Measuring UK greenhouse gas emissions

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

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1 . Main points

- UK greenhouse gas emissions (GHGs) are reported on three bases: territorial, residence (or production) and footprint (or consumption).
- Territorial emissions cover emissions that occur within the UK's borders and are used to track UK-wide progress towards international and domestic targets, such as net zero emissions by 2050; in 2025, total UK territorial emissions were estimated at 367 million tonnes of carbon dioxide equivalent (Mt CO2e) – a 54% reduction since 1990.
- Residence (production) emissions are aligned with the UK National Accounts, enabling emissions to be linked to economic sectors and activity in them; in 2024, total UK production emissions were provisionally estimated at 478 Mt CO2e – a 42% reduction since 1990.
- Footprint (consumption) emissions cover consumption of all goods and services by the UK, sometimes referred to as "carbon footprint"; in 2023, the latest year for which footprint emissions estimates are available, they were estimated to be 699 Mt CO2e – a 24% reduction since 1990.
- By comparison, territorial emissions were estimated to be 384 Mt CO2e and residence emissions 480 Mt CO2e in 2023.
- Emissions on all three measures have declined compared with 1990, with consumption emissions falling at a slower rate than both territorial and residence emissions.

Each year the estimates relating to previous years are subject to revision, as a result of either revisions to the underlying data or methodological improvements.

2 . How the UK measures greenhouse gas emissions

Territorial emissions

Territorial emissions are used to inform progress on UK-wide emissions targets and are published by the Department for Energy Security and Net Zero (DESNZ).

These estimates include emissions produced within the UK's geographical borders. They take into account emissions and removals from:

- activities of businesses in the UK no matter where they are registered in the world
- the activities of people living in the UK as well as visitors from outside the UK
- land in the UK, including forests and crop or grazing land

They currently exclude emissions or removals from:

- international aviation and shipping
- UK residents and UK-registered businesses abroad
- production of goods and services the UK imports from other countries
- CO2 emissions of biogenic origin, for example, burning wood, straw, biogases, and poultry litter; this avoids double counting as these emissions are reported against the land use sector (as a change in carbon stock) of the territory in which the biomass is harvested

Targets include net zero UK greenhouse gas (GHG) emissions by 2050, adopted by the UK government in 2019 following a Climate Change Committee recommendation.

"Net zero" means that any GHG emissions would be the same as, or less, than those removed from the atmosphere, which can be achieved through a combination of reduction and removal of emissions.

The UK has five-yearly carbon budget targets, with the most recently announced being the sixth Carbon Budget target to reduce emissions to 965 million tonnes of carbon dioxide equivalent between 2033 and 2037. This means that emissions are required to be approximately 77% lower by 2035 compared with 1990 levels.

