



## 2019 UK greenhouse gas emissions, provisional figures

26 March 2020

National Statistics

This publication provides the latest estimates of 1990-2019 UK territorial greenhouse gas emissions which are presented in carbon dioxide equivalent units throughout.

- In 2019, total UK greenhouse gas emissions were provisionally 45.2 per cent lower than in 1990 and 3.6 per cent lower than 2018.
- These figures rely on provisional estimates of carbon dioxide emissions based on UK energy statistics. In 2019, UK net emissions of carbon dioxide were provisionally estimated to be 351.5 million tonnes (Mt), 3.9 per cent lower than 2018 (365.7 Mt). Carbon dioxide (CO<sub>2</sub>) is the main greenhouse gas, accounting for 81 per cent of total UK greenhouse gas emissions in 2019.
- The decrease in carbon dioxide emissions was driven by the continuing downward trend in emissions from power stations, with a 13.2 per cent decrease between 2018 and 2019. This is mainly as a result of changes in the fuel mix used for electricity generation, away from coal and towards renewables.
- There was also a 2.8 percent fall in carbon dioxide emissions from transport, which fell for the second year in a row following several years of increases. But transport remains the largest source of carbon dioxide emissions in the UK, accounting for 34 per cent in 2019.
- Adjusting emissions for external temperature does not change the long-term trend. While actual emissions are estimated to have fallen by 3.6 per cent, temperature adjusted emissions fell by 3.4 per cent between 2018 and 2019. The 2019 annual average temperature was warmer than the long-term 1981-2010 average by 0.5 degrees Celsius.

### What you need to know about these statistics:

This publication provides the latest provisional estimates of 2019 UK territorial greenhouse gas emissions based on provisional inland energy consumption statistics, which are published in BEIS's quarterly [Energy Trends publication](#). Emissions are presented in carbon dioxide equivalent units (CO<sub>2</sub>e) throughout this statistical release.

These provisional emissions estimates are subject to revision when the final estimates are published in February 2021; however, they provide an early indication of emissions in 2019. They also include estimates of quarterly emissions and the impact on emissions of external temperature changes.

For more detailed information about the sources of UK greenhouse gas emissions and information on UK emissions targets and progress towards them see the 2018 [final UK greenhouse gas emissions statistics](#).

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# Introduction

This publication provides provisional annual and quarterly estimates of UK territorial greenhouse gas emissions by source sector for 2019. It also provides an estimate of temperature adjusted emissions, which give an idea of overall trends in emissions without fluctuations due to changes in external temperature. More information about the underlying methodology for the provisional emissions statistics can be found in the accompanying [methodology summary](#).

The estimates present emissions on a “territorial” basis, so only include emissions which occur within the UK’s borders. They therefore exclude emissions from UK businesses and residents that occur abroad, including from international aviation and shipping, and any emissions embedded within the supply chain of manufactured goods and services imported into the UK (while including emissions that occur in the UK resulting from exported goods and services).

Data for 1990-2018 are consistent with the annual emissions presented in the National Statistics publication [2018 final UK greenhouse gas emissions statistics](#). Data for 2019 emissions are provisional and are calculated based on UK energy statistics.

The provisional estimates of carbon dioxide (CO<sub>2</sub>) emissions are based on provisional inland energy consumption statistics, which are being published at the same time by BEIS in the quarterly [Energy Trends](#) publication. Estimates of non-CO<sub>2</sub> gases are based on a simple approach which assumes that emissions of non-CO<sub>2</sub> gases in 2019 will change from the 2018 total in line with the percentage difference between the estimates for the 2018 and 2019 of non-CO<sub>2</sub> emissions in the 2018 [Energy and Emissions Projections](#) published by BEIS, and that these emissions will be spread evenly over the year.

Quarterly emissions estimates are presented as a moving annual total up to a particular quarter. For example, when quarterly emissions are presented up to quarter 4 (1 October to 31 December), 2019, this represents an annual total comprising the latest quarter (quarter 4 2019) and the preceding 3 quarters (quarters 1, 2 and 3 of 2019). Presenting the data in this way has some advantages over presenting data for single quarters, since seasonal fluctuations are smoothed out and long-term trends highlighted. Data on emissions in individual quarters are available in the data tables published alongside this publication.

There are uncertainties associated with all estimates of greenhouse gas emissions. Although for any given year considerable uncertainties may surround the emissions estimates for a pollutant, it is important to note that trends over time are likely to be much more reliable. It is also important to note that the provisional 2019 estimates are subject to a greater range of uncertainty than the final figures for earlier years. For more information on uncertainties see the annex published alongside the [2018 final UK greenhouse gas emissions statistics](#).

The provisional estimates are not used for any formal reporting of how the UK is performing against its emissions reduction targets, as this requires final estimates based on the UK’s greenhouse gas inventory. However, these statistics give policy makers and other users an initial steer as to the trend in emissions between 2018 and 2019, which helps them to form an initial assessment of the extent to which the UK is on track to meet targets. For information on UK emissions targets and progress towards them, see the [2018 final UK greenhouse gas emissions statistics](#).

For the purposes of reporting, greenhouse gas emissions are allocated into sectors as follows:

Energy Supply	Emissions from electricity generation and other energy production activities such as mining, refining and manufacturing fuels.
Business	Emissions from fuel combustion and product use in industrial and commercial sectors, and F gas emissions from refrigeration and air conditioning in all sectors. Includes industrial off-road machinery but not business-related transport emissions, which are included in the <i>Transport</i> sector.
Transport	Emissions from road transport, domestic aviation, railways and domestic shipping. Only includes emissions from vehicles and not from transport related infrastructure or from air conditioning. International aviation and shipping emissions are not included in national totals.
Public	Emissions from the combustion of fuel in public sector buildings, e.g. hospitals and schools. Emissions from public transport are included in the <i>Transport</i> sector.
Residential	Emissions from residential properties, including from consumer product use. Primarily consists of fuel combustion for heating/cooking, garden machinery, and fluorinated gases released from aerosols and metered dose inhalers.
Agriculture	Emissions of greenhouse gases from livestock, agricultural soils (excluding carbon stock changes which are included in the <i>LULUCF</i> sector) and agricultural machinery.
Industrial processes	Emissions resulting from industrial processes, except for those associated with fuel combustion which are included in the <i>Business</i> sector.
Land use, land use change and forestry (LULUCF)	Emissions/removals of CO <sub>2</sub> from changes in the carbon stock in forestland, cropland, grassland, wetlands, settlements and harvested wood products, and of other greenhouse gases from drainage (excl. croplands and intensive grasslands) and rewetting of soils, nitrogen mineralisation associated with loss and gain of soil organic matter, and fires. Because the impact of biomass harvest on carbon stocks in ecosystems is included in this sector, any emissions of CO <sub>2</sub> from burning biomass (regardless of the country of origin) are excluded from other sectors to avoid double counting them.
Waste management	Emissions resulting from the treatment and disposal of solid and liquid waste, for example from landfill, incineration and composting. Emissions from incineration with energy recovery are instead reported in the <i>Energy Supply</i> sector and emissions from residential composting are included in the <i>Residential</i> sector.

