



2020 UK greenhouse gas emissions, provisional figures

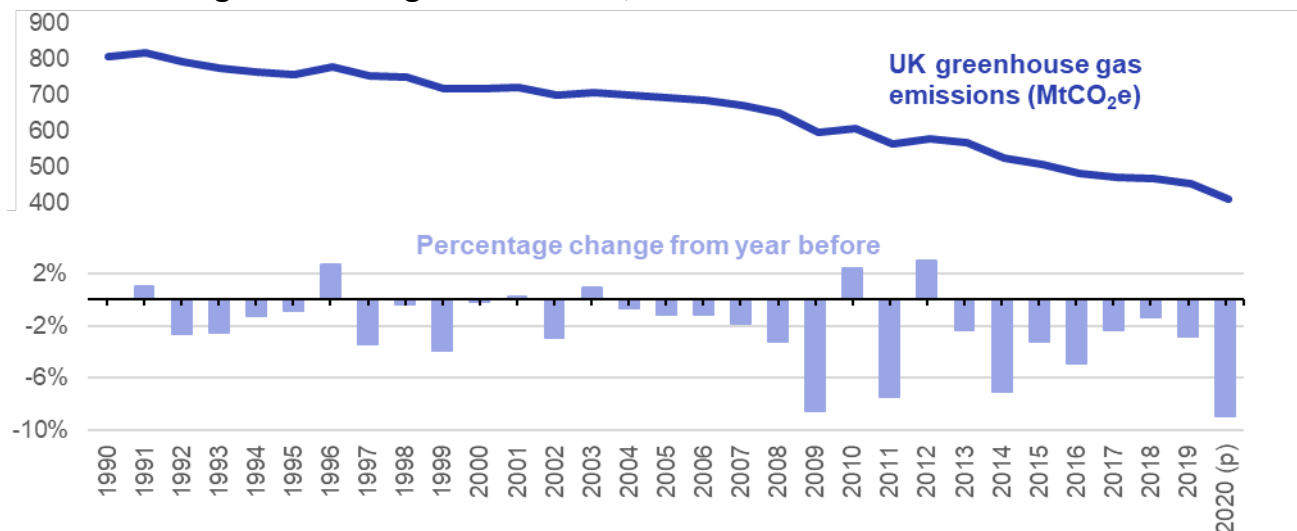
25 March 2021

National Statistics

In 2020 the coronavirus (COVID-19) pandemic and the resulting restrictions brought in across the UK had a major impact on various aspects of society and the economy and this has had a significant impact on greenhouse gas emissions in the UK over this period.

- Carbon dioxide (CO₂) emissions in the UK are provisionally estimated to have fallen by 10.7% in 2020 from 2019, to 326.1 million tonnes (Mt), and total greenhouse gas emissions by 8.9% to 414.1 million tonnes carbon dioxide equivalent (MtCO₂e). Total greenhouse gas emissions were 48.8% lower than they were in 1990.
- This large fall in 2020 is primarily due to the large reduction in the use of road transport during the nationwide lockdowns and the reduction in business activity. CO₂ emissions from transport fell 19.6% in 2020, accounting for over half of the overall fall from 2019, and in the business sector they fell by 8.7%. Conversely, CO₂ emissions from the residential sector increased by 1.8% as more people stayed at home. CO₂ emissions from the energy supply sector fell by 11.9% following lower demand during the pandemic and the continued reduction in fossil fuel use in power stations.

UK territorial greenhouse gas emissions, 1990-2020



What you need to know about these statistics:

This publication provides provisional estimates of 2020 UK territorial greenhouse gas emissions, meaning emissions that occur within the UK's borders. Emissions are presented in carbon dioxide equivalent units (CO₂e) throughout this statistical release.

These estimates give an early indication of emissions in 2020 and are subject to revision when final estimates are published in February 2022. They also include estimates of quarterly emissions and the impact on emissions of external temperature changes.

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Introduction

This publication provides provisional annual and quarterly estimates of UK territorial greenhouse gas emissions by source sector for 2020. 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](#).

