European Environment Agency

European Union emission inventory report 1990-2023

Under the UNECE Convention on Long-range Transboundary Air Pollution (Air Convention)

EEA Report 06/2025

European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel.: +45 33 36 71 00
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

Luxembourg: Publications Office of the European Union, 2025

ISBN 978-92-9480-727-4
ISSN 1977-8449
doi:10.2800/6464904

Cover design: EEA
Cover photo: EEA
Layout: Eworx/EEA

Contents

Acknowledgements

EEA would like to thank its partners from the European Environment Information and Observation Network (EEA member countries and European Topic Centres) for their valuable contributions and input.

In particular, EEA would like to acknowledge the contributions from the European Topic Centre Human health and the environment (ETC HE) for this publication and the European Commission's Directorate General for Environment.

Executive summary

About this report

This document is the annual EU emission inventory report under the United Nations Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution (Air Convention) (UNECE, 1979). The report and its accompanying data are the official submission to the Air Convention from the European Commission on behalf of the EU as a Party to the UNECE Air Convention. The European Environment Agency (EEA) compiled the report, working together with the EU Member States and the European Commission.

The Air Convention requires Parties to report emission data for numerous air pollutants, including:

- regulated pollutants with a reduction obligation, or the so-called main pollutants: nitrogen oxides (NO_X), non-methane volatile organic compounds (NMVOCs), sulphur oxides (SO_X), ammonia (NH_3) and PM with a diameter of 2.5µm or less ($PM_{2.5}$, also known as fine PM);
- other pollutants: carbon monoxide (CO);
- particulate matter (PM) emitted directly to the air (primary PM): PM with a diameter of 10µm or less (PM_{10}), total suspended particulates (TSPs) and black carbon (BC, as component of PM);
- priority heavy metals (HMs): lead (Pb), cadmium (Cd) and mercury (Hg);
- additional HMs: arsenic (As), chromium (Cr), copper (Cu), nickel (Ni), selenium (Se) and zinc (Zn);
- persistent organic pollutants (POPs): polychlorinated dibenzodioxins/dibenzofurans (PCDD/Fs), polycyclic aromatic hydrocarbons (PAHs), hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs);
- the individual PAHs: benzo(a)pyrene (B(a)P), benzo(b)fluoranthene (B(b)F), benzo(k)fluoranthene (B(k)F) and indeno[1,2,3-cd]pyrene (IP); and
- the sum of all four PAHs.

These pollutants harm human health and the environment. Certain pollutants also contribute to forming ground-level ozone (O_3) and secondary PM in the atmosphere. Some pollutants also affect how sunlight is absorbed by Earth and reflected back to space, which impacts the climate (EEA, 2014, 2019a).

Status of emission reporting by EU Member States

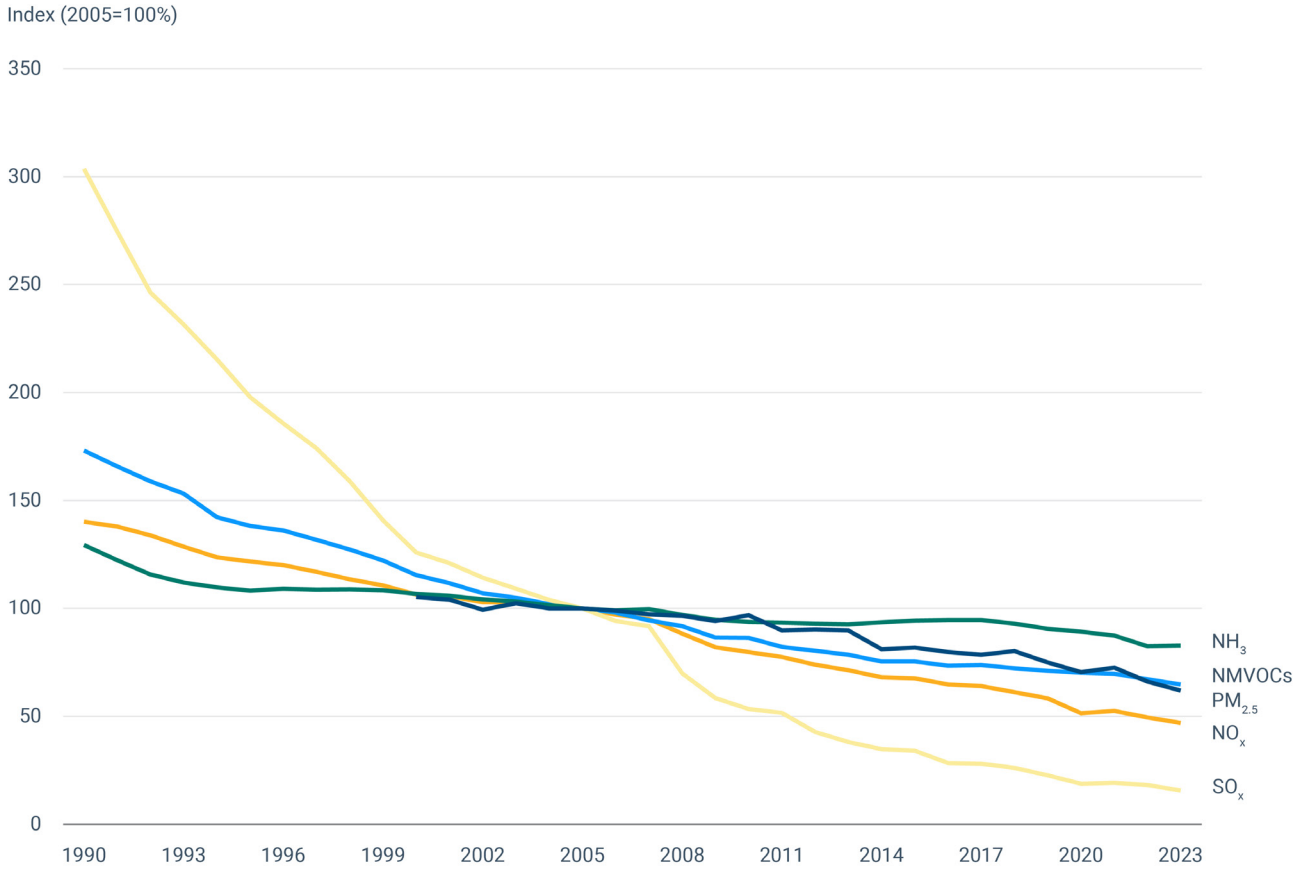
In 2025, under the Air Convention, the EU Member States reported emission inventory data for each year between 1990 and 2023, and for PM from 2000 to 2023. All 27 EU Member States provided air emission inventories and activity data. A gap-filling procedure was applied to those missing emission data for certain years to obtain a European inventory as complete as possible.

Member States also reported their informative inventory reports (IIR) as well as, in the current reporting cycle, gridded and large point source (LPS) data. Detailed information on EU Member States' submissions is given in Appendix 3.

EU emission trends

Emission trends from 1990 to 2023 are presented in Figure ES.1 for NO_X, NMVOCs, SO_X, NH_3 and from 2000 to 2023 for $PM_{2.5}$. The reported emissions of all pollutants were lower in 2023 than in 2005. For the main pollutants, SO_X emissions have reduced the most (in percentage terms) both since 2005 (by 84%) and since 2022 (by 14%). This is followed by NO_X, which reduced by 53% since 2005 and by 5% since 2022. NMVOCs reduced by 35% since 2005 and by 4% since 2022. NH_3 reduced by 17% since 2005, while the emissions did not reduce since 2022. $PM_{2.5}$ reduced by 38% since 2005 and by 6% since 2022.

Figure ES.1 Indexed EU-27 emission trends up to 2023 for NO_X, NMVOCs, SO_X, NH_3 and $PM_{2.5}$



The following paragraphs highlight how emissions have reduced or increased over time in the key sectors responsible for pollution in the EU.

Energy production and distribution

The energy production and distribution sector is a major source of many air pollutants in the EU. In 2023, it was the main source of SO_X and Hg emissions. Despite considerable previous reductions, in 2023 this sector contributed 43% of the total EU emissions of SO_X and 36% of Hg emissions. Additionally, the sector is a significant source of HCB, Cd, NO_X and PCBs. Of the five main pollutants, the highest absolute and relative reductions within this aggregated sector since 2005 were seen for SO_X.

Energy use in industry sector

Energy use in the industry sector is a significant source of SO_X, Hg, Pb, Cd, NO_X and HCB emissions. Of the main pollutants, the highest absolute and relative reduction within this sector since 1990 and 2005, respectively, have been for SO_X. Of the three main heavy metals, Cd shows the biggest reduction from this sector in relative terms since 1990, while Pb shows the largest absolute reduction since 2005.

Industrial processes and product use sector

The industrial processes and product use sector refers to emissions from industrial sources other than those arising from fuel combustion within the industrial sector. This sector is the main source of NMVOC, Cd, Pb, HCB and PCB emissions and a significant source of SO_X, Hg, PM_{10}, PCDD/F and CO emissions. Despite considerable reductions since 1990, the industrial processes and product use sector continues to contribute significantly to total EU emissions of HMs. Of the main pollutants, the highest absolute reductions within this sector since 1990 and 2005 have been for NMVOCs, while SO_X emissions reduced most in relative terms.

Commercial, institutional and households sector

Fuel combustion in commercial and institutional facilities, as well as households, significantly contributes to the total EU emissions of many pollutants. This sector is the main source for B(a)P, PAHs, $PM_{2.5}$, CO, PM_{10} and BC emissions, and a significant source of PCDD/Fs, Cd, HCB, SO_X and NMVOC emissions in the EU. It is also an important sector group for Pb and NO_X emissions. Of the main pollutants for this sector, the highest relative and absolute reduction since both 1990 and 2005 was for SO_X. Within this sector, Cd emissions increased since 1990, although this has levelled off since 2005.

Road transport sector

Road transport is the main sector for NO_X emissions and a significant source of Pb, BC and CO emissions. Of the main pollutants for the sector, the highest absolute reduction since both 1990 and 2005 was for NO_X. The main HM emitted by the road transport sector is Pb, which shows the highest relative reduction in emissions since 1990. However, between 2022 and 2023, Pb emissions increased by 11%.

Non-road transport sector

The non-road transport sector is not the main source for any pollutant, but it is a significant source of NO_X and CO emissions. In 2023 this sector contributed about 14% of the total NO_X emissions and just below 10% of the CO emissions in the EU. In this sector, NO_X emissions have decreased more than CO emissions both relatively and absolutely.

Agriculture sector

The agriculture sector is the main source of NH_3 emissions in the EU with a share of 94% in 2023. In addition, the agriculture sector produces considerable emissions of NMVOCs, PM_{10} and NO_X. Agricultural emissions of NH_3 have fallen by 37% since 1990 and by 16% since 2005.

Waste sector

The waste sector is the main source of PCDD/Fs and BC and a significant source of HCB. PCDD/F emissions in the waste sector have reduced by 66% since 1990 and by 48% since 2005 in the EU. BC emissions in this sector have decreased by 17% since 2000 and by 14% since 2005.

1 Introduction

The European Commission provides this report and its accompanying data, on behalf of the EU-27 countries, as an official submission to the Convention on Long-range Transboundary Air Pollution (Air Convention) via the Convention secretariat at the United Nations Economic Commission for Europe (UNECE).

This report covers the following subjects: the formal institutional arrangements that underpin the EU's emission inventory, the inventory preparation process, methods and data sources, key category analyses (KCAs), information on quality assurance and quality control (QA/QC), general uncertainty evaluation, general assessment of completeness and information on underestimations (Chapter 1); adjustments under the Gothenburg Protocol (Chapter 2); emission trends and the contribution of key categories to total emissions (Chapter 3); sectoral analysis and emission trends for key pollutants (Chapter 4); and information on recalculations and planned improvements (Chapter 5).

Several annexes accompany this inventory report:

- Annex A provides a copy of the EU's formal Air Convention data submission in the required UNECE format for the reporting of air pollutants (nomenclature for reporting 19 (NFR19)).
- Annex B provides the updated EU NO_X emission data for the period 1987-1989, as required by the 1988 NO_X protocol of the Air Convention (see Sofia Protocol in Table 1.1).
- Annex C provides results of the key category analyses (KCAs) for the EU, showing the main emitting sectors for each pollutant.
- Annex D presents the EU's gap-filled inventory, colour-coded for the different data sources used and the various additional gap-filling methods applied.
- Annex E provides EU Member States' projections for NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$ and BC emissions.
- Annex F presents the EU's data submission under the Oslo protocol (Table A2.2 in Appendix 2).
- Annex G gives an overview of the emission data sources of the individual pollutants used when compiling the EU inventory.
- Annex H provides an overview of the completeness of the gap-filled inventory concerning the notation keys 'NE', 'NR', 'NO' and 'NA'.

1.1 Background

The EU ratified the UNECE Air Convention (UNECE, 1979) in 1982. Since 1984, eight protocols have come into force.

Table 1.1 presents the ratification status of each protocol for the EU as a whole. The status differs across individual EU Member States.

Table 1.1: EU ratification status of the Air Convention and related protocols

Year	Air Convention and its protocols	Ratification status
1979	'Air Convention': Convention on Long-range Transboundary Air Pollution (UNECE, 1979)	Signed and ratified (approval)

1984	'EMEP Protocol': Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (UNECE, 1984)	Signed and ratified (approval)
1985	'Helsinki Protocol': Protocol on the Reduction of Sulphur Emissions or Their Transboundary Fluxes by at Least 30 Per Cent (UNECE, 1985)	Not signed
1988	'Sofia Protocol': Protocol Concerning the Control of Emissions of Nitrogen Oxides or Their Transboundary Fluxes (UNECE, 1988)	Ratified (accession)
1991	'Geneva Protocol': Protocol Concerning the Control of Emissions of Volatile Organic Compounds or Their Transboundary Fluxes (UNECE, 1991)	Signed
1994	'Oslo Protocol': Protocol on Further Reduction of Sulphur Emissions (UNECE, 1994)	Signed and ratified (approval)
1998	'Aarhus Protocol': Protocol on Persistent Organic Pollutants (UNECE, 1998a)	Signed and ratified (approval)
1998	'Aarhus Protocol': Protocol on Heavy Metals (UNECE, 1998b)	Signed and ratified (approval)
1999	'Gothenburg Protocol': Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (UNECE, 1999)	Ratified (accession)
2009	Amendments to the Aarhus POPs Protocol	Ratified (acceptance)
2012	Amendments to the Gothenburg Protocol (UNECE, 2012b)	Ratified (acceptance)
2012	Amendments to the Aarhus Heavy Metals Protocol	Ratified (acceptance)

Note: Ratification is the final step in the process of approving an agreement by which the parties indicate their intention to be bound by that agreement. Once ratification has been completed, an agreement can be concluded and formally enters into force[1].

1.1.1 Reporting obligations

Reporting obligations under the Air Convention

The basis for reporting by individual EU Member States and by the EU is the Air Convention (UNECE, 1979), its protocols and the subsequent decisions taken by the Executive Body of the convention. The reporting guidelines describe the data that Parties should report under the Air Convention and its protocols.

Under the Air Convention, Parties are obliged to report their emission totals, the emission inventory, every year for the following pollutants (see Appendix 2):

- regulated pollutants with a reduction obligation:
  - nitrogen oxides (NO_X)
  - non-methane volatile organic compounds (NMVOCs)
  - sulfur oxides (SO_X)
  - ammonia (NH_3)
  - fine PM with a diameter of 2.5µm or less ($PM_{2.5}$)
- other
  - carbon monoxide (CO)

[1] See: https://eur-lex.europa.eu/EN/legal-content/glossary/ratification-process.html

- particulate matter (PM)
  - PM with a diameter of 10µm or less (PM_{10})
  - total suspended particulates (TSPs)
  - black carbon (BC)
- priority heavy metals (HMs)
  - lead (Pb)
  - cadmium (Cd)
  - mercury (Hg)
- additional HMs:
  - arsenic (As)
  - chromium (Cr)
  - copper (Cu)
  - nickel (Ni)
  - selenium (Se)
  - zinc (Zn)
- persistent organic pollutants (POPs)
  - polychlorinated dibenzodioxins/polychlorinated dibenzofurans (PCDD/Fs)
  - polycyclic aromatic hydrocarbons (PAHs)
  - hexachlorobenzene (HCB)
  - polychlorinated biphenyls (PCBs)
- additional reporting of PAHs
  - benzo(a)pyrene (B(a)P)
  - benzo(b)fluoranthene (B(b)F)
  - benzo(k)fluoranthene (B(k)F)
  - indeno(1,2,3-cd)pyrene (IP)

The reporting guidelines (*Guidelines for reporting emissions and projections data under the Convention on Long-range Transboundary Air Pollution*) are adopted by the Executive Body of the Air Convention. The latest guidelines were updated in December 2022 at the 42nd session of the Executive Body (UNECE, 2022a; UNECE, 2022c). A summary of the reporting requirements is presented in Appendix 2.

The reporting guidelines specify separate reporting dates for the EU to allow time to compile an aggregated inventory based on the individual submissions from EU Member States. The reporting guidelines also request that Parties report emission inventory data using the European Monitoring and Evaluation Programme (EMEP) NFR19 format.

The EU should submit the following reporting obligations to the Executive Secretary of UNECE by the dates given below:

- Inventory data by 30th of April, annually;
- Projections data by 30th of April, every 4 years, starting in 2015;
- Informative inventory report by 30th of May, annually;
- Gridded data at a resolution of 0.1°×0.1° longitude-latitude by 15th of June, every 4 years, starting in 2017;
- Large Point Source data (LPS) by 15th of June every 4 years, starting in 2017.

Gothenburg Protocol

The Gothenburg Protocol to the Air Convention (UNECE, 1999) and its amendment (UNECE, 2012a) specifies emission reduction commitments for the pollutants NO_X, NMVOCs, SO_X, NH_3 and $PM_{2.5}$ (and BC as a component of PM). The reduction commitments are defined in relation to the 2005 emission levels and they are to be met by 2020 and every year thereafter.

The emission reduction commitment for the EU as a whole is the sum of the reduction commitments for the EU Member States[2]. For the EU, the emission reduction commitments for 2020 and beyond are the following (UNECE, 2012b):

- 59% for SO_2;
- 40% for NO_X [3];
- 6% for NH_3;
- 28% for NMVOCs;
- 22% for $PM_{2.5}$.

Adjustments under the Air Convention

Adjustments to emission reduction commitments may be applied in certain circumstances if such a circumstance keeps a Party from meeting one of its reduction commitments (UNECE, 2012a; see also Chapter 2. An adjustment may also be applied to emission inventories for the purpose of comparing them with total national emissions.

These circumstances are as follows:

- New emission source categories are identified that were not accounted for at the time the emission reduction commitments were made;
- Emission factors used to determine emission levels for particular source categories have changed since the emission reduction commitments were made;
- The ways of determining emissions from specific source categories have changed significantly between the time when emission reduction commitments were made and the year that they are to be attained.

If a Party is planning to adjust its inventory for the purpose of comparing total national emissions with emission reduction commitments, it indicates in its notification to the Air Convention which categories and pollutants are affected. It uses Annex II to the reporting guidelines as a basis.

Parties must report details of their approved adjusted aggregated emissions using the appropriate row in the main emissions reporting template (Annex I to the reporting guidelines). They must also provide detailed information by pollutant and sector for each adjustment, using the template provided in Annex IIa to the reporting guidelines. Reporting of information on adjusted emissions in no way suspends the mandatory requirement for Parties to report unadjusted emissions, as laid down in Section V, Sub-sections A-D, of the guidelines.

More information and the adjusted emission data can be found in Chapter 2.

1.1.2 Harmonisation of reporting obligations

The National Emissions reduction Commitments (NEC) Directive (2016/2284/EU) entered into force on 31 December 2016, replacing earlier legislation (Directive 2001/81/EC). The 2016 NEC Directive sets emission reduction commitments for five main air pollutants: NO_x, NMVOCs, SO_2, NH_3 and $PM_{2.5}$ separately for the years 2020-2029 and for the years 2030 and after.

The directive transposes the reduction commitments for 2020 agreed by the EU and its Member States under the Gothenburg Protocol of the Air Convention into EU law. The more

[2] The reduction commitment levels specified in Gothenburg Protocol annex II for the EU as a whole are based on the EU membership in 2012 (before Croatia's accession and the UK departure); The EU reduction commitment is therefore subject to technical correction, cf EB decision 2021/3

[3] This figure is in accordance with a technical correction to the original Gothenburg Protocol Annex II table in 2022

ambitious reduction commitments agreed for 2030 are designed to reduce the health impacts of air pollution by half compared to 2005.

Further, the Directive requires that the Member States draw up National Air Pollution Control Programmes with a view to complying with its emission reduction commitments, and to contributing effectively to the achievement of the air quality objectives as stipulated in Article 1 of the Directive.

Reporting obligations under the Air Convention and NEC Directive are largely harmonised. Member States fulfil reporting obligations under either framework using methodologies set out in EMEP Reporting Guidelines, the EMEP/EEA air pollutants emission inventory guidebook and further guidance material adopted under the Air Convention. Minor differences still occur between reporting under the Air Convention and the NEC Directive:

- Reporting of emission data for the PAHs (B(a)P, B(b)F, B(k)F and IP) is voluntary under the Air Convention but is obligatory under the NEC Directive;
- Under the Air Convention, Parties are invited to report their emissions for the EMEP domain. For Portugal, this means that emissions from the Azores and Madeira are included. This differs from reporting under the NEC Directive, for which the Azores and Madeira are excluded;
- Emissions of nitrogen oxides and non-methane volatile organic compounds from activities falling under the 2014 Nomenclature for Reporting (NFR) as provided by the LRTAP Convention categories 3B (manure management) and 3D (agricultural soils) are not included in NECD compliance total, but are included in LRTAP compliance total (Directive 2016/2284/EU, Article 4(3));
- While reporting of projections is required biennially under the NEC Directive, under the Air Convention it is only obligatory every 4 years.

For NO_X, SO_2, NMVOCs and CO, EU Member States are required to report their emissions also under the Governance Regulation (EU 2018/1999) (EU, 2018). This regulation transposes the requirement under the United Nations Framework Convention on Climate Change (UNFCCC) to the EU.

Table 1.2 provides an overview of the various air emission reporting obligations for EU Member States including the NEC Directive, Air Convention and the EU Governance Regulation/UNFCCC. These reporting obligations differ regarding the inclusion of domestic and international aviation and navigation in the reported national totals. Table 1.3 summarises the main differences between these reporting instruments, which are small overall.

Table 1.2: Overview of air emission reporting obligations under the NEC Directive, Air Convention and EU Governance Regulation/UNFCCC in the EU

Legal obligation	Emissions to report	Annual reporting deadline for EU Member States	Annual reporting deadline for the EU([a])
NEC Directive	NO_X (as NO_2), NMVOCs, SO_X (as SO_2), NH_3, CO, HMs, POPs and PM	15 February	Not applicable
Air Convention	NO_X (as NO_2), NMVOCs, SO_X (as SO_2), NH_3, CO, HMs, POPs and PM	15 February	30 April
EU Governance Regulation/United	Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O),	15 January/15 March	15 April

Legal obligation	Emissions to report	Annual reporting deadline for EU Member States	Annual reporting deadline for the EU([a])
Nations Framework Convention on Climate Change (UNFCCC)	hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), nitrogen trifluoride (NF_3), NO_X, CO, NMVOCs and SO_2		

Notes: (a) Over the years, the European Union has acceded to a number of protocols. The protocols have also been signed by the vast majority of EU Member States, while others are in the process to ratify them. Parties are formally required to report only on the substances and for the years set forth in protocols that they have ratified and that have entered into force.

Table 1.3: Comparison of air pollutant reporting obligations under the Air Convention, NEC Directive (NECD) and EU Governance Regulation/UNFCCC

Reporting item	NECD	Air Convention	Governance Regulation/ UNFCCC
Domestic aviation (LTO)	Included	Included	Included
Domestic aviation (cruise)	Not included	Not included	Included
International aviation (LTO)	Included	Included	Not included
International aviation (cruise)	Not included	Not included	Not included
National navigation (domestic shipping)	Included	Included	Included
International inland shipping	Included	Included	Not included
International maritime navigation	Not included	Not included	Not included
Road transport (fuel sold)([a])	Included	Included	Included

Notes: Included: included in national totals; LTO: landing/take-off; Not included: Not included in national total (i.e. memo item). International inland shipping refers to shipping activity in continental waters and international maritime navigation to shipping activity in marine waters. Air emissions resulting from inland shipping are included, as they are more relevant to air quality for the surrounding environment. ([a]) Parties may also report emission estimates based on fuel used as an additional 'memo item'. Austria, Belgium, Ireland, Lithuania, Luxembourg and the Netherlands may choose to use the national emission total calculated on the basis of fuel used in the relevant geographical area as a basis for compliance (UNECE, 2022b; UNECE, 2022c).

1.1.3 Institutional arrangements for the EU

European Commission

The European Commission formally submits the EU emission inventory and the EU IIR to EMEP via the Executive Secretary of UNECE.

European Environment Agency (EEA)

The EEA supports the European Commission's Directorate-General (DG) for Environment to compile the annual EU emission inventory under the Air Convention.

EEA activities include:

- overall coordination and management of the inventory compilation process;
- coordinating the activities of the EEA's European Topic Centre on Human health and the environment (ETC HE);
- communication with the European Commission;
- communication with EU Member States;
- circulation of the draft EU IIR;
- hosting the official inventory database and disseminating the data and inventory report online;
- preparing the gap-filled EU emission inventory, based on Member States submissions and submitting this to the European Commission;
- compiling the EU IIR, based on the gap-filled EU emission inventory and the Member States IIRs;
- supporting a separate annual quality review of emission data submitted by the EU Member States;
- EEA is one of the co-chairs of the Task Force on Emission Inventories and Projections (TFEIP) under the Air Convention.

EU Member States

EU Member States are responsible for compiling their national emission inventories and informative inventory reports. They are responsible for selecting the activity data, emission factors and other parameters for their national inventories. EU Member States should also follow the reporting guidelines (UNECE, 2022b; UNECE, 2022c) and apply the methodologies in the latest version of the EMEP/EEA inventory guidebook (EMEP/EEA, 2023). EU Member States are also responsible for establishing QA/QC programmes for their inventories. Each emission inventory report should include a description of the QA/QC activities and recalculations.

EU Member States submit their national emission inventories and informative inventory reports to the European Environment Agency (EEA) via the reporting system maintained by the EEA. In addition, they take part in the annual review and commenting phase of the draft European Union emission inventory report (EU IIR). EU Member States check their national data and information used in the EU IIR and, if necessary, submit updates. They also provide general comments on the EU IIR.

European Topic Centre on Human Health and the Environment (ETC HE)

The main activities of the ETC HE[4] regarding the EU's Air Convention emission inventory include:

- supporting the EEA in the development of the EU emission inventory and the EU emission inventory report;
- supporting a centralised review of Member State submissions in cooperation with the EMEP Centre on Emission Inventories and Projections (CEIP) and compiling results from those checks (status reports, country synthesis and assessment reports, country review reports).

[4] https://www.eionet.europa.eu/etcs/etc-he

European Environment Information and Observation Network (Eionet)

Eionet facilitates the work of the EEA and the respective European topic centres (ETCs) (EU, 1999)[5]. It comprises the EEA (supported by its ETCs) and a supporting network of experts from national environment agencies and other bodies that deal with environmental information (Eionet, 2023a). Eionet's Central Data Repository is used as the reporting tool where the EU Member States Reportnet make their Air Convention submissions available to the EEA (Eionet, 2023b).

1.2 EU Inventory compilation

The Air Convention emission inventory of the EU is based on an aggregation of data reported by EU Member States. The methods that the Member States use should follow those described in the inventory guidebook (EMEP/EEA, 2023).

The recommended structure for an Informative Inventory Report (IIR) involves a general description of the methodologies and data sources used. This includes an overview of the emission factors used in the national inventory — country specific or default given in the inventory guidebook (EMEP/EEA, 2023) — and the specification of the sources of emission factors and methods. It also provides a detailed description of activity data sources where data differ from national statistics.

The following sub-sections summarise the information that EU Member States provide in their IIRs. This should help readers to understand the basis of the EU inventory. For detailed descriptions of methodologies and data sources, see EU Member States' IIRs (see Appendix 5 for IIR references).

1.2.1 Reporting data flow

Under the agreement between Eionet countries and the EEA concerning priority data flows, EU Member States are requested to post a copy of their official submission to the Air Convention in the reporting system provided by EEA by the 15th of February each year. The EEA subsequently collects the data in a database, performs a QA/QC procedure, compiles the gap-filled EU Air Convention emission inventory database and produces an EU27 emission inventory. The EEA also compiles the EU IIR. The European Commission formally submits the EU's emission inventory data and the EU IIR to EMEP through the Executive Secretary of UNECE. The inventory and accompanying documentation are then made publicly available through the EEA's website.

All inventory documents (submissions, inventory master files, inventory reports, status reports and related correspondence) are archived electronically on the EEA system. Revisions of data sets are recorded.

1.2.2 Data sources

The main data sources for the national emission inventories are official national statistics.

Table 1.4 summarises data sources commonly used by the Member States for the various sectors. The main source for emission factors is the inventory guidebook (EMEP/EEA, 2023). However, the emission factors can also be country specific or even plant specific. The emission factors also vary according to which tier method is used by the Member State. Detailed information on the data sources and emission factors used by each Member State is documented in their respective IIR (see Appendix 5).

[5] https://www.eionet.europa.eu/

The data sources used to compile the EU emission inventory and the EU informative inventory report is the EU Member States' emission inventories and the informative inventory reports, respectively.

Table 1.4: Data sources commonly used for inventory sectors

Sector	Sources
Energy	Energy balances, EU Emissions Trading Scheme (ETS) data, large combustion plant data and LPS surveys
Transport	Energy balances, vehicle fleet statistics
Industrial processes and product use	National production statistics, trade statistics, data from plant operators (facility reports), reporting under the European Pollutant Release and Transfer Register (E-PRTR) and its predecessor, the European Pollutant Emission Register (EPER)
Agriculture	National agricultural statistics, specific studies
Waste	Landfill databases, national studies, national statistics, information from municipalities

Comparison of EU Member States' emissions calculated on the basis of fuel sold versus fuel used in road transport

Parties to the Air Convention can estimate transport emissions using the amount of fuel sold within the country or the amount of fuel consumed. When fuel purchased within a country is used outside that country (and vice versa), these estimates can differ significantly. The EU inventory estimates emissions from road transport based on the fuel sold for all EU Member States.

Article V/A, paragraph 22, of the EMEP reporting guidelines (UNECE, 2022b; UNECE, 2022c) specifies how to report emissions from transport:

> *For emissions from transport, all Parties should calculate emissions consistent with national energy balances reported to Eurostat or the International Energy Agency. Emissions from road vehicle transport should therefore be calculated on the basis of the fuel sold in the Party concerned. In addition, Parties may voluntarily calculate emissions from road vehicles based on fuel used or kilometres driven in the geographical area of the Party. The method for the estimate(s) should be clearly specified in the IIR.*

Paragraph 23 of the guidelines provides detailed information on the basis of compliance checking:

> *For Parties for which emission ceilings are derived from national energy projections based on the amount of fuel sold, compliance checking will be based on fuels sold in the geographical area of the Party. Other Parties within the EMEP region (i.e. Austria, Belgium, Ireland, Lithuania, Luxembourg, the Netherlands, Switzerland and the United Kingdom of Great Britain and Northern Ireland) may choose to use the national emission total calculated on the basis of fuels used in the geographic area of the Party as a basis for compliance with their respective emission ceilings (UNECE, 2022b).*

1.2.3 Data gaps and gap filling

The EMEP reporting guidelines (UNECE, 2022b) require that submitted emission inventories are complete. However, emission estimates are not always available for all pollutants every year,

because there are gaps in the data reported by the EU Member States. A gap-filling process was developed in 2010 for compiling the EU inventory and was refined in 2011 and 2017.

The gap-filling procedure, performed for the EU inventory by the EEA, follows a methodology paper by the EEA and the European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM, 2015) and some changes agreed by TFEIP in 2016[6]. This procedure is also consistent with the techniques used to fill emission data gaps proposed by the inventory guidebook (EMEP/EEA, 2023). It applies a stepwise approach using emission data from other reporting obligations to fill gaps in the national data sets, followed by further gap-filling procedures such as interpolation or extrapolation and manual changes.

Gap filling can only be applied if national total or sectoral data is available. When the national total is available, sectors are first gap filled and then summed to determine the total. When sectoral data is available, the sectoral split of the previous or following year is used to fill the gaps. If a national total was available, but the sectoral data were incomplete, no gap filling is carried out. In such instances, the EU emission totals for these pollutants are considered incomplete (i.e. they are underestimated). Furthermore, inventories cannot be considered complete if the notation keys 'NE' and in some cases 'NR', or the value 0, are reported or are used for gap filling. For further information on the effect of gap filling on the EU inventory, see Section 1.3.7.

Box 1.1: Unified Air Convention gap filling for EU and EMEP inventories (ETC/ACM, 2015)

A stepwise approach is used to fill gaps in the national data sets:

1. An EU wide emission inventory (comprising of trends for all pollutants from 1990 onwards) is compiled by the EEA, using the Air Convention emission inventories provided by the EU Member States

2. Air Convention inventories submitted to the EEA in the previous year are the next source used to fill remaining gaps. All reported data (i.e. values and notation keys) are used.

3. Next, emission data reported officially by EU Member States under the NEC Directive in the current year are used to fill gaps. Notation keys are not used in this step.

4. For those EU Member States not reporting complete data, emission data reported officially by them under the EU Energy Governance Regulation in the current year are used to fill gaps. Notation keys are not used in this step.

5. Subsequently, notation keys reported by EU Member States under the NEC Directive in the current year are used to fill any remaining gaps.

6. In a further step, notation keys reported by EU Member States under the Energy Governance Regulation in the current year are used to fill any remaining gaps.

7. Next, Member State Air Convention emission inventories provided to the EEA in previous years are used to fill any gaps still remaining (values and notation keys).

8. Next, NEC Directive data provided to the EEA in previous years are used to fill any remaining gaps (values and notation keys).

9. The gap filling continues with emission data reported in previous years under the Energy Governance Regulation (values and notation keys).

10. For all remaining cases of missing data, further gap-filling procedures are applied:

    (a) Linear interpolation is performed if one or several years are missing in the middle of a time series.

    (b) Linear extrapolation is performed if one or several years are missing, either at the beginning or at the end of a time series, and if at least 5 consecutive years showing a

[6] TFEIP/Eionet meeting and workshop, 16-18 May 2016, in Zagreb.

clear trend (r2≥0.6) are available. Extrapolation 'backwards' is never allowed to result in negative values.

(c) If fewer than 5 consecutive years are available as a basis for extrapolation, or if years do not show a clear trend (as is the case when $r^2<0.6$), the value of the previous or next year is used to fill the gaps.

(d) If the notation key 'NA' (not applicable) or 'NO' (not occurring) is used as a basis for gap filling, it is treated as '0' and is not gap filled.

(e) When both national total and sectoral data are unavailable, sectors are first gap filled and then summed to determine the total.

(f) When the national total is available but there are no sectoral data, the sectoral split of the previous or following year is used to fill the gaps.

11. The final step of the gap-filling procedure is the correction of the gap-filled particulate matter data in all cases in which total suspended particulate (TSP) emissions are lower than PM_{10} emissions, PM_{10} emissions are lower than $PM_{2.5}$ emissions, or $PM_{2.5}$ emissions are lower than BC emissions. In these cases, PM10 data are equated with TSP data, $PM_{2.5}$ data with PM_{10} data, and BC data with $PM_{2.5}$ data.

1.3 Overview of the reporting in the current cycle

1.3.1 Data submissions

Appendix 3 presents detailed information on EU Member States' submissions in the current reporting cycle. In addition to the inventory data, gridded data and LPS data was mandatory in the current reporting cycle.

1.3.2 Activity Data

Activity Data is provided for all categories for liquid fuels, solid fuels, gaseous fuels, biomass and other fuels. Aggregation of the reported activity data for the EU is possible, when all Member States report in the same unit.

Activity Data for 'Other Activity' is reported in following categories:

- 1A1a Public electricity and heat production
- 1A1b Petroleum refining
- 1A1c Manufacture of solid fuels and other energy industries
- 1A2a Stationary combustion in manufacturing industries and construction: Iron and steel
- 1A2b Stationary combustion in manufacturing industries and construction: Non-ferrous metals
- 1A2c - Stationary combustion in manufacturing industries and construction: Chemicals
- 1A2d - Stationary combustion in manufacturing industries and construction: Pulp, Paper and Print
- 1A2e - Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco
- 1A2f - Stationary combustion in manufacturing industries and construction: Non-metallic minerals
- 1A2gvii - Mobile combustion in manufacturing industries and construction (please specify in the IIR)
- 1A2gviii - Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)
- 1A3ai(i)- International aviation LTO (civil)

- 1A3aii(i) - Domestic aviation LTO (civil)
- 1A3bi - Road transport: Passenger cars
- 1A3bii - Road transport: Light duty vehicles
- 1A3biii - Road transport: Heavy duty vehicles and buses
- 1A3biv - Road transport: Mopeds & motorcycles
- 1A3bvi - Road transport: Automobile tyre and brake wear
- 1A3bvii - Road transport: Automobile road abrasion
- 1A3c - Railways
- 1A3di(ii) - International inland waterways
- 1A3ei - Pipeline transport
- 1A3eii - Other (please specify in the IIR)
- 1A4ai - Commercial/Institutional: Stationary
- 1A4aii - Commercial/Institutional: Mobile
- 1A4bi - Residential: Stationary
- 1A4bii - Residential: Household and gardening (mobile)
- 1A4ci - Agriculture/Forestry/Fishing: Stationary
- 1A4cii - Agriculture/Forestry/Fishing: Off-road vehicles and other machinery
- 1A4ciii - Agriculture/Forestry/Fishing: National fishing
- 1A5a - Other stationary (including military)
- 1A5b - Other, Mobile (including military, land based and recreational boats)
- 2A2 - Lime production
- 2B1 - Ammonia production
- 2B3 - Adipic acid production
- 2B5 - Carbide production
- 2B6 - Titanium dioxide production
- 2B7 - Soda ash production
- 2C3 - Aluminium production
- 1A3bi(fu) - Road transport: Passenger cars (fuel used)
- 1A3bii(fu) - Road transport: Light duty vehicles (fuel used)
- 1A3biii(fu) - Road transport: Heavy duty vehicles and buses (fuel used)
- 1A3biv(fu) - Road transport: Mopeds & motorcycles (fuel used)
- 1A3bv(fu) - Road transport: Gasoline evaporation (fuel used)
- 1A3bvi(fu) - Road transport: Automobile tyre and brake wear (fuel used)
- 1A3bvii(fu) - Road transport: Automobile road abrasion (fuel used)

1.3.3 Condensable components from $PM_{2.5}$ and PM_{10}

Particulate matter (PM) consists of a filterable fraction and a condensable fraction. The condensable fraction reacts shortly after release on cooling and dilution and forms solid or liquid PM. Although the reporting of condensable components is not mandatory, including information on condensable components is recommended in Annex II of the reporting guidelines (EMEP CEIP, 2023a).

In the current reporting cycle, 20 EU Member States provided information in their IIR that confirms they include the condensable components. The level of information provided by the Member States is rather heterogeneous and for many categories no information is available.

1.3.4 Key category analyses

A key category is an emission source category that has a significant influence on an inventory. It may affect the absolute level of emissions, the trend in emissions or both. This report

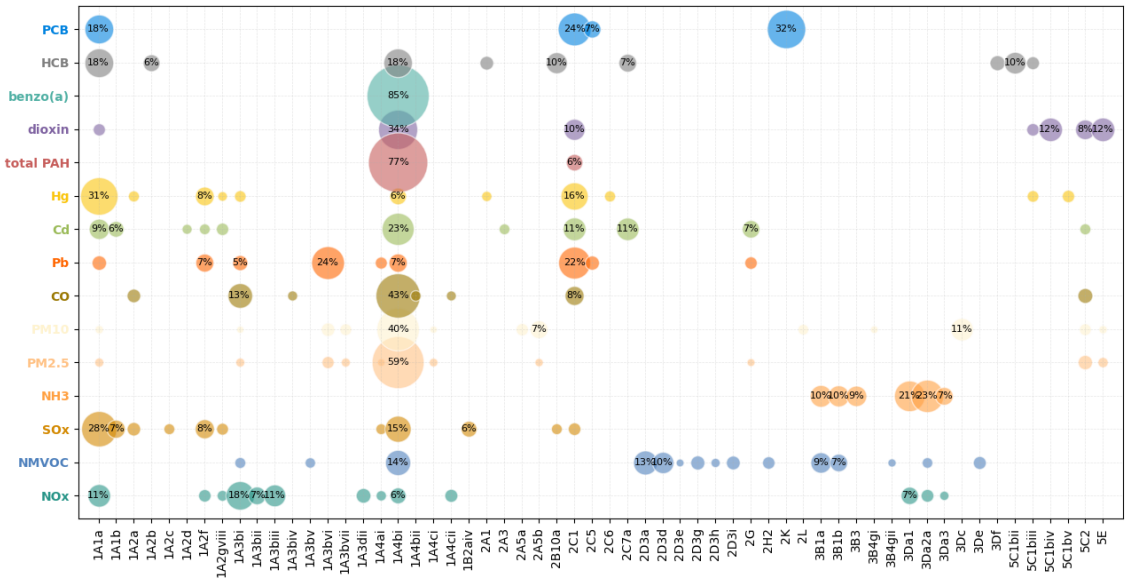
classifies categories jointly responsible for 80% of the national total emissions of a given pollutant as key categories (see EMEP/EEA, 2023).

EU key categories are determined by an analysis of the total EU emission levels of each pollutant following any necessary gap filling. Several factors may influence the determination of key categories at the EU level. When a Member State uses the notation 'IE' (included elsewhere) for a particular source-pollutant combination, the category concerned is likely to be underestimated, while the category in which emissions were reported instead is likely to be overestimated. In addition, EU Member States have different ways of allocating emissions to the sub-sector 'other', which might lead to inconsistencies. Given such issues, the EU KCA may not always accurately reflect the share of all main emission sources. It is also crucial to note that the results of a similar analysis of individual EU Member States will differ from the key sources determined for the EU.

A complete list of all EU key categories for the emissions of NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$, PM_{10}, CO, HMs (Pb, Cd and Hg) and POPs (PCDD/Fs, total PAHs, HCB and PCBs) is given in Figure 1.2. Chapter 3 provides a summary of the top five EU key categories for these pollutants. Additional HMs, TSPs, BC and the remaining POPs are not considered here.

More information on the Key category analysis can be found in Annex c.

Figure 1.2: EU KCA results for the current year



Note: Bubble size indicates the share of the respective category to the national total of the particular air pollutant. All values >5% are indicated. For NFR codes, see the list of source sector abbreviations in Appendix 4.

1.3.5 Quality assurance and Quality control

EU Member States are encouraged to use appropriate quality assurance (QA) and quality control (QC) procedures to ensure data quality and to verify and validate their emission data. These procedures should be consistent with those described in the inventory guidebook (EMEP/EEA, 2023).

Once the Member States submit their quality-assured data to the EEA, an automatic QA procedure is performed. If the submission passes this stage, the data submission is technically accepted by the EEA. After the technical acceptance, the reported data are harvested into the

EEA's internal SQL database. Thereafter, automatic SQL procedures and functions populate the publicly available QA/QC Tableau data-viewers[7]. These data-viewers support the EEA, the European Commission and the EU Member States in performing an evaluation of the reported data. When relevant, this may result in a request for resubmission. An overview of the findings during the current reporting is given in Table 1.6.

Table 1.6: Findings of the quality checks carried out during the preparation of the EU Air Convention emission inventory in the current reporting cycle

Test/check	Number of EU Member States concerned
BC to PM2.5 ratio checks	5
TSP to PM_{10} ratio, PM_{10} to $PM_{2.5}$ ratio checks	16
Discrepancies in individual PAHs and totals	11
'NE' (i.e. Not Estimated) analysis	27
Time series checks	9

In addition to the QA/QC procedures mentioned above, EU Member States also provide external checks through an Eionet review before the EU submits the final version of the EU inventory to the UNECE secretariat.

Additionally, an annual review, consisting of more detailed QA activities for the Member State Air Convention emission inventories, is performed by the EMEP Centre on Emission Inventories and Projections (CEIP) (EMEP CEIP, 2023b). At the same time, the European Commission, assisted by the EEA, reviews the inventories reported under the NEC Directive (EU, 2016). The results from these reviews are used to improve the quality of the national emission inventories, and where applicable, the quality of the EU inventory or the IIR.

1.3.6 Uncertainty evaluation

To quantify uncertainty in the EU Air Convention emission inventory, a prerequisite is that the EU Member States provide detailed information on emission uncertainties. During the current reporting cycle, not all Member States provided detailed tables quantifying uncertainty in their emission inventories for at least the main pollutants and PM emissions. For the Member States that provided uncertainty analysis, the covered pollutants and the assumptions behind the analysis vary across the Member States. As not all countries provided an uncertainty estimate, the overall uncertainty of the EU emission inventory cannot currently be estimated.

1.3.7 Completeness of reporting

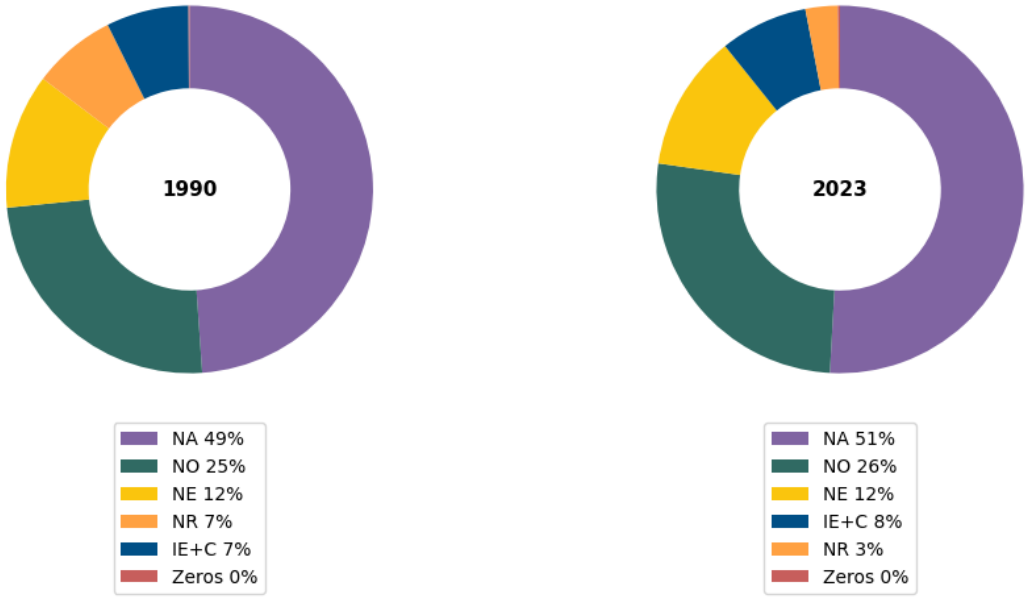
In this context, completeness means that reports include estimates for all pollutants, all relevant source categories, all years and all territorial areas. The reporting guidelines (UNECE, 2022b) require Parties to report data at least for the base year of the relevant protocol, and from the year it entered into force and up to the latest inventory year (i.e. minus 2 years from the

[7]https://tableau-public.discomap.eea.europa.eu/views/LRTAP_QAQC_16468126650020/ReportingOverview?%3AshowAppBanner=false&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

submission year) (see Appendix 2, Table A2.1). Therefore, ideally, there should be no difference between the availability of data submissions for 1990 and for the latest inventory year.

Figure 1.3 shows a simple compilation indicating the completeness of Member State reporting for the first and the latest inventory year. In this compilation, the original data submissions, i.e. before gap filling, are used. It gives the percentages of each notation key or values that the reports present for source categories. The data are for all EU Member States and all pollutants, excluding national totals.

Figure 1.3: Completeness of reporting of NFR templates submitted by EU Member States (all data entries for all pollutants, excluding national totals)



Notes: C, confidential; NO, not occurring; NE, not estimated; NA, not applicable; IE, included elsewhere; NR, not relevant. Appendix 1 provides further explanations of notation keys

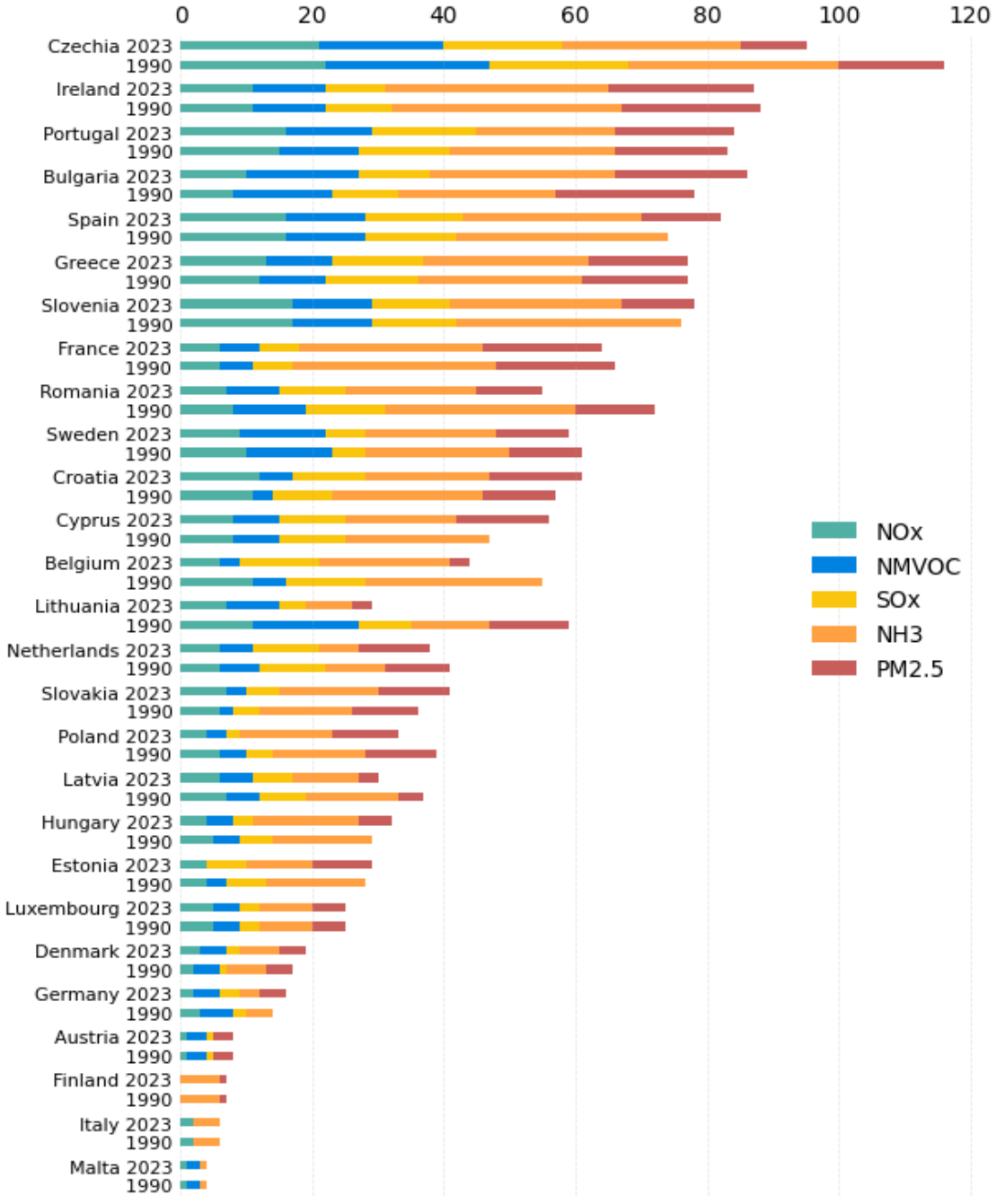
The notation key 'NA' (not applicable) appears often in the Member State's submissions, because an air pollutant is relevant only to specific emission sources (e.g. NH_3 for agriculture). There are many instances, however, in which some countries report emissions for a particular NFR category and pollutant while others use the notation keys 'NA' or 'NO'. More information on these instances can be found in Annex H.

The use of the notation keys 'NE', 'NR'[8] and the reporting of empty cells or '0' count as incomplete reporting. The official reporting guidelines of the Air Convention (UNECE, 2022b) allow countries to report emissions as 'NE' for some sectors. This is carried out when they know that emissions occur but have not estimated or reported them. In some cases, this approach aligns with the methodology of emission inventories as presented in the EMEP/EEA Air Pollutant Emission Inventory Guidebook. Countries should report in their IIR why they have not estimated emissions. A summary of the use of the notation key 'NE' in the Member States is given in Figure 1.4.

[8] According to the reporting guidelines (UNECE, 2022b; UNECE, 2022c), emission inventory reporting should cover all years from 1990 onwards if data are available. However, 'NR' has been added to ease reporting where the different protocols do not strictly require details of emissions. 'NR' is correct and appropriate only in these circumstances.

In the current reporting cycle, EU Member States reported 15% of the data entries incompletely, while for 1990 they reported 19% of the data incompletely.

Figure 1.4: Number of 'NE' source categories reported for 1990 and for the latest year



Notes: The Air Convention formally requests Parties to report emissions of PM for 2000 and thereafter. Therefore, 'NE' reporting for PM2.5 in 1990 might be high for several countries.

2 Adjustments under the Gothenburg Protocol

A list of new inventory adjustment applications accepted by the EMEP Steering Body is given in Table 2.1. An overview of the reported adjustments within the current year's inventory is given in Table 2.2. Figure 2.1 shows the effect of the adjustments on the EU emissions on NMVOCs (sum of EU Member States' adjustments). No figure is shown for NH_3, due to the low values represented by the adjustment. All approved and reported adjustments also appear in the emission trend table in Section 3.3 (Table 3.4 for NMVOCs and Table 3.6 for NH_3).

Table 2.1: Inventory adjustment applications submitted, and accepted by the EMEP Steering Body during 2024

Year of acceptance	Member State	Pollutant	NFR19 code	Years
2024	Denmark	NMVOCs	3B1a, 3B1b	2005, 2020-2022
2024	France	NMVOCs	3B, 3D	2005, 2020-2022
2024	Netherlands	NMVOCs	3B1a	2005, 2020
2024	Czechia	NH_3	3Da1	2005, 2020-2022

Note: For nomenclature for reporting (NFR) codes, see the list of source sector abbreviations in Appendix 4.

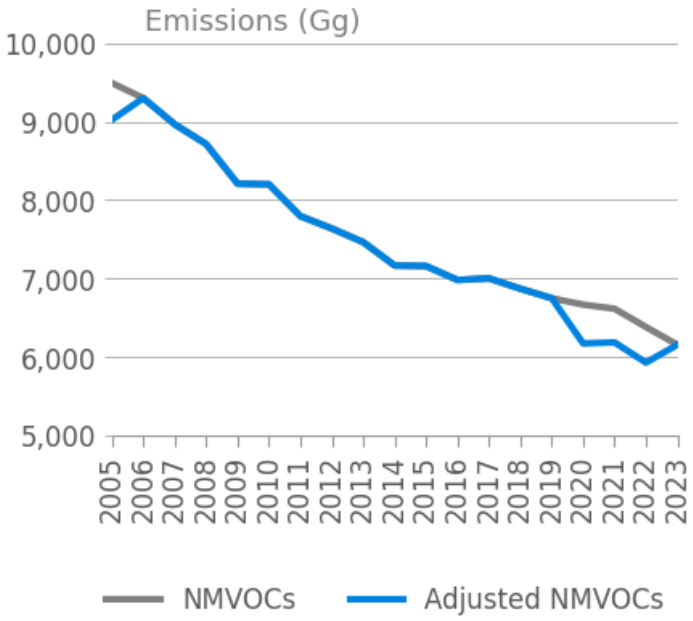
Sources: UNECE, 2024.

Table 2.2: Submitted, but not yet accepted, adjustments in the Air Convention submission for the current year, as of 12 May 2025

Year of submitting	Member State	Pollutant	NFR19 code	Years	Annex I ('adjustment row')	Annex IIa
2025	Denmark	NMVOCs	3B1a	2023 in addition to the previously approved years (see table 2.2)	Yes	Yes
2025	Czechia	NH_3	3Da1	2023 in addition to the previously approved years (see table 2.2)	Yes	Yes
2025	Finland	NH_3	3B1a; 3B1b; 3B2; 3B3; 3B4d; 3B4e; 3B4gi; 3B4gii; 3B4giii; 3B4giv; 3B4h; 3Da1; 3Da2a; 3Da2c; 3Da3;	2005; 2020; 2021	No	Yes

			3Da4; 5B2; 6°			

Figure 2.1: Adjusted and unadjusted emissions of NMVOCs for the EU, 2010-2023



3 Trends and key categories of EU pollutant emissions

In this chapter, the individual sections summarise the contributions each Member State has made to total EU emissions[9] of: NO_X, NMVOCs, SO_X, NH_3, CO, $PM_{2.5}$, PM_{10}, TSPs, BC, Pb, Cd, Hg, As, Cr, Cu, Ni, Se, Zn, PCDD/Fs, total PAHs, B(a)P, B(b)F, B(k)F, IP, HCB and PCBs.

Additionally, the EU emission trends for the five most important key categories are presented for NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$, PM_{10}, HMs and POPs, as well as B(a)P and BC. In the pollutant-specific sections below, the countries listed are ranked according to certain criteria, specified in brackets where it applies.

3.1 Trends in emissions and projections and progress towards Gothenburg Protocol reduction commitments

3.1.1 Total trends in EU emissions

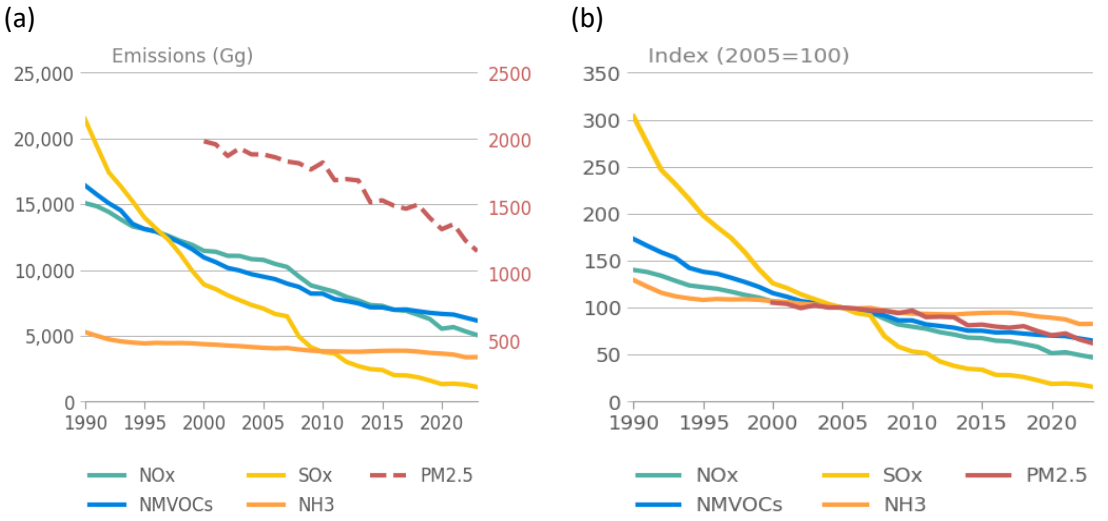
In 2023, emissions of all pollutants were lower than in 2005 (or in 2000 for PM) (Table 3.1). Emission trends for NO_X, NMVOCs, SO_X, NH_3 and $PM_{2.5}$ are presented in Figure 3.1. For the main pollutants, the largest reductions, in percent, across the EU were for SO_X emissions. SO_X reduced by 95% since 1990 and by 14% since the previous reporting cycle. This was followed by NO_X, which reduced by 66% since 1990 and by 3% since the previous reporting cycle. NMVOCs reduced by 63% since 1990 and by 4% since the previous reporting cycle. NH_3 reduced by 36% since 1990, while the emissions did not reduce since the previous reporting cycle. $PM_{2.5}$ reduced by 41% since 2000 and by 6% since the previous reporting cycle.

Emission trends for CO, TSPs, PM_{10} and BC are presented in Figure 3.2 and Figure 3.3. CO emissions decreased by 73% since 1990, while TSP and PM_{10} emissions fell by 34% and 38%, respectively since 2000. BC emissions dropped by 53% during the same period.

Emission trends for HMs and POPs are presented in Figure 3.4. Emissions of these pollutants have reduced significantly since 1990, with the only exception of Cu, which increased by 11%.

[9] For BC and additional HMs, data for several countries (at least for some years) were missing and could not be gap filled. Therefore, the EU total is not complete for these pollutants (see also Section 1.3.7).

Figure 3.1: (a) EU-27 emission trends and (b) indexed emissions for NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$



Note: The right-hand axis gives values for PM2.5 emissions. The indexed emissions are based on emissions in 2005 (=100%).

Figure 3.2: (a) EU-27 emission trends and (b) indexed emissions for CO emissions

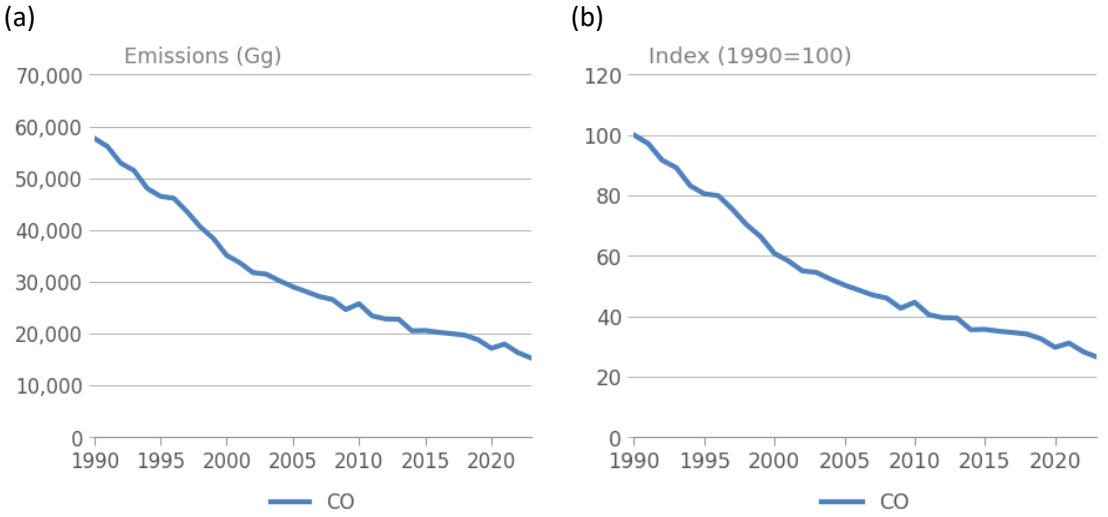
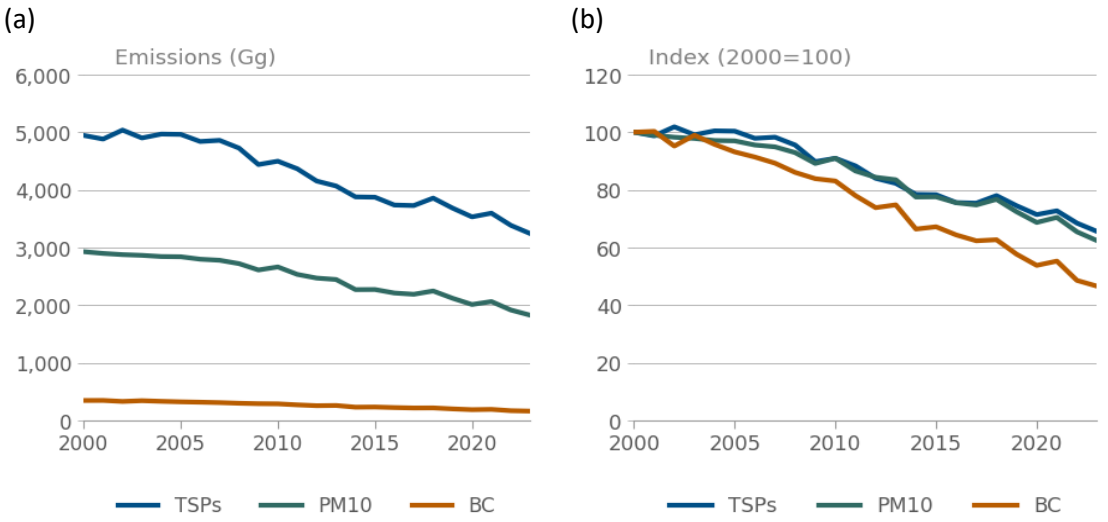
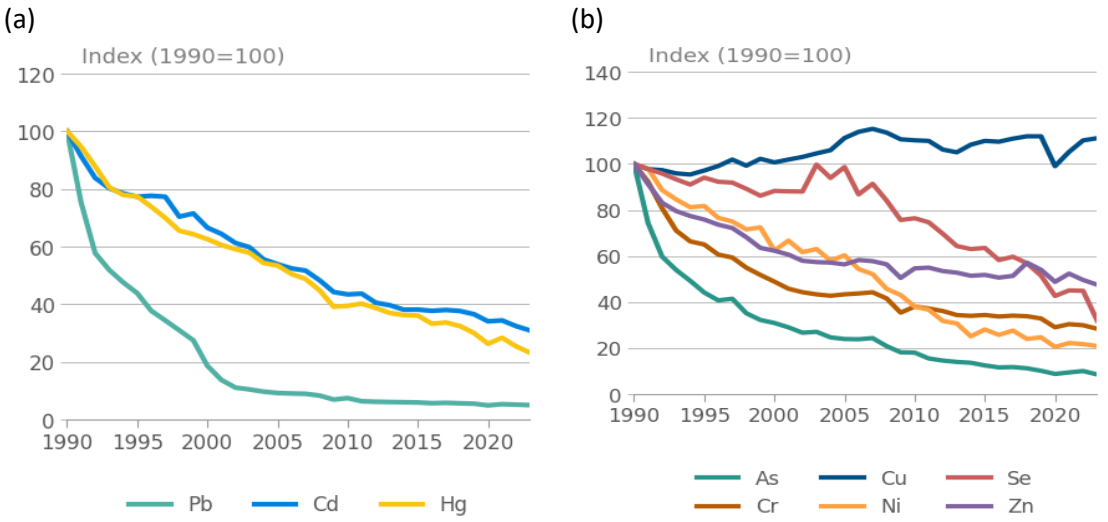


Figure 3.3: (a) EU-27 emission trends (b) and indexed emissions for TSP, PM_{10} and BC

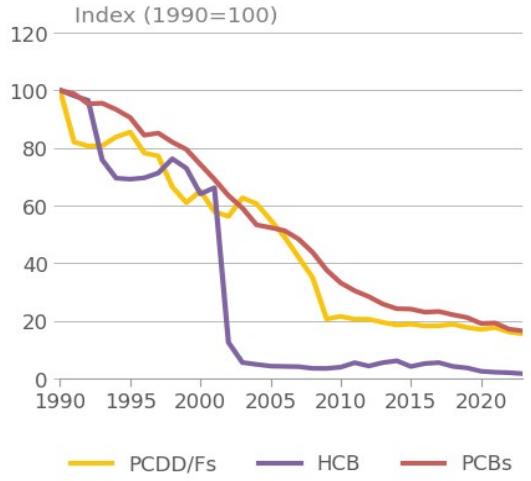


Notes: Not all countries reported data for BC. Values for indexed BC emissions are given in the secondary y-axis. The Air Convention formally requests Parties to report emissions of PM for 2000 and thereafter. Thus, emission trends can be shown for these years only. The indexed emissions are based on emissions in 2000 (=100%).

