

Different emission estimates produced by EU institutions

Complementary emission estimates produced by EU organisations



This briefing provides an overview of the key types of greenhouse (GHG) emission estimates that are regularly published by bodies of the European Union (EU)

- The European Environment Agency (EEA) and certain services of the European Commission (EC) publish updates on GHG emissions in the EU at specified points in time throughout the year.
- These estimates cover different sources, geographical areas and time periods, and can serve various purposes, e.g. fulfilling international obligations, EU compliance, progress-to-target assessment, integrated environmental-economic or footprint analysis, etc.
- There is a delay between the year emissions occur and the year estimates are published (X). The emissions estimates for the year X-1 are published as follows:
 - Early April, May: verified emissions in the EU Emissions Trading System (ETS);
 - April/May: early estimates of carbon dioxide (CO₂) emissions from fossil fuel combustion;
 - August/September: trends in GHG and air pollutant emissions for all countries (Emission Database for Global Atmospheric Research (EDGAR));
 - September/October: approximated ('proxy') GHG inventories.
- Estimates for the year X-2:
 - December/January: air emission accounts and air emission intensities;
 - 15 April, end May: annual EU GHG inventory (official submission to the United Nations Framework Convention on Climate Change (UNFCCC)).
- Estimates for the year X-3:
 - March/April: emissions induced by final use (footprints) for the year X-3.

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EU GHG inventory submission to the UNFCCC (EEA and DG Climate Action)

The European Union (EU), as a party to the UNFCCC, reports annually its GHG inventory for the years 1990 to X-2. The legal basis for the compilation of the EU GHG inventory is the Monitoring Mechanism Regulation (MMR) ^[1]. The annual GHG inventory is the official data source for the GHG emissions of the EU. Its final submission to the UNFCCC takes place at the end of May.

Total GHG emissions reported in the EU GHG inventory submission to the UNFCCC include all anthropogenic emissions and removals of all GHGs not controlled by the Montreal Protocol, within the EU geographical area. The EU GHG inventory is based on the aggregation of the EU Member States' own inventories, which are also reported under the MMR and the UNFCCC. EU and national GHG emissions are estimated according to detailed reporting guidelines from the UNFCCC and the International Panel on Climate Change (IPCC), and are also subject to annual reviews by international experts, who follow internationally agreed review guidelines.

The compilation of the EU GHG inventory involves Member States, the EC Directorate-General for Climate Action (DG CLIMA), Eurostat, the Joint Research Centre, the EEA and its European Topic Centre on Air Pollution and Climate Change Mitigation.

- Official EU GHG inventory
- GHG Data Viewer (EEA)

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Approximated/proxy GHG inventory (EEA, DG Climate Action)

The approximated EU GHG inventory is an early estimate of EU GHG emissions for the year preceding the current year^[2], and is available around September each year. It is based on the proxy GHG emission estimates reported by Member States under the MMR by 31 July every year. The EEA assists the EC in the compilation of the EU's approximated GHG inventory. When Member States are not able to provide their own proxy emission estimates, the EEA complements the EU's approximated GHG inventory with its own estimates. These proxy emissions are relevant for timely progress-to-target analysis.

The proxy GHG estimates cover total GHG emissions for all gases, sectors and Member States. They do not include emissions or removals from the land use, land-use change and forestry (LULUCF) sector.

Member States are responsible for the methodological choice regarding their own estimates. In order to gap-fill missing estimates, the EEA uses the latest activity data available at country level. When no appropriate data set exists, emissions are extrapolated from past trends, or kept constant if historic data do not show a clear trend. In such cases, the emission factors and the methodologies used for the most recent official inventory submissions to the UNFCCC are used. The EEA proxy estimates are used both for gap-filling purposes and for verifying the estimates provided by Member States.

- Approximated EU GHG inventory

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European Union Emissions Trading System (DG Climate Action, EEA)

The EU emissions trading system (EU ETS) was established under Directive 2003/87/EC (the EU ETS Directive). Across all Member States of the European Union plus Iceland, Norway and Liechtenstein, the EU ETS covers CO₂ emissions from approximately 11 000 power stations and industrial plants; nitrous oxide (N₂O) emissions from the production of nitric, adipic and glyoxylic acids; and emissions of perfluorocarbons (PFCs) from aluminum production. The ETS also covers emissions from flights within the European Economic Area.

Installations and aircraft operators covered by the EU ETS monitor their emissions during the calendar year according to an approved monitoring plan. The annual emission data are verified by an accredited verifier and submitted to the relevant authorities in each country by 31 March of the following year. Operators must also surrender a number of allowances equivalent to their verified emissions by 30 April of that year, as part of the annual 'compliance cycle' of the EU ETS.

The main database on the ETS at EU level is the Union Registry, which serves to guarantee accurate accounting for all allowances issued under the EU ETS. The European Union Transaction Log (EUTL) automatically checks, records, and authorises all transactions that take place between accounts in the Union Registry. The EEA publishes the information from the EUTL on verified emissions, allowances and surrendered units in the EU ETS in aggregated form by country, by sector and by year. Data on the annual verified emissions from installations are available in early April each year for the previous year^[3].

- ETS Data Viewer (EEA)
- European Union Transaction Log (EUTL)

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Early CO₂ estimates from fossil fuel combustion (Eurostat)

Eurostat, the statistical office of the European Union, produces early CO₂ emission estimates from fossil fuel combustion using cumulated monthly energy statistics reported by Member States under the EU Energy Statistics Regulation (Regulation (EU) 1099/2008). Early CO₂ estimates are released four to five months after the end of the reference year^[4].

