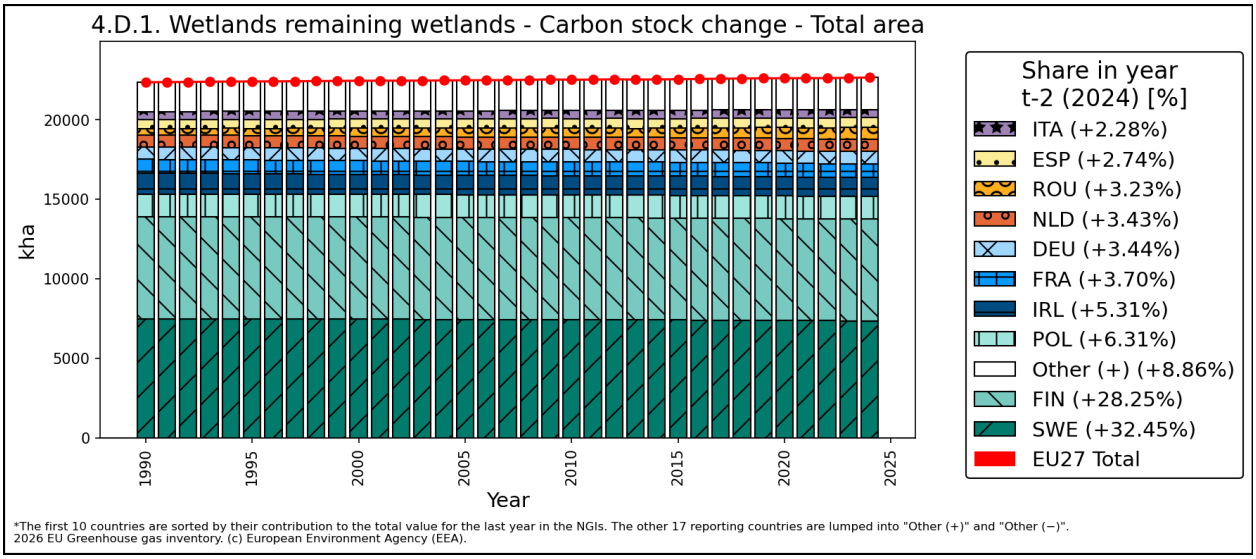
The trend in areas show a constant area of Wetlands dominated by Sweden and Finland, and mainly for the dominant subcategory of Wetlands remaining Wetlands (Figure 6.16).

In terms of emissions, Wetlands remaining Wetlands reaches for this inventory year about 9809 ktCO_2. Subcategories, 4D1 and 4D2, have been overall reported as a net source of emissions, resulting mostly from countries reporting the productive management activities of peatland areas. On the other hand, in some countries these subcategories have been also reported as a net carbon sink.

The main driver of emissions in this category is indeed the occurrence of peat extraction areas, which even if affecting relatively small areas at country level has a big impact on the overall emissions from

LULUCF. Within the EU, Germany, Finland, and Latvia are the main contributors of the emissions from Wetlands remaining wetlands (Table 6.17).

Figure 6.16 Trend of activity data and emissions (+)/removals (-) in subcategory 4D1 "Wetlands remaining Wetlands" in EU-27 (kha, Kt CO_2)



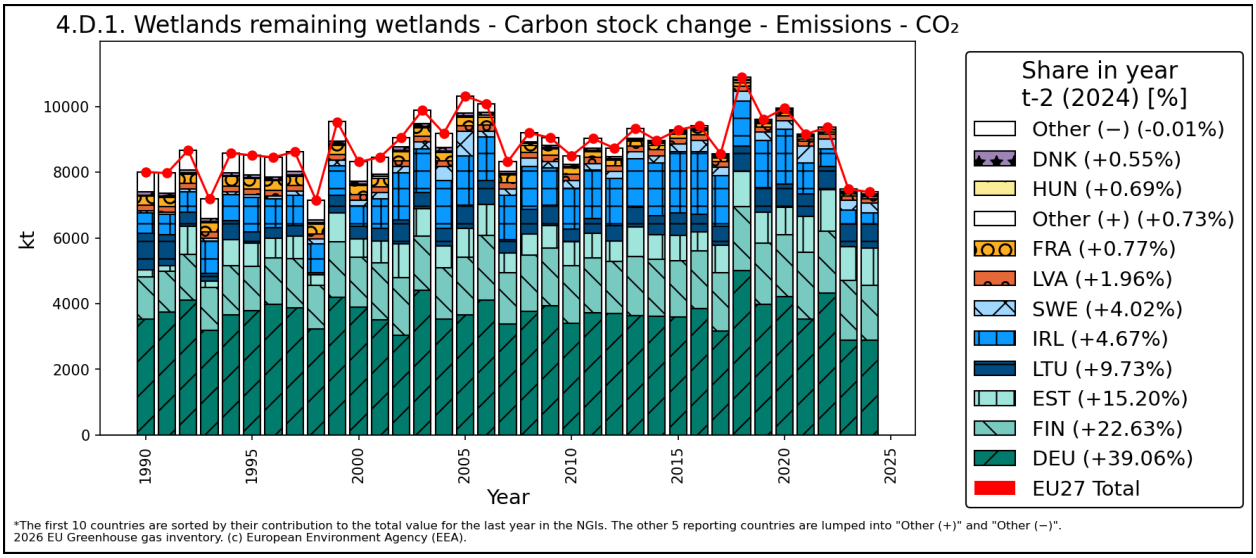


Table 6.17 CO_2 Emissions and removals from 4.D.1 wetlands remaining wetlands contributions to the net CO_2 emissions (+)/removals (-) (CRT table 4)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	21	21	21	0.2%	0	0%	0	0%
Belgium	NO	NO	NO	-	-	-	-	-
Bulgaria	NE,NO	NE,NO	NE,NO	-	-	-	-	-
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NE,NO	NE,NO	NE,NO	-	-	-	-	-
Czechia	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Denmark	109	40	41	0.4%	-68	-63%	1	2%
Estonia	213	1 026	1 124	11.5%	911	428%	98	10%
Finland	1 279	1 834	1 674	17.1%	396	31%	-160	-9%
France	265	62	57	0.6%	-208	-79%	-5	-8%
Germany	3 528	2 882	2 890	29.5%	-638	-18%	8	0%
Greece	NE,NO	NE,NO	NE,NO	-	-	-	-	-
Hungary	256	167	205	2.1%	-51	-20%	38	23%
Ireland	1 841	1 457	1 092	11.1%	-749	-41%	-365	-25%
Italy	NE,NO	NE,NO	NE,NO	-	-	-	-	-
Latvia	1 027	1 586	1 635	16.7%	608	59%	49	3%
Lithuania	1 129	670	720	7.3%	-410	-36%	50	7%
Luxembourg	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Malta	0	0	0	0.0%	0	-310%	0	0%
Netherlands	IE,NA,NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-
Poland	578	13	14	0.1%	-564	-98%	1	7%
Portugal	NO	0	0	0.0%	0	-∞	0	13%
Romania	-3	NA,NO	NA,NO	-	3	100%	-	-
Slovakia	NO	NO	NO	-	-	-	-	-
Slovenia	NE,NO	NE,NO	NE,NO	-	-	-	-	-
Spain	31	39	39	0.4%	8	26%	0	0%
Sweden	68	294	298	3.0%	230	338%	4	1%
EU	**10 341**	**10 089**	**9 809**	**100%**	**-533**	**-5%**	**-280**	**-3%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.

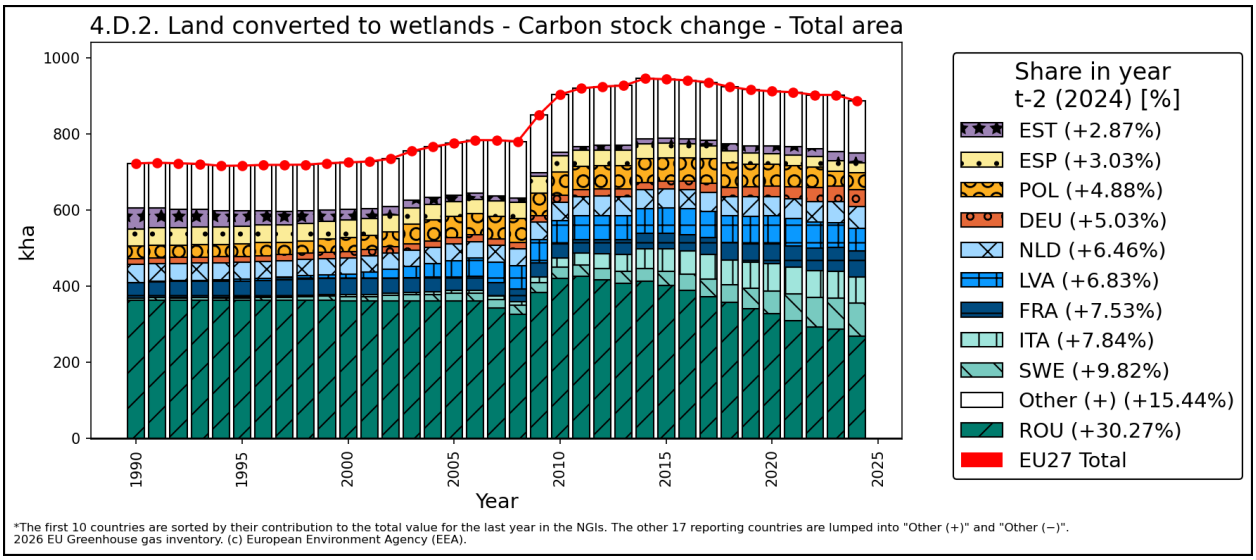
Abbreviations are explained in the Chapter 'Units and abbreviations'.

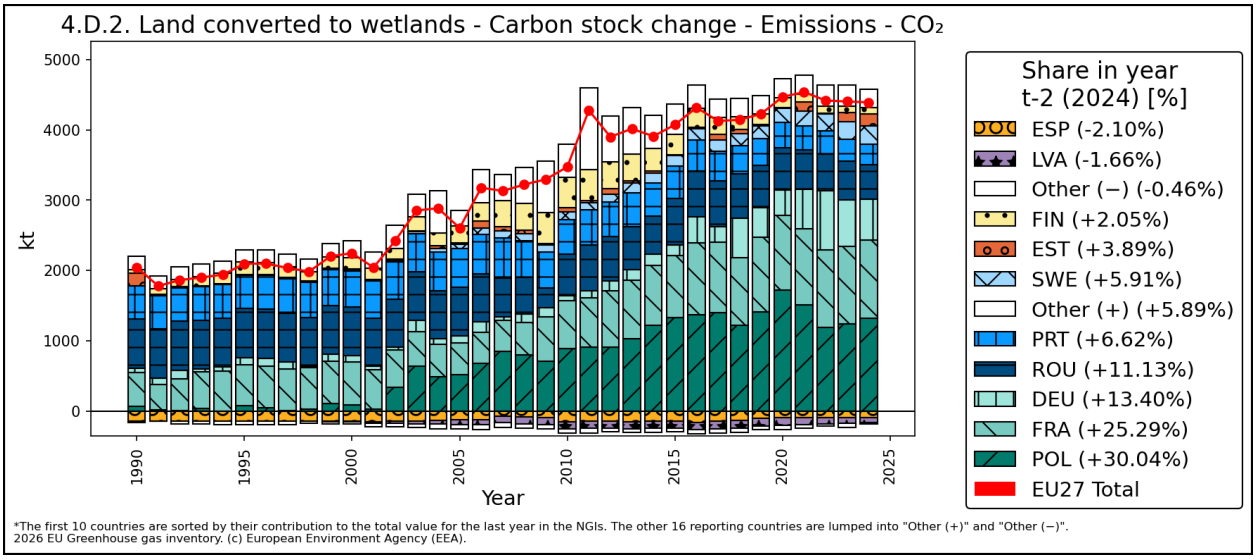
The other subcategory, Land converted to wetlands, represents only 3.8% of the wetlands area but results in about 31% of the final net emissions reported within the category. In terms of emissions this represents more than double the reported emissions in the base year. The main driver is Germany, Poland and France that all reports larger areas in this sub-category in 2024 compared to 1990.

The area of land converted to wetlands is dominated by Romania, Sweden, Italy and France (Figure 6.19).

Nevertheless, these new areas are not always linked to carbon stock changes, as in some cases new wetlands areas are the result of the conversion of lands with insignificant carbon stocks to Other wetlands (i.e. mires and areas saturated by fresh water).

Figure 6.17 Trend of activity data and emissions (+) / removals (-) in subcategory 4D2 "Lands converted to Wetlands" in EU (kha, Kt CO_2)





Emissions in this subcategory are mainly reported by Poland, Finland and Germany because of the loss of carbon from the living biomass existing in the lands that are converted to wetlands (Table 6.18).

Table 6.18 CO_2 Emissions and removals from 4.D.2 land converted to wetlands contributions to the net CO_2 emissions (+)/removals (-) (CTF table 4)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	44	71	71	1.6%	27	61%	0	0%
Belgium	12	9	8	0.2%	-4	-30%	0	-6%
Bulgaria	40	68	64	1.5%	24	60%	-4	-6%
Croatia	77	13	13	0.3%	-63	-83%	1	4%
Cyprus	NO	0	0	0.0%	0	∞	0	0%
Czechia	-15	-15	12	0.3%	26	180%	27	177%
Denmark	0	-22	-2	0.0%	-3	-513%	20	91%
Estonia	178	137	171	3.9%	-7	-4%	34	25%
Finland	55	93	90	2.0%	35	63%	-3	-3%
France	481	1 102	1 111	25.3%	630	131%	8	1%
Germany	59	663	589	13.4%	530	901%	-74	-11%
Greece	NA,NO	54	16	0.4%	16	∞	-37	-69%
Hungary	3	-3	-3	-0.1%	-6	-209%	0	-6%
Ireland	IE,NO	21	16	0.4%	16	∞	-5	-25%
Italy	NO	NO	NO	-	-	-	-	-
Latvia	0	-83	-73	-1.7%	-73	-51615%	10	12%
Lithuania	0	-19	-15	-0.3%	-15	-4978%	4	22%
Luxembourg	0	1	1	0.0%	1	565%	0	-21%
Malta	0	NO	NO	-	0	100%	-	-
Netherlands	-1	36	34	0.8%	36	2463%	-2	-6%
Poland	68	1 242	1 319	30.0%	1 251	1837%	77	6%
Portugal	475	309	291	6.6%	-184	-39%	-19	-6%
Romania	700	550	489	11.1%	-212	-30%	-61	-11%
Slovakia	NO	NO	NO	-	-	-	-	-
Slovenia	12	23	23	0.5%	11	97%	0	0%
Spain	-143	-93	-92	-2.1%	50	35%	0	0%
Sweden	1	247	259	5.9%	259	47519%	13	5%
EU	**2 045**	**4 403**	**4 392**	**100%**	**2 346**	**115%**	**-11**	**0%**

Note: Highlighted *cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.*

Abbreviations are explained in the Chapter 'Units and abbreviations'.

Most of the unmanaged land reported in the EU is found in this category. This explains why countries with the largest share of areas do not always report the largest emissions. Also lack of IPCC methods prevents countries from reporting GHG fluxes in some cases.

6.4.5.2 Settlements (CRT 4E)

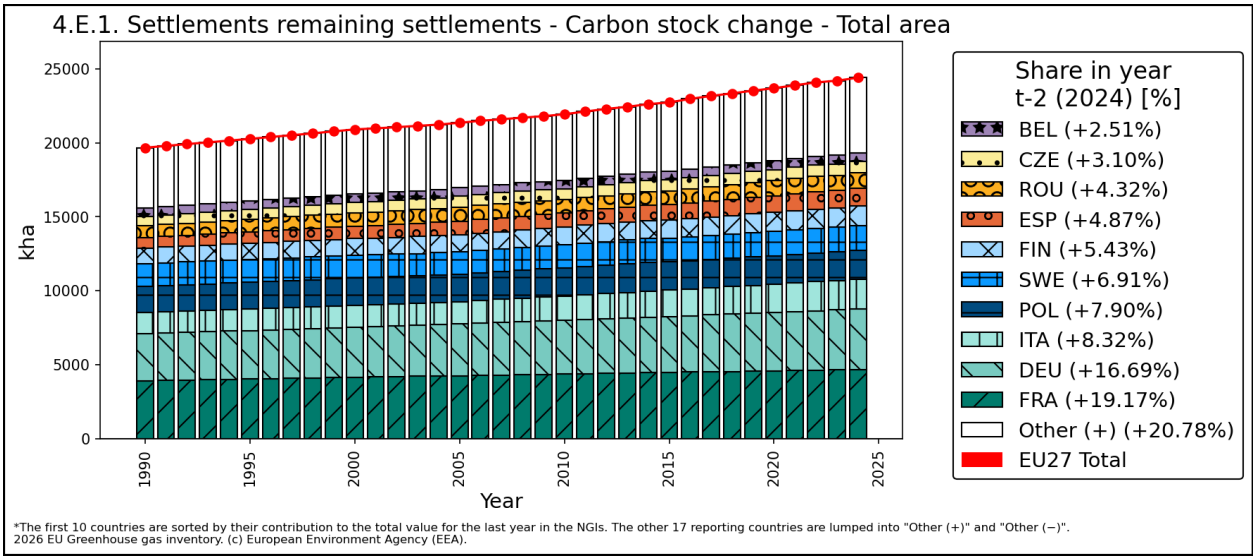
In terms of area, this land use category represents 29 515 kha, which is 7% of the total reported area. For the year 2024, Settlements areas have resulted in an increase of 21% as compared with 1990.

In terms of emissions, this land use category is reported as a net source that reaches 35 378 kt CO_2 in 2024. Out of this, 96,9% are due to emissions resulting from Land converted to Settlement, which although in terms of area represents only 17% of the total category, results in significant emissions when forest, other woody lands, or high-carbon content soils are converted to urban areas.

As regards the methods used for reporting carbon stock changes in these areas, often countries used the tier 1 assumption of equilibrium under the subcategory 4E1, therefore no carbon stock changes are reported, and notation keys are accordingly included in the CRT tables. Nevertheless, nine countries

have reported this subcategory, five as a net source of GHG emissions due to disturbed soils and four with net removals due to accumulation of living biomass.

Figure 6.18 Trend of activity data and emissions (+)/removals (-) in subcategory 4E1 "Settlements remaining Settlements" in EU (kha, kt CO_2)



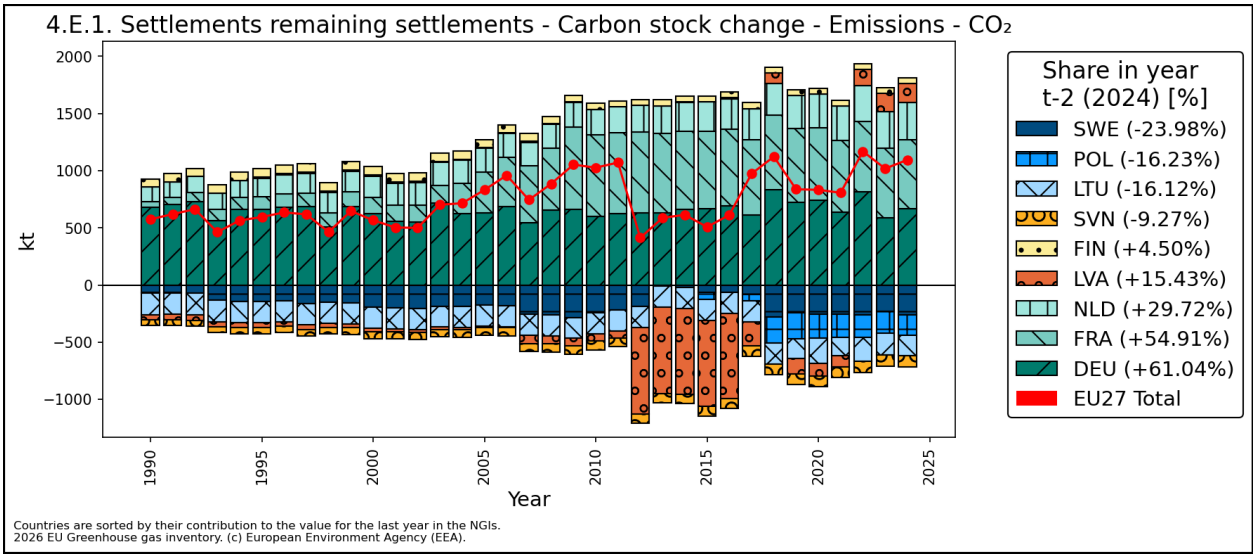
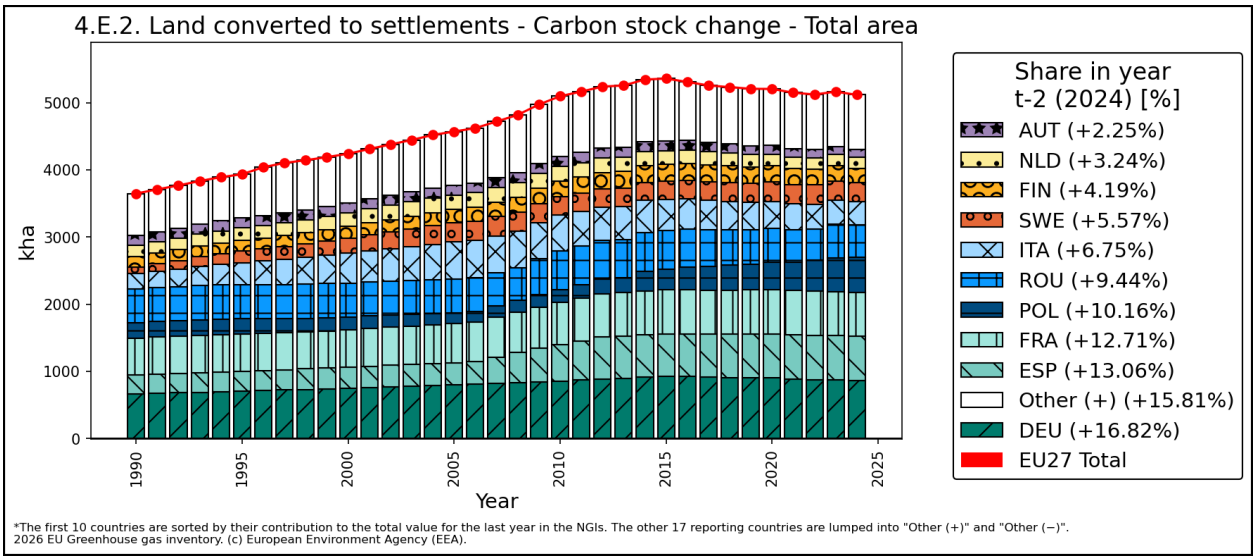
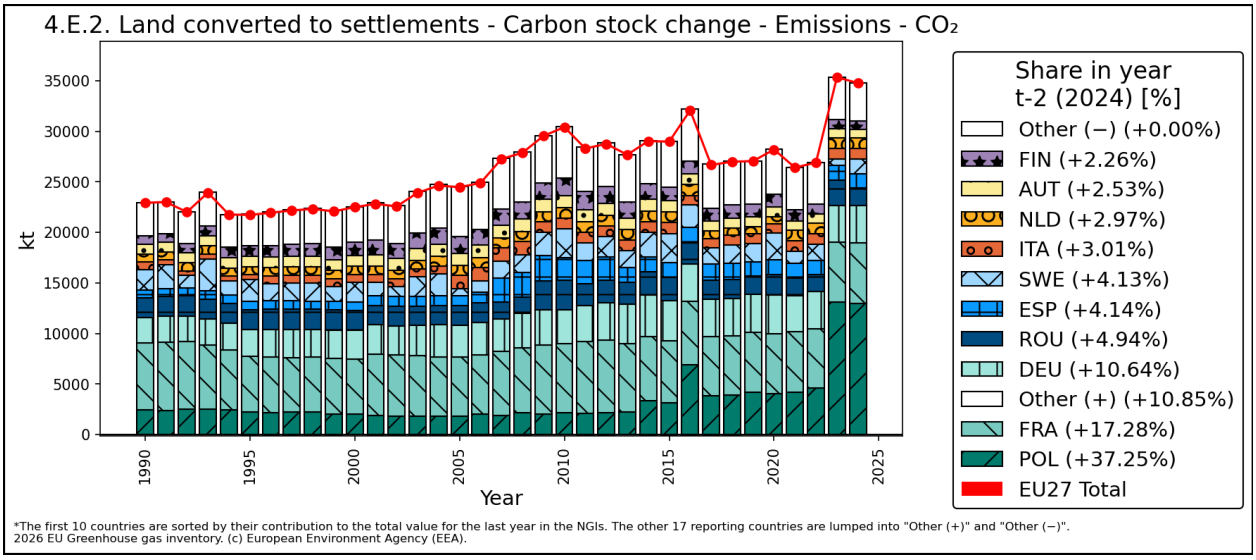


Figure 6.19 Trend of activity data and emissions (+)/removals (-) in subcategory 4E2 "Land converted to Settlements" in EU-27 kha, kt CO_2)





Regarding subcategory 4E2, annual emissions from Land converted to Settlements have increased by 52% since 1990 (Table 6.19). For the year 2024 this subcategory was reported as a net source of emissions, reaching 34 781 kt CO_2.

Emissions are mainly the result of disturbed mineral soils and loss of carbon from living biomass when forests are converted to urban areas. In fact, the conversion of forests to Settlements is an important component of the total deforestation. It represents around 30% of the total area reported as deforested. While conversions to Wetland or Other land may be caused by natural effects, a conversion to Settlement is the result of human actions.

When a land is converted to Settlements, carbon pools are not uniformly disturbed over the whole area. For instance, usually only part of the converted area is paved, trees or upper soils layer is removed, and carbon stored in dead organic matter and soil organic matter diminish significantly. To address this issue, carbon stock changes associated with these deforestation events are reported using country-specific data and approaches.