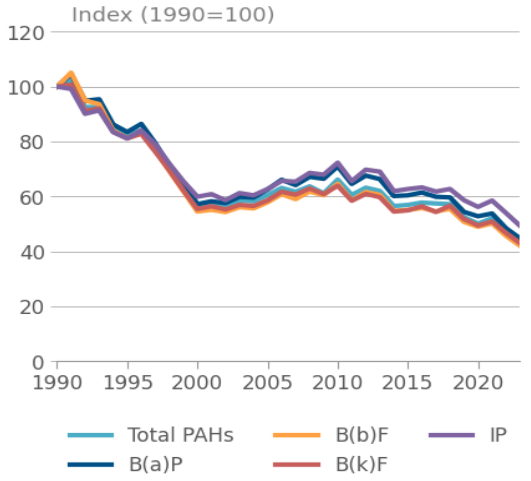
Figure 3.4a: Indexed EU-27 emission trends for HMs and POPs



(c)



(d)



Notes: The drop in HCB emissions between 2001 and 2002 is caused by reductions reported by Germany.

Table 3.1: Total EU emissions of NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$, HMs, POPs and PM

																			Change		
Pollutant	Unit	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023
NOx	Gg	15,088	13,116	11,460	10,770	8,587	8,345	7,955	7,688	7,337	7,276	6,978	6,898	6,597	6,277	5,542	5,660	5,335	5,052	-67%	-53%	-5%
NMVOCs	Gg	16,433	13,115	10,959	9,495	8,202	7,796	7,638	7,463	7,166	7,158	6,981	7,001	6,869	6,748	6,666	6,614	6,380	6,153	-63%	-35%	-4%
NMVOCs*	Gg				9,025											6,170	6,184	5,925				
SOx	Gg	21,468	13,995	8,907	7,072	3,772	3,652	3,019	2,693	2,467	2,404	2,009	1,990	1,850	1,603	1,330	1,364	1,289	1,108	-95%	-84%	-14%
NH3	Gg	5,285	4,421	4,362	4,087	3,826	3,815	3,799	3,787	3,825	3,854	3,866	3,865	3,799	3,702	3,648	3,572	3,372	3,381	-36%	-17%	0%
NH3*	Gg				4,083											3,640	3,565	3,366				
CO	Gg	57,719	46,510	35,126	29,076	25,794	23,434	22,857	22,800	20,559	20,628	20,265	20,018	19,725	18,827	17,200	18,005	16,368	15,317	-73%	-47%	-6%
Pb	Mg	20,487	8,972	3,808	1,874	1,513	1,286	1,252	1,232	1,219	1,200	1,150	1,173	1,142	1,114	993	1,080	1,046	1,012	-95%	-46%	-3%
Cd	Mg	164	127	109	88	71	71	66	65	62	62	62	62	62	60	56	56	53	51	-69%	-43%	-5%
Hg	Mg	144	112	90	77	57	58	56	53	52	52	48	48	47	43	38	41	37	33	-77%	-57%	-9%
As	Mg	570	252	176	137	103	89	83	80	78	71	66	67	64	58	50	54	57	49	-91%	-64%	-15%
Cr	Mg	1,016	660	497	441	387	378	367	349	346	349	343	347	344	334	295	309	304	289	-72%	-34%	-5%
Cu	Mg	2,356	2,289	2,372	2,622	2,598	2,592	2,503	2,476	2,554	2,592	2,584	2,615	2,639	2,639	2,334	2,480	2,597	2,620	11%	0%	1%
Ni	Mg	1,903	1,556	1,187	1,148	724	698	606	585	478	535	490	526	457	470	391	423	414	399	-79%	-65%	-4%
Se	Mg	173	163	153	171	132	129	121	111	109	110	101	103	98	89	74	78	78	55	-68%	-68%	-29%
Zn	Mg	6,904	5,237	4,302	3,892	3,774	3,796	3,692	3,644	3,552	3,578	3,497	3,548	3,943	3,731	3,370	3,616	3,426	3,284	-52%	-16%	-4%
PCDD/Fs	g I-TEQ	11,766	10,055	7,656	6,468	2,530	2,414	2,415	2,283	2,176	2,215	2,140	2,146	2,209	2,076	1,997	2,076	1,889	1,817	-85%	-72%	-4%
Total PAHs	Mg	1,514	1,248	858	916	1,002	917	957	939	856	862	875	870	867	795	759	788	713	656	-57%	-28%	-8%
B(a)P	Mg	442	369	253	276	314	285	299	293	266	267	271	265	264	240	233	238	214	198	-55%	-28%	-8%
B(b)F	Mg	493	400	269	285	319	289	304	299	270	272	275	269	274	250	241	248	225	207	-58%	-27%	-8%
B(k)F	Mg	237	192	131	139	151	138	144	141	129	130	134	129	134	123	117	120	111	102	-57%	-27%	-8%
IP	Mg	218	177	130	136	157	143	152	150	135	137	138	135	137	128	122	127	117	107	-51%	-21%	-9%
HCB	kg	6,054	4,185	3,875	258	235	329	259	330	369	249	312	330	251	220	149	129	119	98	-98%	-62%	-18%
PCBs	kg	6,423	5,811	4,768	3,360	2,127	1,952	1,821	1,657	1,552	1,544	1,476	1,490	1,417	1,356	1,223	1,234	1,096	1,057	-84%	-69%	-4%
																				2000-2023	2005-2023	2022-2023
PM2.5	Gg			1,989	1,890	1,831	1,699	1,707	1,697	1,534	1,549	1,508	1,486	1,517	1,418	1,334	1,371	1,249	1,170	-41%	-38%	-6%
PM10	Gg			2,927	2,839	2,662	2,533	2,468	2,444	2,268	2,270	2,210	2,188	2,245	2,118	2,010	2,061	1,915	1,825	-38%	-36%	-5%
TSPs	Gg			4,944	4,962	4,497	4,365	4,152	4,066	3,877	3,872	3,736	3,727	3,856	3,682	3,531	3,595	3,384	3,240	-34%	-35%	-4%
BC	Gg			345	321	286	269	255	258	229	232	222	215	216	199	185	191	167	161	-53%	-50%	-4%

Notes: * These NMVOC emission data represent the adjusted EU totals. Adjusted data: under the Gothenburg Protocol, the EMEP Steering Body accepted inventory adjustment applications([10]) for emissions from several EU Member States. This table takes these adjustments into account, whereas emission data are based on fuel sold. See Chapter 2 for further details.

Negative percentage values indicate that emissions have decreased.

Table 3.1 and Table 3.3-Table 3.28 express changes in emissions between 1990 and 2023 as 100×(E2023-E1990)/E1990 (%), where E2023 and E1990 are 2023 and 1990 total emissions, respectively. The tables express changes in emissions from 2022 to 2023 as 100×(E2023-E2022)/E2022 (%), where E2022 and E2023 are the 2022 and 2023 total emissions, respectively.

[10] In 2012, the Executive Body for the Air Convention decided that adjustments to emission reduction commitments, or to inventories for the purposes of comparing them with total national emissions, may be made in some circumstances (UNECE, 2012a).

The bases for the EU inventory shown in Table 3.1 and Table 3.3-Table 3.28 provide total national data for the entire territory based on fuel sold for all EU Member States. See Section 1.2.2 for further details.

3.1.2 Progress towards the Gothenburg Protocol reduction commitments

Table 3.2 presents a comparison of the total EU-27 emissions for the current year for NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$, and the Gothenburg Protocol reduction commitments.[11] The total EU-27 emissions for each of the pollutants were lower than the current emission reduction commitments. Thus, the current reduction commitments are overachieved for the EU. Figure 3.5 shows further whether or not each of the EU Member States met the Gothenburg Protocol reduction commitments during the current year.

Table 3.2: Total EU emissions of NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$, for the current year and compared with the Gothenburg Protocol reduction commitments for 2020 and beyond

Pollutant	EU-27 emissions in 2023 (Gg)	EU-27 Emission levels in 2005 (Gg)	Reduction commitment from 2005 level (%)	Current difference (%)
NO_X	5,196	10,710	-40	-52
NMVOCs	5,724	8,960	-28	-35
SO_X	1,108	7,013	-59	-84
NH_3	3,368	3,906	-6	-17
$PM_{2.5}$	1,171	1,884	-22	-38

Notes: For Spain, data for emission comparisons exclude emissions from the Canary Islands, i.e. data comprise the EMEP domain only.

For Portugal's reduction commitments, emissions from the Azores and Madeira are excluded.

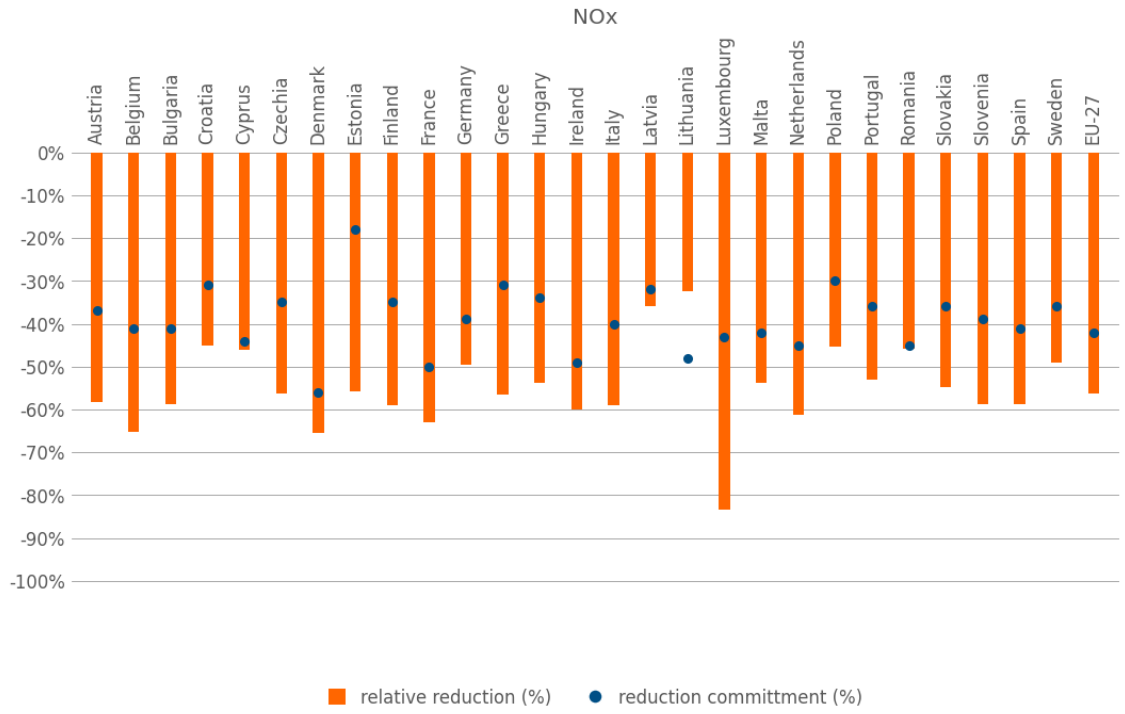
This table takes into account the adjustments, accepted by the EMEP steering body (Chapter 2).

Emission reduction commitments are also specified for individual EU Member States.

For NO_x, the emissions under category 3D are subtracted.

[11] In this report, the comparison with the EU-27 reduction commitments in the Gothenburg Protocol is based on fuel sold.

Figure 3.5a: Distance to Gothenburg Protocol reduction commitments for EU Member States based on reported emissions for NO_x in the current year



Note: For NO_x, the emissions under category 3D are subtracted.

Figure 3.5b: Distance to Gothenburg Protocol reduction commitments for EU Member States based on reported emissions for SO_x in the current year

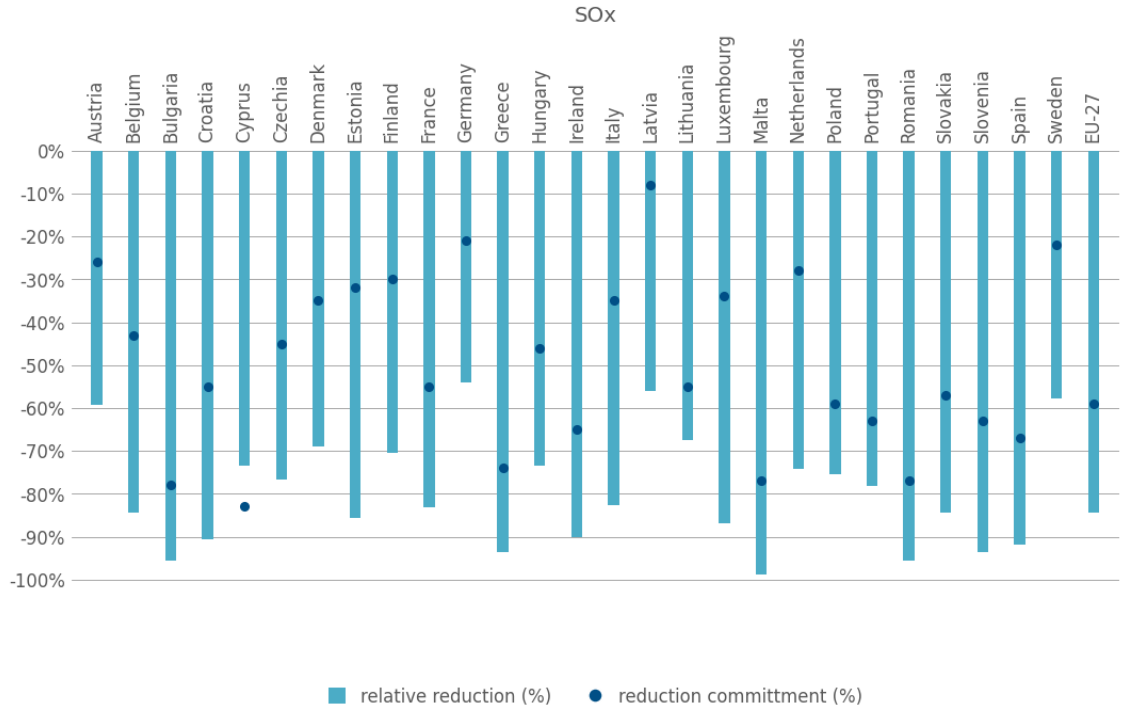


Figure 3.5c: Distance to Gothenburg Protocol reduction commitments for EU Member States based on reported emissions for$PM_{2.5}$ in the current year

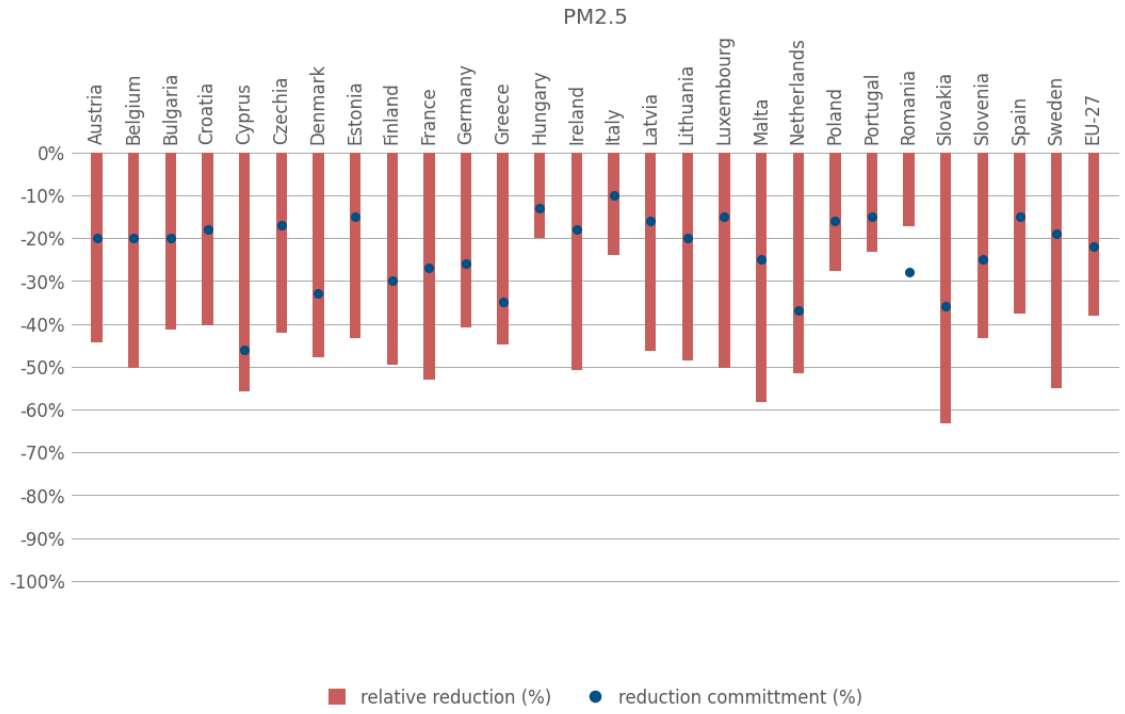


Figure 3.5d: Distance to Gothenburg Protocol reduction commitments for EU Member States based on reported emissions for NMVOCs in the current year

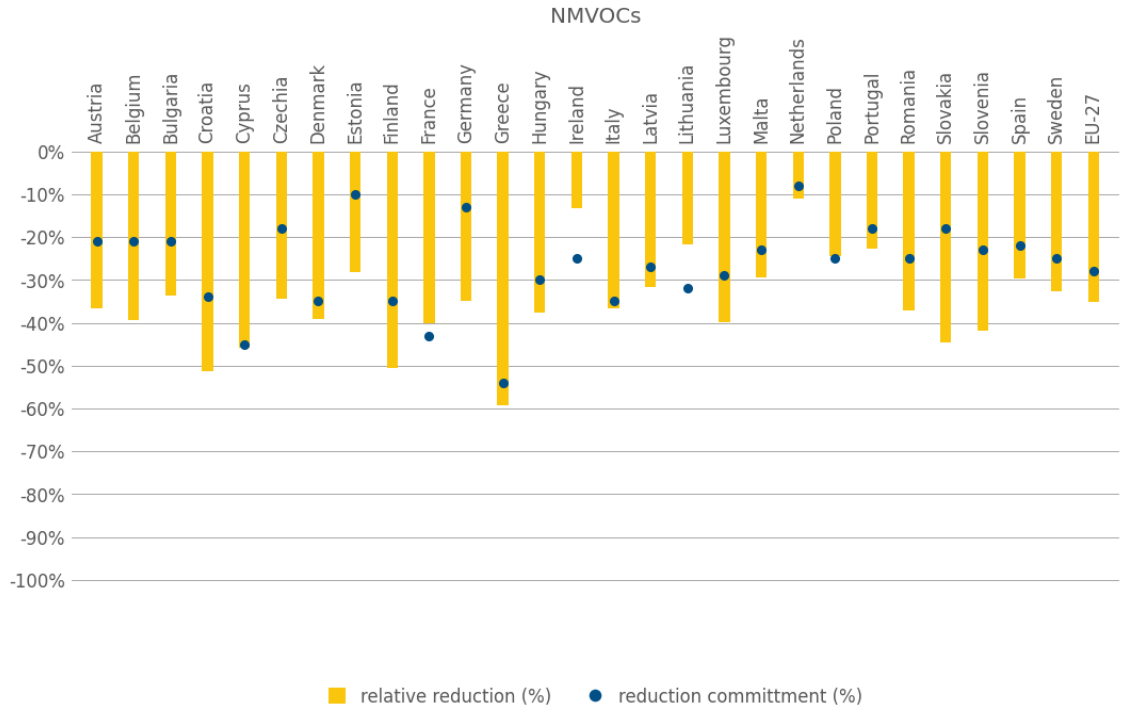
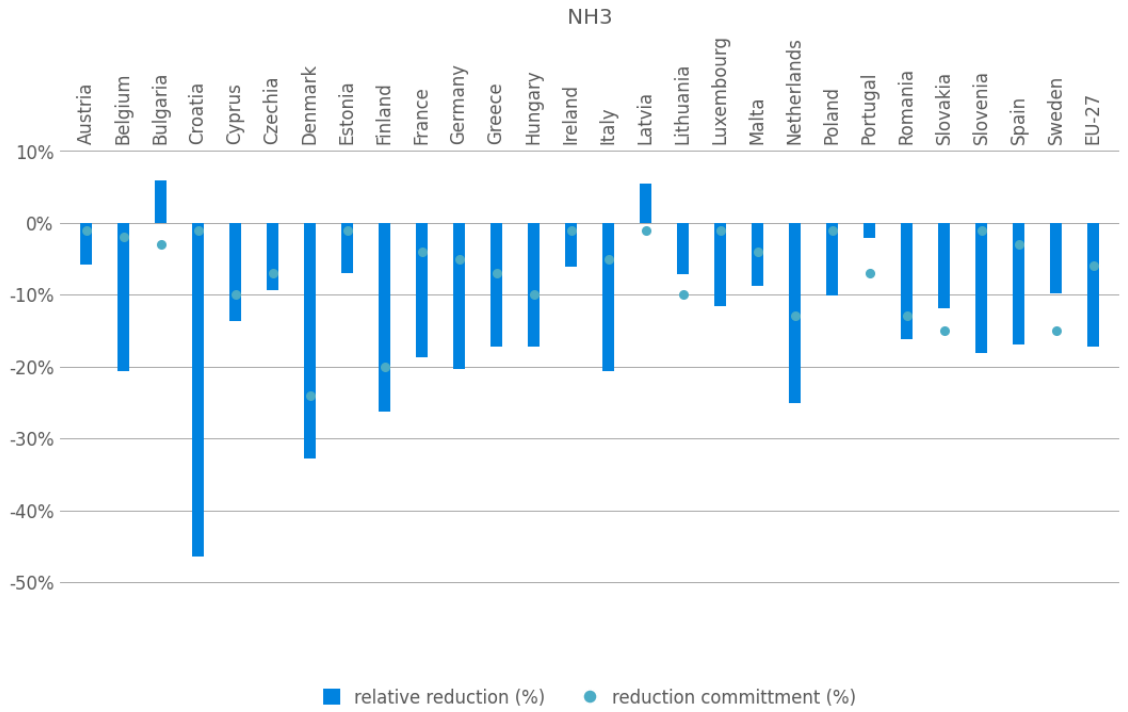


Figure 3.5e: Distance to Gothenburg Protocol reduction commitments for EU Member States based on reported emissions for NH_3 in the current year



Note: The previously approved adjustments of NMVOC emissions from Denmark and of NH_3 from Czechia are considered. NO_X emissions from soils are not included in the estimates from the member states.

3.2 Nitrogen oxide emission trends and key categories

Since 2005 NO_X emissions have dropped by 53% in the EU (Table 3.3). This trend has been largely determined by emissions from Germany, France, Spain and Italy due to their relatively large share of the total emissions (see Figure 3.6). Between the latest two years, the EU total emissions of NO_X decreased by about 5,3%.

Figure 3.7(b) shows the contribution made by each aggregated sector group to total EU emissions. The main sources for NO_X emissions were the road transport sector, non-road transport, the energy production and distribution and the agriculture sector.

The main key categories for NO_X emissions are shown in figure 3.7a. The highest relative reduction in NO_X emissions since 1990 occurred in 'Public electricity and heat production' (81%) (Figure 3.7a). These reductions are thanks to measures such as introducing combustion modification technologies (e.g. low-NO_X burners), implementing flue gas abatement techniques (e.g. NO_X scrubbers and selective catalytic reduction and selective non-catalytic reduction techniques) and switching from coal to gas.

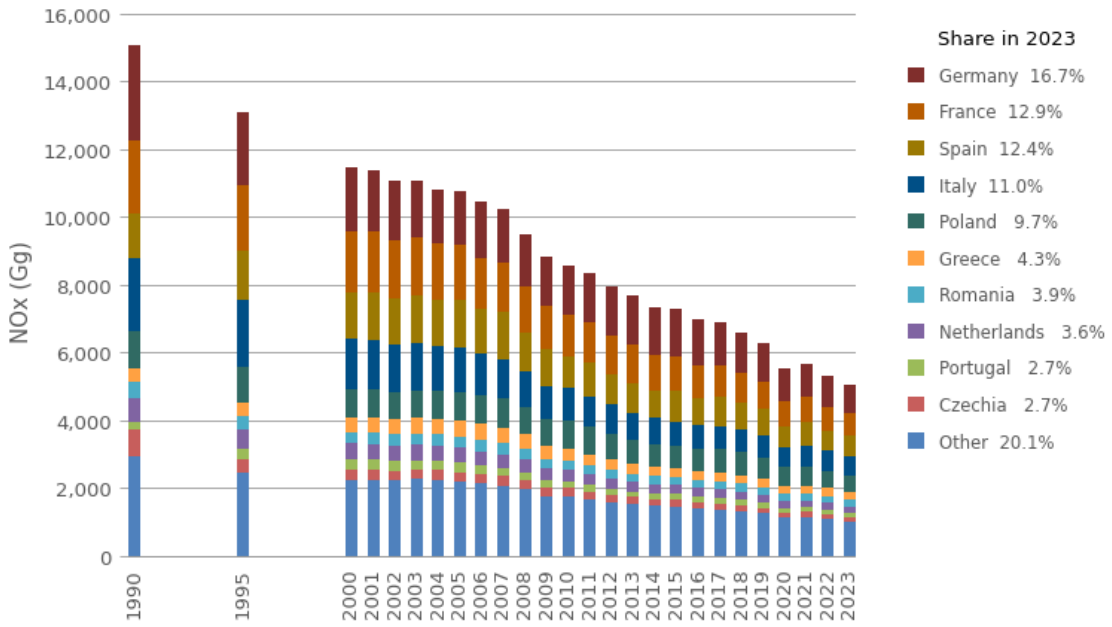
Significant reductions were also reported for NO_X emissions from heavy duty vehicles and buses (76%) and from passenger cars (73%). Emissions from light duty vehicles decreased by only 22%. The road transport sector represents the largest source of NO_X emissions, accounting for 35% of total EU emissions in the current year. Emission reductions made in the road transport sector are mostly due to the harmonised application of Euro emission standards (EEA, 2024a).

Table 3.3: Member State contributions to EU emissions of NO_X

	NOx(Gg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	216	199	213	248	206	184	177	167	155	146	124	123	115	109	-50%	-56%	-5.4%	1.4%	2.2%
Belgium	429	415	363	332	253	203	191	180	173	161	142	144	132	123	-71%	-63%	-6.3%	2.8%	2.4%
Bulgaria	300	193	161	173	116	103	98	95	93	92	86	93	95	83	-72%	-52%	-12.2%	2.0%	1.7%
Croatia	104	79	88	85	69	56	55	55	52	51	46	48	47	48	-54%	-44%	2.9%	0.7%	0.9%
Cyprus	18	21	22	22	19	14	13	13	13	14	12	12	12	12	-32%	-44%	1.0%	0.1%	0.2%
Czechia	763	387	279	286	245	199	189	183	173	162	149	154	149	134	-82%	-53%	-9.7%	5.1%	2.7%
Denmark	295	285	223	206	152	113	113	110	105	100	92	92	87	81	-73%	-61%	-7.2%	2.0%	1.6%
Estonia	72	40	39	38	38	28	28	29	28	23	21	21	21	19	-74%	-51%	-12.0%	0.5%	0.4%
Finland	307	273	241	208	187	139	135	131	128	120	105	104	97	90	-71%	-57%	-6.9%	2.0%	1.8%
France	2,140	1,958	1,815	1,588	1,237	1,027	978	939	884	825	720	753	713	654	-69%	-59%	-8.2%	14.2%	12.9%
Germany	2,846	2,171	1,869	1,602	1,461	1,381	1,341	1,278	1,207	1,116	983	964	927	845	-70%	-47%	-8.8%	18.9%	16.7%
Greece	410	403	431	484	366	262	264	269	261	253	225	223	233	218	-47%	-55%	-6.5%	2.7%	4.3%
Hungary	244	191	189	179	148	128	120	122	121	115	108	110	101	91	-63%	-49%	-9.7%	1.6%	1.8%
Ireland	168	170	180	174	119	112	112	109	110	102	94	97	93	86	-49%	-51%	-7.5%	1.1%	1.7%
Italy	2,125	1,988	1,516	1,302	961	727	708	667	668	650	585	596	590	557	-74%	-57%	-5.6%	14.1%	11.0%
Latvia	99	53	44	47	42	38	37	37	38	37	34	34	33	32	-67%	-31%	-2.7%	0.7%	0.6%
Lithuania	154	74	62	63	57	58	57	56	57	56	53	52	47	45	-71%	-30%	-4.9%	1.0%	0.9%
Luxembourg	41	35	41	57	39	29	26	23	21	19	15	14	11	10	-75%	-82%	-11.1%	0.3%	0.2%
Malta	7.3	8.1	8.3	9.7	9.1	5.7	5.2	4.7	4.5	4.6	4.2	4.4	4.7	4.6	-37%	-53%	-2.9%	0.0%	0.1%
Netherlands	682	580	491	432	346	271	259	252	250	237	209	204	192	184	-73%	-57%	-4.1%	4.5%	3.6%
Poland	1,108	1,063	842	839	820	660	661	688	664	616	578	567	520	492	-56%	-41%	-5.3%	7.3%	9.7%
Portugal	258	292	294	278	200	166	159	162	157	152	133	135	136	135	-48%	-51%	-0.8%	1.7%	2.7%
Romania	483	376	317	333	249	222	212	221	223	220	206	214	203	195	-60%	-42%	-4.1%	3.2%	3.9%
Slovakia	136	113	110	106	88	68	64	64	63	59	56	59	55	51	-62%	-52%	-6.0%	0.9%	1.0%
Slovenia	75	75	59	55	48	35	35	34	33	29	25	26	26	24	-68%	-57%	-7.1%	0.5%	0.5%
Spain	1,321	1,421	1,344	1,430	945	902	797	868	784	791	620	702	588	624	-53%	-56%	6.1%	8.8%	12.4%
Sweden	285	255	219	191	167	145	143	138	134	125	115	113	109	104	-64%	-46%	-4.8%	1.9%	2.1%
EU27(a)	**15,088**	**13,116**	**11,460**	**10,770**	**8,587**	**7,276**	**6,978**	**6,898**	**6,597**	**6,277**	**5,542**	**5,660**	**5,335**	**5,052**	**-67%**	**-53%**	**-5.3%**	**100.0%**	**100.0%**
EU27(b)	15,088	13,116	11,460	10,770	8,587	7,276	6,978	6,898	6,597	6,277	5,542	5,660	5,335	5,052					

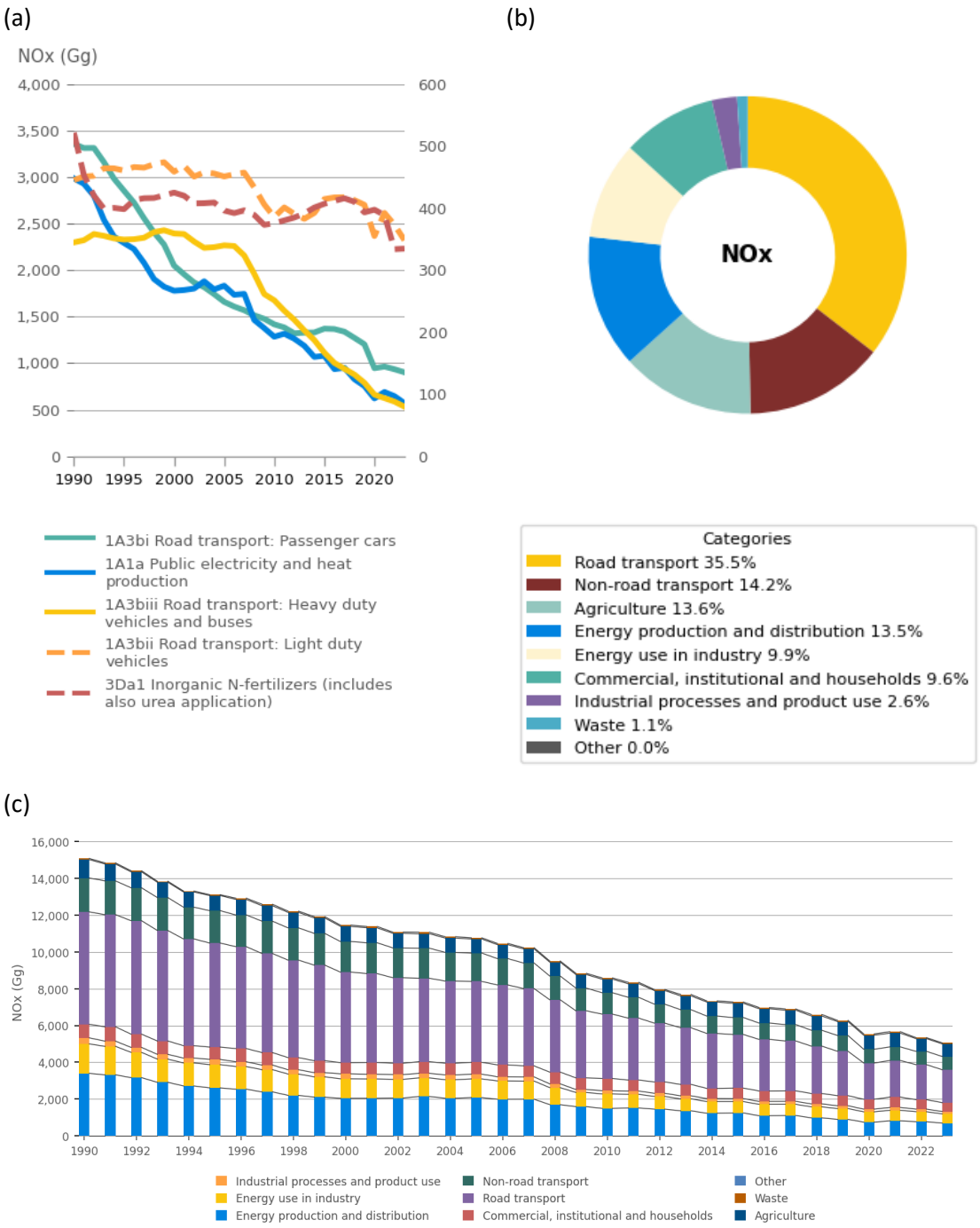
Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

Figure 3.6: NO_X emission trends in the EU and shares of Member States



Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.7: NO_X emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions



Note: In (a), the right-hand axis shows values for '1A3bii — Road transport: Light duty vehicles' and '3Da1 — Inorganic N fertilisers (also includes urea application)'.

3.3 Non-methane volatile organic compound emission trends and key categories

Since 2005, NMVOC emissions have dropped by 35% in the EU (Table 3.4). This trend has been largely determined by emissions from France, Germany, Italy and Poland, due to their relatively large share of the EU total (Figure 3.8).

For the current year, the most important key categories for NMVOC emissions were residential heating (1A4bi), domestic solvent use including fungicides (2D3a) and coating applications (2D3d) (Figure 3.9a). Among the top five key categories, the highest relative reduction is reported for coating applications, which reduced by 66% since 1990 and by 52% since 2005.

Figure 3.9b shows the contribution made by each aggregated sector group to total EU emissions. The main emission source of NMVOCs for the current reporting is industrial processes and product use, followed by agriculture and commercial, institutional and households.

In general, NMVOC emissions in 1990 were caused by emission sources different from those in recent years (Figure 3.9c). In 1990, NMVOC emissions from road transport were most important; however, on account of the introduction of Euro emission standards and renewal of the vehicle fleets, these emissions decreased significantly. Nowadays, the emissions are dominated by NMVOC emissions from solvent use, agriculture and residential heating.

Table 3.4: Member State contributions to EU emissions of NMVOCs

	NMVOCs(Gg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	338	252	193	163	141	120	119	118	114	112	113	115	106	104	-69%	-37%	-1.9%	2.1%	1.7%
Belgium	372	331	253	202	164	137	133	131	129	128	132	131	122	122	-67%	-39%	-0.2%	2.3%	2.0%
Bulgaria	448	141	102	99	80	80	78	77	72	72	71	72	73	66	-85%	-34%	-10.0%	2.7%	1.1%
Croatia	179	121	104	112	87	65	66	65	64	68	63	63	54	55	-69%	-51%	0.8%	1.1%	0.9%
Cyprus	14	14	13	14	12	9.9	7.7	8.6	8.0	7.9	8.5	8.1	7.2	7.4	-47%	-46%	3.3%	0.1%	0.1%
Czechia	834	600	435	373	369	353	345	341	331	313	302	301	286	245	-71%	-34%	-14.3%	5.1%	4.0%
Denmark	218	219	191	161	136	118	113	111	110	104	107	107	101	98	-55%	-39%	-2.7%	1.3%	1.6%
*Adjusted data**				141							83	82	77						
Estonia	66	38	34	32	23	23	22	23	23	23	23	25	25	23	-65%	-28%	-6.1%	0.4%	0.4%
Finland	233	203	178	147	113	91	92	90	87	86	86	85	77	73	-69%	-51%	-5.7%	1.4%	1.2%
France	2,866	2,464	2,116	1,749	1,478	1,257	1,246	1,235	1,193	1,160	1,115	1,089	1,099	1,046	-64%	-40%	-4.9%	17.4%	17.0%
*Adjusted data**				1,323							687	683	668						
Germany	3,954	2,370	1,820	1,497	1,380	1,152	1,144	1,145	1,099	1,071	1,038	1,058	1,051	975	-75%	-35%	-7.3%	24.1%	15.8%
Greece	319	306	312	337	218	167	158	154	149	148	141	140	138	137	-57%	-59%	-0.7%	1.9%	2.2%
Hungary	314	227	202	183	142	135	134	131	125	123	122	121	117	114	-64%	-38%	-2.4%	1.9%	1.9%
Ireland	165	150	130	124	115	112	114	117	116	116	114	113	112	107	-35%	-13%	-3.9%	1.0%	1.7%
Italy	2,007	2,079	1,662	1,374	1,154	948	907	939	912	908	893	901	849	871	-57%	-37%	2.6%	12.2%	14.2%
Latvia	84	61	52	49	39	35	33	34	38	35	34	36	32	34	-60%	-32%	5.1%	0.5%	0.5%
Lithuania	135	88	61	66	57	56	55	55	55	55	52	54	52	52	-62%	-22%	-0.8%	0.8%	0.8%
Luxembourg	29	20	16	15	12	8.8	10	10	9.7	9.6	8.9	9.9	9.7	8.8	-70%	-40%	-9.6%	0.2%	0.1%
Malta	4.9	6.1	5.1	4.0	3.3	2.7	2.6	2.7	2.6	2.6	2.5	2.7	2.8	2.8	-42%	-29%	0.1%	0.0%	0.0%
Netherlands	601	433	335	268	272	256	253	255	248	244	253	240	240	238	-60%	-11%	-0.7%	3.7%	3.9%
*Adjusted data**				244							209								
Poland	865	970	879	848	828	754	752	750	779	747	771	733	667	640	-26%	-25%	-4.0%	5.3%	10.4%
Portugal	268	256	259	208	171	163	155	156	161	162	161	159	162	161	-40%	-23%	-0.4%	1.6%	2.6%
Romania	419	325	318	342	286	253	240	240	233	235	243	241	226	215	-49%	-37%	-4.7%	2.6%	3.5%
Slovakia	247	163	138	137	113	100	100	98	90	87	85	83	80	76	-69%	-45%	-5.3%	1.5%	1.2%
Slovenia	65	63	55	48	39	32	33	32	31	31	32	31	29	28	-57%	-42%	-2.9%	0.4%	0.5%
Spain	1,020	934	874	738	591	569	515	539	549	558	555	561	525	518	-49%	-30%	-1.3%	6.2%	8.4%
Sweden	366	279	223	205	178	159	152	144	140	141	139	136	139	138	-62%	-33%	-1.2%	2.2%	2.2%
EU27(a)	**16,433**	**13,115**	**10,959**	**9,495**	**8,202**	**7,158**	**6,981**	**7,001**	**6,869**	**6,748**	**6,666**	**6,614**	**6,380**	**6,153**	**-63%**	**-35%**	**-3.6%**	**100.0%**	**100.0%**
EU27(b)	16,433	13,115	10,959	9,495	8,202	7,158	6,981	7,001	6,869	6,748	6,666	6,614	6,380	6,153					
EU27(c)	16,433	13,115	10,959	9,025	8,202	7,158	6,981	7,001	6,869	6,748	6,170	6,184	5,925	6,153					

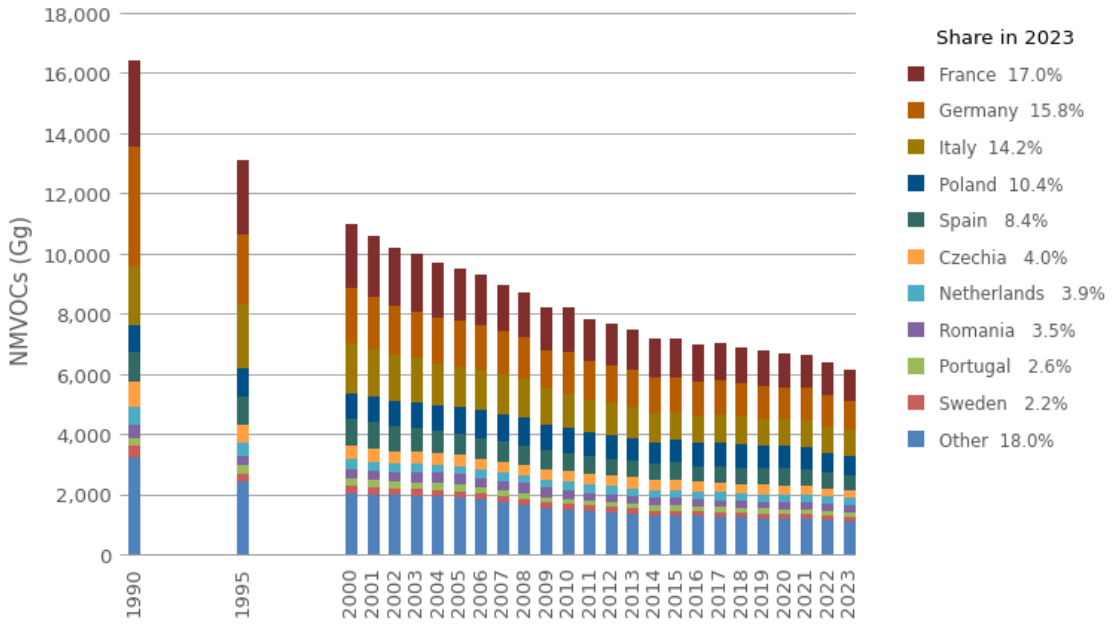
Notes: (a) Sum of national totals, as reported by EU Member States.

(b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

(c) Sum of national totals, as reported by EU Member States, allowing for approved adjustments.

*Adjusted data: under the Gothenburg Protocol, the EMEP Steering Body accepted inventory adjustment applications for emissions from Denmark, France and the Netherlands.

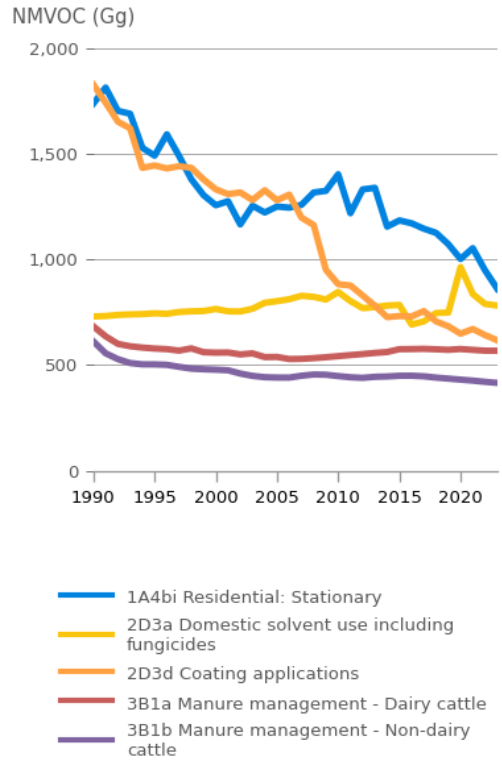
Figure 3.8: NMVOC emission trends in the EU and shares of Member States



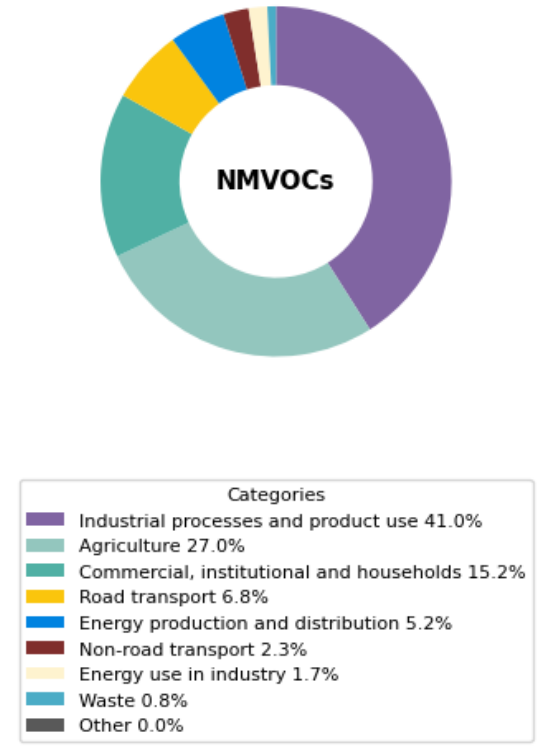
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.9: NMVOC emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

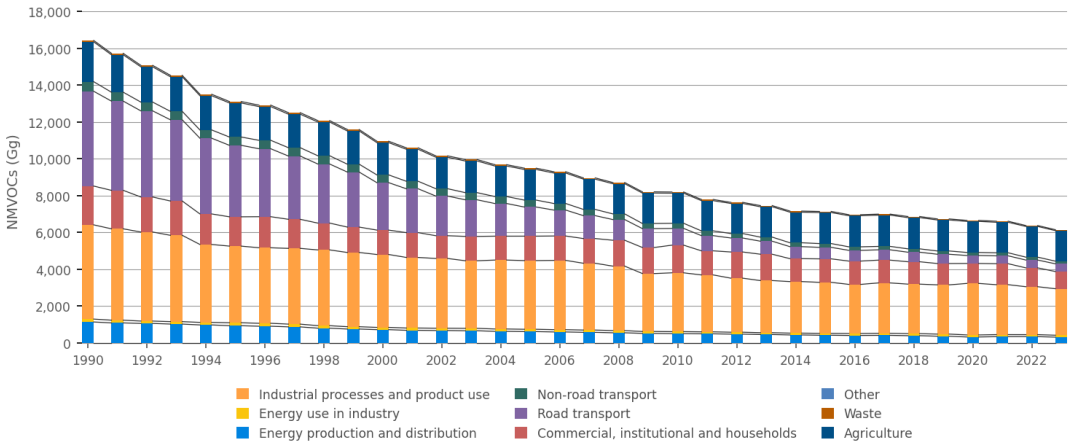
(a)



(b)



(c)



3.4 Sulphur oxide emission trends and key categories

Since 2005, SO_X emissions have dropped by 84% in the EU (see Table 3.5). During the past two years, they decreased by 14%. The recent SO_X emission trend has largely been determined by emissions from Poland and Germany due to their relatively large share of the total EU emissions (Figure 3.10). The major sources for SO_X emissions are fuel combustion in thermal power plants and industrial installations.

Figure 3.11b shows the contribution made by each aggregated sector group to total EU emissions. For SO_X, the common main emission sources are the energy sectors.

Public electricity and heat production (1A1a) is the most significant key category for SO_X emissions (Figure 3.11a). The same sector is also responsible for the highest relative reductions in emissions since 2005 among the top five key categories. The remaining four of these categories saw significant decreases as well.

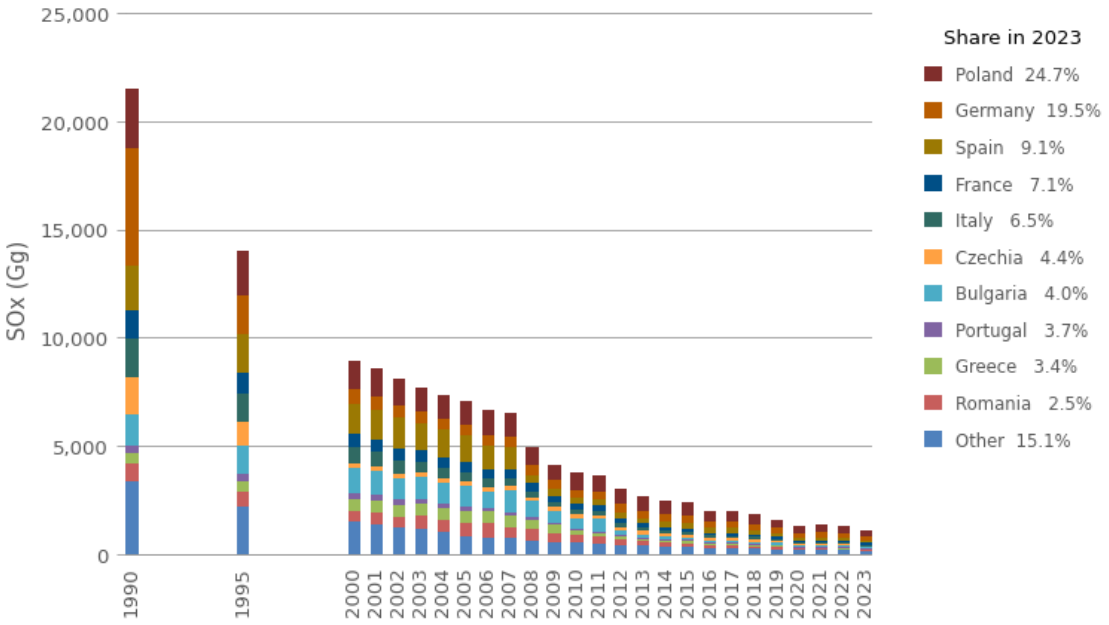
The historical reductions (Figure 3.11c) are mainly due to a shift to fuels with lower sulphur content and retrofitting with desulphurisation installations. After 2010, reductions are also a result of technical improvements to meet the more stringent standards of the EU Industrial Emissions Directive. The shift from the use of fossil fuels to renewable energy sources has also contributed to lower SO_X emissions.

Table 3.5: Member State contributions to EU emissions of SO_X

	SOx(Gg)														Change			Share in EU-27	
Member State	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**1990-2023**	**2005-2023**	**2022-2023**	**1990**	**2023**
Austria	74	47	32	26	16	14	13	13	12	11	10	11	11	11	-86%	-59%	-1.5%	0.3%	1.0%
Belgium	365	258	171	140	61	41	34	33	32	30	24	24	25	22	-94%	-84%	-12.3%	1.7%	2.0%
Bulgaria	1,438	1,314	1,120	972	489	121	93	106	104	86	48	60	69	44	-97%	-95%	-36.3%	6.7%	4.0%
Croatia	170	77	60	59	35	16	15	13	10	7.6	6.2	5.7	5.5	5.5	-97%	-91%	0.0%	0.8%	0.5%
Cyprus	32	40	47	38	22	13	16	16	17	16	12	10.0	11	10	-69%	-73%	-11.4%	0.1%	0.9%
Czechia	1,754	1,059	234	208	164	130	116	110	97	79	67	60	64	48	-97%	-77%	-24.5%	8.2%	4.4%
Denmark	178	145	32	26	15	9.3	9.3	9.8	10	9.0	8.8	7.9	8.1	8.1	-95%	-69%	0.2%	0.8%	0.7%
Estonia	279	117	97	77	83	36	35	39	31	19	11	12	15	11	-96%	-86%	-25.9%	1.3%	1.0%
Finland	249	105	82	70	66	41	40	35	33	30	23	23	22	21	-92%	-70%	-8.6%	1.2%	1.9%
France	1,309	949	626	461	273	152	133	128	122	100	86	93	85	78	-94%	-83%	-7.5%	6.1%	7.1%
Germany	5,461	1,743	643	472	397	341	316	307	294	258	239	249	246	217	-96%	-54%	-12.0%	25.4%	19.5%
Greece	512	522	558	585	233	102	81	90	86	80	49	47	44	38	-93%	-93%	-12.7%	2.4%	3.4%
Hungary	832	615	427	42	30	24	23	28	23	18	17	14	14	11	-99%	-73%	-21.4%	3.9%	1.0%
Ireland	184	163	145	74	27	17	16	15	14	11	11	13	9.4	7.4	-96%	-90%	-21.3%	0.9%	0.7%
Italy	1,784	1,322	756	411	222	127	123	119	113	112	85	79	87	72	-96%	-83%	-17.0%	8.3%	6.5%
Latvia	100	49	18	8.8	4.3	3.6	3.4	3.6	3.9	3.7	3.5	3.7	3.8	3.8	-96%	-56%	1.7%	0.5%	0.3%
Lithuania	199	76	39	27	18	15	15	13	13	12	11	11	11	8.9	-96%	-67%	-21.0%	0.9%	0.8%
Luxembourg	16	9.3	3.6	2.6	1.7	1.3	0.9	1.0	1.0	1.0	0.8	0.7	0.5	0.3	-98%	-87%	-25.9%	0.1%	0.0%
Malta	13	11	9.3	12	8.1	2.2	1.8	0.7	0.2	0.2	0.2	0.2	0.2	0.2	-99%	-99%	-7.4%	0.1%	0.0%
Netherlands	198	137	78	68	36	31	29	27	25	23	20	21	20	18	-91%	-74%	-10.7%	0.9%	1.6%
Poland	2,688	2,079	1,299	1,107	801	612	487	472	447	364	352	359	312	273	-90%	-75%	-12.5%	12.5%	24.7%
Portugal	318	322	294	189	62	45	45	46	45	44	38	39	41	41	-87%	-78%	0.9%	1.5%	3.7%
Romania	821	696	492	604	355	149	98	78	76	86	61	66	47	28	-97%	-95%	-41.1%	3.8%	2.5%
Slovakia	141	122	119	88	69	68	28	29	22	17	15	16	13	14	-90%	-84%	3.4%	0.7%	1.2%
Slovenia	203	125	93	40	10	5.4	4.6	4.9	4.8	4.3	3.9	3.8	3.2	2.6	-99%	-94%	-19.8%	0.9%	0.2%
Spain	2,050	1,823	1,388	1,230	244	271	216	235	198	166	112	119	106	101	-95%	-92%	-4.8%	9.5%	9.1%
Sweden	102	71	44	34	28	17	17	17	17	16	15	15	15	14	-86%	-58%	-2.2%	0.5%	1.3%
EU27(a)	**21,468**	**13,995**	**8,907**	**7,072**	**3,772**	**2,404**	**2,009**	**1,990**	**1,850**	**1,603**	**1,330**	**1,364**	**1,289**	**1,108**	**-95%**	**-84%**	**-14.0%**	**100.0%**	**100.0%**
EU27(b)	21,468	13,995	8,907	7,072	3,772	2,404	2,009	1,990	1,850	1,603	1,330	1,364	1,289	1,108					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

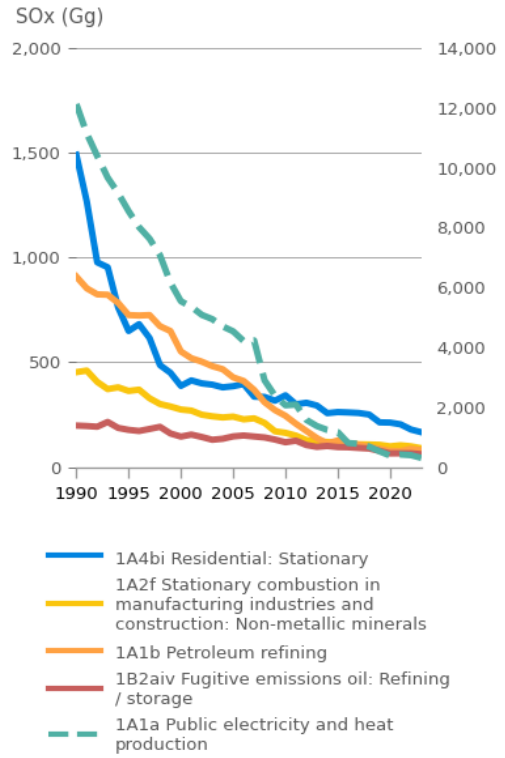
Figure 3.10: SO_X emission trends in the EU and shares of Member States



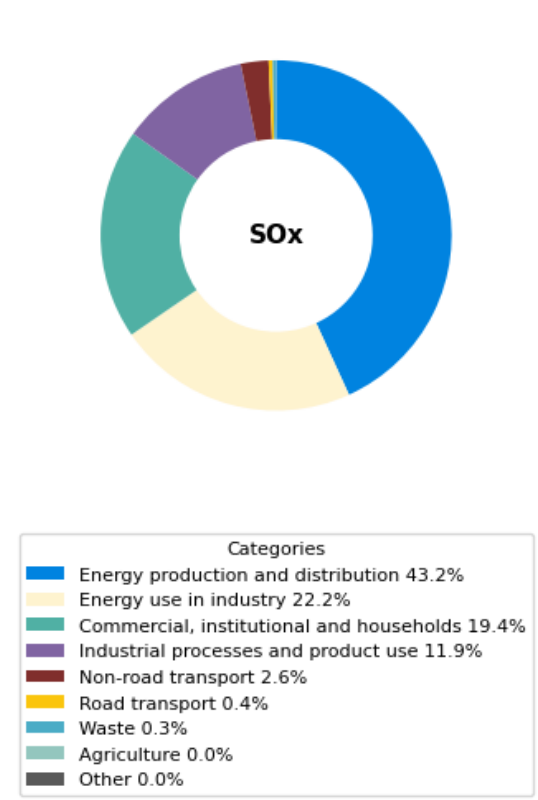
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.11a: SO_X emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

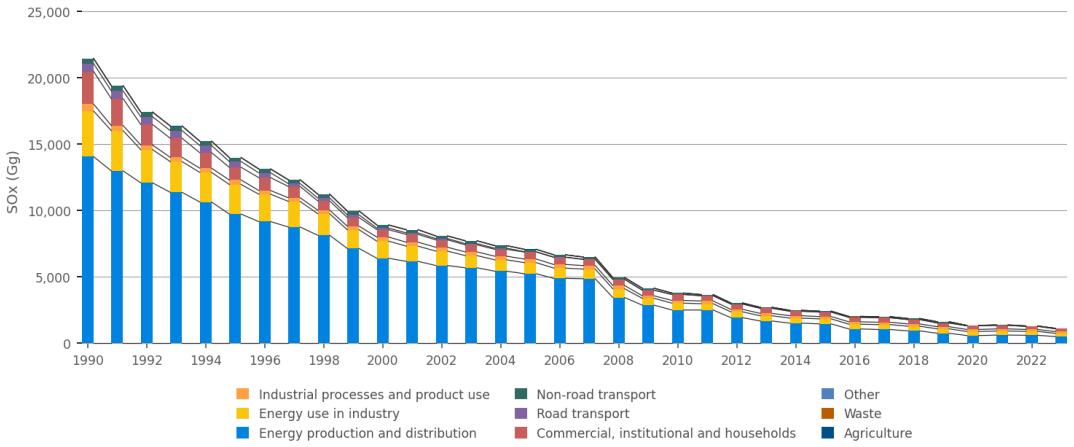
(a)



(b)



(c)



Note: In (a), the right-hand axis shows values for '1A1a — Public electricity and heat production'.

3.5 Ammonia emission trends and key categories

Since 2005, NH_3 emissions have dropped by 17% in the EU (Table 3.6). During the past two years, NH_3 emissions increased by less than 1%. Currently, the EU Member States with the highest share of NH_3 emissions are Germany, France, Spain and Italy (Figure 3.12).

NH_3 emissions are mainly the result of agricultural activities during manure management (3B) and application of fertiliser to soils (3D). For the EU-27, both categories show a decrease since 1990 (Figure 3.13a). Factors driving the emission trend are mainly the number of livestock and changes in manure management practices, feeding practices and abatement technologies in fertiliser application.

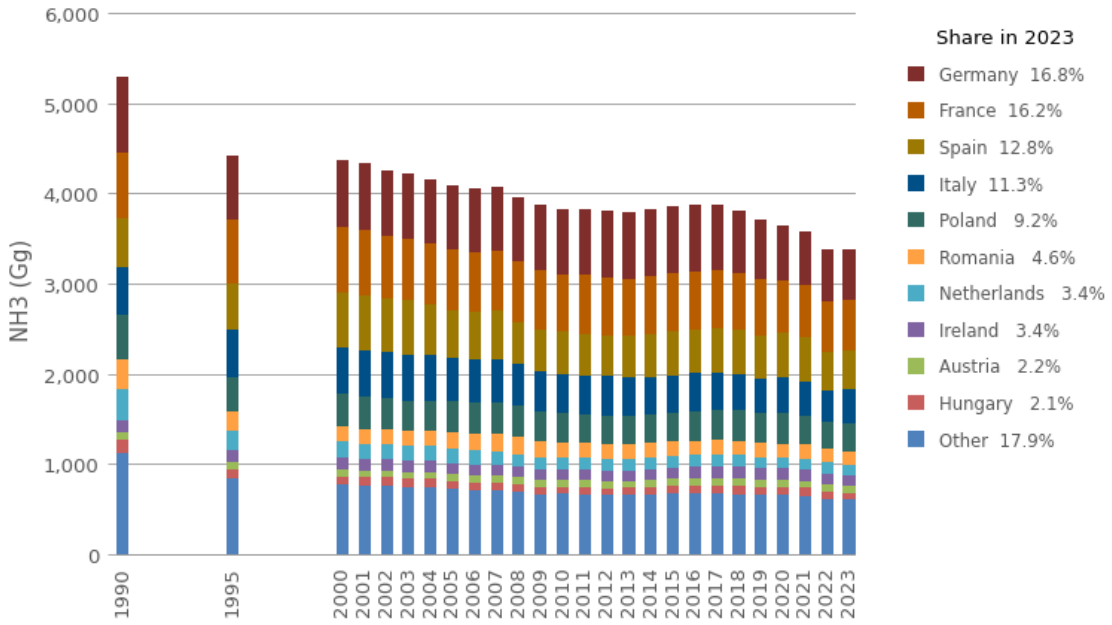
The principal key categories for NH_3 emissions are presented in Figure 3.13a, while Figure 3.13b shows the contribution made by each aggregated sector group to total EU emissions. A single sector group — agriculture — is responsible for over 90% of the NH_3 emissions in the EU (Figure 3.13c).

Table 3.6: Member State contributions to EU emissions of NH_3

	NH3(Gg)														Change			Share in EU-27	
Member State	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**1990-2023**	**2005-2023**	**2022-2023**	**1990**	**2023**
Austria	90	86	82	79	80	80	81	81	80	78	77	77	76	74	-18%	-6%	-2.4%	1.7%	2.2%
Belgium	126	129	95	79	75	71	71	69	69	68	67	66	64	63	-50%	-21%	-2.3%	2.4%	1.9%
Bulgaria	148	72	57	58	56	62	64	62	62	64	62	62	63	61	-59%	6%	-2.3%	2.8%	1.8%
Croatia	54	41	43	43	36	30	28	31	30	29	29	28	24	23	-57%	-46%	-4.0%	1.0%	0.7%
Cyprus	6.8	7.9	8.3	8.2	7.8	6.8	7.1	7.2	7.3	7.4	7.8	7.8	7.2	7.1	3%	-14%	-1.8%	0.1%	0.2%
Czechia	142	90	84	79	70	86	87	86	82	79	77	76	76	72	-49%	-9%	-6.0%	2.7%	2.1%
*Adjusted data**				75							69	69	70						
Denmark	155	128	113	98	90	84	85	87	85	81	83	75	73	66	-57%	-33%	-8.8%	2.9%	2.0%
Estonia	23	10	8.8	10	11	12	11	11	11	11	10	10	10	9.7	-58%	-7%	-2.9%	0.4%	0.3%
Finland	41	39	39	41	39	38	36	36	35	35	34	33	30	30	-27%	-26%	0.6%	0.8%	0.9%
France	734	704	720	673	634	638	637	637	635	612	589	573	550	547	-25%	-19%	-0.5%	13.9%	16.2%
Germany	834	717	734	714	722	745	739	717	683	660	611	593	577	569	-32%	-20%	-1.3%	15.8%	16.8%
Greece	96	85	82	80	76	68	68	67	66	66	69	68	64	66	-31%	-17%	2.7%	1.8%	2.0%
Hungary	149	86	93	87	77	86	88	90	90	89	91	91	81	72	-52%	-17%	-11.1%	2.8%	2.1%
Ireland	129	131	130	124	119	121	126	129	130	128	125	123	121	116	-10%	-6%	-4.1%	2.4%	3.4%
Italy	529	515	517	482	427	407	427	407	390	384	400	388	348	382	-28%	-21%	10.0%	10.0%	11.3%
Latvia	32	14	12	13	13	14	15	15	14	14	14	14	13	13	-58%	5%	0.6%	0.6%	0.4%
Lithuania	77	34	33	37	37	39	38	38	37	38	39	38	35	34	-56%	-7%	-2.4%	1.5%	1.0%
Luxembourg	6.4	6.7	6.9	6.4	6.5	6.2	6.4	6.5	6.5	6.4	6.3	6.3	5.8	5.7	-11%	-12%	-1.6%	0.1%	0.2%
Malta	2.1	2.2	2.1	1.8	1.8	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.6	1.6	-22%	-9%	4.5%	0.0%	0.0%
Netherlands	347	220	175	155	134	129	131	133	132	125	125	123	120	116	-66%	-25%	-3.3%	6.6%	3.4%
Poland	507	385	366	345	325	316	318	334	344	330	335	319	293	311	-39%	-10%	5.8%	9.6%	9.2%
Portugal	68	65	69	57	53	54	54	55	55	57	58	58	56	56	-17%	-2%	0.4%	1.3%	1.7%
Romania	318	212	168	185	165	164	160	159	158	156	153	155	155	155	-51%	-16%	0.3%	6.0%	4.6%
Slovakia	53	34	29	29	23	26	27	29	29	28	26	25	24	25	-52%	-12%	7.1%	1.0%	0.8%
Slovenia	22	20	20	18	17	16	17	16	16	16	16	16	15	15	-33%	-18%	-2.1%	0.4%	0.4%
Spain	528	520	611	522	476	495	488	503	492	484	487	488	435	434	-18%	-17%	-0.2%	10.0%	12.8%
Sweden	67	67	65	60	57	57	56	57	56	55	56	55	54	54	-19%	-10%	0.2%	1.3%	1.6%
EU27(a)	**5,285**	**4,421**	**4,362**	**4,087**	**3,826**	**3,854**	**3,866**	**3,865**	**3,799**	**3,702**	**3,648**	**3,572**	**3,372**	**3,381**	**-36%**	**-17%**	**0.3%**	**100.0%**	**100.0%**
EU27(b)	5,285	4,421	4,362	4,087	3,826	3,854	3,866	3,865	3,799	3,702	3,648	3,572	3,372	3,381					
EU27(c)	5,285	4,421	4,362	4,083	3,826	3,854	3,866	3,865	3,799	3,702	3,640	3,565	3,366	3,381					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

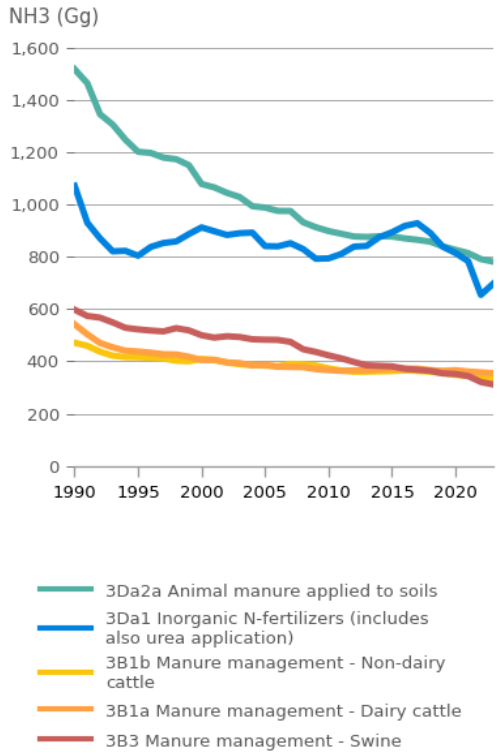
Figure 3.12: NH_3 emission trends in the EU and shares of Member States



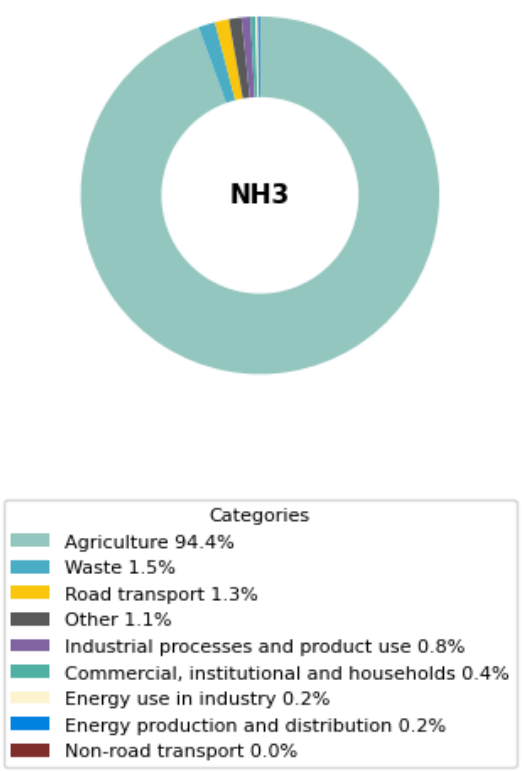
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.13: NH_3 emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

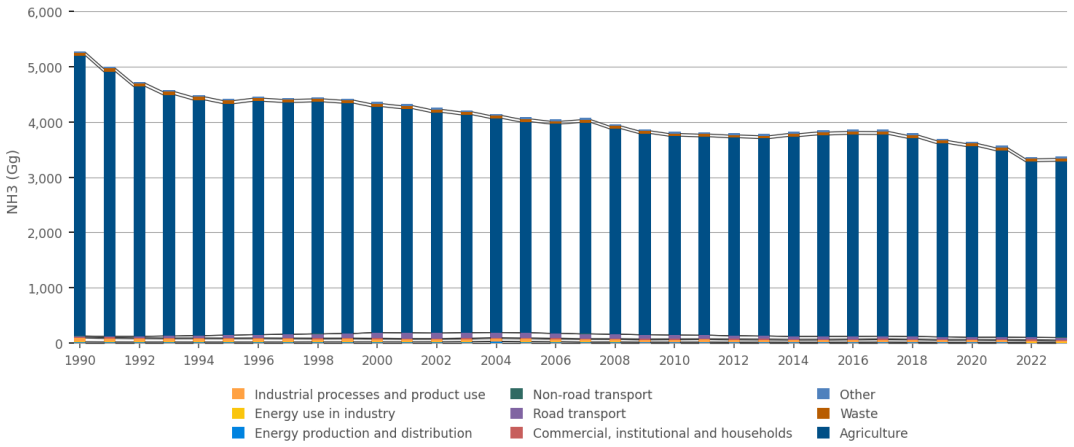
(a)



(b)



(c)



3.6 $PM_{2.5}$ emission trends and key categories

Since 2005, $PM_{2.5}$ emissions have dropped by 38% in the EU (Table 3.7). Between the past two years, emissions decreased by 6%. During the current year, the EU Member States contributing most to $PM_{2.5}$ emissions were Poland, France and Italy (Figure 3.13).

