



Department for  
Business, Energy  
& Industrial Strategy



# 2017 UK GREENHOUSE GAS EMISSIONS, PROVISIONAL FIGURES

Statistical Release: National Statistics



29 March 2018

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This publication is available for download at <https://www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-national-statistics>.

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# Executive Summary

This publication provides the latest estimates of 1990-2017 UK greenhouse gas emissions which are presented in carbon dioxide equivalent units throughout this statistical release.

## Key findings

The provisional emissions figures rely on estimates of carbon dioxide emissions based on UK energy statistics. In 2017, UK net emissions of carbon dioxide were provisionally estimated to be 366.9 million tonnes (Mt), 3.2 per cent lower than the 2016 figure of 378.9 Mt. Carbon dioxide (CO<sub>2</sub>) is the main greenhouse gas, accounting for 81 per cent of total UK greenhouse gas emissions.

This decrease in emissions was mainly caused by:

- Reductions in carbon dioxide emissions in the energy supply sector, down 7.6 per cent (8.7 MtCO<sub>2</sub>e) driven by a decrease in power station emissions. The main reason for this fall is the switch in the fuel mix for electricity generation from coal and gas to renewables. Coal use for electricity generation fell 28 per cent between 2016 and 2017 to a record low following the closure of Longannet and Ferrybridge C in 2016.

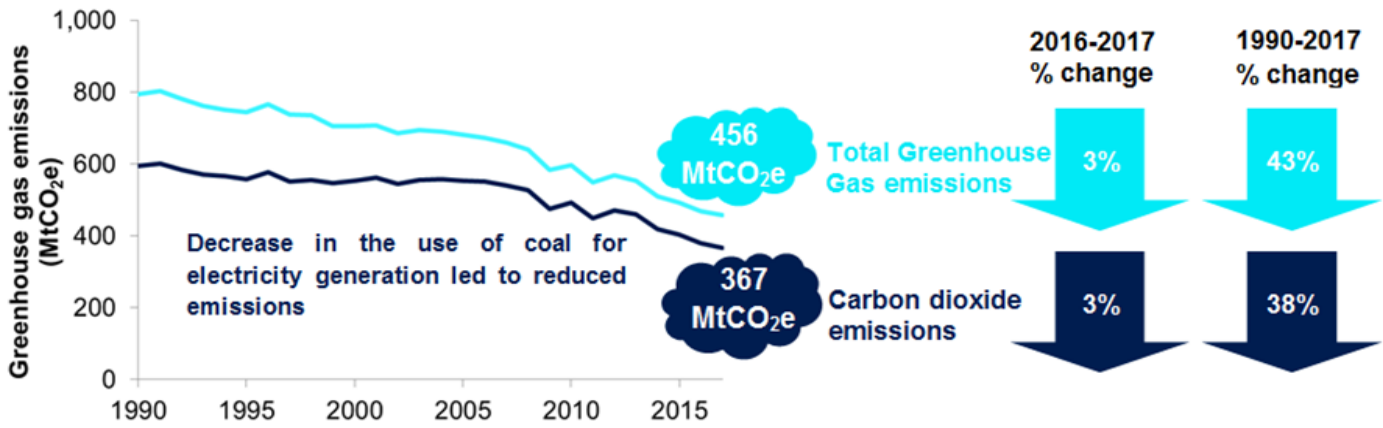
Total carbon dioxide emissions on a temperature adjusted basis for 2017 were 374.8 Mt, 2.1 per cent higher than actual emissions. This represents a 21 per cent fall since 2009 compared to a 23 per cent fall in actual emissions. This demonstrates that some of the fall can be attributed to changes in energy use due to varying external temperatures.

In 2017, total UK greenhouse gas emissions are provisionally 43 per cent lower than in 1990 and 2.6 per cent lower than 2016.

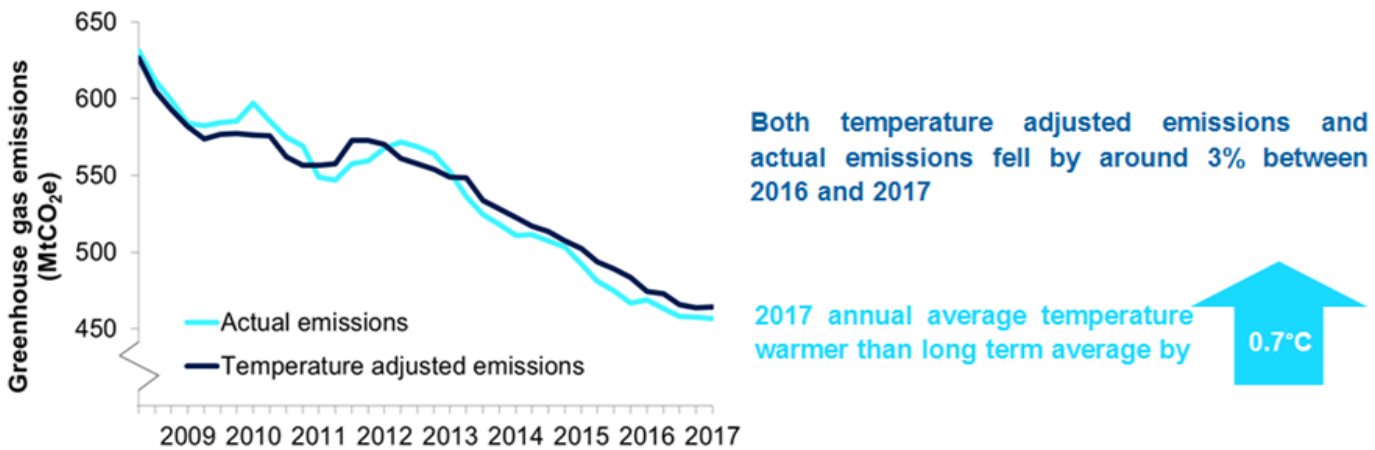
The sectoral breakdowns for provisional emissions are based on the source of the emissions. Emissions related to electricity generation are therefore attributed to power stations, the source of these emissions, rather than homes and businesses where electricity is used.