Table 6.19 4E2 Land converted to Settlements: EU-27 contributions to the net CO_2 emissions (+)/removals (-) (CRT table 4)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	966	900	880	2.5%	-86	-9%	-20	-2%
Belgium	137	497	498	1.4%	361	264%	1	0%
Bulgaria	104	328	183	0.5%	79	76%	-145	-44%
Croatia	243	565	520	1.5%	278	114%	-45	-8%
Cyprus	1	8	7	0.0%	7	1212%	-1	-11%
Czechia	470	252	263	0.8%	-206	-44%	11	4%
Denmark	447	274	248	0.7%	-199	-44%	-26	-9%
Estonia	471	574	663	1.9%	192	41%	89	15%
Finland	849	888	786	2.3%	-63	-7%	-102	-12%
France	6 628	5 923	6 011	17.3%	-618	-9%	87	1%
Germany	2 462	3 634	3 702	10.6%	1 240	50%	68	2%
Greece	50	125	167	0.5%	117	236%	42	33%
Hungary	91	212	164	0.5%	73	81%	-48	-23%
Ireland	59	125	100	0.3%	41	70%	-25	-20%
Italy	738	1 047	1 049	3.0%	311	42%	2	0%
Latvia	24	515	266	0.8%	242	996%	-249	-48%
Lithuania	0	44	6	0.0%	6	3564%	-38	-86%
Luxembourg	43	26	31	0.1%	-12	-29%	4	16%
Malta	2	0	1	0.0%	-2	-76%	0	38%
Netherlands	766	1 019	1 034	3.0%	268	35%	15	1%
Poland	2 453	13 081	12 956	37.3%	10 503	428%	-125	-1%
Portugal	560	310	291	0.8%	-269	-48%	-19	-6%
Romania	1 977	2 531	1 718	4.9%	-259	-13%	-813	-32%
Slovakia	97	77	95	0.3%	-1	-1%	18	24%
Slovenia	469	273	266	0.8%	-203	-43%	-7	-3%
Spain	776	1 434	1 440	4.1%	665	86%	7	0%
Sweden	2 053	686	1 436	4.1%	-617	-30%	750	109%
EU	**22 934**	**35 349**	**34 781**	**100%**	**11 848**	**52%**	**-568**	**-2%**

Note: Highlighted cells *mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.*

Abbreviations are explained in the Chapter 'Units and abbreviations'.

Member States that contribute the most to the sub-category in 2023 are Poland, France and Germany.

For reporting carbon stock changes in dead organic matter, it is generally assumed that all the carbon stock in the pool is instantaneously oxidized in the moment of conversion from Forest land to Settlements. It is also assumed that there is no dead wood and litter on Settlements. Emissions are estimated based on average carbon stock per area of these carbon pools, determined either at national or regional scale or specific to each deforestation site.

For reporting soil organic matter, different assumptions have been implemented by MS. These are generally based on expert judgment or, occasionally, on scientific studies. Associated carbon stocks are derived from one of the following options (depending on MS):

- data from measurements in green area of the city (from scientific studies);
- same carbon stock as under 'GL remaining GL' (assuming that under national circumstances GL is the source of land for Settlement's expansion);
- lowest carbon stock value among the major land categories Forest land, Cropland and Grassland (assuming limited change of carbon stock in the soil under construction);
- applying a factor against carbon stock in previous land use (e.g., constant loss of 50%).

6.4.5.3 Other land (CRT 4F)

The land use category Other land reached in this reporting year 9 681 Kha, which represents about 2% of the total reported area. This land use category has been reported rather constant across the time series because of the balance among the decrease in the subcategory 4F1 and the increase in the subcategory 4F2.

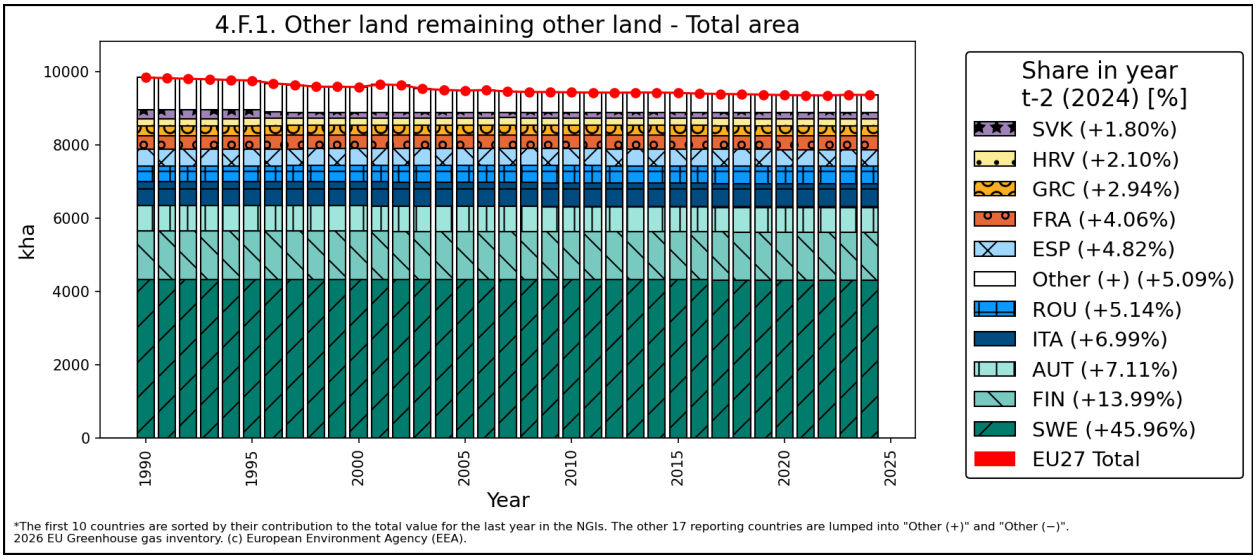
The largest areas under the category 4F1 are reported by Sweden followed Finland (Figure 6.20), while new Other lands areas in the subcategory 4F2 are mainly reported by Poland, Romania and France (Figure 6.21).

In terms of emissions, the trend is driven by Austria, France and Estonia (Figure 6.21).

Definitions of Other land are close to each other among countries and overall match the IPCC general description (Table 6.9). In most cases, following the IPCC approach, this category is used to ensure that the total area reported under LULUCF remains constant along the time series, and matches official country area. To this aim, this land category is on a lower level of hierarchy and includes all the areas that were not identified under any other land use category, and that are in all cases considered unmanaged.

In terms of emissions, Other land represents a small source of emissions of 1 947 Kt CO_2. Countries generally report emissions as a result of carbon oxidation from living biomass and soils when lands are converted to Other land.

Figure 6.20 Trend of activity data in subcategories 4F1 and 4F2 "Other land remaining Other Land" and "Land converted to Other land" in EU (kha)



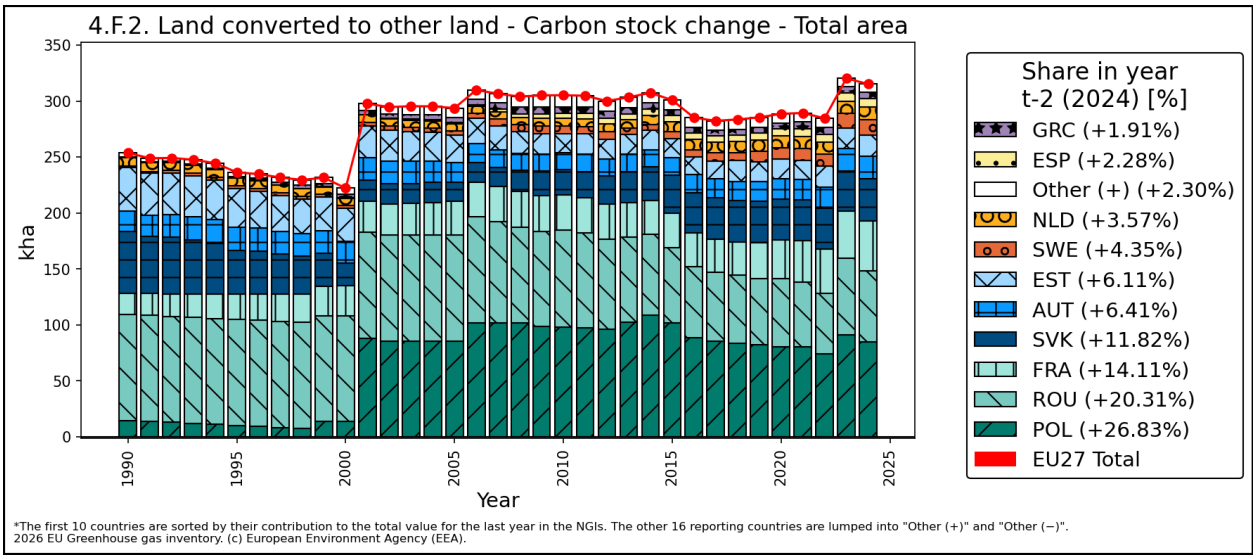
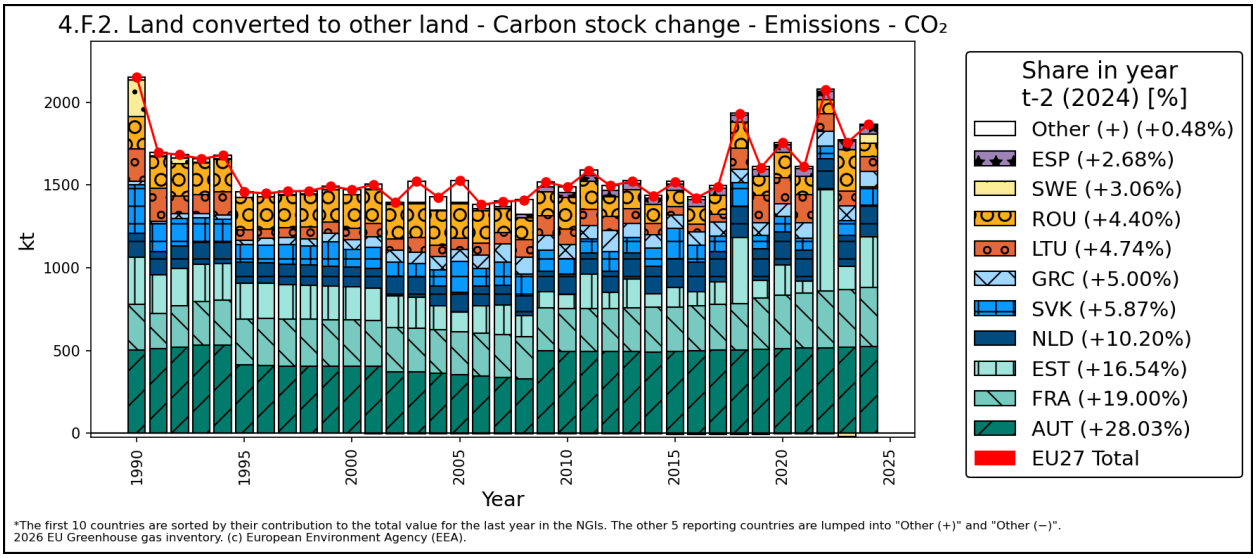


Figure 6.21 Trend of emissions (+)/removals (-) in subcategory 4F2, "Land converted to Other lands" in EU-27 (kt CO_2)



6.4.6 Harvested wood products (CRT 4.G)

This carbon pool covers emissions and removals from carbon stock changes in harvested wood products (HWPs). The net contribution of this pool is the result of the annual carbon inflow to the pool (i.e., gains), and carbon outflow from the pool (i.e., losses) arising from previous years production.

According to the 2006 IPCC guidelines, HWPs includes all wood material (including bark) that leaves harvest sites, where this removal is initially counted as a loss of carbon from living biomass. Slash and other material left at harvest sites should be regarded as dead organic matter in the associated land use category and not as HWP. The inflow of biomass into the HWPs is counted as a gain in the HWPs category.

HWPs represent at the level of EU MS a net carbon sink of –24 818 kt CO_2 in the current inventory year (Table 6.20). Most of the countries reported this carbon pool as a net sink; however, some countries,

and for certain years, reported this pool as a net source. The main contributors to the carbon sink are Sweden, Poland and Finland.

The methods and data sources for estimating carbon stock changes in HWPs are consistent with methodologies provided by 2006 IPCC GL. Individual inventories implement the IPCC Approach B (i.e., production approach) to provide estimates on HWPs consistently with the reporting of the carbon pool under the KP reporting and subsequently according to EU Regulations No 2018/841. This implies that only HWP from domestic harvested wood is reported as an inflow to the HWP pool,

Countries reported carbon stock changes in HWPs considering individual estimates for the semi-finished wood products categories of (i) Solid wood, disaggregated into Sawn wood and wood panels, and (ii) Paper and paperboard. To this aim, the IPCC default half-life values have been used by all individual inventories.

A particular case is given by Malta that has stated that carbon stock changes in HWPs pool, as considered under the Approach B, do not exist, as commercial logging does not occur in its territory.

With regards to the activity data, most of the MS have based their estimates on the information provided by the FAOSTAT database, the TIMBER database of the United Nations Economic Commission for Europe (UNECE, 2011), national statistics when available, or, in specific cases, on information collected by surveying wood industries.

Table 6.20 4G harvested wood products: EU-27 contributions to the net CO_2 emissions (+)/removals (-) (CRT table 4)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	-3 122	-968	-2 023	8.1%	1 100	35%	-1 054	-109%
Belgium	-1 517	203	38	-0.2%	1 555	102%	-166	-81%
Bulgaria	355	-457	-468	1.9%	-823	-232%	-12	-3%
Croatia	-318	-391	-388	1.6%	-70	-22%	4	1%
Cyprus	2	19	20	-0.1%	18	829%	0	2%
Czechia	-1 680	-1 246	-1 285	5.2%	395	24%	-39	-3%
Denmark	24	-115	-25	0.1%	-50	-204%	90	78%
Estonia	-156	-380	-557	2.2%	-401	-257%	-177	-47%
Finland	-2 952	-1 637	-2 143	8.6%	809	27%	-506	-31%
France	-4 669	167	374	-1.5%	5 043	108%	208	125%
Germany	-1 295	-1 415	408	-1.6%	1 702	131%	1 822	129%
Greece	-349	27	27	-0.1%	376	108%	0	-1%
Hungary	-315	-494	-409	1.6%	-94	-30%	85	17%
Ireland	-413	-936	-787	3.2%	-374	-90%	150	16%
Italy	-389	-1 637	-2 002	8.0%	-1 612	-414%	-365	-22%
Latvia	-540	-2 519	-1 571	6.3%	-1 031	-191%	948	38%
Lithuania	-240	-1 668	-2 106	8.5%	-1 866	-777%	-438	-26%
Luxembourg	2	-7	-5	0.0%	-8	-357%	2	25%
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	-42	115	113	-0.5%	154	369%	-2	-2%
Poland	-459	-3 680	-3 784	15.2%	-3 325	-724%	-104	-3%
Portugal	-1 731	513	-88	0.4%	1 643	95%	-601	-117%
Romania	354	-1 865	-1 780	7.2%	-2 135	-602%	84	5%
Slovakia	-470	-292	-538	2.2%	-67	-14%	-246	-84%
Slovenia	-67	-271	-341	1.4%	-274	-409%	-70	-26%
Spain	-2 015	-1 270	-1 699	6.8%	316	16%	-429	-34%
Sweden	-5 007	-5 125	-3 845	15.5%	1 162	23%	1 280	25%
EU	**-27 010**	**-25 329**	**-24 865**	**100%**	**2 145**	**8%**	**464**	**2%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

While the harvested wood products pool has slowed a decrease of 8% in net removals from 1900 to 2024 mainly driven by France, Germany and Portugal.

6.4.7 Other sources of emissions: Tables 4(I)-4(IV)

6.4.7.1 Direct nitrous oxide (N_2O) emissions from nitrogen (N) inputs to managed soils (CRT Table 4(I))

Under CRT table 4(I) countries report N_2O emissions resulting from the addition of organic and inorganic fertilizers to managed soils under land use categories other than Cropland and Grassland.

The majority of countries have stated that fertilization is not part of the management practices of forests, while, if any, emissions from the addition of nitrogen inputs in Wetlands, Settlements, or in a few cases also under forests, are reported under Agriculture sector when it is not possible to separate emissions from fertilization among the land use categories. Therefore, under the LULUCF almost all the countries have reported these emissions using the notation key NO or IE.

Activity data for reporting this source of emissions results from national or sectorial statistics (e.g. sales statistics), which provide the total amount and type of fertilizer. Then, the IPCC default value of 0.01 kg N_2O-N/kg N yr^{-1} is usually used to derive N_2O emissions from nitrogen inputs to managed soils.

The table below shows information in terms of reported emission from this source at country level and for the years 1990, (t-3) and (t-2)

Table 6.21. 4 LULUCF Direct nitrous oxide (N_2O) emissions from nitrogen (N) inputs to managed soils (kt CO_2 eq.)

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	NO	NO	NO	-	-	-	-	-
Belgium	NO	NO	NO	-	-	-	-	-
Bulgaria	NO	NO	NO	-	-	-	-	-
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NO	NO	NO	-	-	-	-	-
Czechia	NO	NO	NO	-	-	-	-	-
Denmark	-	-	-	-	-	-	-	-
Estonia	NO	NO	NO	-	-	-	-	-
Finland	31	58	71	73.8%	40	128%	13	22%
France	NO	NO	NO	-	-	-	-	-
Germany	NO	NO	NO	-	-	-	-	-
Greece	NO	NO	NO	-	-	-	-	-
Hungary	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Ireland	IE	IE	IE	-	-	-	-	-
Italy	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Latvia	IE	IE	IE	-	-	-	-	-
Lithuania	NO	NO	NO	-	-	-	-	-
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	-	-	-	-	-	-
Netherlands	NO	NO	NO	-	-	-	-	-
Poland	IE	IE	IE	-	-	-	-	-
Portugal	IE	IE	IE	-	-	-	-	-
Romania	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Slovakia	NO	NO	NO	-	-	-	-	-
Slovenia	NO	NO	NO	-	-	-	-	-
Spain	NO	NO	NO	-	-	-	-	-
Sweden	44	9	25	26.2%	-18	-42%	16	172%
EU	**75**	**68**	**96**	**100%**	**22**	**29%**	**29**	**42%**

6.4.7.2 Emissions and removals from drainage and rewetting and other management of organic and mineral soils (CRT Table 4(II))

Under CRT table 4(II), CO_2, CH_4 and N_2O emissions and removals from drainage and rewetting and other management of organic and mineral soils areas are reported. However, part of these emissions is already covered under other sectors, so countries need to avoid double counting (e.g., nitrous oxide emissions from drained cropland and grassland soils are covered in the agriculture sector) or they may be reported under other tables within the LULUCF (e.g., CO_2 emissions or removals from drainage of wetlands areas are often already included in CRT tables 4.A to 4.F).

The tables below show information in terms of reported emission from this source at country level and for the years 1990, (t-3) and (t-2)

Table 6.22 4 LULUCF CO_2 Emissions and removals from drainage and rewetting and other management of organic and mineral soils (kt CO_2 eq.)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	897	897	897	10.3%	0	0%	0	0%
Belgium	NO	NO	NO	-	-	-	-	-
Bulgaria	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Czechia	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Denmark	227	115	112	1.3%	-115	-51%	-3	-2%
Estonia	IE,NE,NO	IE,NE,NO	IE,NE,NO	-	-	-	-	-
Finland	IE,NA,NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-
France	752	752	752	8.6%	0	0%	0	0%
Germany	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Greece	NO	NO	NO	-	-	-	-	-
Hungary	235	123	161	1.8%	-74	-32%	38	31%
Ireland	1 208	1 065	1 065	12.2%	-142	-12%	1	0%
Italy	739	724	724	8.3%	-15	-2%	0	0%
Latvia	855	1 557	1 601	18.4%	746	87%	44	3%
Lithuania	3 283	3 312	3 304	37.9%	22	1%	-7	0%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	NA,NE,NO	NA,NE,NO	NA,NE,NO	-	-	-	-	-
Poland	IE,NA,NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-
Portugal	NO	NO	NO	-	-	-	-	-
Romania	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Slovakia	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Slovenia	103	105	106	1.2%	3	3%	1	1%
Spain	0	0	0	0.0%	0	26%	0	0%
Sweden	IE	IE	IE	-	-	-	-	-
EU	**8 298**	**8 649**	**8 723**	**100%**	**425**	**5%**	**74**	**1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Table 6.23 4 LULUCF N_2O Emissions and removals from drainage and rewetting and other management of organic and mineral soils (kt CO_2 eq.)

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	21	21	21	0.5%	0	0%	0	0%
Belgium	NO	NO	NO	-	-	-	-	-
Bulgaria	NE,NO	NE,NO	NE,NO	-	-	-	-	-
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Czechia	2	2	2	0.1%	0	11%	0	-1%
Denmark	29	22	22	0.5%	-7	-23%	0	0%
Estonia	45	47	49	1.1%	4	8%	1	3%
Finland	1 458	1 759	1 757	39.5%	299	21%	-2	0%
France	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Germany	403	412	428	9.6%	25	6%	16	4%
Greece	NO	NO	NO	-	-	-	-	-
Hungary	8	8	8	0.2%	0	4%	0	0%
Ireland	162	216	218	4.9%	56	34%	2	1%
Italy	NO	NO	NO	-	-	-	-	-
Latvia	480	469	464	10.4%	-16	-3%	-5	-1%
Lithuania	320	355	356	8.0%	36	11%	1	0%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	4	4	4	0.1%	0	-6%	0	-1%
Poland	4	6	6	0.1%	2	48%	0	0%
Portugal	NO	NO	NO	-	-	-	-	-
Romania	NO	NO	NO	-	-	-	-	-
Slovakia	NO	NO	NO	-	-	-	-	-
Slovenia	NO	NO	NO	-	-	-	-	-
Spain	0	0	0	0.0%	0	26%	0	0%
Sweden	1 064	1 105	1 108	24.9%	44	4%	2	0%
EU	**4 001**	**4 427**	**4 443**	**100%**	**443**	**11%**	**16**	**0%**

Note: Highlighted *cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.*
Abbreviations are explained in the Chapter 'Units and abbreviations'

Table 6.24 4 LULUCF CH_4 Emissions and removals from drainage and rewetting and other management of organic and mineral soils (kt CO_2 eq.)

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	37	37	37	0.2%	0	0%	0	0%
Belgium	NO	NO	NO	-	-	-	-	-
Bulgaria	NE,NO	NE,NO	NE,NO	-	-	-	-	-
Croatia	NO	NO	NO	-	-	-	-	-
Cyprus	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Czechia	6	6	6	0.0%	0	1%	0	0%
Denmark	388	412	435	2.8%	47	12%	23	5%
Estonia	67	60	63	0.4%	-4	-6%	2	4%
Finland	1 573	481	478	3.1%	-1 095	-70%	-3	-1%
France	32	32	32	0.2%	0	0%	0	0%
Germany	8 441	9 664	8 538	55.8%	97	1%	-1 126	-12%
Greece	NO	NO	NO	-	-	-	-	-
Hungary	4	6	6	0.0%	2	71%	0	8%
Ireland	3 996	3 581	3 597	23.5%	-399	-10%	15	0%
Italy	100	98	98	0.6%	-2	-2%	0	0%
Latvia	551	837	852	5.6%	301	55%	14	2%
Lithuania	2	2	2	0.0%	0	-6%	0	0%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	0	NO	NO	-	0	-100%	-	-
Netherlands	586	607	608	4.0%	22	4%	1	0%
Poland	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Portugal	NO	NO	NO	-	-	-	-	-
Romania	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Slovakia	NA,NO	NA,NO	NA,NO	-	-	-	-	-
Slovenia	9	9	9	0.1%	0	3%	0	1%
Spain	0	0	0	0.0%	0	26%	0	0%
Sweden	613	532	532	3.5%	-82	-13%	0	0%
EU	**16 406**	**16 365**	**15 293**	**100%**	**-1 113**	**-7%**	**-1 072**	**-7%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'

6.4.7.3 Direct nitrous oxide and indirect (N_2O) emissions from nitrogen (N) mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils (CRT Table 4(III))

Under CRT table 4(III), direct nitrous oxide emissions from nitrogen mineralization associated with loss of soil organic matter resulting from change of land use or management of mineral soils are reported by almost all countries. This indicates significant efforts devoted by countries to increase the completeness of reporting for this source of emissions during the last years.

The table below shows information in terms of reported emission from this source at country level and for the years 1990, (t-3) and (t-2)

Table 6.25 Direct nitrous oxide (N_2O) emissions from nitrogen (N) mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils (kt CO_2 eq.)

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	146	128	125	1.9%	-21	-14%	-3	-2%
Belgium	2	39	39	0.6%	37	2419%	0	0%
Bulgaria	54	83	84	1.3%	30	55%	1	1%
Croatia	44	126	119	1.8%	75	172%	-7	-6%
Cyprus	0	1	1	0.0%	1	6147%	0	-16%
Czechia	48	14	14	0.2%	-34	-71%	0	1%
Denmark	38	23	23	0.3%	-15	-40%	0	-1%
Estonia	41	55	54	0.8%	14	34%	0	-1%
Finland	23	26	54	0.8%	31	136%	28	109%
France	1 555	648	599	9.1%	-956	-61%	-49	-8%
Germany	565	382	460	7.0%	-105	-19%	77	20%
Greece	1	14	11	0.2%	10	855%	-3	-22%
Hungary	5	20	20	0.3%	15	293%	0	2%
Ireland	14	17	15	0.2%	1	8%	-2	-13%
Italy	92	147	160	2.4%	68	74%	13	9%
Latvia	0	414	410	6.2%	410	1113967%	-4	-1%
Lithuania	2	9	10	0.2%	8	368%	1	10%
Luxembourg	11	2	2	0.0%	-9	-83%	0	-9%
Malta	0	0	0	0.0%	0	-20%	0	2%
Netherlands	129	109	110	1.7%	-19	-15%	1	1%
Poland	767	2 391	2 393	36.4%	1 626	212%	2	0%
Portugal	125	149	141	2.2%	16	13%	-7	-5%
Romania	635	1 537	1 540	23.4%	905	143%	3	0%
Slovakia	98	16	14	0.2%	-84	-85%	-1	-9%
Slovenia	49	25	23	0.4%	-26	-52%	-1	-6%
Spain	198	138	133	2.0%	-65	-33%	-6	-4%
Sweden	5	15	15	0.2%	10	213%	0	-1%
EU	**4 646**	**6 529**	**6 570**	**100%**	**1 925**	**41%**	**42**	**1%**

Note: Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'

6.4.7.4 CO_2, CH_4 & N_2O emissions from Biomass Burning (CRT Table 4(IV))

This source category covers CO_2, and non-CO_2 emissions from biomass burning because of wildfires and controlled burning, affecting all land use categories.