Data for 1990-2019 are consistent with the annual emissions presented in the National Statistics publication [2019 final UK greenhouse gas emissions statistics](#). Data for 2020 emissions are provisional and do not follow the full methodology used for 1990-2019. The estimates of carbon dioxide (CO₂) emissions that are related to energy use are based on provisional inland energy consumption statistics, which are being published at the same time by BEIS in the quarterly [Energy Trends](#) publication. These are the large majority of emissions in the UK.

CO₂ emissions that are not related to energy use are assumed to remain the same as in 2019 as we do not yet have data from which to produce estimates for them, while estimates of non-CO₂ gases are based on a simple approach which assumes that the change in emissions of non-CO₂ gases between 2019 and 2020 will be in line with the percentage change in non-CO₂ emissions from 2019 to 2020 in the 2019 [Energy and Emissions Projections](#) published by BEIS. These emissions are assumed to be spread evenly over the year.

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, trends over time are likely to be much more reliable. The provisional 2020 estimates are subject to a greater range of uncertainty than the final figures for earlier years and the Covid-19 pandemic means that this year they are more uncertain than usual. For non-CO₂ emissions and emissions not related to energy use in particular, the simple assumptions will not capture any impact of the pandemic, although we can expect these emissions to be less affected by it than emissions related to energy use. For more information on uncertainties in emissions estimates see the annex published alongside the [2019 final UK greenhouse gas emissions statistics](#).

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). 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.

Two additional approaches to estimating UK emissions are also published and the Office for National Statistics (ONS) has published [an article](#) that compares these different measures of the UK’s greenhouse gas emissions in more detail. The alternative measures are:

- ONS publishes emissions on a “residency” 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.

- The Department for Environment, Food and Rural Affairs (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.

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 ₂ 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 ₂ 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 several more detailed sectors, which follow the definitions set out by the Intergovernmental Panel on Climate Change (IPCC)¹ and which are used in international reporting tables which are submitted to the United Nations Framework Convention on Climate Change (UNFCCC)² every year. 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 overall total.

These estimates cover the Kyoto “basket” of seven gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃). The last four gases are collectively referred to as fluorinated gases or F gases. In accordance with international reporting and carbon trading protocols, emissions from each of the gases is weighted by its global warming potential (GWP)³, so that total greenhouse gas emissions can be reported on a consistent basis. The GWP for each gas is defined as its warming influence relation to that of carbon dioxide over a 100-year period. Greenhouse gas emissions are then presented in carbon dioxide equivalent units (CO₂e).

Carbon dioxide is reported in terms of net emissions, which means total emissions minus total removals of carbon dioxide from the atmosphere by carbon sinks. Carbon sinks are defined by the UNFCCC as “any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere”.

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 2019 and 2020, 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 [2019 final UK greenhouse gas emissions statistics](#).

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

² <https://unfccc.int/>

³ The global warming potentials (GWPs) used are from Working Group 1 of the IPCC Fourth Assessment Report: Climate Change 2007 and summarised in a table published on the following page:
<https://www.gov.uk/government/publications/uk-greenhouse-gas-emissions-explanatory-notes>

2020 UK provisional emissions results

In the [data tables](#) accompanying this publication, table 1 shows UK annual territorial 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 5 the totals for individual quarters, with tables 4 and 6 respectively showing the equivalent temperature adjusted estimates.

In 2020, the coronavirus (COVID-19) pandemic and the resulting restrictions brought in across the UK had a major impact on various aspects of UK society and the economy. There are a range of statistics available from across the UK government and the devolved administrations showing the impact it has had, including profound changes to travel and economic activity^{4,5}. As a result, COVID-19 will have had a significant impact on greenhouse gas emissions in the UK in 2020, in particular from transport and from businesses, although it is not possible to identify the exact size of this effect as other factors will have also played a part in the changes seen during 2020.

