Office for National Statistics

Statistical bulletin

Estimates of quarterly greenhouse gas emissions (residence basis), UK: Quarter 2 April to June 2025

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

Contact:
Environmental Accounts team
environment.accounts@ons.gov.uk
+44 1633 560378

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1 . Main points

- We estimate that UK greenhouse gas emissions on a residence basis were 108 million tonnes of carbon dioxide equivalent (MtCO2e) in Quarter 2 (April to June) 2025, below the estimated 116 MtCO2e in Quarter 2 2024.
- The UK emitted 141 tonnes of CO2e per million British pounds of economic activity (gross value added) in Quarter 2 2025, down 63.8% since Quarter 1 1999.
- Residence-based emissions were 1.7 tonnes of CO2e per head in Quarter 2 (April to June) 2025; this is down 47.9% from 3.3 tonnes of CO2e per head in Quarter 1 1999, when this series began.
- 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 2025 are subject to greater uncertainty because final emission estimates for those years are not yet available, so we have modelled six quarters of data.

We refer to residence-based (or 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 (or 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

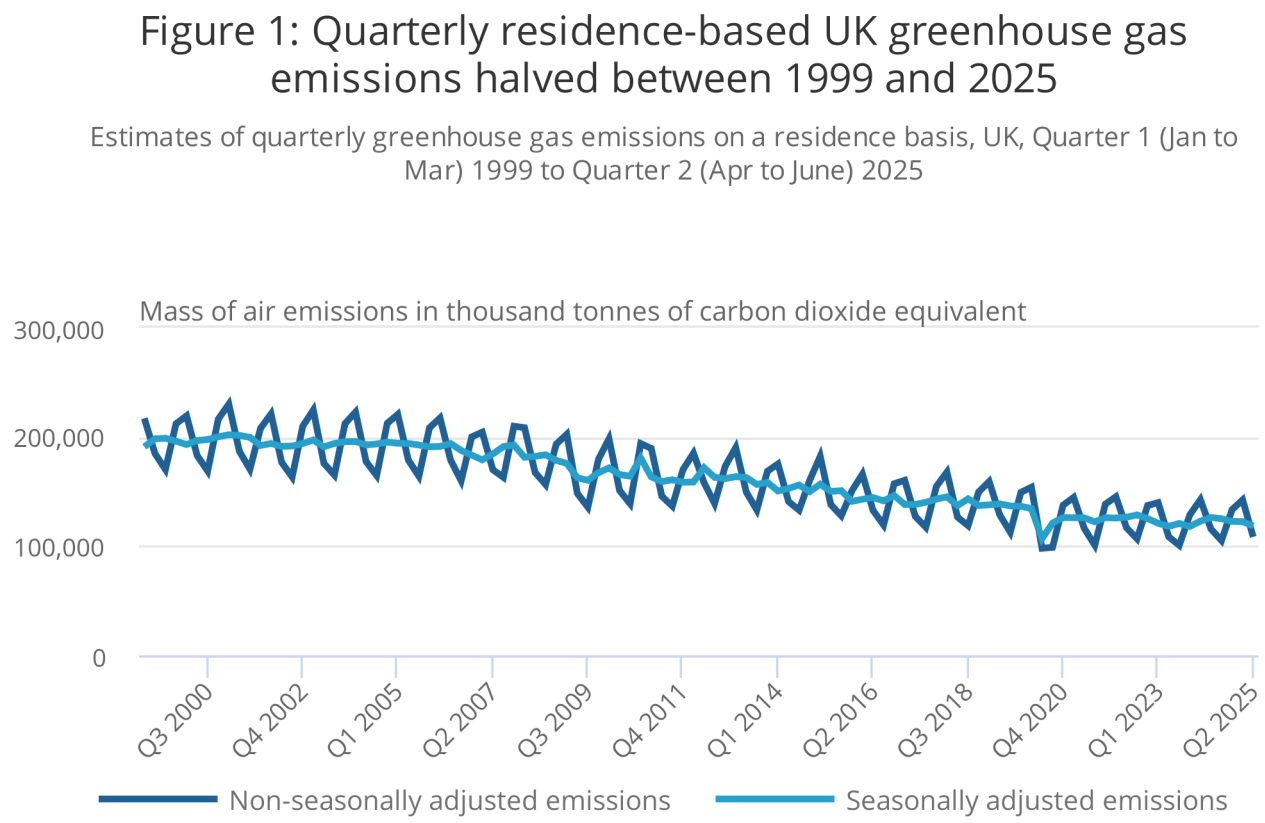
We estimate total quarterly UK greenhouse gas (GHG) and carbon dioxide (CO2) emissions on a residence basis using modelling techniques. All emissions estimates in this bulletin are non-seasonally adjusted, unless otherwise specified.