These high-level sectors are made up of a number of more detailed sectors, which follow the definitions set out by the Intergovernmental Panel on Climate Change (IPCC)<sup>1</sup> and which are used in international reporting tables which are submitted to the United Nations Framework Convention on Climate Change (UNFCCC)<sup>2</sup> every year. It is important to note that these figures are based on provisional energy data and are subject to change. The sectoral

<sup>1</sup> <https://www.ipcc-nggip.iges.or.jp/>

<sup>2</sup> <https://unfccc.int/>

breakdown is given mainly for information, and is included in the publication for completeness, but sectoral estimates are more uncertain than the overall total.

When emissions are measured on this basis, UK emissions account for around 1% of the global total, based on a range of estimates produced by the UN, the International Energy Agency and the World Resources Institute amongst others.

## 2019 annual provisional emissions results

In the [data tables](#) accompanying this publication, table 1 shows UK annual greenhouse gas emissions, including a breakdown by source sector for carbon dioxide emissions, table 3 shows quarterly moving annual totals for these emissions and table 4 shows temperature adjusted estimates.

Between 2018 and 2019, provisional estimates indicate that UK territorial greenhouse gas emissions decreased by 3.6 per cent (16.2 MtCO<sub>2e</sub>), from 451.5 MtCO<sub>2e</sub> to 435.2 MtCO<sub>2e</sub>. Provisional estimates in 2019 were 45.2 per cent lower than in 1990. Because these provisional estimates are based on energy data it is only possible to make estimates of carbon dioxide emissions from different source sectors and not estimates of other gases. Therefore, the rest of this section presents the trends in carbon dioxide emissions.

Carbon dioxide emissions are estimated to have decreased by 3.9 per cent (14.2 million tonnes (Mt)) between 2018 and 2019. In 2019, an estimated 34 per cent of carbon dioxide emissions were from the transport sector, 26 per cent from energy supply, 19 per cent from the residential sector and 18 per cent from business.

Carbon dioxide emissions in the energy supply sector decreased by 8.4 per cent (8.3 Mt), between 2018 and 2019 driven by a change in the fuel mix for electricity generation. There was also a fall of 2.8 per cent (3.5 Mt) in transport carbon dioxide emissions. Changes in transport emissions are usually as a result of traffic volumes or improvements in fuel efficiency. Residential emissions also decreased over the same time period by 1.8 per cent (1.2 Mt), likely due to a difference in weather conditions between the two years.

Since 1990, UK carbon dioxide emissions have decreased by 41.0 per cent. This decrease has resulted mainly from changes in the mix of fuels being used for electricity generation, with a shift away from coal and growth in the use of renewable energy sources. This was combined with lower electricity demand, owing to greater efficiency resulting from improvements in technology and a decline in the relative importance of energy intensive industries. Overall inland energy consumption is provisionally estimated to have decreased by 12 per cent since 1990, and if this figure is adjusted to allow for the effect of temperature, there was a 14 per cent decrease over this period.

**Table 1: Carbon dioxide emissions by sector and overall greenhouse gas emissions, UK 1990-2019**

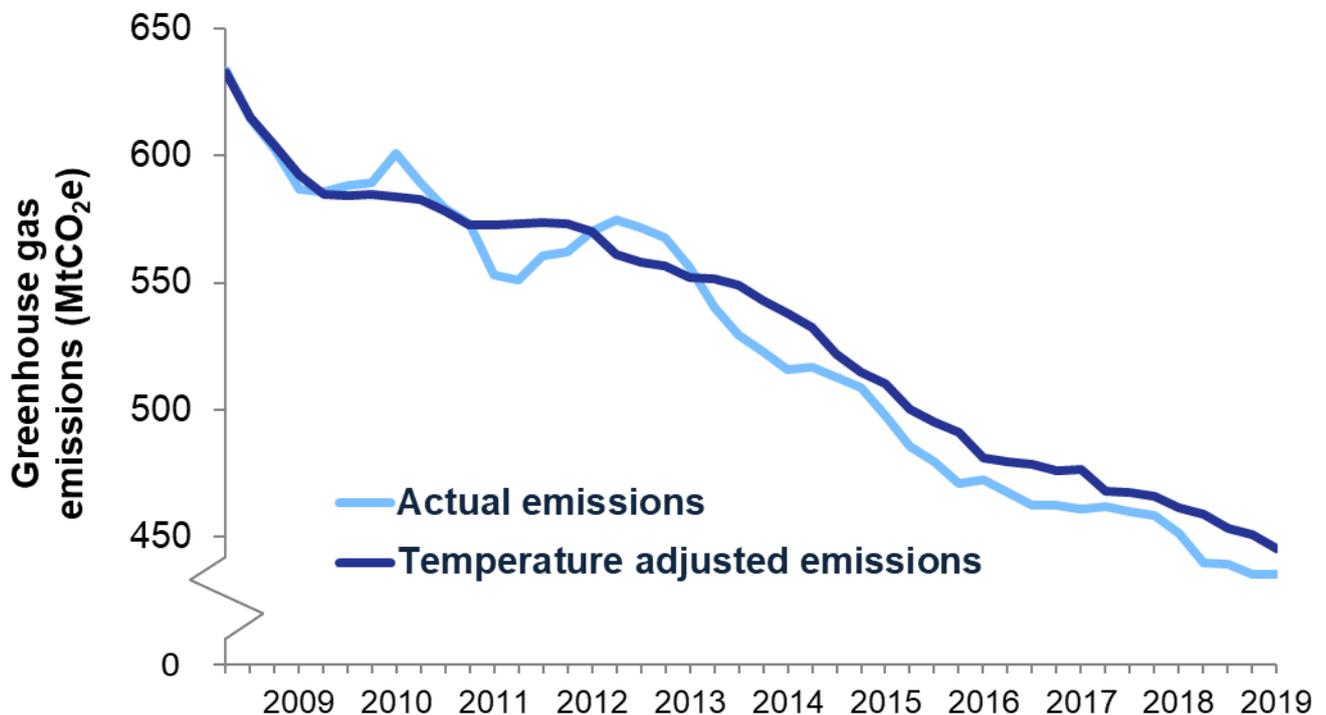
	MtCO <sub>2</sub> e							
	1990	1995	2000	2005	2010	2015	2018	2019 (P)
Energy supply	242.1	210.2	204.0	219.1	197.3	137.6	98.4	90.1
<i>from power stations</i>	203.0	163.1	158.7	173.1	157.3	104.1	66.1	57.4
<i>other Energy supply</i>	39.1	47.2	45.3	46.0	40.0	33.4	32.2	32.6
Business	111.8	109.1	109.1	97.2	78.4	69.6	65.9	64.7
Transport	125.4	126.8	131.0	134.3	123.4	122.2	123.0	119.6
Public	13.4	13.2	12.1	11.1	9.5	8.0	8.0	8.0
Residential	78.3	79.6	85.6	82.4	84.5	64.5	66.4	65.2
Agriculture	6.5	6.5	5.5	6.1	5.4	5.5	5.7	5.7
Industrial process	19.4	17.8	17.0	16.4	10.6	12.1	9.7	9.7
Waste management	1.3	1.0	0.6	0.4	0.3	0.2	0.2	0.2
LULUCF	-2.4	-4.5	-6.3	-9.1	-10.9	-11.4	-11.7	-11.7
<b>Total CO<sub>2</sub></b>	<b>595.7</b>	<b>559.8</b>	<b>558.5</b>	<b>558.1</b>	<b>498.5</b>	<b>408.3</b>	<b>365.7</b>	<b>351.5</b>
Other greenhouse gases	198.1	185.6	149.4	125.8	102.5	89.7	85.8	83.7
<b>Total greenhouse gases</b>	<b>793.8</b>	<b>745.4</b>	<b>707.9</b>	<b>683.9</b>	<b>600.9</b>	<b>497.9</b>	<b>451.5</b>	<b>435.2</b>

