

Statistical bulletin

Estimates of quarterly greenhouse gas emissions (residence basis), UK: Quarter 1 (January to March) 2025

Estimates of greenhouse gas emissions using the Chow-Lin regression-based temporal disaggregation method.

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Release date:
5 August 2025

Next release:
To be announced

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1 . Main points

- We estimate that UK greenhouse gas (GHG) emissions on a residence basis were 145 million tonnes of carbon dioxide equivalent (MtCO₂e) in Quarter 1 (Jan to Mar) 2025; this figure is similar to 144 MtCO₂e in Quarter 1 2024.
- Residence-based GHG emissions were 1.77 tonnes of carbon dioxide equivalent (CO₂e) per head in Quarter 1 2025; this is down 45.7%, or 1.49 tonnes of CO₂e per head since Quarter 1 1999, when this series began.
- The UK emitted 155 tonnes of CO₂e per million British pounds of economic activity (gross value added) in Quarter 1 2025; this is down 61.6% since Quarter 1 1999.
- These quarterly emissions estimates complement and draw on our annual residence-based emissions statistics.
- All estimates in this bulletin are produced using modelling techniques; those for all quarters of 2024 and Quarter 1 2025 are subject to greater uncertainty because final 2024 emission estimates are not yet available, so we have modelled data over five quarters.

We refer to residence-based (production) emissions in this release. The territorial emissions measure from the Department for Energy Security and Net Zero is generally used for greenhouse gas emissions targets, including net zero by 2050. The footprint (consumption) emissions measure from the Department for Environment, Food and Rural Affairs includes emissions from trade. See [Section 7: Data sources and quality](#) for more information.

2 . Quarterly greenhouse gas emission estimates

Our estimates of total quarterly UK greenhouse gas (GHG) and carbon dioxide (CO₂) emissions on a residence basis use modelling techniques. These are available up to Quarter 1 (Jan to Mar) 2025. All GHG and CO₂ estimates in this bulletin are non-seasonally adjusted, unless otherwise specified.

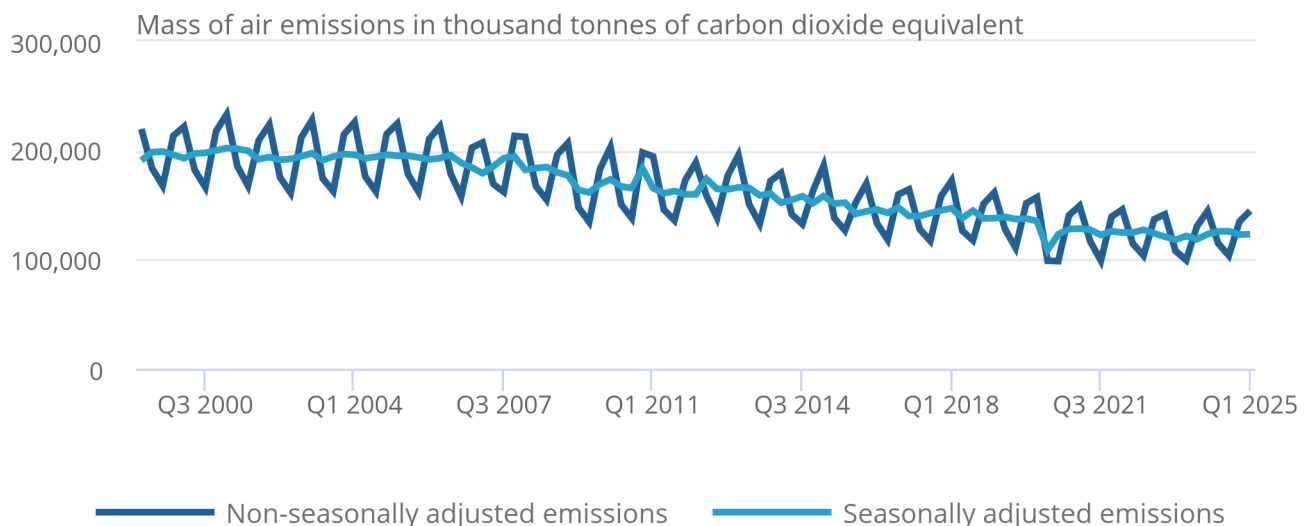
We estimate that total Quarter 1 2025 emissions on a residence basis were 145 million tonnes of CO₂ equivalent (MtCO₂e). This is similar to the same quarter in 2024, when the estimate of emissions was 144 MtCO₂e.