Figure 1: Summary of key findings

2017 UK greenhouse gas emissions provisionally estimated to decrease from 2016



Adjusting emissions for external temperature does not change the long term trend

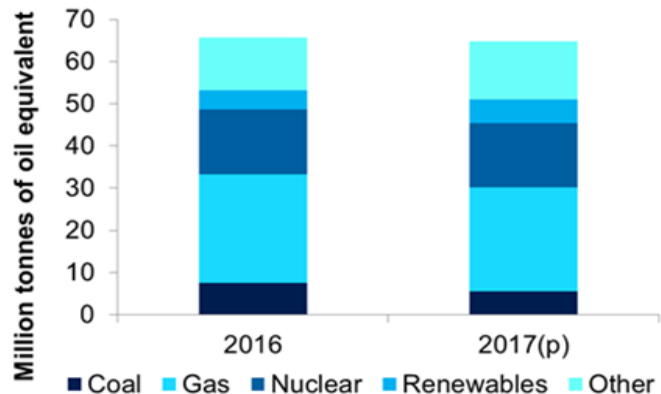


Temperature adjusted emissions estimates remove the estimated effect of external temperatures  
Emissions are calculated for each quarter, with the preceding four quarters summed to create a rolling annual total

The energy supply sector experienced the largest reduction in CO<sub>2</sub> emissions from 2016-2017

	2016-2017 % change	1990-2017 % change
Energy supply (including power sector)	8%	57%
Industrial process	1%	49%
Business	0%	41%
Transport	0%	1%
Residential	4%	18%
Public	3%	41%

Reduction in power sector CO<sub>2</sub> emissions driven by change in fuel mix for electricity generation in 2017, with less use of coal and more use of renewables



## Introduction

This publication provides provisional annual and quarterly estimates of UK greenhouse gas emissions by source sector for 2017. 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.

Data for 1990-2016 are consistent with the annual emissions presented in the National Statistics publication '[2016 Final UK Greenhouse Gas Emissions statistics](#)'. Data for 2017 emissions are provisional and are calculated based on UK energy statistics.

The provisional estimates of carbon dioxide emissions are based on provisional inland energy consumption statistics, which are being published at the same time in BEIS' 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 2017 will be the same as emissions in 2016, 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 as up to quarter 4, 2017, this represents an annual total comprising the latest quarter (quarter 4 2017) and the preceding 3 quarters (quarters 1, 2 and 3 of 2017). 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 2017 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 [2016 Final UK Greenhouse Gas Emissions statistics](#).

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

- Energy supply
- Business
- Transport
- Public
- Residential
- Agriculture
- Industrial process
- Land use, land use change and forestry (LULUCF)
- Waste management

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.

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 2016 and 2017, 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 [2016 Final UK Greenhouse Gas Emissions statistics](#).

More information about the underlying methodology for the quarterly emissions statistics can be found in the accompanying [methodology document](#).

Note that all 2017 greenhouse gas emissions and energy statistics figures in this statistics release are provisional and subject to change. The annual provisional emissions estimates will be subject to revision when the final estimates are published in February 2019; however, they provide an early indication of emissions in the most recent full calendar year. The majority of provisional estimates in the past have been within 2 per cent of the final figures.

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

<sup>2</sup> <http://unfccc.int/2860.php>

## 2017 annual provisional emissions results

In 2017, an estimated 34 per cent of carbon dioxide emissions were from the transport sector, 29 per cent from energy supply, 18 per cent from business and 17 per cent from the residential sector.

Between 2016 and 2017, provisional estimates indicate that carbon dioxide emissions decreased by 3.2 per cent (12.0 million tonnes (Mt)). Carbon dioxide emissions in the energy supply sector decreased by 7.6 per cent (8.7 Mt), driven by a change in the fuel mix for electricity generation, with less use of coal and gas (from the closure of the coal fired power stations, Longannet and Ferrybridge C and increasing cost of generating from coal) and increased use of renewables. Carbon dioxide emissions decreased by 4.3 per cent (2.9 Mt) in the residential sector due to a decrease in the use of natural gas for space heating following temperatures above the long term average.

Since 1990, UK carbon dioxide emissions have decreased by 38 per cent. This decrease has resulted mainly from changes in the mix of fuels being used for electricity generation, including the growth of renewables, together with greater efficiency resulting from improvements in technology and a decline in the relative importance of energy intensive industries. Overall energy consumption is provisionally estimated to have decreased by around 11 per cent since 1990 (although it increased up to 2001 and has decreased since then). If this figure is adjusted to allow for the effect of temperature, energy consumption has fallen by around 13 per cent between 1990 and 2017.

In 2017, total UK greenhouse gas emissions are provisionally 43 per cent lower than in 1990 and 2.6 per cent lower than 2016.



