

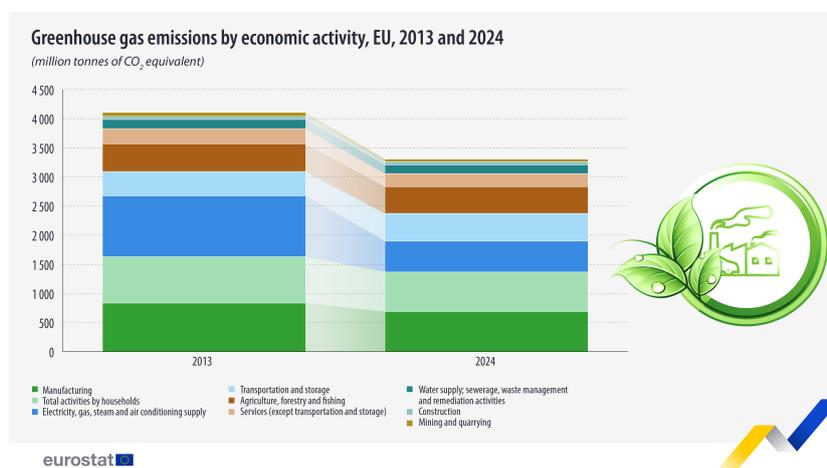
Greenhouse gas emission accounts

Statistics Explained

Data extracted in December 2025
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Highlights

Between 2013 and 2024, almost all economic activities in the EU reduced their greenhouse gas emissions. The major exception was transportation and storage, where emissions increased by around 14%.



Source: Eurostat ([env_ac_ainah_r2](#)) |

This article is a part of the Eurostat online publication [Statistics on climate change mitigation](#). It analyses emissions of [greenhouse gases](#) in the [European Union \(EU\)](#) by [economic activity](#). Eurostat records and publishes these data in [air emissions accounts](#), one of the modules in the [European environmental economic accounts](#).

This article showcases how data from [air emissions accounts](#) can be used to analyse the EU's greenhouse gas emissions in relation to the economic activities which generate them, and what insights can be gained from combining emissions data with economic indicators such as [gross value added](#) and [employment](#). Such analysis can help policymakers design reforms to promote [climate change mitigation](#) measures that will contribute to the goals of the European Green Deal and ensure competitiveness, prosperity and fairness in the EU.

Using the interactive graphs in this article, readers can further explore the data across greenhouse gases and economic activities at both EU and country level on their own.

Greenhouse gas emissions by economic activity

Greenhouse gases comprise carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and the fluorinated gases (also called 'F-gases') hydrofluorocarbons (HFC), perfluorocarbons (PFC), nitrogen trifluoride (NF₃) and sulphur hexafluoride (SF₆). CO₂ is the main greenhouse gas for the EU economy as a whole and for most economic sectors. It arises almost exclusively from the combustion of fossil fuels. Other greenhouse gases are quantified in CO₂ equivalents according to their global warming potential (GWP). Thus, all greenhouse gases can be consistently compared and combined in terms of their climate effects.

As can be seen in **Figure 1**, emissions of methane (CH₄) and nitrous oxide (N₂O) play major roles in some economic activities. In the EU's agricultural sector, methane accounted for 52% of total emissions, N₂O for 26% and CO₂ for 21% in 2024. Methane is released from animal husbandry (manure and gastroenteric releases), and nitrous oxide from land fertilisation. Services are the largest source of emissions for fluorinated gases in the EU (28%), followed by manufacturing (24%) and households (20%). These gases are mainly used as cooling agents in refrigeration and air conditioning, as blowing agents in insulating foam or in fire extinguishers.

Figure 1 Trends in greenhouse gas emissions by economic activity

In 2024, economic producers and households in the EU generated greenhouse gas emissions of 3.3 billion tonnes of CO₂ equivalents. As shown in **Figure 2**, almost all economic activities reduced their emissions between 2013 and 2024, as a result of an overall reduction in energy consumption and a shift to renewable energy sources. The exceptions were transportation and storage, which increased its emissions by 14% over this period, and construction, with an increase of around 6%.