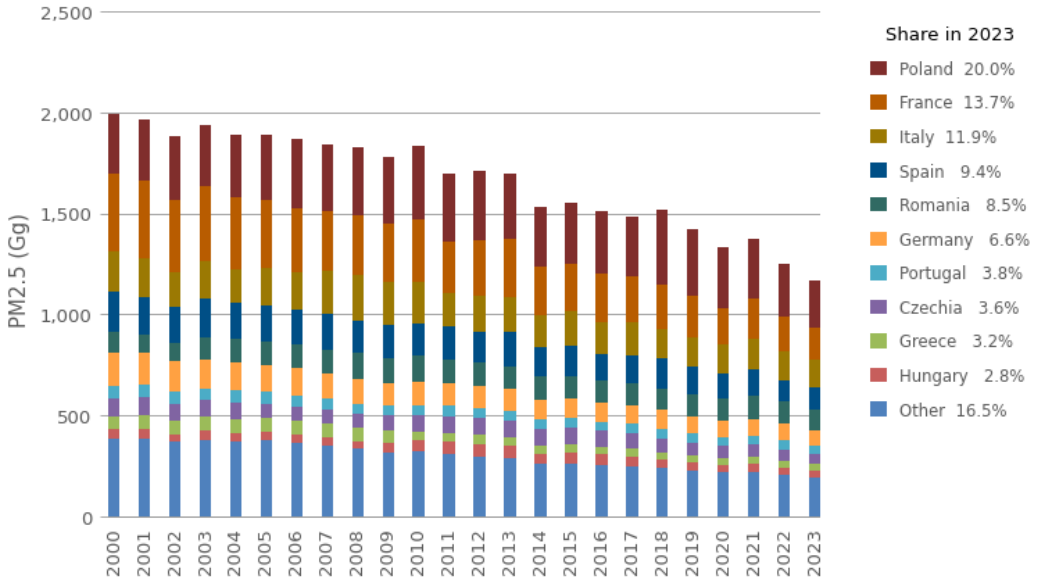
Domestic fuel use (1A4bi) is the principal key category for $PM_{2.5}$ emissions. Among the top five key categories (Figure 3.15a), the highest relative reduction in emissions since 2000 has been in public electricity and heat production (1A1a), which has reduced by 79%, followed by residential fuel use (1A4bi). The reductions achieved in stationary fuel combustion in public electricity and heat production is a result of EU directives introduced for installations. Emissions from road transport (1A3) have decreased as well (3.15c), which is largely due to the Euro emission standards for the transport sector and the introduction of stricter testing procedures with vehicles tested on the road which were introduced in the EU following the Dieselgate scandal. In contrast, emissions from tyre and brake wear (1A3bvi) have increased by about 28% since 2000 mostly due to an increase in vehicle weight.

Table 3.7: Member State contributions to EU emissions of $PM_{2.5}$

	PM2.5(Gg)																Change			Share in EU-27	
Member State	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2000-2023	2005-2023	2022-2023	2000	2023
Austria	24	23	20	19	19	18	17	16	16	16	15	15	14	15	13	13	-47%	-44%	-3.9%	1.2%	1.1%
Belgium	40	35	31	25	25	26	21	22	22	21	19	19	17	19	17	17	-57%	-50%	-0.7%	2.0%	1.5%
Bulgaria	32	38	33	36	34	32	31	30	31	30	29	28	31	30	26	22	-31%	-41%	-13.7%	1.6%	1.9%
Croatia	36	43	38	36	35	34	30	32	31	29	28	27	28	29	25	26	-27%	-40%	2.5%	1.8%	2.2%
Cyprus	2.4	2.0	1.5	1.4	1.1	0.9	0.8	0.9	1.0	1.0	0.9	1.0	0.9	1.0	0.9	0.9	-63%	-56%	-3.2%	0.1%	0.1%
Czechia	84	74	81	81	82	84	79	81	78	76	70	63	59	59	55	43	-49%	-42%	-22.2%	4.2%	3.6%
Denmark	21	21	21	19	18	18	17	17	17	16	15	13	12	12	11	11	-46%	-48%	0.0%	1.0%	1.0%
Estonia	10	8.2	11	16	7.6	9.7	8.5	7.0	6.2	6.6	6.2	5.2	4.9	4.7	4.9	4.7	-54%	-43%	-5.0%	0.5%	0.4%
Finland	26	26	23	21	20	20	19	18	18	18	18	16	14	15	14	13	-50%	-50%	-4.0%	1.3%	1.1%
France	383	341	308	259	276	284	239	240	242	228	214	209	179	196	171	160	-58%	-53%	-6.4%	19.3%	13.7%
Germany	162	131	116	111	109	108	100	99	93	92	92	87	79	81	82	77	-52%	-41%	-5.9%	8.1%	6.6%
Greece	66	67	46	47	48	43	44	42	39	39	37	36	34	35	36	37	-44%	-45%	1.7%	3.3%	3.2%
Hungary	49	41	51	57	59	59	49	51	50	48	41	38	37	38	36	33	-33%	-20%	-9.4%	2.5%	2.8%
Ireland	19	19	16	14	14	14	14	14	14	13	13	12	12	12	11	9.4	-51%	-51%	-11.4%	1.0%	0.8%
Italy	202	182	206	160	183	176	158	165	158	166	150	147	139	151	143	139	-31%	-24%	-2.7%	10.2%	11.9%
Latvia	27	27	20	21	21	19	18	15	15	17	17	17	15	16	15	14	-47%	-46%	-5.3%	1.4%	1.2%
Lithuania	15	18	16	16	16	15	15	19	14	14	14	12	11	12	11	9.2	-40%	-49%	-16.8%	0.8%	0.8%
Luxembourg	2.5	2.5	1.9	1.7	1.6	1.6	1.6	1.4	1.5	1.3	1.4	1.1	1.0	1.1	1.0	1.3	-49%	-50%	21.0%	0.1%	0.1%
Malta	0.7	0.8	0.5	0.5	0.5	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-57%	-58%	-8.0%	0.0%	0.0%
Netherlands	35	28	22	20	19	19	18	18	17	17	16	16	14	14	14	14	-60%	-51%	-2.3%	1.7%	1.2%
Poland	295	323	360	336	339	327	300	296	305	297	372	323	305	296	260	233	-21%	-28%	-10.2%	14.8%	20.0%
Portugal	65	58	49	50	49	48	47	47	46	47	47	46	44	46	46	44	-32%	-23%	-2.9%	3.3%	3.8%
Romania	107	121	129	119	121	114	114	109	108	110	108	109	108	114	108	100	-7%	-17%	-7.2%	5.4%	8.5%
Slovakia	44	36	26	24	25	23	16	21	21	21	17	17	17	16	16	13	-70%	-63%	-16.1%	2.2%	1.1%
Slovenia	14	16	15	15	14	14	12	13	13	12	11	11	10	11	9.6	9.2	-36%	-43%	-4.1%	0.7%	0.8%
Spain	193	176	161	169	145	166	145	156	132	135	146	133	129	133	108	110	-43%	-38%	1.9%	9.7%	9.4%
Sweden	33	32	26	26	24	23	20	18	18	18	17	16	16	15	14	14	-56%	-55%	-0.2%	1.6%	1.2%
EU27(a)	**1,989**	**1,890**	**1,831**	**1,699**	**1,707**	**1,697**	**1,534**	**1,549**	**1,508**	**1,486**	**1,517**	**1,418**	**1,334**	**1,371**	**1,249**	**1,170**	**-41%**	**-38%**	**-6.3%**	**100.0%**	**100.0%**
EU27(b)	1,989	1,890	1,831	1,699	1,707	1,697	1,534	1,549	1,508	1,486	1,517	1,418	1,334	1,371	1,249	1,170					

Notes: The Air Convention formally requests Parties to report emissions of PM for 2000 and thereafter. (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

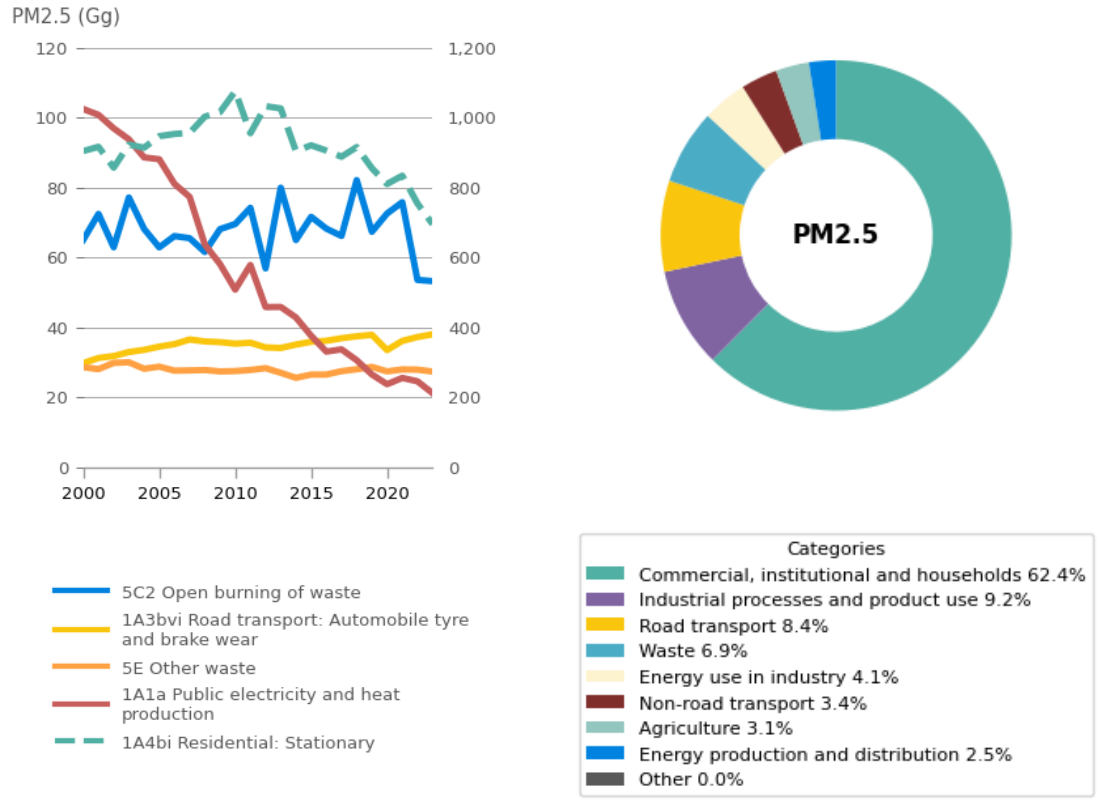
Figure 3.14: $PM_{2.5}$ emission trends in the EU and shares of Member States



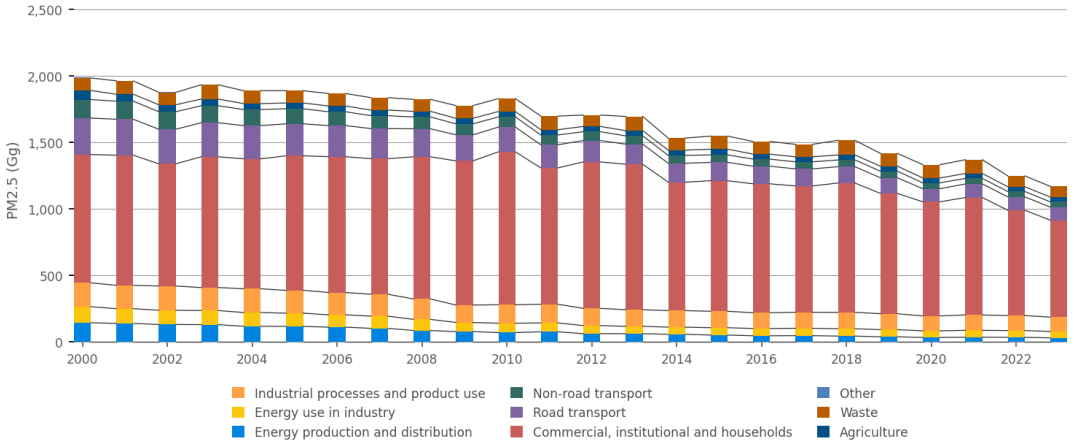
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.15: $PM_{2.5}$ emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

(a) (b)



(c)



Notes: In (a), the right-hand axis shows values for '1A4bi — Residential: Stationary'. The Air Convention formally requests Parties to report emissions of PM for 2000 and thereafter.

3.7 PM_{10} emission trends and key categories

Since 2000, PM_{10} emissions have decreased by 38% in the EU (Table 3.8). During the current year, the EU Member States contributing most to PM_{10} emissions were Poland, France, Italy and Spain (Figure 3.15). During the past two years, the PM_{10} emissions decreased by about 5%.

Figure 3.17b shows the contribution of each aggregated sector group to total EU emissions. The commercial, institutional and households sector group is the biggest source of PM_{10} in the EU. The most significant key category for PM_{10} is residential stationary combustion (1A4bi) (Figure 3.17a). Emissions from this category have decreased since 2000, which is due to for example the

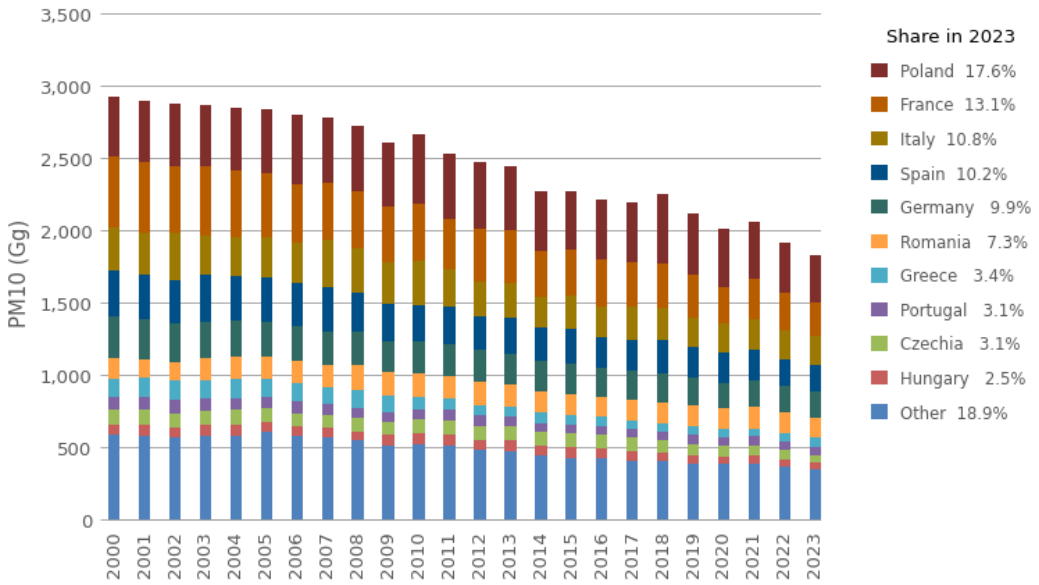
stricter emission standards of the Eco-design Directive (2009/125/EC). Among the top five key categories, construction and demolition (2A5b) has had the highest relative reduction in emissions since 2000 (34%). The reductions in this sector are for example due to better techniques in dust suppression and advances in construction practices. Emissions from quarrying and mining of minerals (2A5a) have also reduced since 2000. From the agricultural sector, emissions have remained relatively constant (Figure 3.17a and 3.17c).

Table 3.8: Member State contributions to EU emissions of PM_{10}

	PM10(Gg)																Change			Share in EU-27	
Member State	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2000-2023	2005-2023	2022-2023	2000	2023
Austria	40	38	34	33	32	32	30	30	30	30	29	29	27	29	27	26	-35%	-32%	-4.0%	1.4%	1.4%
Belgium	60	51	49	37	37	38	33	34	35	33	33	32	30	32	30	30	-50%	-42%	-1.6%	2.0%	1.6%
Bulgaria	66	74	55	58	53	49	50	51	46	46	46	45	47	46	40	36	-46%	-52%	-9.7%	2.3%	2.0%
Croatia	47	57	52	51	51	50	42	42	43	38	41	39	44	44	35	37	-21%	-35%	6.3%	1.6%	2.0%
Cyprus	4.4	3.6	2.9	2.7	2.0	1.6	1.5	1.6	1.7	1.7	1.7	1.8	1.7	1.8	1.7	1.7	-61%	-53%	0.1%	0.2%	0.1%
Czechia	105	93	97	96	98	99	94	96	92	90	85	78	73	73	69	56	-47%	-40%	-19.3%	3.6%	3.1%
Denmark	33	33	32	30	29	29	28	28	27	27	26	24	23	23	22	21	-34%	-34%	-1.3%	1.1%	1.2%
Estonia	27	17	21	34	15	20	17	14	12	13	12	10	10	10	9.0	8.8	-67%	-47%	-2.6%	0.9%	0.5%
Finland	43	42	39	36	35	34	34	31	32	31	31	30	27	28	27	26	-40%	-39%	-4.0%	1.5%	1.4%
France	491	441	396	347	364	371	323	325	327	315	300	295	258	280	254	239	-51%	-46%	-6.2%	16.8%	13.1%
Germany	291	240	223	222	219	220	212	210	195	198	205	191	179	180	182	182	-38%	-24%	-0.2%	10.0%	9.9%
Greece	127	122	88	76	74	70	74	67	67	65	58	58	57	57	60	63	-51%	-49%	4.9%	4.3%	3.4%
Hungary	72	72	71	74	73	77	71	72	69	65	59	58	53	53	50	46	-36%	-36%	-8.5%	2.5%	2.5%
Ireland	32	36	29	22	23	23	23	23	24	23	23	23	22	21	19	18	-45%	-50%	-7.5%	1.1%	1.0%
Italy	298	280	300	261	244	238	214	230	215	226	228	205	199	213	201	198	-34%	-30%	-1.7%	10.2%	10.8%
Latvia	32	34	27	28	29	26	26	24	24	25	25	24	23	25	24	22	-30%	-34%	-7.6%	1.1%	1.2%
Lithuania	17	33	26	28	25	22	25	24	25	21	25	20	20	20	20	17	4%	-47%	-11.2%	0.6%	1.0%
Luxembourg	3.0	3.2	2.5	2.3	2.3	2.2	2.2	2.1	2.1	2.0	2.0	1.8	1.5	1.6	1.7	1.9	-38%	-42%	11.2%	0.1%	0.1%
Malta	1.1	1.5	1.1	1.1	1.1	1.0	1.3	1.0	1.3	1.1	1.0	1.0	1.0	1.2	1.4	1.0	-12%	-33%	-29.5%	0.0%	0.1%
Netherlands	50	42	36	34	33	33	31	31	31	30	30	28	27	27	26	26	-48%	-38%	-1.1%	1.7%	1.4%
Poland	419	446	481	455	461	441	409	401	412	406	480	427	402	395	351	321	-23%	-28%	-8.5%	14.3%	17.6%
Portugal	84	75	66	73	69	62	58	58	57	58	58	59	57	59	59	57	-32%	-24%	-2.2%	2.9%	3.1%
Romania	140	158	165	156	160	150	150	144	141	142	140	145	144	151	142	134	-5%	-15%	-5.8%	4.8%	7.3%
Slovakia	54	45	33	31	32	30	23	29	27	27	23	24	24	23	22	19	-65%	-58%	-14.9%	1.8%	1.0%
Slovenia	18	21	18	18	17	16	14	15	15	15	13	13	13	15	14	13	-26%	-35%	-3.4%	0.6%	0.7%
Spain	313	307	253	259	229	246	223	241	212	215	227	216	207	214	186	185	-41%	-40%	0.0%	10.7%	10.2%
Sweden	59	73	64	65	62	63	59	45	44	44	43	42	41	40	41	39	-33%	-46%	-4.0%	2.0%	2.2%
EU27(a)	**2,927**	**2,839**	**2,662**	**2,533**	**2,468**	**2,444**	**2,268**	**2,270**	**2,210**	**2,188**	**2,245**	**2,118**	**2,010**	**2,061**	**1,915**	**1,825**	**-38%**	**-36%**	**-4.7%**	**100.0%**	**100.0%**
EU27(b)	2,927	2,839	2,662	2,533	2,468	2,444	2,268	2,270	2,210	2,188	2,245	2,118	2,010	2,061	1,915	1,825					

Notes: The Air Convention formally requests Parties to report emissions of PM for 2000 and thereafter. (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

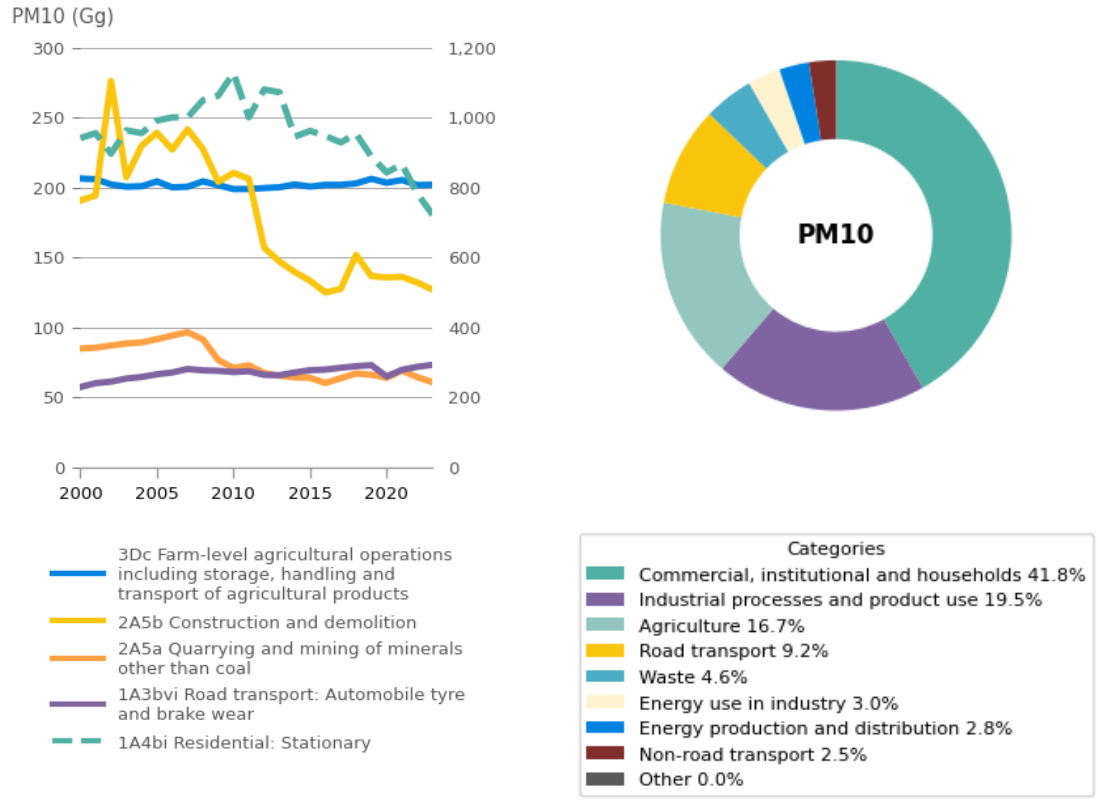
Figure 3.16: PM_{10} emission trends in the EU and shares of Member States



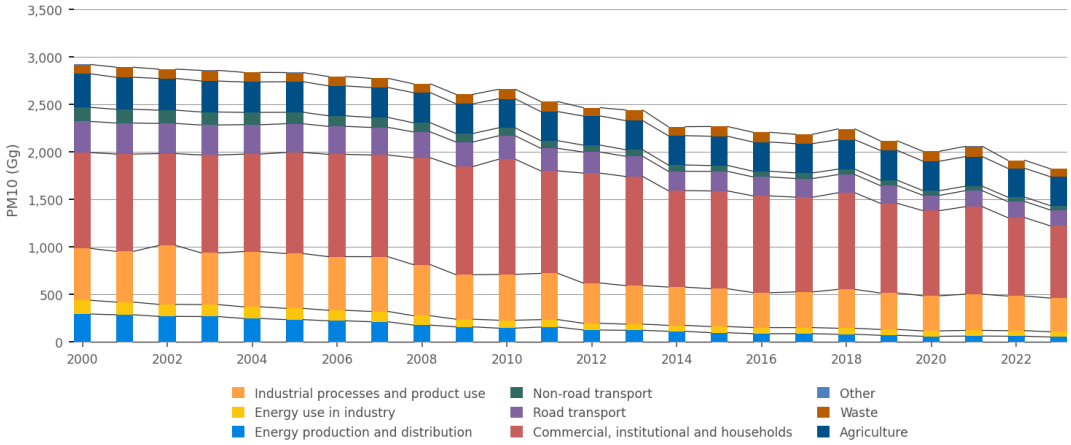
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.17: PM_{10} emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

(a) (b)



(c)



Notes: In (b), the right-hand axis shows values for '1A4bi — Residential: Stationary'. The Air Convention formally requests Parties to report emissions of PM for 2000 and thereafter.

3.8 Total suspended particulate emission trends

Since 2000, TSP emissions have dropped by 34% in the EU (Table 3.9). Between the two latest years, emissions decreased by 4%. During the current year, the EU Member States contributing most to TSP emissions were France, Poland and Germany.

The reductions in TSP emissions are linked to improvements in wood-burning equipment in the residential sector, reduced emissions from demolition and construction, switching from solid to gaseous and liquid fuel, as well as advancements in filter technologies of combustion plants and industrial processes (from the EU-Member State's IIRs).

Table 3.9: Member State contributions to EU emissions of TSPs

	TSPs(Gg)																Change			Share in EU-27	
Member State	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2000-2023	2005-2023	2022-2023	2000	2023
Austria	60	58	52	50	49	49	48	47	47	48	46	47	45	48	45	43	-28%	-25%	-4.1%	1.2%	1.3%
Belgium	97	87	89	62	63	64	58	59	60	58	60	59	58	61	57	56	-42%	-35%	-2.3%	2.0%	1.7%
Bulgaria	126	145	81	90	87	77	93	105	71	72	79	83	77	73	49	48	-62%	-67%	-1.3%	2.6%	1.5%
Croatia	73	87	81	83	85	84	66	61	66	53	65	58	78	72	52	58	-21%	-33%	11.7%	1.5%	1.8%
Cyprus	9.8	6.7	5.9	5.5	4.0	3.2	2.9	3.0	3.2	3.3	3.4	3.7	3.5	3.6	3.4	3.4	-66%	-49%	0.6%	0.2%	0.1%
Czechia	135	115	114	114	117	116	110	113	109	106	100	94	87	89	83	68	-49%	-41%	-18.3%	2.7%	2.1%
Denmark	99	92	93	90	88	87	91	87	88	95	93	89	85	86	84	82	-17%	-11%	-2.4%	2.0%	2.5%
Estonia	63	29	31	45	24	29	24	22	20	20	21	18	20	19	16	15	-76%	-48%	-6.3%	1.3%	0.5%
Finland	57	57	54	51	49	49	49	45	47	45	45	45	40	42	41	40	-30%	-31%	-3.7%	1.1%	1.2%
France	1,107	1,035	954	912	928	931	868	880	889	879	857	852	786	830	808	760	-31%	-27%	-5.8%	22.4%	23.5%
Germany	494	407	377	381	375	384	375	369	342	355	370	344	326	325	328	334	-32%	-18%	1.7%	10.0%	10.3%
Greece	245	229	168	124	113	114	127	118	126	120	104	108	108	107	114	124	-49%	-46%	8.3%	4.9%	3.8%
Hungary	105	132	105	101	90	103	106	104	99	90	87	87	77	73	69	62	-40%	-53%	-9.8%	2.1%	1.9%
Ireland	82	99	75	52	54	54	53	56	57	61	59	60	58	53	52	50	-40%	-50%	-4.6%	1.7%	1.5%
Italy	440	440	483	455	342	337	299	343	311	329	377	303	304	314	299	295	-33%	-33%	-1.5%	8.9%	9.1%
Latvia	40	49	40	47	48	42	42	45	43	40	40	40	40	48	43	37	-9%	-26%	-14.8%	0.8%	1.1%
Lithuania	21	63	42	48	37	30	40	30	39	27	41	29	28	29	29	26	27%	-58%	-10.8%	0.4%	0.8%
Luxembourg	3.8	4.0	3.2	3.1	3.0	2.9	2.9	3.1	2.7	2.8	2.7	2.4	2.1	2.2	2.5	2.6	-31%	-35%	3.1%	0.1%	0.1%
Malta	1.8	4.1	3.0	3.1	3.2	3.1	3.7	3.3	4.5	3.9	2.7	3.5	3.4	5.1	5.1	3.1	76%	-23%	-39.1%	0.0%	0.1%
Netherlands	57	51	43	42	39	39	37	37	36	35	34	33	31	31	31	31	-46%	-40%	-0.8%	1.2%	0.9%
Poland	586	602	626	605	620	580	542	526	537	541	616	562	520	523	468	431	-26%	-28%	-7.8%	11.8%	13.3%
Portugal	143	133	117	139	128	105	93	92	92	93	94	95	94	96	94	94	-35%	-30%	-0.6%	2.9%	2.9%
Romania	236	300	289	287	285	258	261	239	218	208	213	223	235	225	198	183	-22%	-39%	-7.6%	4.8%	5.7%
Slovakia	73	61	42	40	39	38	31	41	35	37	30	30	31	30	28	23	-69%	-62%	-18.8%	1.5%	0.7%
Slovenia	26	30	26	24	22	21	16	17	20	20	18	19	20	22	23	23	-11%	-24%	-2.8%	0.5%	0.7%
Spain	467	496	369	370	325	329	306	343	291	302	316	315	297	311	279	274	-41%	-45%	-2.1%	9.5%	8.4%
Sweden	98	150	135	140	135	137	132	83	82	81	80	79	77	78	80	76	-23%	-50%	-5.2%	2.0%	2.3%
EU27(a)	**4,944**	**4,962**	**4,497**	**4,365**	**4,152**	**4,066**	**3,877**	**3,872**	**3,736**	**3,727**	**3,856**	**3,682**	**3,531**	**3,595**	**3,384**	**3,240**	**-34%**	**-35%**	**-4.2%**	**100.0%**	**100.0%**
EU27(b)	4,944	4,962	4,497	4,365	4,152	4,066	3,877	3,872	3,736	3,727	3,856	3,682	3,531	3,595	3,384	3,240					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.9 Black carbon emission trends

Since 2000, BC emissions have dropped by 53% in the EU (Table 3.10). Between the latest two years, emissions decreased by 4%. One of the drivers for the reduced BC emissions are the Euro standards in the road transport sector (EU Member State's IIRs).

During the current year, the EU Member States contributing most to BC emissions were Spain, France and Italy. Austria and Luxembourg did not provide data for BC. As these gaps could not be gap-filled, the EU total is an underestimate.

Table 3.10: Member State contributions to EU emissions of BC

	Black Carbon(Gg)																Change			Share in EU-27	
Member State	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2000-2023	2005-2023	2022-2023	2000	2023
Austria	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Belgium	8.2	7.3	6.3	5.4	5.0	4.8	3.9	3.9	3.7	3.2	3.0	2.7	2.4	2.6	2.4	2.3	-71%	-68%	-1.5%	2.4%	1.5%
Bulgaria	3.0	4.9	3.8	4.0	4.0	3.7	3.7	3.7	3.7	3.5	3.5	3.4	3.7	3.5	3.1	2.8	-8%	-43%	-9.5%	0.9%	1.7%
Croatia	5.1	6.1	5.2	4.9	4.8	4.6	4.1	4.4	4.2	4.1	3.9	3.7	3.6	3.8	3.4	3.6	-31%	-41%	3.9%	1.5%	2.2%
Cyprus	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-66%	-62%	-3.4%	0.2%	0.1%
Czechia	8.6	8.2	8.2	8.0	8.0	8.0	7.6	7.6	7.3	7.1	6.7	6.2	5.8	5.8	5.4	4.5	-47%	-45%	-16.9%	2.5%	2.8%
Denmark	4.1	3.8	3.3	3.1	2.9	2.8	2.6	2.5	2.5	2.3	2.1	2.0	1.8	1.8	1.6	1.6	-61%	-58%	-2.3%	1.2%	1.0%
Estonia	1.5	1.4	1.5	1.5	1.3	1.2	1.2	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.2	1.1	-29%	-22%	-5.3%	0.4%	0.7%
Finland	6.5	6.0	5.5	4.8	5.0	4.7	4.6	4.2	4.3	4.1	4.0	3.9	3.3	3.5	3.2	3.1	-53%	-49%	-5.1%	1.9%	1.9%
France	78	67	59	52	52	52	45	44	43	39	36	35	29	31	27	26	-67%	-62%	-5.8%	22.5%	15.9%
Germany	39	31	23	21	20	19	17	16	15	14	13	12	10	10	10	9.4	-76%	-70%	-7.3%	11.4%	5.8%
Greece	11	12	9.7	9.0	9.0	8.1	8.4	9.3	8.3	8.4	8.1	8.0	7.6	7.7	8.0	7.5	-30%	-35%	-5.6%	3.1%	4.7%
Hungary	8.3	7.5	8.5	9.1	9.3	8.9	7.7	8.1	7.8	7.4	6.5	6.1	5.7	5.8	5.6	5.2	-38%	-31%	-8.3%	2.4%	3.2%
Ireland	3.9	3.6	2.7	2.4	2.3	2.4	2.3	2.3	2.2	1.9	1.8	1.7	1.6	1.5	1.4	1.3	-67%	-65%	-10.6%	1.1%	0.8%
Italy	42	38	32	27	28	26	24	23	22	22	20	19	18	19	17	17	-60%	-56%	-3.4%	12.1%	10.5%
Latvia	3.4	3.4	2.8	2.7	2.8	2.5	2.4	2.1	2.1	2.2	2.3	2.2	2.0	2.1	2.0	1.9	-43%	-44%	-3.9%	1.0%	1.2%
Lithuania	2.4	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.4	1.9	1.8	1.8	1.7	1.5	-35%	-40%	-11.5%	0.7%	1.0%
Luxembourg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Malta	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-51%	-39%	3.2%	0.1%	0.1%
Netherlands	11	8.3	4.9	4.5	4.1	3.8	3.5	3.3	3.1	3.0	2.9	2.6	2.4	2.3	2.2	2.1	-80%	-75%	-2.3%	3.1%	1.3%
Poland	20	21	23	22	21	20	18	18	19	19	22	20	18	17	15	14	-28%	-33%	-7.4%	5.8%	8.9%
Portugal	9.1	7.9	6.9	6.6	6.2	6.0	6.0	6.0	5.9	5.9	5.8	5.7	4.8	5.0	5.2	5.3	-42%	-33%	1.7%	2.6%	3.3%
Romania	12	14	15	14	14	13	13	13	13	13	13	13	13	13	13	12	-3%	-13%	-5.5%	3.6%	7.5%
Slovakia	4.1	4.5	4.1	3.6	3.7	3.2	2.5	2.9	3.0	2.9	2.5	2.5	2.4	2.3	2.2	1.9	-53%	-57%	-11.5%	1.2%	1.2%
Slovenia	2.6	3.0	2.7	2.7	2.6	2.5	2.2	2.3	2.3	2.2	1.9	1.8	1.7	1.8	1.6	1.5	-42%	-49%	-4.4%	0.8%	0.9%
Spain	56	54	52	55	42	55	43	48	44	44	51	43	44	45	32	33	-40%	-39%	3.0%	16.2%	20.7%
Sweden	5.3	4.6	3.8	3.6	3.3	3.1	2.8	2.7	2.6	2.4	2.2	2.1	1.9	1.9	1.7	1.6	-69%	-65%	-5.9%	1.5%	1.0%
EU27(a)	**345**	**321**	**286**	**269**	**255**	**258**	**229**	**232**	**222**	**215**	**216**	**199**	**185**	**191**	**167**	**161**	**-53%**	**-50%**	**-4.1%**	**100.0%**	**100.0%**
EU27(b)	345	321	286	269	255	258	229	232	222	215	216	199	185	191	167	161					

Notes: Values presented in this table are based on the national total reported by each Member State. Dark blue-shaded cells indicate that no emission values are available. See Appendix 1 for an explanation of the notation keys reported by EU Member States. (a) Sum of national totals, as reported by EU Member States. Due to missing values for Austria and Luxembourg, this is an underestimate. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.10 Carbon monoxide emission trends and key categories

Since 2005, CO emissions have fallen by 47% in the EU (Table 3.11). Between the two latest years, CO emissions decreased by 6%. During the current year, the EU Member States contributing most to CO emissions were Germany, France, Poland and Italy (Figure 3.18).

Figure 3.19b shows the contribution to total EU emissions made by each aggregated sector group. The largest emissions source for CO in the EU is fuel, combustion in the residential sector (Figure 3.19a), mainly consisting of biomass combustion followed by road transport. Among the most important key categories, the highest relative emission reductions (92%) since 1990 have been in the road transport sector for passenger cars (1A3bi) (Figure 3.19a).

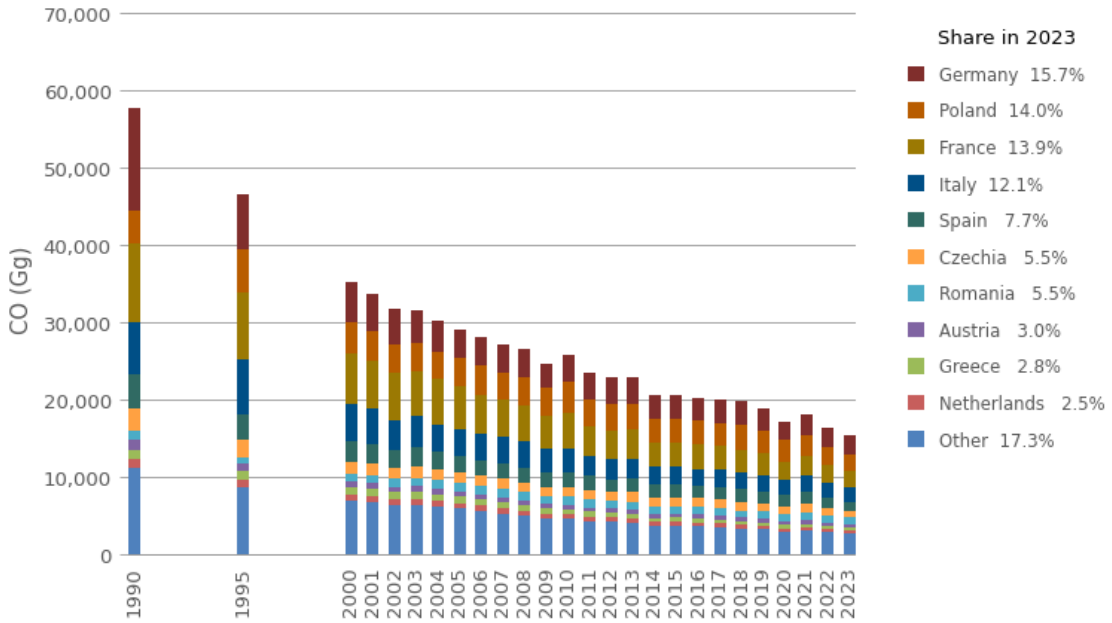
The reduced CO emissions are mainly due to advanced vehicle standards in the transport sector, but also due to reduced burning of agricultural residues (from the EU-Member State's IIRs).

Table 3.11: Member State contributions to EU emissions of CO

	CO(Gg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	1,249	974	728	625	579	541	536	526	484	497	473	537	483	466	-63%	-25%	-3.5%	2.2%	3.0%
Belgium	1,490	1,276	999	802	499	369	351	283	325	356	263	276	264	244	-84%	-70%	-7.8%	2.6%	1.6%
Bulgaria	817	642	417	369	304	256	255	246	233	217	231	233	196	172	-79%	-53%	-12.4%	1.4%	1.1%
Croatia	564	446	466	423	334	271	260	254	233	219	215	228	197	208	-63%	-51%	5.6%	1.0%	1.4%
Cyprus	45	39	30	23	15	11	11	11	10	9.8	8.6	8.9	8.9	8.8	-80%	-62%	-0.7%	0.1%	0.1%
Czechia	2,931	2,312	1,477	1,233	1,229	1,175	1,162	1,149	1,109	1,054	1,069	1,113	1,033	849	-71%	-31%	-17.8%	5.1%	5.5%
Denmark	720	642	469	426	356	268	257	245	227	210	194	194	179	178	-75%	-58%	-0.6%	1.2%	1.2%
Estonia	226	154	137	115	119	94	98	110	106	105	102	93	90	89	-60%	-22%	-0.7%	0.4%	0.6%
Finland	765	662	594	520	447	362	369	359	351	346	320	337	310	298	-61%	-43%	-3.8%	1.3%	1.9%
France	10,165	8,649	6,480	5,509	4,668	3,079	3,120	3,006	2,840	2,764	2,344	2,555	2,322	2,132	-79%	-61%	-8.2%	17.6%	13.9%
Germany	13,321	7,188	5,097	3,790	3,590	3,177	3,050	3,030	2,927	2,839	2,479	2,607	2,568	2,409	-82%	-36%	-6.2%	23.1%	15.7%
Greece	1,236	1,059	1,004	862	610	522	471	483	464	460	427	425	442	429	-65%	-50%	-3.0%	2.1%	2.8%
Hungary	1,415	981	857	698	546	460	445	433	371	352	334	337	326	299	-79%	-57%	-8.5%	2.5%	2.0%
Ireland	574	432	341	299	226	184	179	152	146	126	121	121	105	89	-84%	-70%	-15.0%	1.0%	0.6%
Italy	6,824	7,118	4,814	3,527	3,107	2,303	2,213	2,269	2,057	2,063	1,881	2,052	1,914	1,849	-73%	-48%	-3.4%	11.8%	12.1%
Latvia	400	289	241	213	155	111	109	117	121	117	104	106	105	98	-75%	-54%	-6.2%	0.7%	0.6%
Lithuania	386	219	183	175	158	121	121	118	120	112	106	109	102	89	-77%	-49%	-11.9%	0.7%	0.6%
Luxembourg	470	213	47	40	30	22	23	23	21	21	15	18	18	18	-96%	-56%	-1.6%	0.8%	0.1%
Malta	20	27	20	16	10	7.1	7.2	7.1	6.2	5.7	4.2	4.8	5.0	4.8	-76%	-69%	-3.9%	0.0%	0.0%
Netherlands	1,177	942	758	723	655	521	514	501	504	487	427	418	401	386	-67%	-47%	-3.8%	2.0%	2.5%
Poland	4,198	5,510	4,156	3,594	3,889	2,980	3,090	3,044	3,360	3,017	2,815	2,723	2,332	2,140	-49%	-40%	-8.2%	7.3%	14.0%
Portugal	777	801	659	503	371	303	291	291	272	281	249	279	246	246	-68%	-51%	0.0%	1.3%	1.6%
Romania	1,212	752	1,055	1,224	1,046	908	929	936	936	942	902	953	896	842	-31%	-31%	-6.1%	2.1%	5.5%
Slovakia	1,041	663	552	573	463	371	378	377	319	286	278	316	279	259	-75%	-55%	-7.1%	1.8%	1.7%
Slovenia	291	281	204	182	143	121	120	115	100	96	89	95	79	75	-74%	-59%	-4.6%	0.5%	0.5%
Spain	4,315	3,306	2,702	2,123	1,843	1,760	1,571	1,606	1,773	1,540	1,462	1,579	1,193	1,173	-73%	-45%	-1.7%	7.5%	7.7%
Sweden	1,091	934	640	490	405	330	334	326	307	302	286	286	274	267	-76%	-46%	-2.8%	1.9%	1.7%
EU27(a)	**57,719**	**46,510**	**35,125**	**29,076**	**25,794**	**20,628**	**20,265**	**20,017**	**19,725**	**18,827**	**17,200**	**18,005**	**16,368**	**15,317**	**-73%**	**-47%**	**-6.4%**	**100.0%**	**100.0%**
EU27(b)	57,719	46,510	35,126	29,076	25,794	20,628	20,265	20,018	19,725	18,827	17,200	18,005	16,368	15,317					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

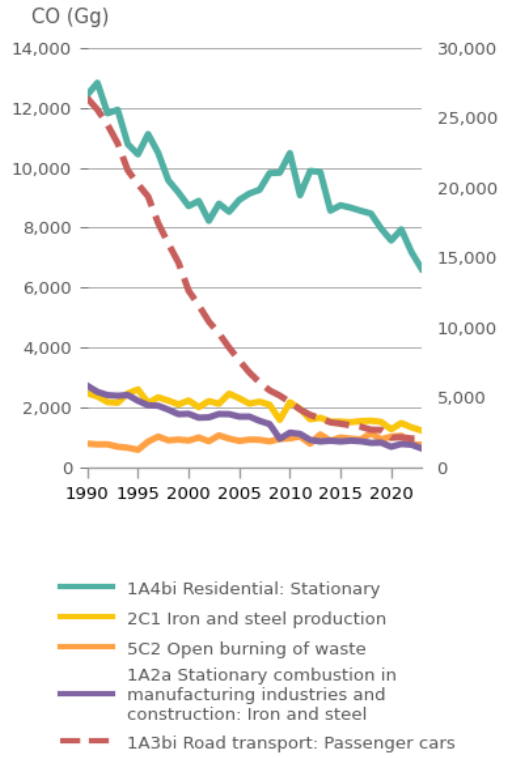
Figure 3.18: CO emission trends in the EU and shares of Member States



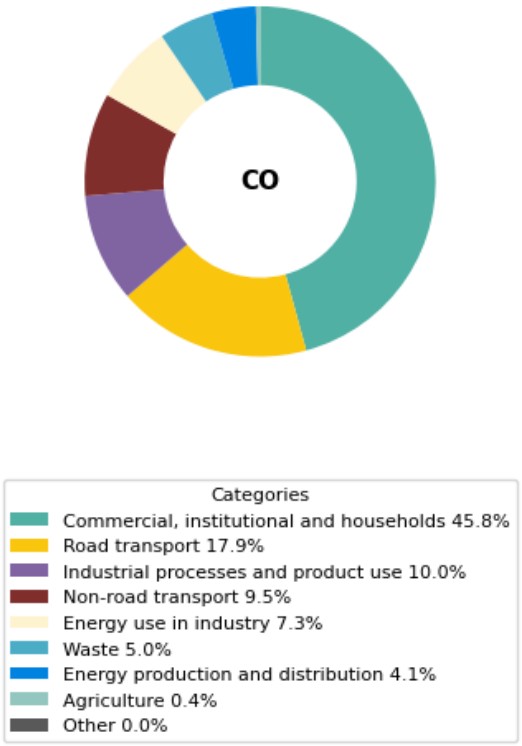
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.19a: CO emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

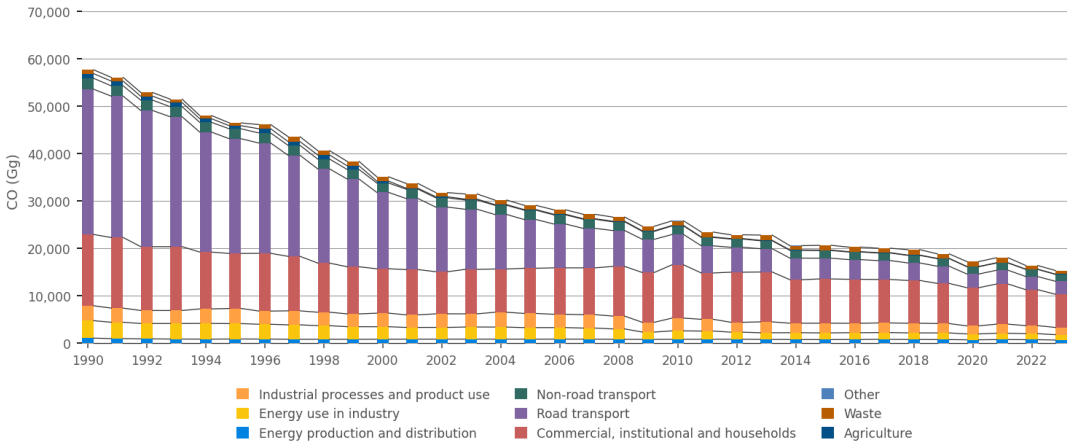
(a)



(b)



(c)



Note: In (a) the right-hand axis gives values for '1A3bi — Road transport: Passenger cars'.

3.11 Lead emission trends and key categories

Since 1990, Pb emissions have dropped by 95% in the EU (Table 3.12). During the current year, the EU Member States contributing most to Pb emissions were Poland, Italy, Germany and Spain (Figure 3.19).

The main key categories for Pb emissions are iron and steel production (2C1), tyre and brake wear from the road transport sector (1A3bvi) and residential combustion (1A4bi) (Figure 3.21a). The aggregated sector group industrial processes and product use, road transport, energy use in industry and commercial, institutional and households are significant sources of Pb emissions (Figure 3.21b).

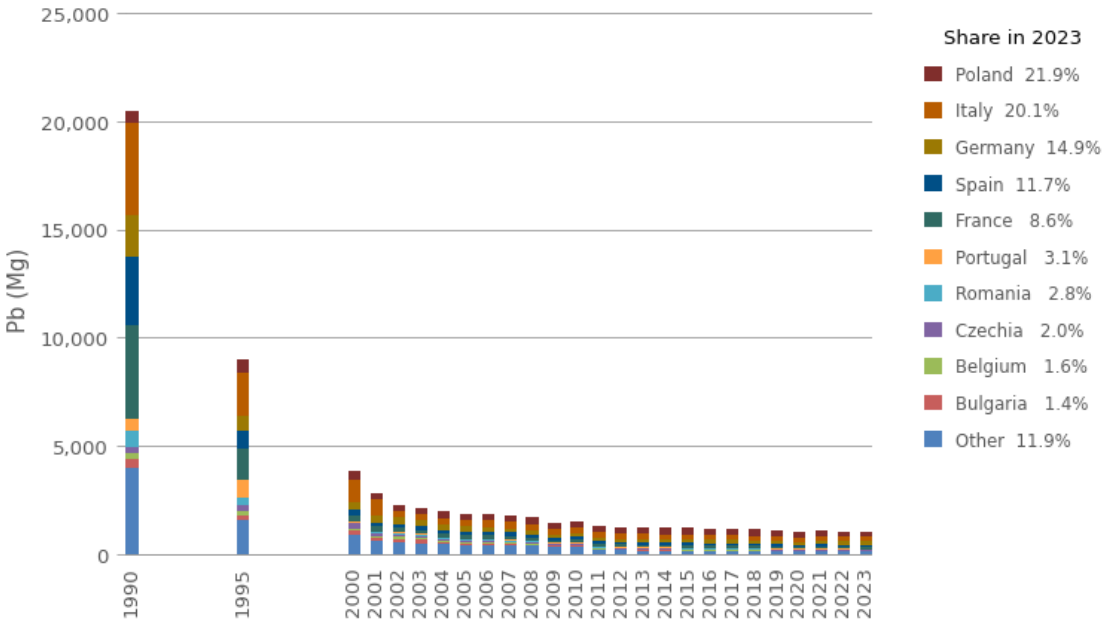
The historical decline in Pb emissions in the EU is primarily achieved through reduced emissions from the road transport sector due to unleaded petrol. Since 2005, Pb emissions have decreased by 46%, mainly driven by reduced lead emissions from iron and steel production. Between the past two years, emissions decreased by 3%.

Table 3.12: Member State contributions to EU emissions of Pb

	Pb(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	233	26	23	27	16	15	16	16	15	15	13	14	14	14	-94%	-49%	-1.6%	1.1%	1.4%
Belgium	257	201	104	81	46	36	33	31	19	20	17	16	16	16	-94%	-80%	1.1%	1.3%	1.6%
Bulgaria	394	269	182	43	23	19	19	17	17	17	16	16	17	14	-96%	-68%	-18.3%	1.9%	1.4%
Croatia	529	264	146	15	10	10	10	10	11	7.5	7.5	8.5	8.1	8.8	-98%	-43%	8.9%	2.6%	0.9%
Cyprus	25	27	21	1.3	1.3	1.0	1.1	1.1	1.1	1.1	1.0	1.1	1.0	1.1	-96%	-18%	3.5%	0.1%	0.1%
Czechia	321	259	225	44	30	27	24	24	25	24	21	21	25	21	-94%	-53%	-16.9%	1.6%	2.0%
Denmark	133	29	22	20	16	15	15	14	16	15	14	14	14	13	-90%	-38%	-6.9%	0.6%	1.3%
Estonia	202	83	30	9.4	8.5	5.1	5.3	5.5	5.3	4.6	4.0	3.9	4.2	3.6	-98%	-62%	-14.3%	1.0%	0.4%
Finland	321	73	31	21	20	15	16	16	15	13	12	13	12	12	-96%	-44%	-0.9%	1.6%	1.2%
France	4,301	1,468	279	176	137	107	106	106	105	105	91	96	93	87	-98%	-50%	-6.5%	21.0%	8.6%
Germany	1,899	679	355	230	164	165	162	167	161	159	144	156	152	151	-92%	-34%	-0.9%	9.3%	14.9%
Greece	505	405	340	73	37	15	14	16	15	13	10	11	11	11	-98%	-85%	-2.3%	2.5%	1.1%
Hungary	818	145	21	14	12	13	13	13	12	13	13	15	15	13	-98%	-9%	-12.4%	4.0%	1.3%
Ireland	158	99	17	11	8.8	8.6	8.8	8.4	8.4	8.0	7.2	7.5	7.4	7.1	-96%	-35%	-4.0%	0.8%	0.7%
Italy	4,302	2,021	991	327	246	228	201	207	208	203	179	213	207	203	-95%	-38%	-2.0%	21.0%	20.1%
Latvia	233	128	154	171	166	5.1	5.3	5.2	5.3	5.3	4.9	4.9	5.7	4.8	-98%	-97%	-16.0%	1.1%	0.5%
Lithuania	9.0	3.8	2.2	2.9	3.0	3.2	3.2	3.4	3.5	3.4	3.1	3.4	4.9	4.4	-52%	51%	-11.1%	0.0%	0.4%
Luxembourg	19	11	2.9	3.2	2.3	2.5	2.5	2.3	2.2	2.2	2.0	2.2	2.0	1.8	-91%	-43%	-8.9%	0.1%	0.2%
Malta	0.4	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	14%	-16%	-1.8%	0.0%	0.0%
Netherlands	336	155	29	30	38	8.7	9.1	8.7	6.0	5.3	5.8	4.9	4.6	4.0	-99%	-87%	-13.0%	1.6%	0.4%
Poland	542	576	394	268	293	289	282	295	296	273	253	262	245	221	-59%	-18%	-9.6%	2.6%	21.9%
Portugal	571	786	39	37	34	30	30	30	30	30	27	28	30	31	-95%	-15%	4.4%	2.8%	3.1%
Romania	734	356	48	74	42	43	42	42	43	44	40	43	38	29	-96%	-61%	-24.8%	3.6%	2.8%
Slovakia	53	45	45	18	8.1	11	11	11	11	9.6	8.0	10	9.4	9.9	-81%	-44%	5.2%	0.3%	1.0%
Slovenia	43	24	8.1	6.9	6.7	6.0	6.2	6.2	6.1	5.8	5.0	5.6	5.4	5.1	-88%	-25%	-4.9%	0.2%	0.5%
Spain	3,182	812	280	157	132	115	106	108	95	108	86	103	96	118	-96%	-25%	22.7%	15.5%	11.7%
Sweden	367	27	17	11	10	8.2	9.0	9.1	8.0	8.3	7.7	6.7	6.6	6.8	-98%	-40%	4.0%	1.8%	0.7%
EU27(a)	**20,487**	**8,972**	**3,808**	**1,874**	**1,513**	**1,200**	**1,150**	**1,173**	**1,142**	**1,114**	**993**	**1,080**	**1,046**	**1,012**	**-95%**	**-46%**	**-3.2%**	**100.0%**	**100.0%**
EU27(b)	20,487	8,972	3,808	1,874	1,513	1,200	1,150	1,173	1,142	1,114	993	1,080	1,046	1,012					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

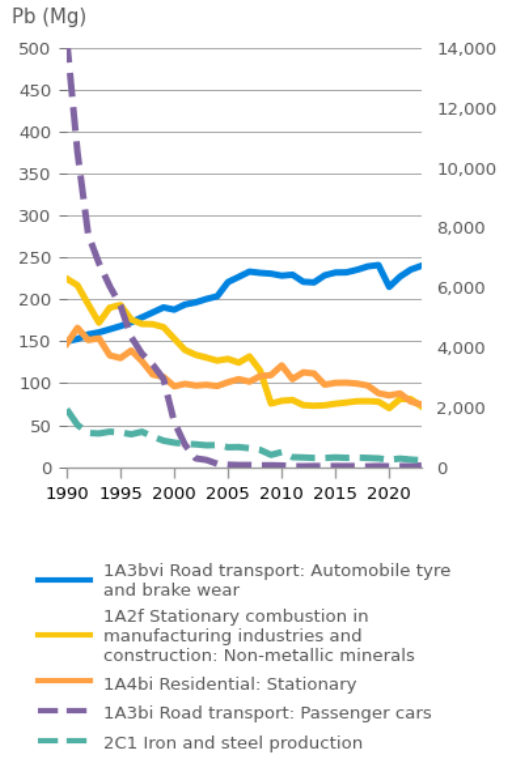
Figure 3.20: Pb emission trends in the EU and shares of Member States



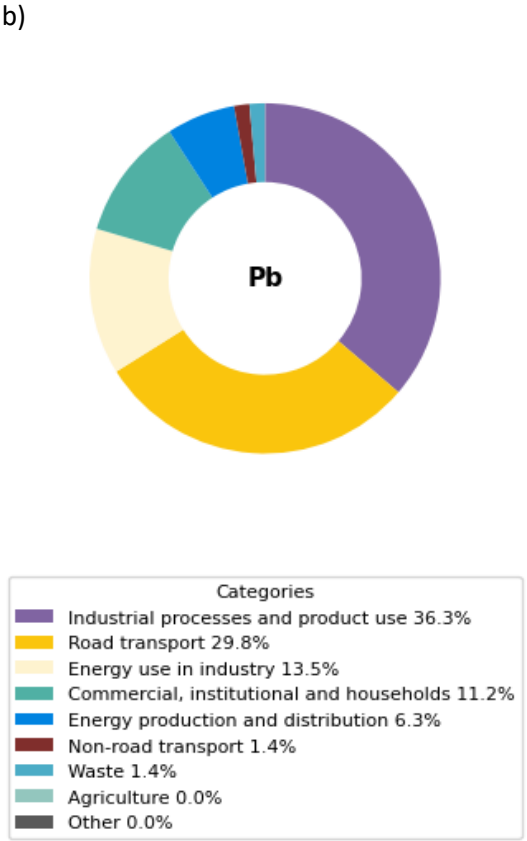
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.21: Pb emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

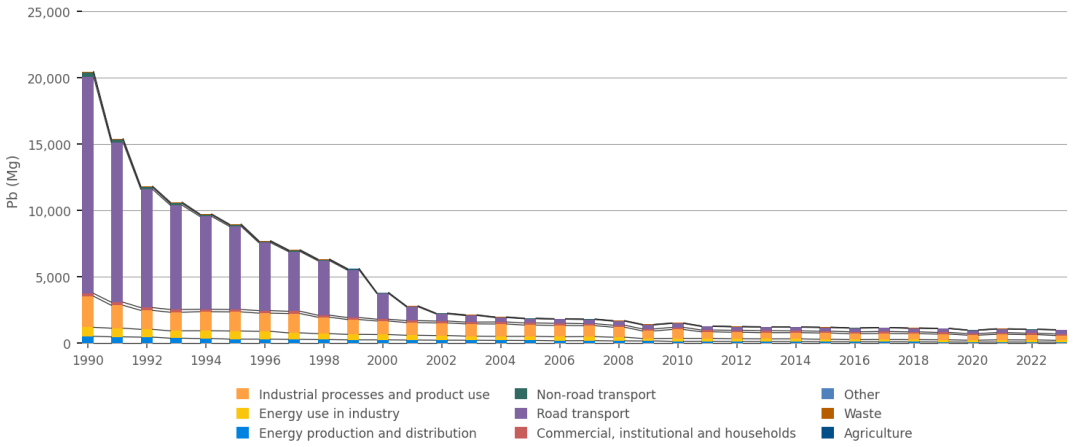
(a)



(b)



(c)



Note: In (a), the right-hand axis gives values for '1A3bi – Road transport: Passenger cars' and '2C1 — Iron and steel production'.

3.12 Cadmium emission trends and key categories

Since 1990, Cd emissions in the EU have fallen by 69% (Table 3.13). Since 2005 they have decreased by 43%. During the past two years, Cd emissions decreased by about 5%. During the latest year, the EU Member States contributing most to Cd emissions were Germany, Poland and Spain (Figure 3.21).

Figure 3.23(b) shows the contribution made by each aggregated sector group to total EU emissions. The common leading sources of Cd emissions are the industrial processes and product use sector and the commercial, institutional and households and energy sector.

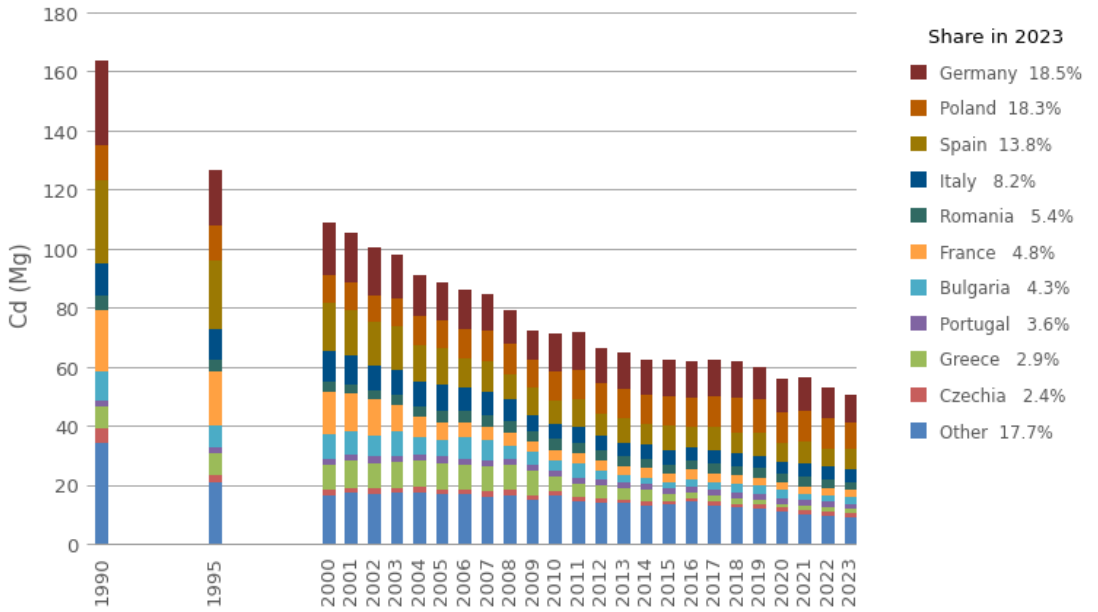
Industrial sources of Cd emissions have fallen since the early 1990s in all EU Member States. This is largely because the abatement technologies for waste water treatment and incinerators have improved, as have those for metal refining and smelting facilities (EEA, 2024b). The reduction since 2005 has mainly been achieved in public electricity and heat production (1A1a) and in iron and steel production (2C1).