Figure 1: Quarterly residence-based UK greenhouse gas emissions decreased by 34% between 1999 and 2025

Estimates of quarterly greenhouse gas emissions on a residence basis, UK, Quarter 1 (Jan to Mar) 1999 to Quarter 1 2025

Figure 1: Quarterly residence-based UK greenhouse gas emissions decreased by 34% between 1999 and 2025

Estimates of quarterly greenhouse gas emissions on a residence basis, UK, Quarter 1 (Jan to Mar) 1999 to Quarter 1 2025



Source: Environmental Accounts from the Office for National Statistics, Energy Trends from the Department for Energy Security and Net Zero

Notes:

1. Q1 refers to Quarter 1 (Jan to Mar), Q2 refers to Quarter 2 (Apr to June), Q3 refers to Quarter 3 (July to Sept) and Q4 refers to Quarter 4 (Oct to Dec).
2. These estimates have been modelled using the Chow-Lin regression-based temporal disaggregation method.
3. The predictor indicators for the seasonally adjusted estimates used X-13ARIMA-SEATS.
4. Because of differences in how the annual and quarterly greenhouse gas emissions estimates are produced, quarterly emissions for 2024 should not be summed to provide a provisional full-year estimate.

Table 1 shows the change in total quarterly emissions estimates, compared with the same quarter the previous year.

Table 1: Emissions have increased every quarter since Quarter 1 2024, and Quarter 1 2025 emissions are higher than the same quarter the previous year

Change in non-seasonally adjusted UK greenhouse gas emission estimates, Quarter 1 (Jan to Mar) 2020 to Quarter 1 2025

Time Period	Change in quarterly totals from same quarter the previous year (%)
Quarter 1 2020	-2.7%
Quarter 2 2020	-22.7%
Quarter 3 2020	-11.0%
Quarter 4 2020	-7.3%
Quarter 1 2021	-5.0%
Quarter 2 2021	18.0%
Quarter 3 2021	0.4%
Quarter 4 2021	-0.9%
Quarter 1 2022	-2.3%
Quarter 2 2022	-1.9%
Quarter 3 2022	4.7%
Quarter 4 2022	-1.7%
Quarter 1 2023	-3.0%
Quarter 2 2023	-5.8%
Quarter 3 2023	-4.0%
Quarter 4 2023	-4.8%
Quarter 1 2024	2.1%
Quarter 2 2024	6.4%
Quarter 3 2024	4.2%
Quarter 4 2024	3.5%
Quarter 1 2025	0.2%

Source: Environmental Accounts from the Office for National Statistics, Energy Trends from the Department for Energy Security and Net Zero

These estimates are subject to uncertainty, so should be interpreted with caution. The underlying input data, the estimates informing the model, and the modelling process itself, each introduce uncertainty that affects accuracy. The level of uncertainty is particularly high for all quarters of 2024 and for Quarter 1 2025. This is because we will not publish the final 2024 annual estimate of GHG emissions on a residence basis, to which we constrain these estimates, until June 2026.