Source: Table 1, Provisional UK greenhouse gas emissions national statistics 1990-2018 Excel data tables

Notes:

1. (p) 2019 estimates are provisional.
2. Provisional 2019 CO<sub>2</sub> emissions for the agriculture, waste and LULUCF sectors are assumed to be the same as 2018 estimates as unlike other CO<sub>2</sub> estimates these cannot be estimated from energy statistics.
3. The entire time series is revised each year to take account of methodological improvements in the UK emissions inventory.
4. Emissions are presented as carbon dioxide equivalent in line with international reporting and carbon trading. To convert carbon dioxide into carbon equivalents, divide figures by 44/12.
5. Figures shown do not include any adjustment for the effect of the EU Emissions Trading System (EU ETS), which was introduced in 2005.
6. Totals for CO<sub>2</sub> emissions, energy supply and total greenhouse gases may not sum due to rounding.
7. Estimates of non-CO<sub>2</sub> gases are based on a simple approach which assumes that emissions of non-CO<sub>2</sub> gases in 2019 will change from the 2018 total in line with the percentage difference between the estimates for the 2018 and 2019 of non-CO<sub>2</sub> emissions in the 2018 Energy and Emissions Projections published by BEIS.

**Figure 1: Actual and temperature adjusted greenhouse gas emissions, UK, Year to Q1 2009 - Year to Q4 2019 (MtCO<sub>2</sub>e)**



Source: Tables 3 & 4, Provisional UK greenhouse gas emissions national statistics 1990-2019 Excel data tables

Note: 1. Figures are annual totals including the preceding 4 quarters.  
2. From year ending Q1 2019 onwards, figures include provisional data.

As shown in Figure 1 above, temperature adjusting greenhouse gas emissions show a similar overall trend to non-temperature adjusted emissions. Over a ten year period, temperature adjusted UK greenhouse gas emissions decreased by 25 per cent, similar to the fall in actual emissions over this period (26 per cent).

## Energy Supply

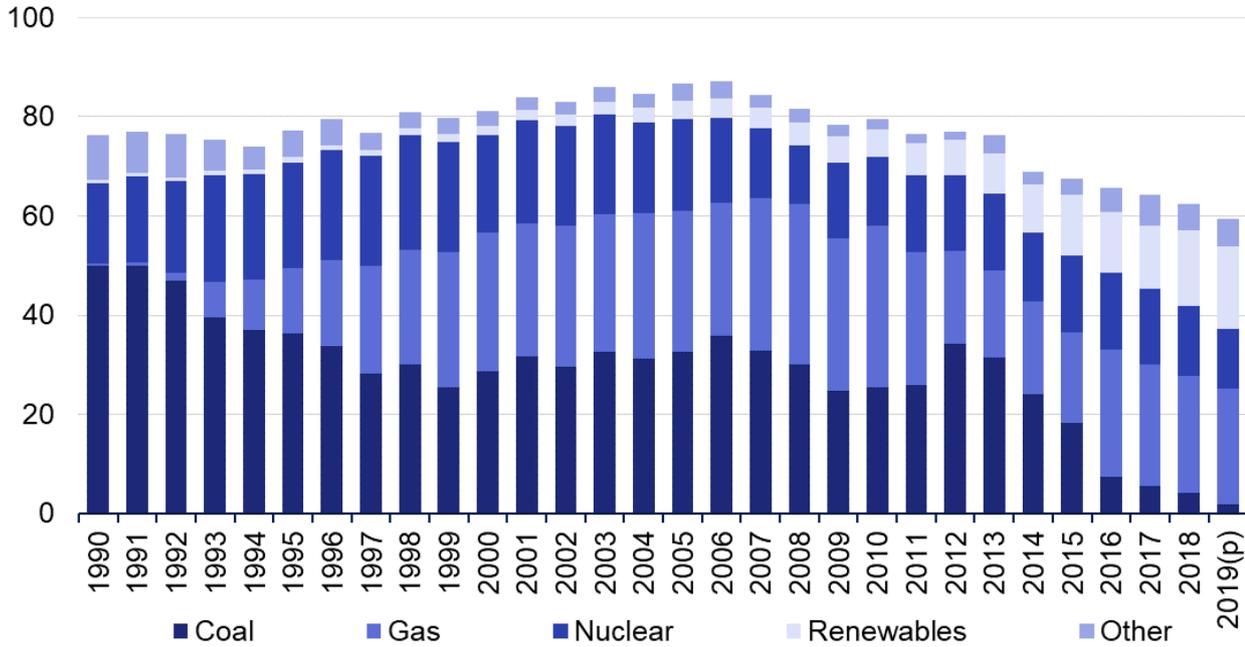
The energy supply sector was the largest contributor to the decrease in carbon dioxide emissions between 2018 and 2019. Carbon dioxide emissions from this sector were provisionally estimated to be 90.1 Mt in 2019, a decrease of 8.4 per cent (8.3 Mt) compared to 2018.