**Table 1: UK Annual Greenhouse Gas Emissions 1990-2017, headline results**

UK, 1990-2017

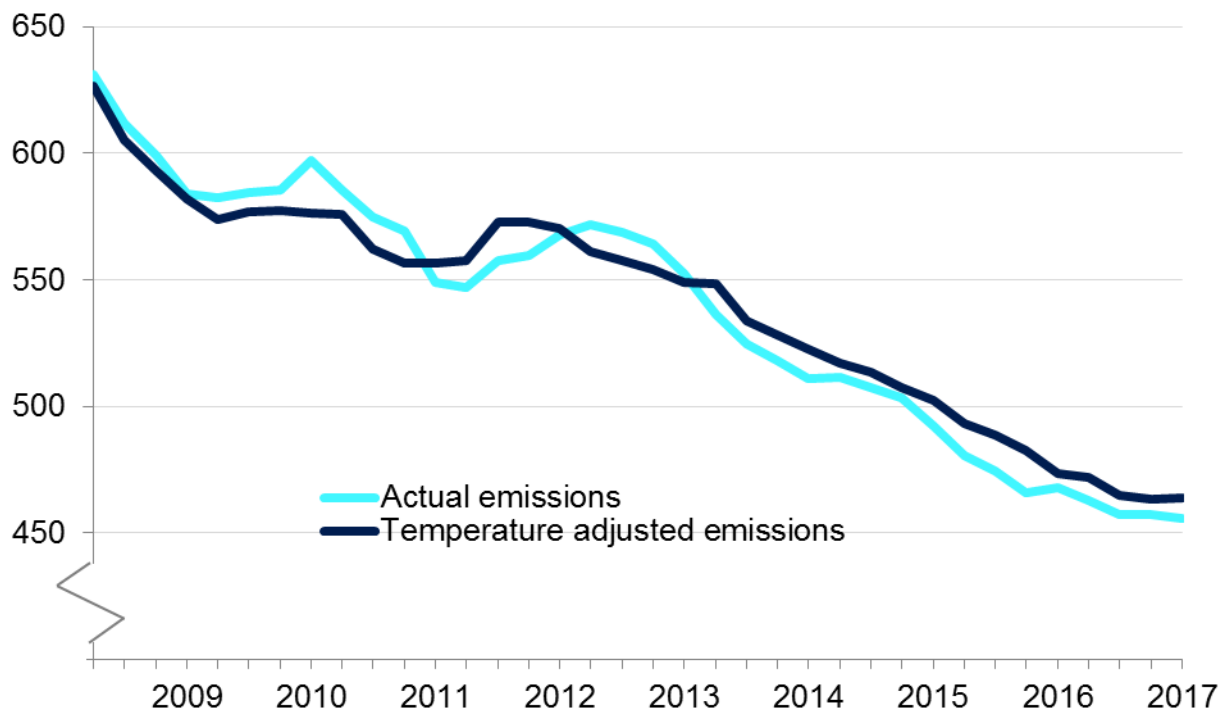
	<b>MtCO<sub>2</sub>e</b>							
	1990	1995	2000	2005	2010	2015	2016	2017 (p)
Energy supply	242.1	210.0	203.4	218.9	197.1	136.7	113.7	105.0
<i>from power stations</i>	203.0	162.8	158.1	172.9	157.1	103.3	81.1	71.8
<i>other Energy supply</i>	39.1	47.2	45.3	46.0	40.0	33.4	32.5	33.2
Business	111.9	108.9	108.8	96.9	78.2	69.9	66.0	65.8
Transport	125.3	126.7	130.9	134.3	123.2	122.1	124.4	124.4
Public	13.4	13.2	12.1	11.1	9.4	8.0	8.2	7.9
Residential	78.4	79.7	85.6	82.5	84.5	64.5	67.0	64.1
Agriculture	6.5	6.5	5.5	6.1	5.4	5.5	5.5	5.5
Industrial process	19.4	17.7	16.9	16.4	10.6	12.1	9.9	9.8
Waste management	1.4	0.9	0.5	0.4	0.3	0.3	0.3	0.3
LULUCF	-4.4	-7.2	-10.0	-13.2	-16.1	-16.6	-16.0	-16.0
Total CO <sub>2</sub>	594.1	556.6	553.7	553.3	492.7	402.5	378.9	366.9
Other greenhouse gases	200.1	187.6	151.3	127.9	104.4	89.8	89.0	89.0
<b>Total greenhouse gases</b>	<b>794.2</b>	<b>744.3</b>	<b>705.0</b>	<b>681.3</b>	<b>597.1</b>	<b>492.4</b>	<b>467.9</b>	<b>455.9</b>

Source: Table 1, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables

Notes:

1. (p) 2017 estimates are provisional.
2. Provisional 2017 CO<sub>2</sub> emissions for the agriculture, waste and LULUCF sectors are assumed to be the same as 2016 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 2017 will be the same as emissions in 2016.

**Figure 2: Actual and temperature adjusted greenhouse gas emissions, UK, Year to Q1 2009 - Year to Q4 2017 (MtCO<sub>2</sub>e)**



Source: Tables 3 & 4, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables

- Note:
1. Figures are annual totals including the preceding 4 quarters.
  2. From year to Q1 2017 onwards, figures include provisional data.

As shown in figure 2 above, both the non-adjusted and the temperature corrected series show a general decreasing trend since 2009. Actual emissions show a larger fall across the time series (23 per cent since 2009) than in the temperature adjusted emissions (21 per cent), which shows that some of the fall can be attributed to changes in energy use due to varying external temperatures. On a temperature adjusted basis, emissions remained relatively flat during the period between early 2010 and 2012, while non-adjusted emissions were much more variable during this period, which again demonstrates the effects of external temperatures on greenhouse gas emissions. In particular, Q4 2010 was 2.4 degrees (Celsius) lower than the long term average, while temperatures in Q4 2012 and Q1 2013 were 0.5 and 1.8 degrees (Celsius) lower than the long term average.

Since 2013 both temperature adjusted and non-adjusted emissions have fallen. This is mainly due to the large fall in emissions from the energy supply sector during this period. Also, temperatures on average for these years have been higher than the long term average which can influence the amount of energy used and hence greenhouse gas emissions.

## Energy Supply

The energy supply sector was the largest contributor to the decrease in carbon dioxide emissions between 2016 and 2017. Carbon dioxide emissions from this sector were provisionally estimated to be 105.0 Mt in 2017, a decrease of 8 per cent (8.7 Mt) compared to 2016.

Since 2016 emissions from power stations have decreased by 11 per cent. The main reason for this fall is the switch in the fuel mix for electricity generation from coal and gas to renewables. Coal use for electricity generation fell 28 per cent between 2016 and 2017 to a record low following the closure of two coal fired power stations, Longannet and Ferrybridge C, in 2016. Low carbon generation (wind, solar, hydro, bioenergy, and nuclear) accounted for around 50 per cent of electricity generation in 2017.