Table 3.13: Member State contributions to EU emissions of Cd

	Cd(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	1.8	1.1	1.0	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	-50%	-20%	-4.5%	1.1%	1.7%
Belgium	6.0	4.9	2.6	2.4	2.0	1.6	2.6	1.4	1.2	1.2	1.1	1.2	1.1	1.1	-82%	-53%	5.7%	3.7%	2.2%
Bulgaria	10	7.5	8.5	5.7	3.6	2.2	2.3	2.5	3.1	2.8	2.9	2.1	2.3	2.2	-78%	-61%	-2.7%	6.1%	4.3%
Croatia	1.2	0.9	0.9	1.2	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	-32%	-29%	6.3%	0.7%	1.6%
Cyprus	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-61%	-62%	-0.7%	0.1%	0.1%
Czechia	5.2	2.2	1.7	1.7	1.5	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.3	1.2	-76%	-28%	-8.2%	3.2%	2.4%
Denmark	1.2	0.7	0.6	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.6	0.7	0.6	0.6	-51%	-14%	3.2%	0.7%	1.2%
Estonia	4.5	2.2	0.8	0.5	0.6	0.5	0.5	0.6	0.6	0.5	0.5	0.4	0.5	0.4	-91%	-19%	-9.3%	2.7%	0.8%
Finland	6.7	2.1	1.4	1.5	1.3	0.9	1.0	1.0	0.9	0.8	0.7	0.8	0.8	0.8	-89%	-48%	0.8%	4.1%	1.5%
France	20	18	14	6.1	3.6	3.0	3.5	3.1	2.6	2.7	2.7	2.5	2.5	2.4	-88%	-61%	-5.2%	12.5%	4.8%
Germany	29	19	18	12	13	12	12	12	12	11	11	11	11	9.4	-68%	-25%	-11.9%	17.8%	18.5%
Greece	7.5	7.8	8.4	8.9	4.6	2.1	2.0	2.1	1.9	1.7	1.5	1.5	1.5	1.5	-81%	-84%	-0.3%	4.6%	2.9%
Hungary	1.9	1.6	1.8	1.4	1.5	1.7	1.6	1.6	1.5	1.4	1.4	1.4	1.3	1.2	-37%	-12%	-10.5%	1.2%	2.4%
Ireland	0.6	0.6	0.6	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	-62%	-45%	-14.2%	0.3%	0.4%
Italy	11	11	10	8.7	5.4	4.6	4.5	4.5	4.5	4.3	4.0	4.5	4.2	4.2	-62%	-52%	-1.0%	6.8%	8.2%
Latvia	0.9	0.8	0.9	1.1	1.0	0.6	0.7	0.7	0.8	0.8	0.7	0.8	0.8	0.8	-17%	-30%	-2.9%	0.6%	1.5%
Lithuania	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-28%	13%	-1.4%	0.2%	0.4%
Luxembourg	0.5	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	-90%	-72%	-31.5%	0.3%	0.1%
Malta	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-92%	-91%	-0.9%	0.0%	0.0%
Netherlands	4.1	3.1	3.1	3.8	4.7	2.9	3.0	2.7	2.6	2.7	2.0	0.9	0.8	0.5	-88%	-88%	-40.5%	2.5%	0.9%
Poland	12	12	9.7	9.5	10.0	10	10.0	10	12	11	11	11	10	9.3	-21%	-3%	-8.5%	7.2%	18.3%
Portugal	1.9	2.0	2.1	2.2	2.0	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	-3%	-17%	1.6%	1.1%	3.6%
Romania	5.0	3.9	3.4	3.8	3.6	3.1	3.2	3.2	3.2	3.2	2.9	3.2	3.0	2.7	-46%	-27%	-8.9%	3.1%	5.4%
Slovakia	1.3	1.1	1.2	0.9	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	-67%	-53%	-10.3%	0.8%	0.9%
Slovenia	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.5	0.5	-23%	-29%	-4.4%	0.4%	1.0%
Spain	28	23	17	13	7.7	8.4	6.7	8.1	7.0	7.7	6.1	7.4	6.2	7.0	-75%	-45%	12.7%	17.0%	13.8%
Sweden	2.3	0.7	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-78%	-9%	3.5%	1.4%	1.0%
EU27(a)	**164**	**127**	**109**	**88**	**71**	**62**	**62**	**62**	**62**	**60**	**56**	**56**	**53**	**51**	**-69%**	**-43%**	**-4.7%**	**100.0%**	**100.0%**
EU27(b)	164	127	109	88	71	62	62	62	62	60	56	56	53	51					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

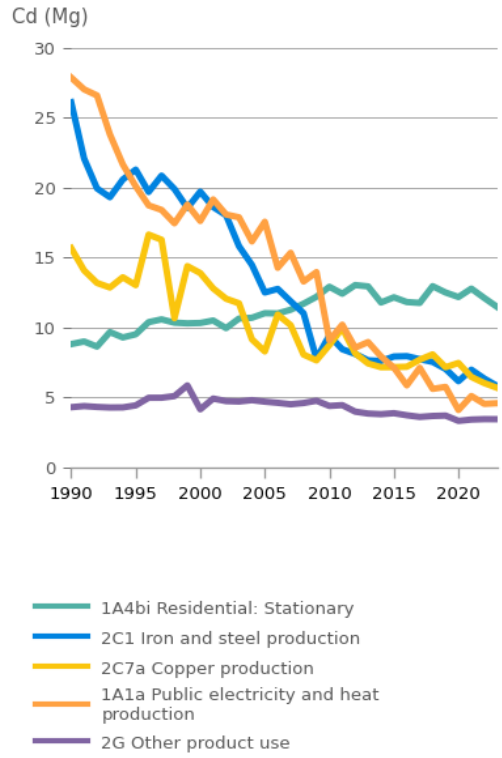
Figure 3.22: Cd emission trends in the EU and share of Member States



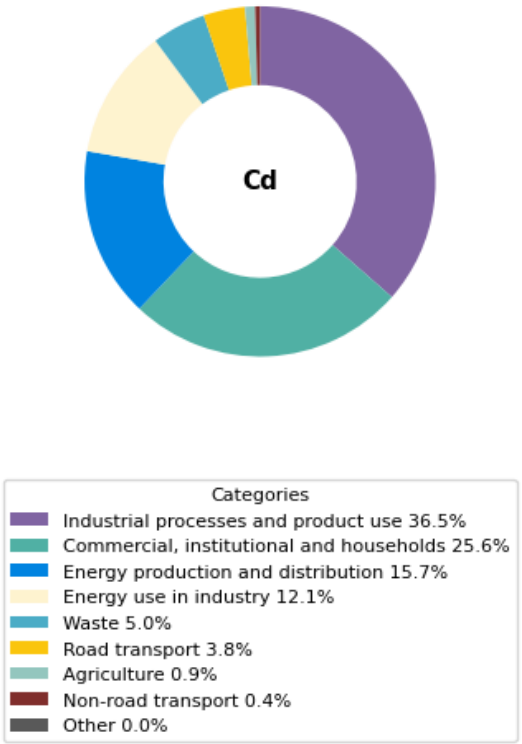
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.23a: Cd emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

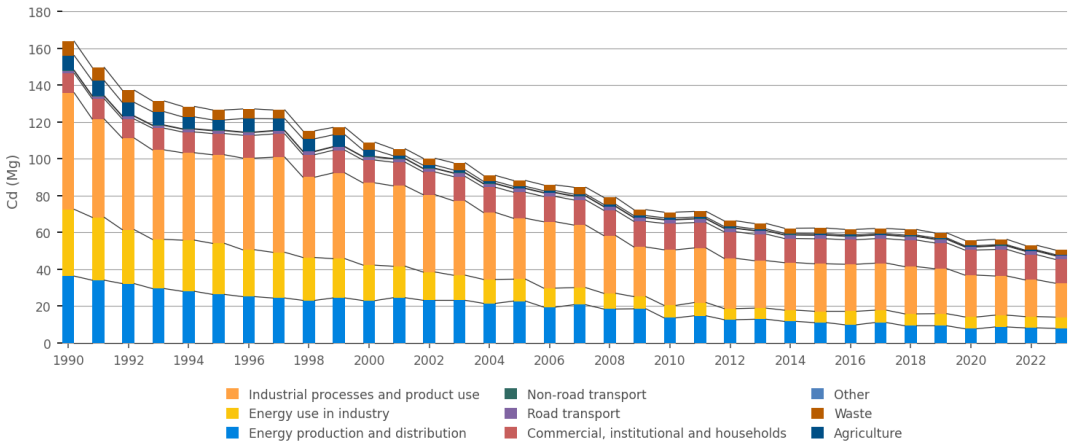
(a)



(b)



(c)



3.13 Mercury emission trends and key categories

Since 1990, Hg emissions in the EU have dropped by 77%, and since 2005 by 57%. Between the past two years they decreased by 9% (Table 3.14).

In 2023, the EU Member States contributing most to Hg emissions were Germany, Italy and Poland (see Figure 3.24).

Figure 3.25b shows the contribution made by each aggregated sector group to total EU emissions. For Hg, the principal emission sources are the energy and the industrial processes and product use sectors. Since 1990, the fall in Hg emissions in the industrial sector is mainly due to better emission controls on Hg cells and replacing them with diaphragm or membrane cells and switching from coal to gas and other energy sources in the power and heat-generating sectors (EEA, 2024b).

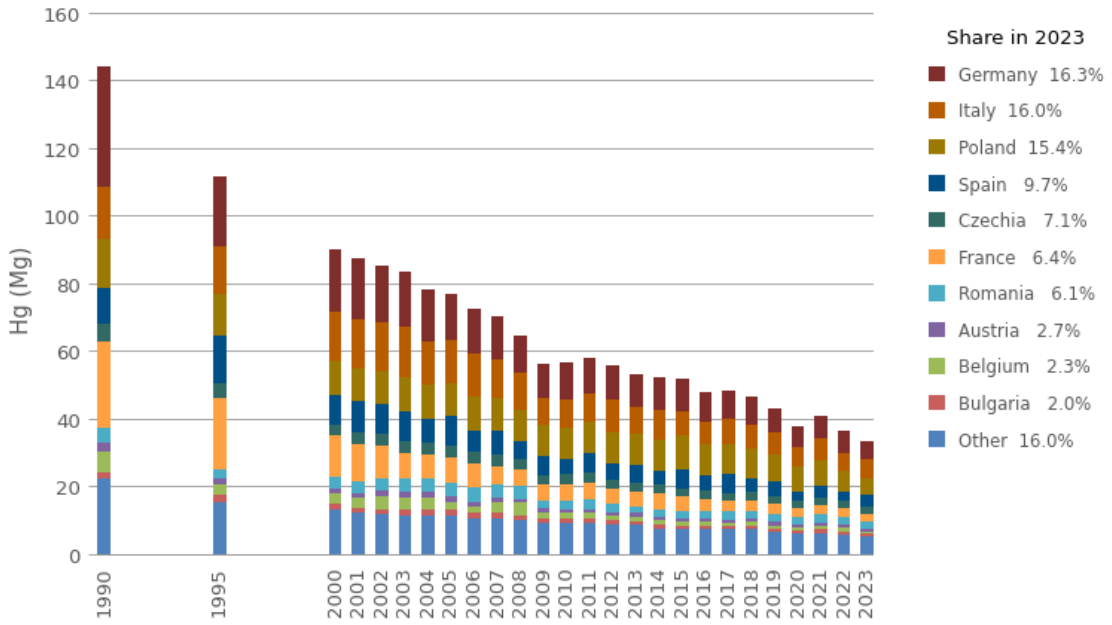
The reductions achieved since 2005 are mainly occurring in the public electricity and heat production and the iron and steel industry. The strong decrease in 2009 is partly explained by lower emissions in the iron and steel production sector (2C1) reported by Belgium (Figure 3.25c).

Table 3.14: Member State contributions to EU emissions of Hg

	Hg(Mg)														Change			Share in EU-27	
Member State	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**1990-2023**	**2005-2023**	**2022-2023**	**1990**	**2023**
Austria	2.5	1.6	1.4	1.6	1.1	1.1	1.0	1.1	1.0	1.1	1.1	1.0	1.0	0.9	-64%	-43%	-10.2%	1.7%	2.7%
Belgium	6.1	3.3	3.2	2.2	1.7	1.1	1.3	0.9	1.2	0.9	0.9	0.9	1.0	0.8	-87%	-66%	-22.1%	4.2%	2.3%
Bulgaria	2.1	2.1	1.8	1.8	1.3	1.0	0.9	1.0	0.9	0.8	0.8	1.0	1.0	0.7	-68%	-62%	-30.4%	1.4%	2.0%
Croatia	1.1	0.2	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	-70%	-39%	-2.5%	0.8%	1.0%
Cyprus	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-69%	-68%	5.1%	0.1%	0.1%
Czechia	5.1	4.3	3.2	3.3	3.1	2.4	2.4	2.3	2.4	2.2	2.0	2.2	2.3	2.4	-53%	-28%	1.4%	3.5%	7.1%
Denmark	3.2	2.3	1.0	0.7	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	-93%	-69%	-16.8%	2.2%	0.6%
Estonia	1.2	0.6	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-84%	6%	-1.3%	0.8%	0.6%
Finland	1.1	0.8	0.6	0.9	0.9	0.6	0.6	0.6	0.7	0.6	0.5	0.5	0.5	0.5	-55%	-45%	-1.7%	0.8%	1.5%
France	26	21	12	7.4	4.9	4.1	3.7	3.4	3.2	3.2	2.6	2.8	2.4	2.1	-92%	-71%	-11.6%	17.8%	6.4%
Germany	36	20	18	14	11	9.5	8.7	8.7	8.4	7.2	6.1	6.7	6.6	5.4	-85%	-61%	-17.2%	24.7%	16.3%
Greece	2.3	2.3	2.6	2.7	2.5	1.4	1.2	1.3	1.4	1.2	0.8	0.8	0.7	0.6	-73%	-77%	-16.0%	1.6%	1.9%
Hungary	2.8	2.0	1.7	1.3	0.9	0.9	0.9	1.0	0.8	0.8	0.8	0.8	0.7	0.6	-78%	-55%	-13.0%	1.9%	1.8%
Ireland	0.7	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	-69%	-54%	-22.5%	0.5%	0.7%
Italy	15	14	15	13	8.5	7.3	6.4	7.1	6.9	6.4	5.8	6.4	5.6	5.3	-65%	-58%	-4.6%	10.6%	16.0%
Latvia	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-72%	-3%	-2.7%	0.2%	0.2%
Lithuania	0.4	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-52%	34%	-9.1%	0.3%	0.6%
Luxembourg	0.5	0.3	0.4	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	-53%	-53%	-0.9%	0.3%	0.7%
Malta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-87%	-79%	5.2%	0.0%	0.0%
Netherlands	3.7	1.6	1.2	1.0	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	-88%	-58%	-9.3%	2.5%	1.3%
Poland	15	12	10	9.8	9.1	10	9.4	8.9	8.8	8.2	7.6	7.6	6.0	5.1	-65%	-48%	-14.2%	10.2%	15.4%
Portugal	1.2	1.4	1.2	0.9	0.8	0.9	0.8	0.9	0.8	0.8	0.7	0.7	0.7	0.7	-46%	-29%	0.1%	0.8%	2.0%
Romania	4.4	2.9	3.3	4.2	2.6	2.2	2.2	2.3	2.3	2.3	2.3	2.6	2.3	2.0	-53%	-52%	-9.7%	3.0%	6.1%
Slovakia	1.8	1.4	1.6	0.9	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-74%	-47%	-7.4%	1.3%	1.4%
Slovenia	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-54%	-27%	-8.1%	0.3%	0.5%
Spain	11	14	8.9	8.8	4.3	5.6	4.5	5.6	4.2	4.2	2.7	3.5	2.6	3.2	-70%	-63%	22.3%	7.4%	9.7%
Sweden	1.6	1.0	0.8	0.7	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	-76%	-45%	-6.5%	1.1%	1.1%
EU27(a)	**144**	**112**	**90**	**77**	**57**	**52**	**48**	**48**	**47**	**43**	**38**	**41**	**37**	**33**	**-77%**	**-57%**	**-8.8%**	**100.0%**	**100.0%**
EU27(b)	144	112	90	77	57	52	48	48	47	43	38	41	37	33					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

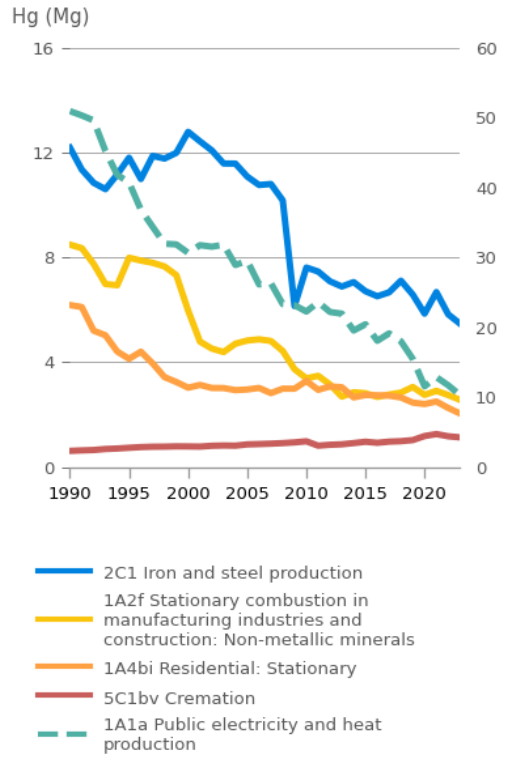
Figure 3.24: Hg emission trends in the EU and shares of Member States



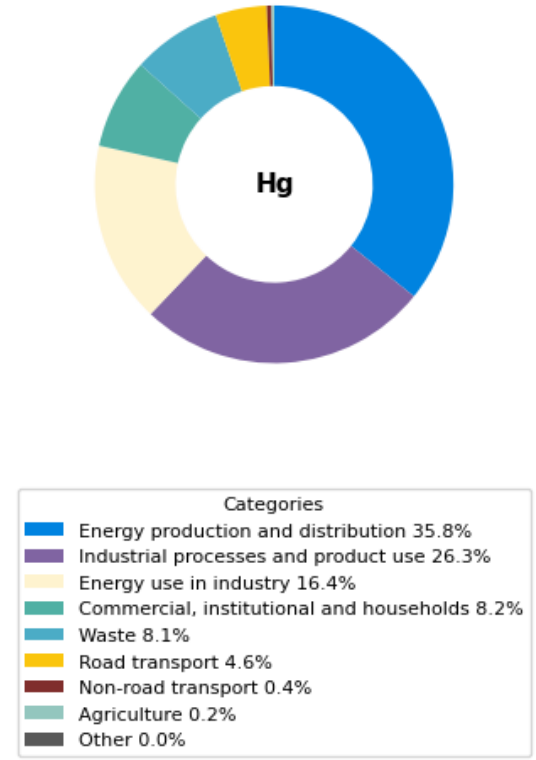
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed up 'Other'.

Figure 3.25a: Hg emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

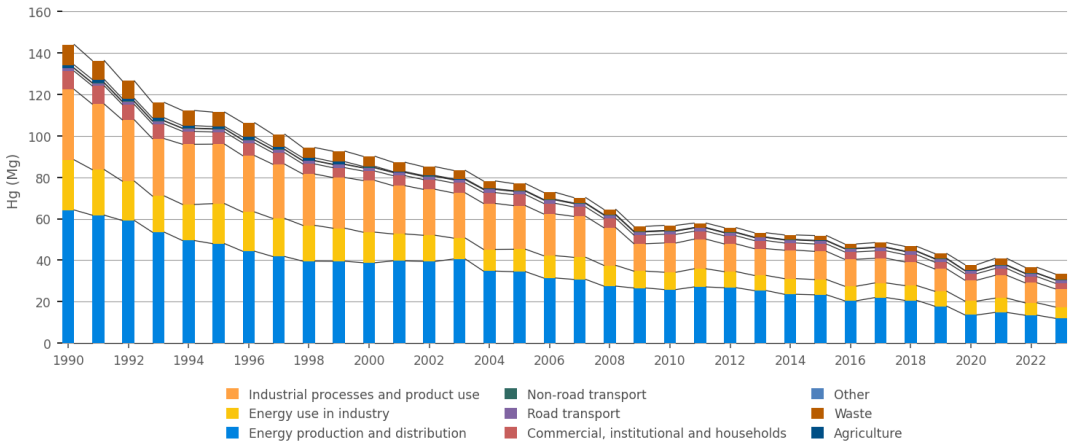
(a)



(b)



(c)



Note: In (a), the right-hand axis shows values for '1A1a — Public electricity and heat production'.

3.14 Arsenic emission trends

Since 1990, As emissions have dropped by 91% in the EU, and by 64% since 2005 (Table 3.15). Between the latest two years, emissions decreased by about 15%. The EU Member States that contributed most to As emissions during the current year were Poland, Germany, France and Italy. Austria and Luxembourg did not provide emission data for As, and therefore, the EU total is an underestimate.

Table 3.15: Member State contributions to EU emissions of As

	As(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Belgium	6.7	6.4	3.9	3.1	2.0	1.2	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	-88%	-74%	0.7%	1.2%	1.7%
Bulgaria	23	15	15	11	4.7	3.3	2.9	3.1	3.0	2.7	2.4	2.6	3.2	2.0	-91%	-82%	-37.0%	4.0%	4.1%
Croatia	8.7	1.3	1.1	1.2	0.8	0.5	0.4	0.6	0.6	0.6	0.3	0.3	0.4	0.4	-96%	-69%	-0.3%	1.5%	0.7%
Cyprus	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-30%	-60%	1.4%	0.0%	0.2%
Czechia	69	17	3.9	2.2	1.8	1.6	1.5	1.6	1.5	1.4	1.3	2.3	6.9	4.9	-93%	126%	-29.3%	12.2%	9.9%
Denmark	1.4	0.8	0.9	0.5	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	-85%	-62%	-13.8%	0.2%	0.4%
Estonia	20	9.7	6.7	1.7	2.0	0.9	1.0	1.1	1.0	0.6	0.5	0.5	0.7	0.5	-98%	-72%	-29.5%	3.5%	1.0%
Finland	35	5.2	4.4	3.0	3.4	2.5	2.6	2.4	2.4	2.1	2.0	2.1	1.9	1.6	-95%	-45%	-14.8%	6.1%	3.3%
France	18	18	16	13	9.0	6.7	6.7	6.4	6.4	6.2	5.3	5.9	5.8	5.6	-69%	-57%	-4.1%	3.1%	11.3%
Germany	86	9.1	8.0	7.7	7.3	6.9	6.9	6.6	6.2	5.4	5.2	5.6	5.8	5.1	-94%	-35%	-12.3%	15.1%	10.3%
Greece	2.4	2.6	3.0	3.2	2.4	3.2	2.6	2.8	2.5	1.9	1.2	1.2	1.2	1.1	-55%	-67%	-9.9%	0.4%	2.2%
Hungary	4.0	3.3	3.2	2.6	2.3	2.2	2.0	2.2	2.1	2.0	1.8	1.6	1.4	1.1	-73%	-57%	-23.0%	0.7%	2.2%
Ireland	1.8	1.9	1.9	1.8	1.4	1.6	1.6	1.5	1.4	1.2	1.1	1.2	1.2	1.1	-41%	-40%	-10.6%	0.3%	2.2%
Italy	37	28	39	28	17	9.4	7.9	7.5	7.4	6.3	5.3	5.8	6.3	4.9	-87%	-82%	-21.4%	6.5%	10.1%
Latvia	17	8.5	15	17	16	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-99%	-99%	-3.1%	2.9%	0.2%
Lithuania	0.8	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-85%	-31%	-11.6%	0.1%	0.2%
Luxembourg	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Malta	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-93%	-91%	-0.7%	0.0%	0.0%
Netherlands	1.5	1.1	1.7	1.6	0.8	0.8	0.9	0.7	0.5	0.3	0.3	0.3	0.3	0.2	-85%	-85%	-23.8%	0.3%	0.5%
Poland	144	71	30	16	16	14	14	14	14	13	12	12	12	10	-93%	-36%	-11.1%	25.3%	20.9%
Portugal	2.1	2.6	3.0	3.1	1.9	2.2	2.0	2.1	2.0	1.6	1.3	1.2	1.2	1.2	-43%	-62%	-0.2%	0.4%	2.4%
Romania	73	37	5.8	6.6	5.1	4.7	4.3	4.3	4.3	4.2	3.3	3.6	3.2	2.3	-97%	-65%	-27.1%	12.8%	4.7%
Slovakia	2.3	1.6	1.5	1.2	0.9	0.9	1.0	1.0	0.9	0.8	0.7	0.9	0.8	0.8	-65%	-30%	2.0%	0.4%	1.6%
Slovenia	0.9	0.8	0.8	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.5	-45%	-43%	-1.3%	0.2%	1.0%
Spain	10	10	10	10	5.6	6.2	5.1	6.3	5.4	4.6	3.3	3.9	3.3	3.6	-65%	-65%	10.6%	1.8%	7.4%
Sweden	5.7	1.6	0.9	1.0	1.0	0.7	0.7	0.8	0.8	0.7	0.7	0.6	0.6	0.6	-89%	-39%	-0.2%	1.0%	1.3%
EU27(a)	**570**	**252**	**176**	**137**	**103**	**71**	**66**	**67**	**64**	**58**	**50**	**54**	**57**	**49**	**-91%**	**-64%**	**-14.7%**	**100.0%**	**100.0%**
EU27(b)	570	252	176	137	103	71	66	67	64	58	50	54	57	49					

Notes: Values presented in this table are based on the national total reported by each Member State. Dark blue-shaded cells indicate that no emission values are available. See Appendix 1 for an explanation of the notation keys reported by EU Member States. (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.15 Chromium emission trends

Since 1990, Cr emissions dropped by 72% in the EU, and by 34% since 2005 (Table 3.16). Between the latest two years, emissions decreased by 5%. During the current year, the EU Member States contributing most to Cr emissions were Germany, Italy, France and Poland. Austria and Luxembourg did not provide emission data for Cr, and therefore, the EU total is an underestimate.

Table 3.16: Member State contributions to EU emissions of Cr

	Cr(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Belgium	38	34	23	20	16	8.6	9.0	7.4	7.3	7.2	6.6	6.6	7.0	6.8	-82%	-67%	-3.1%	3.7%	2.4%
Bulgaria	19	15	15	12	8.0	5.9	5.8	6.3	7.0	6.6	6.5	5.6	6.1	5.5	-71%	-54%	-11.2%	1.9%	1.9%
Croatia	5.2	4.1	3.8	4.4	3.3	2.9	2.8	3.0	2.8	2.8	2.6	2.8	2.7	3.0	-43%	-31%	9.3%	0.5%	1.0%
Cyprus	0.3	0.4	0.5	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	30%	-22%	3.0%	0.0%	0.2%
Czechia	23	15	12	13	12	12	12	12	12	11	10	11	12	10	-56%	-24%	-13.5%	2.3%	3.5%
Denmark	8.1	5.4	4.1	4.2	4.4	4.4	4.5	4.4	4.3	2.8	2.7	2.7	2.6	2.3	-71%	-45%	-10.3%	0.8%	0.8%
Estonia	17	9.0	6.9	3.5	4.5	2.8	3.2	3.4	3.1	1.9	1.6	1.8	2.2	1.6	-91%	-56%	-28.7%	1.7%	0.5%
Finland	48	36	29	20	26	17	18	17	15	14	14	14	15	13	-72%	-33%	-8.1%	4.7%	4.7%
France	402	200	117	63	48	39	38	37	37	38	34	34	33	32	-92%	-49%	-4.2%	39.6%	11.1%
Germany	166	94	83	77	74	76	77	77	76	75	66	66	67	66	-60%	-14%	-2.2%	16.3%	22.7%
Greece	6.0	6.5	6.9	9.8	9.8	17	13	12	13	12	6.0	6.0	5.9	5.4	-11%	-46%	-10.0%	0.6%	1.9%
Hungary	18	12	13	13	12	13	11	14	14	13	12	10.0	9.0	6.8	-63%	-48%	-24.4%	1.8%	2.3%
Ireland	5.0	5.2	5.9	4.7	3.7	3.8	3.8	3.7	3.7	3.6	3.2	3.4	3.5	3.4	-32%	-27%	-2.3%	0.5%	1.2%
Italy	95	79	55	62	51	46	45	45	45	43	37	44	43	41	-57%	-34%	-5.7%	9.4%	14.2%
Latvia	2.8	2.1	2.4	2.9	2.8	1.7	1.7	1.8	1.9	1.9	1.8	1.9	2.0	1.9	-31%	-34%	-2.1%	0.3%	0.7%
Lithuania	2.7	1.2	1.1	1.4	1.4	1.6	1.6	1.7	1.7	1.7	1.7	1.8	2.3	2.3	-16%	66%	-0.7%	0.3%	0.8%
Luxembourg	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Malta	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	1%	-11%	-5.2%	0.0%	0.1%
Netherlands	12	8.6	5.3	4.4	3.9	3.5	3.8	3.6	3.5	3.3	3.2	3.5	3.5	3.5	-71%	-20%	-0.1%	1.2%	1.2%
Poland	56	53	41	41	44	31	33	34	37	35	34	35	34	32	-43%	-24%	-6.0%	5.5%	11.0%
Portugal	9.3	11	12	12	10	9.4	8.8	8.9	8.7	8.7	8.2	8.5	8.5	8.5	-8%	-27%	0.5%	0.9%	3.0%
Romania	25	19	15	20	14	14	14	14	14	15	13	15	13	10	-59%	-49%	-20.9%	2.5%	3.6%
Slovakia	6.1	3.8	3.0	3.3	3.7	4.1	4.5	4.4	4.3	4.4	4.1	4.4	3.6	3.4	-44%	3%	-6.5%	0.6%	1.2%
Slovenia	1.7	1.8	1.8	2.0	2.1	1.9	1.9	1.9	1.8	1.8	1.6	1.8	1.7	1.6	-5%	-20%	-3.8%	0.2%	0.6%
Spain	27	32	33	36	25	28	24	28	24	26	20	23	20	22	-17%	-38%	13.3%	2.7%	7.7%
Sweden	23	12	7.0	10	5.1	5.4	5.5	6.7	6.0	6.0	5.2	6.3	6.5	5.8	-74%	-42%	-10.6%	2.2%	2.0%
EU27(a)	**1,016**	**660**	**497**	**441**	**387**	**349**	**343**	**347**	**344**	**334**	**295**	**309**	**304**	**289**	**-72%**	**-34%**	**-5.1%**	**100.0%**	**100.0%**
EU27(b)	1,016	660	497	441	387	349	343	347	344	334	295	309	304	289					

Notes: Values presented in this table are based on the national total reported by each Member State. Dark blue-shaded cells indicate that no emission values are available. See Appendix 1 for an explanation of the notation keys reported by EU Member States. (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.16 Copper emission trends

Since 1990, Cu emissions in the EU have increased by 11% (Table 3.17). Since 2005 the emissions have remained at the same level. Between the latest two years, the emissions grew by 1%. During the current year, the EU Member States contributing most to Cu emissions were Germany, Italy, France and Poland. Austria and Luxembourg did not provide emission data for Cu, and therefore, the EU total is an underestimate.

Table 3.17: Member State contributions to EU emissions of Cu

	Cu(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Belgium	90	96	99	101	100	97	97	95	94	93	79	81	85	88	-2%	-13%	3.5%	3.8%	3.4%
Bulgaria	73	53	62	55	38	41	42	43	46	48	45	46	46	47	-35%	-14%	1.1%	3.1%	1.8%
Croatia	17	15	20	24	24	25	26	28	27	29	26	28	29	32	91%	37%	12.8%	0.7%	1.2%
Cyprus	4.8	6.1	7.4	8.4	9.2	7.2	7.7	8.0	7.9	7.8	7.5	7.9	7.8	8.1	69%	-4%	3.8%	0.2%	0.3%
Czechia	53	47	49	66	63	67	69	70	71	72	69	71	74	74	39%	12%	0.0%	2.3%	2.8%
Denmark	50	57	65	68	71	69	69	69	71	66	61	62	64	63	27%	-8%	-1.6%	2.1%	2.4%
Estonia	15	8.4	7.7	9.6	11	11	12	12	12	11	11	11	12	11	-26%	19%	-4.0%	0.7%	0.4%
Finland	157	117	65	58	42	41	42	41	40	40	38	39	38	37	-76%	-35%	-1.8%	6.7%	1.4%
France	296	301	311	333	340	338	334	333	331	331	282	290	321	314	6%	-6%	-2.0%	12.6%	12.0%
Germany	620	522	543	542	548	581	589	591	595	594	536	545	565	584	-6%	8%	3.5%	26.3%	22.3%
Greece	22	26	29	89	87	69	68	70	71	71	59	64	69	68	203%	-24%	-1.3%	1.0%	2.6%
Hungary	34	28	34	48	50	51	52	55	58	61	54	60	64	60	78%	26%	-7.0%	1.4%	2.3%
Ireland	20	24	41	49	44	47	48	48	48	48	41	44	47	48	139%	-2%	2.3%	0.9%	1.8%
Italy	389	440	466	496	449	441	396	370	375	373	305	368	381	381	-2%	-23%	0.1%	16.5%	14.5%
Latvia	10.0	6.9	7.5	11	12	12	12	12	13	13	12	13	13	12	24%	16%	-4.0%	0.4%	0.5%
Lithuania	7.8	3.9	3.1	4.2	4.5	5.0	5.2	5.5	5.8	6.1	5.6	5.7	18	18	131%	327%	-0.2%	0.3%	0.7%
Luxembourg	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Malta	1.3	1.9	2.3	2.6	2.8	3.2	3.3	3.2	3.3	3.1	2.5	2.9	3.1	3.1	145%	19%	-1.1%	0.1%	0.1%
Netherlands	92	102	110	109	116	110	112	113	115	116	104	101	107	111	20%	2%	4.2%	3.9%	4.2%
Poland	200	214	193	216	266	253	275	307	316	308	297	312	319	311	56%	44%	-2.2%	8.5%	11.9%
Portugal	48	63	86	88	81	67	68	68	68	70	60	64	67	71	48%	-19%	5.7%	2.0%	2.7%
Romania	10	8.6	6.9	50	57	59	64	68	71	73	72	74	81	84	721%	66%	3.4%	0.4%	3.2%
Slovakia	12	8.6	6.6	8.3	9.3	27	29	28	28	28	26	27	28	28	132%	236%	-1.2%	0.5%	1.1%
Slovenia	9.1	13	13	15	17	16	17	17	18	17	14	16	18	17	84%	15%	-6.2%	0.4%	0.6%
Spain	80	96	118	145	131	127	122	133	126	131	103	121	115	121	51%	-17%	5.3%	3.4%	4.6%
Sweden	45	33	28	26	25	26	27	27	28	27	25	27	27	27	-39%	6%	0.3%	1.9%	1.0%
EU27(a)	**2,356**	**2,289**	**2,372**	**2,622**	**2,598**	**2,592**	**2,584**	**2,615**	**2,639**	**2,639**	**2,334**	**2,480**	**2,597**	**2,620**	**11%**	**0%**	**0.9%**	**100.0%**	**100.0%**
EU27(b)	2,356	2,289	2,372	2,622	2,598	2,592	2,584	2,615	2,639	2,639	2,334	2,480	2,597	2,620					

Notes: Values presented in this table are based on the national total reported by each Member State. Dark blue-shaded cells indicate that no emission values are available. See Appendix 1 for an explanation of the notation keys reported by EU Member States. (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.17 Nickel emission trends

Since 1990, Ni emissions have dropped by 79% in the EU, and by 65% since 2005 (Table 3.18). Between the latest two years, they increased by about 4%. During the current year, the EU Member States contributing most to Ni emissions were Germany, Spain and Poland. A major contributor is the combustion of fuels in sector 1A1. Austria and Luxembourg did not provide emission data for Ni, and therefore, the EU total is an underestimate.

Table 3.18: Member State contributions to EU emissions of Ni

	Ni(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Belgium	77	71	36	29	10	5.4	5.3	4.4	4.1	4.2	3.8	3.9	4.3	4.1	-95%	-86%	-5.7%	4.0%	1.0%
Bulgaria	94	48	33	24	11	7.9	8.0	9.1	9.2	8.1	7.2	7.3	7.8	6.0	-94%	-75%	-23.5%	4.9%	1.5%
Croatia	17	14	13	14	7.8	4.6	4.3	4.4	3.6	2.9	2.4	2.6	2.9	2.6	-85%	-81%	-12.3%	0.9%	0.6%
Cyprus	6.0	7.4	10	12	7.3	5.3	5.7	5.7	5.7	5.1	5.1	4.7	4.7	4.7	-21%	-62%	0.4%	0.3%	1.2%
Czechia	55	28	14	12	8.2	5.6	5.3	5.6	5.4	5.1	4.8	5.0	5.6	5.1	-91%	-59%	-9.2%	2.9%	1.3%
Denmark	23	18	12	12	9.9	8.1	8.4	8.3	7.7	4.9	5.0	5.2	5.1	4.0	-82%	-67%	-22.6%	1.2%	1.0%
Estonia	26	10	6.1	3.4	3.3	2.6	2.8	2.8	2.4	1.8	1.7	1.7	2.1	1.8	-93%	-48%	-16.6%	1.4%	0.4%
Finland	78	47	35	26	23	16	16	15	14	12	9.6	9.9	9.6	8.8	-89%	-66%	-8.8%	4.1%	2.2%
France	299	221	183	150	93	46	41	33	27	29	22	22	24	21	-93%	-86%	-10.1%	15.7%	5.4%
Germany	333	204	161	193	157	149	156	152	145	139	135	127	136	123	-63%	-36%	-9.6%	17.5%	30.8%
Greece	42	47	50	56	61	40	35	32	30	27	22	23	23	22	-49%	-61%	-6.3%	2.2%	5.4%
Hungary	12	20	15	3.8	3.2	2.9	2.9	3.1	3.0	2.9	2.6	2.5	2.4	1.9	-84%	-50%	-19.7%	0.6%	0.5%
Ireland	22	27	32	22	9.6	5.9	5.7	5.2	5.3	5.4	5.5	8.0	7.1	4.8	-78%	-78%	-31.6%	1.2%	1.2%
Italy	116	112	109	114	43	33	32	32	32	30	28	30	33	30	-74%	-74%	-9.1%	6.1%	7.5%
Latvia	15	8.5	6.8	6.4	5.8	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.4	0.3	-98%	-95%	-11.4%	0.8%	0.1%
Lithuania	35	16	8.8	8.1	4.5	1.8	1.5	1.3	1.3	1.0	1.3	1.3	2.2	1.8	-95%	-77%	-14.5%	1.8%	0.5%
Luxembourg	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Malta	3.9	5.6	5.4	5.2	4.9	1.8	1.1	0.4	0.3	0.3	0.4	0.4	0.5	0.3	-91%	-93%	-23.9%	0.2%	0.1%
Netherlands	76	86	21	11	2.5	2.1	2.4	2.1	1.9	1.6	1.8	1.7	1.7	1.9	-98%	-82%	11.8%	4.0%	0.5%
Poland	200	166	120	106	102	74	75	73	70	66	64	68	68	60	-70%	-43%	-11.8%	10.5%	15.1%
Portugal	57	65	64	67	33	18	16	17	16	16	15	14	15	15	-73%	-77%	-0.7%	3.0%	3.8%
Romania	113	64	34	25	15	11	9.7	12	11	12	10	12	11	11	-91%	-58%	-6.7%	5.9%	2.7%
Slovakia	9.2	4.1	2.3	1.5	1.5	1.5	1.5	1.5	1.3	1.3	1.2	1.4	1.3	1.3	-86%	-13%	-3.8%	0.5%	0.3%
Slovenia	2.9	2.1	2.5	2.4	2.2	1.5	1.6	1.6	1.6	1.5	1.5	1.4	1.3	1.3	-55%	-46%	4.4%	0.2%	0.3%
Spain	164	235	197	229	91	84	47	99	51	88	35	64	39	61	-63%	-73%	57.2%	8.6%	15.4%
Sweden	28	30	17	15	14	6.7	7.1	6.6	6.9	6.2	5.4	6.0	5.6	5.3	-81%	-66%	-5.9%	1.5%	1.3%
EU27(a)	**1,903**	**1,556**	**1,187**	**1,148**	**724**	**535**	**490**	**526**	**457**	**470**	**391**	**423**	**414**	**399**	**-79%**	**-65%**	**-3.6%**	**100.0%**	**100.0%**
EU27(b)	1,903	1,556	1,187	1,148	724	535	490	526	457	470	391	423	414	399					

Notes: Values presented in this table are based on the national total reported by each Member State. Dark blue-shaded cells indicate that no emission values are available. See Appendix 1 for an explanation of the notation keys reported by EU Member States. (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.18 Selenium emission trends

Since 1990 and 2005, Se emissions have dropped by 68% in the EU (Table 3.19). Between the latest two years, Se emissions decreased by 29%. This was influenced by major reductions between the two latest years in both Czechia and Bulgaria, for which Se emissions reduced by 79% and 40%, respectively. During the current year, the EU Member States contributing most to Se emissions were France, Spain and Italy. Finland reported emission data only at the sectoral level and used the notation key 'NE' (not estimated) for the national total, while noting in their IIR that there is not yet a comprehensive emission inventory covering all sources of selenium. Therefore, the national total for Finland was calculated using the sum of sector totals in accordance with the gap-filling procedure. Austria, Luxembourg and Poland did not provide emission data for Se, and therefore, the EU total is an underestimate.

Table 3.19: Member State contributions to EU emissions of Se

	Se(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Belgium	5.1	6.4	6.5	27	12	3.7	2.8	2.6	1.9	1.6	1.6	1.9	1.6	1.5	-70%	-94%	-3.0%	3.0%	2.8%
Bulgaria	22	22	20	18	13	9.4	8.1	8.8	8.0	7.2	6.3	7.3	9.3	5.6	-75%	-69%	-40.1%	12.7%	10.1%
Croatia	0.5	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	-14%	-2%	0.1%	0.3%	0.7%
Cyprus	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-37%	-61%	2.4%	0.1%	0.1%
Czechia	32	29	28	30	26	22	22	22	22	21	17	17	18	3.8	-88%	-88%	-78.7%	18.8%	6.8%
Denmark	4.2	3.9	2.3	1.5	1.4	0.7	0.7	0.6	0.5	0.4	0.4	0.5	0.5	0.5	-89%	-69%	-2.2%	2.5%	0.8%
Estonia	9.2	4.9	3.6	1.4	1.8	1.0	1.2	1.3	1.2	0.7	0.6	0.6	0.7	0.5	-94%	-64%	-29.1%	5.3%	0.9%
Finland	1.8	0.4	0.5	0.5	0.6	0.5	0.4	0.9	0.5	0.4	0.4	0.5	0.4	0.4	-76%	-19%	2.9%	1.1%	0.8%
France	13	13	13	12	11	10	9.8	9.9	9.9	9.8	8.5	9.5	9.3	8.5	-34%	-32%	-7.9%	7.5%	15.4%
Germany	5.7	11	8.5	4.9	4.3	3.3	3.3	3.2	2.9	2.8	2.7	2.8	2.9	2.7	-53%	-45%	-8.7%	3.3%	4.8%
Greece	14	14	16	17	15	11	8.9	10.0	9.5	7.1	3.8	3.6	3.6	2.8	-79%	-84%	-21.3%	7.9%	5.1%
Hungary	6.5	5.8	5.8	4.1	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.1	2.0	1.7	-73%	-58%	-13.4%	3.7%	3.1%
Ireland	9.3	7.0	5.6	5.2	4.5	4.6	4.5	3.9	3.6	3.0	2.7	2.9	2.3	1.8	-81%	-66%	-23.5%	5.4%	3.2%
Italy	7.7	7.8	8.5	8.9	8.1	8.4	7.3	7.2	7.1	6.6	6.0	6.6	6.8	6.0	-22%	-32%	-11.8%	4.5%	10.9%
Latvia	0.4	0.3	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-85%	-22%	-7.2%	0.2%	0.1%
Lithuania	0.8	0.5	0.4	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.2	-71%	-15%	-10.8%	0.5%	0.4%
Luxembourg	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Malta	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-97%	-88%	10.2%	0.1%	0.0%
Netherlands	0.4	0.4	0.8	2.8	1.6	1.0	0.7	0.3	0.2	0.2	0.2	0.2	0.2	0.1	-69%	-95%	-33.2%	0.2%	0.2%
Poland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Portugal	3.9	5.2	5.8	6.2	4.8	6.4	5.8	6.3	5.8	4.5	3.6	3.5	3.4	3.3	-14%	-46%	-1.9%	2.2%	6.0%
Romania	20	16	12	13	12	11	9.4	9.4	9.3	8.6	6.2	6.8	6.4	5.1	-74%	-59%	-19.5%	11.4%	9.3%
Slovakia	5.7	3.0	3.1	3.3	2.6	2.2	2.1	2.1	2.1	1.8	1.6	1.5	1.5	1.3	-78%	-61%	-14.0%	3.3%	2.3%
Slovenia	2.9	2.5	2.4	2.6	2.5	1.9	2.0	2.0	2.0	1.9	1.8	1.7	1.4	1.4	-53%	-47%	-1.2%	1.7%	2.5%
Spain	6.7	8.0	8.1	9.7	5.9	7.6	6.4	7.8	6.6	7.5	5.9	7.1	5.9	6.5	-4%	-33%	9.2%	3.9%	11.7%
Sweden	1.0	1.2	1.0	1.1	1.2	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	5%	0%	-1.5%	0.6%	1.9%
EU27(a)	**173**	**163**	**153**	**171**	**132**	**110**	**101**	**103**	**98**	**89**	**74**	**78**	**78**	**55**	**-68%**	**-68%**	**-28.8%**	**100.0%**	**100.0%**
EU27(b)	173	163	153	171	132	110	101	103	98	89	74	78	78	55					

Notes: Values presented in this table are based on the national total reported by each Member State. Dark blue-shaded cells indicate that no emission values are available. See Appendix 1 for an explanation of the notation keys reported by EU Member States. Light blue-shaded cells denote gap-filled data. For more detailed information, see Annex D. (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.19 Zinc emission trends

Since 1990, Zn emissions have dropped by 52% in the EU, and by 16% since 2005 (Table 3.20). Between the latest two years, the emissions decreased by 4%. During the current reporting cycle, the EU Member States contributing most to Zn emissions were Poland, Italy and France. The category “Other sectors” within the energy sector is one of the main contributors to Zn emissions. Austria and Luxembourg did not provide emission data for Zn, and therefore the EU total is an underestimate.

Table 3.20: Member State contributions to EU emissions of Zn

	Zn(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Belgium	242	193	192	142	121	93	84	78	79	85	70	76	77	96	-60%	-32%	25.0%	3.5%	2.9%
Bulgaria	55	42	40	48	43	41	43	43	45	43	46	48	46	41	-25%	-15%	-10.8%	0.8%	1.2%
Croatia	41	34	33	39	39	37	36	37	36	36	35	39	36	39	-5%	-1%	7.4%	0.6%	1.2%
Cyprus	4.1	5.0	6.3	7.3	5.8	4.2	4.5	4.6	4.6	4.4	4.2	4.3	4.2	4.3	5%	-42%	2.0%	0.1%	0.1%
Czechia	110	83	71	70	66	55	52	53	53	52	50	53	53	54	-51%	-23%	1.6%	1.6%	1.6%
Denmark	76	70	59	63	66	66	67	66	70	64	61	61	60	58	-23%	-8%	-3.6%	1.1%	1.8%
Estonia	106	61	44	27	32	26	29	30	31	26	26	25	27	27	-74%	1%	-0.9%	1.5%	0.8%
Finland	683	403	128	119	129	119	127	120	119	130	116	134	127	120	-82%	0%	-5.7%	9.9%	3.6%
France	2,100	1,304	915	514	464	429	430	421	423	415	370	394	386	387	-82%	-25%	0.4%	30.4%	11.8%
Germany	474	266	277	260	289	293	296	300	299	299	268	284	296	285	-40%	9%	-3.8%	6.9%	8.7%
Greece	67	71	74	90	86	80	74	75	75	73	67	70	72	69	2%	-23%	-4.6%	1.0%	2.1%
Hungary	83	65	69	66	73	75	75	74	69	68	65	68	69	64	-23%	-4%	-7.3%	1.2%	1.9%
Ireland	55	51	60	33	27	28	29	28	28	28	25	27	27	26	-53%	-22%	-5.3%	0.8%	0.8%
Italy	971	962	925	999	895	837	779	826	847	814	720	861	790	784	-19%	-21%	-0.7%	14.1%	23.9%
Latvia	31	29	27	34	32	29	30	32	34	34	33	34	35	34	11%	1%	-2.5%	0.4%	1.0%
Lithuania	25	18	18	23	25	31	31	33	33	32	32	35	37	36	44%	55%	-1.4%	0.4%	1.1%
Luxembourg	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Malta	1.7	2.3	2.3	2.9	2.7	1.9	1.7	1.2	1.0	1.0	0.8	0.9	1.0	1.0	-42%	-66%	-1.4%	0.0%	0.0%
Netherlands	226	147	100	89	103	103	101	94	355	280	178	150	156	70	-69%	-21%	-54.9%	3.3%	2.1%
Poland	787	798	568	517	536	510	516	536	594	562	538	545	516	474	-40%	-8%	-8.1%	11.4%	14.4%
Portugal	73	76	82	81	73	64	64	64	65	64	61	62	65	68	-7%	-16%	3.7%	1.1%	2.1%
Romania	125	98	103	135	131	119	120	122	122	124	119	128	121	111	-11%	-18%	-8.4%	1.8%	3.4%
Slovakia	33	25	26	30	30	35	37	37	37	33	30	33	32	29	-12%	-3%	-8.6%	0.5%	0.9%
Slovenia	21	20	19	24	23	22	23	22	21	21	19	21	20	19	-8%	-20%	-4.2%	0.3%	0.6%
Spain	330	281	372	380	384	393	364	370	423	364	367	389	300	315	-5%	-17%	4.8%	4.8%	9.6%
Sweden	187	134	92	99	99	86	82	80	80	77	71	73	73	74	-61%	-26%	0.6%	2.7%	2.2%
EU27(a)	**6,904**	**5,237**	**4,302**	**3,892**	**3,774**	**3,578**	**3,497**	**3,548**	**3,943**	**3,731**	**3,370**	**3,616**	**3,426**	**3,284**	**-52%**	**-16%**	**-4.2%**	**100.0%**	**100.0%**
EU27(b)	6,904	5,237	4,302	3,892	3,774	3,578	3,497	3,548	3,943	3,731	3,370	3,616	3,426	3,284					

Notes: Values presented in this table are based on the national total reported by each Member State. Dark blue-shaded cells indicate that no emission values are available. See Appendix 1 for an explanation of the notation keys reported by EU Member States. (a) Sum of national totals, as reported by EU Member States.(b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.20 Dioxin and furan emission trends and key categories

Since 1990, PCDD/F emissions dropped by 85% in the EU, and by 72% since 2005 (Table 3.21). Between the past two years, the decrease was about 4%. During the current year, the Member States contributing most to PCDD/F emissions were Spain, Italy, Poland and Romania (Figure 3.25).

The drop in emissions between 2008 and 2009 can be attributed to data reported by Bulgaria in the category 'Fugitive emission from solid fuels: Solid fuel transformation' (1B1b). Until 2008 the country reported emission values for this sector, but since 2009 they have reported the notation key 'NO' (not occurring). In Bulgaria, there was one installation for the production of coke in coke ovens until 2008, after which it was closed due to the impossibility of complying with the norms of environmental legislation (Bulgaria's IIR).

Figure 3.27(b) shows the contribution made by each aggregated sector group to total EU emissions. The sector groups waste, as well as commercial, institutional and households and industrial processes and product use are significant sources of PCDD/F emissions.

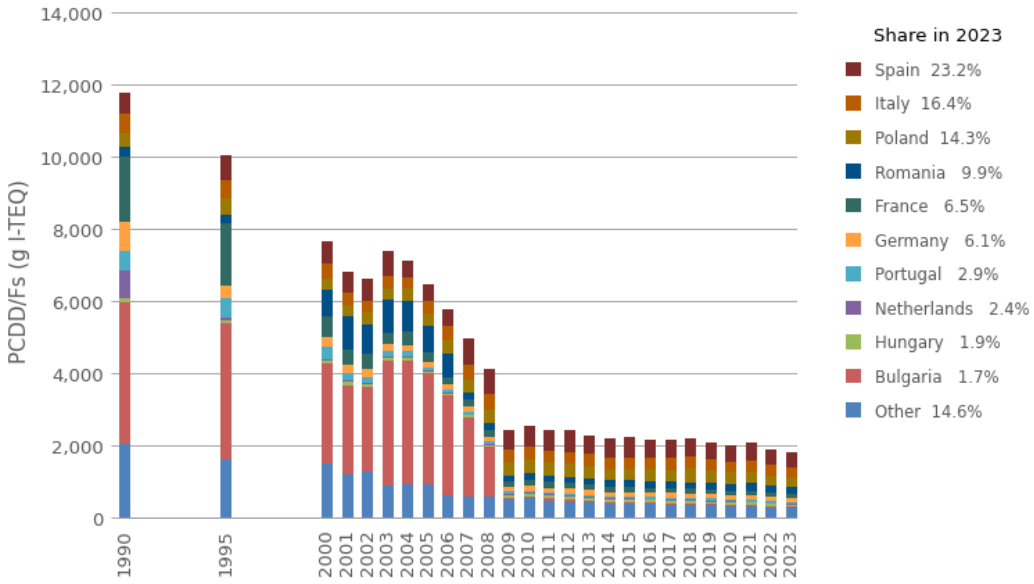
The primary key categories for PCDD/F emissions were residential heating (1A4bi), iron and steel production (2C1) and other waste (5E) (Figure 3.27a). Among the top five key categories, the highest relative reductions in emissions since 1990 have been in iron and steel production (2C1) (78%) and residential heating (1A4bi) (25%). During the same time period, emissions from open burning of waste (5C2) decreased by 15%, while emissions from the category sewage sludge incineration (5C1biv) increased by 152%.

Table 3.21: Member State contributions to EU emissions of PCDD/Fs

	PCDD/Fs(g I-TEQ)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	122	58	51	35	40	38	36	37	34	34	33	37	32	30	-75%	-14%	-5.7%	1.0%	1.7%
Belgium	519	339	91	65	50	30	28	30	25	28	27	26	25	28	-95%	-57%	15.1%	4.4%	1.6%
Bulgaria	3,933	3,790	2,766	3,062	46	39	38	38	37	35	39	39	36	31	-99%	-99%	-12.7%	33.4%	1.7%
Croatia	84	74	71	110	80	38	30	29	27	26	25	27	24	24	-71%	-78%	0.6%	0.7%	1.3%
Cyprus	17	19	21	0.7	0.6	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	-97%	-30%	-3.2%	0.1%	0.0%
Czechia	117	77	64	64	49	38	29	28	29	26	27	22	21	18	-85%	-72%	-15.8%	1.0%	1.0%
Denmark	67	49	32	30	34	33	34	32	30	28	27	27	24	25	-63%	-17%	3.6%	0.6%	1.4%
Estonia	11	5.9	6.3	5.9	5.3	4.8	4.6	4.5	4.6	4.4	4.4	4.1	4.2	4.5	-59%	-23%	8.6%	0.1%	0.2%
Finland	17	16	15	11	14	12	13	10	11	9.8	9.6	11	9.3	8.7	-48%	-24%	-7.4%	0.1%	0.5%
France	1,801	1,742	580	264	174	150	139	136	133	129	119	123	123	119	-93%	-55%	-3.3%	15.3%	6.5%
Germany	805	334	257	145	130	118	113	118	122	116	107	109	112	111	-86%	-24%	-1.4%	6.8%	6.1%
Greece	42	42	42	43	28	27	25	26	26	24	23	26	25	26	-39%	-41%	0.2%	0.4%	1.4%
Hungary	113	79	82	63	77	78	77	66	59	64	60	57	52	35	-69%	-44%	-31.8%	1.0%	1.9%
Ireland	44	34	27	25	25	22	20	19	21	18	18	17	14	11	-74%	-53%	-18.3%	0.4%	0.6%
Italy	529	508	430	361	343	312	314	332	314	308	282	327	305	297	-44%	-18%	-2.5%	4.5%	16.4%
Latvia	32	36	33	37	25	20	19	22	21	21	19	19	19	18	-44%	-51%	-3.1%	0.3%	1.0%
Lithuania	26	18	19	24	22	21	18	19	19	18	17	18	17	14	-44%	-39%	-15.3%	0.2%	0.8%
Luxembourg	41	32	9.0	5.4	5.1	4.2	5.4	5.1	4.2	3.6	3.5	3.6	3.9	3.8	-91%	-30%	-1.3%	0.4%	0.2%
Malta	0.3	0.2	0.3	0.2	8.0	1.3	0.9	1.2	1.2	0.2	0.2	0.2	0.2	0.2	-30%	-22%	0.7%	0.0%	0.0%
Netherlands	745	70	38	35	40	32	32	32	31	31	30	30	30	43	-94%	23%	41.9%	6.3%	2.4%
Poland	373	456	306	348	393	333	341	334	403	352	333	318	283	261	-30%	-25%	-7.9%	3.2%	14.3%
Portugal	556	554	358	74	53	51	52	55	59	57	57	55	53	53	-90%	-28%	0.3%	4.7%	2.9%
Romania	278	226	745	725	180	170	172	179	181	189	195	222	196	181	-35%	-75%	-7.8%	2.4%	9.9%
Slovakia	825	743	953	418	90	63	64	64	65	62	52	38	28	23	-97%	-94%	-16.8%	7.0%	1.3%
Slovenia	21	19	19	21	20	18	18	17	15	15	14	16	13	12	-43%	-41%	-7.5%	0.2%	0.7%
Spain	589	699	612	468	576	546	497	492	518	459	458	484	423	422	-28%	-10%	0.0%	5.0%	23.2%
Sweden	57	35	29	27	22	17	18	18	18	17	17	17	16	16	-71%	-40%	1.8%	0.5%	0.9%
EU27(a)	**11,766**	**10,055**	**7,656**	**6,468**	**2,530**	**2,215**	**2,140**	**2,146**	**2,209**	**2,076**	**1,997**	**2,076**	**1,889**	**1,817**	**-85%**	**-72%**	**-3.8%**	**100.0%**	**100.0%**
EU27(b)	11,766	10,055	7,656	6,468	2,530	2,215	2,140	2,146	2,209	2,076	1,997	2,076	1,889	1,817					

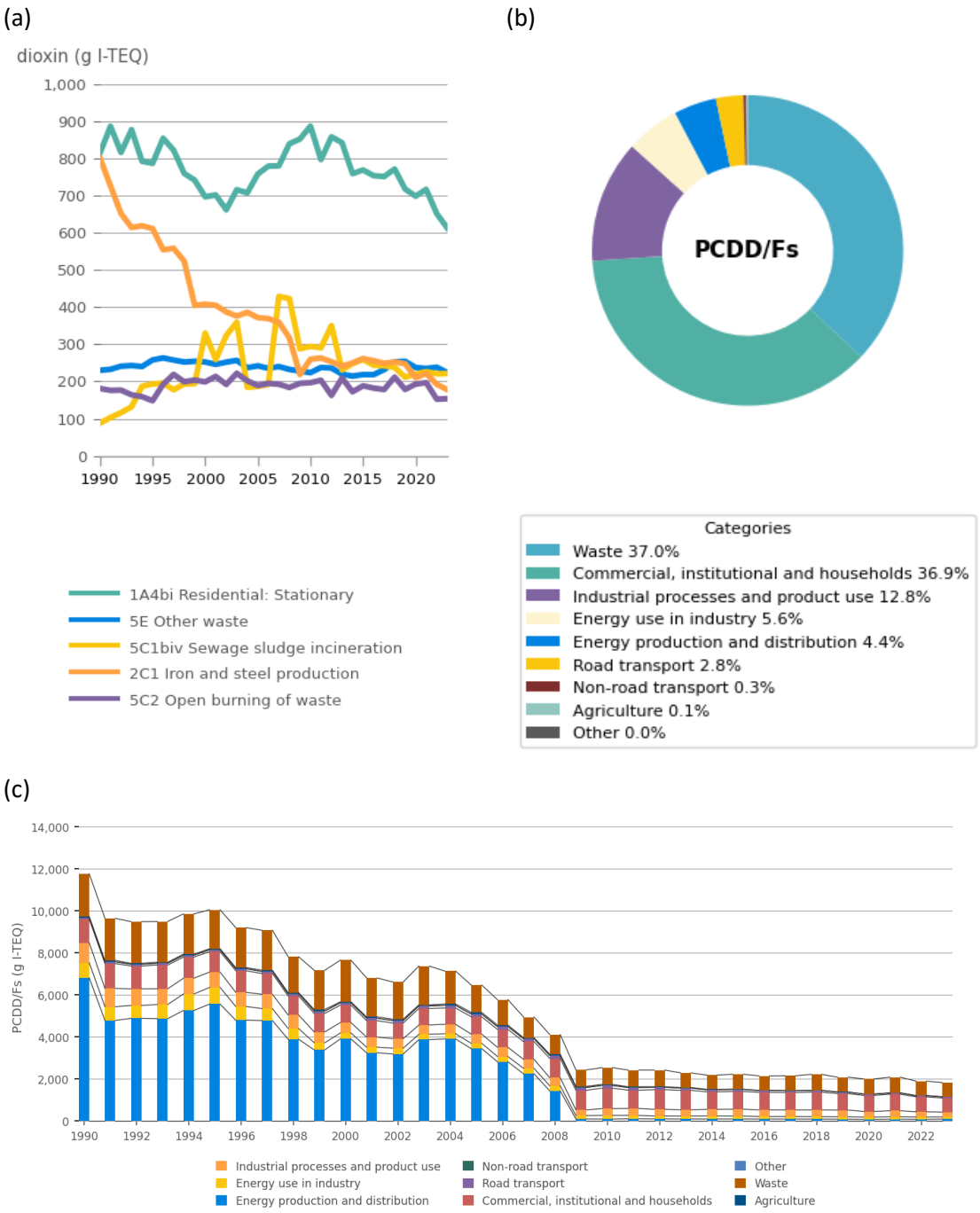
Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available. I-TEQ, international toxic equivalent.

Figure 3.26: Dioxin emission trends in the EU and shares of Member States



Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.27: PCDD/F emissions in the EU (a) emission trends since 1990 from the five most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions



Note: I-TEQ, international toxic equivalent.

3.21 Total PAH emission trends and key categories

Since 1990, PAH emissions have dropped by 57% in the EU, and by 28% since 2005 (Table 3.22). Between the latest two years, PAH emissions fell by 8%. During the current year, the EU Member States contributing most to the PAH emissions in the EU were Poland and Germany (Figure 3.28).

Figure 3.29b shows the contribution made by each aggregated sector group to total EU emissions. The commercial, institutional and households sector group is the most significant source of total PAH emissions.

For the current reporting cycle, the residential heating category (1A4bi) and iron and steel production (2C1) were the principal key categories for these emissions (Figure 3.29a). Both categories show decreases in total PAH emissions since 1990, by 41% and 72%, respectively.

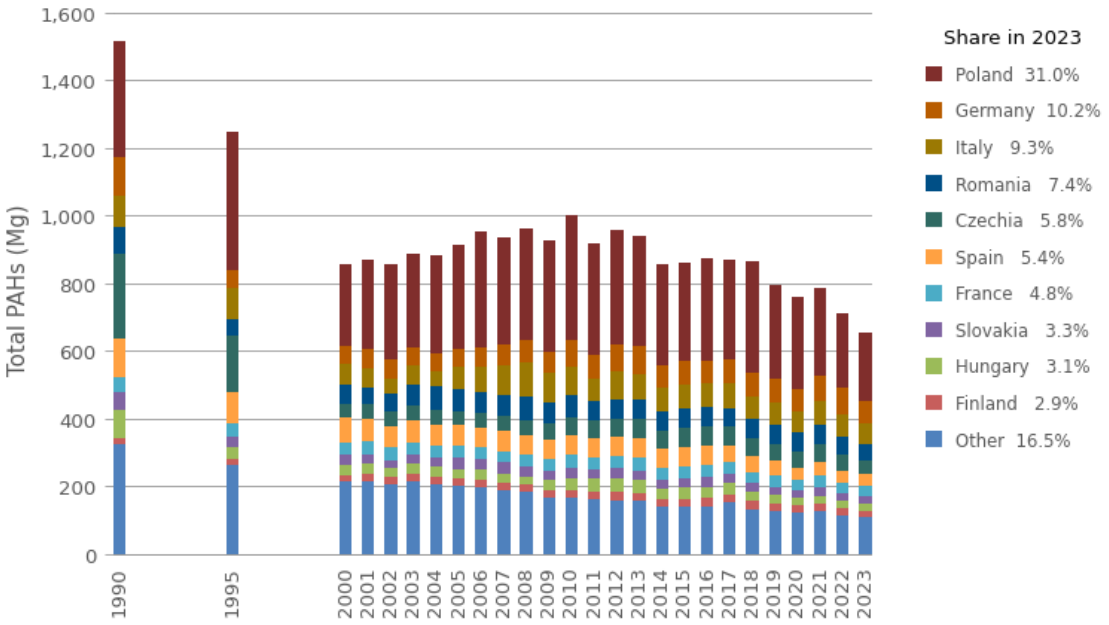
According to the Member States IIRs, the reduction in PAH emissions is mainly caused by a decrease in emissions from the household sector, which is due to a reduced consumption of coal and biomass.