3 . Per-head estimates of greenhouse gas emissions and gross value added

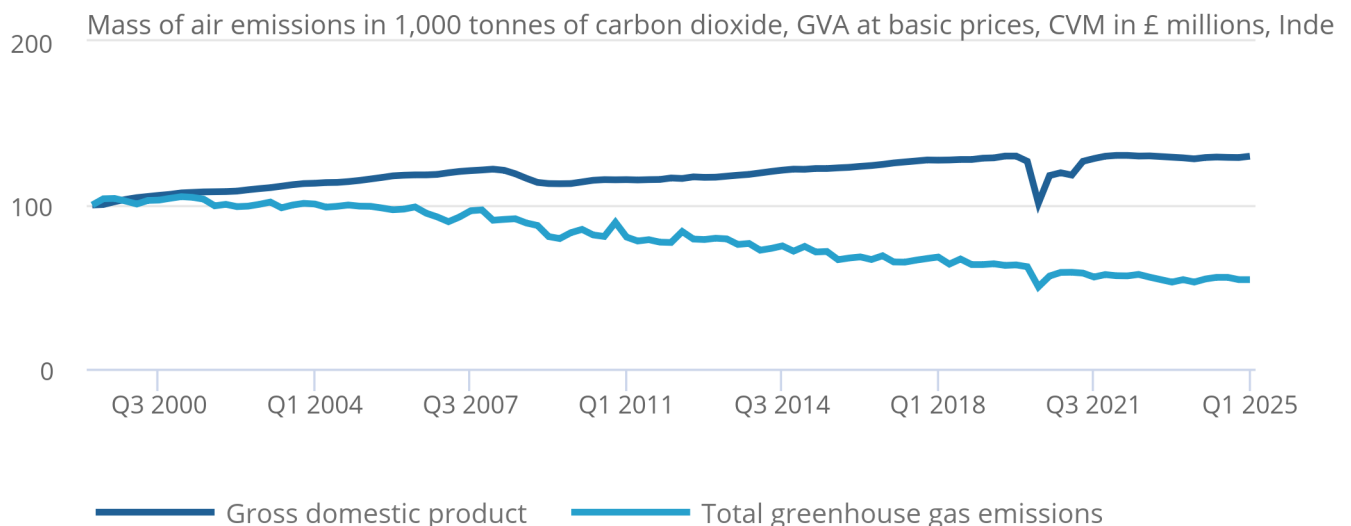
Residence-based greenhouse gas (GHG) emissions were 1.77 tonnes of carbon dioxide equivalent (CO₂e) per head in Quarter 1 (Jan to Mar) 2025. Emissions per head have decreased by 45.7%, or 1.49 tonnes of CO₂e, since 1999, when this time series began.

Figure 2: UK residence-based greenhouse gas emissions per head steadily decreased by 46% between 1999 and 2025

Estimates of quarterly greenhouse gas emissions and gross value added (GVA) per head, Index Quarter 1 (Jan to Mar) 1999 equals 100, UK, Quarter 1 1999 to Quarter 1 2025

Figure 2: UK residence-based greenhouse gas emissions per head steadily decreased by 46% between 1999 and 2025

Estimates of quarterly greenhouse gas emissions and gross value added (GVA) per head, Index Quarter 1 (Jan to Mar) 1999 equals 100, UK, Quarter 1 1999 to Quarter 1 2025



Source: Environmental Accounts from the Office for National Statistics, Energy Trends from the Department for Energy Security and Net Zero

Notes:

1. Q1 refers to Quarter 1 (Jan to Mar), Q2 refers to Quarter 2 (Apr to June), Q3 refers to Quarter 3 (July to Sept) and Q4 refers to Quarter 4 (Oct to Dec).
2. Per-head estimates are calculated by dividing seasonally adjusted greenhouse gas emissions and GVA by quarterly population estimates.
3. GVA is the difference between the value of goods and services produced (output), and the cost of raw materials and other inputs that are used up in production (intermediate consumption), for any given industry. GVA are chained volume measures (CVM), in constant prices, with 2022 as the base and reference year.

More information can be found in Section 6: Methods used to produce the data in our [Estimates of UK quarterly GHG emissions \(residence basis\) quality and methodology information \(QMI\)](#).

4 . Greenhouse gas emissions intensity

Our residence-based emissions estimates are compiled in accordance with the [United Nations System of Environmental Economic Accounting](#), which aligns with the UN System of National Accounts. This enables direct comparisons with important economic indicators, such as gross domestic product (GDP), as well as the calculation of greenhouse gas (GHG) emissions intensity and emissions per unit of economic output.