Following the IPCC approach, many countries that implement the stock-different method to estimate carbon stock changes in forest living biomass use the notation key IE in the CRT table 4(IV), so avoiding double counting of CO_2 emissions. In addition, countries have also used the notation keys NO or NA when wildfires or controlled burning have not taken place under certain categories, or NE for those land use categories for which the IPCC does not provide methods. In general, countries informed that controlled burning on managed lands is not a common practice. With few exceptions for confined areas that are reported by Finland and Sweden in forest lands and Spain in grasslands. In general, northern countries report low emissions from biomass burning (i.e., controlled burning and wildfires).

Methodologies used to report CO_2 emissions from fires are mainly based on tier 2 methods by using information on activity data provided by national statistics and country-specific emission factors. By contrary, tier 1 methodologies are used for estimation of CH_4 and N_2O emissions resulting from fires.

The tables below (Table 6.26, Table 6.27 and Table 6.28) show information in terms of reported emission from this source at country level and for the years 1990, (t-3) and (t-2). However, emissions from biomass burning do not show a clear trend since their occurrence is in many cases beyond the control of the countries. In Mediterranean territories the occurrence of wildfires in certain years result in enormous GHG emissions that are clearly identified in the trend of the LULUCF sector.

Overall, this source of emissions presents a very variable trend and interannual variability that is related to several factors, in many cases driven by climate conditions. It is well known that the countries that often report the larger quantities of emissions from biomass burning are Italy, France, Spain, Portugal and Greece. However, it is remarkable that during the last years more central and northern countries are also reporting significant number of emissions from this source as a result of the impact of wildfires in their territories.

Table 6.26 CO_2 emissions from Biomass Burning (in kt CO_2)

Member State	CO_2 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	IE,NA,NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-
Belgium	IE,NO	3	IE,NO	-	-	-	-3	-100%
Bulgaria	IE,NE,NO	IE,NE,NO	IE,NE,NO	-	-	-	-	-
Croatia	16	10	163	4.0%	146	909%	152	1482%
Cyprus	IE,NA,NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-
Czechia	16	26	16	0.4%	0	3%	-9	-36%
Denmark	IE,NA	IE,NA,NO	IE,NA,NO	-	-	-	-	-
Estonia	IE,NE,NO	IE,NE,NO	IE,NE,NO	-	-	-	-	-
Finland	0	0	0	0.0%	0	-99%	0	-25%
France	2 514	230	132	3.2%	-2 382	-95%	-98	-42%
Germany	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Greece	0	9	0	0.0%	0	25%	-9	-99%
Hungary	IE,NA,NO	IE,NA,NO	IE,NA,NO	-	-	-	-	-
Ireland	406	307	14	0.3%	-392	-97%	-293	-95%
Italy	5 072	1 145	1 082	26.4%	-3 990	-79%	-63	-6%
Latvia	24	81	8	0.2%	-15	-65%	-73	-90%
Lithuania	1	1	1	0.0%	-1	-55%	0	-24%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	5	7	7	0.2%	2	50%	0	1%
Poland	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Portugal	9 337	634	2 387	58.2%	-6 949	-74%	1 754	277%
Romania	9	12	67	1.6%	58	618%	56	481%
Slovakia	82	16	28	0.7%	-54	-66%	12	78%
Slovenia	IE,NO	IE,NO	IE,NO	-	-	-	-	-
Spain	545	143	196	4.8%	-349	-64%	53	37%
Sweden	IE,NO	IE,NO	IE,NO	-	-	-	-	-
EU	**18 028**	**2 623**	**4 102**	**100%**	**-13 925**	**-77%**	**1 479**	**56%**

Note: Highlighted cells mark the three Member *States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.*
Abbreviations are explained in the Chapter 'Units and abbreviations'

Table 6.27 CH_4 emissions from Biomass Burning (in kt CO_2 eq.)

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	1	0	0	0.0%	0	-75%	0	-70%
Belgium	0	0	IE,NO	-	0	-100%	0	-100%
Bulgaria	3	25	45	3.6%	42	1544%	20	81%
Croatia	2	2	20	1.6%	18	992%	18	1001%
Cyprus	0	1	1	0.1%	1	661%	0	63%
Czechia	19	4	3	0.3%	-16	-83%	-1	-26%
Denmark	1	0	0	0.0%	-1	-100%	0	-57%
Estonia	0	0	0	0.0%	0	-74%	0	-44%
Finland	3	2	1	0.1%	-2	-74%	-1	-45%
France	621	508	493	39.5%	-129	-21%	-15	-3%
Germany	10	8	2	0.2%	-8	-78%	-6	-73%
Greece	70	350	89	7.1%	19	26%	-262	-75%
Hungary	25	11	16	1.3%	-8	-34%	5	46%
Ireland	84	66	3	0.2%	-81	-96%	-63	-95%
Italy	727	253	171	13.7%	-556	-76%	-82	-32%
Latvia	27	9	1	0.1%	-26	-96%	-8	-89%
Lithuania	3	0	0	0.0%	-3	-91%	0	-12%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	0	1	1	0.0%	0	52%	0	1%
Poland	55	10	11	0.9%	-44	-80%	1	7%
Portugal	577	46	166	13.3%	-412	-71%	120	260%
Romania	5	5	20	1.6%	16	345%	15	302%
Slovakia	14	15	19	1.5%	5	32%	3	21%
Slovenia	2	0	1	0.1%	-1	-60%	0	159%
Spain	351	169	182	14.6%	-169	-48%	13	7%
Sweden	2	2	1	0.1%	-1	-54%	-1	-46%
EU	**2 604**	**1 489**	**1 246**	**100%**	**-1 358**	**-52%**	**-243**	**-16%**

Note: Highlighted cells mark the three *Member* States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

Table 6.28 N_2O emissions from Biomass Burning (in kt CO_2 eq.)

Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%
Austria	0	0	0	0.0%	0	-75%	0	-73%
Belgium	0	0	IE,NO	-	0	-100%	0	-100%
Bulgaria	1	13	23	4.9%	22	1544%	10	81%
Croatia	1	1	11	2.4%	10	1036%	10	852%
Cyprus	0	0	1	0.1%	0	644%	0	30%
Czechia	10	2	2	0.4%	-8	-83%	-1	-26%
Denmark	0	0	0	0.0%	0	-99%	0	-57%
Estonia	0	0	0	0.0%	0	-76%	0	-43%
Finland	2	1	0	0.1%	-1	-74%	0	-45%
France	201	135	127	26.7%	-73	-37%	-8	-6%
Germany	5	4	1	0.2%	-4	-78%	-3	-73%
Greece	5	23	6	1.2%	1	26%	-17	-75%
Hungary	15	6	9	1.9%	-6	-41%	3	51%
Ireland	21	16	1	0.2%	-20	-96%	-15	-95%
Italy	381	132	90	18.8%	-291	-76%	-43	-32%
Latvia	3	1	0	0.0%	-2	-96%	-1	-89%
Lithuania	3	0	0	0.0%	-3	-94%	0	-22%
Luxembourg	NO	NO	NO	-	-	-	-	-
Malta	NO	NO	NO	-	-	-	-	-
Netherlands	0	0	0	0.1%	0	51%	0	1%
Poland	29	5	6	1.2%	-23	-80%	0	7%
Portugal	146	12	42	8.8%	-104	-71%	30	260%
Romania	4	4	16	3.3%	12	325%	12	287%
Slovakia	8	8	10	2.1%	2	29%	2	22%
Slovenia	1	0	0	0.1%	-1	-61%	0	76%
Spain	253	117	131	27.6%	-122	-48%	15	12%
Sweden	0	0	0	0.0%	0	-54%	0	-46%
EU	**1 088**	**482**	**477**	**100%**	**-612**	**-56%**	**-6**	**-1%**

Note: *Highlighted* cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period.
Abbreviations are explained in the Chapter 'Units and abbreviations'.

6.5 Uncertainties

The table below shows information on the uncertainties that have been estimated for the LULUCF sector. Specifically, the uncertainty of the LULUCF sector is estimated, respectively for the level, and trend as 39%, and 51%. Both values are below uncertainties reported in 2025.

The uncertainty assessment shows significant changes compared with the previous EU GHG inventory submission. Recalculations of emissions/removals, revisions of uncertainties and changes in the resolution of the Member States' uncertainty reporting all influence the sector uncertainties. Therefore, changes in uncertainty estimates between submissions can hardly be attributed to a single cause.

Nonetheless, a large part of the reduced trend uncertainty can be attributed to Finland's revision of its 4A CO_2 uncertainty estimation (from 935% in 2025 to 365% in 2026). Additionally, Finland's share in

the EU total of category 4A (CO_2 emissions) decreased from 9% in 1990 to 0.6% in 2024. Both developments influence the EU trend uncertainty.

Changes in level uncertainty are more diffuse. Notable contributions towards lower level uncertainties come from reduced uncertainty estimates for 4A CO_2 in Croatia and Finland. Recalculations by Romania have mixed effects, decreasing in 4B CO_2 while increasing in 4C CO_2.

For more detailed information on Member States' uncertainties please refer to the Member States' submissions.

For more information on the uncertainty analysis please refer to chapter 1.6.

Table 6.29 Level and trend uncertainty assessment of the annual EU emission/removal on LULUCF land subcategories and GHG sources.

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
4.A Forest Land	CO_2	-381 834	-321 610	-15.8%	18.6%	34.0%
4.A Forest Land	CH_4	1 254	670	-46.6%	45.7%	17.0%
4.A Forest Land	N_2O	2 391	2 201	-7.9%	68.2%	4.8%
4.B Cropland	CO_2	74 314	44 157	-40.6%	55.9%	15.9%
4.B Cropland	CH_4	1 087	833	-23.4%	51.6%	11.6%
4.B Cropland	N_2O	3 017	2 710	-10.2%	120.3%	66.8%
4.C Grassland	CO_2	27 870	3 985	-85.7%	780.4%	46.7%
4.C Grassland	CH_4	3 748	3 289	-12.3%	291.5%	9.7%
4.C Grassland	N_2O	490	289	-41.0%	67.6%	19.1%
4.D Wetlands	CO_2	10 974	12 486	13.8%	61.1%	14.1%
4.D Wetlands	CH_4	5 676	5 842	2.9%	61.7%	1.5%
4.D Wetlands	N_2O	177	230	30.1%	151.9%	33.5%
4.E Settlements	CO_2	23 334	35 563	52.4%	37.7%	14.8%
4.E Settlements	CH_4	124	161	29.7%	53.7%	20.8%
4.E Settlements	N_2O	1 364	2 969	117.7%	113.7%	117.6%
4.F Other Land	CO_2	2 150	1 818	-15.5%	62.3%	18.7%
4.F Other Land	CH_4	2	3	32.3%	100.0%	32.3%
4.F Other Land	N_2O	54	51	-6.5%	150.9%	53.7%
4.G Harvested wood products	CO_2	-26 565	-22 365	-15.8%	48.2%	22.1%
4.G Harvested wood products	CH_4	0	0	0.0%	0.0%	0.0%
4.G Harvested wood products	N_2O	0	0	0.0%	0.0%	0.0%
4.H Other	CO_2	0	23	Inf	30.4%	Inf
4.H Other	CH_4	0	244	Inf	100.0%	Inf
4.H Other	N_2O	0	0	0.0%	0.0%	0.0%
4.I	CO_2	0	0	0.0%	0.0%	0.0%
4.I	CH_4	0	0	0.0%	0.0%	0.0%
4.I	N_2O	31	71	127.5%	21.5%	27.5%
4.II	CO_2	1 082	1 713	58.3%	17.6%	22.7%
4.II	CH_4	6 508	5 361	-17.6%	68.7%	22.1%
4.II	N_2O	2 129	2 461	15.6%	98.4%	16.3%
4.III	CO_2	0	0	0.0%	0.0%	0.0%

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty estimates	Trend uncertainty estimates based on MS uncertainty estimates
4.III	CH_4	0	0	0.0%	0.0%	0.0%
4.III	N_2O	0	0	0.0%	0.0%	0.0%
4.IV	CO_2	446	185	-58.6%	55.3%	90.0%
4.IV	CH_4	117	25	-78.5%	82.5%	65.1%
4.IV	N_2O	27	13	-52.0%	86.4%	77.9%
4. Indirect emissions (4.I & 4.III)	CO_2	0	0	0.0%	0.0%	0.0%
4. Indirect emissions (4.I & 4.III)	CH_4	0	0	0.0%	0.0%	0.0%
4. Indirect emissions (4.I & 4.III)	N_2O	510	589	15.4%	57.8%	8.9%
4 (where no subsector data were submitted)	*all*	-18 849	-14 951	-20.7%	55.7%	37.4%
Total - 4	**all**	**-258 371**	**-230 985**	**-10.6%**	**39.3%**	**50.8%**

6.6 Category -specific quality assurance and quality control, and verification.

6.6.1 Quality Assurance and Quality Control

Information submitted under the LULUCF sector by EU MS is under a double QA/QC system. One implemented at country level, and another one, carried out in the context of the EU Regulations No 2018/841 and 2018/842. As LULUCF is concerned the QA/QC checks are performed by the European Environment Agency, in collaboration with the countries, and European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/CM)

Under these Regulations, the checks focus on early versions of national GHG inventories that are submitted by member States to the European Commission by 15th January. The checks aim to assess and improve the completeness and consistency, but also the accuracy, transparency, and to the extent possible the comparability of the inventories. A second round of submissions are received in March, which are also checked in terms of the implementation status of issues previously identified during the QA/QC check phase. The reasons for potential recalculations of the information submitted in January and March are also assessed.

Ultimately, the checks are mainly, but not only, intended to (i) identify and resolve calculation errors, (ii) to provide suggestions to address completeness issues, (iii) to identify the need for further information to amend the lack of transparency, (iv) to spot outliers on time-series that hamper the consistency, and, (v) to identify discrepancies among data included on the different sections of the submission. In all cases, QA/QC checks are implemented by interacting with national experts to get clarifications and to plan possible improvements.

In addition to the annual QA/QC process the EU also organized an internal EU review of the LULUCF sector in 2025 in accordance with the Governance Regulation. This review carried out by 15 LULUCF reviewers and four lead reviewers included all 27 member States plus Iceland and Norway and resulted in recommendations that subsequently have been implemented or are under implementation by the countries.

6.6.2 Verification

Relatively little information on verification is included in national GHG inventories. From the EEA side, as part of the implementation of QA/QC checks and verification procedures,

As regards activity data, the EEA is assessing how the information included in the LULUCF Instance – a Copernicus[46] product, including estimation of land use area, can be used to support the verification of the areas and trends of the land use categories reported by member States under the LULUCF chapter.

6.7 Category specific recalculations

The following table presents the recalculation of the key categories identified for the LULUCF sector, including the level of recalculations made by Member States contributing the most to the EU recalculations of the specific category.

Table 1.15 Sector LULUCF: Recalculation of key categories

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 equ.	Change in %	Main contributing countries	Change in kt CO_2 equ.	Change in %	Main contributing countries
4 Land use, land-use change and forestry: Biomass Burning (CO_2)	- 273.93	-1.5%	FRA: -115 POL: -107 IRL: -68	201.50	8.3%	ITA: 198 IRL: 80 ESP: -61
4 Land use, land-use change and forestry: Direct N_2O Emissions from N Mineralization/Immobilization (N_2O)	-43.53	-0.8%	POL: -765 ROU: 588 DEU: 458	1268.89	21.0%	ROU: 1778 POL: -536 LVA: 352
4 Land use, land-use change and forestry: Emissions and removals from drainage and rewetting and other management of organic and mineral soils (CH_4)	962.82	6.2%	DEU: 1092 FIN: -318 LVA: 55	1521.40	10.2%	DEU: 1922 FIN: -443 IRL: -65
4 Land use, land-use change and forestry: Emissions and removals from drainage and rewetting and other management of organic and mineral soils (CO_2)	643.51	8.4%	ITA: 739 LTU: -363 FRA: 327	566.37	7.0%	ITA: 724 LTU: -428 FRA: 327
4.A.1 Forest land remaining forest land: Carbon stock change (CO_2)	- 17 081.82	5.1%	FRA: -7594 POL: -6647 FIN: -5633	- 44 124.05	19.5%	SWE: -13619 DEU: -13029 FRA: -11689
4.A.2 Land converted to forest land: Carbon stock change (CO_2)	- 5 196.04	9.5%	ESP: -2398 POL: -1519 FRA: 1171	- 7 511.61	13.0%	ESP: -1912 POL: -1675 IRL: -832
4.B.1 Cropland remaining cropland: Carbon stock change (CO_2)	- 2 399.75	-7.5%	POL: -1313 ROU: 944 ITA: -867	11 005.00	87.3%	DEU: 9671 ROU: 2333 FRA: 2313
4.B.2 Land converted to cropland: Carbon stock change (CO_2)	5 590.63	15.1%	DEU: 5825 FRA: -2549 ROU: 2416	16 420.37	91.4%	ROU: 16464 ITA: -1135 FRA: 878
4.C.1 Grassland remaining grassland: Carbon stock change (CO_2)	- 5 789.78	-17.3%	DEU: -3765 POL: -1452 NLD: -650	- 1 144.19	-5.3%	DEU: -1231 NLD: -602 LTU: -471
4.C.2 Land converted to grassland: Carbon stock change (CO_2)	- 3 593.51	39.4%	DEU: -4349 ROU: -3769 POL: 2016	- 8 235.37	48.5%	ROU: -12439 FRA: 3094 LTU: 1296

[46] CLC+: a new generation Land Information System for Europe — Copernicus Land Monitoring Service

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 equ.	Change in %	Main contributing countries	Change in kt CO_2 equ.	Change in %	Main contributing countries
4.D.1.a Peat extraction remaining peat extraction: Carbon stock change (CO_2)	664.83	9.1%	LTU: 707 EST: -61 HUN: 24	- 9.43	-0.1%	EST: -42 HUN: 40 FIN: 25
4.D.2 Land converted to wetlands: Carbon stock change (CO_2)	1 069.88	109.7%	ROU: 822 FRA: 279 EST: 173	1 652.94	60.1%	ROU: 799 FRA: 572 DEU: 225
4.E.2 Land converted to settlements: Carbon stock change (CO_2)	2 359.61	11.5%	ITA: -5902 DEU: 3148 FRA: 2735	5 639.79	19.0%	DEU: 4955 ITA: -4095 ROU: 1876
4.A.1. Forest land remaining forest land: no classification (CO_2)	- 17 459.96	5.4%	FRA: -7709 POL: -6647 FIN: -5633	- 44 343.74	19.8%	SWE: -13619 DEU: -13029 FRA: -11674
4.A.2. Land converted to forest land: no classification (CO_2)	- 5 215.05	9.6%	ESP: -2398 POL: -1519 FRA: 1171	- 7 526.57	13.1%	ESP: -1914 POL: -1675 IRL: -836

Quantitative information on recalculations that impact the EU LULUCF trend is provided with more detail in chapter 10. However, this section includes an overview of the main drivers for the recalculations observed at EU level on the LULUCF trend.

Overall, recalculations introduced in the LULUCF data reflect the efforts devoted by individual countries to improve their submission of LULUCF chapter. As such, often the recalculations result from the need to incorporate in the estimations new data that becomes available and contribute towards moving the reporting to higher tiers.

On this regard, significant recalculations have been identified for Germany, Poland, France, Italy, Romania and Sweden. Recalculations relate to different causes and affect different land use categories and years. The text below is intended to provide a summary (non-exhaustive list) of the main reasons for these recalculations. The information is collected from individual submission by member States.

Italy, explained for the land converted to settlements category that the revised estimate considers the 20-year transition period and assumes an SOC value for settlements equal to 80% of the previous land use category. In addition, SOC values for annual and woody crops, as well as for grasslands, have been updated. These revisions have triggered a remarkable recalculation in 2026 submissions, compared to the 2025 submission

In the case of Sweden for forest land remaining forest land, NFI data from an addition 6000 plot have become available and resulted in a recalculation of the years 2020-2023 with more removals.

In the case of Romania for both cropland and grassland, updated information on the implementation of policies and measures resulted in a recalculation of SOC in mineral soils for the period 2014-2023. And in the case of wetlands, Romania updated the entire time series calculations for indirect N_2O emissions from N mineralization/immobilization.

In the case of Poland for cropland and land converted to forest land, recalculation of the fluxes from mineral soils in forest land, cropland and grassland has resulted in more removals for cropland remaining cropland and less removals for land converted to forest land.

In the case of Germany, forest land remaining forest land, recalculations for SOC in mineral soils including litter are mainly due to modifications of the input data taking into account the recent years

increase in tree mortality and harvest when modeling with YASSO15 to calculate emissions. And for CH_4 emissions from drained organic soils reported in table 4(II), Germany has implemented a modified hydrological model to calculate the water level which resulted in higher CH_4 emissions.

In the case of France, the forest land remaining forest land category now includes also estimated removals from managed forests in French Guiana which previously were assumed to in a state of equilibrium. The recalculations in the category 4.B1 are explained by new modifications that have been made to the spatially explicit land tracking as part of the continuous improvement of the method. This impacts the entire time series on land area and land-use changes. Activity data are modified and generate recalculations for all years to ensure consistency.

6.8 Category-specific planned improvement

As part of the EU GHG inventory submission under the Paris Agreement, efforts are ongoing to ensuring compliance with reporting requirements, and to align the LULUCF chapter to the outline included in the UNFCCC Decision 5/CMA.3

On this regard, the recommendations received from the UNFCCC Expert Review Team, as part of the review process that the EU GHG inventory submission underwent in 2024 is being taken into consideration.

The list below shows in a non-exhausted mode the most relevant improvements that concern the LULUCF information. implemented

- Streamline the text in this chapter in order to facilitate an easier annual updating of the information.
- Work towards a full reception by MS on the information used on Tier methods at the level of single pools, and land use subcategory.
- Assess the possibility of identifying LULUCF key categories by relevant carbon pool and subcategory in accordance with the 2006 IPCC Guidelines.

7 WASTE (CRT SECTOR 5)

This chapter starts with an overview on emission trends in CRT sector 5 Waste and covers greenhouse gas emissions, which are generated from the treatment and disposal of liquid and solid waste. This sector covers the following sub-sectors:

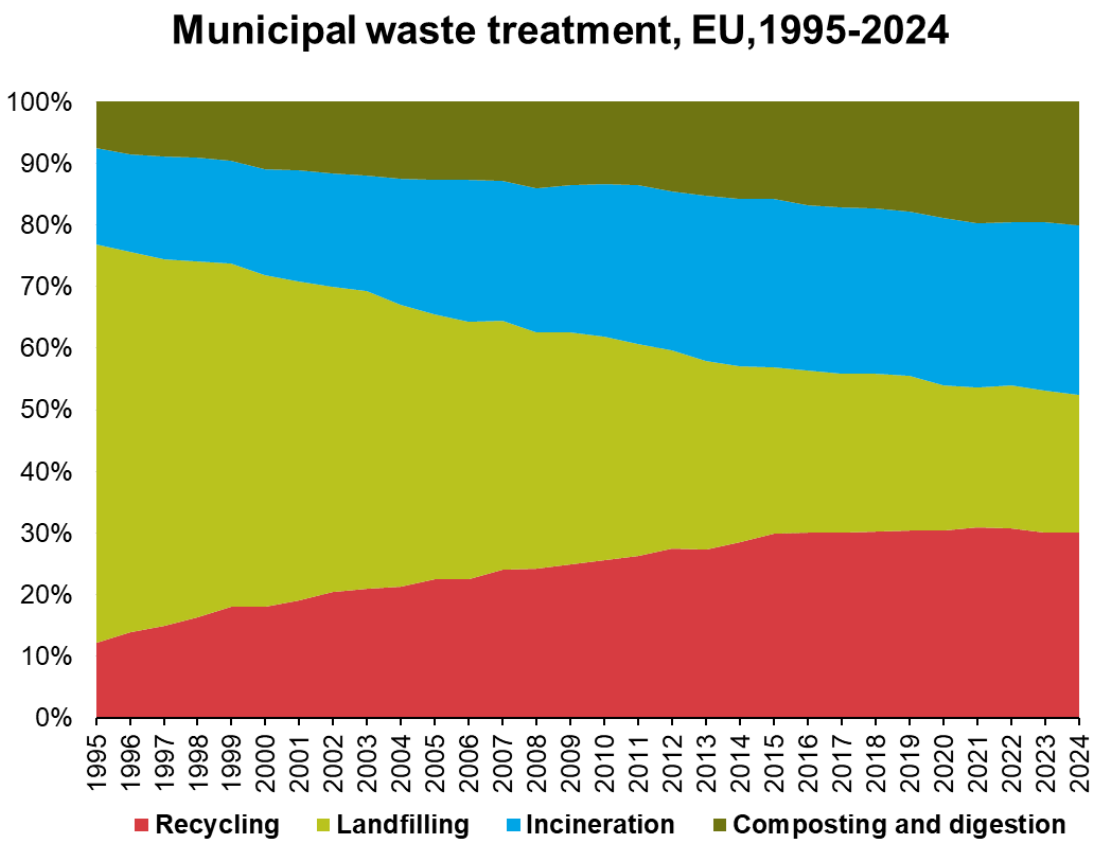
- 5.A Solid waste disposal
- 5.B Biological treatment of solid waste
- 5.C Incineration and open burning of waste
- 5.D Wastewater treatment and discharge.

For each Union key category, overview tables are presented including the Member States' contributions to the key categories in terms of level and trend, and information on methodologies and emission factors.

Of the above, the first three categories mainly refer to possible routes for treatment and disposal of solid waste. The decrease of total GHG emissions in the waste sector is mainly driven by the development of the different waste treatment routes. Figure 7.1 shows the quantities and the share of the Municipal Solid Waste (MSW) treatments over the time series 1995 to 2024 based on activity data for municipal solid waste as published by Eurostat [env_wasmun__custom_14030714]. The figure is based on Eurostat data as there is a common definition for the reporting of municipal waste to Eurostat and information on waste recycling is also included. On the basis of the Regulation on waste statistics (EC) No. 2150/2002, amended by Commission Regulation (EU) No. 849/2010, data on the generation and treatment of waste is collected from the Member States. The information on waste treatment reported to Eurostat is broken down to five treatment types (recovery, incineration with energy recovery, other incineration, disposal on land, biological treatment) and in waste categories. Eurostat data shown in the figures below include only information for municipal waste treatment, while in the GHG inventory also industrial waste, sludge and hazardous waste are reported by some countries under the categories solid waste disposal, biological treatment and waste incineration. However, the Eurostat data is used to show the overall trend of waste treatment in the European Union.

Between 1995 and 2024 the amount of municipal solid waste landfilled is continuously decreasing in the 27 EU countries and other waste treatment methods like recycling, biological treatment of waste and waste incineration with energy recovery are increasing.