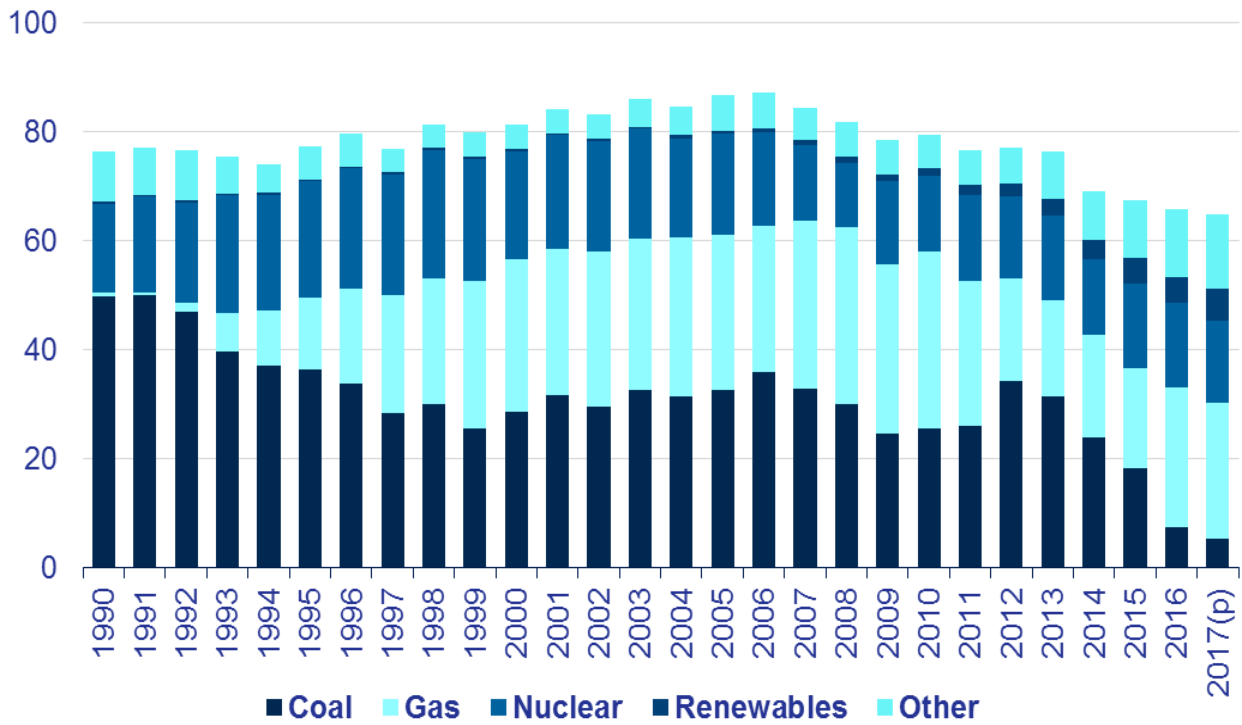
In 2017, carbon dioxide emissions from power stations, at 72 Mt, accounted for just under a fifth of all carbon dioxide emissions.

Looking at longer term trends, carbon dioxide emissions from the energy supply sector were estimated to be around 57 per cent lower in 2017 than they were in 1990. This decrease has resulted mainly from changes in the mix of fuels being used for electricity generation, including fuel switching from coal to gas and the growth of renewables, together with greater efficiency resulting from improvements in technology.

There has been an overall decline in the use of coal at power stations over the period (particularly during the 1990s), accompanied by an overall increase in the use of gas, which has a lower carbon content. Coal use in generation is estimated to have reduced by 89 per cent between 1990 and 2017.

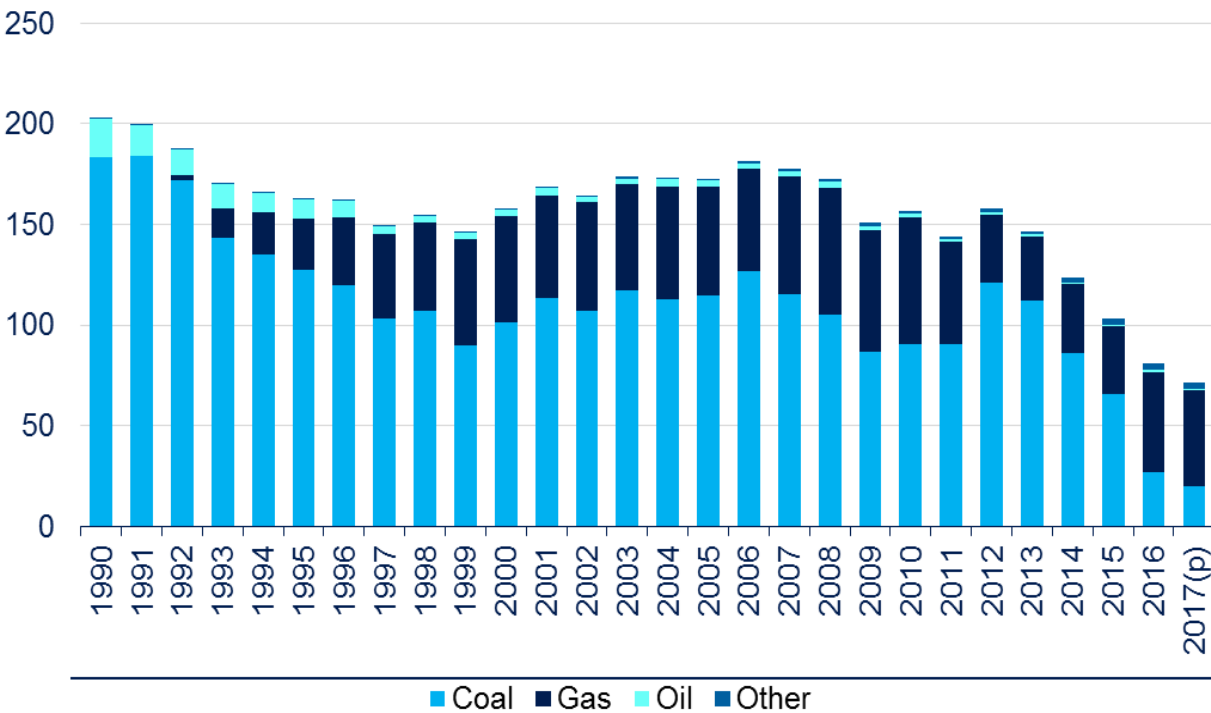
Overall, emissions from electricity generation have decreased by 65 per cent since 1990, despite final consumption of electricity being provisionally estimated to be around 11 per cent higher in 2017 than in 1990 (although it peaked in 2005 and has decreased since then).