Territorial carbon dioxide emissions are provisionally estimated to have fallen by 10.7% (39.0 Mt) in 2020 from 2019, and total greenhouse gas emissions by 8.9% (40.7 MtCO_{2e}). This is the largest proportional fall in UK greenhouse gas emissions in a single year since the start of the data series in 1990, slightly larger than the 8.6% fall seen in 2009 during the recession, although in absolute terms there were larger emission reductions in 2009 (of 56.1 MtCO_{2e}) and 2011 (of 45.5 MtCO_{2e}). At 414.1 MtCO_{2e}, greenhouse gas emissions in the UK in 2020 were 48.8% 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, so the rest of this section presents the trends in carbon dioxide emissions.

Emissions were particularly reduced during the second quarter of 2020, from April to June, when carbon dioxide emissions fell by 24.6% from the same period the year before. This followed the nationwide lockdown that began on 23 March 2020, when many businesses were closed and people were instructed to stay at home as much as possible. Transport was particularly affected, with emissions falling by 43.9% compared to the same quarter the previous year, largely as a result of the large fall in the use of road transport⁶. During the second half of the year when there were fewer restrictions in place emissions did not fall to the same extent, with carbon dioxide emissions 8.0% lower than in the second half of 2019.

⁴ Coronavirus (COVID-19): 2020 in charts, Office for National Statistics (ONS):

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid192020incharts/2020-12-18>

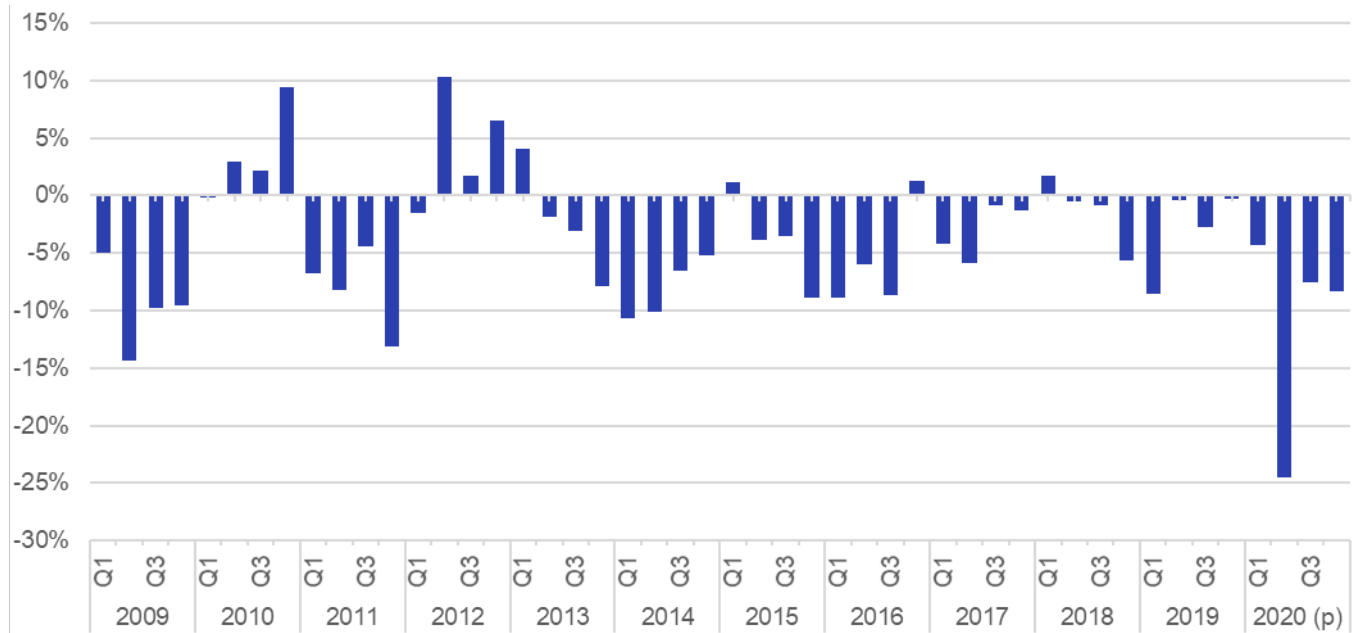
⁵ Coronavirus (COVID-19) roundup, Office for National Statistics:

<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19roundup/2020-03-26>

⁶ Transport use during the coronavirus (COVID-19) pandemic, Department for Transport (DfT):

<https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic>

Figure 1: Percentage change in quarterly UK carbon dioxide emissions from year before, Q1 2009 - Q4 2020



Source: Table 5, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 Excel data tables

Note: (p) 2020 estimates are provisional.