Total emissions in Quarter 2 2025 on a residence basis were 108 million tonnes of CO2 equivalent (MtCO2e). This is lower than for the same quarter in 2024, when the estimate of emissions was 116 MtCO2e, and down 50.0% from Quarter 1 1999.

The decrease in Quarter 2 2025 is partially attributable to emissions from consumer expenditure which was down 21.0%: this includes activities such as heating homes and private car travel.

Figure 1: Quarterly residence-based UK greenhouse gas emissions halved between 1999 and 2025

Estimates of quarterly greenhouse gas emissions on a residence basis, UK, Quarter 1 (Jan to Mar) 1999 to Quarter 2 (Apr to June) 2025



Source: Environmental Accounts from the Office for National Statistics, and 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 in the previous year.

Table 1: Emissions have decreased in both quarters of 2025 compared with the same quarters in the previous year

Change in non-seasonally adjusted UK greenhouse gas emission estimates, January 2020 to June 2025

Time Period	Change in quarterly totals from same quarter the previous year (%)
Quarter 1 2020	-3.3
Quarter 2 2020	-23.8
Quarter 3 2020	-12.3
Quarter 4 2020	-7.9
Quarter 1 2021	-6.0
Quarter 2 2021	18.6
Quarter 3 2021	2.0
Quarter 4 2021	0.7
Quarter 1 2022	0.4
Quarter 2 2022	0.5
Quarter 3 2022	5.9
Quarter 4 2022	-0.9
Quarter 1 2023	-3.7
Quarter 2 2023	-7.1
Quarter 3 2023	-5.6
Quarter 4 2023	-6.2
Quarter 1 2024	1.9
Quarter 2 2024	6.6
Quarter 3 2024	4.3
Quarter 4 2024	3.7
Quarter 1 2025	-0.1
Quarter 2 2025	-6.2

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

These emissions 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 both quarters of 2025. This is because we use the detailed estimates at SIC code level to constrain our modelling of these estimates. Final, detailed 2024 data will not be published until summer 2026.

3 . 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.

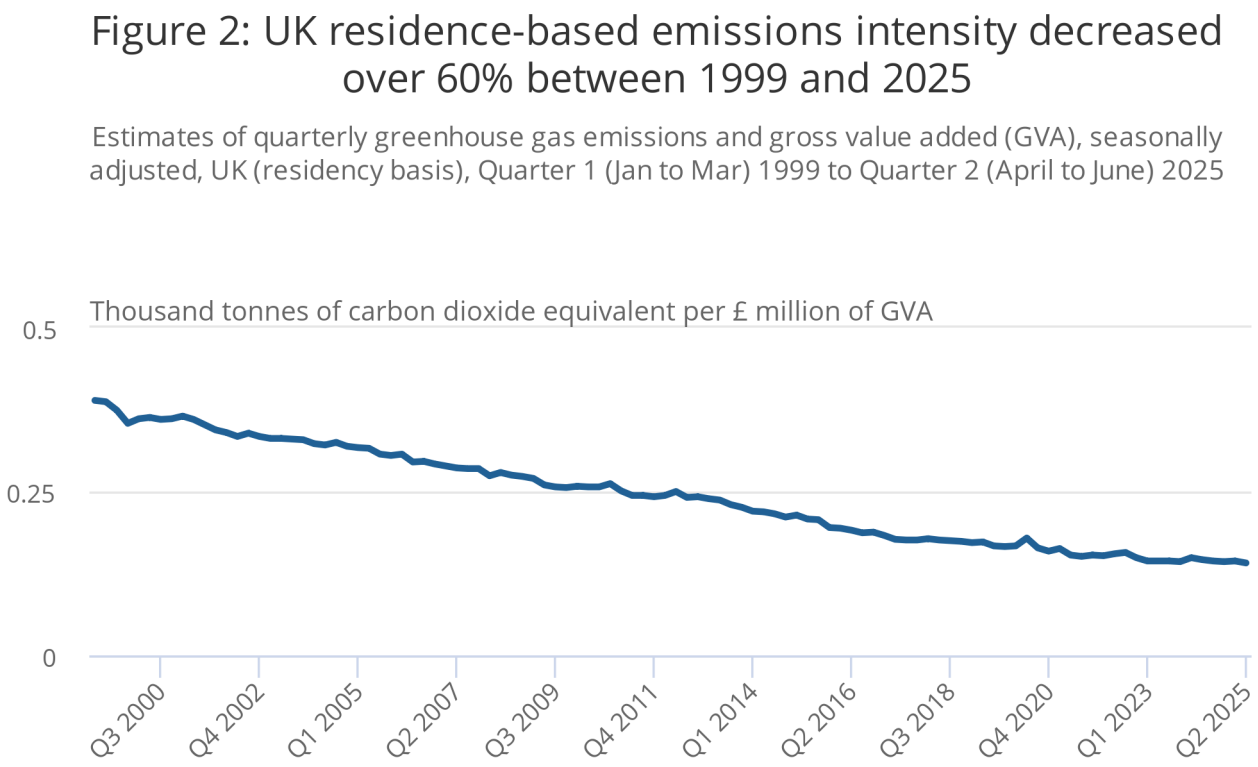
This enables us to directly compare these with important economic indicators, such as gross domestic product (GDP), and so calculate greenhouse gas (GHG) emissions intensity, or emissions per unit of economic output.