Figure 7.1 Sector 5 Waste: Development of municipal waste treatment in the EU (Data source: Eurostat)



Note: estimated by Eurostat.
Source: Eurostat (online data code: env_wasmun)

Many countries experienced a reduction of waste landfilled and an increase of recycling, composting and waste incineration with energy recovery. These trends have already started before the Landfill Directive 1999/31/EC and the Directive on packaging waste 94/62/EC and 2008/98/EC, but are further supported by these directives.

7.1 Overview of sector

Sector 5 Waste is the fourth largest sector in the EU, after energy, agriculture and industrial processes, contributing 4.0 % to total GHG emissions including indirect CO_2 and LULUCF in 2024.

Total emissions from waste decreased by 40 % from 185,4 Mt in 1990 to 111,4 Mt in 2024 (Table 7.1). This strong decrease of emissions from the waste sector is mainly influenced by a strong decline of emissions in the waste sector from Germany, Poland and the Netherlands. Reductions from category 5.A solid waste disposal on land make up about 81 % of total emission reductions in the waste sector between 1990 and 2024 (Table 7.1). Emissions from the waste sector show a continuously decreasing trend during the last years, but as some countries with large emissions in this sector already decreased emissions since 1990 by more than 70 % (e.g. Germany) and most technical mitigation options have been implemented the declining emission trend is slowing down.

Figure 7.2 Sector 5 Waste: EU GHG emissions, 1990-2024

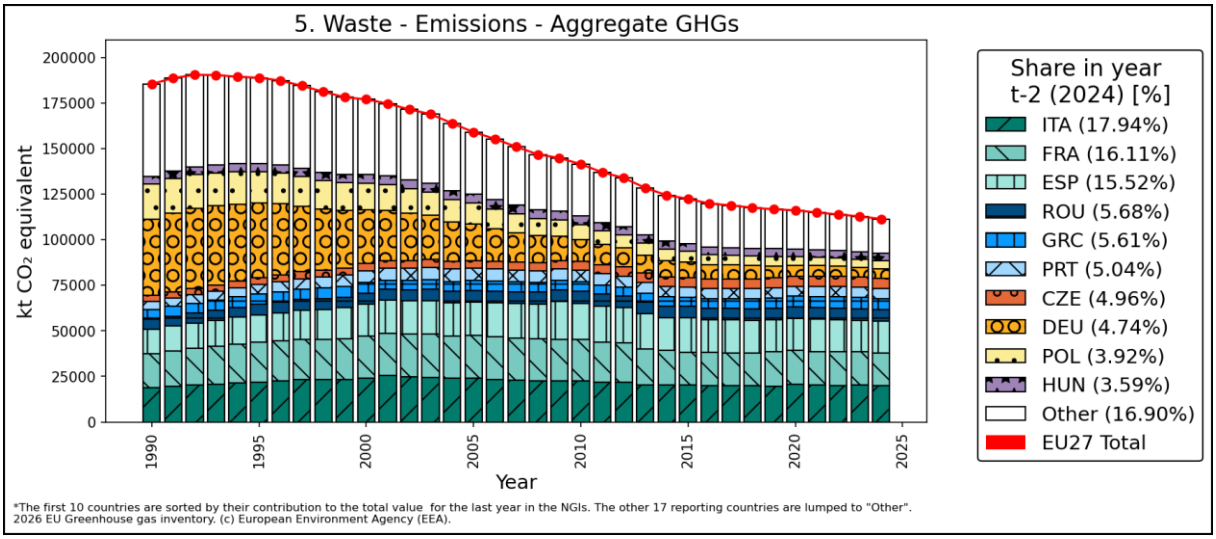


Table 7.1 shows that CH_4 emissions from 5A1 Managed Waste Disposal on Land had the greatest decrease of all waste-related emissions (- 36 %) between 1990 and 2024 but still accounts for 59 % of waste-related GHG emissions in the EU in 2024.

Table 7.1 Sector 5 Waste: Share of major source categories and all remaining categories in 2024 for EU

GREENHOUSE GAS SOURCE CATEGORIES	1990 (kt)	2024 (kt)	absolute change (Mt)	% change (in Mt)	share 2024
5.A.1 - Managed Waste Disposal Sites - CH4	102518	65728	-37	-36%	59%
5.D.1 - Domestic Wastewater - N2O	7589	11293	4	49%	10%
5.D.1 - Domestic Wastewater - CH4	25779	10703	-15	-58%	10%
5.A.2 - Unmanaged Waste Disposal Sites - CH4	31235	8149	-23	-74%	7%
5.D.2 - Industrial Wastewater - CH4	8315	4800	-4	-42%	4%
5.B.1 Waste Composting: Waste (CH4)	513	2821	2	450%	3%
5.B.1 Waste Composting: Waste (N2O)	306	1765	1	477%	2%
al other waste categories	9144	6116	-3	-33%	5%
Total Waste	**185399**	**111375**	**-74**	**-40%**	**100%**

Note: Colors visualize decreases (green), increases (red) and the share in sectoral total emissions (yellow). "Other" is calculated by subtracting the presented categories from the sector total.

7.2 Overview of trends in sector

In this section the contribution of the different emission categories to the overall trend of emissions from the EU waste sector is analysed. Table 7.2 shows the overview of the trend for the waste sector per emission categories. For the whole sector, there was a decrease of 40 % between 1990 and 2024, resulting mainly of the decrease of emission in sector 5.A Solid waste disposal. There was a slight decrease of emissions between 2023 and 2024 (-1.2%).

Table 7.2 Sector 5 Waste: Overview of trend of the sector in 2024 for EU

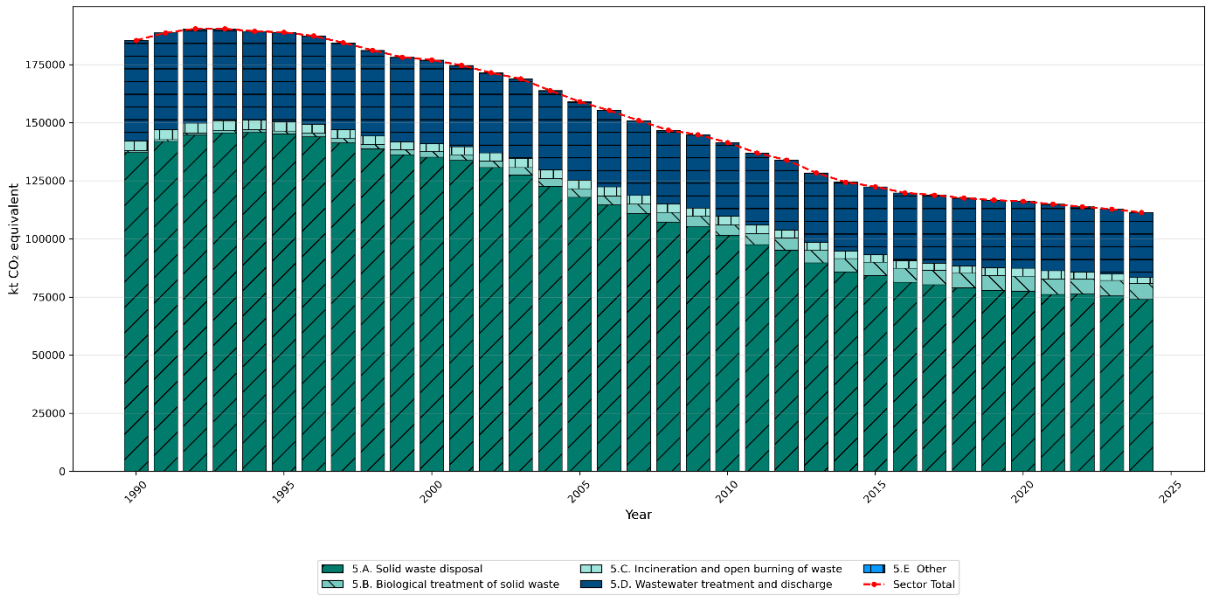


Table 7.3 shows the different emission categories, their contribution to total emissions in the EU sector and their contribution to the trend 1990-2024 and 2023-2024. A negative share of the trend means that the emissions in that category are evolving in the opposite direction to those of the EU.

Table 7.3 Contribution of the different emission categories to the total trend in emissions from the waste sector

Emission category	Gas	Contribution to total waste emissions (2024)	Change in trend 1990-2024	Change in trend 2023-2024
5.A	CH_4	66.5%	-46%	-2.0%
5.B	CH_4	4.5%	852%	2.8%
5.B	N_2O	1.7%	515%	1.7%
5.C	CO_2	1.8%	-43%	-7.6%
5.C	CH_4	0.3%	-8%	1.2%
5.C	N_2O	0.2%	-35%	0.0%
5.D	CH_4	14.0%	-55%	-0.1%
5.D	N_2O	11.1%	40%	1.2%
5.E	CH_4	0.0%	-85%	-0.4%
5.E	N_2O	0.0%	NA	-3.2%
5.E	CO_2	0.0%	-25%	3.5%

The main contributor to the total decrease in waste emissions from last year is category 5.A and 5.D.

7.3 Source categories and methodological issues

The most important GHG from this sector is CH_4 (85,2 % of total GHG emissions), followed by N_2O (13,0 % of total GHG emissions) in 2024. GHG emissions arising from waste incineration with energy recovery are allocated in category 1A1, as well as emissions from the combustion with energy recovery of the biogas produced in landfills, waste digesters and sludge digesters. CO_2 generated by the combustion

or the decomposition of organic waste or from biogas combustion is not accounted for in the national total.

Table 7.1 shows the share of major source categories and their trend changes, visualising, that CH_4 emissions from 5A1 – Managed Waste Disposal Sites had the highest share in 2024, and is the category showing the highest decrease since 1990. N_2O emissions have a rather small share but have been increasing in the last year as composting of waste is increasingly used as a way of treating waste.

The following chapters include information on emission levels and emission trends for all 27 countries (EU) for the EU key source categories and composting. Additionally, information for EU key source categories on national methods and circumstances, which are available in the countries' national inventory reports, are provided in the Annex III.

The following table lists the key sources in the waste sector, and share of Member States using a higher Tier method to estimate these emissions. The share of higher Tier corresponds to the share of EU emissions documented by countries reporting the method as an IPCC Tier 2 method (T2) or a country-specific method (CS), or countries reporting EF as country-specific (CS) or plant specific (PS).

Almost all countries report CH_4 emissions from solid waste disposal on managed and unmanaged landfills 5.A using a Tier 2 methodology. In all other source categories in the waste sector the share of countries using a higher Tier method is much lower.

Table 7.4 Key source categories for level and/or trend analyses and share of MS emissions using higher tier methods

Source category gas	kt CO_2 equ.		Trend	Level		share of higher Tier
	1990	2024		1990	2024	
5.A.1 Managed waste disposal sites: no classification (CH_4)	102518	65728	T	L	L	94%
5.A.2 Unmanaged waste disposal sites: no classification (CH_4)	31235	8149	T	L	L	100%
5.D.1 Domestic wastewater: no classification (CH_4)	25779	10703	T	L	L	66%
5.D.1 Domestic wastewater: no classification (N_2O)	7589	11293	T	0	L	38%
5.D.2 Industrial wastewater: no classification (CH_4)	8315	4800	0	L	L	44 %

Note: For 5.A.1/CH_4 : 2MSs (NLD and CYP) do not document the Tier level; For 5.A.2/CH_4: 2 MSs (IRL and MLT) do not document the Tier level.

For other source categories in the waste sector that are not identified as key sources, only information on total emissions is provided in chapter 7.3.5).

7.3.1 Solid waste disposal on land (CRT Source Category 5A)

Methane is produced from anaerobic microbial decomposition of organic matter in solid waste disposal sites. This source category includes two key categories: CH_4 from 5A1 Managed waste disposal on land and CH_4 from 5.A.2 Unmanaged waste disposal on land. In addition, source category 5A includes the category 5.A.3 CH_4 emissions from uncategorized landfills, but only Estonia (1990-1993) and Poland (1990-2022) report emissions from this category. As this is no EU key category no further information on 5.A.3 is included in the following chapters.

The source category 5A contributes 2.7 % to total GHG emissions including indirect CO_2 and with LULUCF, in 2024.

Table 7.5 provides total greenhouse gas and CH_4 emissions by Member State from 5A Solid Waste Disposal on Land. CH_4 emissions from this category decreased by 46 % between 1990 and 2024 in the EU. Fifteen (15) EU countries reduced their emissions from this source. In the countries experiencing an increase, waste disposal changed from unmanaged to managed landfills during the time period 1990

and 2024 which leads to increasing CH_4 emissions from managed landfills. In 2024, CH_4 emissions from landfills decreased by 2.0% compared to 2023.

Table 7.5 5A Solid Waste Disposal on Land: Countries contributions to total GHG emissions and CH_4 emissions

Member State	GHG emissions in kt CO2 equivalents		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024
Austria	4 081	757	4 081	757
Belgium	3 323	423	3 323	423
Bulgaria	2 100	2 050	2 100	2 050
Croatia	553	1 352	553	1 352
Cyprus	296	576	296	576
Czechia	2 008	3 824	2 008	3 824
Denmark	1 272	212	1 272	212
Estonia	274	173	274	173
Finland	4 847	1 291	4 847	1 291
France	12 457	11 425	12 457	11 425
Germany	37 191	1 997	37 191	1 997
Greece	2 512	4 514	2 512	4 514
Hungary	2 977	3 259	2 977	3 259
Ireland	1 476	586	1 476	586
Italy	13 671	15 419	13 671	15 419
Latvia	353	387	353	387
Lithuania	1 152	538	1 152	538
Luxembourg	103	44	103	44
Malta	46	172	46	172
Netherlands	15 321	1 777	15 321	1 777
Poland	14 942	882	14 942	882
Portugal	2 945	4 077	2 945	4 077
Romania	1 536	4 444	1 536	4 444
Slovakia	782	1 120	782	1 120
Slovenia	437	154	437	154
Spain	6 542	12 177	6 542	12 177
Sweden	3 998	389	3 998	389
EU	**137 196**	**74 019**	**137 196**	**74 019**

Note: The first two columns show total emissions from 5A reported in kt CO_2 eq. The last two columns show CH_4 emissions in kt CO_2 eq. As only CH_4 emissions are reported under 5.A the figures in the columns are identical. Abbreviations explained in the Chapter 'Units and abbreviations.

7.3.1.1 Managed waste disposal sites (CRT Source Category 5A1)

Table 7.6 provides information on emission trends of the key source CH_4 from 5A1 Managed Waste Disposal on Land by Member State. CH_4 emissions from this source account for 2.4 % of total EU GHG emissions including indirect CO_2, with LULUCF, in 2024. Between 1990 and 2024, CH_4 emissions from managed landfills declined by 36 % in the EU. In 2024, CH_4 emissions from managed landfills decreased by 1.6 % compared to 2023.

Table 7.6 5A1 Managed Waste Disposal on Land: Countries contributions to CH_4 emissions and information on method applied and emission factor

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	4 081	799	757	1.2%	-3 324	-81%	-42	-5%	NA,T2	CS,D,NA
Belgium	3 323	511	423	0.6%	-2 901	-87%	-89	-17%	NA,T2	D,NA
Bulgaria	NO	1 250	1 263	1.9%	1 263	∞	13	1%	NA,T2	CS,D,NA
Croatia	523	1 360	1 352	2.1%	829	158%	-8	-1%	NA,T2	CS,NA
Cyprus	NO	195	215	0.3%	215	∞	20	10%	NA	NA
Czechia	2 008	3 814	3 824	5.8%	1 816	90%	11	0%	NA,T1	D,NA
Denmark	1 272	220	212	0.3%	-1 061	-83%	-8	-4%	CS,NA,T2	CS,D,NA
Estonia	NO	110	105	0.2%	105	∞	-5	-5%	NA,T2	D,NA
Finland	4 847	1 326	1 291	2.0%	-3 556	-73%	-35	-3%	NA,T2	CS,D,NA
France	12 457	11 668	11 425	17.4%	-1 032	-8%	-243	-2%	T2	CS,D
Germany	37 191	2 204	1 997	3.0%	-35 194	-95%	-207	-9%	NA,T2	CS,NA
Greece	90	3 114	3 212	4.9%	3 122	3483%	98	3%	NA,T2	CS,D,NA
Hungary	470	2 197	2 218	3.4%	1 748	372%	21	1%	NA,T2	D,NA
Ireland	NO	594	586	0.9%	586	∞	-8	-1%	M,NA,T2	CS,D,NA
Italy	7 153	13 764	13 621	20.7%	6 469	90%	-143	-1%	NA,T2	CS,NA
Latvia	NO	295	291	0.4%	291	∞	-4	-1%	NA,T2	D,NA
Lithuania	766	479	438	0.7%	-328	-43%	-41	-9%	NA,T2	D,NA
Luxembourg	103	47	44	0.1%	-59	-57%	-3	-7%	NA,T1	D,NA
Malta	NO	157	166	0.3%	166	∞	9	6%	NA,T2	M,NA
Netherlands	15 321	1 903	1 777	2.7%	-13 544	-88%	-126	-7%	NA	NA
Poland	1 648	896	772	1.2%	-876	-53%	-124	-14%	NA,T2	CS,D,NA
Portugal	793	3 529	3 564	5.4%	2 771	349%	35	1%	T2	CS,D
Romania	NA,NO	2 762	2 880	4.4%	2 880	∞	117	4%	NA,T2	CS,D,NA
Slovakia	782	1 163	1 120	1.7%	338	43%	-43	-4%	NA,T2	CS,NA
Slovenia	437	175	154	0.2%	-283	-65%	-22	-12%	NA,T2	CS,D,NA
Spain	5 254	11 811	11 634	17.7%	6 380	121%	-177	-1%	NA,T2	CS,D,NA,OTH
Sweden	3 998	467	389	0.6%	-3 609	-90%	-78	-17%	T2	CS,D
EU	**102 518**	**66 810**	**65 728**	**100%**	**-36 790**	**-36%**	**-1 082**	**-2%**	**-**	**-**

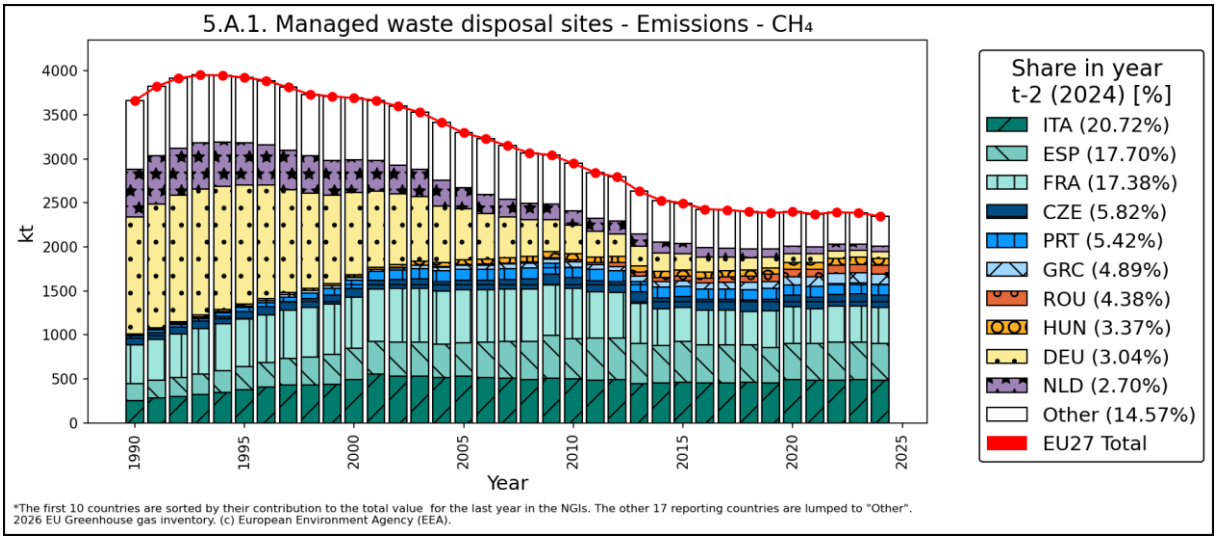
Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.
The Netherlands applies T2 method and CS emission factor and Cyprus applies T2 and D. Due to an ETF reporting tool error, method and emission factors for The Netherlands and Cyprus are reported as NA in the CRTs. The EU considers the JSON submissions of the Member States for the compilation of its inventory and does not make any corrections on discrepancies between the JSON and CRT tables caused by the ETF tool.

Trends in Emissions and Activity Data

CH_4 emissions from solid waste disposal on managed land decreased considerably between 1990 and 2024 by 36 %. *Figure 7.3* shows the trend of emissions indicating the countries contributing most to EU total.

The countries with highest emissions from this source in 2024 were Italy, Spain and France. These MS account for 55.8 % of EU CH_4 emissions from 5A1. The largest reductions in absolute terms between 1990 and 2024 were reported by Germany, the Netherlands and Sweden. The emission reductions are partly due to the (early) implementation of the landfill waste directive or similar legislation in these countries. The landfill waste directive was adopted in 1999 and requires the Member States to reduce the amount of biodegradable waste disposed untreated to landfills and to install landfill gas recovery at all new sites.

Figure 7.3 5A1 Managed waste disposal on land: CH_4 emissions (Trend in relevant countries)



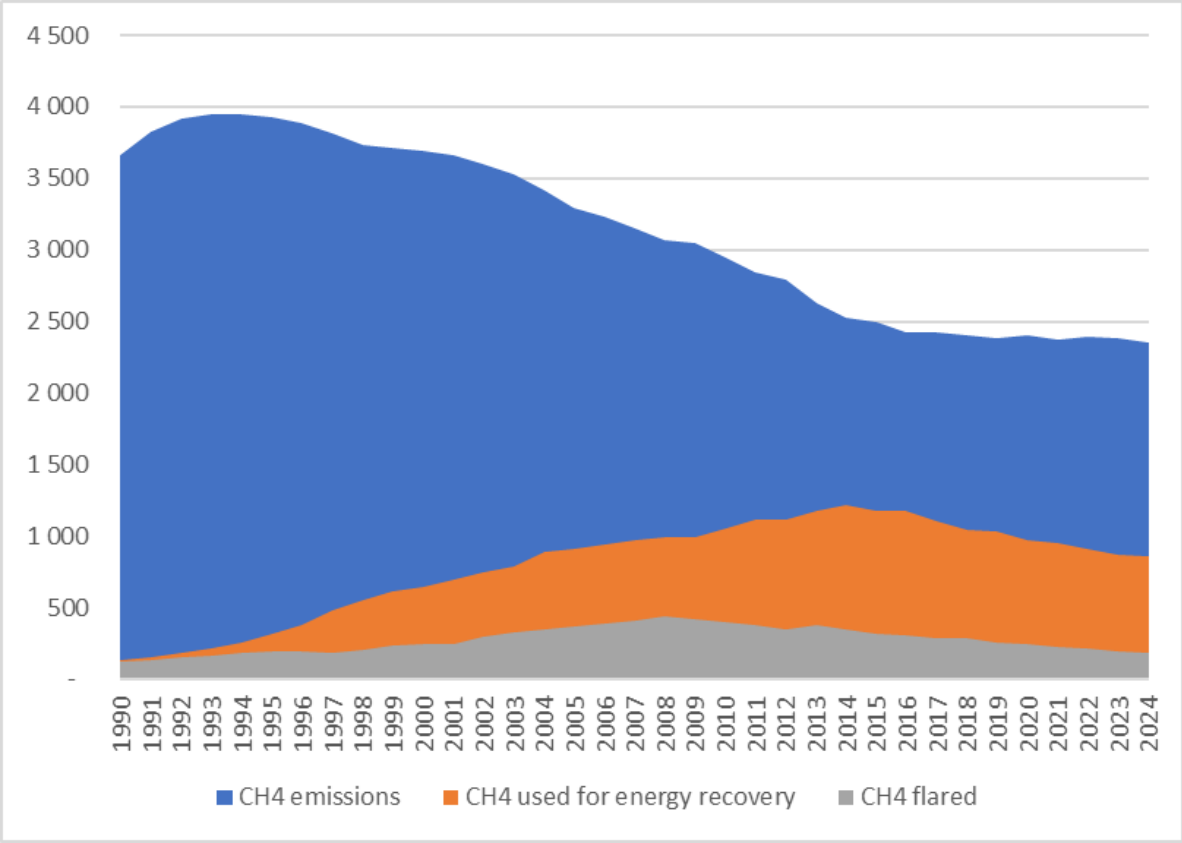
A main driving force of CH_4 emissions from managed waste disposal on land is the amount of waste, especially of biodegradable waste going to landfills. In addition, CH_4 emissions from landfills are influenced by the amount of CH_4 recovered and utilized or flared. The share of CH_4 recovery has increased significantly in EU since 1990.

Methane recovery and flaring

Besides lower quantities of organic carbon deposited on landfills, the major determining factor for the decrease in net CH_4 emissions are increasing methane recovery rates from landfills and flaring of CH_4.