Table 3.22: Member State contributions to EU emissions of total PAHs

	Total PAHs(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	18	11	8.8	7.1	7.8	7.1	7.2	7.2	6.7	6.9	6.5	7.3	5.8	5.4	-71%	-25%	-7.4%	1.2%	0.8%
Belgium	51	40	31	25	15	8.4	8.3	7.5	7.1	6.6	5.9	6.6	5.9	5.8	-88%	-77%	-1.4%	3.3%	0.9%
Bulgaria	27	29	23	23	19	15	16	31	15	14	15	15	11	9.2	-66%	-60%	-18.0%	1.8%	1.4%
Croatia	23	18	16	19	18	16	16	15	14	14	14	15	13	13	-44%	-33%	2.5%	1.5%	2.0%
Cyprus	14	11	6.2	3.8	0.9	0.9	0.7	0.6	0.7	0.6	0.7	0.7	0.7	0.7	-95%	-83%	-5.6%	0.9%	0.1%
Czechia	253	166	43	42	51	56	55	54	52	50	48	50	46	38	-85%	-8%	-17.6%	16.7%	5.8%
Denmark	13	13	10	11	7.6	6.8	6.9	6.3	5.8	4.9	4.6	4.5	4.2	4.5	-64%	-57%	6.9%	0.8%	0.7%
Estonia	9.9	10	7.7	5.8	6.0	4.3	4.3	4.3	4.2	4.0	4.1	3.6	3.8	3.6	-63%	-37%	-3.3%	0.7%	0.6%
Finland	18	17	18	22	26	22	24	24	23	23	19	22	20	19	6%	-11%	-3.3%	1.2%	2.9%
France	46	42	38	35	38	34	36	34	34	34	30	34	31	32	-32%	-11%	1.2%	3.0%	4.8%
Germany	116	53	55	51	77	68	66	68	69	70	66	76	80	67	-42%	31%	-16.4%	7.6%	10.2%
Greece	23	23	23	21	15	18	17	17	17	16	16	17	17	17	-26%	-16%	2.5%	1.6%	2.7%
Hungary	84	35	31	29	34	32	33	32	27	24	23	23	23	21	-75%	-28%	-9.3%	5.5%	3.1%
Ireland	30	20	16	15	15	14	14	12	13	12	12	12	9.2	7.8	-74%	-48%	-15.9%	2.0%	1.2%
Italy	90	92	59	64	87	71	71	74	67	66	61	69	63	61	-32%	-5%	-3.1%	5.9%	9.3%
Latvia	18	17	16	13	10.0	7.0	7.0	7.8	8.1	7.7	6.9	7.1	6.9	5.9	-67%	-55%	-14.1%	1.2%	0.9%
Lithuania	20	9.0	8.6	9.8	11	9.2	9.5	9.7	9.8	8.8	8.2	8.7	8.2	6.3	-68%	-35%	-23.1%	1.3%	1.0%
Luxembourg	4.2	2.5	1.8	1.3	1.3	1.4	1.5	1.8	0.6	0.6	0.6	0.5	0.6	0.6	-85%	-49%	5.9%	0.3%	0.1%
Malta	0.8	0.5	0.4	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	-94%	33%	-64.2%	0.1%	0.0%
Netherlands	21	12	6.6	6.6	7.5	6.1	6.1	5.9	5.7	5.4	4.9	5.4	5.4	5.1	-76%	-24%	-6.6%	1.4%	0.8%
Poland	341	409	242	310	369	291	305	295	330	276	271	260	220	203	-40%	-34%	-7.7%	22.5%	31.0%
Portugal	22	20	18	15	12	12	12	11	12	11	11	11	11	12	-47%	-23%	2.6%	1.5%	1.8%
Romania	79	47	57	67	64	58	57	57	56	57	56	60	55	49	-38%	-27%	-11.4%	5.2%	7.4%
Slovakia	52	31	27	32	31	28	30	30	27	25	22	26	22	22	-58%	-31%	-2.7%	3.4%	3.3%
Slovenia	9.9	8.3	7.9	8.9	8.3	7.6	7.6	7.2	6.1	6.0	5.7	6.3	5.1	4.8	-52%	-46%	-6.8%	0.7%	0.7%
Spain	112	91	72	62	60	58	58	49	48	43	38	40	36	36	-68%	-42%	-1.9%	7.4%	5.4%
Sweden	20	20	15	17	11	8.5	8.5	8.5	7.4	7.4	7.0	7.2	6.6	6.4	-68%	-62%	-3.0%	1.3%	1.0%
EU27(a)	**1,514**	**1,248**	**858**	**916**	**1,002**	**862**	**875**	**870**	**867**	**795**	**759**	**788**	**713**	**656**	**-57%**	**-28%**	**-8.0%**	**100.0%**	**100.0%**
EU27(b)	1,514	1,248	858	916	1,002	862	875	870	867	795	759	788	713	656					

Notes:(a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

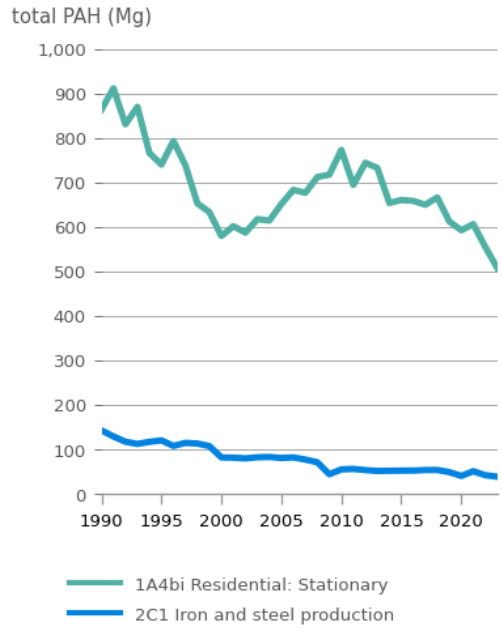
Figure 3.28: total PAH emission trends in the EU and shares of Member States



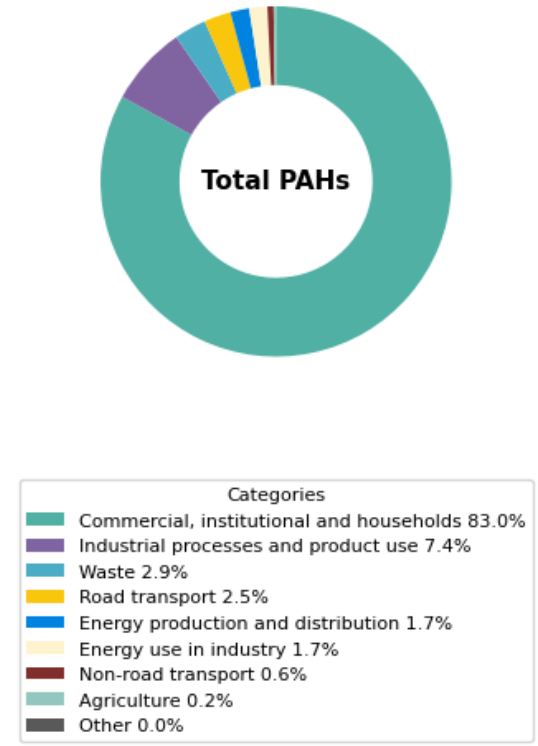
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.29: Total PAH emissions in the EU (a) emission trends since 1990 from the most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

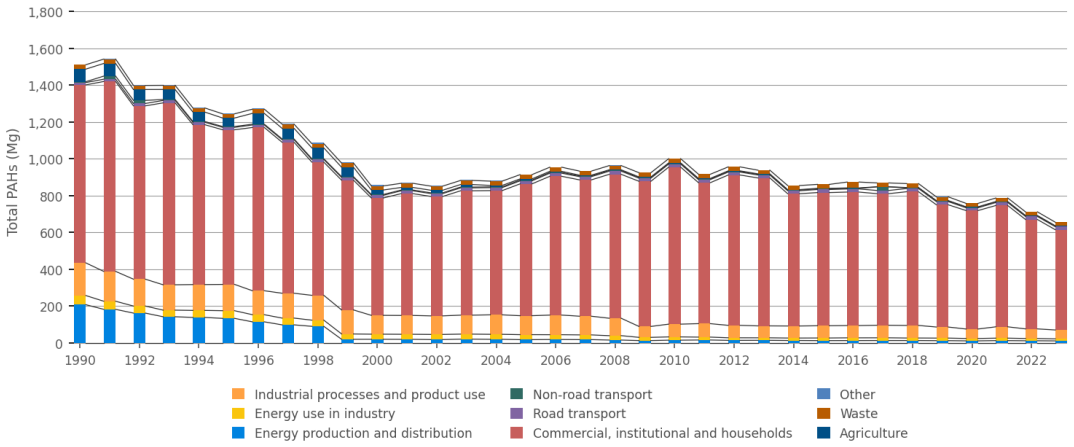
(a)



(b)



(c)



3.22 Benzo(a)pyrene emission trends and key categories

Since 1990, B(a)P emissions have fallen by 55% in the EU, and since 2005 by 28% (Table 3.23). Between the latest two years, they decreased by 8%. During the current year, the Member State contributing most to B(a)P emissions was Poland, with a share of 34% (Figure 3.30).

Figure 3.31b shows the contribution made by each aggregated sector group to total EU emissions. The commercial, institutional and households sector group is the main source of B(a)P emissions.

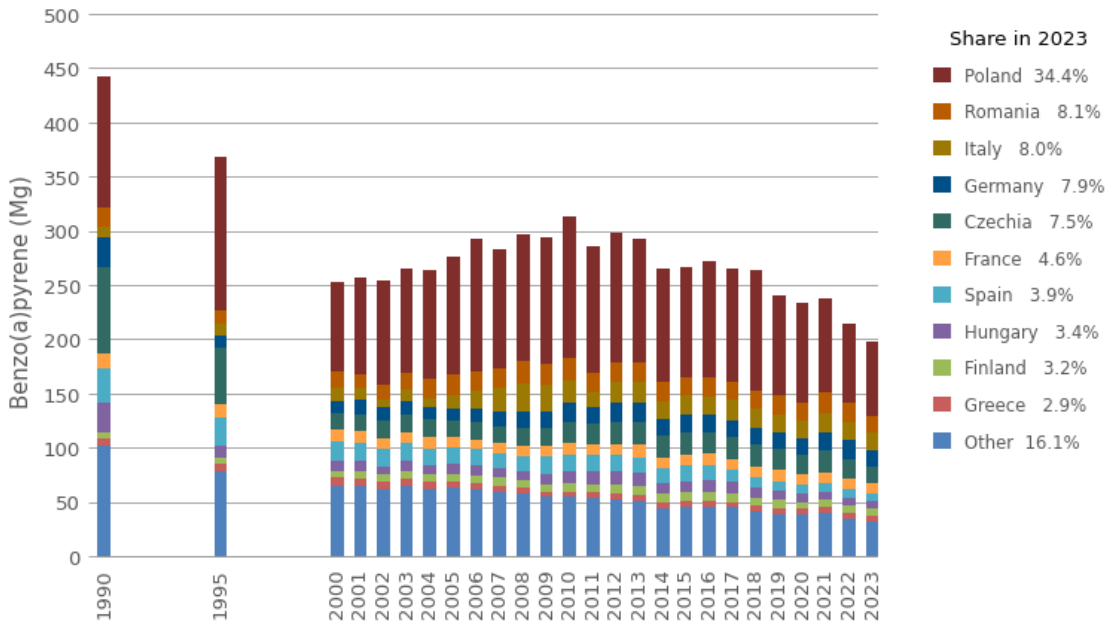
Residential combustion (1A4bi) was the principal key category for B(a)P emissions. This sector also corresponds to the greatest decrease in emissions (41%) since 1990 (Figure 3.31a).

Table 3.23: Member State contributions to EU emissions of B(a)P

	Benzo(a)pyrene(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	6.1	3.6	2.9	2.3	2.5	2.3	2.3	2.3	2.1	2.2	2.1	2.3	1.8	1.7	-72%	-25%	-7.6%	1.4%	0.9%
Belgium	15	12	9.7	7.8	5.4	2.7	2.7	2.4	2.3	2.1	1.9	2.1	1.9	1.8	-88%	-76%	-1.4%	3.5%	0.9%
Bulgaria	5.8	7.2	6.0	6.3	6.3	5.1	5.3	5.2	4.9	4.5	5.1	5.1	3.7	3.0	-49%	-52%	-19.3%	1.3%	1.5%
Croatia	7.4	5.9	5.3	6.6	6.2	5.6	5.4	5.2	4.9	4.7	4.7	5.1	4.4	4.5	-39%	-31%	2.5%	1.7%	2.3%
Cyprus	2.4	1.9	1.1	0.6	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-95%	-83%	-6.4%	0.5%	0.1%
Czechia	80	53	15	15	19	21	21	20	20	19	19	19	18	15	-81%	0%	-17.2%	18.1%	7.5%
Denmark	3.5	3.6	2.9	3.1	2.4	2.1	2.1	1.9	1.7	1.5	1.3	1.3	1.2	1.3	-62%	-56%	8.5%	0.8%	0.7%
Estonia	2.8	2.9	2.1	1.6	1.7	1.2	1.2	1.2	1.2	1.1	1.2	1.0	1.1	1.0	-63%	-36%	-3.0%	0.6%	0.5%
Finland	5.7	5.5	5.6	7.0	8.2	7.2	7.9	7.8	7.6	7.5	6.3	7.1	6.5	6.3	10%	-9%	-2.8%	1.3%	3.2%
France	13	12	11	10	11	9.9	10	9.8	9.7	9.9	8.8	9.9	9.0	9.1	-31%	-10%	1.3%	3.0%	4.6%
Germany	27	11	12	12	18	16	15	16	16	16	15	18	19	16	-42%	35%	-16.7%	6.1%	7.9%
Greece	7.4	7.1	7.2	6.3	4.5	5.8	5.3	5.4	5.4	5.2	5.1	5.4	5.4	5.7	-23%	-9%	4.7%	1.7%	2.9%
Hungary	27	11	9.5	8.7	11	11	11	11	8.8	8.0	7.6	7.7	7.4	6.7	-75%	-23%	-9.1%	6.1%	3.4%
Ireland	6.8	4.7	3.6	3.6	3.6	3.5	3.6	3.1	3.4	3.1	3.2	3.0	2.4	2.0	-71%	-46%	-16.3%	1.5%	1.0%
Italy	10.0	11	11	12	21	18	17	19	17	16	16	18	16	16	58%	26%	-2.7%	2.3%	8.0%
Latvia	6.3	6.0	6.1	4.7	3.5	2.5	2.5	2.7	2.8	2.7	2.4	2.5	2.4	2.0	-68%	-57%	-17.1%	1.4%	1.0%
Lithuania	6.6	3.1	3.0	3.4	3.7	3.2	3.2	3.3	3.3	3.0	2.8	2.9	2.8	2.1	-68%	-37%	-23.1%	1.5%	1.1%
Luxembourg	1.8	1.2	1.4	0.9	0.9	1.0	1.1	1.4	0.2	0.1	0.1	0.1	0.2	0.2	-91%	-80%	8.9%	0.4%	0.1%
Malta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-46%	30%	-58.0%	0.0%	0.0%
Netherlands	5.5	3.4	2.0	2.1	2.2	1.8	1.8	1.7	1.7	1.6	1.5	1.6	1.6	1.5	-72%	-26%	-5.1%	1.2%	0.8%
Poland	120	143	82	109	131	102	107	103	111	92	92	87	73	68	-43%	-38%	-6.7%	27.2%	34.4%
Portugal	6.8	6.0	5.4	4.4	3.4	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.3	3.4	-50%	-22%	1.9%	1.5%	1.7%
Romania	18	11	16	18	20	18	17	17	17	17	17	18	17	16	-11%	-12%	-7.3%	4.1%	8.1%
Slovakia	15	7.5	6.0	7.1	6.9	5.6	5.9	5.7	4.7	4.8	4.6	4.5	4.3	3.7	-75%	-49%	-14.8%	3.3%	1.9%
Slovenia	3.1	2.6	2.6	2.9	2.7	2.5	2.5	2.4	2.0	1.9	1.9	2.1	1.6	1.5	-50%	-48%	-6.4%	0.7%	0.8%
Spain	32	26	18	15	15	14	14	11	11	9.5	8.7	8.0	7.7	7.7	-76%	-49%	0.3%	7.3%	3.9%
Sweden	6.4	6.4	4.9	5.4	3.4	2.6	2.6	2.6	2.2	2.2	2.1	2.1	1.9	1.9	-71%	-65%	-3.0%	1.4%	1.0%
EU27(a)	**442**	**369**	**253**	**276**	**314**	**267**	**271**	**265**	**264**	**240**	**233**	**238**	**214**	**198**	**-55%**	**-28%**	**-7.6%**	**100.0%**	**100.0%**
EU27(b)	442	369	253	276	314	267	271	265	264	240	233	238	214	198					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

Figure 3.30: B(a)P emission trends in the EU and shares of Member States

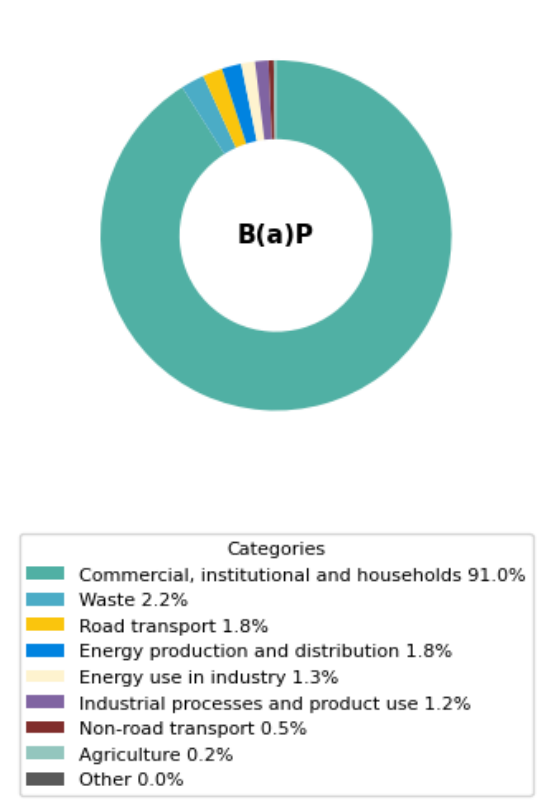


Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

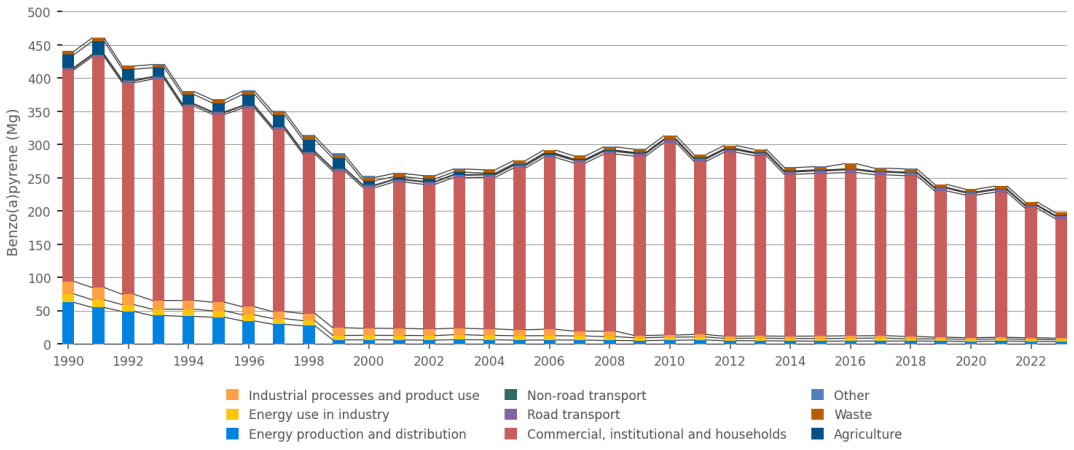
Figure 3.31: B(a)P emissions in the EU (a) emission trends since 1990 from the most important key category, (b) share by sector group in the current year and (c) sectoral trends in emissions

(a)

(b)



(c)



3.23 Benzo(b)fluoranthene emission trends

Since 1990, B(b)F emissions have fallen by 58% in the EU, and by 27% since 2005. Between the two latest years, they decreased by 8% (Table 3.24).

Table 3.24: Member State contributions to EU emissions of B(b)F

	Benzo(b)fluoranthene(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	6.3	3.8	3.1	2.5	2.8	2.5	2.6	2.6	2.4	2.5	2.3	2.6	2.1	1.9	-70%	-24%	-7.3%	1.3%	0.9%
Belgium	18	14	11	8.6	4.7	2.9	2.9	2.6	2.5	2.3	2.1	2.3	2.1	2.1	-88%	-76%	-1.4%	3.6%	1.0%
Bulgaria	5.3	8.7	6.5	6.8	6.4	5.0	5.2	5.1	4.9	4.4	5.0	5.1	3.6	2.9	-46%	-57%	-20.5%	1.1%	1.4%
Croatia	8.1	5.9	5.2	6.3	5.9	5.3	5.1	4.9	4.6	4.4	4.4	4.7	4.1	4.2	-48%	-33%	2.5%	1.6%	2.0%
Cyprus	6.6	5.2	3.0	1.8	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-95%	-83%	-5.5%	1.3%	0.2%
Czechia	89	57	13	12	14	15	15	15	14	13	13	13	12	9.8	-89%	-18%	-19.0%	18.0%	4.7%
Denmark	3.2	3.2	2.6	2.7	2.1	2.0	2.1	1.9	1.8	1.6	1.5	1.4	1.4	1.5	-53%	-46%	8.1%	0.6%	0.7%
Estonia	3.6	2.9	2.1	1.6	1.6	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	-71%	-36%	2.3%	0.7%	0.5%
Finland	4.8	4.5	4.6	5.6	6.5	5.6	6.1	6.0	5.9	5.8	4.9	5.5	5.1	4.9	4%	-12%	-3.6%	1.0%	2.4%
France	15	14	12	12	12	11	12	11	11	11	9.9	11	10	10	-33%	-11%	1.2%	3.1%	5.0%
Germany	36	15	17	17	26	23	22	23	23	23	22	26	27	23	-37%	36%	-16.8%	7.3%	11.0%
Greece	9.1	8.9	8.7	7.7	5.6	6.4	5.9	6.0	6.0	5.8	5.6	5.9	5.9	6.1	-33%	-21%	2.6%	1.8%	2.9%
Hungary	31	13	10	9.7	11	11	11	11	9.0	8.2	7.8	7.9	7.6	6.9	-78%	-28%	-9.2%	6.3%	3.4%
Ireland	12	8.4	6.6	6.3	6.2	5.7	5.9	5.1	5.5	5.0	5.2	4.8	3.9	3.3	-72%	-48%	-15.9%	2.4%	1.6%
Italy	13	14	14	15	25	21	21	22	20	19	18	21	19	19	46%	22%	-2.5%	2.6%	9.0%
Latvia	6.2	5.4	5.0	4.3	3.3	2.3	2.3	2.6	2.7	2.6	2.3	2.4	2.3	2.0	-67%	-52%	-11.5%	1.3%	1.0%
Lithuania	7.9	3.4	3.1	3.6	4.0	3.5	3.6	3.7	3.7	3.4	3.2	3.4	3.2	2.5	-68%	-30%	-20.6%	1.6%	1.2%
Luxembourg	1.1	0.6	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	-78%	31%	3.6%	0.2%	0.1%
Malta	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-95%	37%	-65.4%	0.1%	0.0%
Netherlands	8.1	3.7	2.0	1.9	2.2	1.7	1.7	1.7	1.6	1.5	1.3	1.5	1.5	1.5	-82%	-23%	-4.2%	1.7%	0.7%
Poland	122	147	85	108	128	101	105	102	114	95	94	90	76	70	-42%	-35%	-7.6%	24.8%	34.0%
Portugal	6.6	5.8	5.3	4.4	3.4	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	-48%	-22%	2.0%	1.3%	1.7%
Romania	23	12	16	18	19	17	17	17	17	17	17	18	17	15	-33%	-17%	-8.0%	4.6%	7.4%
Slovakia	11	5.9	5.0	6.0	5.8	5.1	5.2	5.2	4.5	4.5	4.2	4.2	4.0	3.5	-69%	-42%	-14.0%	2.3%	1.7%
Slovenia	3.6	2.9	2.6	2.9	2.6	2.4	2.4	2.3	1.9	1.9	1.8	2.0	1.6	1.5	-58%	-48%	-6.4%	0.7%	0.7%
Spain	36	28	20	15	15	14	14	11	11	9.9	9.1	8.5	8.2	8.3	-77%	-45%	1.3%	7.4%	4.0%
Sweden	6.2	6.1	4.7	5.3	3.4	2.7	2.7	2.7	2.3	2.3	2.2	2.2	2.1	2.0	-68%	-62%	-2.7%	1.3%	1.0%
EU27(a)	**493**	**400**	**269**	**285**	**319**	**272**	**275**	**269**	**274**	**250**	**241**	**248**	**225**	**207**	**-58%**	**-27%**	**-8.0%**	**100.0%**	**100.0%**
EU27(b)	493	400	269	285	319	272	275	269	274	250	241	248	225	207					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.24 Benzo(k)fluoranthene emission trends

Since 1990, B(k)F emissions in the EU decreased by 57%, and since 2005 by 27% (Table 3.25). During the wo latest years, they fell by 8%. During the current year, the EU Member States contributing most to the B(k)F emissions in the EU were Poland and Germany.

Table 3.25: Member State contributions to EU emissions of B(k)F

	Benzo(k)fluoranthene(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	3.6	1.5	1.2	1.0	1.1	1.0	1.0	1.0	1.0	1.0	0.9	1.0	0.8	0.8	-79%	-23%	-7.3%	1.5%	0.8%
Belgium	10.0	7.8	6.0	4.7	2.4	1.3	1.3	1.2	1.1	1.0	0.9	1.0	0.9	0.9	-91%	-81%	-1.3%	4.2%	0.9%
Bulgaria	5.6	3.8	2.9	2.9	2.7	2.0	2.1	2.1	2.0	1.8	2.0	2.1	1.5	1.2	-78%	-57%	-18.5%	2.4%	1.2%
Croatia	3.4	2.5	2.2	2.6	2.5	2.2	2.1	2.0	1.9	1.9	1.9	2.0	1.7	1.8	-49%	-32%	2.2%	1.5%	1.7%
Cyprus	2.8	2.2	1.3	0.8	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-95%	-83%	-5.0%	1.2%	0.1%
Czechia	45	30	7.0	6.9	8.3	9.0	8.8	8.7	8.4	8.2	7.9	8.3	7.7	6.5	-85%	-6%	-15.6%	18.9%	6.4%
Denmark	2.4	2.5	2.1	2.2	1.7	1.4	1.4	1.3	1.1	1.0	0.9	0.9	0.8	0.8	-65%	-62%	5.1%	1.0%	0.8%
Estonia	1.7	1.9	1.4	1.0	1.1	0.8	0.8	0.8	0.8	0.7	0.7	0.6	0.7	0.6	-63%	-39%	-4.8%	0.7%	0.6%
Finland	3.6	3.4	3.5	4.3	5.1	4.4	4.8	4.7	4.7	4.6	3.7	4.2	3.9	3.7	5%	-13%	-3.4%	1.5%	3.7%
France	9.4	8.7	7.8	7.3	7.6	7.0	7.2	7.0	6.8	6.9	6.2	6.9	6.3	6.4	-32%	-12%	1.1%	4.0%	6.3%
Germany	16	7.0	7.9	7.7	12	10	10	10	11	11	10	12	12	10	-36%	35%	-16.5%	6.9%	10.2%
Greece	4.2	4.0	4.1	3.7	2.8	3.3	3.2	3.2	3.2	3.2	3.1	3.2	3.2	3.3	-21%	-10%	2.1%	1.8%	3.2%
Hungary	15	7.5	6.4	6.0	6.2	5.1	5.1	5.0	4.4	3.9	3.5	3.6	3.6	3.3	-78%	-45%	-8.4%	6.3%	3.2%
Ireland	6.2	4.0	3.0	2.8	2.7	2.5	2.6	2.2	2.4	2.1	2.2	2.1	1.7	1.4	-77%	-50%	-15.8%	2.6%	1.4%
Italy	6.0	6.6	6.7	7.5	12	9.7	9.4	10	9.1	8.9	8.4	9.5	8.7	8.5	43%	13%	-2.5%	2.5%	8.4%
Latvia	2.4	2.1	2.0	1.6	1.3	0.9	0.9	1.0	1.0	1.0	0.9	0.9	0.9	0.8	-68%	-54%	-14.3%	1.0%	0.7%
Lithuania	3.3	1.5	1.3	1.6	1.7	1.6	1.6	1.7	1.7	1.5	1.5	1.5	1.5	1.2	-63%	-20%	-17.2%	1.4%	1.2%
Luxembourg	0.7	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-80%	12%	2.3%	0.3%	0.1%
Malta	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-95%	34%	-59.0%	0.1%	0.0%
Netherlands	4.2	2.6	1.1	1.0	1.2	1.0	1.0	0.9	0.9	0.8	0.7	0.8	0.8	0.8	-81%	-24%	-4.4%	1.8%	0.8%
Poland	52	64	39	48	57	45	47	46	54	46	45	43	37	34	-34%	-29%	-8.4%	21.9%	33.4%
Portugal	2.5	2.3	2.1	1.8	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.4	-46%	-24%	2.2%	1.1%	1.3%
Romania	9.4	5.4	6.7	7.6	7.9	7.2	7.1	7.0	6.9	7.0	7.0	7.4	6.9	6.4	-32%	-16%	-7.4%	4.0%	6.3%
Slovakia	7.2	3.9	3.3	4.1	4.0	3.6	3.7	3.6	3.2	3.2	2.9	2.9	2.8	2.5	-65%	-38%	-11.9%	3.0%	2.5%
Slovenia	1.3	1.1	1.0	1.1	1.0	0.9	0.9	0.9	0.7	0.7	0.7	0.8	0.6	0.6	-57%	-47%	-6.8%	0.6%	0.6%
Spain	16	13	9.0	7.3	7.0	6.6	8.2	5.5	5.4	4.4	3.9	3.8	3.6	3.6	-77%	-51%	1.1%	6.6%	3.5%
Sweden	3.0	2.9	2.3	2.9	1.2	1.0	1.0	0.9	0.8	0.8	0.8	0.8	0.7	0.7	-77%	-76%	-3.2%	1.3%	0.7%
EU27(a)	**237**	**192**	**131**	**139**	**151**	**130**	**134**	**129**	**134**	**123**	**117**	**120**	**111**	**102**	**-57%**	**-27%**	**-7.9%**	**100.0%**	**100.0%**
EU27(b)	237	192	131	139	151	130	134	129	134	123	117	120	111	102					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.25 Indeno(1,2,3-cd)pyrene emission trends

Since 1990, IP emissions fell by 51% and since 2005 by 21% in the EU (Table 3.26). During the latest two years, they decreased by about 9%. During the current year, the EU Member States contributing most to IP emissions were Poland and Germany.

Table 3.26: Member State contributions to EU emissions of IP

	Indeno(123-cd)pyrene(Mg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	2.5	2.0	1.6	1.3	1.4	1.3	1.3	1.3	1.2	1.3	1.2	1.3	1.1	1.0	-61%	-25%	-7.3%	1.2%	0.9%
Belgium	7.4	5.9	4.7	3.9	2.5	1.5	1.5	1.3	1.3	1.2	1.0	1.2	1.1	1.0	-86%	-73%	-1.4%	3.4%	1.0%
Bulgaria	6.2	3.4	3.3	3.2	3.3	2.7	2.8	2.8	2.6	2.5	2.9	2.8	2.1	1.8	-71%	-44%	-16.6%	2.9%	1.7%
Croatia	3.9	3.3	3.0	3.7	3.5	3.1	3.0	2.9	2.7	2.6	2.6	2.8	2.4	2.5	-36%	-33%	2.0%	1.8%	2.3%
Cyprus	2.0	1.6	0.9	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-95%	-83%	-5.7%	0.9%	0.1%
Czechia	40	26	8.1	7.8	9.7	11	10	10	9.8	9.3	9.0	9.5	8.8	7.2	-82%	-8%	-18.4%	18.3%	6.7%
Denmark	3.6	3.5	2.7	2.6	1.4	1.3	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.9	-76%	-66%	4.4%	1.6%	0.8%
Estonia	1.8	2.7	2.1	1.5	1.7	1.2	1.2	1.1	1.1	1.0	1.1	1.0	1.0	0.9	-49%	-39%	-8.2%	0.8%	0.9%
Finland	4.1	3.9	4.0	4.9	5.8	5.0	5.5	5.4	5.3	5.2	4.3	4.8	4.5	4.3	5%	-12%	-3.5%	1.9%	4.0%
France	8.2	7.5	6.8	6.5	6.9	6.3	6.5	6.3	6.2	6.3	5.6	6.3	5.8	5.8	-29%	-10%	0.9%	3.8%	5.4%
Germany	23	9.9	11	11	17	15	15	15	15	16	15	17	18	15	-35%	37%	-17.1%	10.6%	14.0%
Greece	3.4	3.4	3.3	2.9	2.0	2.7	2.4	2.4	2.4	2.3	2.2	2.4	2.4	2.5	-26%	-13%	6.3%	1.6%	2.4%
Hungary	10	4.3	4.3	4.0	5.4	5.7	5.8	5.5	4.5	4.2	4.1	4.1	3.9	3.6	-66%	-10%	-9.6%	4.8%	3.3%
Ireland	5.0	3.3	2.4	2.3	2.2	2.0	2.1	1.8	1.9	1.7	1.8	1.7	1.3	1.1	-77%	-50%	-15.5%	2.3%	1.1%
Italy	7.1	7.8	7.8	8.5	14	12	12	13	11	11	10	12	11	10	47%	23%	-2.6%	3.3%	9.7%
Latvia	2.9	3.1	3.1	2.6	1.9	1.3	1.3	1.5	1.5	1.5	1.3	1.3	1.3	1.1	-61%	-56%	-13.0%	1.3%	1.1%
Lithuania	2.8	1.6	1.6	1.8	1.9	1.7	1.7	1.7	1.7	1.5	1.5	1.5	1.5	1.1	-60%	-38%	-23.4%	1.3%	1.1%
Luxembourg	0.6	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-84%	11%	12.3%	0.3%	0.1%
Malta	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-94%	24%	-75.4%	0.1%	0.0%
Netherlands	3.0	1.7	1.0	1.0	1.1	0.9	0.9	0.8	0.8	0.8	0.7	0.8	0.8	0.7	-75%	-23%	-5.0%	1.4%	0.7%
Poland	41	52	31	39	47	37	39	38	44	37	36	35	30	27	-34%	-31%	-8.6%	18.9%	25.2%
Portugal	4.0	3.5	3.2	2.5	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	-50%	-21%	1.8%	1.8%	1.9%
Romania	7.9	5.1	8.5	9.6	11	9.6	9.6	9.6	9.5	9.6	9.6	10	9.6	8.9	13%	-7%	-7.0%	3.6%	8.3%
Slovakia	7.3	3.6	2.9	3.3	3.2	2.6	2.7	2.7	2.2	2.2	2.2	2.2	2.1	1.7	-76%	-48%	-16.5%	3.3%	1.6%
Slovenia	1.7	1.5	1.5	1.7	1.6	1.4	1.4	1.4	1.1	1.1	1.1	1.2	0.9	0.9	-46%	-48%	-6.4%	0.8%	0.8%
Spain	15	12	8.9	7.5	7.8	7.5	7.4	5.6	5.3	5.2	4.8	4.6	4.4	4.4	-70%	-41%	0.0%	6.7%	4.1%
Sweden	3.1	3.3	2.5	2.4	1.9	1.5	1.4	1.4	1.2	1.2	1.1	1.2	1.0	1.0	-68%	-58%	-3.2%	1.4%	0.9%
EU27(a)	**218**	**177**	**130**	**136**	**157**	**137**	**138**	**135**	**137**	**128**	**122**	**127**	**117**	**107**	**-51%**	**-21%**	**-8.6%**	**100.0%**	**100.0%**
EU27(b)	218	177	130	136	157	137	138	135	137	128	122	127	117	107					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

3.26 Hexachlorobenzene emission trends and key categories

Since 1990, HCB emissions have fallen by 98% in the EU, and since 2005 by 62% (Table 3.27). During the latest two years, they decreased by 18%. During the current year, the EU Member States contributing most to HCB emissions were Finland and Italy (Figure 3.30).

The drop in HCB emissions between 2001 and 2002 was mainly attributed to data reported by Germany. Emission estimates were reported up to 2001, after which the notation key 'NA' (not applicable) was used (Figure 3.33). The drop from 1990 to 1995 is mainly due to the reduced emissions from France.

For HCB, the primary emission sources are the commercial, institutional and households and the industrial processes and product use sectors. Figure 3.33(b) shows the contribution made by each aggregated sector group to total EU emissions. The fluctuations in the emission trend for the chemical industry (2B10a) is dominated by the emissions reported by Finland (Finland's IIR).

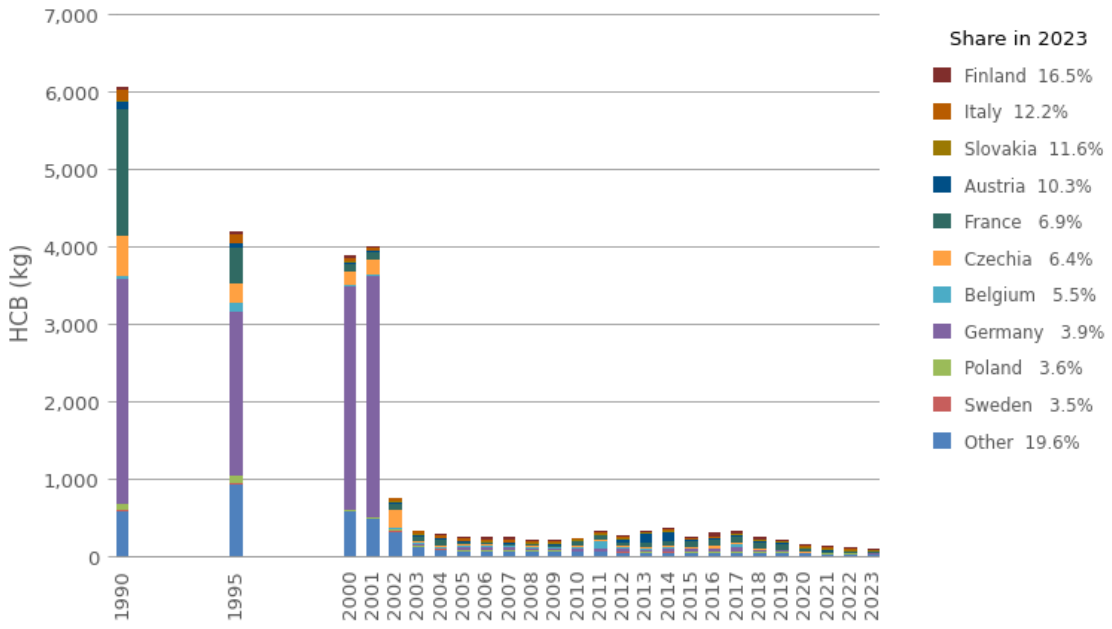
The main key categories for HCB emissions in the current year were the Chemical industry (2B10a), residential combustion (1A4bi) and public electricity and heat production (1A1a) (Figure 3.33a). Among the top five key categories, the highest relative reductions in emissions since 1990 have been in stationary combustion in manufacturing industries and construction (1A2b) (99.5%) and in residential combustion (1A4bi) (88%).

Table 3.27: Member State contributions to EU emissions of HCB

	HCB(kg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	82	43	20	14	15	13	13	14	13	14	11	13	11	10	-88%	-26%	-4.1%	1.3%	10.3%
Belgium	40	115	21	19	11	2.4	2.0	32	2.9	1.9	2.2	1.9	1.8	5.4	-87%	-72%	201.2%	0.7%	5.5%
Bulgaria	5.8	6.0	5.4	5.2	3.8	1.9	1.3	1.4	1.4	1.2	1.2	1.3	1.9	1.4	-76%	-73%	-26.2%	0.1%	1.4%
Croatia	7.1	6.4	2.0	0.5	0.9	0.4	0.5	0.5	0.6	0.6	0.4	0.3	0.3	0.3	-95%	-28%	2.9%	0.1%	0.3%
Cyprus	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-80%	28%	5.6%	0.0%	0.0%
Czechia	516	254	172	14	22	26	25	22	21	15	13	11	10	6.3	-99%	-54%	-37.9%	8.5%	6.4%
Denmark	13	11	5.5	3.7	2.7	2.2	2.3	2.4	2.4	2.1	2.1	2.4	2.3	2.1	-84%	-43%	-7.5%	0.2%	2.1%
Estonia	0.5	0.7	0.8	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-9%	1%	-0.7%	0.0%	0.5%
Finland	36	36	39	32	8.6	16	60	33	32	23	21	23	29	16	-54%	-50%	-44.4%	0.6%	16.5%
France	1,639	472	100	24	58	70	79	79	83	67	34	17	6.9	6.7	-100%	-72%	-1.8%	27.1%	6.9%
Germany	2,901	2,118	2,884	38	29	40	50	61	13	13	5.2	4.6	4.7	3.9	-100%	-90%	-17.6%	47.9%	3.9%
Greece	21	22	25	27	12	3.1	2.7	3.3	2.5	1.6	0.9	0.9	0.9	0.9	-96%	-97%	-1.7%	0.4%	0.9%
Hungary	257	630	367	3.3	2.2	3.2	3.2	3.2	2.9	3.2	2.1	1.6	1.6	1.2	-100%	-62%	-22.1%	4.2%	1.3%
Ireland	48	48	7.9	2.6	2.6	2.7	2.6	2.6	2.4	2.3	2.4	2.5	2.6	2.5	-95%	-7%	-5.1%	0.8%	2.5%
Italy	142	110	33	27	16	16	15	16	15	15	11	13	12	12	-92%	-56%	-1.5%	2.4%	12.2%
Latvia	5.7	0.3	0.2	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-91%	86%	-1.1%	0.1%	0.5%
Lithuania	11	4.7	1.9	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	-97%	49%	0.4%	0.2%	0.4%
Luxembourg	1.4	1.7	1.1	0.7	0.7	0.6	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.4	-75%	-50%	-53.5%	0.0%	0.4%
Malta	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	-32%	2833%	-15.0%	0.0%	0.0%
Netherlands	66	40	17	3.4	3.5	4.1	4.3	4.1	4.0	3.8	3.4	3.4	3.3	3.2	-95%	-8%	-5.1%	1.1%	3.2%
Poland	83	83	12	12	11	11	12	13	13	15	3.4	3.8	3.8	3.5	-96%	-70%	-7.3%	1.4%	3.6%
Portugal	60	76	101	1.7	1.4	1.8	1.9	2.0	2.4	2.4	1.4	1.3	1.2	0.8	-99%	-55%	-38.2%	1.0%	0.8%
Romania	2.9	2.9	3.9	4.2	3.2	3.0	2.9	3.1	3.1	3.1	3.0	3.6	3.1	2.9	0%	-31%	-7.0%	0.0%	2.9%
Slovakia	19	9.4	9.3	14	11	15	15	19	18	17	17	16	16	11	-41%	-19%	-27.6%	0.3%	11.6%
Slovenia	21	18	20	0.9	1.3	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4	-98%	-59%	-3.9%	0.4%	0.4%
Spain	57	60	16	4.6	12	10	12	12	13	13	9.0	2.1	1.9	1.8	-97%	-60%	-5.1%	0.9%	1.9%
Sweden	17	17	11	4.5	6.6	3.8	2.7	3.1	2.8	2.7	2.6	3.1	2.7	3.4	-79%	-24%	28.4%	0.3%	3.5%
EU27(a)	**6,054**	**4,185**	**3,875**	**258**	**235**	**249**	**312**	**330**	**251**	**220**	**149**	**129**	**119**	**98**	**-98%**	**-62%**	**-17.7%**	**100.0%**	**100.0%**
EU27(b)	6,054	4,185	3,875	258	235	249	312	330	251	220	149	129	119	98					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

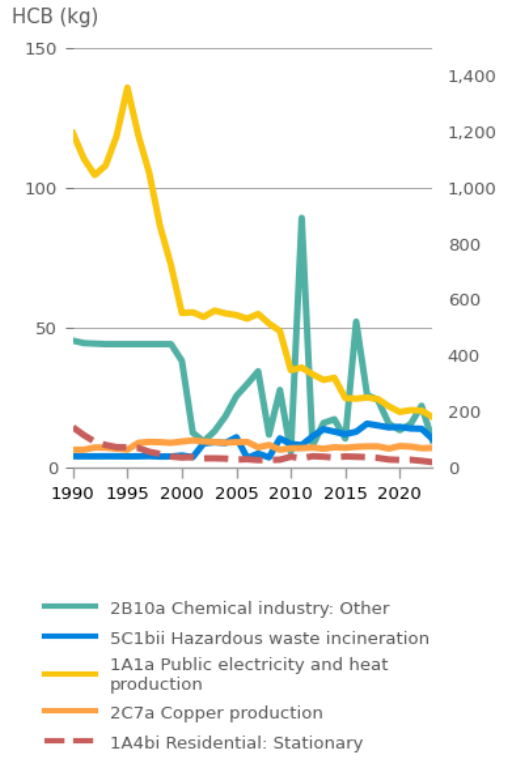
Figure 3.32: HCB emission trends in the EU and shares of Member States



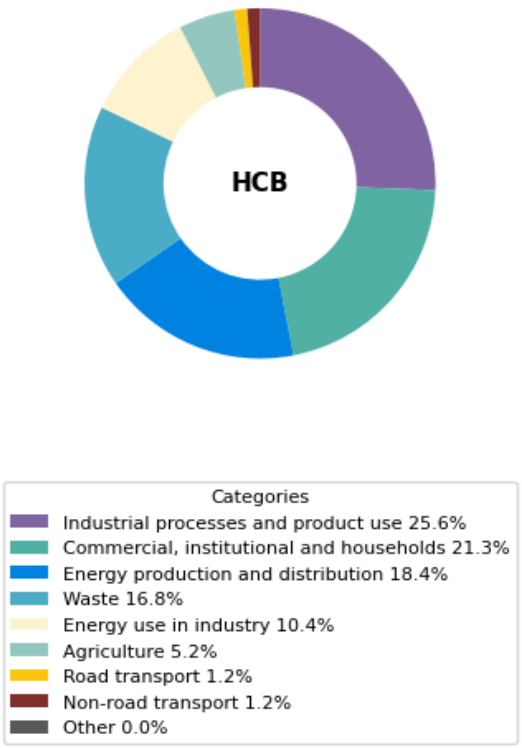
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.33: HCB emissions in the EU (a) emission trends since 1990 from the most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

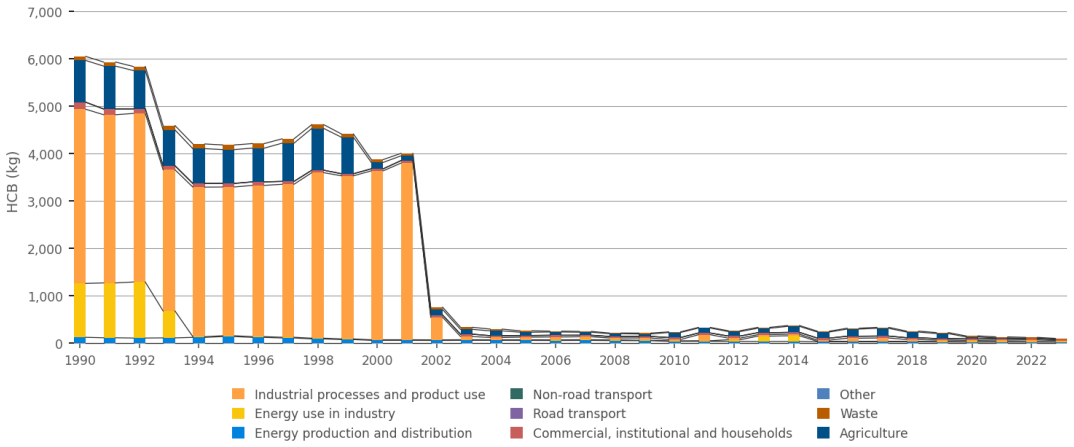
(a)



(b)



(c)



Note: In (a), the right-hand axis shows values for 1A4bi — Residential: Stationary.

3.27 Polychlorinated biphenyl emission trends and key categories

Since 1990, PCB emissions have dropped by 84% in the EU, and since 2005 by 69% (Table 3.28). Between the latest two years they fell by about 4%. During the current year, the EU Member States contributing most to PCB emissions were Spain, Germany, Poland and Italy (Figure 3.32).

For PCBs, the most significant emission source is the industrial processes and product use sector group. Figure 3.35b shows the contribution made by each aggregated sector group to total EU emissions.

Consumption of POPs and heavy metals (2K) was the main key category for PCB emissions. The highest relative emission reductions since 1990 among the top four key categories, have been in the sectors consumption of POPs and heavy metals (2K) (91%) and lead production (2C5) (90%) (Figure 3.35a). However, PCB emissions from lead production have increased about five-fold since 2005, which is mainly due to substantial increases reported by Greece.

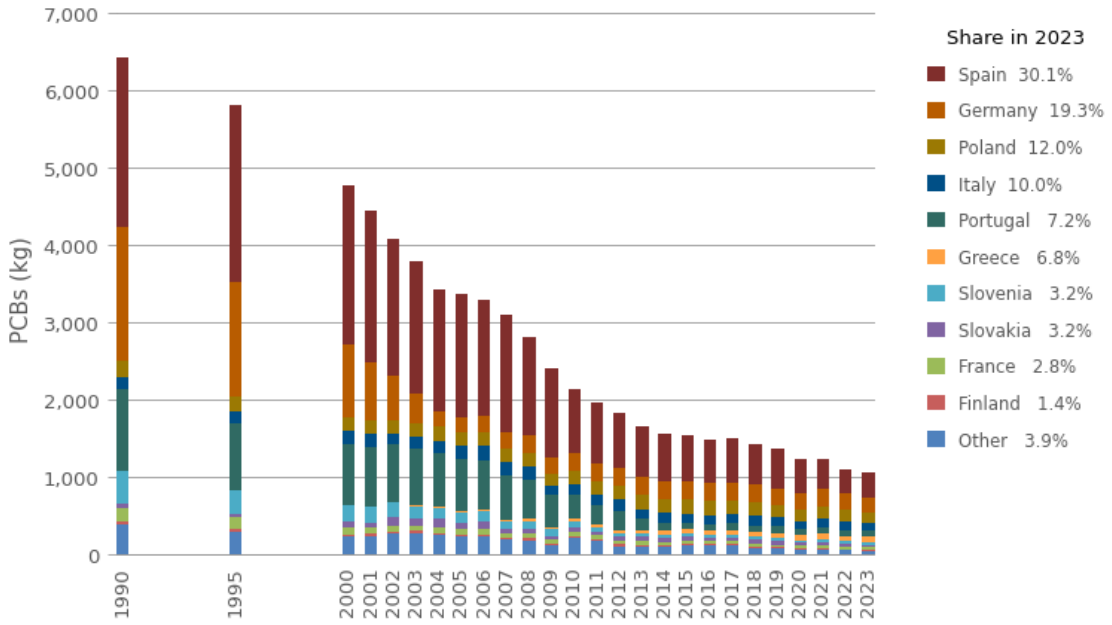
The reduction of PCB emissions from the consumption of POPS and heavy metals in the industry sector is reported to be due to the implementation of the Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT) and Regulation (EC) 850/2004 on Persistent Organic Pollutants (Member State's IIRs).

Table 3.28: Member State contributions to EU emissions of PCBs

	PCBs(kg)														Change			Share in EU-27	
Member State	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022	2023	1990-2023	2005-2023	2022-2023	1990	2023
Austria	36	10	9.2	5.9	4.4	4.1	4.1	4.2	3.7	3.5	3.2	3.1	2.8	2.4	-93%	-59%	-12.4%	0.6%	0.2%
Belgium	119	103	108	89	116	41	53	49	19	15	8.8	9.0	3.7	3.8	-97%	-96%	0.8%	1.9%	0.4%
Bulgaria	11	16	11	10	3.9	2.7	2.8	3.2	3.0	2.7	2.3	2.8	2.0	1.7	-84%	-83%	-13.7%	0.2%	0.2%
Croatia	5.1	1.3	3.3	4.5	4.7	4.5	4.6	2.8	3.0	3.2	2.4	3.1	3.2	3.0	-41%	-33%	-7.1%	0.1%	0.3%
Cyprus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11%	15%	6.5%	0.0%	0.0%
Czechia	3.6	2.7	2.1	2.0	1.7	1.8	1.8	1.7	1.7	1.6	1.5	1.2	1.1	0.7	-80%	-63%	-37.0%	0.1%	0.1%
Denmark	2.9	2.9	2.3	1.2	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	-87%	-68%	-4.9%	0.0%	0.0%
Estonia	4.9	2.8	2.4	1.6	1.3	0.8	0.9	1.0	0.9	0.6	0.6	0.5	0.6	0.4	-91%	-73%	-22.5%	0.1%	0.0%
Finland	26	26	27	28	23	20	22	19	20	16	17	20	16	14	-44%	-48%	-12.9%	0.4%	1.4%
France	178	152	98	68	54	41	41	42	39	35	30	36	34	30	-83%	-56%	-13.0%	2.8%	2.8%
Germany	1,736	1,483	948	192	232	230	229	228	227	223	209	219	209	204	-88%	6%	-2.7%	27.0%	19.3%
Greece	9.2	8.9	7.9	19	32	55	48	47	53	60	58	72	67	72	680%	286%	7.8%	0.1%	6.8%
Hungary	26	12	9.9	11	8.9	11	9.8	8.5	8.7	6.1	5.0	4.8	3.4	4.8	-82%	-58%	42.4%	0.4%	0.5%
Ireland	39	33	30	32	12	9.0	6.7	7.0	8.1	7.6	7.1	6.5	5.7	5.1	-87%	-84%	-11.8%	0.6%	0.5%
Italy	154	166	157	179	133	114	120	122	121	117	104	122	109	106	-31%	-41%	-2.8%	2.4%	10.0%
Latvia	4.3	1.1	0.4	0.6	0.5	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	-98%	-83%	4.4%	0.1%	0.0%
Lithuania	5.9	1.8	0.7	4.4	1.9	0.8	0.9	1.0	1.0	0.8	0.7	0.7	0.7	0.4	-93%	-90%	-36.4%	0.1%	0.0%
Luxembourg	23	35	11	11	18	2.4	3.8	3.8	2.3	2.2	1.7	1.2	1.4	1.7	-93%	-85%	20.8%	0.4%	0.2%
Malta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-94%	-23%	47.6%	0.0%	0.0%
Netherlands	38	22	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.2	0.2	0.1	-100%	-53%	-28.5%	0.6%	0.0%
Poland	207	190	180	172	164	182	176	183	179	157	144	160	160	127	-39%	-26%	-20.4%	3.2%	12.0%
Portugal	1,061	858	794	670	323	86	84	96	92	90	87	78	73	77	-93%	-89%	4.9%	16.5%	7.2%
Romania	62	39	28	39	21	20	20	18	19	19	17	20	15	8.6	-86%	-78%	-42.5%	1.0%	0.8%
Slovakia	60	56	60	78	61	62	38	40	51	47	40	38	36	34	-44%	-57%	-7.0%	0.9%	3.2%
Slovenia	416	291	214	136	77	39	39	38	37	36	35	35	35	34	-92%	-75%	-1.5%	6.5%	3.2%
Spain	2,185	2,286	2,053	1,594	824	606	562	564	517	504	440	391	308	319	-85%	-80%	3.5%	34.0%	30.1%
Sweden	9.2	9.6	9.8	9.4	9.2	9.0	9.1	9.5	9.4	9.2	8.8	9.0	8.6	8.4	-8%	-11%	-2.3%	0.1%	0.8%
EU27(a)	**6,423**	**5,811**	**4,768**	**3,360**	**2,127**	**1,544**	**1,476**	**1,490**	**1,417**	**1,356**	**1,223**	**1,234**	**1,096**	**1,057**	**-84%**	**-69%**	**-3.5%**	**100.0%**	**100.0%**
EU27(b)	6,423	5,811	4,768	3,360	2,127	1,544	1,476	1,490	1,417	1,356	1,223	1,234	1,096	1,057					

Notes: (a) Sum of national totals, as reported by EU Member States. (b) Sum of sectors: differences arise when only national totals and no sectoral data are available.

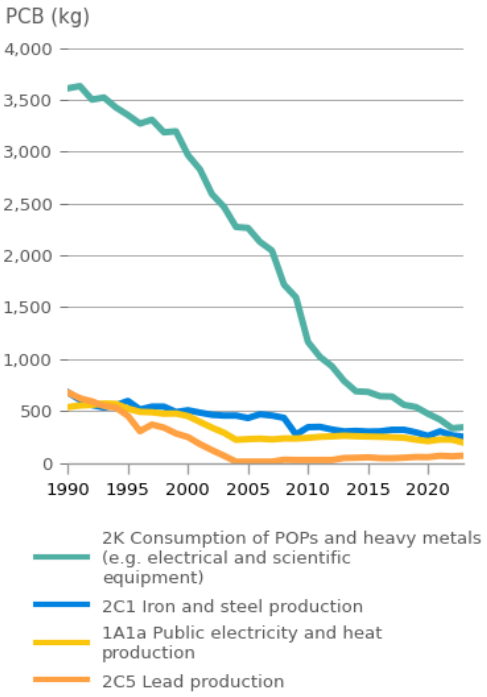
Figure 3.34: PCB emission trends in the EU and shares of Member States



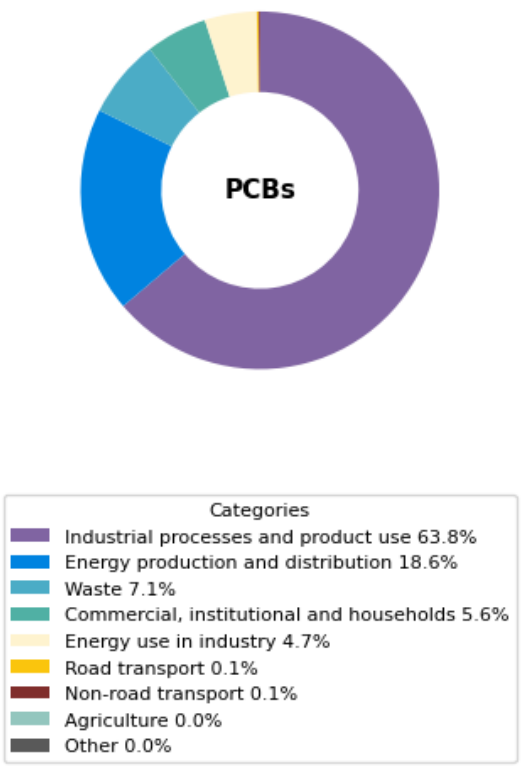
Notes: Countries are sorted by their contribution to the EU total for the last year. The top 10 countries are displayed. Data for the other 17 reporting countries are summed under 'Other'.

Figure 3.35: PCB emissions from key categories in the EU (a) emission trends since 1990 from the most important key categories, (b) share by sector group in the current year and (c) sectoral trends in emissions

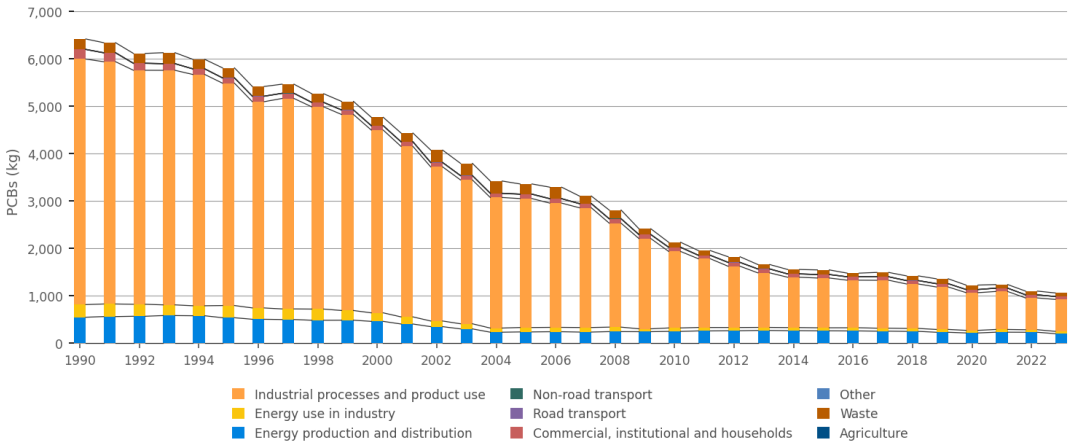
(a)



(b)



(c)



4 Sectoral analysis of EU pollutant emissions

This chapter sets out emission trends for the air pollutants, aggregated into the following main sector groups:

- energy production and distribution;
- energy use in industry;
- industrial processes and product use;
- commercial, institutional and households;
- road transport;
- non-road transport;
- agriculture;
- waste.

Appendix 4 of this report provides a conversion chart showing how the aggregated sector groups include the individual nomenclature for reporting (NFR) source categories (Table A4.1). Box 4.1 gives some general explanations relevant to the figures in this chapter.

Table 4.2, Table 4.4, Table 4.6, Table 4.8, Table 4.9, Table 4.10, Table 4.12 and Table 4.14 provide information on the relative and absolute differences between emissions reported during the current year and the previous year. The changes shown in these tables is a reflection of the performed recalculations by the EU Member States. Certain Member States have carried out major recalculations, which results in major changes in absolute terms. Detailed information can be found in Section 5.1.

Box 4.1: Explanations of the figures in this chapter

The Convention on Long-range Transboundary Air Pollution (Air Convention) formally requests Parties to report emissions of particulate matter (PM) for the year 2000 and thereafter. Therefore, the figures in this chapter show data for PM only from year 2000 onwards.

The figures showing indexed values (in percentages) use either 1990, 2000 or 2005 as the index year, which is detailed for each figure.

4.1 Energy production and distribution

The energy production and distribution sector grouping comprises emissions from a number of activities that employ fuel combustion to produce energy products and electricity, for instance. It is a major source of many pollutants, especially SO_X and Hg. Despite considerable previous reductions, this sector group contributes 43% of the total EU emissions of SO_X and 36% of Hg emissions.

Additionally, the sector is a significant source of HCB, Cd, NO_X and PCBs. For emissions of the main pollutants within this aggregated sector, the highest absolute and relative reductions were seen for SO_X both since 1990 and 2005 (Figure 4.1, Table 4.2).

Since 1990, SO_X emissions have reduced by about 97%. Several measures have been combined to reduce SO_X emissions from these main emitting sources: switching fuel in energy-related sectors away from high-sulphur solid and liquid fuels to low-sulphur fuels such as natural gas, fitting flue gas desulphurisation (FGD) abatement technology in industrial facilities and introducing EU directives relating to the sulphur content of certain liquid fuels (EEA, 2023a).

Since 1990 as well as since 2005, Cd, Pb and Hg emissions have reduced significantly (Figure 4.2a). HCB and PCB emissions have also reduced strongly since 1990 (Figure 4.2b). Since 2005 the trend has continued for HCB, but stagnated for PCB.

The peak in HCB emissions in 1995 reflects high emission values reported by Belgium in public electricity and heat production category (1A1a). The increases in PCB emissions observed after 2004 are mainly caused by Germany. The dip in 2020 is a result of Poland's PCB emission trend. Table 4.1 indicates the number of EU Member States reporting the notation keys 'NA' (not applicable), 'NO' (not occurring), 'NR' (not relevant) and 'NE' (not estimated) within the key categories. Table 4.2 shows the recalculations within the energy production and distribution sector group. For explanations of EU recalculations, see Section 5.1.

Figure 4.1: (a) EU emission trends and (b) indexed EU emission trends in the energy production and distribution sector for NO_X and SO_X since 1990

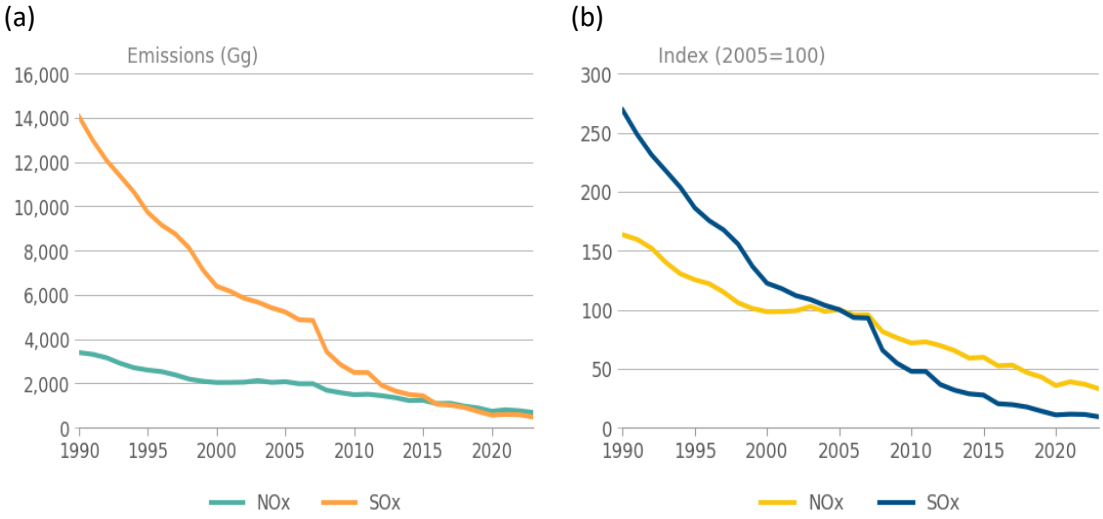


Figure 4.2: (a) EU emission trends and (b) indexed EU emission trends in the energy production and distribution sector group for HMs (Cd and Hg) since 1990

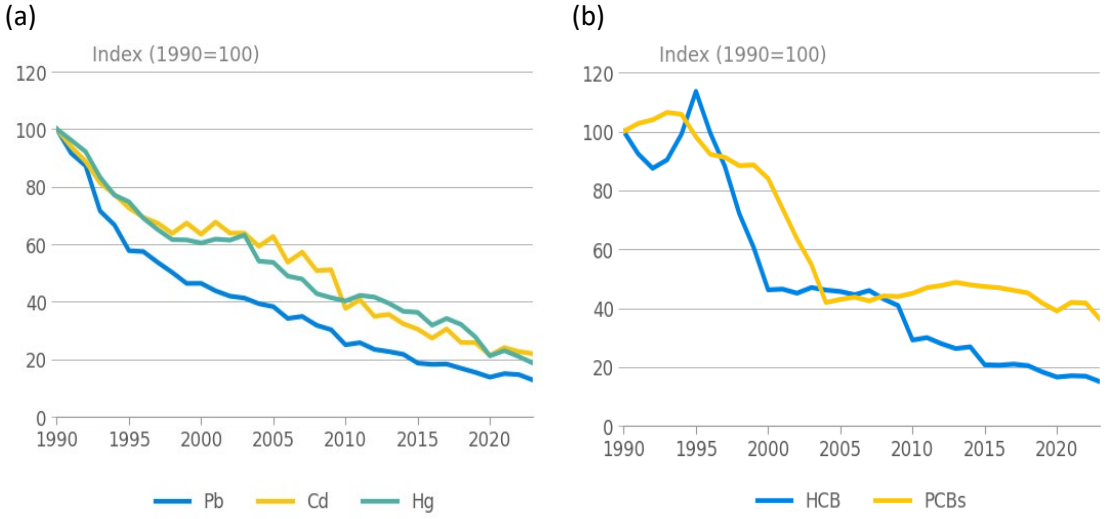


Table 4.1: Number of EU Member States reporting notation keys within the key categories of the energy production and distribution sector group in the latest year

Key categories		NA	NO	NR	NE
HCB	1A1a	1	0	0	0
PCB	1A1a	1	0	0	0
SOx	1A1b	0	6	0	0
Cd	1A1b	0	6	0	0
SOx	1B2aiv	0	5	0	0

Note: Only the key categories where notation keys were reported are considered.