**Figure 3: Fuel mix for UK electricity generation, UK, 1990-2017, (Million tonnes of oil equivalent)**



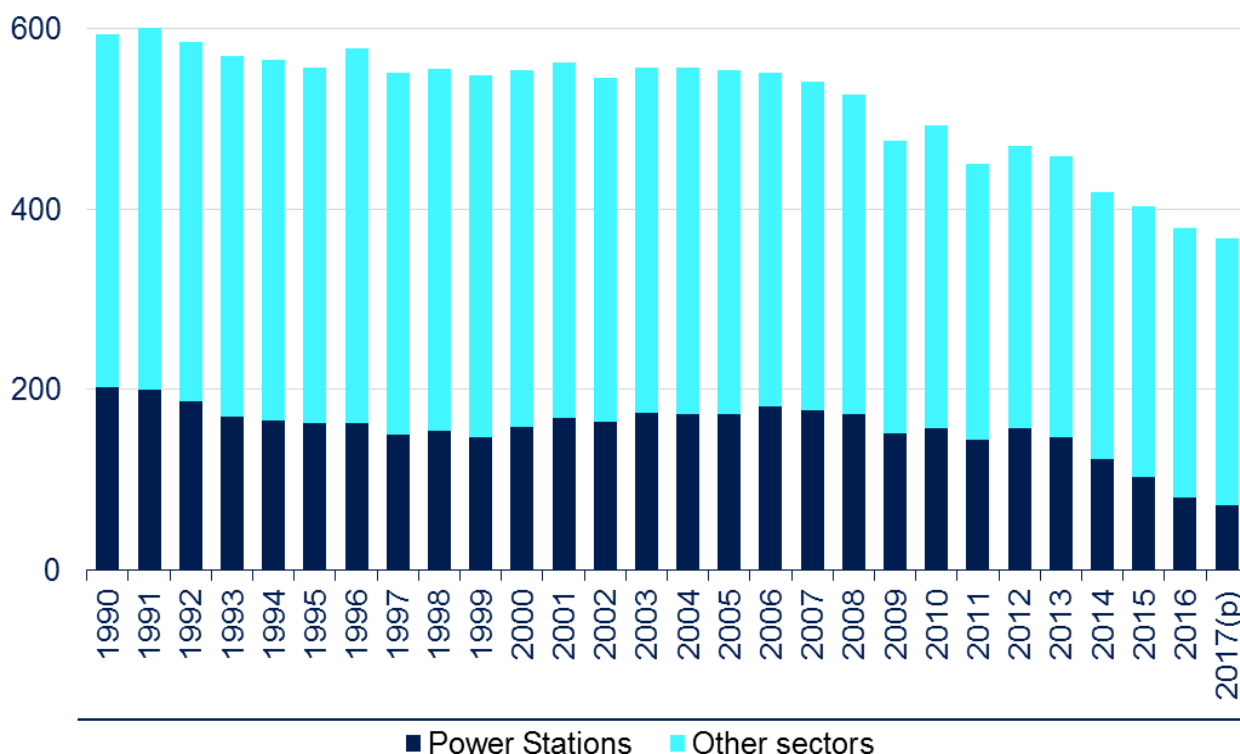
Source: Table 5.1.1, Digest of UK Energy Statistics (DUKES) 1970-2016 and Table 5.1 Energy Trends: March 2018 Excel data tables  
 Note: (p) 2017 estimates are provisional.

**Figure 4: Carbon dioxide emissions from electricity generation, UK, 1990-2017, (MtCO<sub>2</sub>)**



Source: Tables 1 & 2, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables  
 Note: (p) 2017 estimates are provisional.

**Figure 5: Carbon dioxide emissions from power stations compared to carbon dioxide emissions from other sectors, UK, 1990-2017, (MtCO<sub>2</sub>)**



Source: Table 1, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables

Note: (p) 2017 estimates are provisional.

## Residential

In 2017, the residential sector, with emissions of 64.1 Mt, accounted for 17 per cent of all carbon dioxide emissions. Between 2016 and 2017 there was a 4.3 per cent (2.9 Mt) decrease in emissions from this sector. The average temperature was slightly warmer in 2017 compared to 2016, which has contributed to a decrease in the use of natural gas for space heating.

The main source of emissions from this sector is the use of natural gas for heating and cooking. Since 2004 there has been a general downward trend in emissions, although 2010 and 2012 were exceptions to this, due to the particularly cold weather experienced in 2010 and warm weather in 2011. In 2017, emissions from this sector were 18 per cent lower than in 1990.

It should be noted that emissions from this sector do not include those related to domestic electricity consumption, as these emissions are included in the energy supply sector.

## Transport

In 2017, carbon dioxide emissions from the transport sector, at 124.4 Mt, accounted for 34 per cent of all carbon dioxide emissions. Emissions were broadly unchanged from 2016.

Emissions from this sector are similar to 1990 levels. Road transport is the most significant source of emissions in this sector, in particular passenger cars. Emissions from passenger cars have decreased since the early 2000s due to lower petrol consumption outweighing an increase in diesel consumption<sup>3</sup> and, more recently, improvements in fuel efficiency of both petrol and diesel cars<sup>4</sup>. However, since 2013 there has been a small increase in emissions due to an increase in vehicle kilometres travelled<sup>5</sup>.

It should be noted that these estimates do not include emissions from international aviation and shipping; domestic aviation and shipping, however, are included.

## Business

Carbon dioxide emissions from the business sector, at 65.8 Mt, accounted for around 18 per cent of all carbon dioxide emissions in 2017. This was similar to emissions seen in 2016, following a big drop in 2016 estimates compared to 2015 as a result of the closure of SSI steelworks at Redcar in 2015.

There has been a 41 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 driven by economic factors. The main driver of the overall decrease in emissions since 1990 is a reduction in emissions from industrial combustion (including iron and steel).