This fall was mainly as a result of a 13.2 per cent (8.7 Mt) fall in carbon dioxide emissions from power stations. In 2019, carbon dioxide emissions from power stations, at 57.4 Mt, accounted for 16 per cent of all carbon dioxide emissions. Carbon dioxide emissions from power stations were 71.7 per cent lower in 2019 than in 1990. This is despite consumption of electricity being provisionally estimated to be around 6 per cent higher in 2019 than in 1990 (although it peaked in 2005 and has decreased since then).

This decrease has mainly resulted from changes in the mix of fuels being used for electricity generation with a switch from coal to natural gas and growth in the use of renewable energy sources, combined with greater efficiency resulting from improvements in technology and a decline in the relative importance of energy intensive industries. In 2019 coal made up 3 per cent of fuel used for electricity generation, compared to 65 per cent in 1990. Nuclear and

renewables, which are low carbon energy sources, accounted for 48 per cent of fuel used for electricity generation in 2019, up from 22 per cent in 1990.

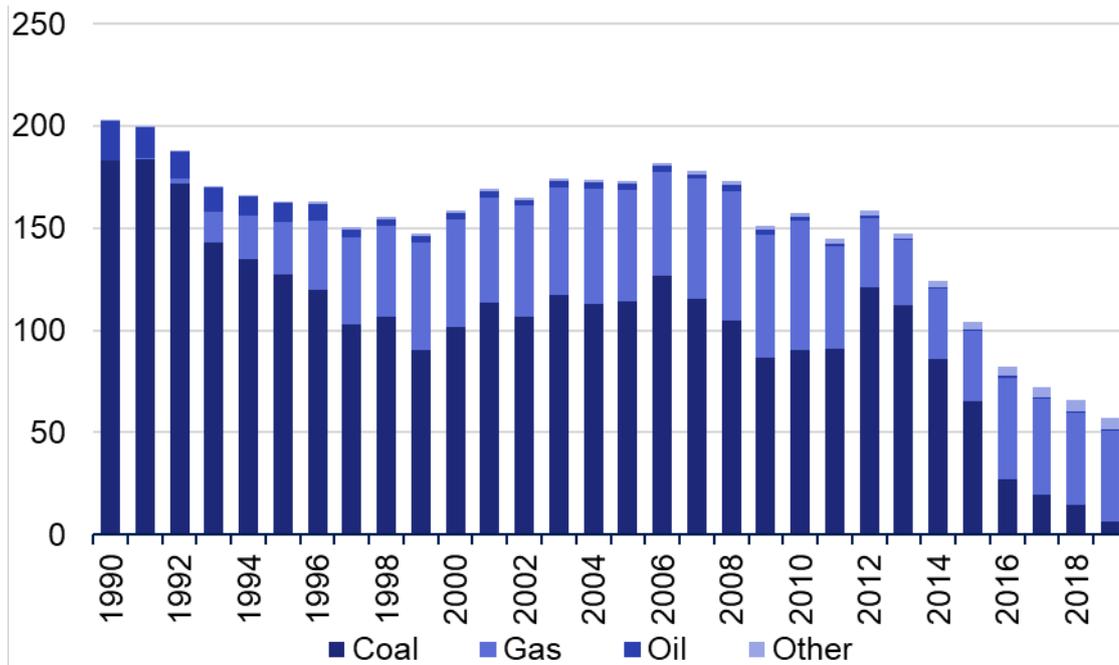
**Figure 2: Fuel mix for UK electricity generation, 1990-2019 (Million tonnes of oil equivalent)**



Source: Table 5.1.1, Digest of UK Energy Statistics (DUKES) 1970-2018 and Table 5.1 Energy Trends: March 2020 Excel data tables

Note: (p) 2019 estimates are provisional.

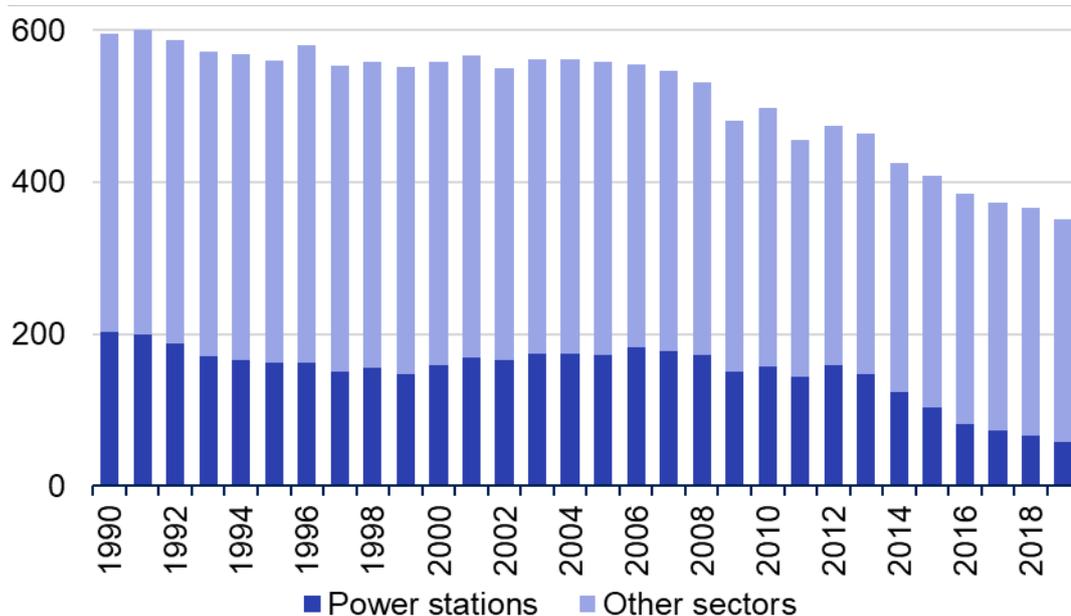
**Figure 3: Carbon dioxide emissions from power stations, UK, 1990-2019 (MtCO<sub>2</sub>)**



Source: Tables 1 & 2, Provisional UK greenhouse gas emissions national statistics 1990-2019 Excel data tables

Note: (p) 2019 estimates are provisional.

**Figure 4: Carbon dioxide emissions from power stations compared to carbon dioxide emissions from other sectors, UK, 1990-2019 (MtCO<sub>2</sub>)**



Source: Table 1, Provisional UK greenhouse gas emissions national statistics 1990-2019 Excel data tables  
 Note: (p) 2019 estimates are provisional.

## Residential and Public sectors

The main source of emissions in these sectors is the use of natural gas for heating (and for cooking in the case of the residential sector). It should be noted that emissions from these sectors do not include the emissions from the generation of the electricity consumed, as these emissions are included in the energy supply sector.

In 2019, the residential sector emitted 65.2 MtCO<sub>2</sub>, accounting for 19 per cent of all carbon dioxide emissions. Emissions from the public sector were 8.0 MtCO<sub>2</sub> accounting for 2 per cent of all carbon dioxide emissions. Between 1990 and 2019 carbon dioxide emissions from the residential sector have fallen by 17 per cent and from the public sector 40 per cent over the same time period.