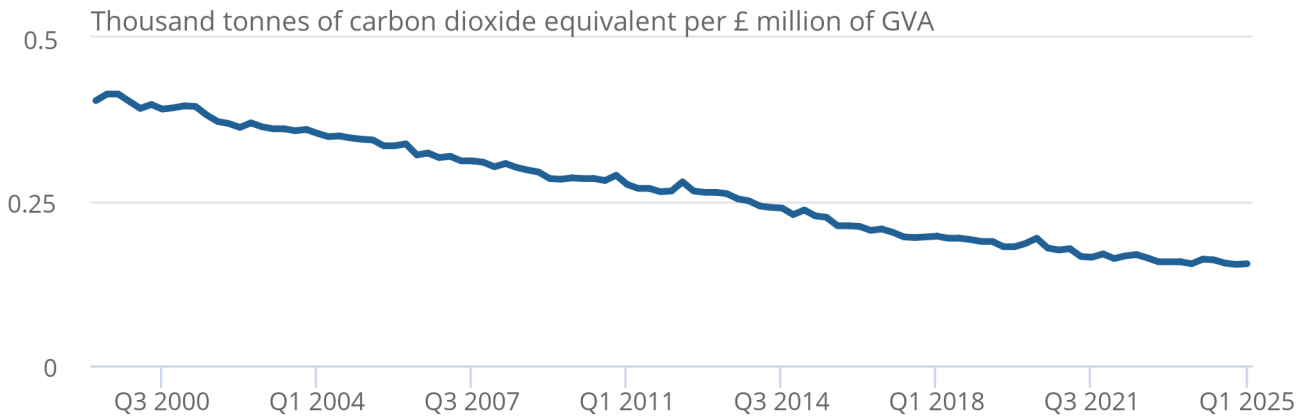
The UK emitted 155 tonnes of carbon dioxide equivalent (CO₂e) per million British pounds of gross value added (GVA) in Quarter 1 (Jan to Mar) 2025. Emissions intensity has fallen by 61.6% from 404 tonnes of CO₂e per million British pounds of GVA in Quarter 1 1999, when this series starts (see Figure 3).

Figure 3: UK residence-based emissions intensity fell by around 60% between 1999 and 2024

Estimates of quarterly greenhouse gas emissions and gross value added (GVA), seasonally adjusted, UK (residence basis), Quarter 1 (Jan to Mar) 1999 to Quarter 1 2025

Figure 3: UK residence-based emissions intensity fell by around 60% between 1999 and 2024

Estimates of quarterly greenhouse gas emissions and gross value added (GVA), seasonally adjusted, UK (residence basis), Quarter 1 (Jan to Mar) 1999 to Quarter 1 2025



Source: Environmental Accounts from the Office for National Statistics, Energy Trends from the Department for Energy Security and Net Zero

Notes:

1. Q1 refers to Quarter 1 (Jan to Mar), Q2 refers to Quarter 2 (Apr to June), Q3 refers to Quarter 3 (July to Sept) and Q4 refers to Quarter 4 (Oct to Dec).
2. Emissions intensity is calculated by dividing the level of greenhouse gas emissions by GVA.
3. GVA is the difference between the value of goods and services produced (output) and the cost of raw materials and other inputs that are used up in production (intermediate consumption), for any given industry. GVA are chained volume measures (CVM), in constant prices, with 2022 as the base and reference year.
4. All emissions intensity figures are calculated using seasonally adjusted estimates of greenhouse gas emissions, excluding those from households that refer to consumer expenditure (travel and non-travel consumer expenditure).

Emissions intensity can be used to examine the relationship between economic growth and emissions. The general reduction in overall emissions intensity on this measure could be considered an indication that the UK is moving towards a lower carbon (emissions) economy.

This movement could be influenced by several factors, including changes in the structure of the economy and behavioural changes that may affect interaction between the economy and the environment. For example, it could be related to:

- some industries becoming more efficient in their production processes through the adoption of lower-emissions technologies
- changes in the composition of the economy, where there is a growing shift from higher- to lower-emitting economic activities, such as from manufacturing to services activities
- a combination of these factors

All estimates of GVA are subject to revisions. For more information, please see Section 8: Revisions to GDP in our [GDP quarterly national accounts, UK: January to March 2025 bulletin](#).

5 . Data

[Estimates of quarterly greenhouse gas emissions](#)

Dataset | Released 5 August 2025

Estimates of greenhouse gas emissions using the Chow-Lin regression-based temporal disaggregation method, quarterly data.

[Energy Trends](#)

Dataset | Last updated 26 June 2025

Quarterly publication from the Department for Energy Security and Net Zero, which presents data on the supply and demand of all the major fuels in the UK.

6 . Glossary

Greenhouse gases

Greenhouse gases (GHGs) are those covered by the [Paris Agreement](#), which has superseded the Kyoto Protocol. These include:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF₆)
- Nitrogen trifluoride (NF₃)

These gases contribute directly to global warming and climate change, because of their positive radiative forcing effect. The potential for each GHG to cause global warming is assessed in relation to a given weight of CO₂, so all GHG emissions are measured as carbon dioxide equivalent (CO₂e).