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<sup>3</sup> Transport Statistics Great Britain, Energy and environment (TSGB03), Table TSGB0301 (ENV0101) Petroleum consumption by transport mode and fuel type: United Kingdom, 2000-2016  
<https://www.gov.uk/government/statistics/transport-statistics-great-britain-2017>

<sup>4</sup> Transport Statistics Great Britain, Energy and environment (TSGB03), Table TSGB0301 (ENV0103) Average new car fuel consumption: Great Britain 1997-2016  
<https://www.gov.uk/government/statistical-data-sets/tsgb03>

<sup>5</sup> Transport Statistics Great Britain, Energy and environment (TSGB03), Table TRA0201 Road traffic (vehicle kilometres) by vehicle type in Great Britain  
<https://www.gov.uk/government/statistics/transport-statistics-great-britain-2017>

## Industrial process

In 2017, carbon dioxide emissions from the industrial process sector were estimated to be 9.8 Mt, a decrease of 1.0 per cent (0.1 Mt) compared with 2016. Between 1990 and 2016, emissions from this sector are estimated to have decreased by around 49 per cent driven by a reduction in emissions from cement production due to lower manufacturing output from this sector.

## Public sector

Carbon dioxide emissions from the public sector, at 7.9 Mt, were estimated to have decreased by about 2.7 per cent (0.2 Mt) from 2016 emissions. This has been largely driven by a decrease in the use of gas for space heating as a result of 2017 being a warmer year than 2016. Between 1990 and 2017, emissions from this sector are estimated to have decreased by around 41 per cent.

## Agriculture; waste management; and land use, land use change and forestry

Updated emissions estimates for these sectors are not yet available for 2017, so for these statistics, emissions from these sectors are assumed to be the same as they were in 2016<sup>6</sup>.

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<sup>6</sup> Final UK greenhouse gas emissions national statistics  
<https://www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-national-statistics>

## Carbon dioxide emissions by fuel type

The combustion of fuels 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 450 tonnes of carbon dioxide per gigawatt hour (GWh) overall in 2017; within this, emissions from electricity generated from coal (870 tonnes of carbon dioxide per GWh electricity supplied) were over two times higher than for electricity supplied by gas (360 tonnes of carbon dioxide per GWh). For all sources of electricity (including nuclear, renewables and autogeneration), the average amount of carbon dioxide emitted in 2017 amounted to around 200 tonnes per GWh of electricity supplied.

In 2017, carbon dioxide emissions from the use of fossil fuels, including fuel used for generating electricity, were estimated at 365.9 Mt. This was 3 per cent lower than the 2016 figure of 377.9 Mt. The biggest change in emissions was from the use of coal, down 8.2 Mt (24 per cent) from 33.6 Mt in 2016 to 25.5 Mt in 2017. This largely resulted from a change in the fuel mix for electricity generation, with less use of coal and gas (as a result of the closure of two fired power stations, Longannet and Ferrybridge C) and increased use of renewables.

Over the period 1990 to 2017, carbon dioxide emissions from fossil fuels decreased by 37 per cent. Over the same period, overall primary consumption of fossil fuels has dropped by around 21 per cent. The relatively higher decrease in emissions can be attributed to an increase in the use of gas accompanied by a decrease in the use of coal and other solid fuels. Carbon dioxide emissions from gas as a proportion of all carbon dioxide emissions from fossil fuels has increased from 25 per cent in 1990 to 50 per cent in 2017, whilst emissions from coal as a proportion of all fossil fuel carbon dioxide emissions has decreased from 38 per cent to 7 per cent over the same period. The proportion of carbon dioxide emissions from oil as a proportion of all carbon dioxide emissions from fossil fuels has increased from 34 per cent in 1990 to 41 per cent in 2017.



## Carbon dioxide emissions by fuel type

**Table 2: UK Carbon dioxide emissions**  
UK, 1990-2017

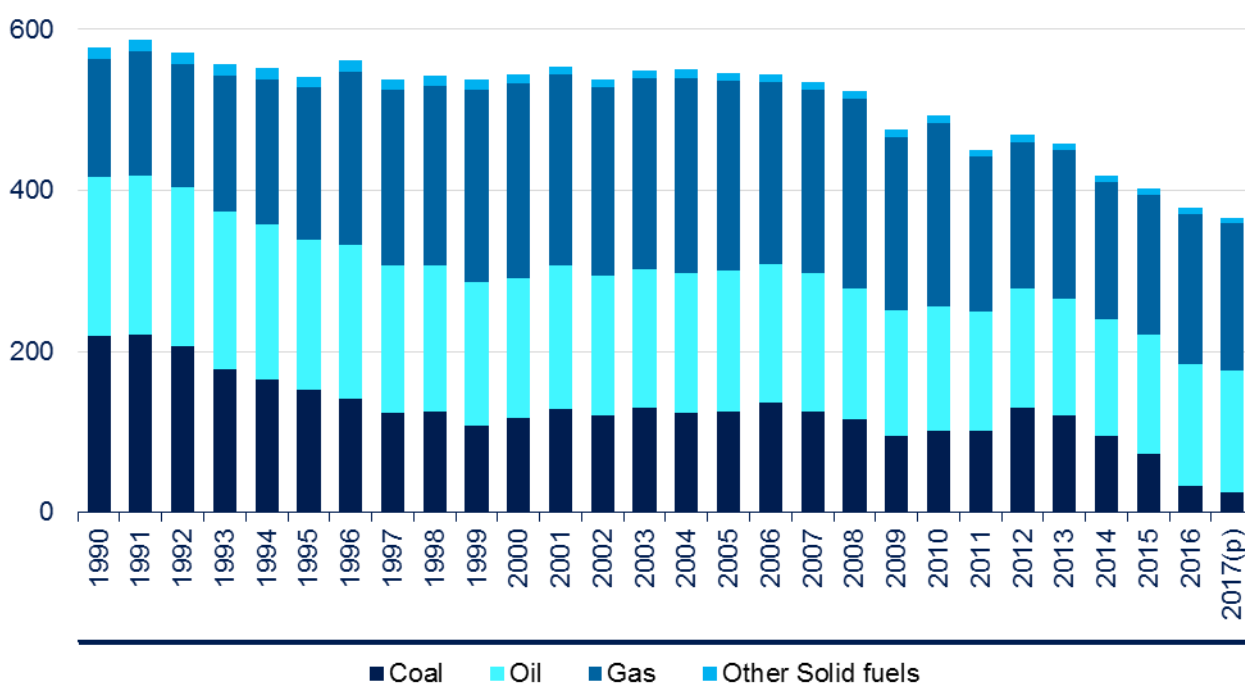
	<b>MtCO<sub>2</sub>e</b>							
	1990	1995	2000	2005	2010	2015	2016	2017 (p)
Gas	146.1	188.5	241.5	235.4	228.2	172.9	187.3	183.0
Oil	197.8	187.1	174.5	175.6	154.9	148.7	150.4	150.9
Coal	219.2	152.2	117.0	124.9	100.9	73.0	33.6	25.5
Other solid fuels	14.1	13.3	11.5	10.1	8.9	7.3	6.5	6.5
Non-fuel <sup>1</sup>	16.8	15.5	9.2	7.3	-0.3	0.7	1.0	1.0
<b>Total</b>	<b>594.1</b>	<b>556.6</b>	<b>553.7</b>	<b>553.3</b>	<b>492.7</b>	<b>402.5</b>	<b>378.9</b>	<b>366.9</b>