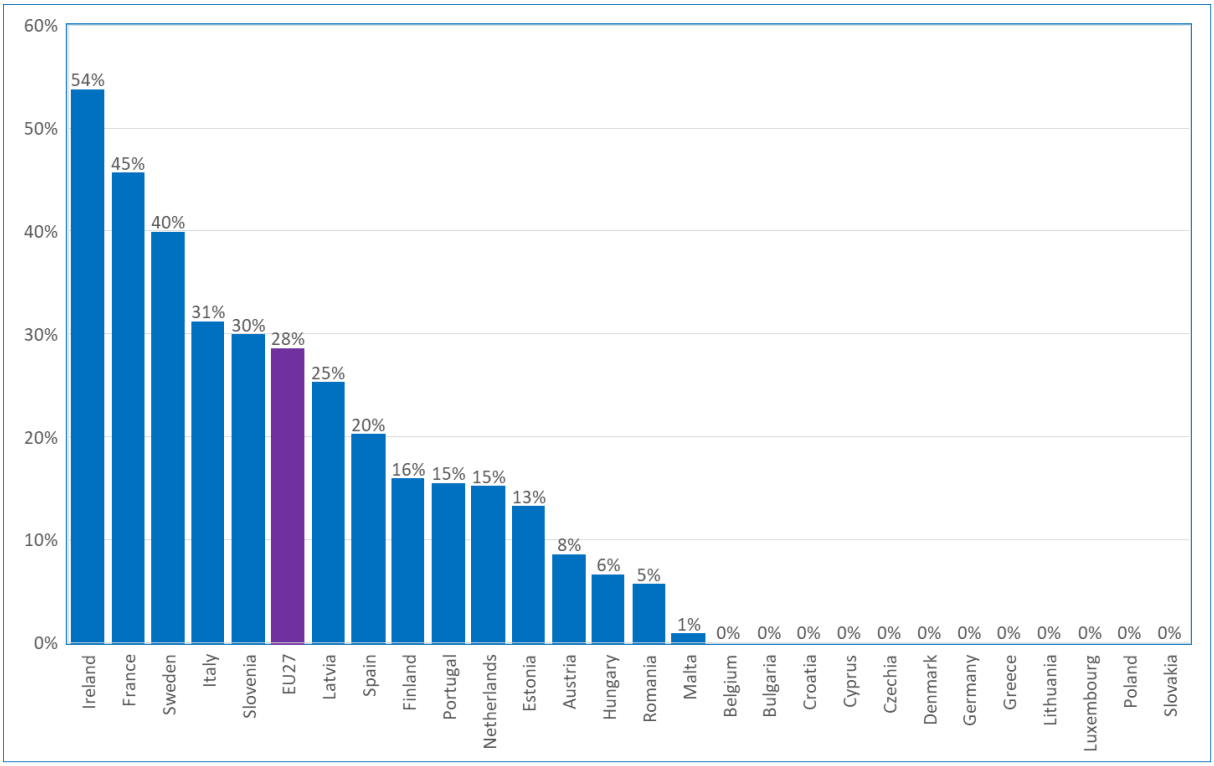
CH_4 recovery and flaring of CH_4 in EU increased from 9% of the total amount of CH_4 generated ("generated" = CH_4 emitted / (1-Ox) + CH_4 flared + CH_4 recovered where the oxidation factor Ox = 0.9) in managed landfills (only 5A1) in 1990 to 28,4% in 2024 (Figure 1.4). Methane recovery is further promoted by the Landfill Directive, and monitoring programs are established. The recovery potential depends on the waste management strategies, e.g. diverting organic fractions to composting leaves more inert materials on landfills and reduces the potential to recover and use CH_4.

Figure 7.4 5A1 Managed Solid Waste Disposal: Evolution of the share of methane used for energy recovery, methane flared and CH_4 emissions in managed landfills in the EU



Source: CRT2026, Table 5A1

Figure 7.5 5A1 Managed Solid Waste Disposal: Share of methane recovery ratio per MS in 2024



Source: CRT2026, Table 5A1

The recovered CH_4 is the amount of CH_4 that is captured for energy use and is a country-specific value which has significant influence on the emission level. Additionally, the amount of CH_4 flared is considered. The percentage of CH_4 recovered and flared, in Figure 7.5, varies among the countries and depends - amongst other - on the share of solid waste disposal sites where recovery installations exist.

Methodological issues

For key sources in the source category 5A it is good practice to use the First Order Decay (FOD) method to calculate the emissions and to display emission trends over time. Giving the IPCC 2006 Guidelines for National Greenhouse Gas Inventories, the First Order Decay (FOD) method that accounts for the fact that the degradable organic components decay slowly over decades, has to be applied for all Tier levels. The Tier 1 method applies mainly default parameters and default activity data. The Tier 2 FOD method requires data on current as well as historic waste quantities, composition and disposal practices for several decades. Historical waste disposal data for 30 years or more should be based on country-specific statistics, surveys or other similar sources. In the following, a short overview of the most important parameters and methodological aspects of the FOD method is presented. The main factors influencing the quantity of CH_4 produced are the amount of waste disposed on land and the concentration of biodegradable carbon in that waste. Further methodological information for all EU countries is provided in the Annex III of this submission.

Municipal Waste landfilled

The amount of waste disposed on SWDS depends on the total amount of waste generated and the share of waste disposed. The total amount of waste disposed can be calculated by using total population numbers, waste generation rate per capita and the share of waste disposed. The FOD method requires historic data on waste generation and the share of waste landfilled over decades, but it is difficult to achieve consistent time series for the activity data over such long periods.

Recent data on waste generation and waste disposal is available in most EU countries and is not estimated based on the per capita waste generation rate and a share of waste landfilled, but on direct measurements. Countries that do not have historic data on waste generation and waste disposal available use the default IPCC values for the waste generation rate per capita and the share of waste disposed and apply inter- or extrapolation methods to create a time series.

Industrial waste

Data on industrial waste may be difficult to obtain in many countries and there are only very few default values available. Only industrial waste that contains organic or fossil carbon fractions needs to be included in the inventory. Many countries do not provide any information on industrial waste landfilled, while other countries report that industrial waste is not reported separately and included under municipal solid waste.

Sludge

Double counting needs to be avoided by reporting a consistent amount of sludge that is disposed of on SWDS; only sludge that goes along with solid waste has to be accounted under this category. All other sludge that is composted, incinerated, treated in wastewater plants or applied to agricultural land should be accounted under other categories. There is no IPCC default activity data available. If no country-specific activity data is available on the amount of sludge that is disposed, composted, incinerated or spread on agricultural land, all emissions from sludge are included under wastewater treatment.

Waste composition

The amount of methane generated on SWDS depends strongly on the waste composition. Disposing waste with no or hardly degradable carbon (e.g. metal or plastics) does not contribute to CH_4 emissions,

but the disposal of paper or food waste with large degradable organic carbon fractions leads to high CH_4 emissions. The composition of the waste landfilled is strongly influenced by waste management practices, such as recycling or composting. This leads also to varying waste compositions along the time series.

Landfill gas recovery

Countries use different methods to determine CH_4 recovery. Several countries combine different methods and sources to estimate the amounts of CH_4 recovered for flaring or for energy purposes, while other countries are using only one method. Data on landfill gas recovery can be based on measured plant specific data, questionnaires and surveys or can be taken from the energy statistics. Further information on CH_4 recovery in the country is provided in the Annex III of this submission.

Emission factors and parameters

Besides information on the amount of waste landfilled, the waste composition and the amounts of CH_4 recovered, other parameters are relevant for the calculation of CH_4 emissions from waste disposal. The fraction of degradable organic carbon (DOC) dissimilated in the individual waste fractions and the methane generation rate constant, which reflects the years necessary for the degradable organic carbon to decompose, are the most relevant parameters for calculating CH_4 emissions. Further parameters included in the calculation are the methane correction factor (MCF), the fraction of DOC that decomposes, the fraction of CH_4 in generated landfill gas and the oxidation factor.

Fraction of Degradable Organic Carbon (DOC): There are default IPCC values for DOC of the different waste fractions available (paper, food waste etc.). Some countries have conducted own chemical analysis to determine the DOC value of different waste fractions. The DOC content of total landfilled waste is based on the composition of waste and can be calculated from a weighted average of the carbon content of various components of the waste. Countries have MSW with widely differing waste compositions.

Methane generation rate constant: CH_4 is emitted on SWDS over a long period of time rather than instantaneously. The FOD model can be used to model landfill gas generation rate curves for individual landfills over time. One important parameter is the methane generation rate constant (also referred to as k-value or half-life value). It is determined by a large number of factors associated with the composition of waste and the conditions at the site.

7.3.1.2 Unmanaged waste disposal sites (CRT Source Category 5A2)

CH_4 emissions from 5A2 Unmanaged Waste Disposal on Land account for 0.3 % of total EU GHG emissions including indirect CO_2, with LULUCF, in 2024. Almost all countries with unmanaged waste disposal feature a decreasing emission trend, due to a decreasing amount of municipal waste going to unmanaged waste disposal sites.

Table 7.7 5A2 Unmanaged Waste Disposal on Land: Countries contributions to CH_4 emissions and information on method applied and emission factor

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	NO	NO	NO	-	-	-	-	-	NA	NA
Belgium	NO	NO	NO	-	-	-	-	-	NA	NA
Bulgaria	2 100	852	787	9.7%	-1 312	-63%	-65	-8%	T2	CS,D
Croatia	30	NO	NO	-	-30	-100%	-	-	NA	NA
Cyprus	296	378	362	4.4%	65	22%	-17	-4%	T2	D
Czechia	NO	NO	NO	-	-	-	-	-	NA	NA
Denmark	IE	IE	IE	-	-	-	-	-	NA	NA
Estonia	NO	NO	NO	-	-	-	-	-	NA	NA
Finland	IE	NO	NO	-	-	-	-	-	NA	NA
France	NO	NO	NO	-	-	-	-	-	-	-
Germany	NO	NO	NO	-	-	-	-	-	NO	NO
Greece	2 423	1 355	1 302	16.0%	-1 120	-46%	-53	-4%	T2	CS,D
Hungary	2 507	1 091	1 041	12.8%	-1 466	-58%	-50	-5%	T2	D
Ireland	1 476	NO	NO	-	-1 476	-100%	-	-	NA	NA
Italy	6 518	1 878	1 798	22.1%	-4 720	-72%	-80	-4%	T2	CS
Latvia	353	102	96	1.2%	-256	-73%	-5	-5%	T2	CS,D
Lithuania	386	109	100	1.2%	-286	-74%	-8	-8%	T2	D
Luxembourg	IE	IE	IE	-	-	-	-	-	NA	NA
Malta	46	5	6	0.1%	-40	-87%	1	27%	M	M
Netherlands	NO	NO	NO	-	-	-	-	-	NA	NA
Poland	10 124	47	36	0.4%	-10 088	-100%	-12	-24%	T2	CS,D
Portugal	2 152	549	512	6.3%	-1 639	-76%	-37	-7%	T2	CS,D
Romania	1 536	1 644	1 565	19.2%	28	2%	-80	-5%	T2	CS,D
Slovakia	NO	NO	NO	-	-	-	-	-	NA	NA
Slovenia	NO	NO	NO	-	-	-	-	-	NA	NA
Spain	1 288	570	543	6.7%	-745	-58%	-27	-5%	T2	D
Sweden	NO	NO	NO	-	-	-	-	-	-	-
EU	**31 235**	**8 582**	**8 149**	**100%**	**-23 086**	**-74%**	**-433**	**-5%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

Trends in Emissions and Activity Data

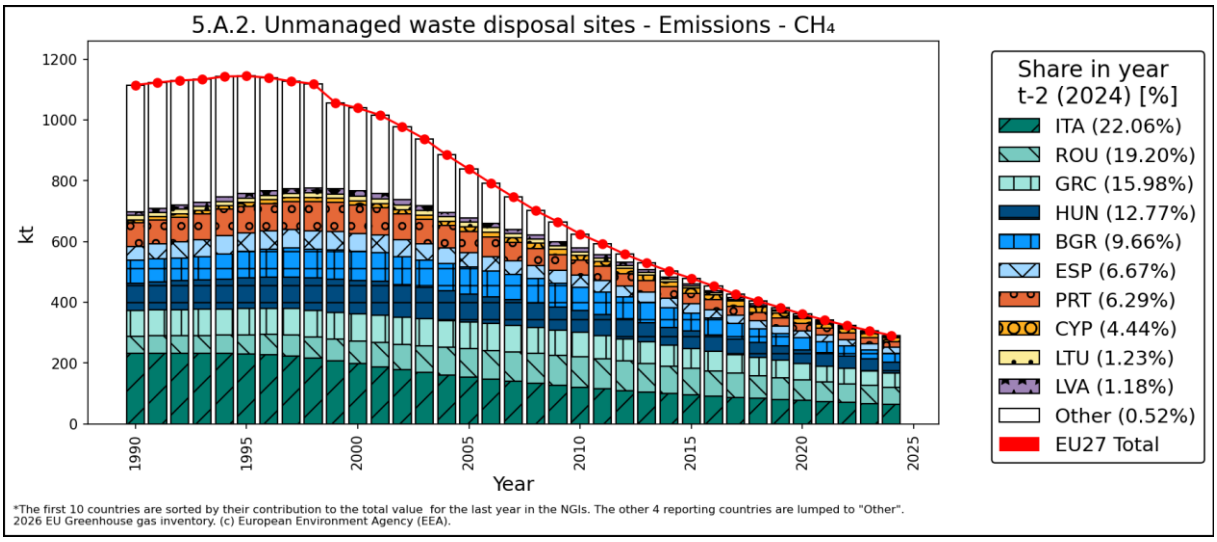
CH_4 emissions from unmanaged solid waste disposal sites decreased considerably. Between 1990 and 2024, CH_4 emissions from this source decreased by 74 % (Table 7.7). In 2024, CH_4 emissions from unmanaged landfills decreased by 5 % compared to 2023.

Figure 7.6 shows the trend of emissions indicating the countries contributing most to EU total. In comparison to the rather drastic decrease of the amount of waste disposed on unmanaged landfills (> -99,5%), CH_4 emissions from unmanaged landfills show a more limited decrease (-74%) during the 1990-2024 time series because of the FOD approach.

Not all countries reported emissions from this source since all waste disposal sites in the countries are managed) or they are included elsewhere (see Table 1.4).

Italy, Romania, Greece are responsible for about 57 % of the total EU emissions from unmanaged waste disposal sites in 2024 (see *Figure 7.6*). Poland, Italy and Portugal show the larger absolute reductions between 1990 and 2024.

Figure 7.6 5A2 Waste disposal on unmanaged landfills: CH_4 emissions (Trend in relevant countries)



Note that, in some countries, waste disposal in unmanaged landfills was practiced but does not occur anymore. However, emissions are still produced from the waste disposed in the past. For the following countries, there are still emissions, but no more waste is disposed on the unmanaged landfills as from the year mentioned: Ireland since 1999, Italy since 2000, Hungary since 2001, Finland since 2002, Portugal and Malta since 2005, Slovakia since 2010, Poland since 2012, Latvia and Spain since 2013, Romania in 2018, Cyprus since 2019 and Lithuania since 2020 (except 2022) and Croatia (since 2022).

In the unmanaged solid waste landfills, hardly any CH_4-recovery takes place. Only Ireland (1996-1998) and Latvia (since 2002) report CH_4 recovery from unmanaged landfills for a few years in the time series.

For countries still using unmanaged landfills (Bulgaria, Greece), solid waste disposal on unmanaged landfill sites is still practiced, but the relative decrease of waste disposed is higher than 96 % in comparison with 1990.

Methodological issues

CH_4 emissions from unmanaged solid waste disposal sites were reported in 14 EU countries in 1990. Only two of these EU countries still dispose MSW to unmanaged SWDS, although in small quantities, while in all other countries waste disposal from the past still cause emissions in 2024 (Table 7.7). 100 % of all EU emissions from this category are calculated using higher tier methods (Table 7.3).

CH_4 emissions from waste disposal on unmanaged landfills are calculated similar to CH_4 emissions from managed landfills, using the amount of waste disposed on unmanaged landfills. If no other data is available the same data on waste composition and the same parameters as used for managed landfills can be applied in the calculation. The Methane Correction Factor (MCF) is the relevant parameter that differentiates between managed and unmanaged landfills, the two countries still disposing MSW are using an MCF value of 0.8, representing deep unmanaged landfills.

7.3.2 Biological treatment of solid waste (CRT Source Category 5B)

Source category 5B Biological treatment of solid waste includes CH_4 and N_2O emissions from subcategories 5B1 Composting and 5B2 anaerobic digestion and also emissions from mechanical-biological treatment according to the IPCC 2006 Guidelines.

The whole sector 5.B contributes only 0.2 % to EU total GHG emissions including indirect CO_2, with LULUCF, in 2024 and is not a quantitative key source for EU.

Decomposition of biomass during biological treatment is much faster than on landfills and the CH_4 emissions are estimated on an annual basis without the need for long time series as in the case of landfills. For composting the decomposition of the organic waste fraction takes place under aerobic conditions. In anaerobic digestion processes the decomposition takes place without oxygen.

Table 7.8 provides total GHG and CH_4 and N_2O emissions by Member State from 5B Biological treatment of solid waste. Total emissions from this category increased considerably since 1990 (more than 725%), and especially since 1993, due to landfill regulations. All countries report emissions from this category since 2010.

Table 7.8 5B Biological treatment of solid waste: Countries contributions to total GHG emissions and CH_4 and N_2O emissions

Member State	GHG emissions in kt CO2 equivalents		N2O emissions in kt CO2 equivalents		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024
Austria	35	152	20	75	15	77
Belgium	6	55	4	30	3	25
Bulgaria	NO	27	NO	6	NO	21
Croatia	NO	42	NO	9	NO	33
Cyprus	NO	21	NO	8	NO	14
Czechia	NE,IE	563	IE,NE	63	IE,NE	500
Denmark	43	567	13	45	30	521
Estonia	5	28	2	8	3	19
Finland	45	104	16	32	29	72
France	173	833	61	179	112	654
Germany	79	1 113	20	194	59	918
Greece	1	143	NO	4	1	139
Hungary	9	167	3	39	6	128
Ireland	NO	51	NO	17	NO	34
Italy	23	505	18	390	5	114
Latvia	29	58	11	18	19	39
Lithuania	0	100	0	29	0	72
Luxembourg	IE,NO	33	IE,NO	5	IE,NO	27
Malta	NO	1	NO	NA,NE,NO	NO	1
Netherlands	11	341	6	96	5	245
Poland	22	475	8	168	14	306
Portugal	9	94	3	30	6	64
Romania	NE,NO	65	NE,NO	17	NE,NO	49
Slovakia	114	318	41	104	73	214
Slovenia	NA,NO	19	NA,NO	7	NA,NO	12
Spain	209	860	76	285	133	576
Sweden	13	103	4	22	8	82
EU	**827**	**6 838**	**306**	**1 881**	**521**	**4 957**

Note: Abbreviations explained in the Chapter 'Units and abbreviations'

Biological treatment of waste is not a quantitative key category for the European Union but because of the rapid increase of emissions from composting activities it can be considered as a qualitative key category. Therefore, source category 5B1 Composting is presented hereafter. Regarding 5B2 Anaerobic digestion, some additional information can be found in the chapter 7.3.5 dedicated to waste - non key categories.

7.3.2.1 Waste Composting (CRT Source Category 5B1)

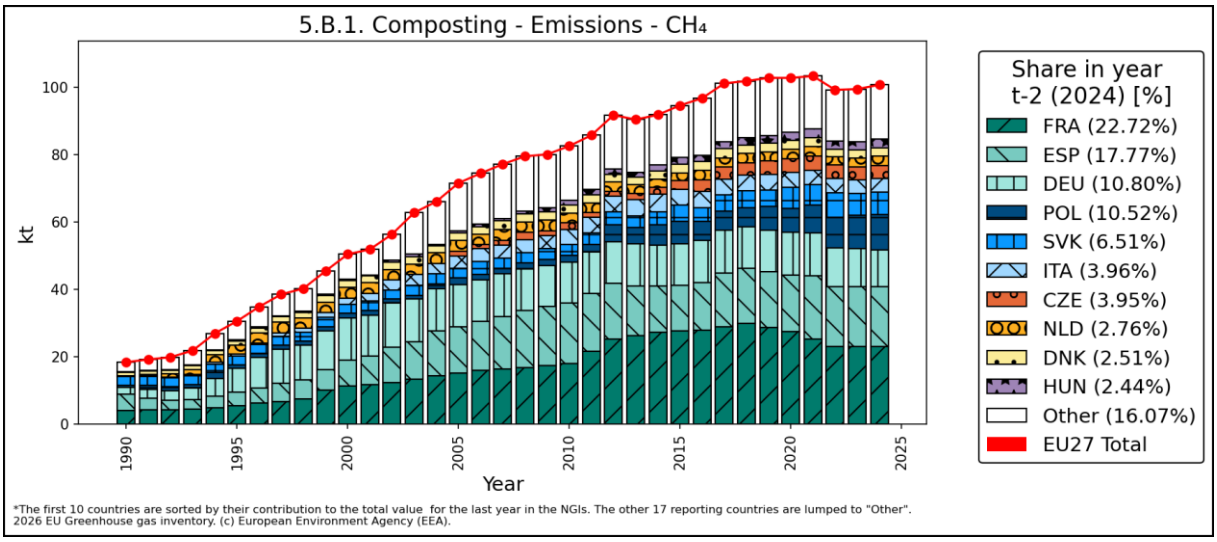
CH_4 emissions from 5B1 Composting account for 0.1 % of total EU GHG emissions including indirect CO_2, with LULUCF, in 2024. Between 1990 and 2024, CH_4 emissions from this source increased considerably of 450% (Table 7.9). All countries feature an increasing emission trend from 1990 onwards.

Table 7.9: 5B1 Waste Composting: Countries contributions to CH_4 emissions and information on method applied and emission factor

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	15	55	57	2.0%	43	294%	2	4%	NA,T2	CS,NA
Belgium	3	31	25	0.9%	22	756%	-6	-19%	NA,T1	CS,NA
Bulgaria	NO	9	10	0.4%	10	∞	1	12%	NA,T1	D,NA
Croatia	NO	18	16	0.6%	16	∞	-2	-12%	NA,T1	D,NA
Cyprus	NO	12	13	0.5%	13	∞	1	11%	T1	D
Czechia	NE	109	111	3.9%	111	∞	2	2%	T1	D
Denmark	24	73	71	2.5%	47	194%	-2	-2%	NA,T1,T2	CS,D,NA
Estonia	3	18	15	0.5%	12	365%	-3	-16%	NA,T1	D,NA
Finland	29	48	56	2.0%	28	97%	8	17%	T1	D
France	111	641	641	22.7%	530	475%	0	0%	T2	CS,D
Germany	59	318	305	10.8%	245	413%	-13	-4%	NO,T2	CS,NO
Greece	NO	8	7	0.3%	7	∞	0	-2%	D	D
Hungary	6	67	69	2.4%	63	1127%	2	3%	T1	D
Ireland	NO	29	29	1.0%	29	∞	0	0%	NA,T1	D,NA
Italy	5	111	112	4.0%	107	2062%	1	1%	D,NA	CS,NA
Latvia	19	33	33	1.2%	14	74%	0	0%	D,NA	D,NA
Lithuania	0	47	50	1.8%	50	21859%	3	7%	T1	D
Luxembourg	NO	8	9	0.3%	9	∞	1	13%	T1	D
Malta	NO	NE,NO	NE,NO	-	-	-	-	-	NA	NA
Netherlands	5	71	78	2.8%	73	1526%	7	10%	NA,T1	CS,NA
Poland	14	275	297	10.5%	282	1985%	21	8%	T1	D
Portugal	6	45	52	1.8%	46	823%	7	17%	NA,T1	D,NA
Romania	NE,NO	32	30	1.1%	30	∞	-2	-7%	NA,T1	D,NA
Slovakia	73	182	184	6.5%	111	153%	1	1%	T1	D
Slovenia	NA,NO	11	12	0.4%	12	∞	1	7%	NA,T1	D,NA
Spain	133	501	501	17.8%	368	276%	0	0%	NA,T1	D,NA
Sweden	8	35	38	1.4%	31	390%	4	11%	T1	D
EU	**513**	**2 786**	**2 821**	**100%**	**2 308**	**450%**	**36**	**1%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 7.7 5B1 Waste Composting: CH_4 emissions (Trend in relevant countries)



Presented methods and emission factor information refer to the last inventory year.
Abbreviations explained in the Chapter 'Units and abbreviations'.

Emissions from 5.B.1 relate with composting of municipal (5.B.1.a) and composting of other waste (5.B.1.b). Only 11 countries report emissions from other waste composting. Other countries generally report emissions from composting of all types of waste (municipal, industrial, sludge…) in the category 5.B.1.a since statistal data concerning composting generally relate to total waste and do not make a distinction between the various types of waste.

Methodological information

According to the IPCC 2006 Guidelines CH_4 from composting is estimated by using the quantity of organic waste processed by composting and the respective emission factor. The application of a Tier 2 method requires the use of a country specific emission factor based on representative measurements. The IPCC default emission factor for CH_4 emissions from composting is 10 g CH_4/kg waste treated on a dry weight basis and 4 g CH_4/kg based on a wet weight basis. The range of this emission factor varies between 0.8 and 11.4 g CH_4/kg waste treated. Most countries apply the default EF for CH_4 emissions (see Table 7.9). Only Austria, Belgium, Finland, France, Germany, Italy, the Netherlands, Poland and Sweden present IEFs different from the default one and these EFs are much lower than the IPCC default EF (except for Sweden) but within the interval indicated in the 2006 IPCC guidelines.

Further methodological information for all countries is provided in the Annex of this submission

7.3.3 Incineration and open burning of waste (CRT Source Category 5C)

This category includes incineration and open burning of waste. Emissions from waste incinerated for energy use are reported under 1A Fuel combustion activities. Emissions from field burning of agricultural wastes should be reported under 3 Agriculture.

Incineration and open burning of waste is not a key category for the European Union. Some additional information can be found in the chapter 7.3.5 dedicated to waste- non key categories.

7.3.4 Wastewater treatment and discharge (CRT Source Category 5D)

Source category 5D includes the CH_4 and N_2O emissions from domestic and industrial and other wastewater treatment and discharge. Methane and nitrous oxide are produced from microbial processes (anaerobic decomposition of organic matter, nitrification) in sewage systems and facilities. N_2O is also indirectly released from disposal of wastewater effluents into aquatic environments[47].

The subcategory 5D1 Domestic wastewater includes the handling of liquid wastes and sludges from housing and commercial sources through wastewater treatment, septic systems, latrines, lagoons, or discharge into surface waters. Industrial wastewater can also be released into domestic sewer systems and resulting emissions are in that case included under domestic wastewater. On the other hand, industrial wastewater can be treated on the industrial site and then the resulting emissions are be accounted under the separate category 5D2 industrial wastewater.

Total emissions from 5D wastewater handling, including N_2O and CH_4 emissions, account for 1.0 % of total EU GHG emissions including indirect CO_2, with LULUCF, in 2024.

According to the key category analysis CH_4 and N_2O emissions from 5D1 Domestic wastewater and CH_4 emissions from 5D2 Industrial wastewater are an EU key source and analysed in more detail in this chapter. N_2O emissions from industrial wastewater are not an EU key source and are therefore not further analysed in this chapter.

Table 7.10 shows total GHG, CH_4 and N_2O emissions by Member State from 5D Wastewater Handling. Between 1990 and 2024, total emissions from wastewater handling decreased by 35 % in EU. All countries except for France, Sweden and Ireland decreased their emissions from wastewater treatment and discharge between 1990 and 2024. Due to the increasing connexion rate of the population to wastewater treatment plant CH_4 emission decreased considerably by 55 % between 1990 and 2024, while N_2O emissions increased by 40 %.

[47] In most countries, indirect N_2O emissions from disposal of wastewater effluents are the major source of N_2O emissions from wastewater handling, whereas direct N_2O emissions from wastewater treatment plants are small or not relevant.