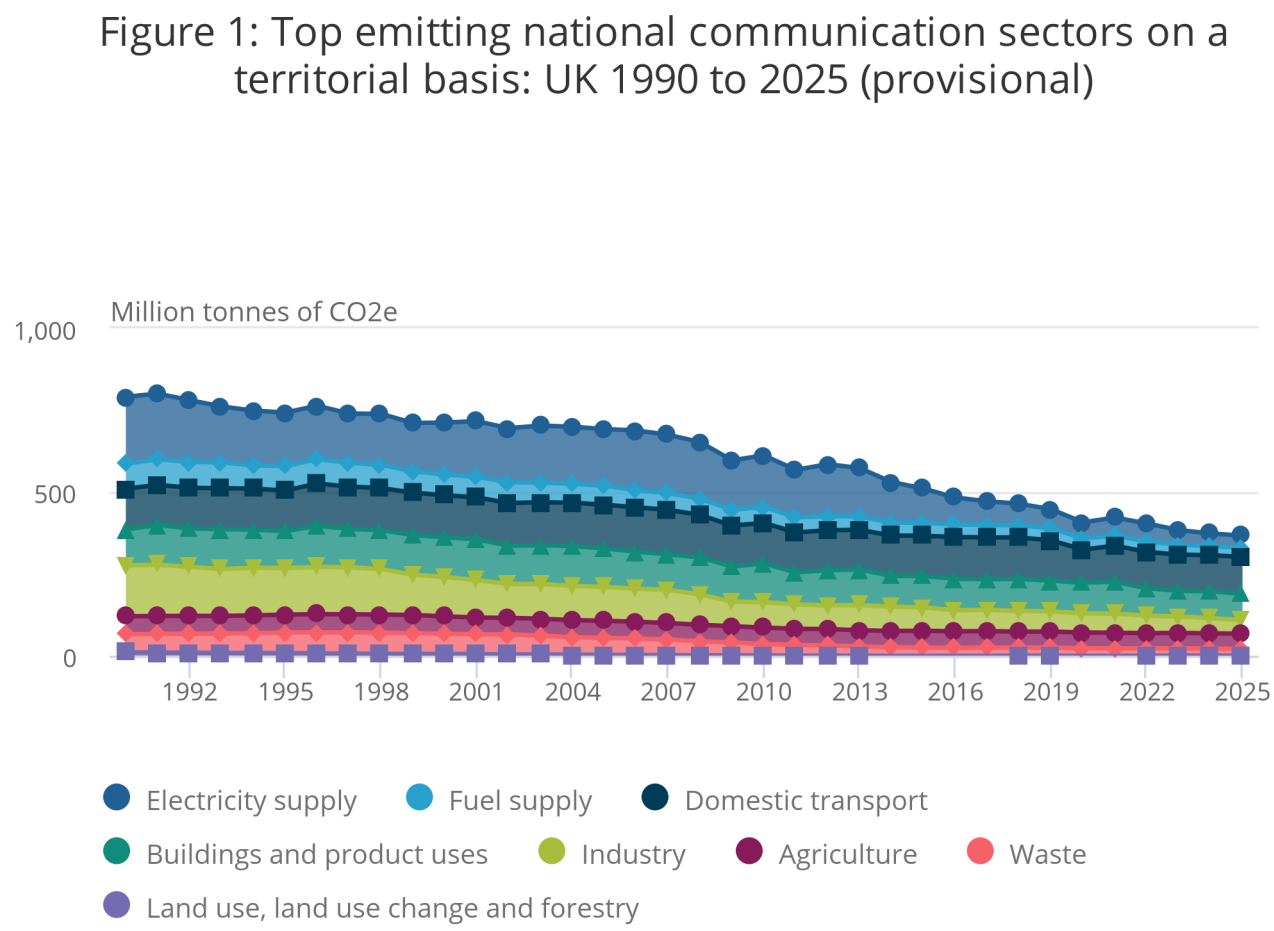
These emissions estimates are used to monitor net-zero progress and other UK-wide targets. They are produced in line with international guidance from the Intergovernmental Panel on Climate Change (IPCC) and reported to the United Nations Framework Convention on Climate Change (UNFCCC) each year.

Territorial emissions are designated as accredited official statistics and are published annually.

The yearly publications cover:

- final UK estimates published each February
- provisional UK estimates published each spring, which provide an early indication of trends in emissions nearly a year ahead of the final statistics publication
- devolved government emissions statistics, published each June
- local authority emissions statistics are published each June, allowing local authorities to, for example, monitor their progress against local targets

Figure 1: Top emitting national communication sectors on a territorial basis: UK 1990 to 2025 (provisional)



Source: Provisional UK greenhouse gas emission statistics, Department for Energy Security and Net Zero

Residence (production) emissions

Residence-based emissions – sometimes referred to as production emissions – cover emissions by UK residents and UK-registered businesses, whether they happen in the UK or overseas.

This means they include emissions from:

- aviation and shipping from British operators or carriers
- UK tourists abroad

And they exclude:

- foreign tourists in the UK
- freight from foreign operators or carriers

An important use of this measure is that it enables direct comparison of emissions by sector of UK industry and households with main economic indicators [including gross value added (GVA).]

These are published by the Office for National Statistics, as part of the [UK's Environmental Accounts], and are aligned with the national accounts because of being compiled in accordance with the [UN System of Environmental-Economic Accounting (SEEA)]. Following this framework also enables international comparisons.