Table 4.2a: Relative difference (relative data, percentage of EU national totals) when comparing the EU's 2024 and 2025 submissions for the energy production and distribution sector group

Relative difference Energy production and distribution																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	0.2%	1.5%	0.0%	1.6%	-0.3%	1.9%	-0.7%	2.2%	-0.9%	1.0%	-0.8%	2.1%	-0.7%	2.8%	-0.3%	3.7%	0.1%	4.1%	0.1%	4.0%	-2.1%
NMVOCs	Gg	0.2%	1.1%	0.6%	1.3%	0.8%	2.7%	2.3%	2.6%	2.0%	2.4%	1.8%	2.2%	1.7%	-1.4%	-1.4%	0.6%	0.8%	-1.5%	-1.5%	0.8%	-4.3%
SOx	Gg	0.1%	-3.4%	0.4%	1.2%	-3.0%	-0.4%	1.1%	1.5%	8.4%	1.3%	-3.8%	2.4%	1.7%	2.0%	3.0%	3.8%	4.8%	3.7%	-0.7%	0.7%	-1.5%
NH3	Gg	-0.1%	-0.2%	-0.1%	0.0%	-0.3%	-0.5%	-0.2%	-0.7%	-1.2%	-1.4%	-2.1%	-2.4%	-3.8%	-5.5%	-6.5%	-6.1%	-8.0%	-11.8%	-12.0%	-14.4%	-13.9%
CO	Gg	0.7%	2.2%	0.9%	1.2%	1.0%	1.4%	1.1%	0.9%	0.9%	1.4%	0.9%	0.9%	0.9%	1.2%	1.0%	1.1%	1.1%	0.9%	0.8%	1.2%	0.2%
Pb	Mg	-1.3%	-1.2%	-1.7%	0.2%	-1.0%	0.0%	-0.7%	-0.2%	-0.8%	0.1%	2.9%	4.1%	2.3%	4.0%	2.8%	4.7%	3.5%	2.3%	1.3%	1.6%	0.3%
Cd	Mg	-1.7%	1.7%	-2.0%	5.3%	-0.6%	6.0%	-0.1%	7.8%	-0.1%	6.9%	4.0%	14.7%	5.2%	16.8%	6.5%	19.8%	9.1%	18.3%	6.9%	13.8%	4.8%
Hg	Mg	-1.6%	0.3%	-1.8%	1.7%	-2.6%	1.4%	-2.6%	2.7%	-1.4%	2.1%	1.8%	6.1%	1.6%	6.4%	1.5%	7.4%	1.5%	4.7%	-0.9%	4.2%	0.3%
As	Mg	-3.7%	-5.9%	-6.3%	-5.3%	-7.2%	-6.4%	-7.0%	-4.7%	-4.7%	-6.6%	4.2%	5.4%	0.8%	5.0%	0.6%	3.5%	1.7%	-1.2%	-3.1%	2.8%	21.0%
Cr	Mg	-1.6%	-0.2%	-2.8%	2.4%	-2.1%	2.0%	-1.7%	3.4%	-0.8%	2.2%	3.5%	8.3%	3.1%	7.6%	3.3%	8.8%	3.8%	5.7%	1.3%	5.5%	2.1%
Cu	Mg	-1.0%	0.4%	-1.1%	2.5%	0.5%	2.3%	0.0%	1.1%	-1.4%	0.6%	-2.5%	-0.4%	-2.8%	-1.9%	-3.2%	-1.7%	-3.0%	1.4%	0.0%	0.7%	0.8%
Ni	Mg	1.6%	5.0%	-0.6%	11.8%	2.5%	14.3%	4.7%	17.7%	3.4%	17.2%	4.6%	22.7%	4.2%	19.9%	1.9%	19.7%	1.0%	20.5%	0.7%	11.2%	-1.1%
Se	Mg	-10.8%	-8.8%	-9.1%	-8.8%	-10.5%	-9.9%	-9.3%	-6.3%	-4.9%	-8.6%	14.6%	16.0%	14.6%	16.8%	14.9%	18.0%	15.3%	-0.6%	-2.8%	-4.3%	-8.7%
Zn	Mg	0.8%	0.4%	-0.3%	1.7%	1.3%	2.0%	1.6%	1.6%	1.3%	1.6%	2.8%	3.4%	3.2%	3.2%	3.3%	4.0%	4.0%	4.3%	4.2%	4.5%	4.1%
Total PAHs	Mg	-1.2%	-0.4%	-0.4%	0.9%	0.9%	0.8%	1.1%	-1.0%	1.2%	4.6%	3.3%	1.1%	2.2%	3.6%	4.5%	5.1%	5.8%	5.6%	6.5%	6.1%	6.4%
PCDD/Fs	g I-TEQ	0.2%	0.2%	0.0%	29.1%	33.0%	33.2%	28.6%	-3.5%	-3.4%	-2.0%	-3.4%	-3.9%	-3.9%	-3.8%	-3.6%	-3.3%	-3.4%	-1.2%	-1.4%	-1.4%	-1.7%
B(a)P	Mg	-0.1%	-0.1%	-0.9%	0.2%	0.1%	0.0%	0.4%	-1.5%	0.6%	3.3%	2.6%	0.7%	1.7%	3.1%	3.8%	4.3%	5.0%	4.6%	5.3%	5.0%	5.3%
B(b)F	Mg	-0.2%	0.0%	0.0%	1.9%	1.7%	1.7%	2.0%	-0.7%	2.1%	6.2%	4.5%	2.2%	3.4%	5.0%	6.1%	7.0%	7.8%	7.8%	9.0%	8.8%	9.2%
B(k)F	Mg	-0.1%	0.1%	0.6%	1.8%	1.6%	1.7%	1.9%	0.5%	1.8%	6.1%	3.7%	0.9%	2.1%	3.4%	4.3%	4.8%	5.5%	5.1%	6.0%	5.7%	6.0%
IP	Mg	-7.3%	-2.8%	-1.5%	-1.0%	-0.4%	-0.5%	-0.1%	-2.7%	-0.2%	3.8%	2.1%	-0.2%	1.0%	2.5%	3.3%	3.9%	4.5%	4.7%	5.6%	3.9%	4.3%
HCB	kg	3.2%	3.0%	6.4%	6.1%	5.7%	6.1%	4.6%	3.3%	4.8%	3.4%	-0.1%	-0.1%	-0.6%	-1.9%	-1.6%	-1.4%	-0.9%	-1.4%	-1.5%	-1.8%	-2.3%
PCBs	kg	0.4%	0.3%	0.0%	0.1%	0.1%	0.1%	0.1%	-0.5%	0.1%	0.9%	0.5%	-0.1%	-0.1%	0.1%	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	-1.8%
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			-2.2%	-2.0%	-2.5%	-2.5%	-2.7%	-2.0%	-4.3%	-1.5%	-4.1%	-3.3%	-2.9%	0.0%	-1.9%	-0.7%	-1.5%	-1.6%	-3.0%	-2.2%	-7.3%
PM10	Gg			0.0%	0.6%	0.1%	0.4%	0.7%	0.7%	0.6%	-0.1%	-0.4%	-0.4%	-0.3%	0.6%	-0.9%	-0.3%	-0.9%	-1.0%	-2.1%	-1.7%	-5.4%
TSPs	Gg			0.0%	0.3%	0.0%	0.1%	0.7%	0.9%	1.0%	-0.5%	1.4%	0.9%	0.9%	0.5%	-0.5%	-0.2%	-0.7%	-0.8%	-1.7%	-1.5%	-4.3%
BC	Gg			1.0%	18.1%	15.3%	15.4%	10.8%	5.1%	1.8%	5.2%	2.2%	2.5%	1.4%	1.4%	0.6%	1.8%	0.9%	2.6%	0.8%	2.7%	1.3%

Note: Differences of +/- 10% or more are highlighted in red.

Table 4.2b: Absolute difference between reported emissions when comparing the EU's 2024 and 2025 submissions for the energy production and distribution sector group

Relative difference Energy production and distribution																					
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	7	37	0	34	-6	38	-11	35	-14	15	-12	28	-9	33	-3	39	1	35	0	31	-16
NMVOCs	Gg	2	10	4	8	5	15	12	13	10	12	8	10	7	-6	-6	2	3	-6	-5	3	-16
SOx	Gg	14	-344	23	63	-150	-22	36	43	193	33	-76	39	25	28	31	37	42	26	-4	4	-9
NH3	Gg	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1
CO	Gg	7	18	7	10	8	11	8	7	7	11	7	7	7	8	7	8	8	6	6	9	1
Pb	Mg	-7	-3	-4	0	-2	0	-1	0	-1	0	3	4	2	4	3	4	3	2	1	1	0
Cd	Mg	-1	0	0	1	0	1	0	1	0	1	0	2	1	2	1	2	1	1	0	1	0
Hg	Mg	-1	0	-1	1	-1	0	-1	1	0	1	0	1	0	1	0	2	0	1	0	1	0
As	Mg	-5	-4	-3	-3	-3	-3	-3	-2	-2	-3	1	2	0	2	0	1	0	0	-1	1	5
Cr	Mg	-3	0	-2	2	-2	2	-1	2	-1	2	2	5	2	5	2	5	2	3	1	2	1
Cu	Mg	-3	0	-1	2	0	2	0	1	-1	0	-2	0	-2	-1	-2	-1	-2	1	0	0	0
Ni	Mg	14	38	-4	68	13	69	21	68	12	54	13	54	8	43	4	41	2	34	1	19	-2
Se	Mg	-13	-10	-10	-10	-11	-11	-10	-6	-4	-8	10	10	9	10	8	10	8	0	-1	-2	-4
Zn	Mg	8	2	-1	6	4	7	5	5	4	5	9	10	9	9	9	11	11	11	10	11	10
Total PAHs	Mg	-3	-1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1
PCDD/Fs	g I-TEQ	12	9	0	775	698	556	317	-3	-3	-2	-3	-3	-3	-3	-3	-3	-3	-1	-1	-1	-1
B(a)P	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(b)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(k)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP	Mg	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	kg	4	4	3	3	3	3	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0
PCBs	kg	2	1	0	0	0	0	0	-1	0	2	1	0	0	0	0	0	0	0	0	0	-4
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			-3	-2	-3	-3	-2	-2	-3	-1	-3	-2	-2	0	-1	0	-1	-1	-1	-1	-3
PM10	Gg			0	1	0	1	1	1	1	0	-1	-1	0	1	-1	0	-1	-1	-1	-1	-3
TSPs	Gg			0	1	0	0	2	2	2	-1	3	2	2	1	-1	0	-1	-1	-2	-1	-4
BC	Gg			0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4.2 Energy use in industry sector

Energy use in the industry sector is a significant source of SO_X, Hg, Pb, Cd, NO_X and HCB. Of these main pollutants from this sector, the highest absolute and relative reduction since 1990 and 2005 was for SO_X (Figure 4.3).

Of the three main heavy metals, Cd shows the biggest reduction in relative terms since 1990, while Pb shows the largest reduction since 2005 (Figure 4.4). The development of Cd and Hg emissions over the past 30 years mainly reflects data reported by Spain in the category stationary combustion in manufacturing industries and construction: non-metallic minerals (1A2f), including the rise in emissions from 1994 to 1995.

Pb emissions from this sector fell between 1996 and 1997 after a minor peak in 1995, decreased considerably between 2008 and 2009, and increased again afterwards (Figure 4.4). This pattern was mainly the result of data reported by Italy and France for the energy sector in iron and steel (1A2a), non-ferrous metals (1A2b) and non-metallic minerals (1A2f).

Table 4.3 presents the number of EU Member States reporting the notation keys 'NA', 'NO', 'NR' and 'NE' within the key categories. Table 4.4 shows the recalculations within the energy use in industry sector group. For explanations of EU recalculations, see Section 5.1.

Figure 4.3: (a) EU emission trends and (b) indexed EU emission trends in the energy use in industry -sector for NO_X and SO_X since 1990

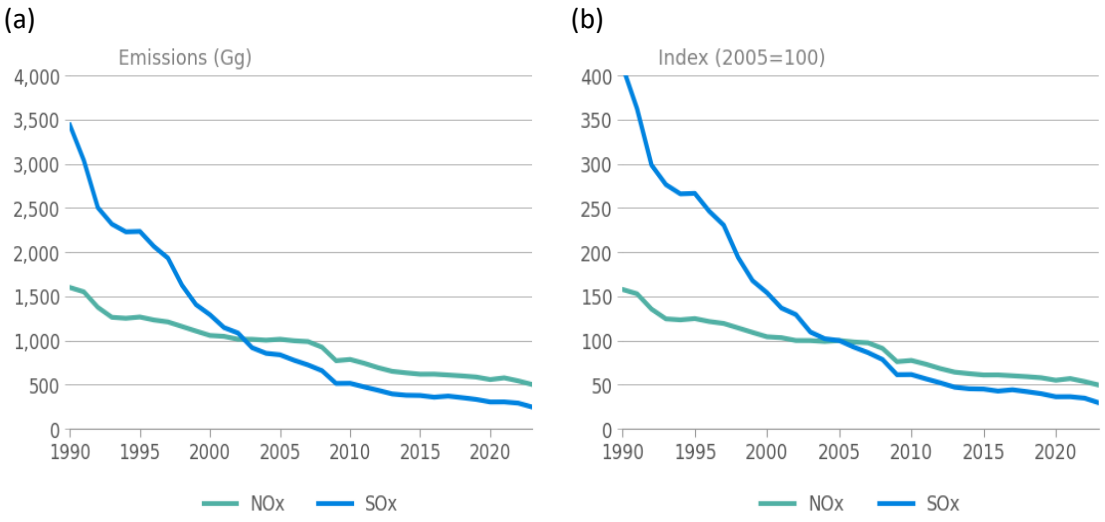


Figure 4.4: EU emission trends in the energy use in industry sector group for HMs (Pb, Cd and Hg) since 1990

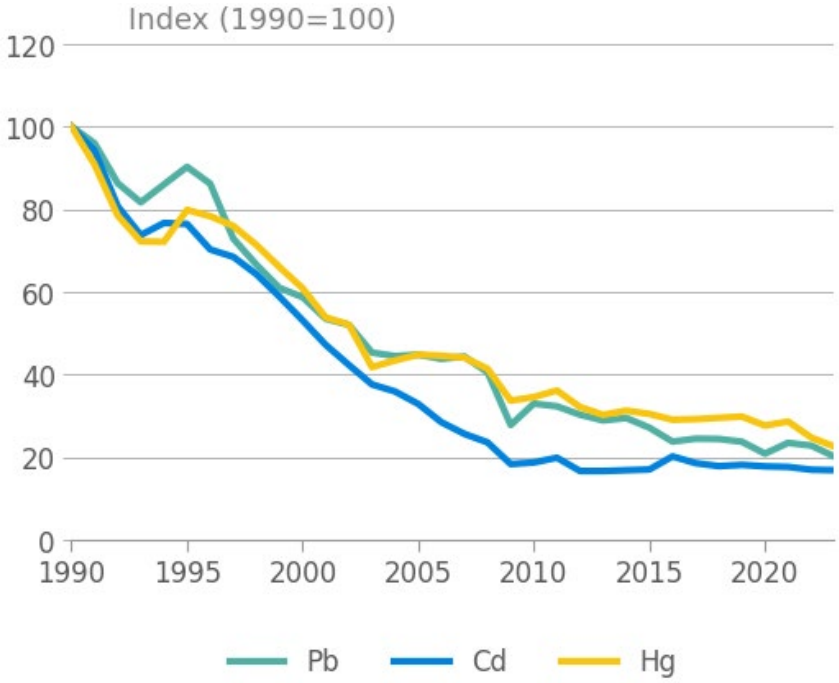


Table 4.3: Number of EU Member States reporting notation keys within the key categories of the energy use in industry sector group in the latest year.

Key categories		NA	NO	NR	NE
SOx	1A2a	0	1	0	0
CO	1A2a	0	1	0	0
Hg	1A2a	0	1	0	0
HCB	1A2b	3	3	0	7
SOx	1A2c	0	1	0	0
Cd	1A2d	1	1	0	0
NOx	1A2f	0	1	0	0
SOx	1A2f	0	1	0	0
Pb	1A2f	0	1	0	0
Cd	1A2f	0	1	0	0
Hg	1A2f	0	1	0	0

Note: Only the key categories where notation keys were reported are considered.

Table 4.4a: Relative difference (relative data, percentage of EU national totals) between reported emissions when comparing the EU's 2024 and 2025 submissions for the energy use in industry sector group

Relative difference Energy use in industry																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	0.0%	0.1%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.3%	-0.3%	-0.2%	-0.2%	0.4%	0.0%	0.0%	-0.2%	-0.3%	-0.7%	-0.6%	-0.7%	-0.8%	-2.2%
NMVOCs	Gg	-5.3%	-5.1%	-4.8%	-4.1%	-4.6%	-5.6%	-6.1%	-6.5%	-7.5%	-8.1%	-8.0%	-7.7%	-9.0%	-8.5%	-8.9%	-9.1%	-10.8%	-10.7%	-10.9%	-11.6%	-13.2%
SOx	Gg	-0.1%	0.1%	-0.2%	-2.4%	-2.5%	-2.7%	-3.0%	-5.9%	-3.5%	-11.9%	-6.2%	-3.6%	-3.9%	-4.0%	-4.3%	2.1%	2.0%	2.8%	-0.2%	0.8%	0.0%
NH3	Gg	-1.9%	-9.4%	-9.3%	-13.2%	-9.2%	-15.6%	-15.4%	-21.6%	-28.3%	-16.6%	-18.8%	-23.0%	-23.2%	-25.4%	-24.9%	-21.2%	-24.9%	-22.0%	-22.2%	-23.1%	-27.0%
CO	Gg	0.0%	0.0%	-0.1%	0.9%	0.8%	0.8%	0.5%	0.0%	-0.1%	0.0%	0.0%	0.2%	0.1%	0.2%	0.1%	0.3%	0.2%	0.2%	0.3%	0.1%	-0.3%
Pb	Mg	0.0%	0.3%	0.3%	-1.9%	-1.9%	-1.7%	-0.7%	0.1%	0.2%	0.0%	0.3%	0.7%	0.4%	0.4%	0.3%	0.6%	0.5%	0.8%	0.9%	0.7%	2.5%
Cd	Mg	0.2%	0.5%	0.5%	0.5%	0.2%	0.2%	0.0%	0.6%	0.5%	0.8%	0.9%	1.1%	1.1%	1.2%	0.9%	1.3%	1.2%	1.0%	0.9%	1.1%	0.9%
Hg	Mg	0.0%	0.2%	-0.1%	1.0%	0.5%	0.3%	0.3%	0.7%	0.6%	-0.7%	0.0%	0.7%	0.4%	0.3%	0.4%	0.7%	0.9%	0.5%	0.3%	0.8%	0.6%
As	Mg	0.0%	0.0%	0.0%	-0.4%	-0.4%	-0.5%	-0.5%	0.1%	0.1%	0.3%	0.5%	0.7%	0.6%	0.9%	0.9%	1.5%	1.5%	1.1%	1.0%	1.3%	2.0%
Cr	Mg	0.0%	0.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	0.1%	0.7%	1.1%	1.7%	1.4%	1.3%	1.1%	1.7%	1.5%	1.6%	1.6%	1.5%	2.3%
Cu	Mg	0.0%	0.1%	0.0%	-1.0%	-1.0%	-0.9%	-0.4%	0.1%	0.1%	0.4%	0.6%	0.8%	0.8%	0.7%	1.3%	1.2%	1.2%	1.5%	0.9%	1.1%	1.7%
Ni	Mg	0.0%	0.2%	0.0%	0.5%	0.2%	0.5%	-0.1%	-1.1%	0.1%	2.6%	1.8%	3.4%	0.3%	1.1%	-0.1%	4.8%	5.6%	7.5%	4.5%	-4.2%	1.0%
Se	Mg	2.1%	1.6%	1.6%	-1.8%	-2.0%	-2.4%	-2.3%	0.4%	0.5%	0.9%	1.0%	1.1%	1.1%	1.0%	0.9%	1.7%	1.4%	0.3%	-0.3%	0.8%	1.5%
Zn	Mg	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.1%	0.0%	0.2%	0.1%	0.5%	0.8%	1.2%	1.1%	1.2%	1.1%	1.9%	1.6%	1.6%	1.4%	1.6%	2.0%
Total PAHs	Mg	1.2%	1.1%	3.9%	-0.7%	-0.3%	0.0%	0.9%	2.5%	1.9%	-0.1%	-2.3%	3.4%	3.9%	2.7%	2.7%	5.5%	-4.1%	-3.8%	-4.6%	-4.7%	-5.9%
PCDD/Fs	g I-TEQ	0.5%	0.9%	1.2%	-4.4%	-4.3%	-3.5%	-1.1%	1.3%	1.6%	1.2%	1.8%	2.5%	2.4%	2.1%	2.3%	2.9%	2.4%	2.5%	2.5%	2.5%	2.6%
B(a)P	Mg	7.4%	7.4%	21.2%	7.7%	10.6%	10.0%	13.0%	20.7%	17.4%	18.4%	5.4%	26.2%	30.1%	23.1%	22.7%	34.0%	-4.2%	-4.0%	-4.8%	-4.7%	-6.0%
B(b)F	Mg	-1.0%	-0.9%	-1.0%	-4.2%	-4.4%	-4.1%	-3.5%	-3.6%	-3.6%	-7.0%	-6.0%	-4.8%	-5.4%	-5.0%	-4.8%	-4.6%	-5.4%	-5.2%	-6.0%	-5.9%	-6.8%
B(k)F	Mg	-0.9%	-0.5%	-1.0%	-2.1%	-2.9%	-1.0%	-1.6%	-0.7%	-1.9%	-6.4%	-4.3%	-2.8%	-3.4%	-2.3%	-2.5%	-2.2%	-3.2%	-2.0%	-4.5%	-4.9%	-6.0%
IP	Mg	-1.1%	-0.7%	-1.2%	-4.6%	-5.0%	-4.5%	-3.8%	-3.6%	-3.3%	-6.7%	-5.1%	-3.2%	-3.8%	-3.5%	-3.5%	-2.8%	-3.7%	-3.4%	-3.9%	-4.0%	-4.3%
HCB	kg	0.0%	0.9%	0.8%	-0.5%	-0.5%	0.0%	0.6%	1.4%	-0.2%	0.7%	0.1%	0.0%	0.1%	1.4%	1.4%	1.2%	1.1%	1.7%	1.8%	1.7%	1.3%
PCBs	kg	0.0%	0.0%	-0.1%	-0.3%	-0.4%	-0.3%	0.0%	-0.1%	0.0%	-2.4%	-0.9%	0.5%	0.4%	0.6%	0.3%	0.6%	0.7%	0.7%	0.9%	0.5%	-1.1%
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			0.0%	0.1%	-0.3%	-0.2%	-0.3%	-0.8%	-1.3%	-1.6%	-2.0%	-0.8%	-1.8%	-4.5%	-1.8%	-1.6%	-2.5%	-2.5%	-2.4%	-2.8%	-4.3%
PM10	Gg			-0.1%	0.0%	-0.4%	-0.3%	-0.4%	-0.9%	-1.2%	-1.3%	-1.6%	-0.5%	-1.5%	-3.9%	-1.8%	-1.5%	-2.3%	-2.4%	-2.3%	-2.6%	-3.8%
TSPs	Gg			-0.1%	-0.2%	-0.5%	-0.3%	-0.4%	-0.7%	-1.0%	-1.0%	-1.2%	-0.3%	-1.2%	-3.1%	-1.5%	-1.1%	-1.7%	-1.8%	-1.8%	-2.0%	-3.2%
BC	Gg			0.1%	0.2%	0.0%	0.4%	0.0%	0.4%	-0.1%	3.1%	2.3%	4.2%	2.6%	2.2%	1.0%	2.0%	1.2%	2.1%	1.1%	1.6%	1.5%

Note: Differences of +/- 10% or more are highlighted in red.

Table 4.4b: Absolute difference between reported emissions when comparing the EU's 2024 and 2025 submissions for the energy use in industry sector group

Relative difference Energy use in industry																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	0	2	0	0	-1	-1	-2	-2	-2	-2	-1	3	0	0	-1	-2	-4	-3	-4	-5	-12
NMVOCs	Gg	-9	-9	-6	-5	-6	-7	-8	-7	-9	-9	-9	-8	-10	-9	-10	-11	-14	-14	-13	-14	-16
SOx	Gg	-3	2	-3	-21	-20	-20	-20	-32	-19	-64	-29	-15	-15	-16	-16	8	7	9	0	2	0
NH3	Gg	0	-1	-1	-1	-1	-1	-2	-2	-3	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-3
CO	Gg	-1	0	-1	22	20	18	10	-1	-1	0	1	3	2	2	2	4	2	3	3	1	-3
Pb	Mg	0	2	1	-6	-6	-5	-2	0	0	0	1	1	1	1	1	1	1	1	1	1	4
Cd	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hg	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	Mg	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	0	1
Cu	Mg	0	0	0	-1	-1	-1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1
Ni	Mg	0	1	0	1	0	1	0	-1	0	3	2	3	0	1	0	3	3	4	2	-2	1
Se	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	Mg	0	0	0	-1	-1	-1	0	1	0	2	3	5	4	4	4	6	5	5	5	5	6
Total PAHs	Mg	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	-1	-1	-1	-1
PCDD/Fs	g I-TEQ	3	7	3	-12	-11	-10	-3	2	3	2	2	3	3	3	3	3	3	3	3	3	3
B(a)P	Mg	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0
B(b)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(k)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCBs	kg	0	0	0	0	0	0	0	0	0	-2	-1	0	0	0	0	0	0	0	1	0	-1
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			0	0	0	0	0	-1	-1	-1	-1	0	-1	-3	-1	-1	-1	-1	-1	-2	-2
PM10	Gg			0	0	0	0	0	-1	-1	-1	-1	0	-1	-3	-1	-1	-1	-2	-1	-2	-2
TSPs	Gg			0	0	-1	0	-1	-1	-1	-1	-1	0	-1	-3	-1	-1	-2	-2	-1	-2	-3
BC	Gg			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4.3 Industrial processes and product use sector

The industrial processes and product use sector grouping refers to emissions from industrial sources other than those arising from fuel combustion within the industrial sector. This is the primary sector group for PCB, NMVOC, Cd, Pb, HCB, Hg, PM_{10}, PCDD/F and CO emissions, as well as a significant source of SO_X emissions. Figure 4.5 and 4.6 show the emission trends for this sector.

Of all the countries, Germany, Italy and France contributed most to NMVOC emissions. The Cd emissions are mainly driven by data reported by Germany, Poland and Spain. For Pb, the greatest contributions came from Poland, Italy and Germany.

Data from France and Germany for the category '2C1 — Iron and steel production' have a great influence on the trend in CO emissions. In France, CO emissions from the 2C1 category have fluctuated over the years, depending on the amount of blast furnace gas that has been produced in the iron and steel production, resulting in peaks (1995, 2004 and 2010) or troughs (2001 and 2009) (EU IIR 2024). The negative peak in 2009 was also influenced by the data reported by several countries, mainly Germany, Belgium and France, in the category '2C1 — Iron and steel production'.

Despite considerable reductions since 1990, the industrial processes and product use sector continues to contribute significantly to total EU emissions of HMs. Figure 4.6a presents emission trends for these pollutants. For the HMs, Pb shows the highest relative reduction in emissions since 1990 (84%).

The trend in Cd emissions reflects mainly data reported by Germany in the categories '2C1 — Iron and steel' and '2C7a — Copper production'.

The dip in Pb emissions between 2008 and 2009 was mainly caused by reductions in the category '2C5 — Lead production' reported by Bulgaria. The reduction in Pb emissions between 2010 and 2011 reflected the drastic drop in emissions reported by Latvia in category '2C1 — Iron and steel production', resulting from a change in the type of furnace used in metal production. Overall, between 2010 and 2011, Latvia's total Pb emissions (national total) fell by 96%, mainly due to change of furnace type in the only metal production plant (Latvia's IIR 2025).

Among the persistent organic pollutants (POPs), HCB recorded the highest relative reduction since 1990 (99%) in this sector, while PCBs shows highest relative reductions since 2005 (75%)

(Figure 4.6b). Spain contributed most to PCB emissions in this sector during the current reporting cycle, caused by electrical equipment manufactured or contaminated with PCBs that has been destroyed, reported in category 2K.

The major decrease in HCB from 2001 to 2002 (87%) is a result of Germany's reporting the notation key 'NA' in category '2C3 — Aluminium production', due to the prohibition of secondary aluminium production in Germany since 2002, which has resulted in the omission of the source of HCB (Germany's IIR 2024).

Table 4.5 presents the number of EU Member States reporting the notation keys 'NA', 'NO', 'NR' and 'NE' within the key categories. Table 4.6 shows the recalculations within the industrial processes and product use sector group. For explanations of EU recalculations, see Section 5.1.

Figure 4.5: EU emission trends in the industrial processes and product use sector group for NMVOCs, SO_X, PM_{10} and CO since 1990 (or 2000 for PM_{10})

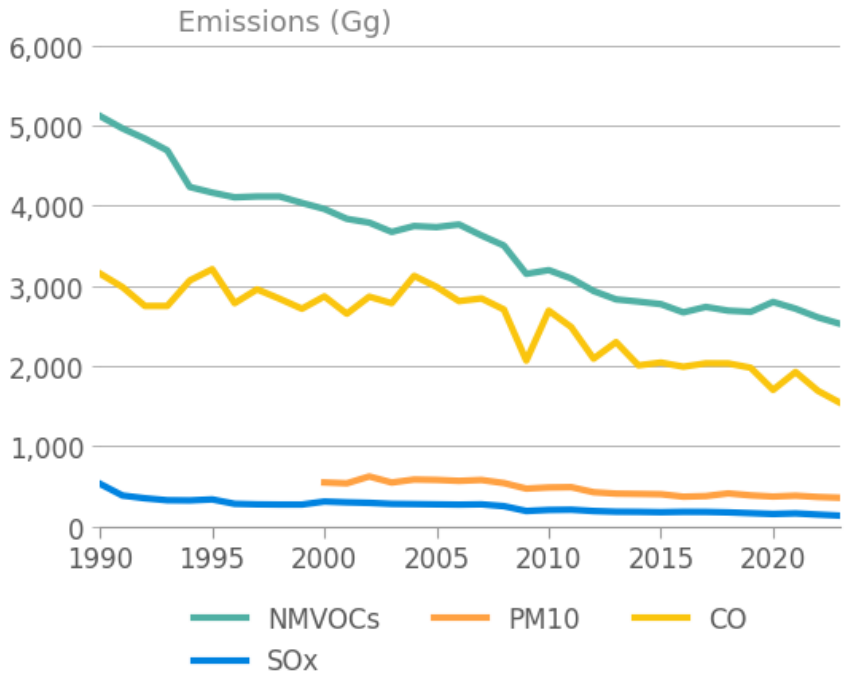


Figure 4.6: (a) EU emission trends and (b) indexed EU emission trends in the industrial processes and product use sector group for HMs (Pb, Cd, Hg) since 1990

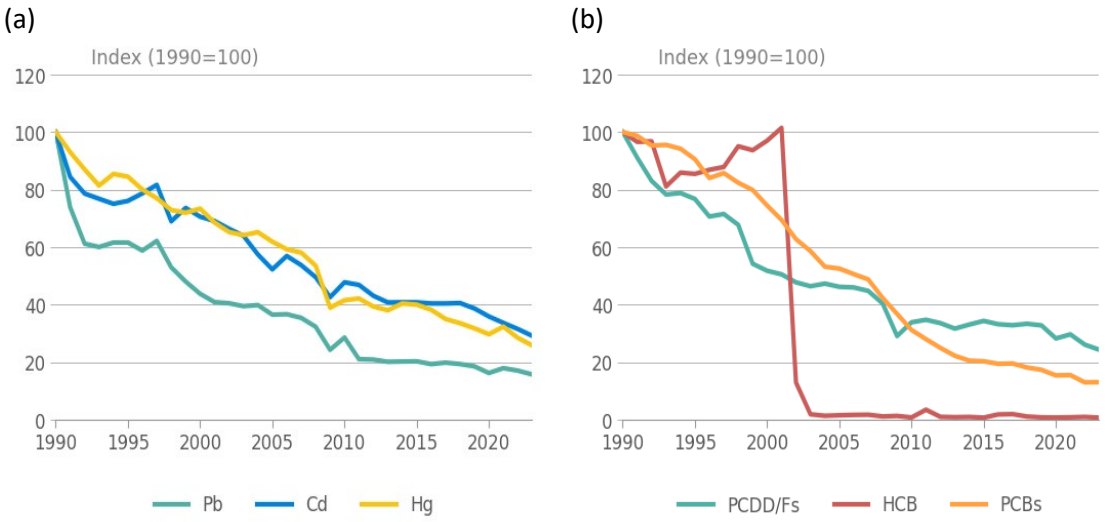


Table 4.5: Number of EU Member States reporting notation keys within the key categories of the industrial processes and product use sector group

Key categories		NA	NO	NR	NE
Hg	2A1	5	2	0	4
HCB	2A1	8	2	0	5
Cd	2A3	2	3	0	0
PM10	2A5a	0	2	0	1
PM2.5	2A5b	0	0	0	1
PM10	2A5b	0	0	0	1
SOx	2B10a	1	5	0	1
HCB	2B10a	13	6	0	6
SOx	2C1	1	4	0	2
CO	2C1	1	4	0	2
Pb	2C1	0	4	0	0
Cd	2C1	0	4	0	0
Hg	2C1	0	4	0	0
total PAH	2C1	0	4	0	2
dioxin	2C1	0	4	0	1
PCB	2C1	0	4	0	0
Pb	2C5	0	8	0	0
PCB	2C5	1	7	0	1
Hg	2C6	2	12	0	0
Cd	2C7a	0	11	0	1
HCB	2C7a	3	12	0	6
NMVOC	2D3e	0	1	0	0
NMVOC	2D3g	0	0	0	1
NMVOC	2D3i	0	0	0	1
PM2.5	2G	1	0	0	1
Pb	2G	1	0	0	0
Cd	2G	1	0	0	0
PCB	2K	7	8	0	5
PM10	2L	5	14	0	1

Note: Only the key categories where notation keys were reported are considered.

Table 4.6a: (a) Relative difference (relative data, percentage of EU national totals) between reported emissions when comparing the EU's 2024 and 2025 submissions for the industrial processes and product use sector group

Relative difference Industrial processes and product use																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	-0.4%	-0.8%	-0.8%	-1.6%	-0.3%	-0.4%	-0.4%	-0.1%	0.0%	-0.6%	-0.6%	-0.9%	-1.0%	-1.1%	-1.2%	-1.2%	-1.1%	-1.1%	-1.2%	-0.8%	-0.4%
NMVOCs	Gg	0.5%	1.0%	1.0%	1.0%	0.6%	1.0%	2.0%	1.0%	0.9%	1.4%	1.2%	1.8%	1.7%	2.2%	-0.4%	-0.4%	-0.3%	0.9%	1.8%	1.0%	0.2%
SOx	Gg	0.1%	0.1%	0.1%	1.4%	1.2%	1.2%	1.5%	2.0%	1.7%	1.8%	1.9%	2.0%	1.9%	1.9%	1.0%	-0.2%	-0.4%	-0.7%	-0.7%	-0.3%	0.3%
NH3	Gg	0.2%	0.2%	0.2%	0.0%	-0.1%	0.1%	-0.5%	-0.1%	-0.1%	0.0%	-0.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	0.4%	0.6%
CO	Gg	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Pb	Mg	0.3%	0.1%	-0.2%	-0.8%	-1.0%	-0.9%	-1.8%	-2.0%	-2.2%	-3.2%	-3.1%	-2.5%	-2.7%	-2.5%	-2.5%	-2.8%	-2.8%	-3.0%	-3.4%	-3.4%	-3.3%
Cd	Mg	0.3%	-0.1%	-0.2%	0.1%	0.1%	-0.2%	-0.3%	-0.1%	-0.3%	-0.2%	-0.4%	-0.3%	-0.4%	-0.3%	-0.4%	-0.3%	-0.4%	-0.3%	-0.5%	-0.3%	-0.5%
Hg	Mg	0.3%	0.0%	0.2%	0.4%	0.4%	0.5%	-0.3%	-1.1%	-1.6%	-1.9%	-1.6%	-0.5%	3.1%	11.4%	6.9%	1.9%	-0.2%	0.3%	0.6%	1.9%	-1.9%
As	Mg	0.1%	0.1%	0.0%	-3.0%	-1.6%	-1.9%	-3.6%	-4.1%	-3.8%	-10.0%	-9.9%	-9.0%	-12.8%	-13.9%	-13.1%	-14.6%	-13.9%	-13.8%	-18.4%	-19.4%	-20.4%
Cr	Mg	-0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	-0.1%	0.3%	0.0%	0.0%	-11.9%	-12.0%	-11.3%	-11.4%	-10.6%	-11.8%	-13.5%	-13.6%	-14.6%
Cu	Mg	-0.2%	-0.3%	-0.3%	-3.3%	-3.5%	-4.8%	-6.0%	-6.6%	-7.1%	-7.0%	-7.7%	-7.7%	-7.1%	-7.0%	-6.7%	-7.2%	-6.9%	-7.6%	-9.6%	-9.4%	-8.4%
Ni	Mg	0.1%	0.1%	0.0%	0.1%	0.0%	0.1%	-0.1%	-0.2%	-0.3%	-0.3%	-0.2%	-0.1%	-14.6%	-13.7%	-13.3%	-14.4%	-12.9%	-14.3%	-17.8%	-17.0%	-17.4%
Se	Mg	1.4%	0.5%	0.3%	0.4%	0.4%	0.8%	0.5%	0.8%	-0.4%	0.8%	0.5%	0.9%	0.5%	1.3%	0.9%	1.4%	0.8%	1.4%	0.9%	1.3%	1.0%
Zn	Mg	0.1%	0.1%	0.3%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	-0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
Total PAHs	Mg	0.6%	0.5%	0.4%	0.7%	0.6%	0.9%	0.3%	0.9%	0.4%	0.3%	0.4%	0.8%	0.7%	0.7%	0.7%	0.5%	0.5%	0.6%	0.9%	0.7%	0.8%
PCDD/Fs	g I-TEQ	1.4%	1.3%	-0.5%	0.7%	-0.7%	0.3%	-2.7%	-2.2%	-3.8%	-3.6%	-2.9%	-1.4%	-1.5%	-0.8%	-1.2%	-2.2%	-1.9%	-1.8%	-0.9%	-1.6%	-1.9%
B(a)P	Mg	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.3%	-0.2%	-0.1%
B(b)F	Mg	0.0%	0.0%	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	-0.3%	-0.3%	-0.3%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.5%	-0.5%	-0.5%	-0.5%
B(k)F	Mg	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.3%	-0.3%	-0.2%
IP	Mg	0.0%	0.0%	-0.2%	-0.2%	-0.3%	-0.3%	-0.3%	-0.7%	-0.9%	-0.7%	-0.9%	-0.8%	-1.0%	-0.9%	-0.8%	-0.8%	-0.8%	-1.1%	-1.1%	-1.1%	-1.0%
HCB	kg	0.0%	0.0%	-0.1%	-2.7%	-3.0%	-2.5%	-4.2%	-2.8%	-6.2%	112.2%	12.0%	9.9%	3.5%	-3.0%	-3.4%	-3.1%	-4.2%	-4.5%	-4.8%	-6.0%	-4.4%
PCBs	kg	0.0%	1.4%	0.0%	5.8%	8.2%	15.9%	15.1%	19.3%	6.5%	6.7%	5.3%	1.1%	-2.0%	1.8%	-0.9%	1.6%	0.1%	1.8%	0.0%	-6.6%	-17.5%
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			0.4%	0.6%	0.4%	0.6%	-0.7%	-0.6%	-1.0%	-0.7%	-1.0%	-0.8%	-1.1%	-0.9%	-1.6%	-0.9%	-1.3%	-0.7%	-1.4%	-1.2%	-1.1%
PM10	Gg			0.3%	0.5%	0.3%	0.5%	-0.2%	0.1%	-0.3%	-0.2%	-0.2%	-0.1%	-0.5%	-0.3%	-1.0%	-0.2%	-1.1%	0.1%	-0.7%	-0.6%	-1.4%
TSPs	Gg			0.1%	2.5%	0.8%	1.4%	0.6%	0.6%	1.0%	1.6%	0.9%	0.7%	1.0%	0.5%	0.5%	0.3%	0.9%	0.6%	0.3%	0.5%	1.2%
BC	Gg			-4.0%	-2.3%	-3.3%	-2.4%	-3.6%	-1.4%	-3.6%	-1.6%	-3.7%	-2.1%	-3.2%	-1.8%	-3.2%	-2.9%	-5.1%	-3.5%	-5.2%	-3.0%	-3.8%

Note: Differences of +/- 10% or more are highlighted in red.

Table 4.6b: Absolute difference between reported emissions when comparing the EU's 2024 and 2025 submissions for the industrial processes and product use sector group

Relative difference Industrial processes and product use																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	-1	-2	-2	-4	-1	-1	-1	0	0	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-1	-1
NMVOCs	Gg	25	41	39	39	24	35	69	32	30	41	36	50	46	60	-10	-11	-7	23	49	28	5
SOx	Gg	1	0	0	4	3	3	4	4	3	4	3	4	3	3	2	0	-1	-1	-1	0	0
NH3	Gg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO	Gg	-2	-1	-1	0	0	2	1	1	1	2	1	1	1	2	2	0	0	0	0	1	1
Pb	Mg	6	1	-3	-7	-9	-7	-14	-11	-15	-16	-16	-12	-13	-12	-11	-13	-13	-13	-13	-15	-14
Cd	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hg	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
As	Mg	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2	-2	-2	-2	-2
Cr	Mg	0	0	0	0	0	0	0	0	0	0	0	0	-11	-11	-10	-10	-9	-10	-11	-11	-11
Cu	Mg	-1	-1	-1	-10	-11	-15	-18	-18	-20	-19	-20	-20	-19	-19	-19	-21	-20	-22	-23	-23	-24
Ni	Mg	0	0	0	0	0	0	0	0	0	0	0	0	-9	-9	-8	-9	-8	-9	-9	-9	-9
Se	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	Mg	2	2	4	1	1	0	1	0	0	0	0	1	-1	2	2	1	1	1	0	0	0
Total PAHs	Mg	1	1	0	1	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
PCDD/Fs	g I-TEQ	13	9	-2	3	-3	1	-11	-6	-13	-12	-10	-4	-5	-3	-4	-7	-6	-6	-2	-5	-5
B(a)P	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(b)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(k)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	kg	-1	-1	-2	-2	-2	-2	-2	-1	-2	67	4	3	1	-1	-2	-2	-2	-1	-1	-2	-2
PCBs	kg	0	65	0	150	199	348	289	308	99	91	65	13	-21	19	-9	16	1	16	0	-57	-143
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-1	-2	-1	-2	-1	-1
PM10	Gg			1	3	1	3	-1	0	-2	-1	-1	0	-2	-1	-4	-1	-4	1	-3	-2	-5
TSPs	Gg			2	43	14	24	10	9	15	24	12	8	12	6	5	3	11	7	4	5	12
BC	Gg			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4.4 Commercial, institutional and households sector

As indicated in Chapter 2, fuel combustion in commercial and institutional facilities and households makes a significant contribution to the total emissions of many pollutants. The commercial, institutional and households sector is the primary source for B(a)P, PAHs, $PM_{2.5}$, CO, PM_{10}, BC, PCDD/Fs, Cd, HCB, SO_X, NMVOC emissions. It is also an important sector group for Pb and NO_X emissions.

For B(a)P and PAHs, the greatest contributions were reported by Poland (36%). The trend in total emissions of PAHs largely reflects data from Poland, Germany and Italy in category '1A4bi — Residential: Stationary'. The peaks in 2010 and 2012 reflect data reported by Germany and

Poland in category '1A4bi — Residential: Stationary'. Emissions from Poland reported in the same category reflects the peak in total PAHs and B(a)P emissions in 1993.

For $PM_{2.5}$ and PM_{10}, Poland, France, Italy and Romania reported the highest emissions. Poland, Italy and France contributed most to CO emissions. Poland, Italy and Romania emitted the largest proportion of PCDD/Fs during the current reporting cycle.

Of the main pollutants for the sector grouping, the highest relative reduction since both 1990 and 2005 was for SO_X, which reduced by 91% and 59%, respectively (Figure 4.7).

The trend for CO within the commercial, institutional and households sector is mainly influenced by emissions reported by France, Poland and Italy in category '1A4bi — Residential: Stationary'.

Lower SO_X emissions from 1990 onwards were the result of reductions in emissions of this air pollutant in Germany. The Member State explained that lower SO_X emissions resulted from the fuel switch from coal, especially lignite, with a high emission factor, to natural gas with a lower emission factor). From 2008 onwards, a further reduction in sulphur dioxide (SO_2) emissions can be explained by the increasing use of fuel oil with a low sulphur content (Germany's IIR 2022).

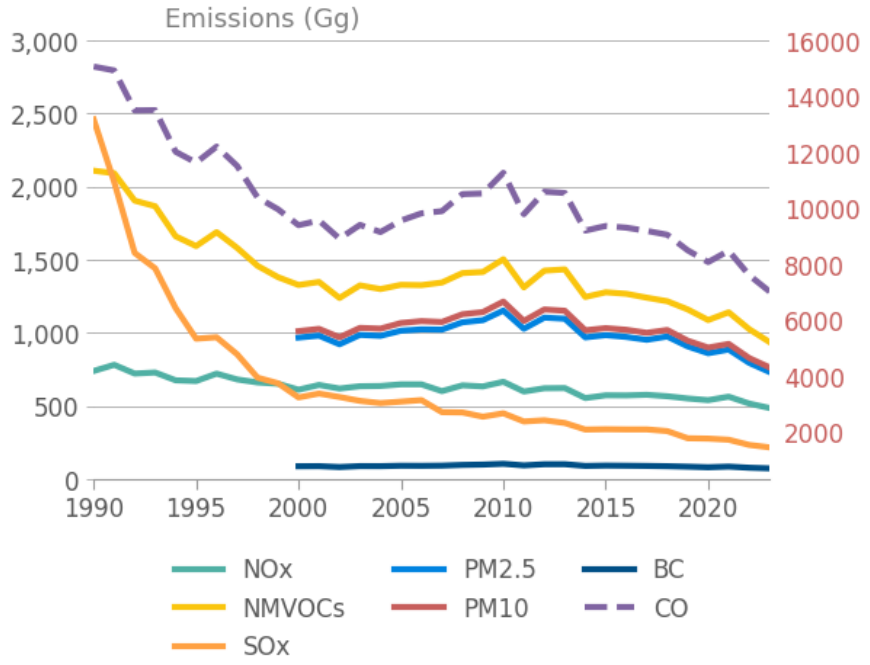
The trend for NMVOC emissions mainly follows the development of emissions from the main contributors Czechia, France and Italy for category '1A4bi — Residential: Stationary'.

Of the HMs in the commercial, institutional and households sector, Pb shows the largest reduction since 1990 (Figure 4.8a). Poland, Germany, France and Italy contribute most to the trend in Pb emissions. The fall in Pb emissions from 1990 to 1992 is the result of emission reductions reported by several countries, especially Germany and Italy, which reduced their emissions considerably in categories '1A5b — Other, mobile (including military, land based and recreational boats)' and '1A4cii — Agriculture/forestry/fishing: Off-road vehicles and other machinery'.

Cd emissions show an increasing trend since 1990 in category '1A4bi — Residential: Stationary', with some fluctuations, mainly related to emissions reported by Poland and Romania. Poland's Cd emissions increased by 86% between 2017 and 2018, due to an update of the fuel balance (Poland's IIR, 2025) affecting other pollutants as well.

Among the POPs relevant to the commercial, institutional and households sector, the highest relative reduction occurred for HCB both since 1990 (86%) and since 2005 (39%) (Figure 4.8b).

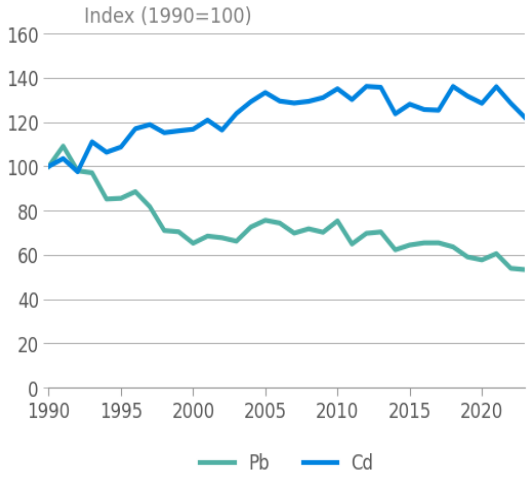
Figure 4.7: EU emission trends in the commercial, institutional and households sector group for NO_x, NMVOCs, SO_x, $PM_{2.5}$, PM_{10}, BC and CO since 1990 (or 2000 for PM)



Notes: The right-hand axis shows values for CO.

Figure 4.8a: EU emission trends in the commercial, institutional and households sector group for (a) HMs (Pb and Cd) and (b) for POPs (PCDD/Fs, total PAHs, B(a)P and HCB) since 1990

(a)



(b)

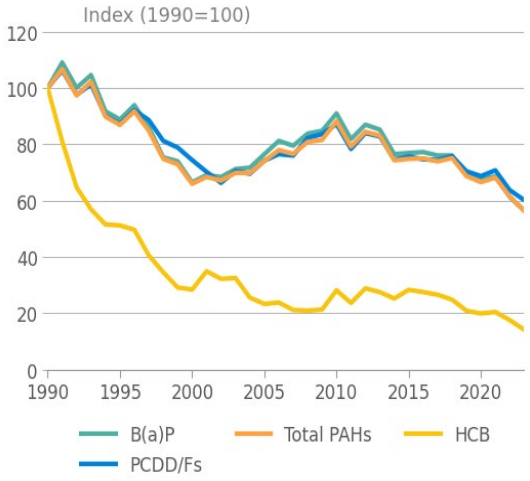


Table 4.8a: Relative difference (relative data, percentage of EU national totals) between reported emissions when comparing the EU's 2024 and 2025 submissions for the commercial, institutional and households sector group

Relative difference Commercial, institutional and households																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	0.0%	-0.9%	-0.8%	-0.4%	-0.5%	-0.6%	-0.7%	-0.7%	-0.2%	-0.2%	-0.4%	-0.6%	-0.8%	-0.9%	-1.3%	-0.7%	-1.0%	-1.0%	-0.9%	-0.8%	-0.5%
NMVOCs	Gg	-1.9%	-2.9%	-2.4%	-2.0%	-1.6%	-1.2%	-0.8%	0.1%	0.8%	1.6%	2.6%	3.7%	3.4%	3.4%	3.0%	2.3%	2.2%	2.5%	2.3%	1.8%	1.8%
SOx	Gg	-0.5%	0.1%	0.2%	0.3%	0.0%	0.2%	0.3%	0.3%	0.1%	0.2%	0.3%	0.4%	-0.6%	-0.7%	-0.6%	-0.7%	-0.7%	-0.9%	-1.3%	-2.1%	-1.6%
NH3	Gg	-65.5%	-65.9%	-65.1%	-64.9%	-63.2%	-63.2%	-63.4%	-64.1%	-64.2%	-62.5%	-62.1%	-62.0%	-61.2%	-61.0%	-60.8%	-60.6%	-61.0%	-61.4%	-60.0%	-61.7%	-61.5%
CO	Gg	-0.9%	-1.5%	-1.4%	-1.1%	-1.0%	-0.9%	-0.9%	-0.7%	-0.6%	-2.1%	-1.6%	-0.1%	-0.3%	-0.4%	-0.8%	-1.1%	-1.1%	-1.2%	-1.2%	-1.8%	-1.7%
Pb	Mg	-0.4%	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.3%	0.4%	0.0%	0.3%	0.6%	0.3%	0.8%	0.6%	0.4%	0.5%	0.4%	0.4%	0.2%	-0.3%
Cd	Mg	-0.5%	0.1%	0.0%	0.1%	-0.1%	0.1%	-0.1%	0.1%	-0.2%	0.0%	-0.4%	-0.2%	-0.6%	-0.4%	-0.6%	-0.7%	-0.5%	-0.8%	-0.6%	-0.9%	-0.4%
Hg	Mg	-0.3%	0.1%	0.2%	0.3%	0.3%	0.1%	0.1%	0.3%	0.2%	0.5%	0.6%	0.8%	0.9%	0.7%	0.7%	0.5%	0.5%	0.6%	0.3%	-0.2%	0.5%
As	Mg	0.5%	0.5%	0.3%	0.0%	0.1%	0.2%	0.5%	1.0%	1.2%	1.7%	2.3%	2.9%	2.6%	2.3%	2.0%	1.6%	1.6%	1.7%	1.5%	1.4%	0.9%
Cr	Mg	-0.3%	0.1%	0.1%	0.1%	0.0%	0.2%	0.2%	0.6%	0.7%	1.0%	1.2%	1.7%	1.2%	1.1%	0.9%	0.5%	0.7%	0.5%	0.5%	0.2%	0.2%
Cu	Mg	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.4%	0.6%	0.8%	1.0%	0.8%	0.8%	0.7%	0.5%	0.5%	0.5%	0.5%	0.3%	-0.5%
Ni	Mg	-1.0%	-0.3%	0.0%	0.1%	0.0%	0.0%	0.2%	0.2%	0.2%	1.9%	2.1%	2.2%	2.2%	1.6%	1.6%	1.4%	1.3%	0.7%	0.1%	0.2%	-0.5%
Se	Mg	0.7%	0.6%	0.2%	0.0%	0.1%	0.3%	0.6%	1.2%	1.4%	1.8%	2.3%	2.7%	2.3%	2.0%	1.8%	1.5%	1.6%	1.6%	1.3%	1.1%	1.2%
Zn	Mg	-0.4%	0.0%	0.0%	0.0%	-0.1%	0.1%	0.0%	0.3%	0.1%	0.3%	0.2%	0.4%	0.1%	0.1%	0.0%	-0.2%	-0.1%	-0.3%	-0.2%	-0.2%	-0.3%
Total PAHs	Mg	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.1%	-0.3%	-0.4%	-0.4%	-0.3%	-0.1%	-0.7%	-0.2%
PCDD/Fs	g I-TEQ	1.3%	0.5%	-0.2%	0.1%	0.1%	-0.1%	0.2%	0.4%	0.4%	0.5%	0.5%	0.6%	0.5%	0.7%	0.5%	0.6%	0.7%	0.6%	0.8%	0.5%	0.4%
B(a)P	Mg	-0.1%	0.0%	0.0%	0.0%	0.6%	1.0%	0.9%	0.9%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.1%	-0.3%	-0.4%	-0.3%	-0.3%	-0.1%	-0.8%	-0.4%
B(b)F	Mg	-0.1%	0.0%	0.0%	0.0%	0.5%	0.7%	0.6%	0.7%	-0.1%	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-0.4%	-0.5%	-0.4%	-0.4%	-0.2%	-0.8%	-0.2%
B(k)F	Mg	-0.1%	0.0%	-0.1%	0.1%	1.6%	2.5%	2.4%	2.4%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.1%	-0.3%	-0.4%	-0.4%	-0.4%	0.0%	-0.6%	-0.1%
IP	Mg	-0.1%	0.0%	0.0%	0.0%	0.8%	1.0%	0.9%	1.0%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.1%	-0.3%	-0.4%	-0.4%	-0.3%	0.0%	-0.6%	0.0%
HCB	kg	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.4%	0.9%
PCBs	kg	-1.9%	-2.7%	-3.1%	-3.7%	-3.6%	-4.3%	-4.0%	-4.6%	-4.9%	-5.0%	-4.8%	-4.6%	-5.3%	-4.8%	-5.3%	-5.1%	-5.2%	-5.2%	-5.0%	-5.5%	-4.0%
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			0.8%	0.8%	0.8%	0.9%	0.9%	1.3%	1.3%	1.6%	1.7%	2.1%	1.8%	1.8%	1.3%	0.9%	0.9%	1.0%	1.1%	0.6%	0.4%
PM10	Gg			0.8%	0.8%	0.7%	0.8%	0.9%	1.2%	1.2%	1.5%	1.6%	2.0%	1.8%	1.7%	1.3%	0.9%	0.9%	1.0%	1.0%	0.5%	0.4%
TSPs	Gg			0.8%	0.7%	0.7%	0.8%	0.8%	1.2%	1.2%	1.5%	1.6%	2.0%	1.7%	1.6%	1.2%	0.9%	0.8%	0.9%	1.0%	0.5%	0.2%
BC	Gg			0.2%	0.3%	0.2%	0.3%	0.2%	0.5%	0.4%	0.6%	0.5%	0.7%	0.6%	0.6%	0.2%	0.2%	0.2%	0.2%	0.3%	-0.3%	-0.7%

Note: Differences of +/- 10% or more are highlighted in red.

Table 4.8b: Absolute difference between reported emissions when comparing the EU's 2024 and 2025 submissions for the commercial, institutional and households sector group

Relative difference Commercial, institutional and households																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	0	-6	-5	-2	-3	-3	-5	-4	-1	-1	-3	-4	-5	-5	-7	-4	-6	-6	-5	-5	-3
NMVOCs	Gg	-42	-47	-33	-28	-22	-17	-11	1	11	21	36	51	41	41	37	28	27	28	24	20	18
SOx	Gg	-12	1	1	2	0	1	1	1	0	1	1	1	-2	-2	-2	-3	-2	-3	-4	-6	-4
NH3	Gg	-31	-33	-32	-34	-32	-31	-33	-34	-35	-30	-32	-32	-28	-28	-28	-27	-26	-26	-24	-26	-24
CO	Gg	-142	-180	-136	-108	-100	-95	-95	-73	-72	-206	-173	-10	-29	-38	-76	-101	-104	-103	-97	-151	-132
Pb	Mg	-1	0	0	0	0	0	0	0	1	0	0	1	0	1	1	1	1	1	1	0	0
Cd	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hg	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	Mg	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
Cu	Mg	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ni	Mg	-2	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
Se	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	Mg	-3	0	0	0	-1	0	0	2	1	2	1	3	1	1	0	-2	-1	-2	-1	-1	-2
Total PAHs	Mg	-1	0	0	0	0	0	-1	0	0	0	-1	-1	-1	-1	-2	-3	-3	-2	-1	-5	-1
PCDD/Fs	g I-TEQ	15	5	-1	1	1	-1	1	3	4	5	5	5	4	6	4	5	6	5	6	4	3
B(a)P	Mg	0	0	0	0	2	2	2	3	0	0	0	0	0	0	-1	-1	-1	-1	0	-2	-1
B(b)F	Mg	0	0	0	0	1	2	1	2	0	0	0	0	-1	0	-1	-1	-1	-1	0	-2	0
B(k)F	Mg	0	0	0	0	2	3	3	3	0	0	0	0	0	0	0	0	0	0	0	-1	0
IP	Mg	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	-1	0
HCB	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCBs	kg	-4	-3	-3	-3	-3	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-3	-4	-3
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			8	8	8	9	10	14	15	16	19	23	17	17	13	9	9	9	9	5	3
PM10	Gg			8	8	8	9	10	14	15	16	19	23	18	17	13	9	9	9	9	5	3
TSPs	Gg			8	8	8	9	10	14	15	17	19	24	18	18	13	9	9	9	9	5	2
BC	Gg			0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	-1

4.5 Road transport sector

The road transport sector group is the primary sector group for NO_X, Pb, BC and CO emissions (Figure 4.9 and Figure 4.10).

In absolute terms, France, Germany, Italy and Spain reported the highest emissions for NO_X, Pb and BC in the road transport sector during the current reporting cycle. Germany, Poland and Italy contributed most to CO emissions in the road transport sector.

In this sector, NO_X emissions have decreased since 1990 by 71% and since 2005 by 59%. The main source of NO_X emissions in this sector group is category 1A3bi 'Road transport: Passenger cars'. CO emissions have decreased by 91% since 1990 and by 73% since 2005 in the road

transport sector. Category 1A3bi 'Road transport: Passenger cars' is also the main source of CO emissions, with a share of 75% of CO emissions during the current reporting cycle.

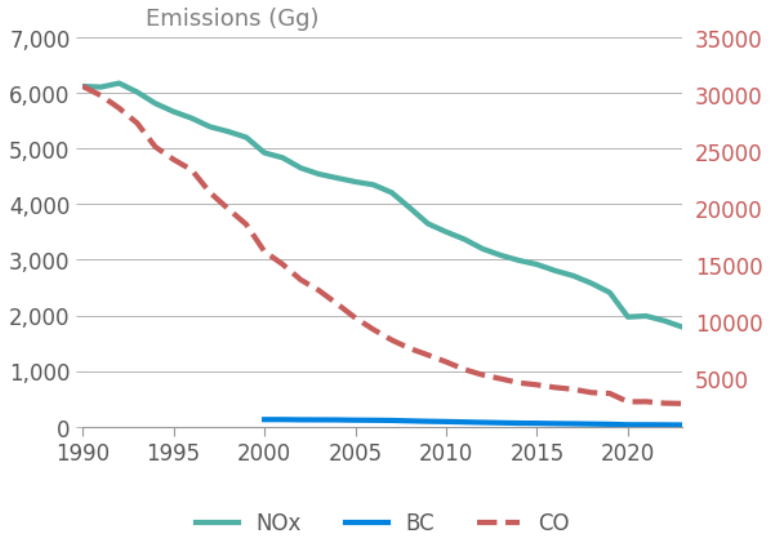
Since 1990, BC emissions from this sector have decreased by 76% and since 2005 by 72%. The main reasons for the decline of these pollutants in this sector are the introduction of Euro standards (EU, 2007) as well as the regulation of the catalytic-converter (EU, 1991).

The main HM for the road transport sector is Pb, which shows a high relative reduction in emissions (98%) since 1990 and since 2005 (4%) (Figure 4.10). However, between the two latest reporting cycles, the Pb emissions increased by 11%. A major increase is seen for Spain in the road traffic sector for passenger cars (+103%), which explains the largest part of this increase.

The promotion of unleaded petrol in the EU and other EEA member countries, by means of a combination of fiscal and regulatory measures, has been a success story. For example, EU Member States have completely phased out the use of leaded petrol. Directive 98/70/EC on the quality of petrol and diesel fuels (EU, 2009) achieved that objective. Nevertheless, the road transport sector remains a key source of Pb, contributing around 30% of total Pb emissions in the EU.

Table 4.9 shows the recalculations within the road transport sector group. For explanations of EU recalculations, see Section 5.1.

Figure 4.9: EU emission trends in the road transport sector group for NO_X, BC and CO since 1990 (or 2000 for BC)



Note: In the left-hand panel the right-hand axis shows values for CO.

Figure 4.10: EU emission trend in the road transport sector group for Pb since 1990

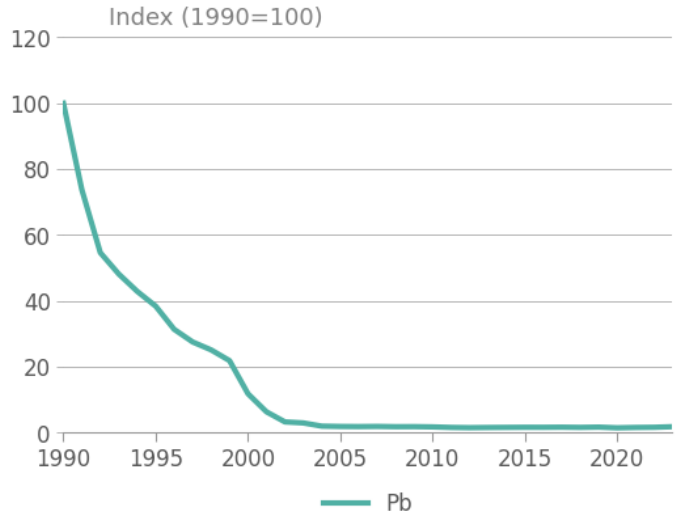


Table 4.9a: Relative difference (relative data, percentage of EU national totals) between reported emissions when comparing the EU's 2024 and 2025 submissions for the road transport sector group

Relative difference Road transport																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	-1.1%	-0.9%	-1.1%	-0.2%	-1.1%	-0.7%	-1.0%	-0.7%	-0.5%	-0.6%	-0.8%	-0.5%	-1.0%	-0.7%	-1.2%	-0.8%	-1.4%	-1.1%	-1.1%	-0.1%	-0.4%
NMVOCs	Gg	-0.5%	0.5%	0.8%	0.8%	0.8%	1.5%	1.8%	2.8%	3.3%	3.4%	3.3%	3.5%	2.6%	2.6%	2.9%	3.4%	2.5%	3.3%	2.4%	2.8%	1.8%
SOx	Gg	0.2%	0.5%	0.1%	0.9%	-0.1%	0.7%	0.0%	0.1%	-0.3%	-0.1%	-0.4%	0.1%	-0.2%	-0.1%	-0.2%	0.1%	-0.4%	0.1%	-0.3%	0.1%	-0.3%
NH3	Gg	0.1%	0.2%	-0.1%	0.8%	-0.8%	-0.6%	-1.8%	-1.5%	-2.1%	-1.5%	-2.3%	-1.7%	-2.5%	-1.8%	-2.3%	-1.9%	-2.4%	-1.7%	-2.1%	-1.5%	-1.9%
CO	Gg	0.3%	2.5%	3.7%	3.8%	3.9%	4.6%	4.8%	6.2%	6.9%	6.9%	7.0%	7.5%	6.4%	6.7%	7.2%	7.9%	6.9%	9.1%	8.8%	9.0%	6.9%
Pb	Mg	0.0%	0.3%	0.2%	5.0%	1.7%	3.7%	1.4%	3.3%	0.6%	1.2%	0.6%	2.4%	1.1%	7.3%	6.6%	7.4%	1.0%	2.0%	0.9%	1.7%	0.8%
Cd	Mg	1.7%	1.9%	1.7%	2.1%	0.9%	1.6%	0.6%	1.4%	-0.3%	0.7%	0.0%	1.3%	0.0%	0.9%	0.4%	1.0%	0.2%	1.0%	0.2%	0.9%	-0.3%
Hg	Mg	0.1%	0.3%	0.1%	1.0%	0.0%	0.7%	0.0%	0.6%	0.0%	0.5%	0.0%	0.6%	-0.1%	0.6%	-0.2%	0.4%	-0.3%	0.3%	-0.7%	0.0%	-0.8%
As	Mg	2.2%	2.3%	2.4%	2.1%	1.8%	1.8%	1.6%	1.7%	1.1%	1.1%	1.0%	1.7%	1.5%	1.6%	1.5%	1.6%	1.4%	1.6%	1.2%	1.3%	1.0%
Cr	Mg	2.6%	2.8%	3.1%	2.5%	2.0%	2.0%	1.6%	1.9%	0.6%	0.7%	0.5%	1.6%	1.1%	1.4%	1.2%	1.2%	0.9%	1.2%	0.8%	0.8%	0.5%
Cu	Mg	0.1%	0.8%	1.3%	1.4%	0.8%	0.9%	0.4%	0.7%	-0.4%	-0.2%	-0.5%	0.6%	0.0%	0.4%	0.2%	0.2%	-0.1%	0.2%	-0.2%	0.0%	-0.4%
Ni	Mg	0.7%	1.5%	1.4%	1.5%	0.6%	1.1%	0.3%	0.9%	-0.7%	0.1%	-0.5%	0.7%	-0.3%	0.4%	0.0%	0.4%	-0.2%	0.4%	-0.2%	0.2%	-0.7%
Se	Mg	1.1%	1.6%	1.5%	1.9%	0.8%	1.5%	0.6%	1.4%	-0.1%	0.9%	0.1%	1.3%	0.1%	0.9%	0.6%	1.3%	0.6%	1.5%	0.8%	1.4%	0.3%
Zn	Mg	0.7%	1.2%	1.4%	1.7%	0.8%	1.2%	0.6%	1.0%	0.0%	0.5%	0.0%	1.1%	0.4%	1.2%	1.0%	1.0%	0.8%	1.1%	0.8%	1.0%	0.7%
Total PAHs	Mg	0.0%	0.1%	-0.2%	0.2%	-0.4%	0.1%	-0.4%	0.1%	-0.8%	-0.3%	-0.7%	-0.2%	-0.9%	-0.4%	-0.8%	-0.4%	-0.8%	-0.4%	-0.8%	-0.4%	-1.2%
PCDD/Fs	g I-TEQ	-3.5%	1.0%	0.5%	0.8%	0.1%	0.7%	0.1%	0.5%	-0.5%	0.2%	-0.3%	0.2%	-0.5%	0.0%	-0.4%	0.0%	-0.1%	-1.3%	-0.8%	0.1%	-2.1%
B(a)P	Mg	0.2%	0.3%	0.1%	0.3%	-0.1%	0.4%	-0.1%	0.4%	-0.9%	0.1%	-0.4%	0.0%	-0.7%	-0.1%	-0.3%	-0.1%	-0.4%	0.1%	-0.3%	0.1%	-1.0%
B(b)F	Mg	-0.1%	0.0%	-0.4%	0.2%	-0.5%	0.0%	-0.6%	-0.1%	-0.7%	-0.4%	-0.8%	-0.4%	-1.0%	-0.6%	-1.0%	-0.6%	-1.0%	-0.6%	-1.0%	-0.7%	-1.3%
B(k)F	Mg	0.2%	0.1%	-0.2%	0.4%	-0.4%	0.0%	-0.5%	0.0%	-0.5%	-0.4%	-0.8%	-0.3%	-1.0%	-0.5%	-1.0%	-0.5%	-1.0%	-0.7%	-1.0%	-0.7%	-1.2%
IP	Mg	-0.1%	-0.1%	-0.4%	0.0%	-0.4%	0.1%	-0.5%	0.1%	-1.1%	-0.2%	-0.7%	-0.2%	-0.9%	-0.4%	-0.7%	-0.4%	-0.8%	-0.3%	-0.7%	-0.3%	-1.3%
HCB	kg	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.3%	-0.3%	-0.2%	-0.4%	-0.2%	-0.2%	-0.3%
PCBs	kg	0.0%	2.3%	0.0%	5.7%	0.0%	3.9%	0.0%	3.7%	0.0%	3.3%	0.0%	3.9%	0.0%	3.7%	0.0%	3.5%	0.0%	3.6%	0.0%	3.6%	1.2%
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			-0.7%	-1.1%	-1.5%	-1.2%	-1.6%	-1.2%	-1.8%	-1.5%	-1.5%	-1.3%	-1.7%	-1.3%	-1.9%	-1.7%	-2.3%	-2.3%	-2.3%	-2.0%	-3.0%
PM10	Gg			-1.1%	-1.3%	-2.7%	-1.8%	-2.3%	-1.8%	-2.8%	-2.1%	-2.2%	-2.2%	-2.5%	-0.2%	-1.3%	-1.6%	-2.1%	-1.9%	-1.8%	-1.6%	-1.5%
TSPs	Gg			-1.7%	-1.9%	-3.9%	-2.7%	-3.3%	-2.7%	-3.9%	-3.1%	-3.1%	-3.3%	-3.5%	-0.3%	-1.6%	-2.2%	-2.8%	-2.5%	-2.2%	-2.1%	-1.8%
BC	Gg			-3.2%	-3.8%	-4.1%	-3.8%	-4.6%	-4.5%	-5.5%	-4.4%	-4.5%	-4.1%	-4.2%	-4.0%	-4.6%	-4.7%	-4.5%	-5.7%	-5.5%	-5.3%	-5.7%

Note: Differences of +/- 10% or more are highlighted in red.