Suppliers of electricity, gas, steam and air conditioning (hereinafter referred to as 'electricity and gas supply') have achieved the most significant emission reductions since 2013, both in relative (almost 50%) and absolute (about 512 million tonnes of CO₂ equivalents) terms. This was the result of switching heat and electricity production from carbon-intensive solid fossil fuels, such as hard coal, to renewable energy sources, particularly wind and photovoltaics. Electricity and gas supply had been the largest source of greenhouse gas emissions in the EU until 2018, but due to the significant emission reductions, it ranked third in 2024, with 531 million tonnes of CO₂ equivalents. Instead, manufacturing was the largest source of greenhouse gas emissions in the EU in 2024, with 688 million tonnes of CO₂ equivalents. The sector also reduced its emissions from 2013 to 2024, albeit at a slower pace of around 18%.

Households were the second largest source of greenhouse gas emissions in 2024, with 680 million tonnes of CO₂ equivalents. Households' emissions are associated with the heating and cooling of their dwellings, transportation in private vehicles and other energy uses. Households reduced these emissions between 2013 and 2024, albeit to a lesser extent than economic producers in many economic activities.

Transportation and storage was the fourth largest source of greenhouse gas emissions in the EU in 2024, with 475 million tonnes of CO₂ equivalents. The emissions in this sector increased by around 14% since 2013. The steady increase in transport volumes (especially road freight transport) appears to have offset the considerable investments in low-carbon transport technologies that have taken place in this sector since 2005 (see the article on 'Investment in climate change mitigation' for further details).

Figure 2 Country patterns in greenhouse gas emissions by economic activity

Across EU countries, the greenhouse gases emitted by the different economic activities (including households) vary considerably in terms of magnitude (see **Figure 3**). This is mainly due to differences in countries' economic structure, referring to the goods and services a country produces, the efficiency of energy supply and consumption, and the share of renewable energy sources. In 2024, the largest emitters across EU countries were the following:

- In Latvia, the agricultural sector was the largest source of emissions, accounting for around 30% of total emissions.

- In 9 EU countries, manufacturing was the main emitter of greenhouse gases
- Electricity and gas supply was the main source of emissions in 6 countries; in Cyprus and Estonia, it accounted for over 40% of total emissions
- In 6 countries transport and storage was the highest emitting sector; in 3 of these countries (Denmark, Malta and Luxembourg), emissions from this sector accounted for more than half of their total greenhouse gas emissions
- In the remaining 5 countries, activities of households were the key source of emissions

The overall picture regarding the main sources of greenhouse gas emissions has become more heterogeneous compared with 2013, when electricity and gas supply was the key emitter in 12 countries. This change results from large reductions in greenhouse gas emissions from electricity and gas supply across all EU countries (use the drop-down field in **Figure 2** above to switch between different countries).

As shown in **Figure 3**, Denmark, Luxembourg, Ireland, and Malta were the largest emitters of greenhouse gases per capita in 2024 across the EU. In Denmark, Luxembourg, and Malta, transportation was the key emitting activity, mainly due to high emissions from air and water transport, respectively. These emissions can be traced to companies active in global freight transport that are located in these countries (and hence, in air emissions accounts, these companies' emissions are allocated to the country of residence). In Ireland, the key emitting activity was the agricultural activity comprising crop and animal production, hunting and related service activities. This is due to the country's global orientation of exporting beef, sheep and dairy products. At the other end of the spectrum, per capita emissions of greenhouse gases were lowest in Portugal and Sweden.

Figure 3

Greenhouse gas emissions and gross value added

To become a climate-neutral economy and society by 2050 and ensure competitiveness, prosperity and fairness, the EU has to **decouple** economic activities from their related **greenhouse gas** emissions. A comparison between greenhouse gas emissions and economic data such as **gross value added** (this section) or **employment** (next section) can identify areas where policy action is needed.