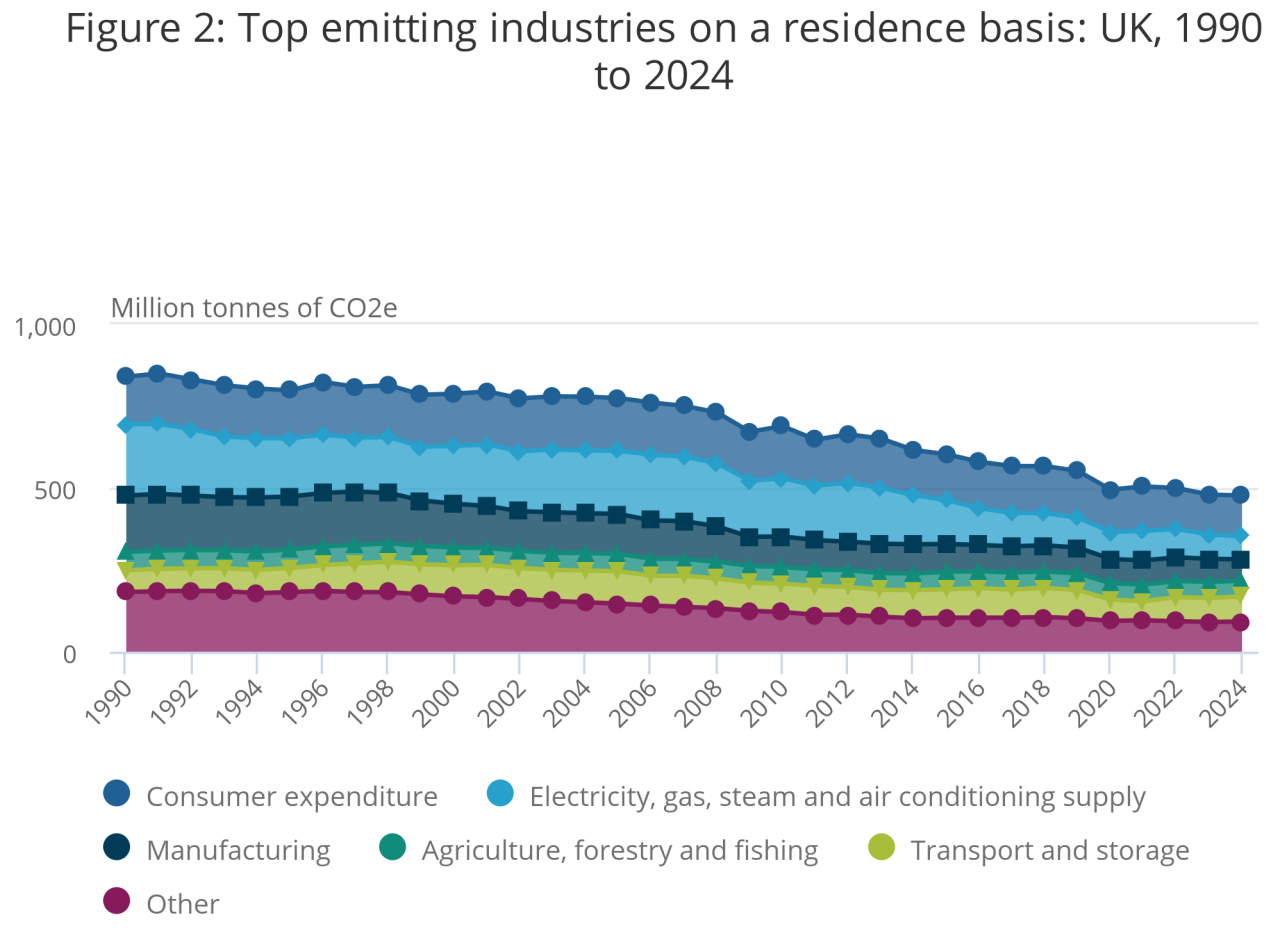
Residence-based emissions are designated as accredited official statistics and are published on a yearly basis. They are also reported to the OECD annually.