Source: Table 2, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables

Note: (p) 2017 estimates are provisional.

1. A negative number indicates that this sector was a net sink, with the total removals of carbon dioxide by the land use, land use change and forestry sector larger than the emissions from other non-fuel activities.

**Figure 6: Carbon dioxide emissions by fossil fuels, UK, 1990-2017, (MtCO<sub>2</sub>)**



Source: Table 2, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables

Note: (p) 2017 estimates are provisional.

## 2017 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 external temperatures. Table 3 compares temperature adjusted and unadjusted quarterly CO<sub>2</sub> emissions by sector.

**Table 3: Actual and temperature adjusted Carbon dioxide emissions by sector**

UK, Year to Q4 2017

	Total CO <sub>2</sub> emissions	Temperature adjusted CO <sub>2</sub> emissions	Difference (MtCO <sub>2</sub> )	Difference (%)
Energy supply	105.0	107.7	2.6	2.5%
Business	65.8	66.9	1.1	1.7%
Transport	124.4	124.4	0.0	0.0%
Public	7.9	8.2	0.3	3.6%
Residential	64.1	68.0	3.8	6.0%
Other	-0.4	-0.4	0.0	0.0%
<b>Total CO<sub>2</sub></b>	<b>366.9</b>	<b>374.8</b>	<b>7.9</b>	<b>2.1%</b>

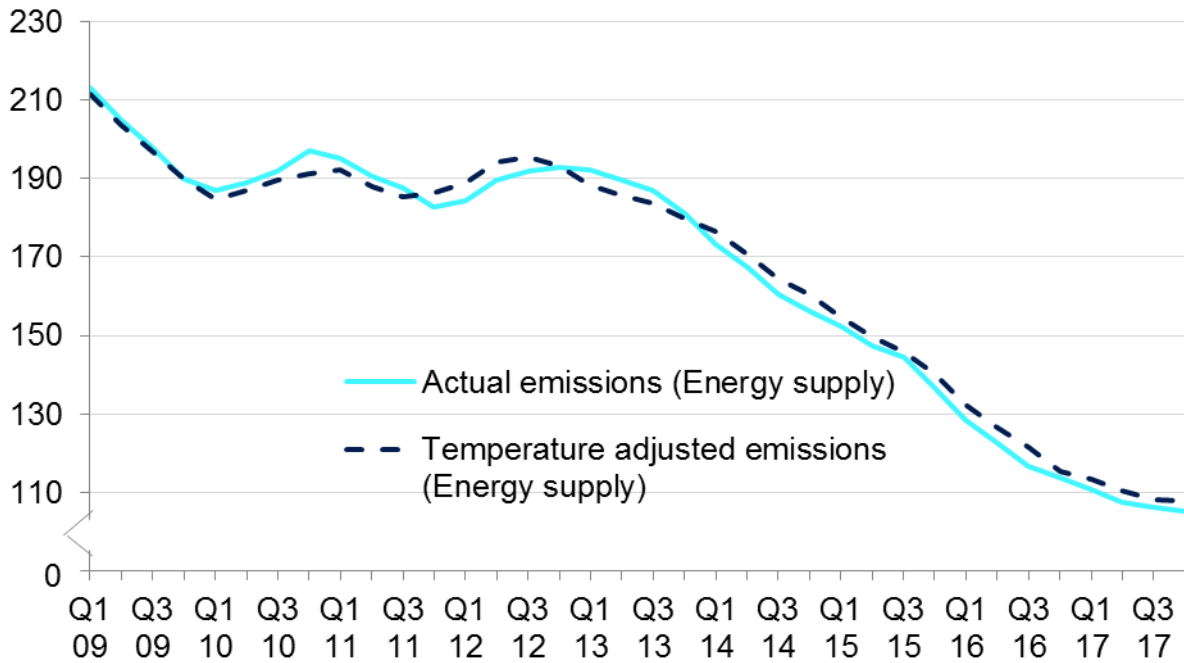
Source: Tables 3 & 4, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables

Note: 1. Figures for "Total CO<sub>2</sub>" and "Difference" may be different to the sum of those presented in the table due to rounding.

The sectors most influenced by temperature are residential and energy supply. With respect to the residential sector in particular, if temperatures increase there is a decrease in demand for space heating, resulting in a decrease in emissions. The reverse is true if temperatures decrease.

Figures 7 and 8 below show the trend for these two sectors. Temperature adjusted emissions from the energy supply sector show a similar trend to non-adjusted emissions.