The **greenhouse gas emissions intensity** of the economy can be analysed by putting greenhouse gas emissions in relation to economic data from the national accounts. **Gross value added** measures the contribution of each production activity to the whole economy and is thus a suitable measure for comparing emissions intensities across different economic activities. Time series of greenhouse gas emissions intensity thus reveal whether the amount of emissions (measured in **CO₂equivalents**) per unit of gross value added (measured in euro) has increased or decreased. A decrease in the emissions intensity means less emissions for the same amount of economic value added. Please note that households' greenhouse gas emissions are not included in the emissions intensity figures presented below because households do not generate gross value added.

Evolution of greenhouse gas emissions intensity of gross value added

From 2013 to 2024, greenhouse gas emissions from the EU economy decreased by 20% while its gross value added increased by 20%. With this, the EU's greenhouse gas emissions intensity decreased by 34% (see **Figure 4**). **Map 1** provides a country-by-country view of how the greenhouse gas emissions intensity has changed over the period from 2013 to 2024. Countries such as Luxembourg (-14%), Lithuania (-18%) or Austria (-20%) have experienced moderate improvements in their greenhouse gas emissions intensity since 2013. The strongest reductions in emissions intensity were achieved by Estonia (-64%), Ireland (-50%) and Finland (-44%). Only Malta (+17%) has seen an increase in its emissions intensity since 2013.

Analysing the data over time helps to provide a better understanding of the key drivers behind the developments in greenhouse gas emissions intensity. For example, between 2013 and 2024, Ireland's economy more than doubled its gross value added (by 128%) while the related greenhouse gas emissions increased more slowly (by 14%) (select Ireland in **Figure 4**).

Estonia's gross value added also grew significantly, although more slowly than Ireland's, at 24%, while its greenhouse gas emissions reduced more considerably by 55%. This meant its overall improvement in greenhouse gas emissions intensity was even larger than Ireland's. Further country trends can be analysed by selecting different countries in **Figure 4**.

Figure 4 **Greenhouse gas emissions intensity of gross value added by economic activity**

Data from the [air emissions accounts](#) allow the [greenhouse gas emissions intensity](#) for individual economic activities to be compared. At the EU level, manufacturing recorded the strongest decrease (improvement) in greenhouse gas emissions intensity of gross value added between 2013 and 2024, by 33%, followed by services (30%; excluding transportation and storage) and electricity and gas supply (25%). In contrast, the decrease in emissions intensity was smallest in construction (2%) and in agriculture, forestry and fishing (8%). Two activities — transportation and storage as well as mining and quarrying — experienced slight increases (deterioration) in their emissions intensities between 2013 and 2024, by 0.1% and 3% respectively.

Figure 5 shows the drivers behind these changes, by displaying the underlying trends for greenhouse gas emissions and gross value added for the period 2013 to 2024. At EU level, the improvement in emissions intensity of manufacturing and services (excluding transportation and storage) is a result of growth in gross value added combined with moderate reductions in greenhouse gas emissions. Electricity and gas supply experienced a 32% decrease in gross value added combined with a 49% reduction in the sector's greenhouse gas emissions. In contrast, construction and agriculture, forestry and fishing saw a small increase in gross value added of around 7% and 5%, respectively, while these sectors' greenhouse gas emissions changed only slightly by +6% and -4%, respectively. In transportation and storage, the slight increase in emissions intensity between 2013 and 2024 is a result of greenhouse gas emissions growing stronger than gross value added.

Figure 5

Investigating the drivers behind the changes in greenhouse gas emissions intensity of gross value added: the case of Ireland

Changes in the greenhouse gas emissions intensity of gross value added can be more deeply analysed at the individual country level. This section uses the example of Ireland, which experienced one of the strongest decreases in emissions intensity (select Ireland in **Figure 5**). While Ireland's greenhouse emissions from agriculture stayed roughly constant between 2013 and 2024, the sector's gross value more than doubled over the period. As a result, the greenhouse gas emissions intensity of agriculture fell significantly. In addition, the gross value added of the manufacturing sector more than tripled over the 11-year period (growth of 233%) while the sector's greenhouse gas emissions increased more slowly (by 10%). This resulted in a 67% reduction in the sector's greenhouse gas emissions intensity, which might be explained by multinational companies changing their domiciles and tax practices.