The yearly publications cover:

- final estimates (usually published in the summer), with breakdowns by industry using detailed Standard Industrial Classification (SIC) 2007 codes
- provisional estimates (usually published in the autumn) by high-level SIC codes
- statistics on quarterly greenhouse gas emissions

This measure covers Scope 1 emissions, which means direct emissions from owned or directly controlled sources.

Figure 2: Top emitting industries on a residence basis: UK, 1990 to 2024



Source: UK Environmental Accounts, Office for National Statistic

Footprint (consumption) emissions

A further measure of UK emissions focusing on consumption, known as the "carbon footprint", is published by the Department for Environment, Food and Rural Affairs (Defra).

This accounts for all GHG emissions through the supply chain of goods and services consumed in the UK, wherever they are produced in the world. This includes emissions from UK imports of goods and services and excludes emissions arising from UK-produced goods that are exported.

This means that they include emissions from:

- aviation and shipping owned by UK companies, used by UK residents
- aviation and shipping owned by non-UK companies, used by UK residents

They exclude emissions from:

- land, land use and forestry
- aviation and shipping owned by UK companies, used by non-UK residents
- aviation and shipping owned by non-UK companies, used by non-UK residents

This measure helps to understand the UK's global contribution to GHG emissions through UK consumption. For more information on the UK's carbon footprint, see the articleEmissions embedded in trade and impacts on climate change.

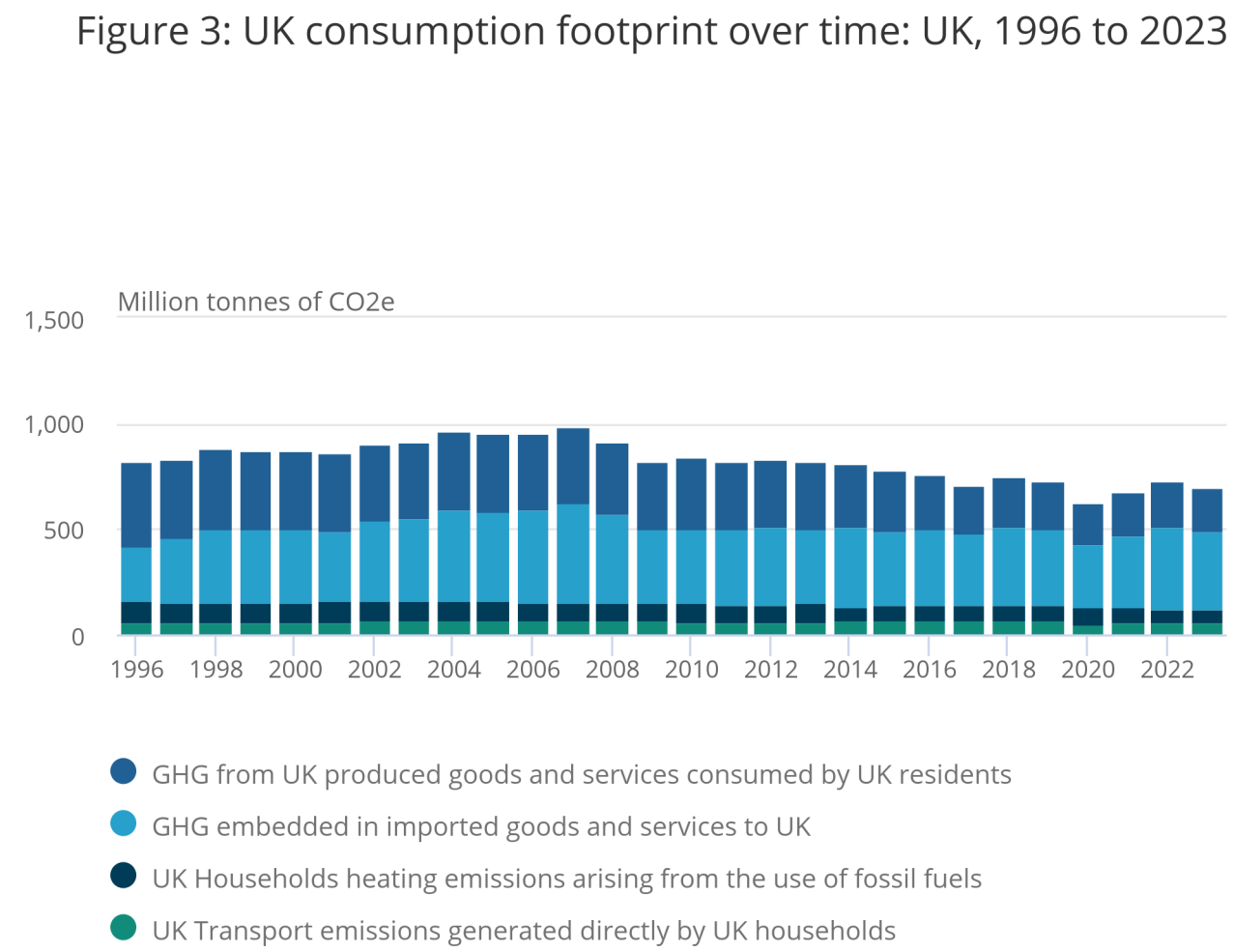
This is the "widest" measure of UK emissions, including emissions embedded in imported materials and products. This means they will not be affected by "carbon leakage", where overseas production for UK consumption is not captured in the territorial emissions measure, for example.