Between 2018 and 2019:

- There was a 1.8 per cent (1.2 Mt) decrease in residential emissions
- There was a small 0.5 per cent (0.04 Mt) increase in emissions from the public sector.

These changes were affected by warmer weather in 2019 than the previous year. On a temperature adjusted basis between 2018 and 2019:

- There was a 1.3 per cent (1.0 Mt) decrease in residential emissions
- There was a 0.7 per cent (0.06 Mt) increase in emissions from the public sector.

After we adjust the residential emissions figures to remove the effect of year on year variation in temperatures, we see a more consistent trend. Between 2009 and 2019 residential emissions fell by 13.1 per cent and by 9.6 per cent on a temperature adjusted basis.

## Transport sector

In 2019, carbon dioxide emissions from the transport sector were 119.6 Mt, 2.8 per cent (3.5 Mt) lower than in 2018, and 4.6 per cent lower than in 1990. In 2019 transport accounted for around a third (34 per cent) of all carbon dioxide emissions. The large majority of emissions from transport are from road transport.

Primarily as a result of a continual growth in vehicle kilometres travelled on roads<sup>3</sup>, transport carbon dioxide grew to a peak in 2007, 8.5 per cent higher than in 1990. Since then emissions from this sector have fallen back to around 1990 levels, driven mainly by improvements in new car fuel efficiency<sup>4</sup>, as well lower traffic growth than in previous years as a result of a dip following the 2008/2009 recession.

It should be noted that these estimates do not include emissions from international aviation and shipping. Domestic aviation (i.e. flights taking off and landing within the UK) and shipping, however, are included.

## Business sector

Carbon dioxide emissions from the business sector were estimated to be 64.7 Mt in 2019 and accounted for around 18 per cent of all carbon dioxide emissions. This was similar to the emissions seen in 2018. There has been a 42 per cent decrease in business sector emissions since 1990. Most of this decrease came between 2001 and 2009, with a significant drop in 2009 likely to have been driven by economic factors.

## Other sectors

For the *agriculture, waste management, and land use, land use change and forestry* (LULUCF) provisional CO<sub>2</sub> emissions cannot be derived based on energy statistics, so the carbon dioxide emissions from these sectors are assumed to be the same as they were in 2018. This is also the case for most of the emissions from the *industrial processes* sector.

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<sup>3</sup> Transport Statistics Great Britain, Roads and traffic (TSGB07), Table TSGB0702 (TRA0201) Road traffic (vehicle kilometres) by vehicle type in Great Britain, annual from 1949 <https://www.gov.uk/government/statistical-data-sets/tsqb07>

<sup>4</sup> Transport Statistics Great Britain, Energy and environment (TSGB03), Table TSGB0303 (ENV0103) Average new car fuel consumption: Great Britain from 1997 <https://www.gov.uk/government/statistical-data-sets/tsqb03>

# Carbon dioxide emissions by fuel type

In the [data tables](#) accompanying this publication, table 2 shows UK carbon dioxide emissions by fuel type.

The combustion of fuel releases both energy and carbon dioxide. The amount of carbon dioxide released by the production of one unit of power depends on the type of fuel that is burned. For example, since coal has a higher carbon content than gas, more carbon dioxide emissions result from burning one tonne of coal to generate a unit of power than from one tonne of gas.

Emissions per unit of electricity supplied from fossil fuels are estimated to have been around 400 tonnes of carbon dioxide per gigawatt hour (GWh) overall in 2019. Within this, emissions from electricity generated from coal (990 tonnes of carbon dioxide per GWh electricity supplied) were over twice as high as for electricity supplied by gas (370 tonnes of carbon dioxide per GWh). For all sources of electricity (including nuclear, renewables and autogeneration), the average amount of carbon dioxide emitted in 2019 amounted to 200 tonnes per GWh of electricity supplied.

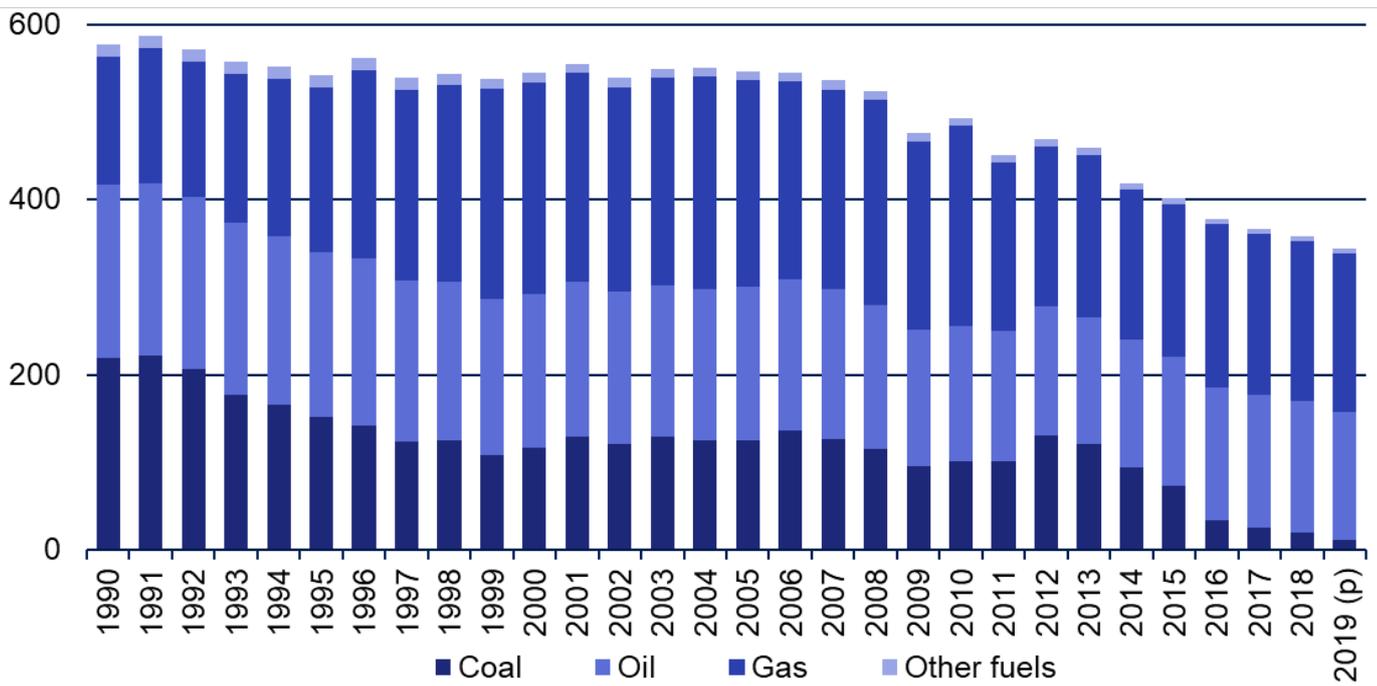
In 2019, total carbon dioxide emissions from the use of fossil fuels, including fuel used for generating electricity, were estimated at 338.0 Mt. This was 4.0 per cent lower than the 2018 figure of 351.9 Mt. The biggest change in emissions was from the use of coal, down 8.8 Mt (43.1 per cent) from 20.5 Mt in 2018 to 11.7 Mt in 2019. This largely resulted from the reduced use of coal for electricity generation.