Eurostat uses the same method and data source for all Member States. For each Member State, it calculates the percentage growth rate in the consumption of solid, gaseous and liquid fossil fuels for the last two years. These percentage changes are then applied to the CO₂ emissions from fossil fuel combustion, as reported by Member States in their most recent GHG inventory, using the IPCC's "reference approach". The EU's total early CO₂ estimate from fossil fuel combustion corresponds to the sum of early CO₂ emission estimates for each Member State.

-  Overview of Eurostat's methodology to produce early CO₂ estimates
- Eurostat early estimates on CO₂ emissions from fossil fuel combustion

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Air emission accounts, intensities and footprints (Eurostat)

Air emission accounts (AEAs) record the flows of gaseous and particulate materials (i.e. six GHGs including CO₂, and seven air pollutants) emitted into the atmosphere. Eurostat collects the data annually as stipulated by Regulation (EU) 691/2011 (Annex I).

AEAs are conceptually embedded in the international statistical standards of the System of Environmental-Economic Accounting (SEEA CF 2012). They offer a detailed breakdown of emissions by emitting industries and by households, as defined and classified in national accounts, and follow the national accounts residence principle. This implies that emissions by resident economic units are included even if these occur outside the territory (for example, shipping companies operating in the rest of the world). AEAs are, therefore, particularly suitable for integrated environmental-economic analysis and modelling, and they also reconcile emission totals that appear in the accounts with national inventory totals by reporting on so-called 'bridging items'.

Eurostat also publishes estimates of GHG and air pollutant emissions from the final use of products. These are also referred to as footprints and are estimated using environmental-economic modelling. They capture all emissions that occur throughout the full production chain of a product that arrives in the EU for final consumption or investment, irrespective of the industry or country where the emissions occurred. As such, they offer a complementary consumption perspective compared with GHG inventories and AEAs, which record emissions from a production perspective. These estimates use a method that requires various modelling assumptions, resulting in higher margins of error. For example, it is assumed that the imported products are produced with technologies similar to those employed within the EU. The emissions embodied in imports represent the amount of emissions avoided by the EU through importing the products from elsewhere instead of producing them in the EU.

- Dedicated section on air emission accounts
- Air emission accounts datasets, including air emission intensities and air emission footprints

EDGAR database (DG JRC)

The EC's Joint Research Centre (JRC)^[5], in collaboration with the Netherlands Environmental Assessment Agency, produces preliminary emission estimates on an annual basis, which cover the whole world. The estimates are based on the latest energy consumption data published by the International Energy Agency and, for fast-track time series, are complemented with additional data from British Petroleum and the National Bureau of Statistics of China. In addition to the energy data, non-combustion emissions are included, such as production data for cement, lime, ammonia, steel, agricultural liming from the U.S. Geological Survey and more.

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The historic time series by country are aggregated in the EDGAR database.

EDGAR also contains GHG, air pollutant, particulate matter and mercury emissions per country on a 0.1 × 0.1 degree grid for all anthropogenic sources, covering the 1970-2012 period. Although the database distinguishes between about 5 000 source activities, emissions are provided using the source categories defined by the IPCC.

-  Detailed methodological descriptions and overviews per emission source category are provided in the annual CO₂ report
- EDGAR database

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Overview of EU data sources for GHG estimates

What?	Who?	When?	Time-liness	Geographical scope	Sectoral scope	EU reporting obligation
EU GHG inventory to UNFCCC	EEA	15 April (draft submission) and end May (final submission)	X-2	EU and its 28 Member States (UNFCCC Convention) and EU-28 plus Iceland (Kyoto Protocol)	All gases and sectors (100 % of emissions)	EU MMR (525/2013)
Proxy GHG inventory	EEA	30 September	X-1	EU and its 28 Member States, plus other EEA member countries, if reported	All gases and sectors (100 % of emissions)	EU MMR (525/2013)
EU ETS	DG CLIMA	Early April and May	X-1	EU-28, Iceland, Norway and Liechtenstein	~ 11 000 heavy energy-using installations, plus aircraft operators (~45 % of total emissions)	EU ETS Directive (2003/87/EC)
Early CO ₂ estimates	Eurostat	April/May	X-1	EU and its 28 Member States	CO ₂ from fossil fuel combustion (~80 % of total emissions)	Eurostat work programme
Air emission accounts and air emission intensities	Eurostat	December/January	X-2	EU and its 28 Member States, EFTA and EU candidate countries	All gases and economic sectors (100 % of emissions)	Regulation (EU) 691/2011 (Annex I)

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Emissions induced by final use (footprints)	Eurostat	March/April	X-3	EU	All gases and economic sectors (100 % of emissions)	Eurostat work programme
EDGAR global database	JRC	August/September	X-1	Global coverage	All gases and economic sectors (100 % of emissions)	JRC work programme

Footnotes and references

[1] Regulation (EU) 525/2013 of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions

[2] If the current year is 2017, the approximated inventory refers to the year 2016.

[3] If the current year is 2017, the ETS data cover up to 2016.

[4] For example, the early estimate from Eurostat for 2016 is available by May 2017.

[5] In addition to being the organisation responsible for the agriculture and LULUCF sectors within the EU's GHG inventory system under the UNFCCC, the JRC is also responsible for the quality assurance and quality control of the LULUCF data reported under EU Regulation 525/2013.

- European Environment Agency
- DG Climate Action, European Commission
- Eurostat, European Commission
- DG Joint Research Centre, European Commission

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