Footprint emissions are classified as official statistics. They are published on a yearly basis with a three-year lag: estimates for 2023 were published in 2026. This measure covers Scopes 1, 2 and 3. See Section 4: Glossary for more details about Scopes 1, 2 and 3.

Points to note:

- the emissions relating to overseas production of imports to the UK or England, often referred to as emissions that are "embedded" in imports, are not as easily measured as emissions generated within the UK borders

Figure 3: UK consumption footprint over time: UK, 1996 to 2023



Source: UK Carbon Footprint, Department for Environment, Food and Rural Affairs

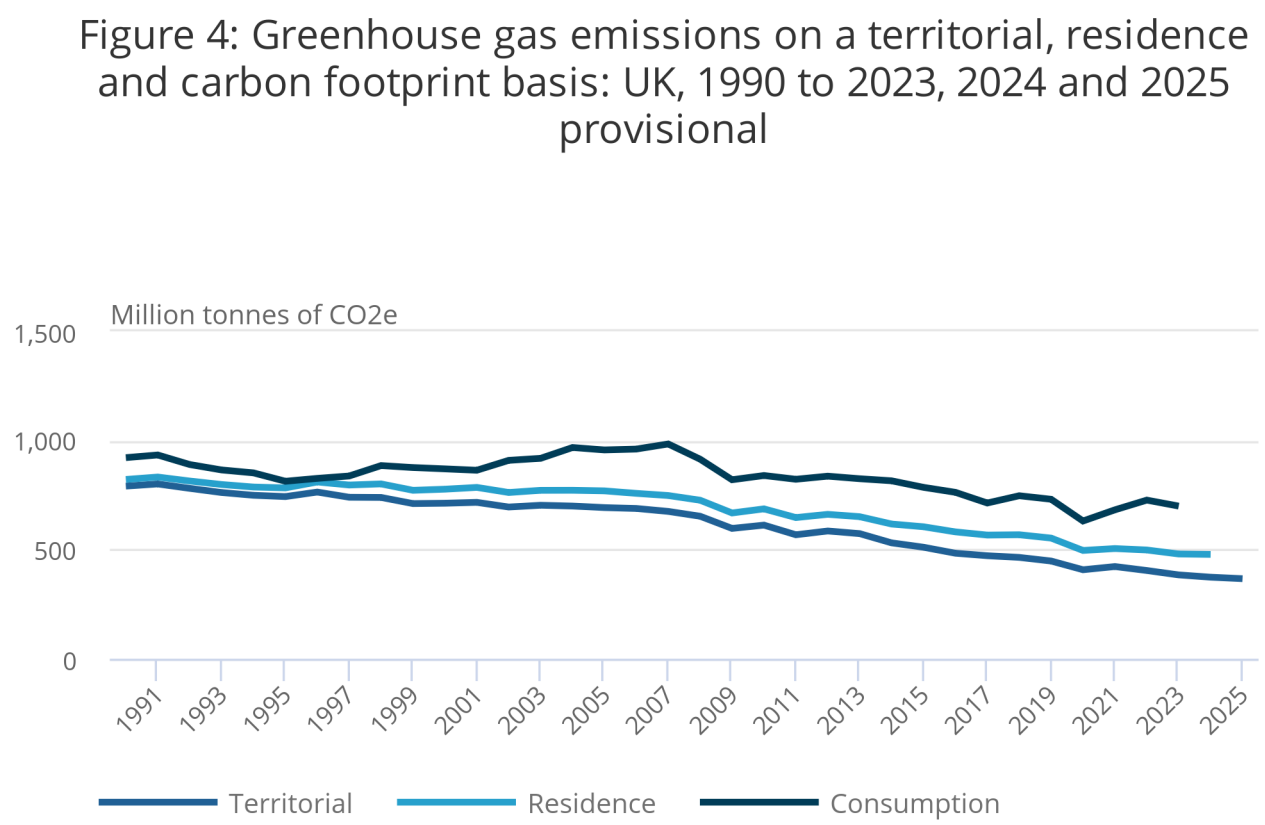
3 . Comparing the three emissions measures