Table 4.9b: Absolute difference between reported emissions when comparing the EU's 2024 and 2025 submissions for the road transport sector group

Relative difference Road transport																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	-69	-49	-56	-8	-48	-29	-41	-24	-18	-22	-27	-14	-31	-21	-35	-21	-36	-26	-23	-2	-7
NMVOCs	Gg	-23	19	21	13	11	19	20	28	29	27	24	24	16	16	17	18	13	16	10	12	8
SOx	Gg	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH3	Gg	0	0	0	1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
CO	Gg	87	580	572	377	348	368	346	410	412	371	346	344	275	276	277	293	240	304	234	240	178
Pb	Mg	2	21	4	15	5	11	4	10	2	3	2	6	3	19	17	19	3	6	2	5	2
Cd	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hg	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	Mg	1	2	2	2	2	2	1	2	1	1	0	1	1	1	1	1	1	1	1	1	0
Cu	Mg	2	11	20	25	15	18	8	14	-8	-4	-10	11	0	8	4	4	-2	5	-4	0	-9
Ni	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	Mg	4	8	10	13	7	10	5	8	0	4	0	8	4	10	8	9	7	9	6	9	6
Total PAHs	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCDD/Fs	g I-TEQ	-3	1	1	1	0	1	0	1	-1	0	0	0	0	0	0	0	0	-1	0	0	-1
B(a)P	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(b)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(k)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCBs	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			-2	-3	-4	-3	-4	-2	-3	-3	-3	-2	-3	-2	-3	-2	-3	-3	-2	-2	-3
PM10	Gg			-4	-4	-8	-5	-7	-5	-7	-5	-5	-5	-5	0	-3	-3	-4	-4	-3	-3	-3
TSPs	Gg			-7	-7	-15	-10	-12	-9	-13	-10	-9	-10	-10	-1	-5	-6	-8	-7	-5	-5	-5
BC	Gg			-4	-5	-5	-5	-5	-5	-5	-4	-4	-3	-3	-3	-3	-3	-2	-3	-2	-2	-2

4.6 Non-road transport sector

In this report, emissions from international/domestic aviation and shipping are reported as a simple sum of the emissions from each of the EU Member States. Accordingly, emissions from international/domestic aviation and shipping are not divided into those occurring within the EU and those that cross its geographical boundaries. However, as the guidelines (UNECE, 2022b) define international emissions as those that start in one country and finish in another, the reporting matches the guidelines.

The non-road transport sector is not a key sector for any pollutant but is a source of NO_X and CO emissions (Figure 4.11). Within the non-road transport sector group, NO_X is the most relevant pollutant. CO emissions are largely determined by Germany, also the dip in 2009.

As the non-road transport sector group does not contribute very much to HM and POP emissions, trends in pollutants from these two pollutant groups are not shown.

Table 4.10 shows the recalculations within the non-road transport sector group. For explanations of EU recalculations, see Section 5.1.

Figure 4.11: (a) EU emission trend and (b) indexed EU-emission trend in the non-road transport sector group for NO_X since 1990

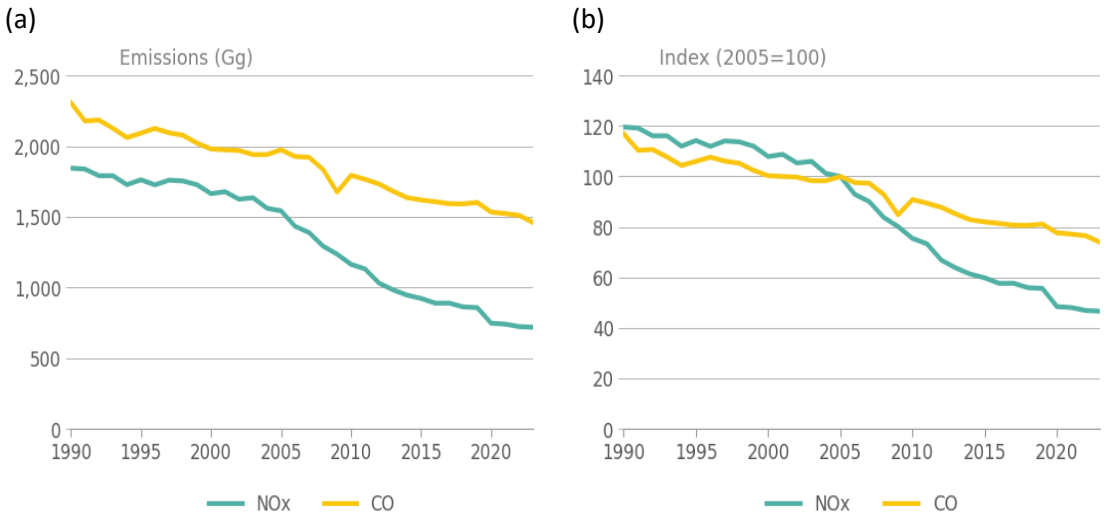


Table 4.10a: Relative difference (relative data, percentage of EU national totals) between reported emissions when comparing the EU's 2024 and 2025 submissions for the non-road transport sector group

Relative difference Non-road transport																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	2.1%	4.0%	0.5%	2.0%	0.6%	2.8%	1.0%	2.9%	1.2%	2.9%	1.6%	3.0%	2.5%	4.4%	4.6%	7.4%	4.7%	7.1%	3.1%	6.5%	2.2%
NMVOCs	Gg	0.3%	0.3%	-0.7%	-0.1%	-0.4%	-0.1%	-0.3%	0.1%	-0.3%	-0.1%	-0.5%	-0.2%	-0.4%	-0.3%	-0.7%	-0.3%	-1.0%	-0.4%	-1.2%	-0.5%	-1.2%
SOx	Gg	5.0%	10.3%	5.3%	5.9%	2.2%	4.6%	3.1%	4.6%	3.2%	8.7%	8.4%	13.7%	9.3%	12.8%	6.0%	14.1%	5.5%	13.3%	1.8%	12.3%	-2.7%
NH3	Gg	-1.4%	-2.0%	-1.3%	-2.1%	-2.2%	-1.9%	-1.5%	-1.3%	-1.2%	-0.9%	-1.0%	-0.6%	-1.0%	-0.9%	-0.9%	-1.0%	-1.0%	-0.8%	-0.2%	-0.9%	-0.7%
CO	Gg	0.6%	0.5%	-0.1%	-0.1%	-0.3%	-0.1%	-0.3%	-0.2%	-0.4%	-0.2%	-0.4%	-0.3%	-0.4%	-0.3%	-0.2%	0.0%	-0.1%	0.1%	-0.2%	0.2%	-0.2%
Pb	Mg	1.3%	2.9%	8.6%	15.2%	15.4%	15.9%	14.7%	17.4%	15.7%	16.9%	16.3%	16.8%	16.6%	16.3%	16.2%	16.6%	16.2%	17.1%	18.2%	19.5%	17.5%
Cd	Mg	6.6%	8.7%	5.1%	4.5%	1.7%	4.1%	2.4%	4.5%	2.2%	4.7%	2.7%	4.4%	2.5%	3.8%	1.8%	3.8%	1.3%	3.9%	0.4%	3.4%	-0.7%
Hg	Mg	2.7%	11.6%	2.6%	10.2%	0.9%	9.4%	1.4%	9.1%	1.3%	9.0%	1.6%	7.1%	1.7%	6.0%	1.5%	7.7%	1.3%	8.5%	1.2%	8.9%	0.8%
As	Mg	16.0%	24.5%	13.9%	12.0%	5.2%	12.7%	8.1%	11.4%	6.1%	16.7%	9.5%	18.1%	10.3%	15.5%	6.1%	21.0%	6.3%	23.3%	4.1%	22.0%	2.4%
Cr	Mg	0.7%	1.1%	0.5%	0.4%	0.2%	0.4%	0.3%	0.5%	0.2%	0.5%	0.3%	0.5%	0.2%	0.4%	0.1%	0.6%	0.1%	13.4%	-2.0%	-16.0%	-12.6%
Cu	Mg	0.9%	1.1%	0.8%	0.9%	0.6%	0.9%	0.7%	0.9%	0.7%	0.9%	0.6%	0.8%	0.7%	0.9%	0.8%	0.9%	0.7%	0.9%	5.3%	4.2%	4.3%
Ni	Mg	8.1%	12.6%	6.7%	5.1%	2.5%	5.5%	3.6%	5.7%	3.0%	7.1%	4.2%	7.5%	4.0%	5.8%	2.4%	9.1%	2.4%	18.7%	0.3%	-1.5%	-6.6%
Se	Mg	5.0%	11.2%	3.6%	6.9%	1.3%	6.9%	2.1%	6.6%	1.7%	7.0%	2.4%	6.5%	2.5%	5.5%	1.6%	7.7%	2.8%	9.5%	1.8%	8.9%	-3.6%
Zn	Mg	10.4%	12.9%	9.4%	7.0%	3.3%	5.7%	4.4%	6.6%	4.1%	7.1%	4.9%	6.8%	4.6%	6.0%	3.9%	5.1%	3.2%	4.9%	1.5%	4.5%	1.5%
Total PAHs	Mg	4.5%	5.5%	5.0%	4.0%	3.2%	3.3%	2.9%	3.5%	3.2%	4.0%	3.5%	3.6%	2.7%	2.5%	2.4%	0.5%	2.4%	2.7%	1.7%	2.4%	1.1%
PCDD/Fs	g I-TEQ	1.3%	2.6%	1.3%	1.4%	0.4%	1.5%	0.6%	1.6%	0.6%	1.7%	0.6%	1.5%	0.7%	1.3%	0.5%	2.1%	0.3%	2.2%	0.1%	2.1%	-2.3%
B(a)P	Mg	4.5%	5.0%	5.0%	3.8%	3.3%	3.1%	3.0%	3.3%	3.2%	3.7%	3.5%	3.4%	2.7%	2.5%	2.4%	2.3%	2.3%	2.3%	1.6%	2.0%	0.8%
B(b)F	Mg	3.7%	4.3%	3.7%	3.3%	2.6%	2.9%	2.4%	3.2%	2.8%	3.6%	3.0%	3.1%	2.2%	2.2%	1.9%	2.3%	1.9%	2.4%	1.2%	1.9%	0.6%
B(k)F	Mg	6.0%	8.1%	6.9%	5.7%	4.2%	4.6%	3.8%	4.7%	4.0%	5.2%	4.4%	4.7%	3.5%	3.5%	3.2%	3.9%	3.3%	4.0%	2.3%	3.4%	1.5%
IP	Mg	7.1%	8.4%	7.2%	4.3%	3.3%	2.6%	2.3%	2.9%	2.5%	3.5%	3.4%	3.7%	2.5%	1.6%	1.4%	1.5%	1.7%	1.7%	1.2%	2.1%	0.6%
HCB	kg	3.2%	6.2%	3.2%	4.0%	1.1%	3.9%	1.4%	3.8%	1.4%	4.0%	1.7%	3.9%	1.6%	3.4%	1.7%	4.6%	1.3%	4.7%	0.9%	4.7%	-0.6%
PCBs	kg	5.3%	10.3%	6.5%	5.8%	2.7%	6.1%	4.0%	6.6%	5.4%	8.6%	5.1%	9.2%	5.1%	7.5%	3.2%	11.2%	4.0%	12.4%	1.8%	11.6%	1.7%
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			-1.1%	-1.3%	-2.1%	-1.6%	-2.5%	-1.7%	-2.7%	-2.0%	-2.9%	-2.4%	-3.6%	-3.5%	-4.5%	-2.9%	-5.1%	-3.4%	-6.7%	-5.8%	-8.3%
PM10	Gg			-2.6%	-3.1%	-4.1%	-3.7%	-4.8%	-3.9%	-5.1%	-4.4%	-5.6%	-5.1%	-6.5%	-6.6%	-7.6%	-6.0%	-8.3%	-6.6%	-10.2%	-10.0%	-12.2%
TSPs	Gg			-2.3%	-2.8%	-3.8%	-3.4%	-4.3%	-3.5%	-4.6%	-3.9%	-5.0%	-4.5%	-5.8%	-5.9%	-6.7%	-5.2%	-7.2%	-5.8%	-9.1%	-8.8%	-10.6%
BC	Gg			-0.5%	-0.2%	-0.3%	-0.2%	-0.4%	-0.2%	-0.6%	-0.4%	-0.8%	-0.9%	-1.2%	-1.3%	-1.8%	-1.8%	-2.5%	-2.5%	-3.3%	-3.1%	-2.4%

Note: Differences of +/- 10% or more are highlighted in red.

Table 4.10b: Absolute difference between reported emissions when comparing the EU's 2024 and 2025 submissions for the non-road transport sector group

Relative difference Non-road transport																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	38	68	8	31	8	37	12	35	14	32	16	28	23	39	39	62	39	57	22	45	16
NMVOCs	Gg	1	1	-3	0	-2	0	-1	0	-1	0	-1	-1	-1	-1	-1	-1	-2	-1	-2	-1	-2
SOx	Gg	18	28	11	10	4	7	4	6	3	7	6	8	5	7	4	10	4	10	0	3	-1
NH3	Gg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CO	Gg	13	11	-2	-2	-5	-2	-6	-3	-7	-4	-7	-4	-6	-5	-4	0	-2	2	-2	3	-3
Pb	Mg	4	3	4	3	3	3	3	4	3	3	3	3	3	3	2	2	2	3	2	3	2
Cd	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hg	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	-4	-3
Cu	Mg	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	12	10	12
Ni	Mg	9	12	6	4	2	5	3	5	3	6	3	6	3	5	2	8	2	16	0	-1	-5
Se	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	Mg	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0
Total PAHs	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCDD/Fs	g I-TEQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(a)P	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(b)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(k)F	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCBs	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			-2	-1	-2	-2	-2	-1	-2	-1	-2	-2	-2	-2	-3	-2	-3	-2	-3	-3	-4
PM10	Gg			-4	-4	-5	-4	-5	-4	-4	-4	-4	-4	-5	-4	-5	-4	-5	-4	-6	-5	-6
TSPs	Gg			-4	-4	-5	-4	-5	-4	-4	-4	-4	-4	-5	-4	-5	-4	-5	-4	-6	-5	-6
BC	Gg			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0

4.7 Agriculture sector

This sector group is responsible for 94% of NH_3 emissions in the EU. With regard to the size of the absolute values that the countries reported, France, Germany, Spain and Italy contributed most to NH_3 emissions in the current reporting cycle. In addition, the agriculture sector produces considerable emissions of NMVOCs, PM_{10} and NO_X.

Agricultural emissions of NH_3 have fallen by 37% since 1990 and by 16% since 2005 (Figure 4.12). France, which represents 17% of NH_3 emissions from the agricultural sector in the EU for the current reporting cycle, reports that the decrease in NH_3 emissions are mainly caused by a reduction in the use of mineral fertilizer and manure spreading and a drop in livestock numbers (France's IIR 2024).

Germany represents also 17% of NH_3 emissions from the agricultural sector in the EU. The main drivers for the historical reduction of NH_3 emissions in this category is the reduced number of livestock in Germany following the German reunification. Germany's NH_3 emissions in Manure Management (NFR 3.B) and Agricultural Soils (NFR 3.D) have reduced markedly since 1990 (Germany's IIR 2024).

Spain represents 13% of NH_3 emissions from the agricultural sector for the current reporting cycle. The introduction of fertilization practices with NH_3 abatement measures from 2004 onwards and improvements in animal feed formulations, as well as the enforcement of animal welfare legislation affecting laying hens since 2010 have led to decreases in NH_3 emissions (Spain's IIR 2024).

Manure management (categories 3B1a and 3B1b) is the main source of NMVOC emissions in the agriculture sector. For PM_{10} emissions in this sector the primary source is farm-level agricultural operations including storage, handling and transport of agricultural products (3Dc). NO_X emissions arise especially in categories 3Da1 (Inorganic N-fertilizers (includes also urea application)), 3Da2a (Animal manure applied to soils) and 3Da3 (Urine and dung deposited by grazing animals).

Historically, agriculture has been a major source of HCB (Figure 4.13). Due to the banning of certain pesticides, HCB emissions from agriculture are now only 5%.

Table 4.11 presents the number of EU Member States reporting the notation keys 'NA', 'NO', 'NR' and 'NE' within the key categories. Table 4.12 shows the recalculations within the agriculture sector group. For explanations of EU recalculations, see Section 5.1.

Figure 4.12: EU emission trends in the agriculture sector group for NH_3, PM_{10}, NMVOCs and NO_X since 1990 (or 2000 for PM_{10})

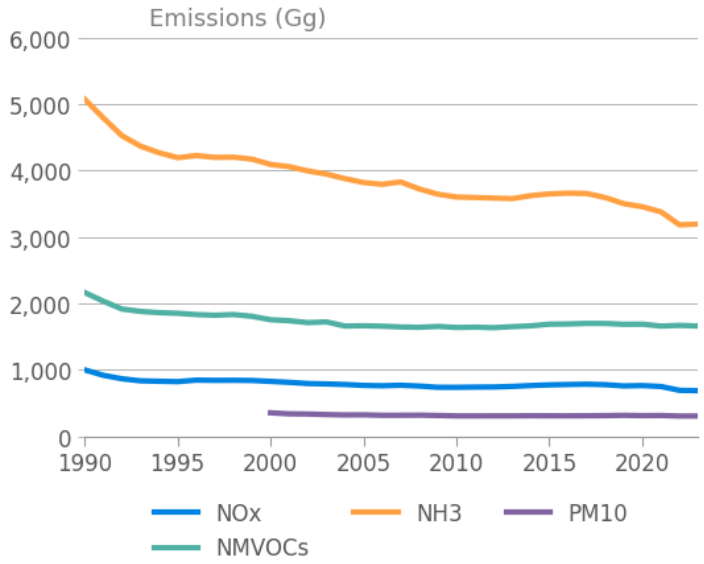


Figure 4.13: EU emission trends in the agriculture sector group for HCB since 1990

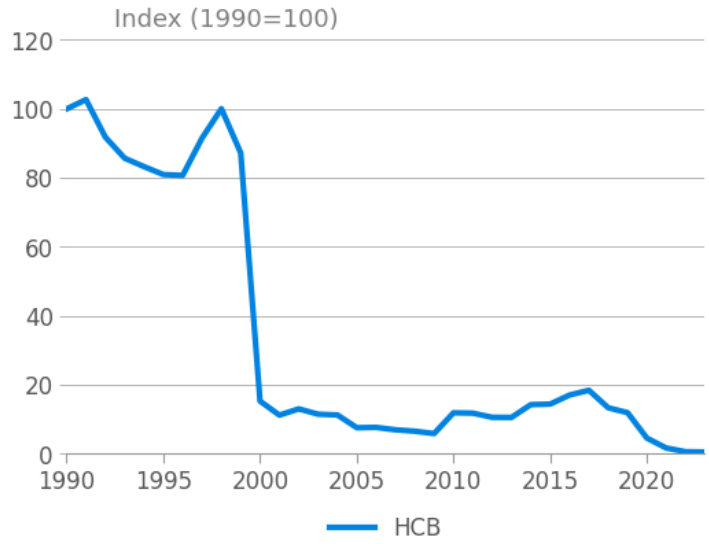


Table 4.11: Number of EU Member States reporting notation keys within the key categories of the agriculture sector group

Key categories		NA	NO	NR	NE
NMVOC	3Da2a	0	0	0	1
NOx	3Da3	0	1	0	0
NH3	3Da3	0	1	0	0
HCB	3Df	3	2	0	2

Note: Only the key categories where notation keys were reported are considered.

Table 4.12a: Relative difference (relative data, percentage of EU national totals) between reported emissions when comparing the EU's 2024 and 2025 submissions (relative data, percentage of EU national totals) for the agriculture sector group

Relative difference Agriculture																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	0.8%	0.8%	0.5%	0.3%	0.4%	0.4%	0.3%	0.2%	0.2%	0.2%	0.1%	0.0%	-0.1%	-0.1%	-0.1%	0.0%	-0.2%	-0.1%	-0.1%	-0.1%	-2.2%
NMVOCs	Gg	3.3%	2.5%	2.8%	3.4%	3.6%	3.8%	3.9%	4.1%	4.3%	4.7%	4.7%	4.9%	5.1%	5.2%	5.1%	5.3%	5.2%	5.4%	5.3%	5.5%	5.8%
SOx	Gg	18.9%	21.5%	4.1%	-21.0%	-8.4%	-7.7%	-1.7%	-3.2%	-5.7%	-14.1%	-10.5%	-8.4%	-20.0%	-22.3%	-16.4%	-22.7%	-30.7%	-31.9%	-32.3%	-32.0%	-33.7%
NH3	Gg	5.2%	5.2%	6.0%	5.9%	5.5%	5.9%	5.6%	5.6%	5.6%	5.8%	5.7%	6.0%	6.3%	6.3%	6.0%	6.0%	5.4%	5.6%	5.2%	5.3%	4.0%
CO	Gg	17.9%	19.2%	6.3%	-14.7%	-4.8%	-4.0%	0.3%	-1.1%	-3.0%	-9.8%	-6.9%	-5.1%	-14.8%	-16.3%	-11.0%	-17.2%	-24.4%	-26.4%	-26.7%	-26.7%	-28.3%
Pb	Mg	13.9%	14.1%	2.1%	-7.5%	-2.9%	-2.4%	-0.5%	-1.1%	-2.0%	-5.3%	-4.0%	-3.1%	-8.6%	-9.7%	-6.5%	-10.1%	-14.4%	-15.6%	-15.1%	-15.1%	-15.8%
Cd	Mg	21.2%	24.3%	4.9%	-24.5%	-11.1%	-9.4%	-1.9%	-3.9%	-6.6%	-16.0%	-11.7%	-9.2%	-22.5%	-24.6%	-17.7%	-24.9%	-33.3%	-34.5%	-35.0%	-36.3%	-38.3%
Hg	Mg	20.4%	23.1%	5.9%	-24.0%	-10.7%	-9.0%	-1.7%	-3.7%	-6.4%	-15.7%	-11.5%	-9.0%	-22.1%	-24.1%	-17.3%	-24.5%	-33.1%	-34.5%	-35.2%	-36.7%	-38.7%
As	Mg	9.4%	8.8%	2.4%	-1.6%	1.4%	1.5%	1.8%	1.3%	0.5%	-1.9%	-1.5%	-1.2%	-4.2%	-4.6%	-2.7%	-4.6%	-7.0%	-7.4%	-7.4%	-6.6%	-8.0%
Cr	Mg	17.2%	18.5%	6.9%	-17.5%	-6.7%	-5.4%	-0.3%	-1.8%	-4.1%	-11.5%	-8.3%	-6.5%	-17.2%	-18.7%	-12.9%	-19.3%	-27.1%	-28.7%	-29.5%	-30.5%	-32.4%
Cu	Mg	14.2%	15.6%	2.8%	-12.8%	-4.9%	-4.0%	-0.6%	-1.6%	-3.2%	-8.8%	-6.5%	-5.2%	-13.7%	-15.2%	-10.4%	-15.4%	-21.4%	-22.5%	-22.4%	-22.4%	-23.9%
Ni	Mg	18.2%	20.7%	4.2%	-21.7%	-9.2%	-7.6%	-1.2%	-3.0%	-5.5%	-14.0%	-10.3%	-8.2%	-20.5%	-22.4%	-15.9%	-22.3%	-30.2%	-31.0%	-31.5%	-32.2%	-34.4%
Se	Mg	15.7%	16.1%	6.0%	-10.7%	-3.4%	-2.6%	0.3%	-0.7%	-2.2%	-7.3%	-5.3%	-4.2%	-11.8%	-13.0%	-8.5%	-13.4%	-19.4%	-20.9%	-21.3%	-22.0%	-23.6%
Zn	Mg	6.3%	5.4%	1.2%	-1.1%	-0.6%	-0.5%	0.0%	-0.2%	-0.3%	-0.8%	-0.6%	-0.5%	-1.4%	-1.5%	-0.9%	-1.4%	-2.1%	-2.3%	-2.2%	-2.9%	-3.0%
Total PAHs	Mg	8.8%	8.9%	4.0%	-11.8%	-4.8%	-5.5%	-1.0%	-2.8%	-5.2%	-13.1%	-9.3%	-7.8%	-19.7%	-20.4%	-16.8%	-26.2%	-33.2%	-35.7%	-35.1%	-35.1%	-36.3%
PCDD/Fs	g I-TEQ	1.9%	1.6%	0.3%	-0.2%	-0.1%	-0.1%	0.0%	0.0%	-0.1%	-0.3%	-0.3%	-0.2%	-0.7%	-1.4%	-2.1%	-3.7%	-5.3%	-6.3%	-6.1%	-6.1%	-4.6%
B(a)P	Mg	5.3%	5.4%	2.6%	-8.8%	-3.2%	-3.4%	-0.6%	-1.6%	-3.1%	-8.3%	-5.9%	-4.8%	-12.4%	-14.1%	-11.1%	-17.6%	-23.5%	-25.3%	-24.7%	-25.4%	-25.3%
B(b)F	Mg	11.2%	11.2%	5.0%	-11.0%	-4.6%	-4.9%	-0.8%	-2.2%	-4.2%	-11.0%	-7.7%	-6.2%	-16.5%	-17.2%	-12.9%	-20.2%	-26.8%	-29.4%	-28.8%	-28.8%	-29.8%
B(k)F	Mg	9.2%	9.4%	3.6%	-10.9%	-4.6%	-4.9%	-0.9%	-2.3%	-4.2%	-10.8%	-7.7%	-6.2%	-16.4%	-17.2%	-13.1%	-20.0%	-26.3%	-28.2%	-27.5%	-27.3%	-28.3%
IP	Mg	7.3%	7.7%	2.7%	-10.6%	-4.3%	-4.7%	-1.0%	-2.3%	-4.2%	-10.5%	-7.5%	-6.1%	-15.7%	-16.9%	-13.1%	-19.7%	-25.7%	-27.2%	-26.4%	-26.4%	-27.1%
HCB	kg	0.4%	0.6%	0.4%	0.9%	0.0%	1.1%	-0.2%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	-0.1%	-0.6%	1.6%
PCBs	kg	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			2.8%	-4.1%	-1.5%	-1.0%	-0.1%	-0.3%	-0.7%	-2.2%	-1.5%	-1.1%	-3.2%	8.6%	-2.0%	-3.1%	-4.4%	-4.5%	-4.4%	-4.3%	-4.7%
PM10	Gg			0.6%	-0.4%	-0.3%	0.2%	0.0%	0.2%	0.1%	0.1%	0.2%	0.3%	0.2%	0.4%	0.6%	0.4%	0.3%	0.3%	0.4%	0.5%	0.3%
TSPs	Gg			0.2%	-0.2%	-0.2%	0.0%	-0.1%	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.2%	-0.2%	0.5%	0.5%	0.4%	0.3%	0.4%	0.3%	1.0%
BC	Gg			5.4%	-7.6%	-2.7%	-2.3%	-0.3%	-0.9%	-1.9%	-5.4%	-4.0%	-3.2%	-8.8%	-9.8%	-6.6%	-10.8%	-15.8%	-18.0%	-17.9%	-18.1%	-18.8%

Note: Differences of +/- 10% or more are highlighted in red.

Table 4.12b: Absolute difference between reported emissions when comparing the EU's 2024 and 2025 submissions (relative data, percentage of EU national totals) for the agriculture sector group

Relative difference Agriculture																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	8	7	4	3	3	3	3	2	1	2	0	0	-1	-1	-1	0	-2	0	-1	-1	-15
NMVOCs	Gg	70	45	47	55	57	61	62	66	67	73	73	77	81	83	82	85	84	86	85	87	92
SOx	Gg	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH3	Gg	249	206	230	213	197	212	196	194	191	198	193	201	215	217	206	207	185	185	170	169	123
CO	Gg	151	105	24	-23	-7	-5	0	-1	-3	-11	-8	-5	-16	-17	-10	-16	-22	-23	-22	-21	-22
Pb	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cd	Mg	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hg	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
As	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ni	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	Mg	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	Mg	6	4	1	-1	0	0	0	0	0	0	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1
PCDD/Fs	g I-TEQ	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(a)P	Mg	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(b)F	Mg	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B(k)F	Mg	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP	Mg	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	kg	4	4	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCBs	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			2	-2	-1	0	0	0	0	-1	-1	0	-1	3	-1	-1	-2	-2	-2	-2	-2
PM10	Gg			2	-1	-1	0	0	1	0	0	1	1	0	1	2	1	1	1	1	2	1
TSPs	Gg			2	-2	-2	0	-1	0	-1	-1	0	0	2	-2	5	4	4	3	3	3	9
BC	Gg			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4.8 Waste sector

This sector group is a primary source of PCDD/Fs and BC and a significant source of HCB (Figure 4.14). With regard to the size of the absolute values that the countries reported, Spain and Romania contributed most to PCDD/F emissions during the current reporting cycle. For BC emissions, Spain with a share of 66% is the main contributor within this sector. For HCB emissions in this sector, the main contributor is Slovakia, with a share of 59%.

The decrease in PCDD/F emissions in the waste sector in the EU (67% since 1990 and 48% since 2005) is led by a decreasing trend in category 'Clinical waste incineration' without energy recovery. Other influencing factors have been the introduction of municipal waste incineration

plants with energy recovery (1A1a) and a progressive reduction in the amount of clinical waste incinerated (5C1biii) (Portugal's and Spain's IIRs 2024). Since 2018, the category contributing most to PCDD/F emission in the waste sector, are emissions resulting from incidental house and car fires (category 5E).

BC emissions have decreased by 17% since 2000 and by 14% since 2005. Open burning of waste (category 5C2) is the most important subcategory with regard to BC emissions.

Table 4.13 presents the number of EU Member States reporting the notation keys 'NA', 'NO', 'NR' and 'NE' within the key categories. Table 4.14 shows the recalculations within the waste sector group. For explanations of EU recalculations, see Section 5.1.

Figure 4.14: EU emission trends in the waste sector group for the PCDD/Fs and BC since 1990 (or 2000 or BC)

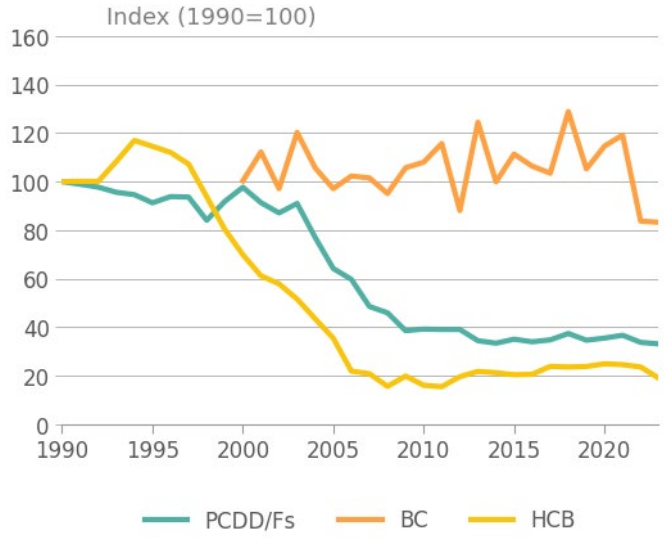


Table 4.13: Number of EU Member States reporting notation keys within the key categories of the waste sector group

Key categories		NA	NO	NR	NE
HCB	5C1bii	0	10	0	1
Hg	5C1biii	0	8	0	0
dioxin	5C1biii	0	8	0	0
HCB	5C1biii	0	8	0	0
dioxin	5C1biv	1	14	0	0
Hg	5C1bv	0	1	0	0
PM2.5	5C2	0	5	0	2
PM10	5C2	0	5	0	2
BC	5C2	0	4	2	3
CO	5C2	0	5	0	2
Cd	5C2	0	6	0	3
dioxin	5C2	0	5	0	2

Note: Only the key categories where notation keys were reported are considered.

Table 4.14a: Relative difference (relative data, percentage of EU national totals) between reported emissions when comparing the EU's 2024 and 2025 submissions for the waste sector group

Relative difference Waste																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	6.3%	3.1%	6.1%	11.0%	2.1%	1.5%	-0.9%	-0.2%	-0.4%	3.1%	3.5%	0.6%	7.6%	3.0%	-0.5%	1.6%	0.3%	3.5%	-0.5%	2.0%	-27.8%
NMVOCs	Gg	-5.7%	-5.9%	-6.6%	-3.9%	-5.4%	-4.8%	-5.1%	-4.2%	-5.2%	-3.7%	-5.5%	-5.5%	-5.0%	-4.6%	-7.6%	-6.5%	-7.5%	-6.7%	-7.7%	-6.0%	-15.3%
SOx	Gg	1.2%	0.9%	2.9%	6.0%	1.8%	0.9%	-0.1%	0.9%	0.1%	2.4%	2.6%	0.9%	5.4%	2.7%	0.0%	1.7%	0.7%	3.0%	0.2%	2.0%	-20.9%
NH3	Gg	2.4%	1.9%	1.2%	0.4%	0.4%	0.1%	0.0%	-0.1%	-0.1%	0.0%	1.0%	2.0%	2.1%	2.0%	2.3%	3.6%	3.6%	5.1%	6.3%	6.5%	5.8%
CO	Gg	6.8%	3.6%	6.3%	11.8%	3.7%	3.1%	0.9%	1.3%	1.1%	4.3%	5.2%	1.9%	8.6%	4.4%	1.4%	3.3%	1.7%	5.0%	1.1%	3.4%	-24.6%
Pb	Mg	-0.2%	-0.4%	2.4%	9.3%	8.7%	2.5%	3.2%	1.9%	2.9%	3.0%	2.6%	2.3%	5.7%	4.3%	-0.4%	1.3%	1.8%	3.7%	1.3%	2.7%	-17.3%
Cd	Mg	1.3%	-0.7%	1.2%	9.1%	7.0%	4.4%	4.3%	4.7%	5.2%	5.7%	5.7%	5.8%	8.3%	6.7%	5.5%	6.4%	5.8%	7.4%	5.4%	6.2%	-7.9%
Hg	Mg	-12.3%	-14.8%	-3.7%	18.2%	17.5%	15.9%	8.8%	5.9%	11.0%	1.8%	-0.2%	9.7%	10.3%	12.5%	17.5%	22.7%	24.6%	30.4%	32.7%	40.2%	33.3%
As	Mg	1.8%	1.0%	1.9%	3.8%	2.2%	1.0%	0.7%	1.0%	0.9%	1.6%	0.8%	0.0%	1.0%	-0.2%	-1.8%	-0.8%	-0.6%	-0.7%	-3.1%	-3.5%	-12.0%
Cr	Mg	0.0%	0.0%	0.4%	2.1%	1.2%	1.1%	0.9%	1.7%	1.6%	1.8%	1.4%	1.4%	1.2%	0.5%	0.2%	1.0%	1.1%	0.5%	-1.1%	-2.1%	-5.7%
Cu	Mg	-0.5%	-0.8%	0.4%	3.5%	0.9%	0.8%	-0.2%	0.6%	0.5%	1.2%	1.1%	1.1%	2.9%	1.4%	0.3%	1.8%	1.5%	2.5%	0.7%	1.4%	-10.6%
Ni	Mg	-0.2%	-0.4%	-0.8%	0.0%	-0.7%	-0.3%	-0.2%	0.4%	0.1%	-0.4%	-2.2%	-3.9%	-5.2%	-6.6%	-7.0%	-7.5%	-7.9%	-11.4%	-14.9%	-16.9%	-21.0%
Se	Mg	5.7%	3.1%	5.8%	10.9%	3.3%	2.8%	0.6%	1.2%	1.0%	3.5%	-2.3%	-5.5%	-4.6%	-8.9%	-12.6%	-11.3%	-10.4%	-13.8%	-21.3%	-23.5%	-45.2%
Zn	Mg	4.6%	2.5%	5.4%	8.7%	1.2%	0.6%	-1.5%	-0.9%	-1.0%	2.1%	2.1%	-0.1%	5.7%	1.9%	-1.3%	0.7%	-0.4%	2.2%	-1.4%	0.9%	-26.3%
Total PAHs	Mg	8.5%	9.6%	8.5%	9.7%	9.2%	8.6%	8.5%	7.8%	7.7%	8.2%	8.7%	7.5%	6.7%	7.0%	4.3%	6.2%	6.1%	6.6%	5.6%	5.3%	4.1%
PCDD/Fs	g I-TEQ	0.8%	1.0%	-0.3%	1.8%	2.8%	4.7%	3.4%	3.6%	4.2%	1.0%	-2.0%	-1.9%	1.3%	0.9%	0.5%	2.2%	3.1%	3.6%	3.0%	3.7%	-3.5%
B(a)P	Mg	7.7%	6.9%	5.3%	4.7%	4.4%	3.1%	2.0%	0.5%	1.0%	1.7%	1.4%	-4.7%	-5.0%	-4.9%	-3.6%	-7.0%	-6.3%	-7.4%	-11.0%	-10.4%	-10.2%
B(b)F	Mg	8.3%	9.9%	9.0%	11.1%	10.8%	10.3%	10.6%	10.0%	9.8%	10.1%	10.9%	11.3%	10.3%	10.7%	7.9%	10.4%	10.2%	11.2%	11.4%	10.7%	9.3%
B(k)F	Mg	9.5%	11.3%	10.3%	11.3%	10.4%	10.0%	10.1%	9.9%	9.6%	10.0%	11.0%	12.2%	11.1%	11.4%	8.1%	11.1%	10.8%	12.3%	11.9%	11.5%	9.4%
IP	Mg	-0.2%	-0.2%	-0.2%	4.4%	5.2%	5.2%	5.8%	4.3%	4.5%	4.5%	3.7%	3.0%	2.4%	2.4%	0.9%	2.1%	1.9%	1.1%	-0.6%	-1.8%	-3.1%
HCB	kg	3.8%	3.5%	6.3%	50.7%	18.6%	33.8%	30.3%	132.9%	128.8%	119.4%	157.2%	222.1%	197.3%	176.8%	217.2%	270.4%	240.6%	200.3%	182.5%	170.2%	171.9%
PCBs	kg	18.9%	19.8%	27.5%	34.1%	51.2%	15.9%	31.3%	35.2%	55.0%	36.6%	30.6%	54.4%	45.8%	66.0%	19.7%	18.4%	33.9%	33.4%	29.4%	19.9%	25.1%
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			4.1%	6.8%	1.3%	0.8%	-0.8%	-0.4%	-0.6%	1.8%	1.7%	0.1%	4.3%	1.7%	-1.0%	1.0%	0.7%	2.5%	-0.4%	0.9%	-19.8%
PM10	Gg			3.7%	6.5%	0.9%	-0.6%	-2.1%	-1.4%	-1.7%	0.6%	0.3%	-0.4%	3.6%	1.0%	-1.5%	0.5%	-1.0%	2.0%	-1.0%	0.2%	-20.9%
TSPs	Gg			-0.5%	4.9%	-0.4%	-1.4%	-2.6%	-1.9%	-2.1%	0.0%	-0.6%	-1.1%	2.9%	0.4%	-2.1%	-0.3%	-1.9%	0.8%	-2.1%	-0.8%	-21.6%
BC	Gg			6.7%	11.1%	2.3%	1.7%	-0.7%	-0.1%	-0.3%	3.1%	3.5%	0.7%	7.3%	3.1%	-0.3%	1.9%	0.7%	3.8%	-0.2%	2.2%	-27.0%

Note: Differences of +/- 10% or more are highlighted in red.

Table 4.14b: Absolute difference between reported emissions when comparing the EU's 2024 and 2025 submissions for the waste sector group

Relative difference Waste																						
Pollutant	Unit	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	4	1	4	6	1	1	-1	0	0	2	2	1	4	2	0	1	0	2	0	2	-21
NMVOCs	Gg	-5	-5	-5	-3	-4	-3	-3	-3	-4	-2	-3	-4	-3	-3	-5	-4	-5	-4	-5	-4	-9
SOx	Gg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
NH3	Gg	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	2	2	3	3	3	3
CO	Gg	52	21	54	94	33	28	8	12	11	43	39	21	71	43	13	30	19	45	11	35	-251
Pb	Mg	0	0	1	2	2	1	1	0	1	1	0	0	1	1	0	0	0	1	0	0	-3
Cd	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hg	Mg	-1	-1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
As	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
Ni	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	Mg	14	5	15	22	3	2	-4	-3	-3	6	5	0	14	5	-4	2	-1	6	-4	3	-80
Total PAHs	Mg	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
PCDD/Fs	g I-TEQ	17	18	-7	23	33	45	31	27	32	7	-16	-14	8	6	4	15	23	25	21	27	-25
B(a)P	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	-1
B(b)F	Mg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B(k)F	Mg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IP	Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCB	kg	3	3	4	10	3	5	3	10	8	7	10	13	12	11	12	15	14	14	14	13	13
PCBs	kg	35	35	38	54	82	22	43	31	37	26	28	32	29	38	12	14	25	25	21	12	15
				2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			4	6	1	1	-1	0	-1	2	1	0	4	2	-1	1	1	2	0	1	-20
PM10	Gg			4	6	1	-1	-2	-1	-2	1	0	0	3	1	-2	0	-1	2	-1	0	-22
TSPs	Gg			-1	5	0	-1	-3	-2	-2	0	-1	-1	3	0	-2	0	-2	1	-2	-1	-24
BC	Gg			2	3	1	1	0	0	0	1	1	0	2	1	0	1	0	1	0	1	-11

5 Recalculations and implemented or planned improvements

5.1 Recalculations

Recalculations are changes made to previous emission estimates (for one or more years) to eliminate errors, consider additional factors and incorporate new data. The inventory guidebook (EMEP/EEA, 2023) stipulates that it is good practice to change or refine data and/or methods when:

- available data have changed;
- the method previously used is not consistent with good practice for a certain category;
- an emission source category has become a key category;
- the method previously used does not reflect mitigation activities transparently;
- the capacity (resources) for inventory preparation has increased;
- new inventory methods become available;
- the correction of errors is necessary.

It is important to identify inventory recalculations and to understand their origin in order to evaluate officially reported emission data properly. EU Member States often do not document why they report numbers that differ from those of the previous year.

5.1.1 Recalculations of the EU inventory

Table 5.1 compares total emissions from the EU submitted in 2024 with those submitted in 2025 both based on percentage (Table 5.1a) and on absolute values (Table 5.1b).

Table 5.1a: Comparison of data submitted in 2024 and 2025 by EU Member States based on relative difference (percentage of EU total)

Pollutant	Unit	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	-0.1%	0.4%	-0.4%	0.6%	-0.2%	0.3%	-0.3%	0.5%	-0.3%	0.6%	-0.2%	1.1%	-0.2%	0.9%	-0.2%	1.1%	-1.1%
NMVOCs	Gg	0.1%	0.4%	0.6%	0.8%	1.7%	2.1%	2.2%	2.7%	2.5%	2.8%	1.7%	1.6%	1.5%	2.1%	2.3%	2.0%	1.3%
SOx	Gg	0.1%	-2.2%	0.4%	0.8%	5.0%	-0.5%	-3.0%	1.4%	0.7%	0.9%	0.9%	2.6%	2.8%	2.7%	-0.7%	0.2%	-1.1%
NH3	Gg	4.3%	4.1%	4.8%	4.6%	4.2%	4.6%	4.4%	4.6%	5.1%	5.1%	4.8%	4.9%	4.3%	4.5%	4.2%	4.2%	3.0%
CO	Gg	0.3%	1.2%	1.5%	1.3%	1.4%	0.9%	0.9%	1.6%	1.5%	1.3%	1.1%	1.1%	0.7%	1.3%	0.8%	0.6%	-1.4%
Pb	Mg	0.0%	0.3%	0.1%	0.4%	-0.6%	-0.7%	-0.5%	0.3%	-0.2%	1.3%	1.0%	1.2%	-0.3%	-0.1%	-0.6%	-0.4%	-0.8%
Cd	Mg	0.7%	1.3%	-0.2%	1.4%	0.0%	1.4%	0.7%	2.7%	0.7%	2.5%	0.8%	2.8%	0.9%	2.1%	0.4%	1.5%	-0.4%
Hg	Mg	-1.4%	-0.7%	-0.9%	1.7%	-0.5%	0.5%	0.4%	3.2%	2.0%	6.3%	3.2%	4.7%	1.7%	3.4%	1.6%	4.4%	1.5%
As	Mg	-0.8%	-1.2%	-1.7%	-2.6%	-2.6%	-4.2%	0.6%	1.3%	-1.4%	0.0%	-2.0%	-0.8%	-1.7%	-2.8%	-5.2%	-2.8%	4.0%
Cr	Mg	-0.2%	0.3%	0.0%	1.0%	0.1%	0.9%	1.0%	2.3%	-1.9%	-1.1%	-1.7%	-0.8%	-1.6%	-0.6%	-3.1%	-3.6%	-3.8%
Cu	Mg	0.0%	0.6%	0.9%	0.8%	-1.0%	-0.7%	-1.2%	-0.2%	-0.7%	-0.4%	-0.5%	-0.6%	-0.8%	-0.5%	-0.6%	-0.5%	-0.8%
Ni	Mg	1.2%	3.4%	0.2%	6.8%	2.1%	9.9%	3.2%	12.2%	0.7%	8.0%	-0.3%	9.1%	-0.2%	10.6%	-1.5%	1.6%	-3.8%
Se	Mg	-6.7%	-5.6%	-5.9%	-5.4%	-3.1%	-5.7%	9.7%	10.4%	9.2%	10.6%	9.1%	11.2%	9.3%	0.0%	-1.4%	-1.9%	-4.8%
Zn	Mg	0.4%	0.4%	0.7%	1.1%	0.1%	0.6%	0.5%	0.8%	0.9%	0.9%	0.6%	0.8%	0.6%	0.8%	0.5%	0.8%	-1.7%
Total PAHs	Mg	0.4%	0.5%	0.5%	0.3%	0.2%	0.3%	0.1%	0.2%	0.1%	0.1%	0.0%	-0.1%	-0.2%	-0.2%	0.0%	-0.5%	-0.2%
PCDD/Fs	g I-TEQ	0.5%	0.5%	-0.1%	13.9%	0.9%	0.0%	-0.9%	-0.5%	0.3%	0.4%	0.1%	0.6%	1.0%	1.2%	1.3%	1.3%	-1.4%
B(a)P	Mg	0.4%	0.4%	0.6%	0.3%	0.2%	0.4%	0.0%	0.1%	0.1%	0.1%	-0.1%	0.0%	-0.5%	-0.4%	-0.3%	-0.9%	-0.7%
B(b)F	Mg	0.6%	0.6%	0.4%	0.1%	0.1%	0.1%	0.0%	0.1%	-0.1%	0.0%	-0.1%	-0.2%	-0.3%	-0.2%	-0.1%	-0.5%	-0.1%
B(k)F	Mg	0.7%	0.9%	0.7%	0.6%	0.5%	0.6%	0.5%	0.5%	0.4%	0.5%	0.3%	0.2%	0.2%	0.3%	0.5%	0.0%	0.3%
IP	Mg	-0.8%	0.0%	0.0%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%	-0.3%	-0.1%	-0.3%	-0.4%	-0.4%	-0.3%	-0.1%	-0.7%	-0.2%
HCB	kg	0.2%	0.3%	0.2%	5.1%	3.3%	29.8%	5.7%	5.0%	3.7%	4.2%	3.1%	3.9%	5.3%	5.9%	9.0%	9.3%	10.3%
PCBs	kg	0.3%	1.7%	0.7%	6.3%	6.6%	6.2%	5.2%	2.6%	0.3%	3.6%	0.0%	1.9%	1.6%	3.0%	1.5%	-3.8%	-10.9%
				2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			0.4%	0.4%	0.1%	0.6%	0.6%	0.9%	0.7%	1.0%	0.1%	0.2%	-0.1%	0.2%	-0.2%	-0.3%	-2.5%
PM10	Gg			0.3%	0.3%	0.0%	0.2%	0.3%	0.5%	0.4%	0.5%	0.0%	0.1%	-0.4%	0.1%	-0.2%	-0.3%	-2.0%
TSPs	Gg			0.0%	0.9%	0.3%	0.6%	0.4%	0.5%	0.5%	0.4%	0.3%	0.1%	0.2%	0.2%	0.0%	0.0%	-0.5%
BC	Gg			-0.6%	-0.1%	-1.9%	-0.7%	-0.9%	-0.8%	-0.2%	-0.5%	-1.4%	-1.1%	-1.2%	-0.9%	-1.5%	-1.1%	-7.7%

Note: Differences of +/- 10% or more are highlighted in red.

Table 5.1b: Comparison of data submitted in 2024 and 2025 by EU Member States based on absolute values

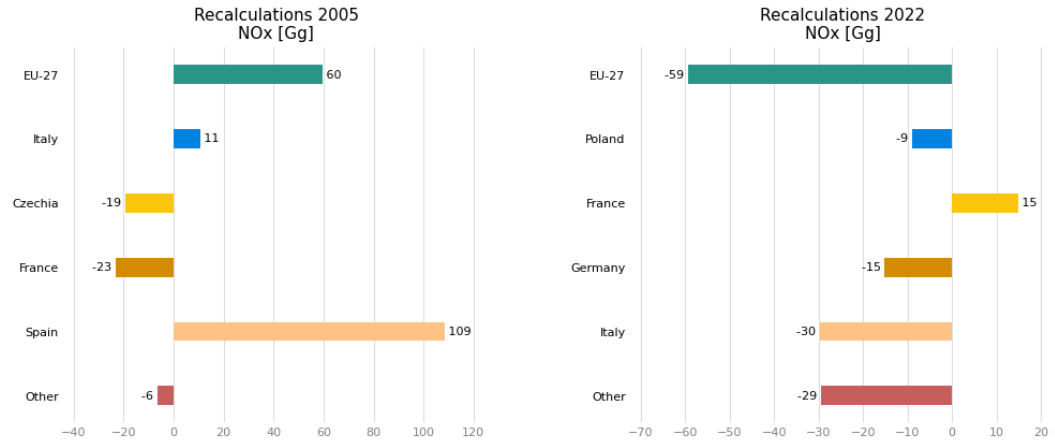
Pollutant	Unit	1990	1995	2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
NOx	Gg	-14	57	-47	60	-21	25	-25	40	-19	47	-11	73	-10	57	-12	64	-59
NMVOCs	Gg	20	57	64	78	135	162	163	200	178	194	114	108	99	138	149	131	80
SOx	Gg	20	-310	33	59	181	-20	-94	38	16	20	18	51	50	42	-9	3	-14
NH3	Gg	220	174	199	180	153	167	159	168	186	187	176	179	158	159	146	144	99
CO	Gg	164	554	517	371	348	205	207	356	305	272	212	219	141	234	133	116	-231
Pb	Mg	5	23	3	8	-9	-9	-6	4	-3	15	12	14	-3	-1	-6	-5	-9
Cd	Mg	1	2	0	1	0	1	0	2	0	2	1	2	1	1	0	1	0
Hg	Mg	-2	-1	-1	1	0	0	0	2	1	3	1	2	1	1	1	2	1
As	Mg	-5	-3	-3	-4	-3	-4	0	1	-1	0	-1	-1	-1	-2	-3	-2	2
Cr	Mg	-2	2	0	4	0	3	4	8	-7	-4	-6	-3	-6	-2	-9	-11	-12
Cu	Mg	0	13	20	20	-27	-19	-30	-6	-18	-10	-14	-15	-21	-13	-14	-12	-20
Ni	Mg	22	51	2	73	15	63	19	64	3	40	-2	44	-1	45	-6	7	-17
Se	Mg	-13	-10	-10	-10	-4	-8	11	10	9	11	8	10	8	0	-1	-2	-4
Zn	Mg	30	21	29	43	3	21	19	28	32	33	20	28	23	31	15	27	-61
Total PAHs	Mg	5	6	4	2	2	2	1	2	1	1	0	-1	-2	-1	0	-4	-1
PCDD/Fs	g I-TEQ	59	50	-6	791	22	0	-22	-13	7	8	3	13	22	25	26	27	-27
B(a)P	Mg	2	2	2	1	1	1	0	0	0	0	0	0	-1	-1	-1	-2	-2
B(b)F	Mg	3	3	1	0	0	0	0	0	0	0	0	-1	-1	0	0	-1	0
B(k)F	Mg	2	2	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0
IP	Mg	-2	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	-1	0
HCB	kg	10	10	6	12	8	76	14	16	13	10	9	12	13	12	12	11	11
PCBs	kg	17	98	34	200	131	114	90	42	4	54	0	27	23	39	18	-48	-135
				2000	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
PM2.5	Gg			8	7	3	10	10	15	11	15	2	2	-2	2	-2	-4	-32
PM10	Gg			7	9	0	6	8	13	8	11	0	1	-8	3	-5	-6	-39
TSPs	Gg			1	44	11	24	18	19	21	16	10	5	6	7	0	-1	-19
BC	Gg			-2	0	-5	-2	-2	-2	0	-1	-3	-2	-3	-2	-3	-2	-14

Details of recalculations that influenced the EU recalculations are given below. In some cases, recalculations reflect changes in gap filling rather than 'true' recalculations by the countries themselves. Often, high recalculations for EU Member States are compensated for by low recalculations for other EU Member States, and therefore overall EU recalculations are only moderate.

Recalculations of nitrogen oxide emissions

Figure 5.1 shows the recalculations for nitrogen oxide (NO_X) emissions for the EU-27 and the four biggest contributing Member States to these recalculations for the years 2005 and 2022. For 2022, high negative recalculations from Italy in the non-road transport sector contribute to the total EU recalculations. For 2005, Spain reported high recalculations in energy production and distribution (1A1a), non-road transport (1A3dii) and road transport sectors (1A3bii, 1A3bi).

Figure 5.1: Recalculations for NO_X emissions for the years 2005 and 2022



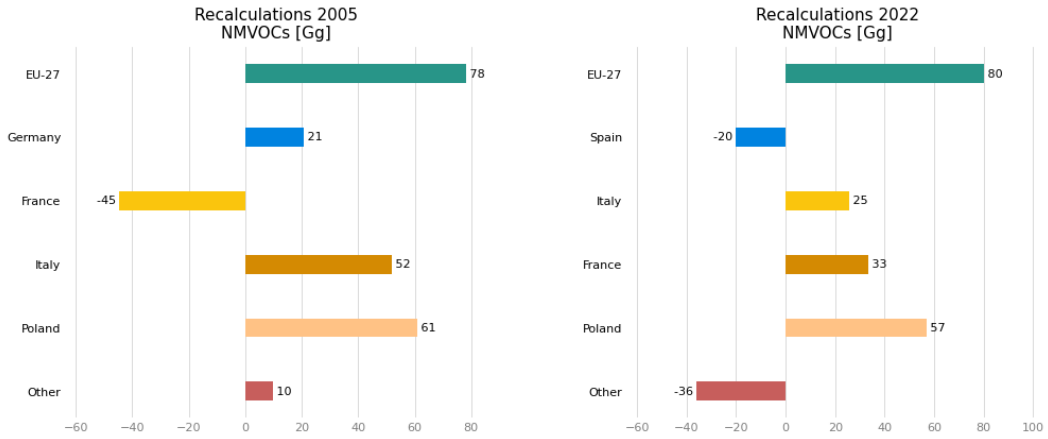
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of non-methane volatile organic compound emissions

Figure 5.2 shows the recalculations for non-methane volatile organic compound (NMVOC) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For 2022, high recalculations in the agriculture sector (3B1a and 3B1b) from Poland contributed to the change in EU's reported emissions. For the Commercial, institutional and households sector (1A4bi), France reported considerable recalculations. For 2005 recalculations were made also in the Road transport sector (1A3bi) by Poland.

Figure 5.2: Recalculations for NMVOC emissions for the years 2005 and 2022



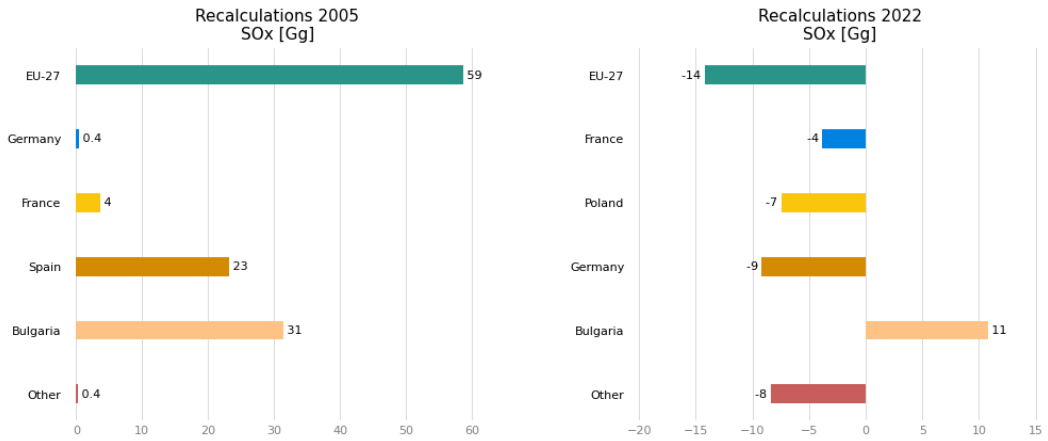
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of sulphur oxide emissions

Figure 5.3 shows the recalculations for sulphur oxide (SO_X) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For 2022 and 2005, Bulgaria had the highest absolute change in SO_X emissions. Energy use in industry sector (1A2c) contributed to the change in 2022, while energy production and distribution (1A1a) contributed to the change in 2005.

Figure 5.3: Recalculations for SO_X emissions for the years 2005 and 2022

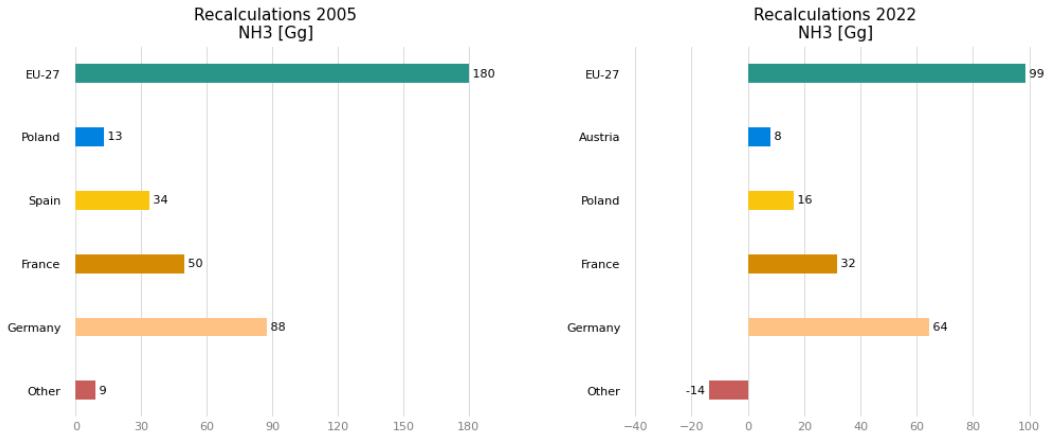


Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of ammonia emissions

Figure 5.4 shows the recalculations for NH_3 emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022. For both 2005 and 2022, major recalculations of NH_3 emissions were made Germany, to which recalculations in the agriculture sector (3Da1 and 3Da2a) had a major impact.

Figure 5.4: Recalculations for NH_3 emissions for the years 2005 and 2022



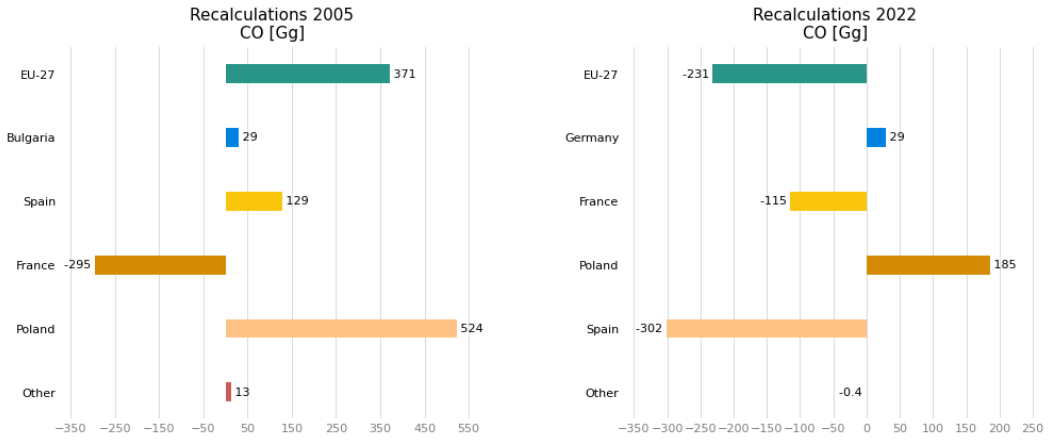
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of carbon monoxide emissions

Figure 5.5 shows the recalculations for carbon monoxide (CO) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For 2022, recalculations in the waste sector (5C2) contributed to the major negative recalculation by Spain. For 2005, major recalculations of CO emissions were reported for the road transport sector (1A3bi) by Poland.

Figure 5.5: Recalculations for CO emissions for the years 2005 and 2022



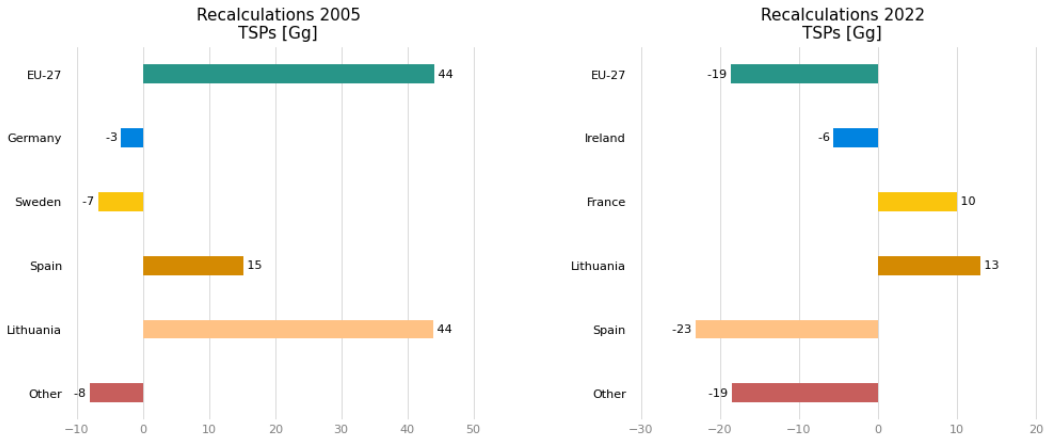
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of total suspended particle emissions

Figure 5.6 shows the recalculations for total suspended particulate (TSP) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For 2022, recalculations made in the waste sector (5C2) contributed to the recalculations by Spain. The sector Commercial institutional and households (1A4bi) contributed to the high recalculations by Lithuania for 2005.

Figure 5.6: Recalculations for TSP emissions for the years 2005 and 2022

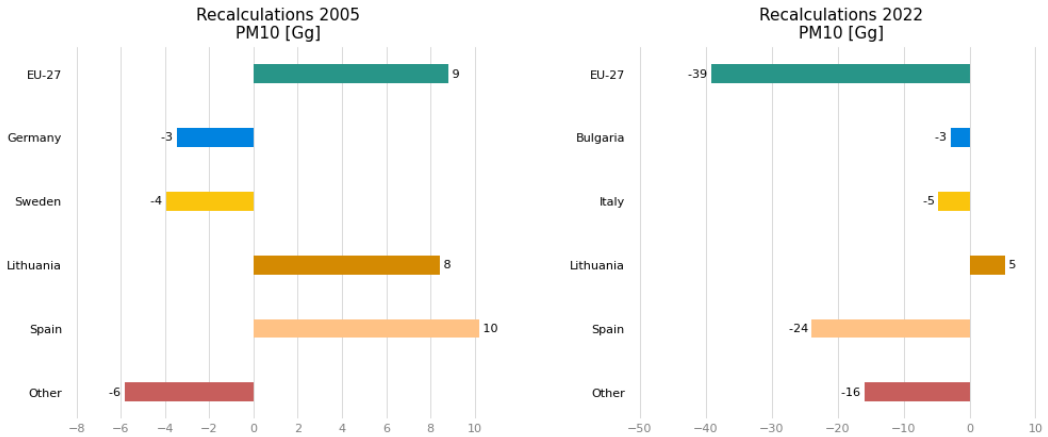


Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations for PM_{10} emissions

Figure 5.7 shows the recalculations for emissions of PM_{10} for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022. For both 2005 and 2022, the waste sector (5C2) contributed to the recalculations made by Spain.