Over the period 1990 to 2019, carbon dioxide emissions from fossil fuels decreased by 40 per cent. Over the same period, primary consumption of fossil fuels dropped by 24 per cent. This relatively large decrease in emissions can be attributed to an increase in the use of gas accompanied by a decrease in the use of coal.

Carbon dioxide emissions from gas as a proportion of all carbon dioxide emissions from fossil fuels has increased from 26 per cent in 1990 to 54 per cent in 2019, whilst emissions from coal as a proportion of all fossil fuel carbon dioxide emissions has decreased from 39 per cent to 3 per cent over the same period. The proportion of carbon dioxide emissions from oil relative to carbon dioxide emissions from fossil fuels has increased from 35 per cent in 1990 to 43 per cent in 2019.

Note that we are considering changing the fuel categories presented in these statistics in future to provide more detail and bring them more in line with the energy statistics BEIS publishes. We intend to set out the proposed new categories in an article in the June 2020 Energy Trends publication.

**Figure 5: UK Carbon dioxide emissions by fuel type, 1990-2019 (MtCO<sub>2</sub>)**



Source: Table 2, Provisional UK greenhouse gas emissions national statistics 1990-2019 Excel data tables

Note: (p) 2019 estimates are provisional.

# 2019 temperature adjusted provisional emissions results by sector

A temperature adjustment has been applied to the quarterly CO<sub>2</sub> emissions, in order to estimate what the overall trend of emissions would have been without the impact of differences in external temperatures. Table 2 compares temperature adjusted and unadjusted CO<sub>2</sub> emissions by sector in 2019.

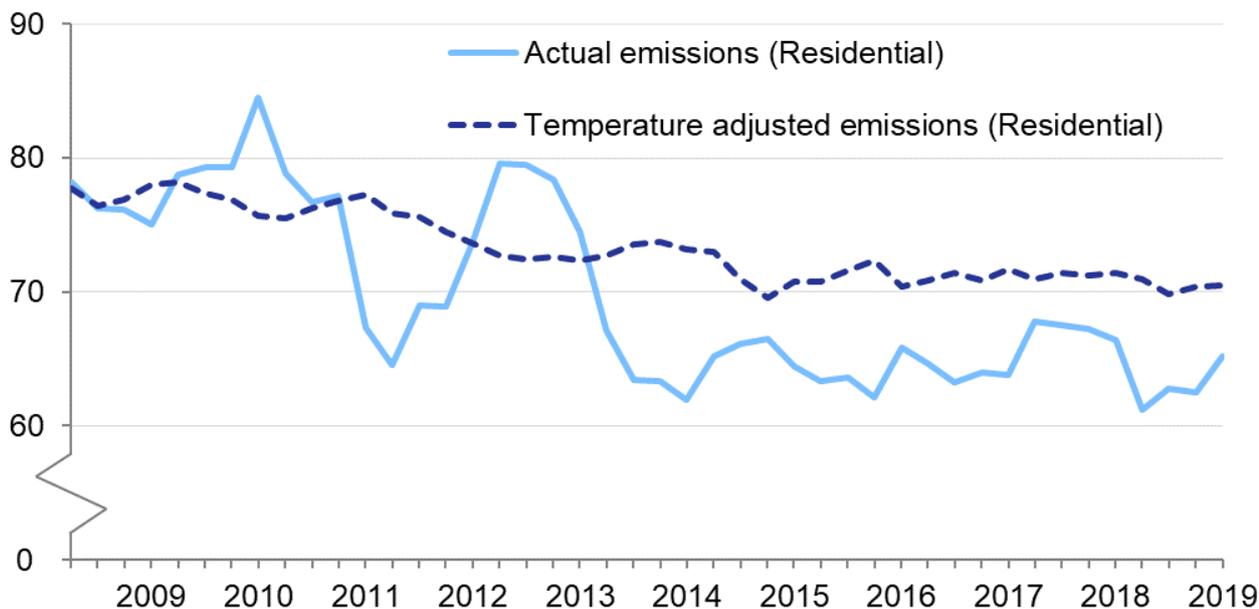
**Table 2: Percentage changes in carbon dioxide emissions by sector between 2018 and 2019 based on the temperature adjusted emissions and actual emissions**

	Temperature adjusted emissions			Actual emissions		
	2018 (MtCO <sub>2</sub> )	2019 (MtCO <sub>2</sub> )	Percentage change	2018 (MtCO <sub>2</sub> )	2019 (MtCO <sub>2</sub> )	Percentage change
Energy supply	101.3	93.2	<b>-8.1%</b>	98.4	90.1	<b>-8.4%</b>
Business	67.4	66.2	<b>-1.8%</b>	65.9	64.7	<b>-1.9%</b>
Transport	123.0	119.6	<b>-2.8%</b>	123.0	119.6	<b>-2.8%</b>
Public	8.4	8.4	<b>0.7%</b>	8.0	8.0	<b>0.5%</b>
Residential	71.4	70.5	<b>-1.3%</b>	66.4	65.2	<b>-1.8%</b>
Other	4.0	4.0	<b>0.6%</b>	4.0	4.0	<b>0.6%</b>
<b>Total CO<sub>2</sub></b>	<b>375.5</b>	<b>361.8</b>	<b>-3.6%</b>	<b>365.7</b>	<b>351.5</b>	<b>-3.9%</b>

Source: Tables 3 & 4, Provisional UK greenhouse gas emissions national statistics 1990-2019 Excel data tables

The sectors most affected by external temperatures are the residential sector and energy supply. When temperatures are lower there is greater use of natural gas and electricity for heating households. Residential emissions fluctuate from year to year owing to year on year variation in weather conditions, as seen in figure 6 below.