This detailed example of the Irish economy illustrates that a multitude of factors may drive greenhouse gas emissions intensity, with improving environmental performance and decarbonisation policies being only one of them. On a more general level, structural changes within an economic activity may be much more relevant in reducing carbon intensity. Such structural changes could involve, for example, a switch within the manufacturing sector from the emissions-intensive production of goods to activities with higher added value and lower emissions such as research and marketing, while basic production processes are outsourced abroad. For an analysis of greenhouse gas emissions along the full production chain, see the article on [greenhouse gas emission footprints](#).

Map 1 above allows readers to switch between different economic activities, revealing a more diverse picture of

progress with some sectors becoming more greenhouse gas-intensive in certain countries. Selecting the same country in **Figure 5** allows users to uncover the underlying trends behind the changes in greenhouse gas emissions intensity for the different economic activities.

Country patterns in greenhouse gas emissions intensity of gross value added

Figure 6 shows the absolute value of greenhouse gas emissions intensity of gross value added across economic activities at the country level. It reveals considerable differences across countries, both for the total economy and for individual economic activities (use the dropdown option in **Figure 6** to switch to individual economic activities). The country differences can largely be explained by structural differences between economies and, although to a much lesser extent, by differences in efficiency and decarbonisation in production processes.

Figure 6

Greenhouse gas emissions and employment

Data from the [air emissions accounts](#) also allow trends in [greenhouse gas](#) emissions to be assessed in relation to [employment](#) across different [economic activities](#). Such analysis can help to ensure a fair green transition.

Evolution of greenhouse gas emissions intensity of employment

Overall, between 2013 and 2024, the EU's greenhouse gas emissions in relation to employment fell by 29% or 3 kilograms (kg) per hour worked. In 2024, the emissions stood at 7.4 kg per hour worked, compared with 10.4 kg in 2013. As shown in **Figure 7**, this improvement resulted from a decrease in greenhouse gas emissions combined with an increase in hours worked. From 2013 to 2024, the EU's greenhouse gas emissions decreased by 21% while employment in terms of hours worked increased by almost 11%.

At country level, Estonia showed the strongest improvement in greenhouse gas emissions intensity of employment over the period from 2013 to 2024, with a decrease of 57%, followed by Finland and Greece with decreases of 41% and 39%, respectively. The strong improvement in Estonia was driven by a 55% reduction in greenhouse gas emissions, while the hours worked only increased slightly, by 3.9%. In Finland and Greece, growth in hours worked was higher, at 4.5% and 14.7% respectively, while the reduction in greenhouse gas emissions was below the progress achieved in Estonia (use the drop-down field in **Figure 7** to switch between different countries)

Figure 7

Greenhouse gas emissions intensity of employment by economic activity

The greenhouse gas emissions intensity of employment can also be compared between individual economic activities. At the aggregated EU level, electricity and gas supply recorded the strongest decrease (improvement) in emissions intensity of employment between 2013 and 2024, by 53%, followed by services (25%; excluding transportation and storage), and manufacturing (20%). In contrast, agriculture, forestry and fishing experienced an 21% increase in emissions intensity of employment.

Figure 8 shows the drivers behind these changes, by displaying the underlying trends for greenhouse gas emissions and hours worked for the period 2013 to 2024. It reveals that the strong improvement in emissions

intensity of electricity and gas supply is the result of an 8% increase in hours worked combined with a 49% reduction in greenhouse gas emissions, mirroring the ongoing decarbonisation of the power sector. Manufacturing shows a similar pattern, even though the magnitude of the change in both emissions and employment is much smaller. In contrast, agriculture, forestry and fishing experienced a 21% reduction in hours worked between 2013 and 2024 while the sector's greenhouse gas emissions decreased only slightly, by roughly 4%, resulting in a considerable increase in emissions intensity of employment.