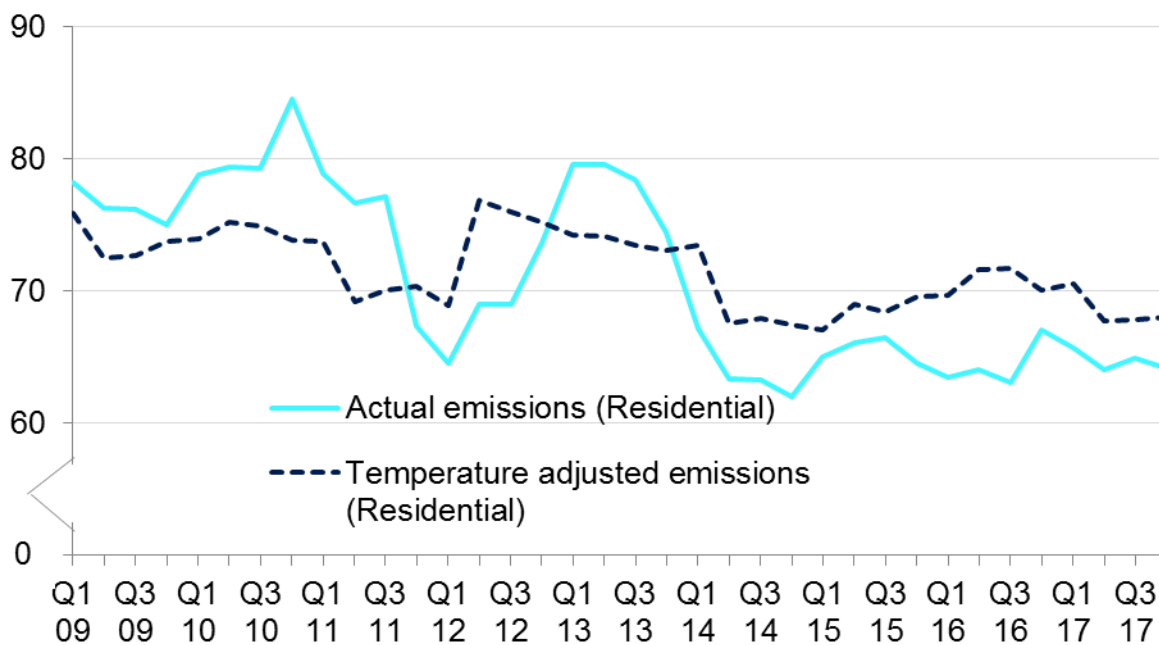
**Figure 7: Actual and temperature adjusted energy supply CO<sub>2</sub> emissions, UK, Year to Q1 2009 - Year to Q4 2017 (MtCO<sub>2</sub>)**



Source: Tables 3 & 4, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables

In the residential sector, the difference between actual and temperature adjusted emissions is much more noticeable than in other sectors, reflecting the fact that this is the sector in which energy consumption and emissions are most sensitive to external temperatures. On a temperature adjusted basis, residential emissions have remained relatively flat since 2009, while the trend for non-adjusted emissions is much more variable over the same time period. Temperature adjusted emissions in the residential sector have decreased by around 10 per cent compared to the year to Q1 2009, while non-adjusted emissions have decreased by around 18 per cent over the same period.

**Figure 8: Actual and temperature adjusted residential emissions, UK, Year to Q1 2009 - Year to Q4 2017 (MtCO<sub>2</sub>)**



Source: Tables 3 & 4, Provisional UK greenhouse gas emissions national statistics 1990-2017 Excel data tables

## Additional Information

### Coverage of emissions reporting

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, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. 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), 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.

Carbon dioxide (CO<sub>2</sub>) 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”.

Unless otherwise stated, any figures included in this release represent emissions from within the UK and excludes its Crown Dependencies (Jersey, Guernsey, and the Isle of Man) and overseas territories. Figures are expressed in millions of tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e).

### Basis of the provisional emissions estimates

The estimates of carbon dioxide emissions 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 2016). 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 2017 will be the same as emissions in 2016, and that these emissions will be spread evenly over the year.

## 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). The temperature adjustment to emissions has been applied for the months from September to April inclusive. In any given calendar year, it will therefore be applied in the period from January to April, and then again from September to December. 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](#).

## Revisions to the quarterly provisional emissions estimates

It should be noted that the quarterly emissions time series may be revised annually to reflect any revisions made to either the underlying energy data or to the UK greenhouse gas inventory. Emissions from 2009-2016 are consistent with final UK greenhouse gas emissions statistics from 1990-2016. Emissions estimates for 2017 are provisional and are based on UK energy statistics. More information on the timing of revisions to the underlying data can be found in the [methodology summary](#).

## Future updates to emissions estimates

Final estimates of UK greenhouse gas emissions for 2017 will be published as National Statistics on 5<sup>th</sup> February 2019. These estimates will be based on the UK's Greenhouse Gas Inventory for 2017.

Provisional estimates help us to understand the latest trend in emissions, and will provide an early indication of this trend ahead of the final annual figures being available from our greenhouse gas emissions inventory. We recommend that users look at this trend rather than any absolute figures.

It is important to note that these figures are based on provisional energy data and are subject to change. The sectoral breakdown is given mainly for information, and is included in the publication for completeness, but sectoral estimates are more uncertain than the total.

## Further information

Further information on UK greenhouse gas emissions statistics, including Excel tables with additional data on UK emissions, can be found on the Gov.uk website at:

<https://www.gov.uk/government/collections/uk-greenhouse-gas-emissions-statistics>

The latest UK energy statistics, including revisions to earlier years' data, can be found in the [Energy Trends](#) quarterly bulletin produced by BEIS. Any enquiries about the Energy Trends report should be sent to [energyefficiency.stats@beis.gov.uk](mailto:energyefficiency.stats@beis.gov.uk).

## Background notes

1. A full set of data tables can be accessed via the <https://www.gov.uk/government/collections/provisional-uk-greenhouse-gas-emissions-national-statistics> pages of the Gov.uk website.
2. The [background quality report](#) provides a summary of quality issues relating to statistics on UK greenhouse gas (GHG) emissions.
3. The latest UK energy statistics, including revisions to earlier years' data, can be found in the [2017 Digest of UK Energy Statistics](#).
4. Detailed UK temperature data can be found on both the [Met Office website](#) and the [Weather Statistics section of the Gov.uk website](#).
5. When emissions are measured on this basis, UK emissions account for less than 2 per cent of the global total, based on a range of estimates produced by the UN, the IEA, the World Resources Institute and the EIA, amongst others.



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