**Figure 6: Actual and temperature adjusted residential carbon dioxide emissions, UK, Year to Q1 2009 - Year to Q4 2019 (MtCO<sub>2</sub>)**

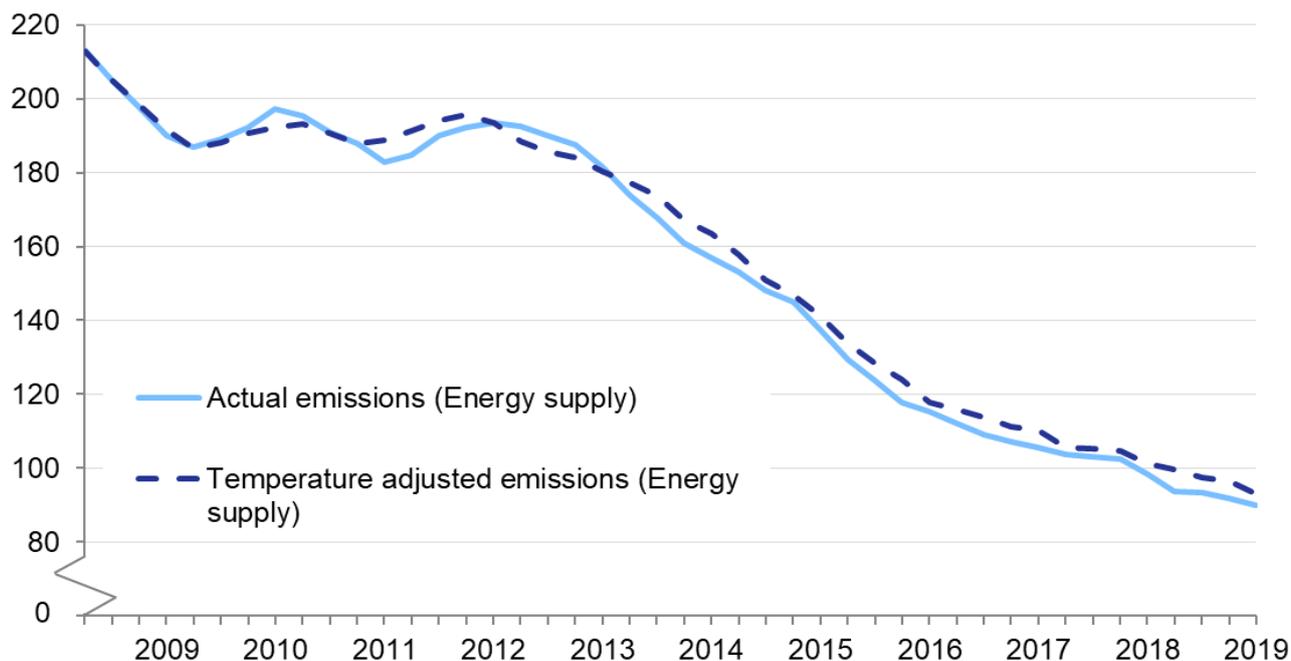


Source: Tables 3 & 4, Provisional UK greenhouse gas emissions national statistics 1990-2019 Excel data tables

- Note:
1. Figures are annual totals including the preceding 4 quarters.
  2. From year ending Q1 2019 onwards, figures include provisional data.

The overall trend in temperature adjusted energy supply emissions is similar to the unadjusted trend, as the majority of electricity generated is used for other purposes rather than heating.

**Figure 7: Actual and temperature adjusted energy supply carbon dioxide emissions, UK, Year to Q1 2009 - Year to Q4 2019 (MtCO<sub>2</sub>)**



Source: Tables 3 & 4, Provisional UK greenhouse gas emissions national statistics 1990-2019 Excel data tables

# Accompanying tables

The following tables are available in Excel and ODS format on the department's statistics website <https://www.gov.uk/government/collections/provisional-uk-greenhouse-gas-emissions-national-statistics>:

Table 1	UK annual territorial greenhouse gas emissions, including a breakdown by source sector for carbon dioxide emissions
Table 2	UK territorial carbon dioxide emissions by fuel type
Table 3	UK territorial greenhouse gas emissions, annual totals
Table 4	UK temperature adjusted territorial greenhouse gas emissions annual totals
Table 5	UK territorial greenhouse gas emissions for individual quarters
Table 6	UK temperature adjusted territorial greenhouse gas emissions for individual quarters

## Technical information

### Coverage of emissions reporting

The estimates present emissions on a “territorial” basis, so only include emissions which occur within the UK’s borders. They therefore exclude emissions from UK businesses and residents that occur abroad, including from international aviation and shipping, and any emissions embedded within the supply chain of manufactured goods and services imported into the UK (while including emissions that occur in the UK resulting from exported goods and services).

The basket of greenhouse gases covered by these statistics is based on that covered by the Kyoto Protocol, and consists of seven gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulphur hexafluoride (SF<sub>6</sub>) and nitrogen trifluoride (NF<sub>3</sub>). The last four gases are collectively referred to as fluorinated gases or F gases. In accordance with international reporting and carbon trading protocols, each of these gases is weighted by its global warming potential (GWP)<sup>5</sup>, so that total greenhouse gas emissions can be reported on a consistent basis. The GWP for each gas is defined as its warming influence relative to that of carbon dioxide. Greenhouse gas emissions are then presented in *carbon dioxide equivalent* units (CO<sub>2</sub>e).

Carbon dioxide is reported in terms of *net* emissions, which means total emissions from burning fuel minus total removals of carbon dioxide from the atmosphere by *carbon sinks*. Carbon sinks are incorporated within the land use, land use change and forestry (LULUCF) sector, which covers afforestation, reforestation, deforestation and forest management. They are defined by the United Nations Framework Convention on Climate Change (UNFCCC) as “any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere”.

<sup>5</sup> Global warming potentials (GWP) of greenhouse gases used in UK emissions statistics: <https://www.gov.uk/government/publications/uk-greenhouse-gas-emissions-explanatory-notes>

## Basis of the provisional emissions estimates

The estimates of carbon dioxide emissions in 2019 have been produced based on provisional inland energy consumption statistics which are published in BEIS's quarterly [Energy Trends](#) publication.

Carbon dioxide accounts for the majority of UK greenhouse gas emissions (81 per cent in 2019). However, in order to give an indication of what the latest provisional carbon dioxide emissions estimates imply for the total, we need to also produce an estimate of emissions of the remaining non-CO<sub>2</sub> gases. Estimates of non-CO<sub>2</sub> gases are based on a simple approach which assumes that emissions of non-CO<sub>2</sub> gases in 2019 will change from the 2018 total in line with the percentage difference between the estimates for the 2018 and 2019 non-CO<sub>2</sub> emissions in the 2018 [Energy and Emissions Projections](#) published by BEIS.

Estimates of emissions of all greenhouse gases for 1990-2018 come from the latest UK greenhouse gas inventory. Information about the methodology behind these estimates can be found in the [2018 final UK greenhouse gas emissions statistics](#).