The UK emitted 141 tonnes of carbon dioxide equivalent (CO2e) per million British pounds of gross value added (GVA) in Quarter 2 (Apr to Jun) 2025.

Emissions intensity has fallen 63.8% from 389 tonnes of CO2e per million British pounds of GVA in Quarter 1 (Jan to Mar) 1999, when this series starts (see Figure 2).

Figure 2: UK residence-based emissions intensity decreased over 60% between 1999 and 2025

Estimates of quarterly greenhouse gas emissions and gross value added (GVA), seasonally adjusted, UK (residency basis), Quarter 1 (Jan to Mar) 1999 to Quarter 2 (April to June) 2025



Source: Environmental Accounts from the Office for National Statistics, and 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. GVA is the difference between the value of goods and services produced (output) and the cost of raw materials and other inputs, which are used up in production (intermediate consumption), for any given industry. GVA are chained volume measures (CVM), in constant prices with 2023 as the base and reference year.

3. 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 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, like from manufacturing to services activities
- a combination of these factors

All estimates of GVA are subject to revisions. For more information, please see Section 6: Revisions to GDP in our GDP quarterly national accounts, UK: April to June 2025

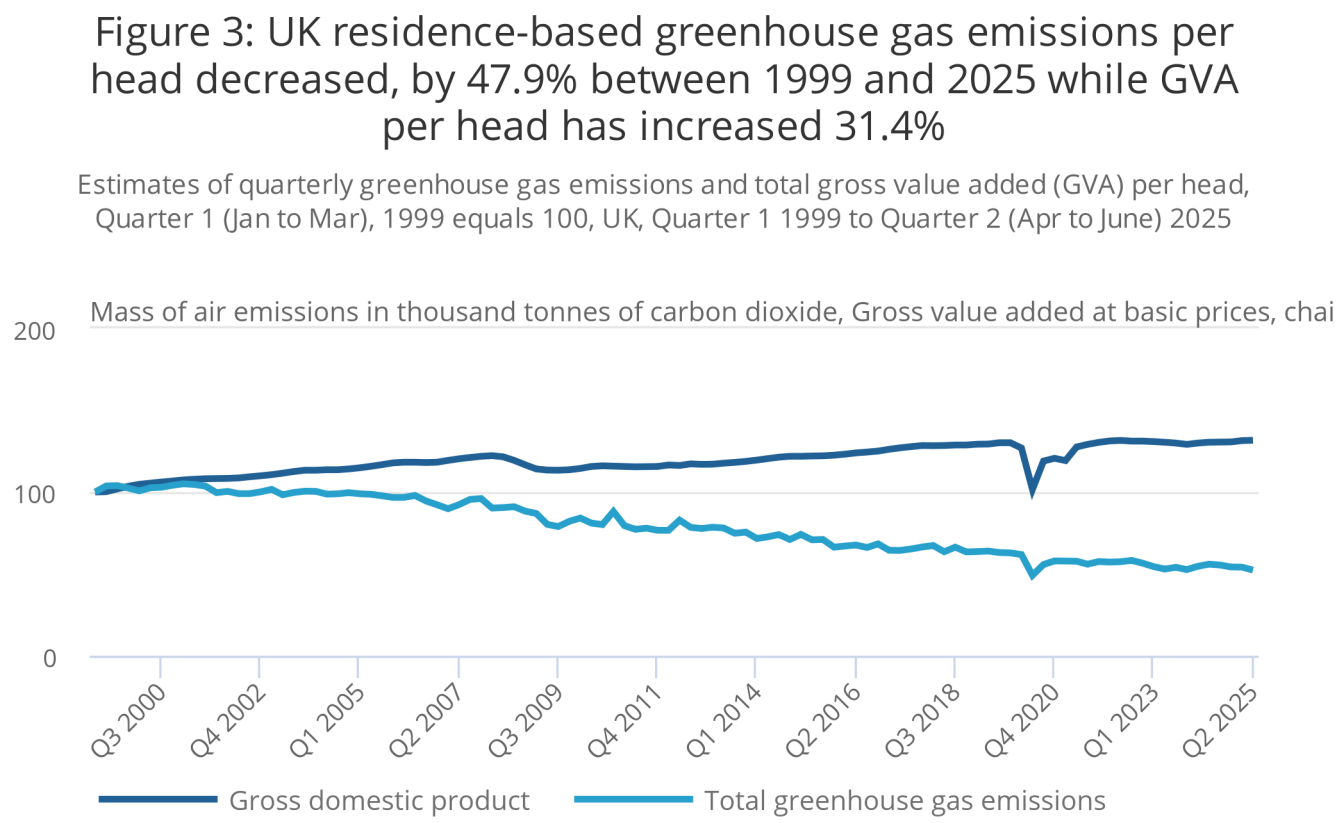
4 . Greenhouse gas emissions per head

Residence-based greenhouse gas (GHG) emissions were 1.70 tonnes of carbon dioxide equivalent (CO2e) per head in Quarter 2 (April to June) 2025.

Emissions per head have decreased by 47.9%, 1.56 tonnes of CO2e, since 1999 when this time series began.

Figure 3: UK residence-based greenhouse gas emissions per head decreased, by 47.9% between 1999 and 2025 while GVA per head has increased 31.4%

Estimates of quarterly greenhouse gas emissions and total gross value added (GVA) per head, Quarter 1 (Jan to Mar), 1999 equals 100, UK, Quarter 1 1999 to Quarter 2 (Apr to June) 2025



Source: Environmental Accounts from the Office for National Statistics, and 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 2023 as the base and reference year.

4. The CVM has been rebased to 2023, which has produced a level increase in GVA across the time series. More information on the production of CVM can be found in our Blue Book 2025: advanced aggregate estimates article.