Figure 5.7: Recalculations of PM_{10} emissions for the years 2005 and 2022



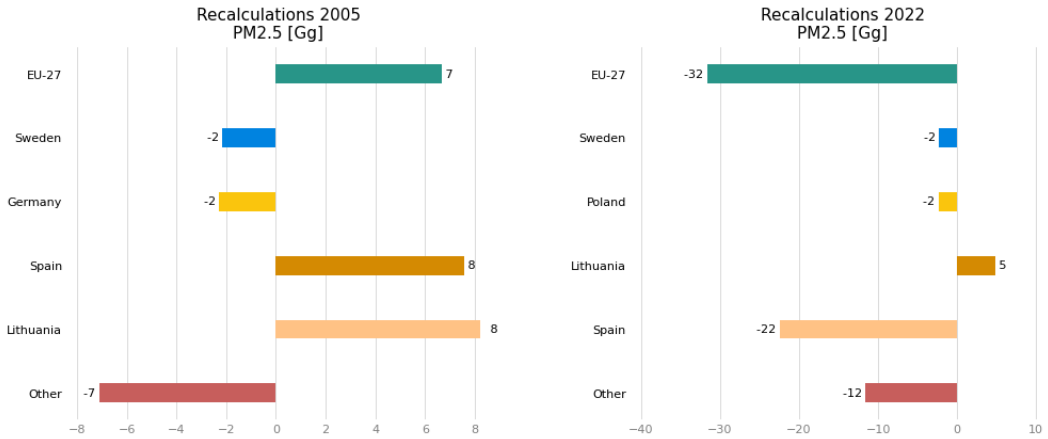
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of $PM_{2.5}$ emissions

Figure 5.8 shows the recalculations for emissions of $PM_{2.5}$ for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For 2022, the negative recalculations by Spain are dominated by the waste sector (5C2). For 2005, the Lithuanian recalculations are dominated by the Commercial, institutional and households sector (1A4bi).

Figure 5.8: Recalculations for $PM_{2.5}$ emissions for the years 2005 and 2022

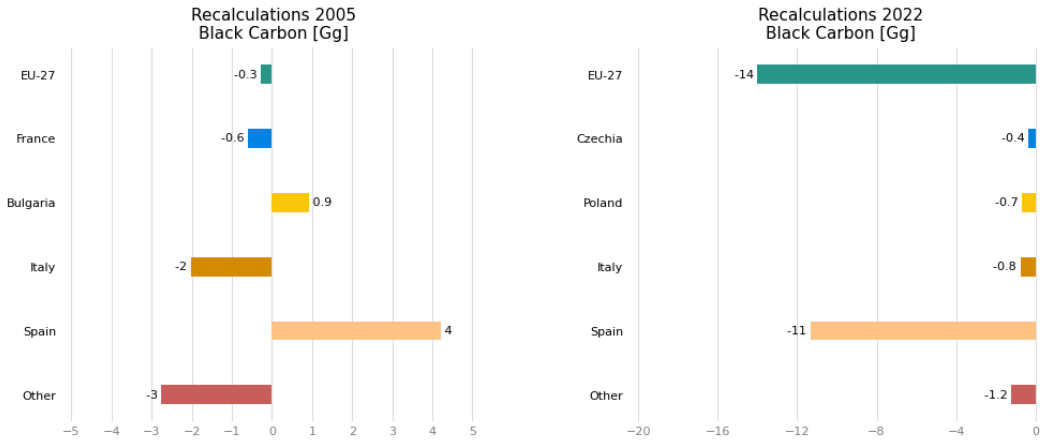


Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of black carbon emissions

Figure 5.9 shows the recalculations for BC emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022. For 2022, the negative recalculations performed by Spain, were made for the waste sector (5C2), which was the same sector contributing to the positive recalculations in 2005.

Figure 5.9: Recalculations for BC emissions for the years 2005 and 2022

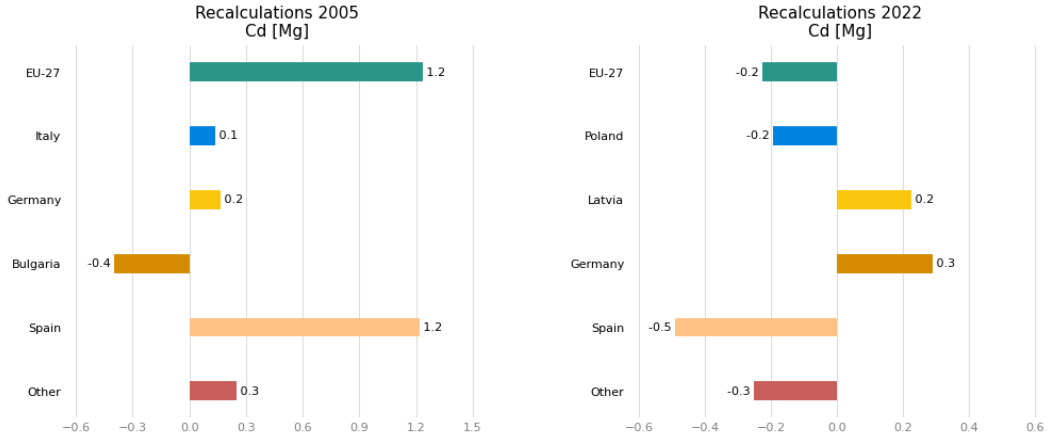


Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the impact on recalculations from all other Member States.

Recalculations of cadmium emissions

Figure 5.10 shows the recalculations for cadmium (Cd) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022. In general, recalculations of Cd emissions were minor. The major contributing sector for the recalculations by Spain was the waste sector (5C2) in 2022 and the energy production and distribution sector (A1a) in 2005.

Figure 5.10: Recalculations for Cd emissions for the years 2005 and 2022



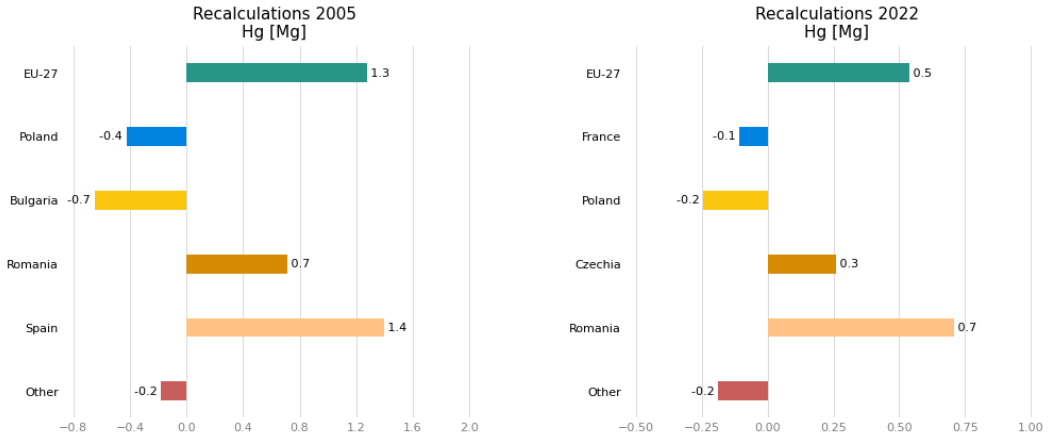
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of mercury emissions

Figure 5.11 shows the recalculations for mercury (Hg) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

In general, the recalculations for Hg were only minor. For 2022, the largest recalculations of Hg emissions were performed in the waste sector (5c1biii) by Romania. For 2005, the main contributing sector for the recalculations in Spain was the Energy production and distribution sector (1A1a).

Figure 5.11: Recalculations for Hg emissions for the years 2005 and 2022



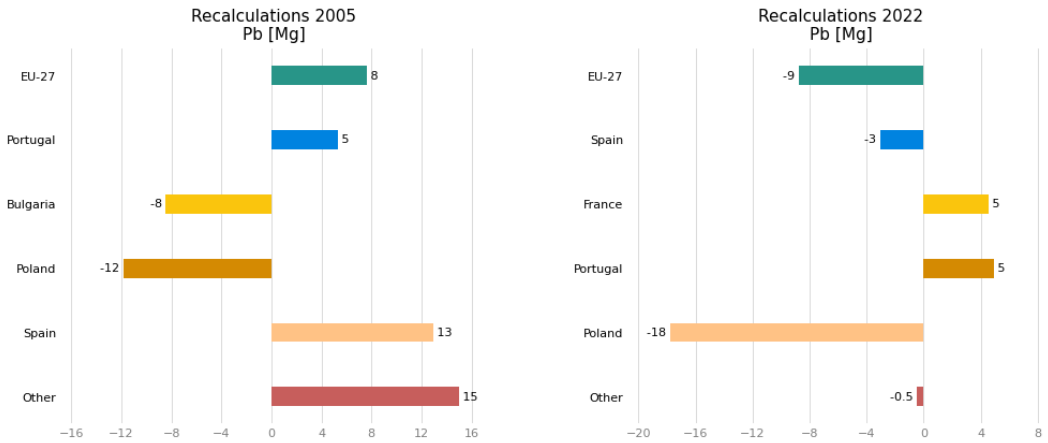
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of lead emissions

Figure 5.12 shows the recalculations for lead (Pb) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For both 2005 and 2022, recalculations of Pb emissions in Poland were dominated by recalculations in the industrial processes and product use sector (2C7a). The recalculations made by Spain for 2005 were dominated by the road transport sector (1A3bi).

Figure 5.12: Recalculations for Pb emissions for the years 2005 and 2022



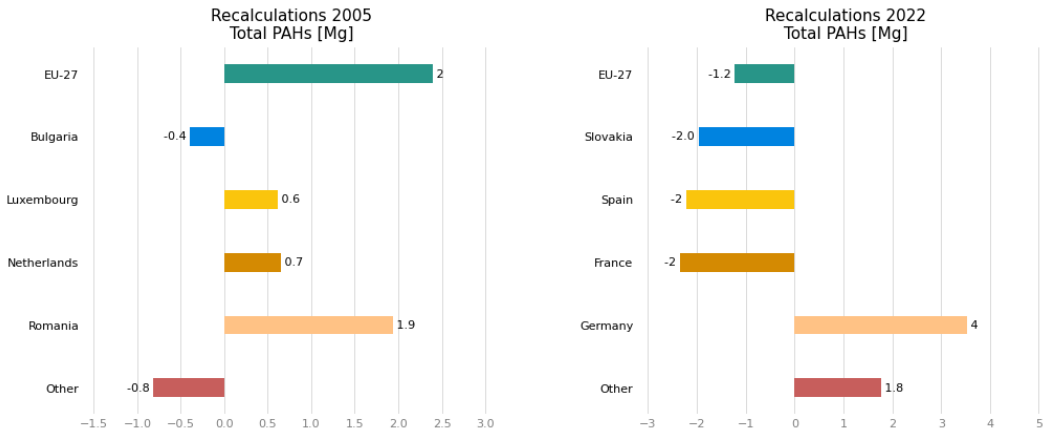
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of total polycyclic aromatic hydrocarbon emissions

Figure 5.13 shows the recalculations for total polycyclic aromatic hydrocarbons (PAHs) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2021.

For 2022, the largest recalculations for PAHs were performed by Germany in the commercial, institutional and households sector (1A4bi). For the 2005 recalculations by Romania, the waste sector (5C2) was the main contributor.

Figure 5.13: Recalculations for PAH emissions for the years 2005 and 2022



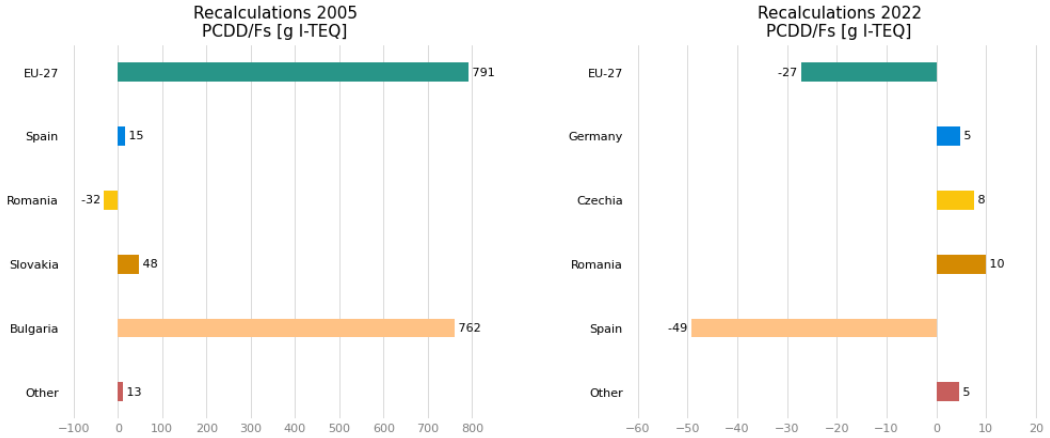
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of dioxin emissions

Figure 5.14 shows the recalculations for dioxin emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For 2022, the major contributing sector to the recalculations performed by Spain, was the waste sector (5C2). For 2005, there was a major recalculation by Romania in the energy production and distribution sector (1A1c). A reason for this recalculation could not be retrieved from the IIR.

Figure 5.14: Recalculations for dioxin emissions for the years 2005 and 2022



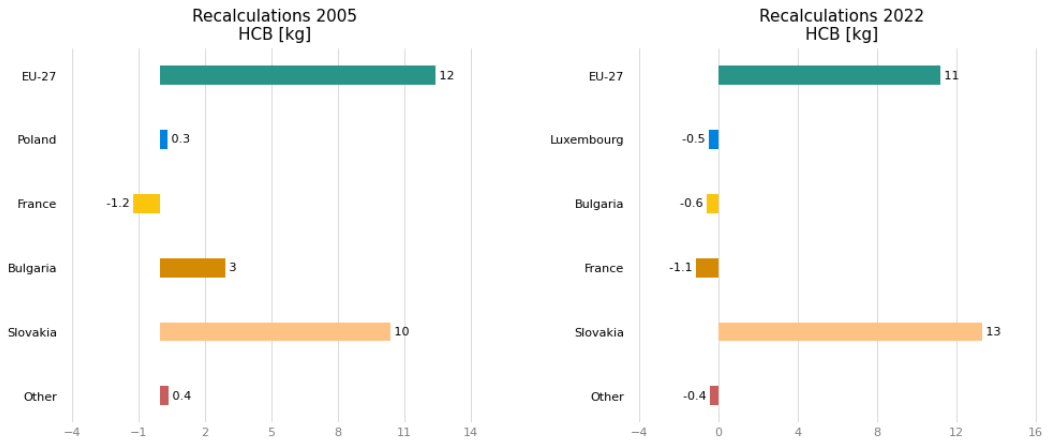
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of hexachlorobenzene emissions

Figure 5.15 shows the recalculations for hexachlorobenzene (HCB) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For 2022, significant recalculations of HCB emissions were performed by Slovakia in the waste sector (5Cbii).

Figure 5.15: Recalculations for HCB emissions for the years 2005 and 2022



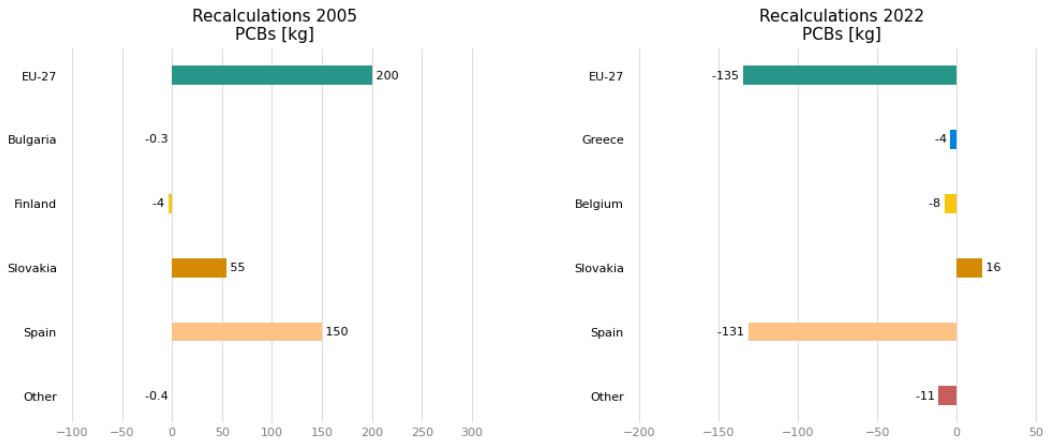
Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

Recalculations of polychlorinated biphenyl emissions

Figure 5.16 shows the recalculations for polychlorinated biphenyl (PCB) emissions for the EU-27 and the four biggest contributors to these recalculations for the years 2005 and 2022.

For 2005 and 2022, the largest recalculations of PCB emissions, when regarded as the absolute change, were performed by Spain in the industrial processes and product use (2K) sector.

Figure 5.16: Recalculations for PCB emissions for the years 2005 and 2022



Note: The figure shows recalculations for the EU-27 and the four biggest contributors. 'Other' is the sum of the recalculations from all other Member States.

5.1.2 EU Member States' recalculations

Under the reporting guidelines (UNECE, 2022b), all countries should submit explanatory informative inventory reports (IIRs) that include details explaining any recalculations made. Some EU Member States provide very detailed explanations for their recalculations of parts of the time series or the whole time series (e.g. methodological improvements, revisions of emission factors, reallocations, revisions of activity data and corrections of errors). The annual European Monitoring and Evaluation Programme (EMEP) inventory review report presents a summary of the individual recalculations reported by EU Member States. This report will be available on the Centre on Emission Inventories and Projections (CEIP) website from July onwards each year (EMEP CEIP, 2023c).

5.2 Improvements of the EU inventory

In 2024, the in-depth review focused on the 'industrial processes and product use – solvents' sector with a special emphasis on NMVOC emissions; including gridded data. While the focus was set on NMVOC emissions, also all other pollutants covered by Air Convention and its protocols were checked for the time series years 1990 – 2022 (UNECE/CEIP, 2024). In 2020, the EU emission inventory report (1990-2018) under the Air Convention was reviewed (UNECE/CEIP, 2021). The findings, in relation to the EU inventory, and their implementation from both reviews are summarised in Table 5.2.

5.2.1 Improvements planned at the EU level

For the long-term improvement of the EU inventory, the EEA and the European Topic Centre on Human Health and the Environment (ETC HE) have noted that the main future challenge for EU Member States remains improving the quality of data submissions in order to deliver more complete and more timely emission inventories to the Air Convention. Improvements cannot be implemented at the EU level alone; the EU Member States themselves must also develop and prioritise reliable and timely inventory reporting systems.

The EEA and ETC HE have identified the following challenges:

- Further progress on the completeness of reporting. Although clear progress has been made in recent years on making reporting complete, a full set of emission inventory data for air pollutants is still not available for all EU Member States, as noted earlier in this report. In addition, for certain pollutants (mainly particulate matter (PM) and heavy metals (HMs)), data could not be fully gap filled because some EU Member States had not reported emission values in any year; this is especially the case for pollutants for which reporting is not obligatory (Figure 1.5 and Figure 1.6).
- Updating of emissions data by EU Member States, including for previous years. The ETC HE has also identified a problem with gap filling using data submitted several years ago. In a number of cases, because countries have not submitted corrected or updated data sets, the EU inventory unavoidably includes inconsistencies. Therefore, the quality of the EU's inventory will be enhanced if the consistency and completeness of EU Member States' submissions improve. Such improvements would help reliable trend analysis to inform policy. Since 2017, emission inventory reviews have been conducted for each MS inventory under the National Emission reduction Commitments (NEC) Directive (EU, 2016). The results of the review of these processes also improve the quality of the Air Convention submissions.
- Reducing the need for gap filling. This is achievable if the EU Member States report complete time series as far as possible, and if they have already provided the data in

earlier submissions under the Air Convention. Current gap-filling procedures first use submissions received in the current years under various reporting mechanisms and then use older Air Convention submissions. However, because of the yearly inventory review under the NEC Directive, it is expected that the completeness of submissions (under the NEC Directive and Air Convention) will improve.

- More explanatory information on trends and recalculations. This would be possible only if the MS IIRs included such information. Thus, countries are encouraged to provide it.
- Further research on outliers in EU Member States' emission data to ensure that they reflect real emissions. A comparison of Member States' contributions to the EU total reveals extraordinarily high or low proportions in some instances. Future investigation could determine whether these high proportions reflect actual emissions or are attributable to incomplete reporting (or underestimates) by other EU Member States.

5.2.2 Stage 3 review recommendations from 2020 and 2024

Table 5.2 lists the status of improvements implemented in response to the stage 3 review by an expert review team (ERT) in 2020 (UNECE/CEIP, 2020). During the course of the 2025 reporting, focus by the EEA has been on improving the efficiency of compiling the EU inventory and the inventory report. Therefore, progress in other areas for improvement has been limited.

Table 5.2: EU stage 3 review results for 2020 and improvements implemented

Review findings (2020)			
Topic	**Recommendation**	**Implemented**	**Comment**
Transparency			
Timeliness	Submit the IIR a few weeks before the deadline of 30 May or, if that is not possible, provide the ERT with a draft IIR a few weeks earlier in those years when the EU is being reviewed, to facilitate the work of the ERT	Yes	The EU will provide the draft IIR before the reporting deadline in review years
Methodologies	Include in the IIR: summaries of the methodologies used by the MSs for emissions in the EU's key categories	No	Gathering this information would mean considerable effort; such an analysis is not feasible within the limited time-frame
Trends	Include in the IIR: explanations for all emission trends in the EU inventory, in consultation with the MSs	Partly	The EU has made efforts to provide explanations for trends in consultation with the MSs. More information on emission trends will be included in future submissions
Methods	Include in the IIR: sub-sector-level information on methods used to calculate emissions	No	MSs' inventories and IIRs are also part of the EU submission, and provide information on methods applied to sub-sectors. Including this information in the EU IIR is not feasible within the limited time-frame

Review findings (2020)			
Topic	**Recommendation**	**Implemented**	**Comment**
Sources included	Include in the IIR: sub-sector-level information on sources included in the inventory, especially in the industry sector	No	MSs' inventories and IIRs are also part of the EU submission, and provide information on sources to sub-sectors. Including this information in the EU IIR is not feasible within the limited time-frame
Gap-filling procedure	Include in the IIR: information at the sector level in the main text of the IIR about the gap-filling procedure, or at least provide Annex D containing this information as a public part of the IIR	Yes	Annex D will be publicly available in future submissions
EU-level inventory improvement programme	Include in the IIR: information on improvements and progress on improvement work	Ongoing	Table 5.3 (improvements implemented) and Table 5.4 (improvements planned) are provided in the EU IIR
Condensable component	Include in the IIR: summary information at the sectoral level on whether the condensable component of PM is included or not in MSs' inventories	Yes	Information on condensable components of PM is included in the EU IIR
Include links	Include in the IIR: links to relevant websites where gridded data and LPS data are available	Yes	The links are provided within the relevant sections of this report
Sector-specific QA/QC, trends	Implement sector-specific QA/QC procedures to investigate the data in detail and find explanations for real but unusual sector trends, and work with the individual MSs to provide more details on the drivers behind the trends	Ongoing	Work on outliers and unusual trends has already been established; further cooperation with the MSs is outside the scope of this report
Accuracy			
KCA to prioritise improvements	Use the results of the EU inventory's KCA to prioritise improvements in the inventory; include this issue in the improvement plan with clear steps and a schedule and report on progress in the next submissions	Ongoing	The EU is taking results from the KCA into account to improve the inventory and will provide information in the improvement plan
Completeness			
Completeness assessment	Include in the IIR: sector-specific assessment of the completeness of the inventory	No	This task would mean considerable effort; such an analysis is not feasible within the limited time-frame
Eurostat data for data gaps	Further improve the completeness and comparability of the inventory in consultation with the MSs by exploring the potential to use the Eurostat data or other data sources in cases where an MS does not include an existing source in its	No	This task would mean considerable effort; such an analysis is not feasible within the limited time-frame

Review findings (2020)			
Topic	**Recommendation**	**Implemented**	**Comment**
	inventory although methods are available in the inventory guidebook		
Activity data	Further improve the completeness and comparability of the inventory in consultation with the MSs by using the results of the NEC Directive technical review to improve the reporting of activity data in the EU submission	No	This task would mean considerable effort; such an analysis is not feasible within the limited time-frame
Fuel data	Further improve the completeness and comparability of the inventory in consultation with the MSs by including fuel data in the NFR tables for the years and the sectors for which this is possible	Yes	Fuel data is provided in the NFR tables (Annex A) for those years and sectors, which is possible
Uncertainty of information from MSs	The ERT recommends that the Party include an uncertainty analysis in line with paragraph 31 of the reporting guidelines and work with the MSs to increase their reporting on uncertainties in their inventories and report on summarised information on uncertainties	No	To develop an uncertainty analysis, possibly on GAINS and IIASA data for the years 2005 and 2010, would exceed the workload
Uncertainty analysis	The ERT also recommends that the Party develops a parallel uncertainty analysis independent of the MSs' submissions, including an assessment of the impacts of the gap-filling procedure and improvements following the NEC Directive technical review on inventory uncertainty	No	Gathering this information would mean considerable effort; such an analysis is not feasible within the limited time-frame
Comparability			
Notation keys	Always use notation keys in line with paragraph 12 of the reporting guidelines, and especially check that the use of the notation key 'NE' is in line with the reporting guidelines. Include information in the IIR to justify the uses of the notation keys; for 'IE' also document where the emissions are included	No	EEA decided to go with the current approach.
Compare MS data	Further improve the completeness and comparability of the inventory in consultation with the MSs by ensuring the comparability of MS data before aggregation at the EU level	No	This task would mean considerable effort; such an analysis is not feasible within the limited time-frame
Consistency			

Review findings (2020)			
Topic	**Recommendation**	**Implemented**	**Comment**
Sector-specific QA/QC	Include in the IIR: sector-specific information on QA/QC procedures	No	This task would mean considerable effort; such an analysis is not feasible within the limited time-frame
Sector-specific recalculations	Include in the IIR: sector-specific information on recalculations wherever possible	Ongoing	Considerable efforts have already been undertaken to extract this information either from the IIRs or by contacting the MSs
Recalculations	Include in the IIR: information of the impacts of recalculations based on gap filling	Yes	Figures 1.5 and 1.6 of the EU IIR provide this information. Because of increasing completeness of reporting by the MSs, the percentage of gap-filled values within the EU inventory is steadily decreasing

Note: GAINS, Greenhouse Gas and Air Pollution Interactions and Synergies (model); IE, included elsewhere; IIASA, International Institute for Applied Systems Analysis; LPS, large point source; MS, Member State; NFR, nomenclature for reporting; QA/QC, quality assurance and quality control.

Table 5.3: EU stage 3 review results for 2024

Review findings (2024)			
Topic	**Recommendation**	**Implemented**	**Comment**
Quality of reporting in the 'industrial processes and product use – solvents' sector			
Methodology	Review the gap-filling methodology applied to Member States' submissions	Pending	The gap-filling methodology will be revised
Methodology	Develop a methodology to calculate the emissions from intra-EU navigation.	Pending	Method development and its feasibility will be considered
Transparency	Ensure that activity data is presented in the Annex I submission where possible and where not, provide information why it is not possible in the Solvent sector within the IPPU chapter in the IIR.	Pending	Pending feasibility assessment
Transparency	Provide documentation on the Solvent sector within the IPPU chapter in the IIR	Pending	Pending feasibility assessment

Review findings (2024)			
Topic	**Recommendation**	**Implemented**	**Comment**
Transparency	Provide commentary on the trends of emissions from solvent related categories (2D, 2G) in the IIR	Pending	Pending feasibility assessment
Transparency	Document the reasons for using specific notation keys within the IIR.	Pending	Pending feasibility assessment

5.2.3 Further improvements undertaken in 2025

During 2024-2025 the methods to collate the tables and graphs for the EU IIR have been updated.

5.2.4 Improvements at the Member State level

Improvements at the Member State level also automatically improve the EU inventory. Information on Member State-level improvements can be found within the respective IIRs (see Appendix 5).

List of abbreviations

List of units, symbols and abbreviations referred to in the main text

Abbreviation	Name
As	Arsenic
B(a)P	Benzo(a)pyrene
B(b)F	Benzo(b)fluoranthene
BC	Black carbon
B(k)F	Benzo(k)fluoranthene
Cd	Cadmium
CDR	Central Data Repository
CEIP	Centre on Emission Inventories and Projections
CO	Carbon monoxide
Cr	Chromium
Cu	Copper
DG	Directorate-General
EEA	European Environment Agency
Eionet	European Environment Information and Observation Network
EMEP	European Monitoring and Evaluation Programme
ERT	Expert review team
ETC	European topic centre
ETC HE	European Topic Centre on Human Health and the Environment
EU	European Union
FGD	Flue gas desulphurisation
Gg	1 gigagram=10^9g=1kilotonne (kt)
GNFR	Gridding nomenclature for reporting
HCB	Hexachlorobenzene
HCE	Hexachloroethane
Hg	Mercury
HM	Heavy metal
IE	Included elsewhere
IIR	Informative inventory report
IP	Indeno(1,2,3-cd)pyrene
I-TEQ	International toxic equivalent
KCA	Key category analysis
kg	1 kilogram=10^3g (gram)

LPS	Large point source
LRTAP	Long-range Transboundary Air Pollution; (UNECE) Air Convention
LTO	Landing/take-off
Mg	1 megagram = 10^6 g = 1 tonne (t)
MMR	Monitoring Mechanism Regulation
NA	Not applicable
NE	Not estimated
NEC	National Emission reduction Commitments (Directive)
NFR	Nomenclature for reporting
NFR1	Nomenclature for reporting 1
NFR14	Nomenclature for reporting 14
NFR19	Nomenclature for reporting 19
NH_3	Ammonia
Ni	Nickel
NMVOC	Non-methane volatile organic compound
NO	Not occurring
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
NR	Not relevant
O_3	Ozone
PAH	Polycyclic aromatic hydrocarbon
Pb	Lead
PCB	Polychlorinated biphenyl
PCDD/F	Polychlorinated dibenzodioxin/dibenzofuran
PM	Particulate matter
$PM_{2.5}$	Particulate matter with a diameter of 2.5µm or less
PM_{10}	Particulate matter with a diameter of 10µm or less
POP	Persistent organic pollutant
QA	Quality assurance
QC	Quality control
Se	Selenium
SO_2	Sulphur dioxide
SO_X	Sulphur oxides
t	1 tonne (metric) = 1 megagram (Mg) = 10^6g
TERT	Technical Expert Review Team
TFEIP	Task Force on Emission Inventories and Projections
TSP	Total suspended particulate
UNECE	United Nations Economic Commission for Europe

UNFCCC	United Nations Framework Convention on Climate Change
VOC	Volatile organic compound
WM	With measures (projections)
WaM	With additional measures (projections)
Zn	Zinc

Key category source sector abbreviations referred to in the main text

Abbreviation	Name
1A1a	Public electricity and heat production
1A1b	Petroleum refining
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals
1A2gvii	Mobile combustion in manufacturing industries and construction
1A2gviii	Stationary combustion in manufacturing industries and construction: Other
1A3bi	Road transport: Passenger cars
1A3bii	Road transport: Light duty vehicles
1A3biii	Road transport: Heavy duty vehicles and buses
1A3biv	Road transport: Mopeds and motorcycles
1A3bv	Road transport: Gasoline evaporation
1A3bvi	Road transport: Automobile tyre and brake wear
1A3bvii	Road transport: Automobile road abrasion
1A3dii	National navigation (shipping)
1A4ai	Commercial/institutional: Stationary
1A4bi	Residential: Stationary
1A4bii	Residential: Household and gardening (mobile)
1A4ci	Agriculture/forestry/fishing: Stationary
1A4cii	Agriculture/forestry/fishing: Off-road vehicles and other machinery
1B2aiv	Fugitive emissions oil: Refining/storage
1B2av	Distribution of oil products
2A1	Cement production
2A3	Glass production
2A5a	Quarrying and mining of minerals other than coal
2A5b	Construction and demolition
2B10a	Chemical industry: Other
2C1	Iron and steel production
2C3	Aluminium production
2C6	Zinc production
2C7a	Copper production

2D3a	Domestic solvent use including fungicides
2D3b	Road paving with asphalt
2D3d	Coating applications
2D3e	Degreasing
2D3g	Chemical products
2D3h	Printing
2D3i	Other solvent use
2G	Other product use
2H2	Food and beverages industry
2K	Consumption of POPs and heavy metals
2L	Other production, consumption, storage, transportation or handling of bulk products
3B1a	Manure management — Dairy cattle
3B1b	Manure management — Non-dairy cattle
3B3	Manure management — Swine
3B4gi	Manure management — Laying hens
3B4gii	Manure management — Broilers
3Da1	Inorganic N fertilisers (also includes urea application)
3Da2a	Animal manure applied to soils
3Da3	Urine and dung deposited by grazing animals
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products
3De	Cultivated crops
3Df	Use of pesticides
3F	Field burning of agricultural residues
5C1bi	Industrial waste incineration
5C1biii	Clinical waste incineration
5C1bv	Cremation
5C2	Open burning of waste
5E	Other waste

Country codes

Abbreviation	Name
AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czechia
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia

References

EEA, 2024a, 'Emissions of the main air pollutants in Europe ', European Environment Agency (https://www.eea.europa.eu/ims/emissions-of-the-main-air) accessed 20 May 2025.

EEA, 2023b, 'Heavy metal emissions in Europe', European Environment Agency (https://www.eea.europa.eu/ims/heavy-metal-emissions-in-europe) accessed 20 May 2025.

Eionet, 2023a, 'European Environment Information and Observation Network', European Environment Information and Observation Network (http://eionet.europa.eu/) accessed 23 May 2025.

Eionet, 2023b, 'Eionet — Central Data Repository', European Environment Information and Observation Network (http://cdr.eionet.europa.eu/) accessed 23 May 2025.

EMEP CEIP, 2023a, 'Annexes to the 2023 reporting guidelines', European Monitoring and Evaluation Programme Centre on Emission Inventories and Projections (https://www.ceip.at/reporting-instructions/annexes-to-the-2023-reporting-guidelines/) accessed 23 May 2025.

EMEP CEIP, 2023b, 'Review process', European Monitoring and Evaluation Programme Centre on Emission Inventories and Projections (https://www.ceip.at/review-of-emission-inventories/review-process) accessed 23 May 2025.

EMEP CEIP, 2023c, 'Inventory review reports', European Monitoring and Evaluation Programme Centre on Emission Inventories and Projections (https://www.ceip.at/review-of-emission-inventories/technical-review-reports) accessed 23 May 2025.

EMEP/EEA, 2023, *EMEP/EEA air pollutant emission inventory guidebook — 2023*, EEA Report No 06/2023, European Environment Agency (https://www.eea.europa.eu/publications/emep-eea-guidebook-2023) accessed 23 May 2025.

ETC/ACM, 2015, *Proposed unification of the gap filling procedures for the EU Air Convention emission inventory and the EMEP Air Convention emission inventory*, Technical Paper, European Topic Centre on Air Pollution and Climate Change Mitigation (available on request).

EU, 1991, Council Directive 91/441/EEC of 26 June 1991 amending Directive 70/220/EEC on the approximation of the laws of the Member States relating to measures to be taken against air pollution by emissions from motor vehicles; https://eur-lex.europa.eu/eli/dir/1991/441/oj; accessed 23 May 2025.

EU, 1999, Council Regulation (EC) No 933/1999 of 29 April 1999 amending Regulation (EEC) No 1210/90 on the establishment of the European Environment Agency and the European Environment Information and Observation Network (OJ L 117, 5.5.1999, p. 1-4) (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31999R0933&from=SL) accessed 23 May 2025.

EU, 2007, Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information (https://eur-lex.europa.eu/eli/reg/2007/715/oj) accessed 17 May 2025.

EU, 2009, Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC (https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32009L0030) accessed 23 May 2025.

EU, 2016, Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (OJ L 344, 17.12.2016, p. 31) (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2016:344:FULL&from=EN) accessed 23 May 2025.

EU, 2018, 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, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2018.328.01.0001.01.ENG) accessed 23 May 2025.

EU, 2024, IIR (https://cdr.eionet.europa.eu/ec/clrtap/2024/) accessed 23 May 2025.

France's IIR 2024 (https://cdr.eionet.europa.eu/fr/un/clrtap/iir/) accessed 23 May 2025.

Germany's IIR 2022 (https://iir.umweltbundesamt.de/2022/) accessed 23 May 2025.

Germany's IIR 2024 (https://cdr.eionet.europa.eu/de/un/clrtap/iir/) accessed 23 May 2025.

Latvia's IIR 2025 (https://cdr.eionet.europa.eu/lv/un/clrtap/iir/) accessed 23 May 2025.

Poland's IIR 2025 (https://cdr.eionet.europa.eu/pl/un/clrtap/iir/) accessed 23 May 2025.

Spain's IIR 2024 (https://cdr.eionet.europa.eu/es/un/clrtap/iir/) accessed 23 May 2025.

UNECE, 1979, The 1979 Geneva Convention on Long-range Transboundary Air Pollution, United Nations Economic Commission for Europe (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:21979A1113(01)) accessed 23 May 2025.

UNECE, 1984, EMEP Protocol: the 1984 Geneva Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP), United Nations Economic Commission for Europe (http://www.unece.org/env/lrtap/emep_h1.html) accessed 23 May 2025.

UNECE, 1985, The 1985 Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent, United Nations Economic Commission for

Europe (https://unece.org/sites/default/files/2021-10/1994.Sulphur.e.pdf) accessed 23 May 2025.

UNECE, 1988, Protocol concerning the Control of Emissions of Nitrogen Oxides: the 1988 Sofia Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes, United Nations Economic Commission for Europe (http://www.unece.org/env/lrtap/nitr_h1.html) accessed 23 May 2025.

UNECE, 1991, Protocol concerning the Control of Emissions of Volatile Organic Compounds: the 1991 Geneva Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes, United Nations Economic Commission for Europe (http://www.unece.org/env/lrtap/vola_h1.html) accessed 23 May 2025.

UNECE, 1994, Protocol on Further Reduction of Sulphur Emissions: the 1994 Oslo Protocol on Further Reduction of Sulphur Emissions, United Nations Economic Commission for Europe (https://unece.org/environment-policyair/protocol-further-reduction-sulphur-emissions) accessed 23 May 2025.

UNECE, 1998a, Protocol on Persistent Organic Pollutants (POPs): the 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs), United Nations Economic Commission for Europe (http://www.unece.org/env/lrtap/pops_h1.html) accessed 23 May 2025.

UNECE, 1998b, Protocol on Heavy Metals: the 1998 Aarhus Protocol on Heavy Metals, United Nations Economic Commission for Europe (http://www.unece.org/env/lrtap/hm_h1.html) accessed 23 May 2025.

UNECE, 1999, Protocol to Abate Acidification, Eutrophication and Ground-level Ozone: the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, United Nations Economic Commission for Europe (http://www.unece.org/env/lrtap/multi_h1.html) accessed 23 May 2025.

UNECE, 2012a, Decision 2012/3: Adjustments under the Gothenburg Protocol to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them, ECE/EB.AIR/111, United Nations Economic Commission for Europe (http://www.unece.org/fileadmin/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1__ENG_DECISION_3.pdf) accessed 23 May 2025.

UNECE, 2012b, Decision 2012/2: Amendment of the text of and annexes II to IX to the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone and the addition of new annexes X and XI (https://unece.org/DAM/env/documents/2013/air/ECE_EB.AIR_111_Add.1__ENG_DECISION_2.pdf) accessed 23 May 2025.

UNECE, 2022a, Report of the Executive Body on its forty-second session, ECE/EB.AIR/150, United Nations Economic Commission for Europe (https://unece.org/sites/default/files/2023-03/Advance%20version_ECE_EB.AIR_150.pdf) accessed 23 May 2025.

UNECE, 2022b, Adoption of the updated Guidelines for Reporting Emissions and Projections Data under the Convention on Long-range Transboundary Air Pollution, ECE/EB.AIR/150/Add.1 (https://unece.org/sites/default/files/2023-04/Decision%202022_1%20%28E%29.pdf) accessed 23 May 2025.

UNECE, 2022c, Guidelines for Reporting Emissions and Projections Data under the Convention on Long-range Transboundary Air Pollution, ECE/EB.AIR/GE.1/2022/20−ECE/EB.AIR/WG.1/2022/13 (https://unece.org/sites/default/files/2022-08/ECE_EB.AIR_GE.1_2022_20-2210473E.pdf) accessed 23 May 2025.

UNECE, 2024 Review of adjustment applications Report by the Centre on Emission Inventories and Projections, ECE/EB.AIR/GE.1−WG.1/2024/INF.6, (https://unece.org/sites/default/files/2024-08/Item%205a%20ECE_EB.AIR_GE.1_2024%20INF%206%20CEIP%20fin.pdf) accessed 20 May 2025.

UNECE/CEIP, 2021, Report for the stage 3 in-depth review of emission inventories submitted under the UNECE Air Convention and EU National Emissions Ceilings Directive for: European Union, CEIP/S3.RR/2020/EU 24/11/2020CEIP/S3.RR/2017/EU, United Nations (https://www.ceip.at/fileadmin/inhalte/ceip/00_pdf_other/2020_s3/eu_s3_rr_2020_final.pdf) accessed 20 May 2025.

UNECE/CEIP, 2024, Report for the Stage 3 ad-hoc review of emission inventories submitted under the UNECE LRTAP Convention 2024, EU, (https://webdab01.umweltbundesamt.at/download/review/EU/2024/EU_2024_Stage3RR_FINAL.pdf?cgiproxy_skip=1) accessed 31 March 2025.

Appendix 1: Notation keys

Where there are methodological or data gaps in the inventories, information on these gaps should be presented in a transparent manner. Parties should clearly indicate, which sources they have not considered in their inventories — although the inventory guidebook (EMEP/EEA, 2023) includes them — and explain the reason for excluding them. Similarly, each Party should indicate if it has excluded part of its territory and explain why. In addition, each Party should use the notations presented below to fill the blanks in all the tables in the nomenclature for reporting (NFR) inventory. This approach helps in assessing how complete the emission data reports are. Further explanation and guidance concerning the use of these notation codes are given in the European Monitoring and Evaluation Programme (EMEP) reporting guidelines (UNECE, 2022c). The notation keys are as follows:

NO: 'Not occurring' means that an emission source or process does not exist in a country.

NE: 'Not estimated' means that emissions occur but have not been estimated or reported. Where an inventory uses 'NE', the Party should indicate why it could not estimate emissions.

NA: 'Not applicable' means that a source exists but relevant emissions are considered never to occur.

IE: 'Included elsewhere' is for emissions that are estimated and included in the inventory but are not presented separately for the relevant source. Where it uses 'IE', the Party should indicate where the inventory includes the emissions from the displaced source category and should give the reasons for deviating from the expected category.

C: 'Confidential' is for aggregated emissions that the inventory includes elsewhere because reporting at a disaggregated level could lead to the disclosure of confidential information. Where an inventory uses 'C', it should make reference to the protocol provision that authorises it.

NR: 'Not relevant' eases reporting where different protocols do not strictly require details of the emissions. According to Article III paragraph 9 in the reporting guidelines, emission inventory reporting should cover all years from 1980 onwards if data are available. However, for example, some Parties do not need to report emissions of non-methane volatile organic compounds (NMVOCs) prior to 1988.

Appendix 2: Air Convention emission-reporting programme for 2025

Emission data should be submitted to the European Monitoring and Evaluation Programme (EMEP) Centre on Emission Inventories and Projections (CEIP) by 15 February 2025. Informative inventory reports (IIRs) should reach the centre no later than 15 March 2025.

Table A2.1 summarises information in the revised reporting guidelines (UNECE, 2022b,c).

Description of contents	Pollutant(s)	Reporting for the years([a])
A. National total emissions – reported every year		
Main pollutants other than PM	NO_X, NMVOCs, SO_X, NH_3, CO	1990-2023
Particulate matter([b])	$PM_{2.5}$, PM_{10} (TSPs, BC)	2000-2023
Heavy metals([b])	Pb, Cd, Hg, (As, Cr, Cu, Ni, Se, Zn)	1990-2023
Persistent organic pollutants([b])	PCDD/Fs, total PAHs, PCBs, HCB (PAHs: B(a)P, B(b)F, B(k)F, IP)	1990-2023
B. Emissions by NFR source category – reported every year		
Main pollutants other than PM	NO_X, NMVOCs, SO_X, NH_3, CO	1990-2023
Particulate matter([b])	$PM_{2.5}$, PM_{10}, (TSPs, BC)	2000-2023
Heavy metals([b])	Pb, Cd, Hg, (As, Cr, Cu, Ni, Se, Zn)	1990-2023
Persistent organic pollutants([b])	PCDD/Fs, total PAHs, PCBs, HCB (PAHs: B(a)P, B(b)F, B(k)F, IP)	1990-2023
C. Activity data – reported every year	NO_X, NMVOCs, SO_X, NH_3, CO	1990-2023
D. Gridded data in the EMEP 0.1°×0.1° longitude/latitude grid, sector emissions (GNFR19)([c]) and national totals (optional) –	NO_X, NMVOCs, SO_X, NH_3, CO, $PM_{2.5}$, PM_{10}, Pb, Cd, Hg, PCDD/Fs, PAHs, HCB, PCBs	2015, 2019, 2023 (1990, 1995, 2000, 2005, 2010 if not previously reported)

reported every 4 years, from 2017 onwards		
E. Emissions from large point sources (LPSs) – reported every 4 years, from 2017 onwards	NO_X, NMVOCs, SO_X, NH_3, CO, $PM_{2.5}$, PM_{10}, Pb, Cd, Hg, PCDD/Fs, PAHs, HCB, PCBs	2015, 2019, 2023 (1990, 1995, 2000, 2005, 2010 if not previously reported)
F. Projected emissions and projected activity data – reported every 4 years, from 2015 onwards *(thus not a part of the 2025 reporting requirements)*		
1. National total emission projections	NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$, BC	2025, 2030, where available 2040 and 2050
2. Emission projections by NFR19	NO_X, NMVOCs, SO_X, NH_3, $PM_{2.5}$, BC	2025, 2030, where available 2040 and 2050
3. Projected activity data by NFR19		2025, 2030, where available 2040 and 2050
Additional reporting for review and assessment purposes – reported every 5 years		
VOC speciation/height distribution/temporal distribution		Parties are encouraged to review the information used for modelling at https://www.ceip.at/webdab-emission-database/emissions-as-used-in-emep-models
Land use data/Hg breakdown		
Percentage of toxic congeners of PCDD/F emissions		
Pre-1990 emissions of PAHs, HCB, PCDD/Fs and PCBs		
Information on natural emissions		

Notes: (a) As a minimum, data for the base year of the relevant protocol and from the year of entry into force of that protocol and up to the latest year (i.e. the second-last before the current year) should be reported; (b) Parties report the pollutants listed in brackets voluntarily; (c) Gap-filled NFR19.

Reporting format

Each Party should use the reporting format in Annex IV of the Air Convention reporting guidelines (UNECE, 2022b,c) for its annual submissions. It should submit the information to the CEIP formally, preferably in electronic format, and notify the Air Convention via the United Nations Economic Commission for Europe (UNECE) Secretariat. The reporting format, including the nomenclature for reporting (NFR), is standardised for reporting estimates of emissions. It includes activity data, projected activity data, projected emissions and other relevant information. The reporting format aims to facilitate electronic submissions by making it easier

to process emission information and prepare useful documentation about technical analysis and synthesis.

The nomenclature for reporting 19 (NFR19) format covers:

- national annual emissions and national annual sector emissions (Annex I);
- total and aggregated sector emissions for reporting emissions of nitrogen oxides (NO_X), non-methane volatile organic compounds (NMVOCs), sulfur oxides (SO_X), ammonia (NH_3), particulate matter (PM), black carbon (BC), carbon monoxide (CO), lead (Pb), cadmium (Cd), mercury (Hg), polychlorinated dibenzodioxins/dibenzofurans (PCDD/Fs), polycyclic aromatic hydrocarbons (PAHs), hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs) for the EMEP 0.1°×0.1° grid cell and from large point sources (LPSs) (Annexes V and VI);
- for 2020, 2025, 2030, 2040 and 2050, projected activity data and projected national total emissions of NOX, NMVOCs, sulfur and NH_3, which Parties are to report for the source categories listed in Annex IV (A-with measures (WM); B-WM; A-with additional measures (WaM); B-WaM).

Table A2.2 EU: country groupings

EU-11 refers to the following 11 Member States of the EU: Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Greece, Portugal and Spain
EU-27 refers to the 27 Member States of the EU

Appendix 3: Status of reporting and timeliness

Table A3.1 EU Member State's inventory submissions 2025: date received by the EEA, years covered and information provided (as of 12th of May 2025)

	Submission date and format								
Member State	Submission date*	Resubmission date	Adjustment date (Information or Annex submission)	Projection submission date	Grid submission date	LPS submission date	Date of additional information	Date of IIR	NFR template version
Austria	13/02/2025	14/03/2025		31/03/2025	30/04/2025	30/04/2025 30/04/2025		14/03/2025 30/04/2025	2019-1
Belgium	15/02/2025			17/03/2025	01/05/2025	01/05/2025		17/03/2025 01/05/2025	2019-1
Bulgaria	17/02/2025	06/03/2025 17/03/2025		18/03/2025 18/03/2025 18/03/2025	30/04/2025	30/04/2025		17/03/2025 30/04/2025	2019-1
Croatia	11/02/2025			12/03/2025	30/04/2025 15/05/2025	04/04/2025		11/03/2025 04/04/2025	2019-1
Cyprus	14/02/2025			14/03/2025 13/05/2025	14/03/2025	20/05/2025 20/05/2025		15/03/2025	2019-1
Czechia	14/02/2025	14/03/2025	14/02/2025	14/03/2025 14/03/2025 14/03/2025	07/05/2025 07/05/2025	01/05/2025 05/05/2025		15/03/2025	2019-1
Denmark	03/03/2025		03/03/2025	14/03/2025	15/05/2025	01/05/2025		14/03/2025	2019-1
Estonia	11/02/2025	17/03/2025		10/03/2025 13/03/2025	24/04/2025	24/04/2025		14/03/2025 29/04/2025	2019-1
Finland	14/02/2025	14/02/2025 15/03/2025	14/02/2025 15/03/2025	15/03/2025	29/04/2025	28/04/2025		15/03/2025	2019-1
France	12/02/2025		12/02/2025	31/03/2025 07/04/2025	15/05/2025			14/03/2025 14/03/2025 29/04/2025	2019-1
Germany	14/02/2025			14/03/2025	03/05/2025	24/04/2025		08/04/2025	2019-1
Greece	11/02/2025			14/03/2025	13/05/2025	07/05/2025 12/05/2025		13/03/2025	2019-1
Hungary	21/02/2025			27/03/2025					2019-1
Ireland	14/02/2025	19/03/2025		14/03/2025	03/05/2025	02/05/2025 08/05/2025		14/03/2025 02/05/2025	2019-1
Italy	14/02/2025	17/02/2025		26/03/2025 26/03/2025				14/03/2025 26/03/2025	2019-1
Latvia	14/02/2025	14/03/2025 14/04/2025		31/03/2025 14/04/2025	30/04/2025 07/05/2025	30/04/2025		14/03/2025 31/03/2025 14/04/2025 30/04/2025	2019-1
Lithuania	14/02/2025	17/02/2025 15/04/2025		21/03/2025	29/04/2025 05/05/2025	05/05/2025		16/03/2025	2019-1
Luxembourg	25/02/2025	19/03/2025		19/03/2025	16/05/2025 16/05/2025	16/05/2025		29/04/2025	2019-1
Malta	03/03/2025	15/04/2025		15/04/2025	19/05/2025	20/05/2025		15/04/2025 19/05/2025	2019-1
Netherlands	12/02/2025		12/02/2025 13/02/2025 13/02/2025 13/02/2025	13/03/2025 26/03/2025 28/04/2025		30/04/2025		13/03/2025 14/03/2025	2019-1
Poland	11/02/2025			06/03/2025 12/03/2025	30/04/2025	30/04/2025		12/03/2025	2019-1
Portugal	14/02/2025	14/03/2025		18/03/2025 01/04/2025 23/04/2025				15/03/2025 01/04/2025	2019-1
Romania	14/02/2025			13/03/2025				13/03/2025	2019-1
Slovakia	14/02/2025	14/03/2025	15/05/2025	14/03/2025 15/04/2025	30/04/2025	30/04/2025		14/03/2025 15/04/2025 15/05/2025	2019-1
Slovenia	11/02/2025			15/04/2025	28/04/2025	25/04/2025		14/03/2025 15/04/2025 14/05/2025	2019-1
Spain	13/02/2025			22/04/2025	09/05/2025	30/04/2025		13/03/2025	2019-1
Sweden	24/01/2025			06/03/2025 25/03/2025	30/04/2025	09/04/2025		24/02/2025	2019-1

Notes: Dates in red indicate that data were submitted after the formal deadline for submissions (submissions 15 February; resubmissions 15 March; projections 15 March; IIR 15 March).

(a) Refers to the first submission of inventory data to the Central Data Repository (CDR); submission of other data are possible at later dates.

IIR, informative inventory report; LPS, large point source; NFR, nomenclature for reporting.

Table A3.2 Coverage of data in the 2025 inventory submissions by EU member States (as of 12th of May 2025)

	Years Reported								
Member State	SOx,NOx, CO, NH3, NMVOC	Cd,Hg,Pb	Additional HM	PM2.5, PM10	TSP	BC	POPs, PAH, PCDD, HCB, PCB	Additional PAH: B(a)P B(b)F B(k)F IP	Activity Data
Austria	1990-2023	1990-2023		1990, 1995, 2000-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Belgium	1990-2023	1990-2023	1990-2023	2000-2023	2000-2023	2000-2023	1990-2023	1990-2023	1990-2023
Bulgaria	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Croatia	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Cyprus	1990-2023	1990-2023	1990-2023	2000-2023	2000-2023	2000-2023	1990-2023	1990-2023	1990-2023
Czechia	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Denmark	1980-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1980-2023
Estonia	1990-2023	1990-2023	1990-2023	2000-2023	1990-2023	2000-2023	1990-2023	1980-2023	1990-2023
Finland	1980-2023	1980-2023	1980-2023	1980-2023	1990-2023	1990-2023	1980-2023	1980-2023	1980-2023
France	1980-2023	1980-2023	1980-2023	1980-2023	1990-2023	1990-2023	1980-2023	1990-2023	1980-2023
Germany	1990-2023	1990-2023	1990-2023	1995-2023	1990-2023	2000-2023	1990-2023	1990-2023	1990-2023
Greece	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Hungary	1990-2023	1990-2023	1990-2023	1990-2023	2000-2023	2000-2023	1990-2023	1987, 1990-2023	1990-2023
Ireland	1987, 1990-2023	1987, 1990-2023	1987, 1990-2023	1987, 1990-2023	1990-2023	1990-2023	1987, 1990-2023	1990-2023	1987, 1990-2023
Italy	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Latvia	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Lithuania	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Luxembourg	1990-2023	1990-2023		1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Malta	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Netherlands	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Poland	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Portugal	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Romania	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Slovakia	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023
Slovenia	1980-2023	1990-2023	1990-2023	2000-2023	2000-2023	2000-2023	1990-2023	1990-2023	1990-2023
Spain	1990-2023	1990-2023	1990-2023	2000-2023	2000-2023	2000-2023	1990-2023	1990-2023	1990-2023
Sweden	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023	1990-2023

Notes: Reporting of additional HMs is not mandatory.

EU Member States do not have to report TSPs if they report PM emissions.

Appendix 4: Conversion chart for aggregated sector groups

To enable the presentation of sectoral emission trends, individual nomenclature for reporting (NFR) source categories for the EU-27 inventory were aggregated into the following main sector groups:

- energy production and distribution;
- energy use in industry;
- industrial processes and product use;
- commercial, institutional and households;
- road transport;
- non-road transport;
- agriculture;
- waste.

Table A4.1 provides a conversion chart showing which of the individual NFR source categories appeared in each of the aggregated sector groups.

Table A4.1 Conversion chart for aggregated sector groups

NFR code	Full name	EEA aggregated sector name
1A1a	Public electricity and heat production	Energy production and distribution
1A1b	Petroleum refining	Energy production and distribution
1A1c	Manufacture of solid fuels and other energy industries	Energy production and distribution
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	Energy use in industry
1A2b	Stationary combustion in manufacturing industries and construction: Non-ferrous metals	Energy use in industry
1A2c	Stationary combustion in manufacturing industries and construction: Chemicals	Energy use in industry
1A2d	Stationary combustion in manufacturing industries and construction: Pulp, paper and print	Energy use in industry
1A2e	Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco	Energy use in industry
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	Energy use in industry
1A2gvii	Mobile combustion in manufacturing industries and construction	Non-road transport
1A2gviii	Stationary combustion in manufacturing industries and construction: Other	Energy use in industry
1A3ai(i)	International aviation LTO (civil)	Non-road transport
1A3aii(i)	Domestic aviation LTO (civil)	Non-road transport
1A3bi	Road transport: Passenger cars	Road transport
1A3bii	Road transport: Light duty vehicles	Road transport
1A3biii	Road transport: Heavy duty vehicles and buses	Road transport
1A3biv	Road transport: Mopeds and motorcycles	Road transport
1A3bv	Road transport: Gasoline evaporation	Road transport
1A3bvi	Road transport: Automobile tyre and brake wear	Road transport
1A3bvii	Road transport: Automobile road abrasion	Road transport
1A3c	Railways	Non-road transport
1A3di(ii)	International inland waterways	Non-road transport
1A3dii	National navigation (shipping)	Non-road transport
1A3ei	Pipeline transport	Non-road transport
1A3eii	Other	Non-road transport

NFR code	Full name	EEA aggregated sector name
1A4ai	Commercial/institutional: Stationary	Commercial, institutional and households
1A4aii	Commercial/institutional: Mobile	Non-road transport
1A4bi	Residential: Stationary	Commercial, institutional and households
1A4bii	Residential: Household and gardening (mobile)	Non-road transport
1A4ci	Agriculture/forestry/fishing: Stationary	Commercial, institutional and households
1A4cii	Agriculture/forestry/fishing: Off-road vehicles and other machinery	Non-road transport
1A4ciii	Agriculture/forestry/fishing: National fishing	Non-road transport
1A5a	Other stationary (including military)	Commercial, institutional and households
1A5b	Other, mobile (including military, land-based and recreational boats)	Non-road transport
1B1a	Fugitive emission from solid fuels: Coal mining and handling	Energy production and distribution
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	Energy production and distribution
1B1c	Other fugitive emissions from solid fuels	Energy production and distribution
1B2ai	Fugitive emissions oil: Exploration, production, transport	Energy production and distribution
1B2aiv	Fugitive emissions oil: Refining/storage	Energy production and distribution
1B2av	Distribution of oil products	Energy production and distribution
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	Energy production and distribution
1B2c	Venting and flaring (oil, gas, combined oil and gas)	Energy production and distribution
1B2d	Other fugitive emissions from energy production	Energy production and distribution
2A1	Cement production	Industrial processes and product use
2A2	Lime production	Industrial processes and product use
2A3	Glass production	Industrial processes and product use
2A5a	Quarrying and mining of minerals other than coal	Industrial processes and product use
2A5b	Construction and demolition	Industrial processes and product use
2A5c	Storage, handling and transport of mineral products	Industrial processes and product use
2A6	Other mineral products	Industrial processes and product use
2B1	Ammonia production	Industrial processes and product use
2B2	Nitric acid production	Industrial processes and product use
2B3	Adipic acid production	Industrial processes and product use
2B5	Carbide production	Industrial processes and product use
2B6	Titanium dioxide production	Industrial processes and product use
2B7	Soda ash production	Industrial processes and product use
2B10a	Chemical industry: Other	Industrial processes and product use
2B10b	Storage, handling and transport of chemical products	Industrial processes and product use
2C1	Iron and steel production	Industrial processes and product use
2C2	Ferroalloys production	Industrial processes and product use
2C3	Aluminium production	Industrial processes and product use
2C4	Magnesium production	Industrial processes and product use
2C5	Lead production	Industrial processes and product use
2C6	Zinc production	Industrial processes and product use
2C7a	Copper production	Industrial processes and product use
2C7b	Nickel production	Industrial processes and product use
2C7c	Other metal production	Industrial processes and product use
2C7d	Storage, handling and transport of metal products	Industrial processes and product use
2D3a	Domestic solvent use including fungicides	Industrial processes and product use
2D3b	Road paving with asphalt	Industrial processes and product use
2D3c	Asphalt roofing	Industrial processes and product use
2D3d	Coating applications	Industrial processes and product use
2D3e	Degreasing	Industrial processes and product use
2D3f	Dry cleaning	Industrial processes and product use

NFR code	Full name	EEA aggregated sector name
2D3g	Chemical products	Industrial processes and product use
2D3h	Printing	Industrial processes and product use
2D3i	Other solvent use	Industrial processes and product use
2G	Other product use	Industrial processes and product use
2H1	Pulp and paper industry	Industrial processes and product use
2H2	Food and beverages industry	Industrial processes and product use
2H3	Other industrial processes	Industrial processes and product use
2I	Wood processing	Industrial processes and product use
2J	Production of POPs	Industrial processes and product use
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	Industrial processes and product use
2L	Other production, consumption, storage, transportation or handling of bulk products	Industrial processes and product use
3B1a	Manure management — Dairy cattle	Agriculture
3B1b	Manure management — Non-dairy cattle	Agriculture
3B2	Manure management — Sheep	Agriculture
3B3	Manure management — Swine	Agriculture
3B4a	Manure management — Buffalo	Agriculture
3B4d	Manure management — Goats	Agriculture
3B4e	Manure management — Horses	Agriculture
3B4f	Manure management — Mules and asses	Agriculture
3B4gi	Manure management — Laying hens	Agriculture
3B4gii	Manure management — Broilers	Agriculture
3B4giii	Manure management — Turkeys	Agriculture
3B4giv	Manure management — Other poultry	Agriculture
3B4h	Manure management — Other animals	Agriculture
3Da1	Inorganic N-fertilisers (includes also urea application)	Agriculture
3Da2a	Animal manure applied to soils	Agriculture
3Da2b	Sewage sludge applied to soils	Agriculture
3Da2c	Other organic fertilisers applied to soils (including compost)	Agriculture
3Da3	Urine and dung deposited by grazing animals	Agriculture
3Da4	Crop residues applied to soils	Agriculture
3Db	Indirect emissions from managed soils	Agriculture
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	Agriculture
3Dd	Off-farm storage, handling and transport of bulk agricultural products	Agriculture
3De	Cultivated crops	Agriculture
3Df	Use of pesticides	Agriculture
3F	Field burning of agricultural residues	Agriculture
3I	Agriculture other	Agriculture
5A	Biological treatment of waste — Solid waste disposal on land	Waste
5B1	Biological treatment of waste — Composting	Waste
5B2	Biological treatment of waste — Anaerobic digestion at biogas facilities	Waste
5C1a	Municipal waste incineration	Waste
5C1bi	Industrial waste incineration	Waste
5C1bii	Hazardous waste incineration	Waste
5C1biii	Clinical waste incineration	Waste
5C1biv	Sewage sludge incineration	Waste
5C1bv	Cremation	Waste
5C1bvi	Other waste incineration	Waste
5C2	Open burning of waste	Waste

NFR code	Full name	EEA aggregated sector name
5D1	Domestic waste water handling	Waste
5D2	Industrial waste water handling	Waste
5D3	Other waste water handling	Waste
5E	Other waste	Waste
6A	Other (included in national total for entire territory)	Other

Note: LTO, landing/take-off; NFR, nomenclature for reporting; POPs, persistent organic pollutant.

Appendix 5: EU Member State informative inventory reports

Table A5.1 List of submitted informative inventory reports (IIRs) by the EU Member States including source and date of submission (as of 25th of May 2025)

Country code	Source	Date of submission
AT	https://cdr.eionet.europa.eu/at/un/clrtap/iir	14 Mar 2025
BE	https://cdr.eionet.europa.eu/be/un/clrtap/iir	17 Mar 2025
BG	https://cdr.eionet.europa.eu/bg/un/clrtap/iir	17 Mar 2025
CY	https://cdr.eionet.europa.eu/cy/un/clrtap/iir	15 Mar 2025
CZ	https://cdr.eionet.europa.eu/cz/un/clrtap/iir	15 Mar 2025
DE	https://cdr.eionet.europa.eu/de/un/clrtap/iir/	8 April 2025
DK	https://cdr.eionet.europa.eu/dk/un/clrtap/iir	14 Mar 2025
EE	https://cdr.eionet.europa.eu/ee/un/clrtap/iir	14 Mar 2025
EL	https://cdr.eionet.europa.eu/gr/un/clrtap/iir	13 Mar 2025
ES	https://cdr.eionet.europa.eu/es/un/clrtap/iir	13 Mar 2025
FI	https://cdr.eionet.europa.eu/fi/un/clrtap/iir	15 Mar 2025
FR	https://cdr.eionet.europa.eu/fr/un/clrtap/iir	14 Mar 2025
HR	https://cdr.eionet.europa.eu/hr/un/clrtap/iir	11 Mar 2025
HU		
IE	https://cdr.eionet.europa.eu/ie/un/clrtap/iir	14 Mar 2025
IT	https://cdr.eionet.europa.eu/it/un/clrtap/iir	14 Mar 2025
LT	https://cdr.eionet.europa.eu/lt/un/clrtap/iir	16 Mar 2025
LU	https://cdr.eionet.europa.eu/lu/un/clrtap/iir/	29 March 2025
LV	https://cdr.eionet.europa.eu/lv/un/clrtap/iir	14 Mar 2025
MT	https://cdr.eionet.europa.eu/mt/un/clrtap/iir/	19 May 2025
NL	https://cdr.eionet.europa.eu/nl/un/clrtap/iir	13 Mar 2025
PL	https://cdr.eionet.europa.eu/pl/un/clrtap/iir	12 Mar 2025

Country code	Source	Date of submission
PT	https://cdr.eionet.europa.eu/pt/un/clrtap/iir	15 Mar 2025
RO	https://cdr.eionet.europa.eu/ro/un/clrtap/iir	13 Mar 2025
SE	https://cdr.eionet.europa.eu/se/un/clrtap/iir	24 Feb 2025
SI	https://cdr.eionet.europa.eu/si/un/clrtap/iir	14 Mar 2025
SK	https://cdr.eionet.europa.eu/sk/un/clrtap/iir	14 Mar 2025

European Environment Agency

European Union emission inventory report 1990-2023
Under the UNECE Convention on Long-range Transboundary Air Pollution (Air Convention)
2025 — 145 pp. — 21 x 29.7 cm

ISBN: 978-92-9480-727-4
doi: 10.2800/6464904

European Environment Agency

European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark
Tel.: +45 33 36 71 00
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

Publications Office
of the European Union

TH-01-25-021-EN-N
doi:10.2800/6464904