Table 7.10 5D Wastewater handling: Countries' contributions to total GHG, CH_4 and N_2O emissions from 5D

Member State	GHG emissions in kt CO2 equivalents		N2O emissions in kt CO2 equivalents		CH4 emissions in kt CO2 equivalents	
	1990	2024	1990	2024	1990	2024
Austria	420	342	86	155	334	187
Belgium	1 145	331	103	90	1 042	241
Bulgaria	3 138	591	176	124	2 961	467
Croatia	715	499	59	96	655	403
Cyprus	140	78	10	16	130	62
Czechia	1 291	1 056	208	200	1 083	856
Denmark	441	225	201	126	241	99
Estonia	160	90	34	32	126	58
Finland	315	230	68	62	247	168
France	3 612	4 306	2 299	2 392	1 313	1 914
Germany	4 280	2 139	544	1 156	3 736	984
Greece	2 871	1 587	249	256	2 622	1 331
Hungary	995	560	140	305	855	255
Ireland	135	177	67	113	68	63
Italy	4 703	3 889	1 120	1 238	3 584	2 651
Latvia	429	134	47	33	382	101
Lithuania	185	40	23	6	162	33
Luxembourg	13	6	5	4	8	1
Malta	28	14	9	7	19	7
Netherlands	965	740	544	521	421	219
Poland	4 648	3 009	762	1 103	3 886	1 906
Portugal	1 410	1 354	253	778	1 157	575
Romania	4 098	1 805	383	377	3 715	1 429
Slovakia	257	221	75	130	182	91
Slovenia	347	163	32	32	315	131
Spain	6 054	3 996	1 126	2 838	4 928	1 157
Sweden	371	379	201	187	170	192
EU	**43 168**	**27 960**	**8 824**	**12 377**	**34 344**	**15 583**

Abbreviations explained in the Chapter 'Units and abbreviations'.

7.3.4.1 Domestic wastewater (CRT Source Category 5D1)

CH_4 emissions

CH_4 emissions from 5D1 Domestic Wastewater account for 0.4 % of total EU GHG emissions including indirect CO_2, with LULUCF in 2024.

Table 7.11 5D1 Domestic and commercial wastewater: Countries' contributions to CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	333	186	184	1.7%	-150	-45%	-3	-1%	T2	CS,D
Belgium	1 042	244	241	2.3%	-801	-77%	-3	-1%	CR,T1	CR,D
Bulgaria	473	243	274	2.6%	-199	-42%	31	13%	T2	D
Croatia	547	306	300	2.8%	-247	-45%	-6	-2%	T1	D
Cyprus	103	25	25	0.2%	-78	-75%	0	1%	T1	D
Czechia	677	399	335	3.1%	-342	-51%	-64	-16%	T1	D
Denmark	122	97	95	0.9%	-27	-22%	-2	-2%	CS	CS
Estonia	126	56	56	0.5%	-70	-56%	0	0%	T1	D
Finland	218	152	151	1.4%	-67	-31%	-1	-1%	CS,T2	CS,D
France	1 245	1 800	1 826	17.1%	581	47%	26	1%	T2	CS,D
Germany	3 726	926	927	8.7%	-2 799	-75%	1	0%	CS,D	CS,D
Greece	1 703	169	169	1.6%	-1 534	-90%	0	0%	D	D
Hungary	703	238	227	2.1%	-476	-68%	-11	-5%	T1,T2	D
Ireland	68	63	63	0.6%	-5	-7%	1	1%	T1,T2	CS,D
Italy	1 881	1 090	1 080	10.1%	-801	-43%	-9	-1%	T1	D
Latvia	229	91	96	0.9%	-133	-58%	5	5%	T2	CS
Lithuania	162	22	33	0.3%	-129	-79%	11	48%	T1,T2	D
Luxembourg	8	2	1	0.0%	-7	-83%	0	-17%	T1	CS
Malta	19	10	7	0.1%	-12	-63%	-3	-30%	D	CS
Netherlands	163	123	130	1.2%	-34	-21%	7	6%	T1,T2	D
Poland	3 171	1 669	1 620	15.1%	-1 551	-49%	-48	-3%	T1,T2	CS,D
Portugal	963	533	525	4.9%	-438	-45%	-8	-1%	T2	CS,D
Romania	3 292	1 332	1 308	12.2%	-1 984	-60%	-24	-2%	D	D
Slovakia	146	89	88	0.8%	-58	-40%	-1	-2%	T2	D
Slovenia	207	131	124	1.2%	-83	-40%	-7	-5%	T1	CS,D
Spain	4 289	620	631	5.9%	-3 658	-85%	11	2%	T2	D
Sweden	164	186	186	1.7%	22	14%	0	0%	T2	CS
EU	**25 779**	**10 800**	**10 703**	**100%**	**-15 076**	**-58%**	**-97**	**-1%**	**-**	**-**

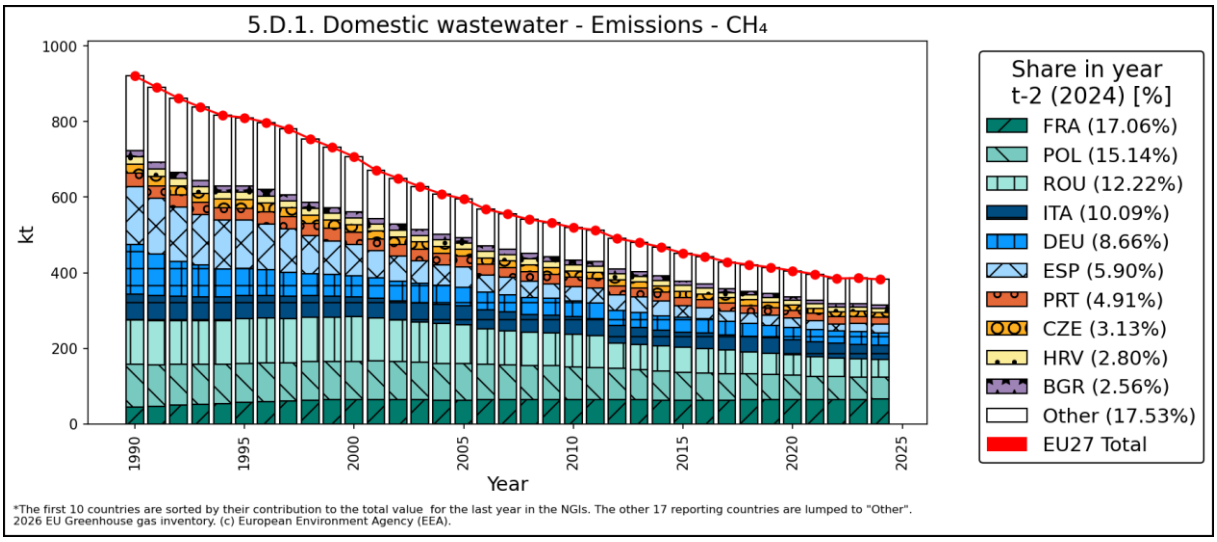
Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

Figure 7.8 shows the trend of emissions indicating the countries contributing most to EU total.

CH_4 emissions from domestic wastewater treatment and discharge decreased considerably between 1990 and 2024 by 58%. In 2024, CH_4 emissions decreased by 0.9 % in comparison to 2023.

Whereas France shows significant emission increases (+ 47 %) between 1990 and 2024, contributing to 17 % of EU emissions from source 5D1 in 2024. Although France increased its emissions, the trend of EU emissions is dominated by the large emission reductions in Spain, Germany and Romania which have large decreases in absolute terms between 1990 and 2024, contributing together to only 27% of EU emissions from source 5D1 in 2024.

Figure 7.8 5D1 Domestic wastewater: CH_4 emissions (Trend in relevant countries)



The decreasing trend of CH_4 emissions from wastewater is not related to a decreasing quantity of wastewater and the amount of the total organic product in the wastewater. Key drivers for the large emission reduction are the following:

- Improvements of wastewater disposal routes with the development of centralized wastewater treatment plants, especially applying aerobic processes
- Amount of sludge removed
- Increased share of CH_4 flared or recovered on anaerobic wastewater and sludge treatment systems

Methodological information for CH_4 emissions from domestic wastewater

All wastewater generated by households as well as any wastewater not disposed on-site in industrial installations is reported as domestic wastewater. CH_4 emissions from wastewater are formed by anaerobic conditions, these can originate during all stages: from wastewater generation to final disposal. CH_4 emissions from domestic wastewater handling (5D1) are a significant emission source in category 5D and key source in the EU.

An important remark in the interpretation of data on CH_4 recovery that are reported in the EU's CRT tables (and the countries CRT tables) for wastewater treatment (5D) is that, not all countries are reporting data related to CH_4 recovery, (for energy use of flaring) in CRT table 5D. The reported CH_4 recovery is generally recovered during sludge digestion for biogas production in a follow-up step of aerated wastewater treatment plants. On the opposite, CH_4 emissions relate mainly to anaerobic treatment systems (septic tanks and natural lagoons). Therefore, comparing CH_4 emissions to CH_4 recovery is meaningless.

Moreover, it must be highlighed that some of the EU member states started to implement the 2019 refinement to the 2006 IPCC GL.

N_2O emissions

N_2O emissions from 5D1 Domestic Wastewater account for 0.4 % of total EU GHG emissions including indirect CO_2, with LULUCF, in 2024.

Table 7.12 5 D1 Domestic and commercial wastewater: Countries' contributions to N_2O emissions

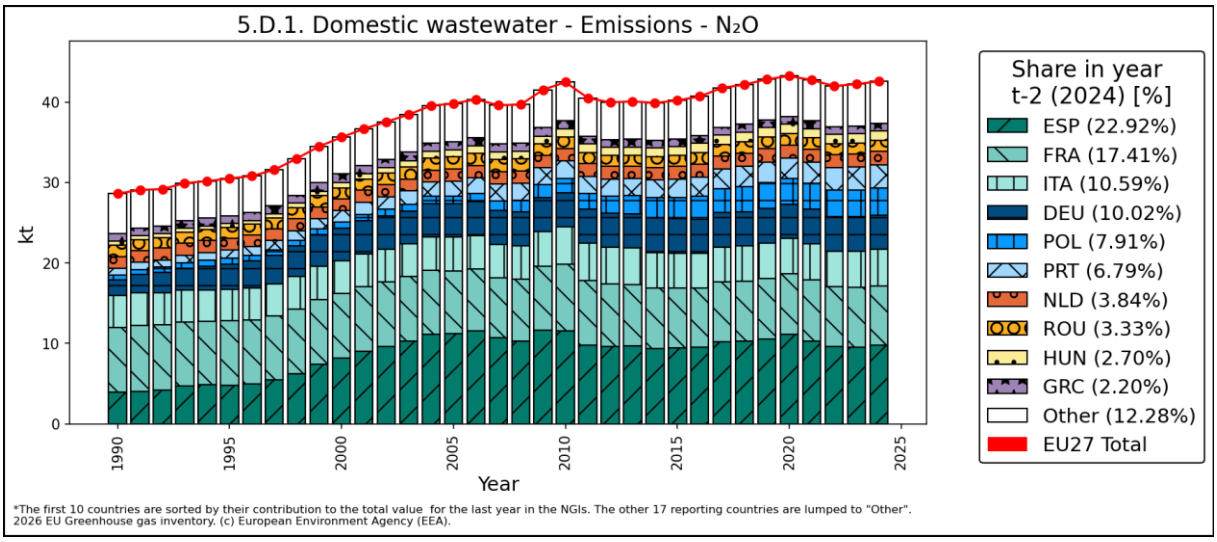
Member State	N_2O Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	85	153	154	1.4%	68	80%	0	0%	CS,D	CS,D
Belgium	103	89	90	0.8%	-13	-13%	0	0%	D	D
Bulgaria	176	124	124	1.1%	-53	-30%	0	0%	T1	D
Croatia	59	95	96	0.9%	37	62%	1	1%	T1	D
Cyprus	10	16	16	0.1%	6	65%	0	1%	T1	D
Czechia	208	200	200	1.8%	-8	-4%	0	0%	T1	CS,D
Denmark	154	114	119	1.1%	-35	-23%	5	4%	CS	CS
Estonia	34	32	32	0.3%	-2	-6%	0	1%	T1	D
Finland	49	54	53	0.5%	3	7%	-1	-2%	CS,T1	D
France	2 131	1 976	1 966	17.4%	-165	-8%	-10	-1%	T2	CS,D
Germany	516	1 132	1 132	10.0%	616	119%	0	0%	CS,D	CS,D
Greece	244	249	249	2.2%	5	2%	0	0%	D	CS
Hungary	140	309	305	2.7%	165	117%	-4	-1%	T1,T2	D
Ireland	67	111	113	1.0%	47	70%	2	2%	T1	D
Italy	1 059	1 190	1 195	10.6%	136	13%	5	0%	T1	D
Latvia	45	34	33	0.3%	-12	-26%	0	-1%	D	D
Lithuania	23	7	6	0.1%	-16	-72%	0	-4%	T1,T2	D
Luxembourg	5	4	4	0.0%	0	-5%	0	-1%	T1	D
Malta	9	8	7	0.1%	-2	-26%	-1	-11%	D	D
Netherlands	374	426	434	3.8%	60	16%	8	2%	T2	D
Poland	155	886	893	7.9%	739	477%	7	1%	T1	D
Portugal	226	745	767	6.8%	541	239%	22	3%	D	CS,D
Romania	383	376	377	3.3%	-7	-2%	0	0%	D	D
Slovakia	66	130	127	1.1%	62	93%	-3	-2%	T2	D
Slovenia	32	31	32	0.3%	0	1%	2	5%	T1	D
Spain	1 050	2 533	2 588	22.9%	1 539	147%	55	2%	D	D
Sweden	185	179	180	1.6%	-5	-3%	0	0%	T1	CS,D
EU	**7 589**	**11 203**	**11 293**	**100%**	**3 704**	**49%**	**90**	**1%**	**-**	**-**

Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

N_2O emissions from domestic wastewater treatment and discharge increased between 1990 and 2024 by 49 % (Table 7.12). *Figure 7.9* shows the trend of emissions indicating the countries contributing most to EU total. The countries contributing most to the observed increase between 1990 and 2024 are Spain, Poland and Germany whereas France presents an important decrease in absolute value. In 2024, N_2O emissions increased by 0.8 % in comparison to 2023 because of the important increase in absolute value observed for Spain, Portugal and the Netherlands.

Key drivers for the emission reduction are the development of centralized wastewater treatment plants with nitrogen abatement technologies.

Figure 7.9 5D1 Domestic wastewater: N_2O emissions (Trend in relevant countries)



Methodological information for N_2O emissions from domestic wastewater

Direct emissions of N_2O during processing only occur in countries with predominantly advanced centralized wastewater treatment plants with nitrification and denitrification steps. Indirect emissions come from wastewater treatment effluent discharged into environments.

For the calculation of N_2O emissions from domestic wastewater no different tier levels are provided in the IPCC 2006 Guidelines but the 2019 Refinement introduces a more complex methodology. Some countries apply the 2006 IPCC GL, some apply the 2019 refinement and, according to Table 7.12 some apply a country specific methodology and/or emission factors.

Further methodological information for all countries is provided in the Annex III of this submission.

7.3.4.2 Industrial wastewater (CRT Source Category 5D2)

CH_4 emissions from 5D2 Industrial Wastewater account for 0.2 % of total EU GHG emissions including indirect CO_2, with LULUCF in 2024.

Table 7.13 5D2 Industrial wastewater: Countries' contributions to CH_4 emissions

Member State	CH_4 Emissions in kt CO2 equiv.			Share in EU-27 Emissions in 2024	Change 1990-2024		Change 2023-2024		Method	Emission factor Information
	1990	2023	2024		kt CO2 equiv.	%	kt CO2 equiv.	%		
Austria	1	3	3	0.1%	2	236%	0	-1%	CS	CS,D
Belgium	IE	IE	IE	-	-	-	-	-	NA	NA
Bulgaria	2 488	216	192	4.0%	-2 296	-92%	-24	-11%	T2	D
Croatia	108	100	103	2.1%	-5	-5%	3	3%	T1	D
Cyprus	27	37	37	0.8%	10	37%	0	0%	T1	D
Czechia	406	525	521	10.9%	115	28%	-4	-1%	CS,T1	CS,D
Denmark	119	4	4	0.1%	-115	-97%	0	0%	CS	CS
Estonia	NO	2	2	0.0%	2	∞	0	12%	T1	D
Finland	30	18	17	0.4%	-12	-42%	-1	-5%	CS,T2	CS,D
France	68	77	88	1.8%	20	30%	11	14%	T2	CS,D
Germany	10	56	57	1.2%	46	446%	1	2%	CS,T2	CS
Greece	919	1 159	1 162	24.2%	243	26%	3	0%	CS,D	CS,D
Hungary	152	28	28	0.6%	-123	-81%	0	0%	T1	D
Ireland	IE	IE	IE	-	-	-	-	-	NA	NA
Italy	1 703	1 549	1 570	32.7%	-132	-8%	21	1%	T1	D
Latvia	154	3	5	0.1%	-149	-97%	2	94%	T1	PS
Lithuania	IE	IE	IE	-	-	-	-	-	NA	NA
Luxembourg	NO	NO	NO	-	-	-	-	-	NA	NA
Malta	IE	IE	IE	-	-	-	-	-	NA	NA
Netherlands	8	10	10	0.2%	2	25%	0	-1%	T2	CS
Poland	715	258	286	6.0%	-429	-60%	28	11%	T1	CS,D
Portugal	194	46	50	1.0%	-144	-74%	4	8%	T2	CS,D
Romania	424	122	121	2.5%	-302	-71%	-1	-1%	D	D
Slovakia	36	4	3	0.1%	-33	-91%	0	-13%	T1	D
Slovenia	108	6	6	0.1%	-101	-94%	0	2%	T1	CS,D
Spain	640	492	526	11.0%	-113	-18%	34	7%	T1	CS,D
Sweden	7	6	6	0.1%	-1	-10%	0	-3%	T2	CS
EU	**8 315**	**4 723**	**4 800**	**100%**	**-3 515**	**-42%**	**77**	**2%**	**-**	**-**

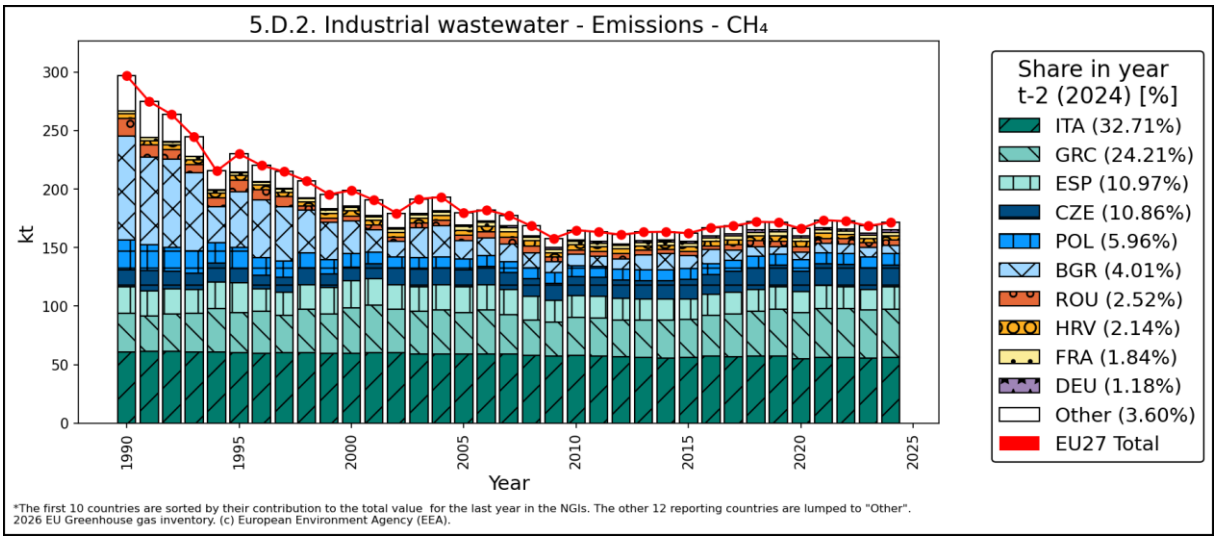
Note: Presented methods and emission factor information refer to the last inventory year. Highlighted cells mark the three Member States with highest share in the EU sector total (yellow), highest decrease (green) and highest increase (red) in the respective period. Abbreviations are explained in the Chapter 'Units and abbreviations'.

CH_4 emissions from 5D2 industrial wastewater treatment and discharge decreased by 42 % between 1990 and 2024. In 2024, CH_4 emissions from this category decreased of 1,6 % in comparison to 2023 (see Table 7.13). *Figure 7.10* shows the trend of emissions indicating the countries contributing most to EU total.

The emission trends in this sector are mainly influenced by the strong decrease in Bulgaria.

Key drivers for the development of CH_4 emissions are primarily economic activities and the share of CH_4 flared or recovered. CH_4 emissions are related to production data in certain industries with high organic contents in the wastewater. Therefore, the trend in CH_4 emissions is fluctuating throughout the time series based on the economic situation in the countries.

Figure 7.10 5D2 Industrial wastewater: CH_4 emissions (Trend in relevant countries)



Methodological information

Emissions from industrial wastewater include all wastewater that is treated/disposed on-site and not sent to public sewers. The main sources for methane emissions from industrial wastewater are:

- pulp and paper manufacture;
- food and drink processing (e.g. meat and poultry processing, alcohol/starch production and dairy products); and
- Organic chemicals production.

Activity data is based on production output from the relevant industries and a Chemical Oxygen Demand per unit of output for each industry. Default IPCC values are provided and it is good practice to use them in the absence of national data.

There is an IPCC default value available for the maximum methane producing potential which is applied in most of the countries. In contrast, the MCF has to be determined country specifically and varies strongly among the countries depending on wastewater treatment systems used.

7.3.5 Waste – non-key categories

Table 7.14 Aggregated GHG emissions from non-key categories in the waste sector

EU	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 5. Waste in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
5.A.3 Uncategorized waste disposal sites: no classification (CH_4)	3 443.2	164.6	142.0	0.13%	-3 301	-96%	-22.5	-14%
5.B.1 Composting: no classification (CH_4)	512.6	2 785.5	2 821.1	2.58%	2 308	450%	35.6	1%
5.B.1 Composting: no classification (N_2O)	306.0	1 739.4	1 765.0	1.62%	1 459	477%	25.6	1%

EU	Aggregated GHG emissions in kt CO_2 eq.			Share in sector 5. Waste in 2024	Change 1990-2024		Change 2023-2024	
	1990	2023	2024		kt CO_2 eq.	%	kt CO_2 eq.	%
5.B.2 Anaerobic digestion at biogas facilities: no classification (CH_4)	8.1	2 034.6	2 135.8	1.95%	2 128	26209%	101.2	5%
5.B.2 Anaerobic digestion at biogas facilities: no classification (N_2O)	0.0	110.5	115.9	0.11%	116	100%	5.4	5%
5.C.1 Waste incineration: no classification (CH_4)	22.9	5.7	5.9	0.01%	-17	-74%	0.2	3%
5.C.1 Waste incineration: no classification (CO_2)	3 336.8	2 076.9	1 916.8	1.75%	-1 420	-43%	-160.1	-8%
5.C.1 Waste incineration: no classification (N_2O)	188.9	84.0	84.1	0.08%	-105	-55%	0.1	0%
5.C.2 Open burning of waste: no classification (CH_4)	330.9	315.3	319.1	0.29%	-12	-4%	3.8	1%
5.C.2 Open burning of waste: no classification (CO_2)	83.4	32.7	32.8	0.03%	-51	-61%	0.0	0%
5.C.2 Open burning of waste: no classification (N_2O)	172.6	152.7	152.6	0.14%	-20	-12%	-0.1	0%
5.D.2 Industrial wastewater: no classification (N_2O)	1 098.7	986.4	1 037.4	0.95%	-61	-6%	51.0	5%
5.D.3 Other: no classification (CH_4)	249.8	77.6	79.5	0.07%	-170	-68%	1.9	2%
5.D.3 Other: no classification (N_2O)	136.4	47.0	47.0	0.04%	-89	-66%	0.0	0%
5.E Other: no classification (CH_4)	56.3	8.7	8.7	0.01%	-48	-85%	0.0	0%
5.E Other: no classification (CO_2)	16.5	12.0	12.4	0.01%	-4	-25%	0.4	3%
5.E Other: no classification (N_2O)	0.0	26.7	25.9	0.02%	26	100%	-0.8	-3%

7.4 Uncertainties

Table 7.15 shows the total EU uncertainty estimates for the sector Waste and the uncertainty estimates for the relevant gases of each source category. The highest level of uncertainty was estimated for CO_2 from 5E, followed by N_2O from 5D followed by the category 5E and followed by CH_4 from 5E. Regarding the uncertainty on trend, N_2O and CH_4 from 5B and N_2O from 5D show the highest uncertainty estimates.

The uncertainty assessment shows notable changes compared to the previous EU GHG inventory submission. Recalculations of emissions/removals, revisions of uncertainties and changes in the resolution of the Member States' uncertainty reporting all influence the sector uncertainties. Therefore, changes in uncertainty estimates between submissions can hardly be attributed to a single cause.

Nonetheless, a large part of the increase in waste level and trend uncertainties can be attributed to Spain's introduction of 5D N_2O uncertainty estimates in combination with a recalculation in this category. For more detailed information on Member States' uncertainties please refer to the Member States' submissions.

Table 7.15 Sector 5 - Waste: EU uncertainty estimates

Source category	Gas	Emissions Base Year	Emissions 2024	Emission trends Base Year-2024	Level uncertainty estimates based on MS uncertainty	Trend uncertainty estimates based on MS uncertainty
5.A Solid Waste Disposal	CO2	0	0	0,0%	0,0%	0,0%
5.A Solid Waste Disposal	CH4	137 196	74 019	-46,0%	43,2%	10,0%
5.A Solid Waste Disposal	N2O	0	0	0,0%	0,0%	0,0%
5.B Biological treatment of solid waste	CO2	0	0	0,0%	0,0%	0,0%
5.B Biological treatment of solid waste	CH4	521	4 957	851,9%	62,8%	315,3%
5.B Biological treatment of solid waste	N2O	230	1 596	593,3%	71,9%	227,1%
5.C Waste Incineration	CO2	3 296	1 950	-40,8%	21,0%	7,7%
5.C Waste Incineration	CH4	201	202	0,4%	36,7%	11,1%
5.C Waste Incineration	N2O	227	106	-53,2%	28,3%	14,7%
5.D Wastewater treatment and discharge	CO2	0	0	0,0%	0,0%	0,0%
5.D Wastewater treatment and discharge	CH4	34 344	15 583	-54,6%	69,0%	33,3%
5.D Wastewater treatment and discharge	N2O	8 824	12 377	40,3%	408,5%	279,3%
5.E Other	CO2	16	12	-24,7%	500,4%	123,8%
5.E Other	CH4	7	8	11,6%	353,4%	106,3%
5.E Other	N2O	0	26	Inf	20,1%	Inf
5 (where no subsector data were submitted)	all	537	539	0,4%	241,8%	210,3%
Total - 5	**all**	**185 399**	**111 375**	**-39,9%**	**55,6%**	**16,4%**

***Note**: Emissions are in kt CO_2 equivalent; trend uncertainty is presented as percentage points; the sum of the source category emissions may not be the total sector emissions of the EU-NID because uncertainty estimates are not available for all source categories in all countries*

For a description of the Tier 1 uncertainty analysis carried out for the EU, see Chapter 1.6.