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).

5 . Data

Estimates of quarterly greenhouse gas emissions
Dataset | Released 05 November 2025
Estimates of UK quarterly greenhouse gas emissions (GHG) and carbon dioxide (CO2) emissions on a residence basis.

Energy trends
Dataset | Last updated 30 September 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 of 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 complied 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 (GHG) 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 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 explainer.

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 are required for our quarterly emissions model. We have published final estimates of emissions for 2023, and provisional estimates for 2024, with final 2024 emissions estimates due to be published in Summer 2026.

The whole time series is updated for each instance of this release, so this 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, the data they provide, and their strengths and limitations, see 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

These estimates are subject to uncertainty, both in the underlying estimates used with the model and through uncertainty introduced by the modelling itself. 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.

For more detailed information on the strengths and limitations of the estimates presented in this bulletin, see Section 6: Methods used to produce the data in our associated 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, impact of economic activity on the environment, and response to environmental issues.

Greenhouse gas emission, UK: provisional estimates, 2024
Bulletin | Released 24 October 2025
The emissions of carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons, sulphur hexafluoride, nitrogen trifluoride, and total greenhouse gas emissions by industry (SIC 2007 group of around 130 categories), for the UK from 1990 to 2023.

UK territorial greenhouse gas emissions statistics
Statistics | Last updated 27 March 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 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 05 November 2025, ONS website, statistical bulletin, Estimates of quarterly greenhouse gas emissions (residence basis), UK: April to June 2025