Figure 8

Country patterns in greenhouse gas emissions intensity of employment

Figure 9 shows the absolute value of greenhouse gas emissions intensity of employment across economic activities at a country level. Among the EU countries, Denmark recorded the highest emissions intensity of employment in 2024 (18.2 kg per hour worked), followed by Ireland (13.4 kg) and Malta (11.1 kg). In contrast, Portugal (4.4 kg per hour worked) and Sweden (5.1 kg) recorded the lowest values. Across EU countries, electricity and gas supply is the most emissions-intensive economic activity. In 2024, it generated the third highest greenhouse gas emissions in the EU (see **Figure 1**) while recording the second-lowest number of hours worked (after mining and quarrying).

Figure 9

Data sources

This article presents data on [greenhouse gas](#) emissions from Eurostat's [air emissions accounts \(AEA\)](#). [Environmental accounts](#) are a statistical framework that integrates economic and environmental data to assess how the environment contributes to the economy and how [economic activities](#) affect the environment. They provide a valuable tool for tracking the pressures the economy places on the environment and identifying potential ways to mitigate these impacts. By organising environmental information from various sectors using the same concepts and terminology as national accounts, environmental accounts reveal the relationships between economic, [household](#) and environmental elements. This approach offers deeper insights than national accounts alone, allowing for integrated environmental-economic analyses such as calculating emission intensities or [environmental footprints](#).

Greenhouse gas emissions include emissions of [carbon dioxide \(CO₂\)](#), methane (CH₄), nitrous oxide (N₂O) and several fluorinated gases: sulphur hexafluoride (SF₆), nitrogen trifluoride (NF₃), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). Each greenhouse gas has a different capacity to cause global warming, depending on its radiative properties, molecular weight and the length of time it remains in the atmosphere. The [global warming potential \(GWP\)](#) of each gas is defined in relation to a given weight of carbon dioxide for a set time period (for the purpose of the Kyoto Protocol a period of 100 years). GWPs are used to convert emissions of greenhouse gases to a relative measure (known as [carbon dioxide \(CO₂\) equivalents](#)).

The weighting factors currently used are the following, as defined in the IPCC Fifth Assessment Report (AR5), based on a 100-year time horizon and consistent with the EU greenhouse gas inventory:

- Carbon dioxide = 1
- Methane = 28
- Nitrous oxide = 265
- Sulphur hexafluoride = 23 500.

Hydrofluorocarbons and perfluorocarbons comprise a large number of different gases that have different GWPs.

In air emissions accounts, the emissions data are organised by economic activity, using the [NACE classification](#) . Eurostat's air emissions accounts offer a detailed analysis by 64 economic activities following the EU's [statistical classification of economic activities \(NACE Rev. 2\) from 2008](#) . This arrangement makes it possible to have an integrated environmental-economic analysis to supplement national accounts. The scope encompasses production by all businesses resident in the country, including those operating ships, aircraft and other transportation equipment in other countries. The NACE Rev. 2 groups used in this article are:

- Agriculture, forestry and fishing — NACE Rev. 2 Section A
- Mining and quarrying — NACE Rev. 2 Section B
- Manufacturing — NACE Rev. 2 Section C
- Electricity, gas, steam and air conditioning supply — NACE Rev. 2 Section D
- Water supply; sewerage, waste management and remediation activities — NACE Rev. 2 Section E
- Construction — NACE Rev. 2 Section F
- Transportation and storage — NACE Rev. 2 Section H
- Services (except transportation and storage) — NACE Rev. 2 Sections G to U, excluding H, in other words all remaining economic activities as defined in NACE without transportation and storage
- Total — all NACE activities

More detailed data on individual economic activities such as the manufacture of chemicals (C20) or of basic metals (C24) can be accessed by through the data tables specified below each graph.

Air emissions accounts also include [households](#) as consumers. Their emissions are accounted for whenever household consumption is directly responsible for environmental pressures. For example, emissions from a privately owned car are accounted for under households, whereas cars owned by transport businesses (such as taxis) are accounted for under transportation and storage.

Please note that in addition to the air emissions accounts data presented in this article, Eurostat also disseminates emissions from the EU and countries' territories ('[greenhouse gas inventories](#)'). Territorial data are used to follow the development of emissions in relation to climate actions of the European Union and of the members of the [United Nations](#) according to the guidelines developed by the [UN panel on climate change \(IPCC\)](#) . The greenhouse gas inventories contain the official data to measure emissions in the EU and in each country towards the relevant policy targets. The table below lists the main differences between inventories and accounts.