7.5 Sector-specific quality assurance and quality control

There are several activities for improving the quality of estimating and reporting GHG emissions from waste: Before and during the compilation of the EU GHG inventory, several checks are made of the countries data in particular for completeness, time series consistency of emissions and implied emission factors, comparisons of implied emission factors across countries and checks of internal consistency.

In the second half of the year, the EU internal review is carried out for selected source categories. In 2005, the EU internal review was carried out for the first time. In 2012 a comprehensive review was carried out for all sectors and all EU countries in order to Source category Gas Emissions fix the base year 2020 under the EU Effort Sharing Decision. (ESD review 2012). This review also covered the waste sector of the MS GHG inventories (peer review). In 2015, a few countries volunteered to be reviewed under step 2 of the ESD trial review for the sector waste. In 2016, again a comprehensive review was carried out for all sectors and all EU countries with a focus on the years 2005, 2008-2010, 2013 and 2014 in order to track progress of the EU countries under the EU Effort Sharing Decision. (ESD review 2016).

In March 2016, during the WG1-meeting, a note/paper on wastewater treatment and discharge was discussed with the countries. This note/paper reflects a number of concerns raised during the ESD 2015 trial review. In connection to the ESD review further capacity building activities between the ESD review team and EU sectoral experts have taken place via webinars and distribution of working papers on the main conclusions from the ESD reviews.

In September 2017 a capacity building webinar related to the waste sector was organized between the ESD review team and the countries. Several aspects on solid waste disposal, biological treatment and wastewater treatment were discussed. A second webinar took place in November 2017 in order to discuss in more detail the different interpretations when using equations 6.1-6.3 of the IPCC 2006 guidelines (Volume 5, chapter 6) for calculating emissions from wastewater treatment. An elaborated spreadsheet, along with a brief explanation of the spreadsheet was presented and explained during the webinar.

In autumn 2018 a capacity building webinar related to the waste sector was organized where the ESD review team informed the Countries on specific aspects that were handled and discussed during the ESD review round in 2018.

In autumn 2019 a capacity building webinar related to the waste sector was organized where the ESD review team informed the Countries on specific aspects that were handled and discussed during the ESD review round in 2019.

In autumn 2020 a capacity building webinar related to the waste sector was organized where the ESD review team informed the Countries on specific aspects that were handled and discussed during the ESD review round in 2020.

In autumn 2021 a capacity building webinar related to the waste sector was organized where the ESD review team informed the Countries on specific aspects that were handled and discussed during the ESD review round in 2021.

In 2024, the EU provided bilateral capacity building for the MSs to improve inventory.

In 2024, the transfer from the CRF reporting to ETF reporting tool was quality checked by comparing MSs's estimates of the two reporting tools.

In 2025, a capacity building webinar related to the waste sector was organized in which the ESR review team informed the countries about specific aspects that were handled and discussed during the ESR review round in 2025.

7.6 Sector-specific recalculations

The following table presents the recalculation of the key categories identified for the waste sector, including the level of recalculations made by Member States contributing the most to the EU recalculations of the specific category.

Table 7.16 Sector 5 - Waste: Recalculation of key categories

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 eq.	Change in %	Main contributing countries	Change in kt CO_2 eq.	Change in %	Main contributing countries
5.A.1. Managed waste disposal sites: no classification (CH_4)	492.76	0.5%	ESP: 412 DNK: -253 POL: 165	1482.84	2.3%	ESP: 1774 DNK: -180 EST: -73
5.A.2. Unmanaged waste disposal sites: no classification (CH_4)	1013.30	3.4%	POL: 1012 CYP: 1	28.28	0.3%	POL: 27 CYP: 2

EU key categories	Change in 1990			Change in 2023		
	Change in kt CO_2 eq.	Change in %	Main contributing countries	Change in kt CO_2 eq.	Change in %	Main contributing countries
5.D.1. Domestic wastewater: no classification (CH_4)	-978.93	-3.7%	POL: -1380 ESP: 412 BEL: -7	276.58	2.6%	ESP: 260 DEU: 11 BGR: -8
5.D.1. Domestic wastewater: no classification (N_2O)	850.08	12.6%	ESP: 785 POL: 102 BEL: -20	2429.22	27.7%	ESP: 2289 POL: 150 PRT: -50
5.D.2. Industrial wastewater: no classification (CH_4)	-1285.72	-13.4%	ESP: -1286	-707.93	-13.0%	ESP: -698 GRC: -18 ITA: 6

7.7 Sector-specific improvements

In 2024, the reporting has been amended to be in line with the new CRT reporting tables, as well as the NID outline. Descriptions of categories have been aligned accordingly. Information across sectors has been streamlined to provide a harmonised approach across the whole NID. Any recommendations for improvement of earlier UNFCCC reviews have been continuously followed up and implemented.

Improvements planned for the next reporting are continuing the efforts to ensure consistency between CRT/JSON files and NID, and the provision of sufficient information to meet transparency requirements.

8 OTHER (CRT SECTOR 6)

Sector Other is not an EU key category (see Annex 1.1) and does not include any emissions in 2026

9 INDIRECT CO_2 AND N_2O EMISSIONS

9.1 Description of sources of indirect emissions in the GHG inventory

The CO_2 resulting from the atmospheric oxidation of CH_4, CO and NMVOC is referred to as indirect CO_2. Indirect CO_2 resulting from the oxidation of CH_4, CO and NMVOCs produced by fossil fuel combustion are included in the general methodological approach which assumes that all the carbon in the fuel (minus the portion that remains as soot or ash) is oxidized to CO_2 whereas a fraction of this carbon is initially emitted as CH_4, CO or NMVOC.

Total indirect CO_2 emissions at EU level are based on emission sources reported by those Member States estimating and reporting indirect CO_2, and consistent with the methodological guidance provided in the 2006 IPCC Guidelines.

Indirect CO_2 emissions from solvent use, road paving with asphalt and asphalt roofing are generally reported under CRT category 2D3 ,'non-energy products from fuels and solvent use according to UNFCCC Reporting Guidelines. For other sources of indirect CO_2, emissions are reported in CRT Table 6.

Indirect CO_2 only includes fossil carbon and excludes biogenic sources and combustion-fuels where IPCC default CO_2 emission factors (i.e. full oxidation with factor equal to 1) are assumed.

Indirect N_2O emissions in the agriculture sector address nitrous oxide (N_2O) emissions that result from the deposition of the nitrogen emitted as nitrogen oxides (NO_X) and ammonia (NH_3). N_2O is produced in soils through the biological processes of nitrification and denitrification. One of the main controlling factors in this reaction is the availability of inorganic nitrogen in the soil and therefore deposition of nitrogen resulting from NO_X and NH_3 will enhance emissions.

In addition to agriculture, the 2006 IPCC Guidelines include guidance for estimating N_2O emissions resulting from nitrogen deposition of all anthropogenic sources of NO_X and NH_3 (in particular from sources in the energy and IPPU sectors). The 2006 IPCC Guidelines, Volume 5, also address indirect N_2O emissions which occur from the release of wastewater effluents into waterways, lakes or the sea.

Also, according to para 52 of the MPGs, each Party should report indirect N_2O emissions from sources other than those in the agriculture and LULUCF sectors as a memo item. It follows that those estimates of indirect N_2O shall not be included in national totals. Whereas this paragraph of the MPGs has caused some confusion in previous reviews, the conclusions from the 2nd meeting of lead reviewers of biennial transparency reports clarified that if a Party has reported N_2O emissions from wastewater after disposal of effluent into waterways, lakes or the sea in the “effluent” column of CRT 5.D, the TERT should consider that the approach used by the Party aligns with the 2006 IPCC Guidelines and the MPGs.

As with indirect CO_2, indirect N_2O emissions at EU level are fully consistent with estimation methods used by Member States.

The EU GHG national total includes indirect CO_2 if these emissions have been reported by Member States. Both national totals, including and excluding indirect CO_2, are reported in the CRT tables. Indirect N_2O emissions reported in Summary 1 are not included in national GHG totals.

This chapter refers to the indirect emissions that are reported in Table 6 of the EU CRT tables. As mentioned above, indirect emissions are also included in other sectors, such as indirect CO_2 in IPPU (i.e. under ‘2D Non-energy products from fuels and solvents’) and indirect N_2O in the agriculture and LULUCF sectors (i.e. in CRT tables 3.D and 3.B.b or table 4(IV)). These emissions are dealt with in the corresponding sectoral chapters.

9.2 Methodological issues

Table 9.1 summarizes indirect CO_2 and nitrous oxide emissions reported by EU Member States. Fourteen countries provided values for indirect CO_2 emissions for 2024. The highest shares of the EU total of indirect CO_2 emissions are reported by Italy (23.9 %) and France (21.4 %). Indirect CO_2 has been identified as an EU key category for the first time in 2026.

Seven countries reported indirect N_2O emissions for the year 2024, with Romania, Bulgaria and Italy accounting together for 88 % of the total EU indirect N_2O emissions.

Table 9.1 Indirect CO_2 and N_2O emission for the EU in 2024

Countries	indirect CO_2 [kt CO_2 equ.]	Share in EU [%]	indirect N_2O [kt CO_2 equ.]	Share in EU [%]
Austria	IE,NA,NE,NO	-	IE,NE	-
Belgium	IE,NE,NO	-	IE,NE	-
Bulgaria	36.0	1.0%	3.13	20.6%
Croatia	NA,NO	-	NA,NO	-
Cyprus	7	0.2%	NE,NO	-
Czechia	386	10.6%	0.57	3.7%
Denmark	291	8.0%	0.65	4.3%
Estonia	IE,NE,NO	-	IE,NE,NO	-
Finland	42	1.2%	0.39	2.6%
France	780	21.4%	-	0.0%
Germany	NE,NO	-	IE,NE,NO	-
Greece	NE	-	NE	-
Hungary	NE	-	NE	-
Ireland	105	2.9%	NA,NE,NO	-
Italy	871	23.9%	2.67	17.5%
Latvia	11	0.3%	IE,NA,NO	-
Lithuania	37	1.0%	IE,NE,NO	-
Luxembourg	NA,NO	-	NA,NO	-
Malta	NA,NE	-	NA,NE	-
Netherlands	439	12.0%	NE,NO	-
Poland	468	12.8%	NA,NO	-
Portugal	128	3.5%	NA,NE,NO	-
Romania	NE,NO	-	7.65	50.2%
Slovakia	46	1.3%	NA,NE,NO	-
Slovenia	NA,NE	-	NA,NE	-
Spain	NE,NO	-	NE,NO	-
Sweden	NE,NO	-	0.17	1.1%
EU	**3 648**	**100%**	**15.24**	**100%**

The methodologies for the estimation of indirect emissions in EU countries are consistent with the 2006 IPCC Guidelines.

For the estimation of indirect CO_2 emissions EU countries follow the basic principle proposed by the IPCC for calculating the CO_2 inputs from the atmospheric oxidation of CH_4, CO or NMVOC (2006 IPCC Guidelines, Volume 1, Chapter 7, p. 7.6):

From CH_4:	$Inputs_{CO2} = Emissions_{CH4} \bullet 44/16$
From CO:	$Inputs_{CO2} = Emissions_{CO} \bullet 44/28$
From NMVOC:	$Inputs_{CO2} = Emissions_{NMVOC} \bullet C \bullet 44/12$
Where C is the fraction carbon in NMVOC by mass (default = 0.6)	

Some countries (i.e. CZE, DNM) explicitly mention that the precursor gases emissions (CO, NO_X and NMVOC) used in the above equations are consistent with the precursor gases emissions reported under the United Nations Economic Commission for Europe (UNECE) Convention on Long-Range Transboundary Air Pollution (CLRTAP) and the CH_4 emissions reported to the UNFCCC.

In general, emissions reported in Table 6 refer to indirect emissions from energy, IPPU and waste, while some countries report the indirect CO_2 emissions in other categories too (e.g. in the IPPU category 2.D.3).

9.3 Uncertainties and time-series consistency

Indirect CO_2 emissions decreased between 1990 and 2024 by 52% in the EU, although four countries (Ireland, Lithuania, Poland and Portugal) of the 14 reporting countries reported increases during this period. The highest percentage decrease has been reported by Denmark and Czechia (both -76 %), with Czechia reporting the highest decrease in absolute terms (-1.2 Mt kt CO_2 equ.). The main reason for the decrease in indirect CO_2 emissions is the decrease of the precursor gases emissions.

Only three of the seven countries reporting Indirect N_2O in 2024, also reported emission values for 1990. In these three countries (Czechia, Denmark and Finland) emissions decreased, which caused a decrease of 99% at EU level.

The uncertainty of the indirect emission estimates is also based on the calculation of emissions from these gases.

9.4 Category specific planned improvements

The separate reporting of indirect CO_2 and nitrous oxide emissions (from sources other than agriculture and LULUCF) to the UNFCCC under CRT Table 6 has been performed for the first time in 2015 and is in line with paragraph 52 of the MPGs (Decision 18/CMA.1). Following this reporting the EU team analysed the ways that countries reported these emissions and presented the results in Working Group 1 of the Climate Change Committee of the European Commission. The different approaches have been discussed and guidance was provided to Member States in order to improve the consistency in the reporting of these emissions at EU level.

10 RECALCULATIONS AND IMPROVEMENTS

10.1 Main recalculations

Recalculations presented are calculated from countries submissions (CRT tables) used in the EU GHG inventory submitted on April 15, 2025 and Member State submissions received by 15 March 2026.

Table 10.1 provides an overview of recalculations within the EU GHG inventory by source category in the years 1990-2020 in 5-year steps, and 2020-2023. Explanations are provided for recalculations greater than +(-1000 kt CO_2eq), explaining the underlying reasons from the countries contributing most to the recalculation at EU level. The threshold for explanations is 1000kt CO_2eq, which represents 0.04% of total net EU GHG emissions in 2024.

Comparing recalculations across sectors for the year 2023, it can be seen that recalculations in the energy sector were the highest (change of -18.6 Mt CO_2eq). The changes in the categories ’1A4 other sectors’ (-7.7 Mt CO_2eq) are mainly due to changes in fossil fuel and biomass consumption. In 1B ‘fugitive emissions’ (-6.3 Mt CO_2eq) mainly the revision of average emission rates for surface mines in Romania contributed to the recalculation. The third largest recalculation in the energy sector, occurs in category ‘1A2 manufacturing industries and construction’ (-4.7 Mt CO_2eq) mainly due to updated of the energy balance.

Recalculations in the LULUCF sector were the second largest, after the energy sector, and led to a change of emissions in 2023 of -17.1 Mt CO_2eq. The highest change in occurred in 4A ‘Forest Land’ (- 52Mt CO_2eq) caused by updated assessment of carbon stock in Sweden, changes in soil organic carbon in Germany and updated modelling in France. Changes in category 4B ‘Cropland’ (+29.6 Mt CO_2eq) are a result of an update of the soil organic carbon estimates in Romania, and Germany used for the first time a hectare-accurate record of emissions from mineral soils. Many changes in the reporting cycle 2026 are a result of the implementation of recommendations from the 2025 comprehensive review of the Land Use, Land-Use Change, and Forestry (LULUCF) sector.

Relatively high recalculations can also be observed in the waste category, specifically for 5D ‘Waste water treatment’ with regard to consideration of collected and uncollected waste water and its treatment.

Table 10.1 Recalculations by source category for 1990-2023 in kt CO_2 eq.

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
Total (net emissions)	- 26 713	- 60 998	- 30 228	- 44 438	- 40 483	- 37 068	- 58 944	- 41 931	- 50 638	- 34 372	
1. Energy	**-3 385**	**-3 571**	**-6 800**	**- 10 260**	**-9 725**	**- 18 433**	**- 15 709**	**- 11 729**	**- 15 576**	**- 18 559**	
1.A. Fuel combustion	-1 436	-1 574	728	-872	-1 971	- 10 959	-8 559	-5 126	-9 286	- 12 261	
1.A.1.Energy industries	293	259	240	237	-1 128	-2 820	-1 779	-2 273	-7 842	-1 131	**ROU** (-2 749): Recalculation made for 1A1b with transfer of consumptions from Energy to IPPU sector. Also consumptions have been revised for 1A1a following the comprehensive review and the use of the fuel consumptions from the energy balance. **DEU** (+2 227): The finalization of the preliminary national energy balance is the main reason for the recalculations for 2023. Moreover, for the purpose of improving data quality of the GHG Inventory, national energy balances go under revisions every two years (for the years starting from 2003) through fine-tuning of the computational models, consideration of new statistics or re-allocation of activity data. Latest submission year was also a revision year and there have been updates on the time series from 2018 on for certain plant types as well as updates in official statistics on fuel use for the same time period. These led to recalculations in activity data and emissions from gaseous fuels 1A1a. **ITA** (-308): recalculations are due to the update in National Energy Balance. As reported in the NID, in recent years, the Italian energy balance has been undergoing a general review and updating process. Consequently the final availability is also affected by the related revision procedures.
1.A.2.Manufacturing industries and construction	-314	-229	1 878	2 172	94	-296	1 126	1 703	-1 024	-4 659	**DEU** (-3 072): - The recalculations were mainly driven by revisions of the energy balances, the replacement of provisional 2023 data with final values, revised emission factors, and recalocation of the emission from the heat generation in industrial boilers in 1.A.2.a to 1.A.1.c (heat generation for the production of hard coal coke) and 2.C.1.a. (heat generation for raw steel production) **ITA** (-844): recalculation due to updated activity data in the National Energy Balance. The differences are mainly due to: Update of coal consumption in 2023 for integrated plants (1A2a); Update of liquid

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
											consumptions of other oil products in chemical and petrochemical for 2022 and 2023 resulting in some change in CO_2 emissions from 1A2c; Update of natural gas consumptions data with the reallocation of emissions to 1A2g from 1A1a **POL** (-756): GHG emission was recalculated for 2023 as the result of correction in diesel oil consumption in energy balance in EUROSTAT database. Additional insignificant changes starting from 2010 are related to adjustments in natural gas consumption in updated statistical data as well in fuel oil use for 2023.
1.A.3.Transport	635	654	969	5 737	1 989	7	500	3 554	490	1 247	**POL** (+743): use of updated activity data obtained from the national vehicle registry. The updated dataset includes revised numbers of vehicles, updated annual mileage estimates and corrected age structure of the fleet. These improvements led to changes in fuel consumption estimates and consequently CO_2 emissions. **DEU** (-652): Recalculations for years 2003 - 2023 due to a planned revision of the energy balances. **FRA** (+330): updating activity data: vehicle registration and fleet data by age for 2010-2023 series (SDES / RSVERO data). Traffic statistics (SDES / RSVERO data); traffic volumes (vehicle-km), average annual mileage (km), fuel consumption, fuel deliveries and unit fuel consumption of vehicles registered in France for 1990–2023 series; Improvement of static fleet calculations; Update of energy balance
1.A.4.Other sectors	-2 123	-2 317	-2 448	-9 080	-2 988	-7 897	-8 602	-8 266	-7 111	-7 733	**ESP** (-3 222): Recalculations reflect updated biomass and diesel consumption data for 2021–2023 and methodological improvements for agricultural machinery, irrigation, stationary engines and fishing activity **ITA** (-2 393): Recalculations reflect the alignment of fossil–biogenic CO_2 ratios with ETS data, including the revised assumption that “special” waste incinerated in municipal plants contains a 50/50 fossil–biogenic share, supported by consultations with trade associations and applied with a smoothed transition for 2010–2020 **DEU** (-1 237): Mobile emitters in 1.A.4.a ii, b ii and c ii: revised percentage shares of domestic sales in accordance with line 67 of the national energy balances

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
1.A.5.Other	74	59	88	62	62	47	196	157	140	16	
1.B. Fugitive emissions from fuels	**-1 949**	**-1 997**	**-7 528**	**-9 388**	**-7 754**	**-7 474**	**-7 150**	**-6 603**	**-6 289**	**-6 298**	
1.B.1.Solid fuels	-1 388	-1 454	-6 450	-8 144	-6 127	-5 191	-4 591	-4 460	-4 430	-4 376	**ROU** (-4 153): Recalculations are mainly caused by revision of the Average Emission Rate parameter for CH_4 emissions in subcategory 1.B.1.a.i.3 **POL** (-245): Recalculations are mainly caused by revision of the Average Emission Rate parameter for CH_4 emissions **SVK** (+98) error correction in category 1.B.1.a for CO_2 and CH_4 emissions in Slovenia.
1.B.2.Oil and natural gas and other emissions from energy production	-561	-543	-1 078	-1 244	-1 627	-2 283	-2 559	-2 144	-1 859	-1 922	**POL** (-1 591): Recalculations are mainly caused by the correction of emission factors **BEL** (-277): change in methodology **CZE** (-59): update of activity data in categories 1.B.2.a.iv. and 1.B.2.b.v.
1.C. CO_2 transport and storage											
2.Industrial processes and product use	**-421**	**266**	**144**	**-165**	**62**	**-336**	**-1 442**	**-1 635**	**-708**	**-1 455**	
2.A.Mineral industry	- 79	- 75	- 62	- 77	- 48	-130	-126	-135	-165	-290	
2.B.Chemical industry	-4 966	-4 116	-840	-438	74	74	-550	-546	-320	109	
2.C.Metal industry	0	0	1	0	-0	6	-180	-318	-391	-373	
2.D.Non-energy products from fuels and solvent use	- 15	- 18	- 11	-6	-0	- 58	- 22	-113	129	-181	
2.E.Electronic Industry	1	2	8	13	20	17	30	35	51	35	
2.F.Product uses as ODS substitutes	-0	- 60	-295	-338	-220	-363	-386	-337	-545	-512	
2.G.Other product manufacture and use	- 11	- 14	- 13	64	51	61	-237	-220	-195	-232	
2.H.Other	4 649	4 547	1 355	616	186	57	29	-1	729	- 12	
3.Agriculture	**-2 260**	**-2 543**	**-2 493**	**-2 515**	**-2 101**	**-4 203**	**-3 346**	**-2 343**	**-3 404**	**-1 698**	
3.A.Enteric fermentation	871	512	356	248	178	119	161	154	128	271	
3.B.Manure management	-306	-159	-208	-160	-203	-529	-621	-423	-740	-356	
3.C.Rice cultivation	312	215	516	562	588	531	492	419	291	263	
3.D.Agricultural soils	-3 140	-3 117	-3 163	-3 170	-2 655	-4 358	-3 452	-2 582	-3 216	-1 853	**ITA** (-2 836): update of emission factors from in line with 2019 Refinement, a Tier 2 approach has been implemented using the disaggregated values of these updated factors

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
											FRA (+823): mainly in 3D1a due to adjustment of the method for estimating EF N_2O (refined spatial distribution to take into account fertilizer forms) for Mineral fertilizersresulting in a downward revision at the beginning of the period. Revision of the UNIFA campaigns (activity data) from 2014 onwards, which offsets this decrease at the end of the period, and 3D1d - Crop residues: adjustment of distribution by climate (wet/dry) based on the utilised agricultural areas. **DEU** (+484): The largest changes in terms of amount are in the subcategories "mineralization" and "indirect emission, deposition". Emission from "mineralization" is consistently higher than in Submission 2025, as mineralization in grassland is now included for the first time, in addition to mineralization in arable land.
3.E.Prescribed burning of savannahs											
3.F.Field burning of agricultural residues	3	3	3	2	2	2	2	2	3	4	
3.G. Liming	-0	0	0	0	0	0	1	1	-8	- 31	
3.H. Urea application	0	4	3	3	- 12	34	65	73	129	93	
3.I. Other carbon-containing fertilizers	-0	-0	-0	-0	-0	3	9	14	13	11	
3.J.Other	-0	-0	-0	-0	-0	-5	-4	-1	-4	- 99	
4. Land use, land-use change and forestry	**- 21 048**	**- 56 724**	**- 24 112**	**- 35 533**	**- 32 683**	**- 17 904**	**- 42 973**	**- 30 037**	**- 34 731**	**- 17 094**	
4.A. Forest land	- 23 185	- 58 356	- 28 385	- 25 756	- 47 724	- 32 063	- 56 192	- 50 673	- 50 107	- 52 701	**SWE** (+14 260): Biomass for the years 2020-2023 have been recalculated due to 6000 more sample plots that showed higher carbon stocks. **DEU** (-13 442): recalculations for SOC in mineral soils including litter are mainly due to modifications of the input data taking into account the recent years increase in mortality and harvest when modeling with YASSO15 to calculate emissions. **FRA** (-11822): changes have been made to the spatially explicit land monitoring model. This mostly affects pre 2005 and post 2015 estimates for deforestation dynamics. The attribution of the deforestated areas has been modified for the years not covered by the spatially explicit method. This creates an important recalculation for forest converted to cropland and forest converted to grassland