Residence basis

Estimates compiled on a residence basis include data relating to UK resident and UK-registered businesses, regardless of whether they are in the UK or overseas. Emissions released in the UK by tourists and foreign transport operation are excluded. For more detailed comparisons of UK emissions measures, please see our [Measuring UK greenhouse gas emissions article](#).

Temporal disaggregation

Temporal disaggregation is the process of deriving high-frequency data (for example, quarterly) from low-frequency data (for example, annual).

7 . Data sources and quality

All greenhouse gas emission estimates presented in this bulletin and our accompanying dataset have been produced using temporal disaggregation and modelling techniques. They are therefore subject to uncertainty.

The main sources of information and predictor indicators for producing these estimates are:

- UK annual estimates of greenhouse gas (GHG) emissions on a residence basis from the Office for National Statistics (ONS)
- Energy Trends from the Department for Energy Security and Net Zero (DESNZ), which provides information on UK energy production, consumption, and trade, for energy overall and for specific fuels

We refer to residence-based (also known as production) emissions in this bulletin. Territorial emissions published by DESNZ is the measure generally used for GHG emissions targets, including net zero by 2050. Footprint (or consumption) emissions, published by the Department for Environment, Food and Rural Affairs, account for emissions from trade. More information on these three official measures of UK GHG emissions can be found in our [Measuring UK greenhouse gas emissions article](#).

All estimates of the annual GHG series and the latest quarter of the energy trends are provisional and subject to revisions. A complete breakdown of emission data by more granular standard industrial classification (SIC) codes is required for our quarterly emissions model. We have published final estimates of emissions for 2023, with the final 2024 emissions due to be published in Summer 2026.

The whole time series is updated for each instance of this release, which means that the latest version supersedes all previous versions.

This bulletin presents non-seasonally adjusted estimates. Both non-seasonally adjusted and seasonally adjusted data are available in our accompanying dataset.

Official statistics status

As official statistics, these are produced in line with the Code of Practice for Statistics. We are committed to the continued innovation and improvement of these data. You can read more about the different types of official statistics on the [UK Statistics Authority website](#).

We have published quarterly GHG emissions estimates regularly since July 2023. We have automated the production process using Reproducible Analytical Pipelines (RAPs), as described in [GOV.UK's blog post](#).

For more information on the methods used, and the strengths and limitations of the data, see Section 6: Methods used to produce the data in our [Estimates of UK quarterly GHG emissions \(residence basis\) quality and methodology information \(QMI\)](#).

For further information, or if you have any views on these statistics or suggestions for improvement, you can contact us at environment.accounts@ons.gov.uk.

Strengths and limitations

The estimates used in the model and the modelling process are both subject to uncertainty. For instance, for periods where a base or reference year is unavailable (such as this quarter), we use "nowcasting" measures to extend the series for five quarters. This implies that the estimates for those periods are less accurate, compared with periods where a base or reference year is available.

More detailed information on the strengths and limitations of the estimates presented in this bulletin, is available in Section 6 of our QMI.

More quality and methodology information

More quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in our [Estimates of UK quarterly greenhouse gas emissions \(residence basis\) QMI](#).

8 . Related links

[UK Environmental Accounts: 2025](#)

Bulletin | Released 5 June 2025

Measuring the contribution of the environment to the economy, the impact of economic activity on the environment, and responses to environmental issues.

[Greenhouse gas emissions, UK: provisional estimates, 2023](#)

Bulletin | Released 17 October 2024

Measuring the air emissions generated by UK economic activities.

[UK territorial greenhouse gas emissions statistics](#)

Statistics | Last updated 23 January 2025

Final and provisional estimates of UK territorial greenhouse gas emissions from 1990 from the Department for Energy Security and Net Zero.

[UK and England's carbon footprint to 2022](#)

Statistics | Last updated 14 May 2025

Annual greenhouse gas and carbon dioxide emissions relating to UK and England consumption from the Department for Environment, Food and Rural Affairs.

[Measuring UK greenhouse gas emissions](#)

Article | Last updated 18 June 2025

Summary of the three measures of UK greenhouse gas (GHG) emissions: territorial, residence and footprint.

9 . Cite this statistical bulletin

Office for National Statistics (ONS), released 5 August 2025, ONS website, statistical bulletin, [Estimates of quarterly greenhouse gas emissions \(residence basis\), UK: January to March 2025](#)