In 2023, the latest year for which all three measures are available, territorial emissions were 384 million tonnes of carbon dioxide equivalent (Mt CO2e), residence emissions were 480 Mt CO2e and footprint emissions 699 Mt CO2e.

All three emission measures have declined compared with 1990, the first year for which data are available. Estimates of UK greenhouse gas emissions on a footprint (consumption) basis have fallen more slowly than estimates on the other bases. The larger reduction in territorial emissions may be because of the UK economy moving from a manufacturing base to a service base with a greater dependence upon imports and their associated embedded emissions.

The year 2020 was a low point for all three emission measures with a subsequent increase in 2021. Both territorial and residence-based emissions have seen decreases from 2022 onwards that are now below the coronavirus (COVID-19) pandemic low in 2020. Consumption emissions have remained above their record low in 2020.

Figure 4: Greenhouse gas emissions on a territorial, residence and carbon footprint basis: UK, 1990 to 2023, 2024 and 2025 provisional



Source: Territorial emission, Department for Energy Security and Net Zero, Environmental Accounts from the Office for National Statistics and UK Carbon Footprint from Department for Environment, Food and Rural Affairs

4 . Glossary

Greenhouse warming potential (GWP)

Global warming potential (GWP) is an emission metric used to quantify the contributions of different greenhouse gases (GHG) to climate change. All three greenhouse gas estimates are reported with a GWP of AR5, aligned with the latest agreed international reporting practice under the Paris Agreement transparency framework.

The AR5 reporting standard comes from the Fifth Assessment Report from the United Nations Intergovernmental Panel on Climate Change (IPCC). It summarises the latest scientific knowledge on climate change, including the latest information on GHG and their impact on the environment. The global warming potentials (GWPs) used are from table 8.A.1 (without climate-carbon feedback) of Working Group 1 of the IPCC Fifth Assessment Report: Climate Change 2013.

Scopes 1, 2 and 3:

- Scope 1: direct emissions from owned or directly controlled sources
- Scope 2: indirect emissions from the generation of purchased energy
- Scope 3: all other indirect emissions that occur in producing and transporting goods and services, including the full supply chain

5 . Related links

Residence - UK Environmental Accounts
Statistical bulletin | Released 5 June 2026
Residence-based emissions published by the Office for National Statistics.

Territorial - UK greenhouse gas emissions statistics
Article | Released 2 April 2026
Territorial based emissions published by the Department for Energy Security and Net Zero.

Consumption - UK and England's carbon footprint
Article | Released 30 June 2026
Consumption based emissions published by the Department for Environment, Food and Rural Affairs.

6 . Cite this methodology

Office for National Statistics (ONS), updated 7 July 2026, ONS website, methodology, Measuring UK greenhouse gas emissions