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
											attributions (mostly in the biomass carbon pool). Please note that the deforestation dynamic (for the whole timeseries) is still identified as a main point of improvement for the next submission due to recent discussions with the NFI team. Then, the model for rotation between agricultural uses has also been updated to include a nomenclature correction that affects the distribution of areas between cropland and grasslands categories ("Long rotation grassland >6years" in the LPIS data are now attributed to Grassland and not temporary Grassland=Cropland). Finally, the areas of drained organic soils have been updated on the basis of a new cartographic product (French Peatland Atlas, Université de Franche Comté).
4.B. Cropland	4 654	7 393	11 310	1 512	7 304	5 047	10 694	16 845	12 950	29 606	**ROU** (+20 198): updated the entire time series calculations of SOC CSC in mineral soils in annual and perennial cropland (SOCref and emission factors, on two time segments: 1989-2009 and 2010-2024), based on policies and measures implemented by Romania; updated the entire time series calculations of indirect N_2O emissions from N mineralization/immobilization. **DEU** (+10 531): Germany has for the first time used hectare-accurate recording of emissions from mineral soils in cropland remaining cropland. Over time full timeseries this resulted most years in less emissions compared to the 2025 submissions but with large interannual variation and in 2023 the result was significant higher emissions compared to what was reported in the 2025 submission. **FRA** (+3 393): changes have been made to the spatially explicit land monitoring model. This mostly affects pre 2005 and post 2015 estimates for deforestation dynamics. The attribution of the deforestated areas has been modified for the years not covered by the spatially explicit method. This creates an important recalculation for forest converted to cropland and forest converted to grassland attributions (mostly in the biomass carbon pool). Please note that the deforestation dynamic (for the whole timeseries) is still identified as a main point of improvement for the next submission due to recent discussions with the NFI team. Then, the model for rotation between agricultural uses has also been updated to include a

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
											nomenclature correction that affects the distribution of areas between cropland and grasslands categories ("Long rotation grassland >6years" in the LPIS data are now attributed to Grassland and not temporary Grassland=Cropland). Finally, the areas of drained organic soils have been updated on the basis of a new cartographic product (French Peatland Atlas, Université de Franche Comté).
4.C. Grassland	-8 185	-5 665	-8 865	- 11 719	-2 591	705	-5 123	-3 734	-6 147	-7 016	**ROU** (-12 114)**:** updated the entire time series calculations of SOC CSC in mineral soils in grassy and woody grassland (SOCref and emission factors, on two time segments: 1989-2013 and 2014-2024), based on policies and measures implemented by Romania; updated the 1989-2018 time series with activity data on biomass burning, based on FAOSTAT data. The 2019-2023 time segment was recalculated, based on a new methodological approach (AI algorithms for including the burned areas in a specific subcategory); updated the entire time series calculations of indirect N_2O emissions from N mineralization/immobilization; **FRA** (+3200): changes have been made to the spatially explicit land monitoring model. This mostly affects pre 2005 and post 2015 estimates for deforestation dynamics. The attribution of the deforestated areas has been modified for the years not covered by the spatially explicit method. This creates an important recalculation for forest converted to cropland and forest converted to grassland attributions (mostly in the biomass carbon pool). Then, the model for rotation between agricultural uses has also been updated to include a nomenclature correction that affects the distribution of areas between cropland and grasslands categories ("Long rotation grassland >6years" in the LPIS data are now attributed to Grassland and not temporary Grassland=Cropland). Finally, the areas of drained organic soils have been updated on the basis of a new cartographic product (French Peatland Atlas, Université de Franche Comté). **POL** (+1668): Main reasons leading to recalculations in the LULUCF sector for the whole time-series are as follows: LUC matrix update; Biomass expantion factor update; Updated SOC assement in categories 4.A, 4.B, 4.C;

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
4.D. Wetlands	1 628	825	886	1 194	904	65	880	1 517	1 311	1 794	**ROU** (+873): updated the entire time series calculations of indirect N_2O emissions from N mineralization/immobilization. **FRA** (+604): changes have been made to the spatially explicit land monitoring model. This mostly affects pre 2005 and post 2015 estimates for deforestation dynamics. The attribution of the deforestated areas has been modified for the years not covered by the spatially explicit method. This creates an important recalculation for forest converted to cropland and forest converted to grassland attributions (mostly in the biomass carbon pool). Please note that the deforestation dynamic (for the whole timeseries) is still identified as a main point of improvement for the next submission due to recent discussions with the NFI team. Then, the model for rotation between agricultural uses has also been updated to include a nomenclature correction that affects the distribution of areas between cropland and grasslands categories ("Long rotation grassland >6years" in the LPIS data are now attributed to Grassland and not temporary Grassland=Cropland). Finally, the areas of drained organic soils have been updated on the basis of a new cartographic product (French Peatland Atlas, Université de Franche Comté). Germany: Introduction of new land ue subcategories as well as updating the base map for determining activity data has resulted in recalculated emissions for CO_2, CH_4 and N_2O in the wetlands category.
4.E. Settlements	1 117	-1 611	47	-2 548	7 793	6 741	5 847	5 718	5 008	5 049	**DEU** (+4716): The recalculation is due to several improevements, introduction of a new land use subcategory Photovoltaic areas, changed sealing factor and methodological changes for determining biomass in settlements all resulted in recalculations of the settlement category. **ITA** (-4361): The revised estimate considers the 20-year transition period and assumes an SOC value for settlements equal to 80% of the previous land use category, in accordance with the 2006 IPCC Guidelines (Vol. 4, Chapter 8). In addition, SOC values for annual and woody crops, as well as for grasslands, have been updated. **ROU** (+2078): Romania updated the entire time series

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
											calculations of indirect N_2O emissions from N mineralization/immobilization.
4.F. Other land	1 020	738	663	612	435	472	733	585	1 036	689	
4.G. Harvested wood products	1 706	-201	36	918	904	924	- 88	-564	964	5 167	**DEU** (+3190): There are newers data for the 2023 avilabe that was not available when making last years submission. To improve consistency, the timeseries has now been recalcuated based on the availablity of data from the 2022 NFI. **ESP (+1270)**: In this edition of the National Inventory, the activity data have been updated according to the information available on the FAOSTAT website. Variations have been identified in the data for the following wood products and in the following years:Sawn wood: production in 2022 and exports in 1963; Wood-based panels: production in 1961–1965, 1992, 1993 and 2022; imports in 1983 and 1984; and exports in 1962–1966; Paper and paperboard: production in 2022, imports in 1984 and exports in 1963; Roundwood: exports in 1963–1965; andPulp: production in 1989–1993 and 2022; imports in 1968, 1970–1974 and 1989–1991; and exports in 1964, 1967, 1969–1972, 1974, 1977, 1984 and 1986–1991. **ITA (-1113)**: The recalculation is due to the revision of FAOSTAT data, available after the january 15th, for wood-based panels, for the years 2020-2023, for paper&paperboard for the years 2022-2023 and for the 2023 data related to the industrial roundwood. Small deviations, comparing the 2026 and 2025 submissions, in the 1990-2020 time series are due to the legacy effect of the FAOSTAT revisions of production, import, and export data prior to 1990.
4.H. Other		-	-0	0	-0	0	-0	0	-0	0	
5.Waste	**395**	**1 555**	**3 020**	**4 003**	**3 948**	**3 770**	**4 427**	**3 731**	**3 719**	**4 270**	
5.A.Solid waste disposal-	1 857	2 004	2 256	2 043	2 078	1 660	1 458	1 049	1 174	1 633	**ESP (+1774):** The 2012–2023 period has been recalculated following the correction of the assumption of a 70% maximum efficiency for biogas captured in landfills, in compliance with a 2025 ESR review recommendation. Furthermore, a recalculation has been performed for the entire time series due to

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023	Main explanations for Recalculations in 2023
											the update of the DOC and DOCf parameters for some waste types, applying the default values from the 2019 Refinement. **POL (+110):** Change of the Oxidation factor value over the whole trend for managed SWDS (to OX = 0.1) . The impact is higher than the 0,05% of the national total only over the 1990-2016 period. **DNK (-180)** : Recalculation occurred for for the whole time series due to improvements in the decay model.The impact is higher than the 0,05% of the national total only over the 1990-2016 period.
5.B.Biological treatment of solid waste	-0	4	9	11	52	97	30	109	99	84	
5.C.Incineration and open burning of waste	-131	25	-124	- 67	-112	-108	-137	-148	- 67	- 73	
5.D.Waste water treatment and discharge	-1 331	-478	879	2 016	1 929	2 121	2 645	2 309	2 119	2 249	**ESP** (+2073): For 5D1, changes in N_2O emissions had the largest impact, caused by the a recommendation from the 2025 ESR review, the calculation methodology has been fixed and aligned with the 2019 IPCC Refinement for the entire historical series. Additionally, for the 2013–2023 period, the distribution of "equivalent inhabitants" (collected and uncollected) has been corrected. Furthermore, the types of treatment applied to both collected and uncollected wastewater have been updated to better reflect the national circumstances, incorporating data from the CNV (National Census of Discharges into Water Bodies) to determine the treatment methods for uncollected water. **POL** (+157): The recalculation results from the update of the BDO value for years 2020-2023, **PRT** (-47): recalculation issued from 2025 ESR Review recommendation for N_2O affecting all the years: Fnon-con value changed from 1.09 to Fnon-con=1 (sinks are generally not equipped with "food waste disposal systems" in Portugal) and the per capita protein intake has been updated for the complete time seriesbased on the Portuguese Food Balance (INE).
5.E.Other	-	-	-	-	-	-	-	-0	-0	0	

Note: The green color code marks recalculations >-1000 kt CO_2 eq and the red colour code marks recalculations >1000 kt CO_2eq

10.2 Implications for emission levels

Table 10.2 provides the differences in total GHG emissions (with LULUCF) between the latest submission and the previous submission in absolute and relative terms for the EU. The table shows that due to recalculations, total 1990 net GHG emissions in the 2026 inventory submission have decreased by 26 713 kt (0.58 %) compared to the previous 2025 submission. Total net EU GHG emissions also decreased by 34 372 kt CO_2 eq (1.18%) compared to the 2025 inventory submission. Recalculations were significantly smaller when excluding LULUCF.

Table 10.2 Overview of recalculations of EU total GHG emissions (difference between latest submission and previous submission in kt CO_2 equivalents)

		1990	1995	2000	2005	2010	2015	2020	2021	2022	2023
Total CO_2 equivalent emissions including LULUCF	kt	-26 713	-60 998	-30 228	-44 438	-40 483	-37 068	-58 944	-41 931	-50 638	-34 372
	%	-0.58%	-1.44%	-0.73%	-1.06%	-1.06%	-1.06%	-1.90%	-1.28%	-1.59%	-1.18%
Total CO_2 equivalent emissions excluding LULUCF	kt	-5 665	-4 274	-6 116	-8 905	-7 800	-19 164	-15 971	-11 894	-15 906	-17 278
	%	-0.12%	-0.09%	-0.14%	-0.20%	-0.19%	-0.50%	-0.48%	-0.34%	-0.47%	-0.56%

Table 10.3 and Table 10.4 give an overview of absolute and relative changes of Member States' emissions due to recalculations for 1990 and 2023. Recalculations of more than 1000 kt of CO_2 equivalents were made by 10 countries in 1990, and by 12 countries in 2023. For the EU, this resulted in a relative change of -0.58 % in 1990 emissions and of -1.18 % in 2023. In 1990, the highest recalculations were made by Italy, Poland and Finland, whereas in 2023, the largest recalculations occurred in Italy, Poland and Sweden. On country level, the highest recalculations in relative terms (of more than 10% in 2023) were made by Sweden, followed by Latvia and Romania.

Table 10.3 Recalculation on Member State and EU level of total GHG emissions (with LULUCF) for 1990–2023 (absolute difference between latest submission and previous submission kt of CO_2 equivalents)

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023
Austria	82	-239	-232	-214	- 62	2	-343	-451	-556	-854
Belgium	-184	-205	-202	-322	-314	-251	-270	-352	-390	-468
Bulgaria	2 114	1 262	1 322	1 576	1 210	1 227	1 407	1 076	809	1 282
Croatia	-105	- 80	42	- 96	-122	-122	- 43	-111	- 83	-119
Cyprus	75	125	115	155	153	153	566	666	544	426
Czechia	-1 377	-1 127	-1 430	-1 374	-1 524	-2 276	1 559	1 025	352	-435
Denmark	-681	-680	-579	-569	-584	-460	-368	-257	-538	-456
Estonia	992	735	687	1 019	656	-224	228	122	608	388
Finland	-6 365	-7 516	-9 095	- 10 103	- 10 001	-9 596	-4 321	-3 705	-4 108	-5 024
France	-3 313	-5 428	-7 426	-4 524	-5 911	-4 607	-8 014	-2 421	-1 490	- 18
Germany	1 198	3 386	3 693	- 10 824	9 007	-2 363	- 31 031	- 16 793	- 17 531	2 176
Greece	- 36	-0	- 44	-0	-0	5	- 50	-133	-130	-121
Hungary	51	57	86	87	- 19	- 29	130	-236	1 562	379
Ireland	1 238	740	475	- 29	-994	-1 012	-1 466	-1 422	-1 136	-872

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023
Italy	- 11 471	- 14 098	- 12 159	- 12 659	- 10 626	- 10 501	-9 820	- 12 119	- 13 028	- 11 578
Latvia	356	1 202	2 106	-383	-737	-1 868	-3 109	-2 852	-3 367	-3 054
Lithuania	375	-316	105	1 623	- 64	309	-640	-555	-618	-1 072
Luxembourg	- 31	- 26	- 30	- 16	-4	38	101	98	58	44
Malta	-7	-4	-6	-3	-1	-5	- 13	-5	-6	- 42
Netherlands	-923	-896	-1 344	-1 363	-402	-666	-479	247	-1 096	-349
Poland	-9 137	- 39 161	-5 549	-5 725	- 24 611	-7 782	- 10 323	-9 386	-9 870	-7 944
Portugal	779	637	799	846	867	642	1 247	1 987	1 931	1 444
Romania	2 491	1 698	-3 075	-3 629	581	4 353	6 505	7 782	5 811	7 266
Slovakia	461	1 544	1 759	1 945	1 918	1 431	1 208	1 020	1 576	1 161
Slovenia	-222	-140	- 33	43	66	- 22	-5	1	52	- 44
Spain	-2 907	-2 218	29	- 67	374	-3 125	-1 095	-1 969	-1 427	-1 509
Sweden	-167	-252	-240	167	660	-318	-506	-3 191	-8 565	- 14 979
EU	**-26 713**	**-60 998**	**-30 228**	**-44 438**	**-40 483**	**-37 068**	**-58 944**	**-41 931**	**-50 638**	**-34 372**

Note: Red marked are all Member State recalculations > +/- 1000 kt CO_2 equivalents

Table 10.4 Recalculation on Member State and EU level of total GHG (with LULUCF) for 1990–2023 (relative difference between latest submission and previous submission in %)

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023
Austria	0.1%	-0.4%	-0.4%	-0.3%	-0.1%	0.0%	-0.5%	-0.6%	-0.8%	-1.1%
Belgium	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	-0.2%	-0.3%	-0.3%	-0.4%	-0.5%
Bulgaria	2.6%	2.3%	3.2%	3.4%	2.5%	2.3%	3.6%	2.4%	1.6%	3.5%
Croatia	-0.4%	-0.6%	0.2%	-0.4%	-0.6%	-0.6%	-0.2%	-0.6%	-0.4%	-0.6%
Cyprus	1.4%	1.8%	1.4%	1.7%	1.7%	1.9%	7.3%	8.4%	6.8%	5.2%
Czechia	-0.7%	-0.8%	-1.0%	-1.0%	-1.2%	-1.9%	1.3%	0.8%	0.3%	-0.4%
Denmark	-0.9%	-0.8%	-0.7%	-0.8%	-0.9%	-0.9%	-0.8%	-0.6%	-1.3%	-1.2%
Estonia	2.8%	4.7%	4.7%	6.1%	4.0%	-1.2%	1.8%	0.9%	4.2%	3.0%
Finland	-12.9%	-14.8%	-18.3%	-22.1%	-18.3%	-21.9%	-8.7%	-6.3%	-7.1%	-9.5%
France	-0.6%	-1.1%	-1.4%	-0.9%	-1.2%	-1.1%	-2.2%	-0.6%	-0.4%	0.0%
Germany	0.1%	0.3%	0.4%	-1.1%	1.0%	-0.3%	-3.8%	-2.0%	-2.1%	0.3%
Greece	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.2%	-0.2%
Hungary	0.1%	0.1%	0.1%	0.1%	0.0%	-0.1%	0.2%	-0.4%	2.9%	0.8%
Ireland	2.0%	1.1%	0.6%	0.0%	-1.5%	-1.6%	-2.4%	-2.2%	-1.8%	-1.5%
Italy	-2.2%	-2.7%	-2.2%	-2.3%	-2.2%	-2.6%	-2.9%	-3.2%	-3.5%	-3.5%
Latvia	2.6%	-51.5%	-115.1%	-8.6%	-7.5%	-16.9%	-28.2%	-22.5%	-21.3%	-20.9%
Lithuania	0.9%	-1.8%	1.2%	9.5%	-0.7%	2.5%	-4.4%	-3.9%	-4.9%	-8.5%
Luxembourg	-0.2%	-0.3%	-0.3%	-0.1%	0.0%	0.4%	1.2%	1.1%	0.8%	0.6%
Malta	-0.2%	-0.2%	-0.2%	-0.1%	0.0%	-0.2%	-0.6%	-0.2%	-0.3%	-1.9%
Netherlands	-0.4%	-0.4%	-0.6%	-0.6%	-0.2%	-0.3%	-0.3%	0.1%	-0.7%	-0.2%
Poland	-2.1%	-9.2%	-1.6%	-1.6%	-6.7%	-2.2%	-3.0%	-2.5%	-2.9%	-2.5%
Portugal	1.2%	1.0%	1.0%	0.9%	1.3%	1.0%	2.3%	3.7%	3.4%	2.8%
Romania	1.1%	1.1%	-2.8%	-3.0%	0.6%	6.4%	10.4%	11.5%	9.1%	12.7%
Slovakia	0.7%	3.5%	4.5%	4.2%	4.7%	4.1%	4.1%	3.0%	5.3%	4.1%

	1990	1995	2000	2005	2010	2015	2020	2021	2022	2023
Slovenia	-1.5%	-1.0%	-0.3%	0.3%	0.5%	-0.1%	0.0%	0.0%	0.5%	-0.4%
Spain	-1.2%	-0.8%	0.0%	0.0%	0.1%	-1.1%	-0.5%	-0.8%	-0.6%	-0.7%
Sweden	-1.4%	-1.4%	-3.4%	2.1%	28.4%	15.6%	-7.6%	-28.9%	-80.9%	-113.8%
EU	**-0.58%**	**-1.44%**	**-0.73%**	**-1.06%**	**-1.06%**	**-1.06%**	**-1.90%**	**-1.28%**	**-1.59%**	**-1.18%**

Note: Red marked are all Member State recalculations > +/- 5%

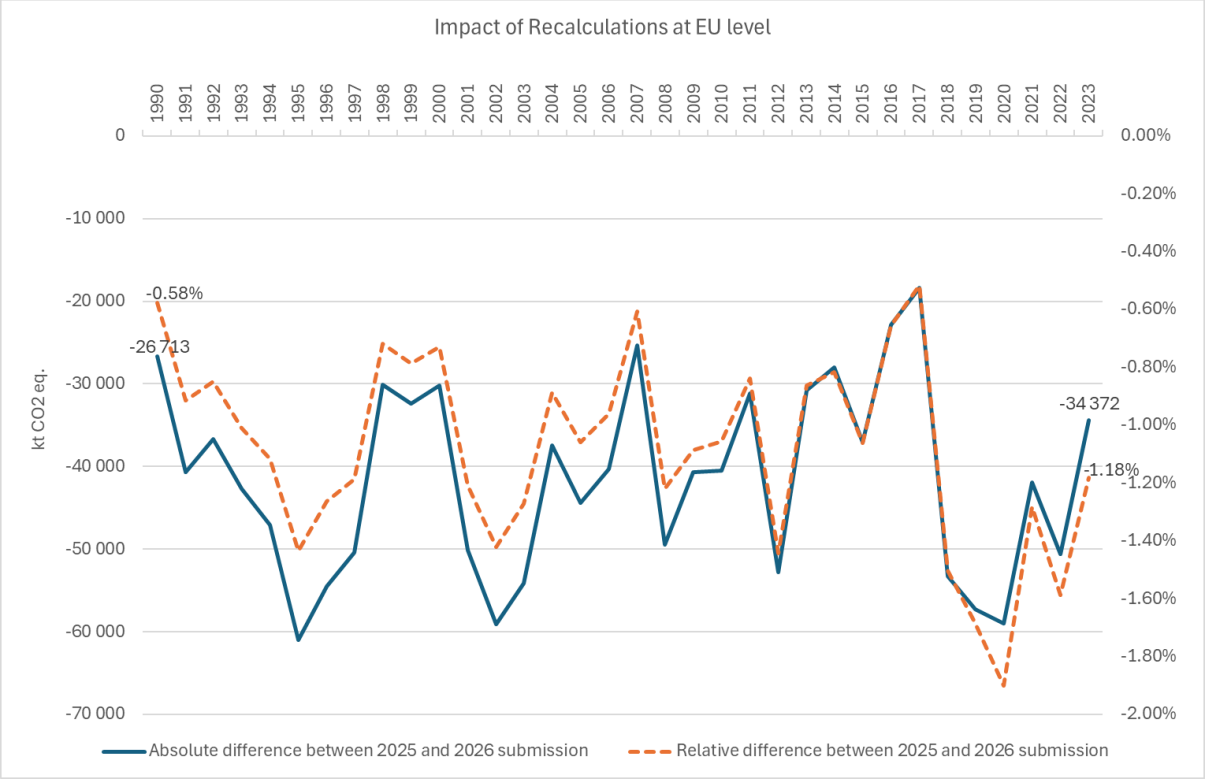
Additional information on recalculations and improvements, with transparent explanations for the main reasons, are available from Member State's on inventory submissions, according to para 43 of the Annex to Decision 18/CMA.1.

10.3 Implications for emission trends, including time series consistency

Figure 10.1 shows the absolute and relative difference in the 2025 and the 2026 submission for all years, showing the decreasing impact of recalculations for all years. Recalculations do not show a specific trend across the years.

In the previous submission total EU GHG emissions (with LULUCF) decreased by 37.3 % between 1990 and 2023, and in the latest submission they decreased by 37.7% over the same period.

Figure 10.1: Absolute and relative difference of total EU GHG emission trends 1990–2022 (with LULUCF) between the latest and the previous submission



Note: Recalculations in this figure are based on EU National Totals. Recalculations in category 1A4 of Spain (Table 10.1.) are not reflected in this figure, as they only affect the sum of 1A4 but not the sector total or national total.

10.4 Areas of improvement, including responses to the review process

In 2026, the report has been updated following the latest information available in Member State submissions. Any recommendations for improvement of earlier UNFCCC reviews have been

continuously followed up and implemented. A detailed improvement plan with the status of implementation of UNFCCC recommendations is part of this report (see Annex V).

The transparency of the information in the EU NID has been further improved. In response to the in country, review of the EU GHG inventory in February 2025 several small adaptations/improvements have been implemented. The EU will continue to improve the transparency of its NID and provide more detailed information based on the recommendations included in the final review report, which was not available at the time of submission of this report.

General improvements made can be summarised as follows:

- Additional trend tables for each sector chapter included
- Further amendment of layout for figures to display emission trends in sectors
- Streamlining and harmonising of information provided in sectoral chapters
- New key categories included in the NID, giving detailed information like for other key categories

Improvements planned for the next reporting cycle are:

- Continue efforts to ensure consistency between CRT/JSON files and NID
- Continue efforts in harmonising the sectoral chapters and the content provided
- Continue the regular QA/QC activities and correct any possible inconsistencies detected

11 REFRENCES

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12 UNITS AND ABBREVIATIONS

t	1 tonne (metric) = 1 megagram (Mg) = 10^6 g
Mg	1 megagram = 10^6 g = 1 tonne (t)
Gg	1 gigagram = 10^9 g = 1 kilotonne (kt)
Tg	1 teragram = 10^{12} g = 1 megatonne (Mt)
TJ	1 terajoule

AWMS	animal waste management systems
AD	activity data
BEF	biomass expansion factor
BKB	lignite briquettes
C	confidential
CAPRI	Common Agricultural Policy Regional Impact Assessment model (http://www.capri-model.org/)
CCC	Climate Change Committee (established under Council Decision No 280/2004/EC)
CH_4	methane
CO_2	carbon dioxide
COP	conference of the parties
CRF	common reporting format
CRT	common reporting tables
CV	calorific value
EC	European Community
EEA	European Environment Agency
EF	emission factor
Eionet	European environmental information and observation network
EMAS	Ecomanagement and Audit Scheme
ETC/CM	European Topic Centre on Climate Change Mitigation
ETF	Enhanced Transparency Framework

ETS	European Emissions Trading System
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
GHG	greenhouse gas
GPG	good practice guidance and uncertainty management in national greenhouse gas inventories (IPCC, 2000)
GWP	global warming potential
HFCs	hydrofluorocarbons
JRC	Joint Research Centre
F-gases	fluorinated gases (HFCs, PFCs, SF_6)
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
LULUCF	land-use, land-use change and forestry
MNP	Milieu-en Natuurplanbureau
MPG	Modalities, Procedures and guidelines
MS	Member State
MRG	monitoring and reporting guidelines
N	nitrogen
NH_3	ammonia
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NFI	national forest inventory
NID	national inventory document
NIR	national inventory report
NO	not occurring
NUTS	Nomenclature of Territorial Units for Statistics
PFCs	perfluorocarbons
QA	quality assurance

QA/QC	quality assurance/quality control
QM	quality management
QMS	quality management system
RIVM	National Institute of Public Health and the Environment (The Netherlands)
SF_6	sulphur hexafluoride
SNE	Single National Entity
UNFCCC	United Nations Framework Convention on Climate Change
VOCs	Volatile Organic Compounds

Abbreviations in the source category tables in Chapters 3 to 9 and 18-24

Methods applied	**EF: methods applied for determining the emission factor**	**AD: methods applied for determining the activity data**	**Estimate: assessment of completeness**	**Quality: assessment of the uncertainty of the estimates**
CR — Corinair	CR — Corinair	AS — associations, business organizations	All — full	H — high
CS — country-specific	CS — country-specific	IS — international statistics	F — full	M — medium
COPERT X — Copert Model X = version	D — default	NS — national statistics	Full — full	L — low
D — default	M — model	PS — plant specific data	IE — included elsewhere	
M — model	MB — mass balance	Q — specific questionnaires, surveys	NE — not estimated	
NA — not applicable	PS — plant-specific	RS — regional statistics	NO — not occurring	
OTH - other				
RA — reference approach			P — partial	
T1 — IPCC Tier 1			Part — partial	
T1a — IPCC Tier 1a				

Methods applied	EF: methods applied for determining the emission factor	AD: methods applied for determining the activity data	Estimate: assessment of completeness	Quality: assessment of the uncertainty of the estimates
T1b — IPCC Tier 1b				
T1c — IPCC Tier 1c				
T2 — IPCC Tier 2				
T3 — IPCC Tier 3				