Note: National and EU totals differ between the two approaches, as different boundaries apply. GHG emission inventories include international aviation and maritime transport (international bunker fuels) as memorandum items, which means that they are excluded from national totals reported. However, they are included in air emissions accounts totals. Therefore total emissions reported in greenhouse gas emissions inventory databases can differ significantly from the total reported in air emissions accounts for countries with a large international aircraft and/or shipping fleet, but data can be reconciled using bridging tables.

Source: [dedicated section on climate change related statistics](#)

Significant differences between the totals for greenhouse emissions inventories and air emissions accounts may occur in certain countries where very large resident businesses engage in international water- and air transport services. For instance, in Denmark, carbon dioxide emissions reported in the accounts are more than twice the

National inventories for greenhouse gases and other air pollutants	Air emissions accounts
Emissions are assigned to the country where the emission takes place (territory principle).	Emissions are assigned to the country where the company causing the emission is based (residence principle as used in the system of national accounts).
Emissions are assigned to technical processes (e.g. combustion in power plants, solvent use).	Emissions are classified by economic activity (using the NACE classification as used in the system of national accounts).
Emissions from international shipping and aviation are assigned to the countries where the associated fuel is purchased regardless of where the purchasing company is based.	Emissions from international shipping and aviation are assigned to the countries where the airline/shipping company is based , regardless of where the emission takes place.

amount of emissions reported in inventories. This difference is due to a very large Danish shipping company, which operates vessels worldwide, and hence bunkers most of its fuel and emits most of its emissions outside Denmark. These emissions abroad are not accounted for in the Danish greenhouse gas emissions inventory, but they are included in the air emissions accounts. For the EU as a whole, the differences between totals from the greenhouse gas emissions inventories and the air emissions accounts are much less pronounced.

Furthermore, Eurostat estimates and disseminates [environmental footprints](#), presenting data on greenhouse gas emissions from a consumption perspective. These data include the global emissions that occur throughout the global production chain of a product that arrives in the respective country or region for final demand.

Context

In the European Union, [Regulation \(EU\) 691/2011 on European environmental economic accounts](#) (including its amendments in 2014 and 2022) has established a common framework for the collection, compilation, transmission and evaluation of [European environmental economic accounts](#), for the purpose of setting up environmental economic accounts as satellite accounts to the European System of Accounts (ESA). The environmental economic accounts in the Regulation are grouped in the following 6 modules:

- [Air emissions accounts](#)
- [Economy-wide material flow accounts](#)
- [Environmental taxes](#)
- [Environmental protection expenditure](#) accounts
- [Environmental goods and services sector \(EGSS\)](#) accounts
- [Physical energy flow accounts](#)

More information on these modules can be found through [Eurostat's dedicated section on environment](#).

The most recent amendment of the Regulation - through [Regulation \(EU\) 2024/3024](#) - introduced 3 further modules:

- Forest accounts
- Environmental subsidies and similar transfers accounts
- Ecosystem accounts

Preparing the implementation of these new modules is one of the key objectives of the [European Strategy for environmental accounts \(ESEA\)](#) for the period 2024-2028.

In line with the EU's commitment to tackling environmental challenges and becoming climate-neutral, the environmental accounts are vital for providing better information for supporting Europe's [sustainable prosperity and](#)

competitiveness and its quality of life as well as for implementing the 8th Environmental Action Programme and the Sustainable Development Goals (SDGs) .

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- [Methodology - Emissions of greenhouse gases and air pollutants \(air emissions accounts\)](#)

Legislation

- [Regulation \(EU\) 691/2011 on European environmental economic accounts](#)

Selected datasets

[Air emissions accounts by NACE Rev. 2 activity \(env_ac_ainah_r2\)](#)

[Air emissions intensities by NACE Rev. 2 activity \(env_ac_aeint_r2\)](#)

[Air emissions accounts for greenhouse gases by NACE Rev. 2 activity - quarterly data \(env_ac_aigg_q\)](#)