## Quarterly totals

In order to remove the seasonality in the data so that a trend in emissions over time can be observed, quarterly emissions are reported as annual totals, covering the stated quarter plus the preceding three quarters. When data becomes available for each new quarter, the estimates for the latest quarter are added to the total, while at the same time the estimates for the same quarter from the previous year are removed from the series. This procedure serves to smooth out short-term fluctuations and highlights long term trends and can be used to show the underlying trend each quarter. Emissions estimates for each individual quarter are reported in the data tables accompanying this publication.

## Temperature adjustment

Carbon dioxide emissions are indirectly influenced by external temperatures. During the winter months, emissions are generally higher than in summer months, due to higher demand for fuel for space heating. During a particularly cold winter for example, it is likely that more fuel will be burnt for domestic or commercial use than during an average winter, and therefore emissions will be higher due to the additional fuel consumption.

Temperature adjusted quarterly emissions estimates therefore remove the effect of external temperatures. In a particularly cold winter quarter, for example, this will result in temperature adjusted emissions being lower than actual emissions, reflecting the lower fuel consumption which would have occurred if temperatures had been at average levels (based on the 30 year period 1981-2010). Temperature adjustment is determined by the average number of heating degree days in each quarter. This information can be found in [Energy Trends](#).

Further details of how quarterly emissions have been estimated and of the methodology underlying the temperature adjusted estimates can be found alongside this statistical release in a separate [methodology summary](#).

# Further information

## Future updates to these statistics

On Thursday 25<sup>th</sup> June 2020 BEIS will publish estimates of carbon dioxide emissions by local authority for 2018.

Final estimates of UK greenhouse gas emissions for 2019 will be published as National Statistics in February 2021. These estimates will be based on the UK's Greenhouse Gas Inventory for 1990-2019.

In March 2021 the 1990-2019 UK emissions estimates will be updated to include estimates by end user and by fuel type, and provisional 2020 emissions estimates will be published.

## Related publications

- The UK's National Inventory Report (NIR) for 1990-2018 will be submitted to the United Nations Framework Convention on Climate Change (UNFCCC) on 15<sup>th</sup> April 2020. The report will contain national greenhouse gas emissions estimates for 1990-2018 and descriptions of the methods used to produce the estimates. Previous reports can be found on the [NAEI website](#).
- The [background quality report](#) provides a summary of quality issues relating to statistics on UK territorial greenhouse gas emissions.
- The [record of base year emissions](#) table shows how the UK base year for UK Carbon Budgets and the Kyoto Protocol has changed from 2008 to the latest inventory year.
- BEIS also publishes [emissions projections](#) based on assumptions of future emission reduction policies, economic growth, fossil fuel prices, electricity generation costs, UK population and other key variables.
- Further information about the Kyoto Protocol can be found on the [UNFCCC's website](#).
- Further details of the European Union Emissions Trading System can be found at the [EU ETS section of the Gov.uk website](#).
- ONS publishes emissions on a "residential" basis in the [UK Environmental Accounts](#). The figures represent emissions caused by UK residents and businesses whether in the UK or abroad but exclude emissions within the UK which can be attributed to overseas residents and businesses.
- Defra publishes the [UK's carbon footprint](#). This estimates emissions on a "consumption" basis, meaning it covers emissions associated with the consumption of goods and services by households in the UK. It includes estimates of emissions associated with each stage of the supply chain for those goods and services, regardless of where they occur, while excluding emissions occurring in the UK that are associated with the consumption of goods and services by households outside the UK.

- The latest UK energy statistics, including revisions to earlier years' data, can be found in the [Digest of UK Energy Statistics](#) and [Energy Trends](#) quarterly bulletin produced by BEIS. Any enquiries about the UK energy statistics should be sent to [energy.stats@beis.gov.uk](mailto:energy.stats@beis.gov.uk).
- Detailed UK temperature data can be found on both the Met Office website and the weather statistics section of the [Gov.uk website](#).

## Revisions policy

The [BEIS statistical revisions policy](#) sets out the revisions policy for these statistics, which has been developed in accordance with the UK Statistics Authority [Code of Practice for Statistics](#).

Emissions estimates for 2019 are provisional and are based on UK energy statistics. They will be revised when the final 2019 estimates are published in February 2021. The full time series going back to 1990 will also be revised at this time in line with any methodology changes made to the UK greenhouse gas inventory.

## Uses of these statistics

The provisional estimates are not used for any formal reporting of how the UK is performing against its emissions reduction targets, as this requires final estimates based on the UK's greenhouse gas inventory. However, these statistics give policy makers and other users an initial steer as to the trend in emissions between 2018 and 2019, which helps them to form an initial assessment of the extent to which the UK is on track to meet targets. They also include estimates of quarterly emissions and the impact on emissions of external temperature changes.

For more detailed information about the sources of UK greenhouse gas emissions and information on UK emissions targets and progress towards them, see the [2018 final UK greenhouse gas emissions statistics](#).

A statement of user needs for greenhouse gas emission statistics is published at: <https://www.gov.uk/government/publications/uk-greenhouse-gas-emissions-statistics-statement-on-user-needs>

## User engagement

Users are encouraged to provide comments and feedback on how these statistics are used and how well they meet user needs. Comments on any issues relating to this statistical release are welcomed and should be sent to: [ClimateChange.Statistics@beis.gov.uk](mailto:ClimateChange.Statistics@beis.gov.uk)

The BEIS statement on [statistical public engagement and data standards](#) sets out the department's commitments on public engagement and data standards as outlined by the [Code of Practice for Statistics](#).

## National Statistics designation

National Statistics status means that our statistics meet the highest standards of trustworthiness, quality and public value, and it is our responsibility to maintain compliance with these standards.

The continued designation of these statistics as National Statistics was confirmed in September 2018 following a [compliance check](#) by the Office for Statistics Regulation. The statistics last underwent a [full assessment](#) against the [Code of Practice for Statistics](#) in 2014.

Since the latest review by the Office for Statistics Regulation, we have continued to comply with the Code of Practice for Statistics, and have made the following improvements:

- Improved the accuracy of the historic emissions estimates by continuing to make [methodological changes](#) to the UK's Greenhouse Gas Inventory.
- Improved the accuracy of the provisional estimates by reviewing and changing the methodology for making provisional estimates of non-CO<sub>2</sub> emissions.

## Pre-release access to statistics

Some ministers and officials receive access to these statistics up to 24 hours before release. Details of the arrangements for doing this and a list of the ministers and officials that receive pre-release access to these statistics can be found in the [BEIS statement of compliance](#) with the Pre-Release Access to Official Statistics Order 2008.

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This publication is available from: <https://www.gov.uk/government/collections/provisional-uk-greenhouse-gas-emissions-national-statistics>

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