Overall, across 2020, carbon dioxide emissions in the transport sector fell by an estimated 19.6% (23.7 Mt), but it remained the largest emitting sector in the UK, accounting for 29.8% of carbon dioxide emissions in 2020. A further 24.2% of carbon dioxide emissions were from energy supply, 20.8% from the residential sector and 18.2% from business.

Carbon dioxide emissions in the energy supply sector decreased by 11.9% (10.6 Mt), between 2019 and 2020. This will have been affected by the pandemic, with lower demand for electricity and fuels, and by the continued change in the fuel mix for electricity generation that has been seen in recent years, with lower use of coal and increased use of renewables in 2020 compared to 2019.

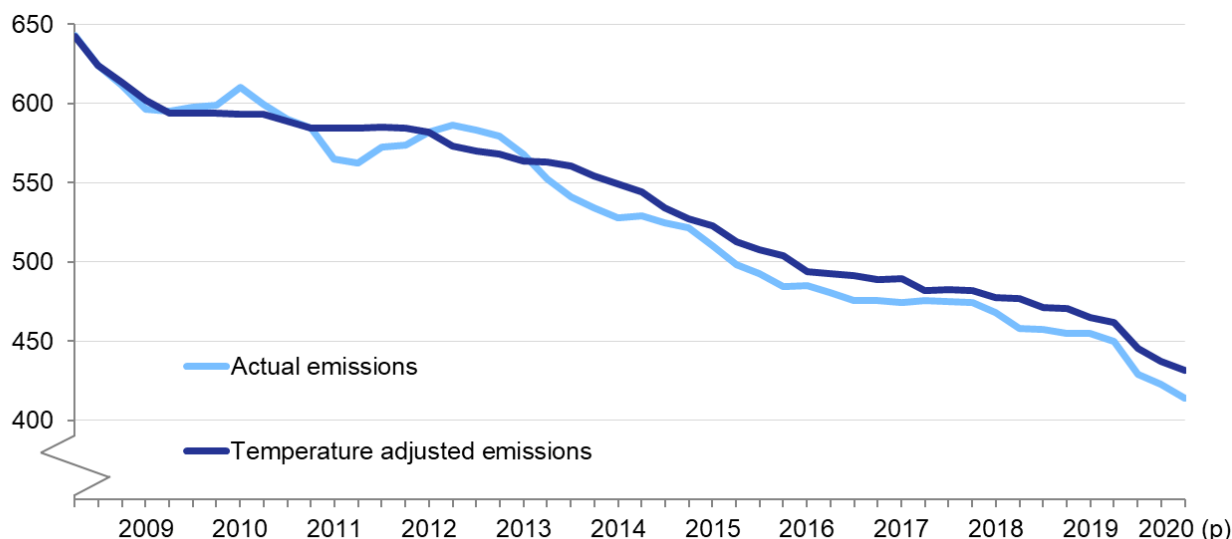
Business sector territorial carbon dioxide emissions decreased by 8.7% (5.7 Mt) and public sector emissions by 2.0% (0.2 Mt) between 2019 and 2020. Both will have been affected by the restrictions during the pandemic, the business sector in particular as large numbers of businesses either closed or reduced their activities for periods of 2020. Both will also have seen slightly reduced emissions due to the warmer temperatures in 2020 compared to 2019, which will have reduced the use of heating in buildings.

The residential sector was the one sector to see an increase in carbon dioxide emissions in 2020, of 1.8% (1.2 Mt) compared to 2019. These emissions are predominantly from the use of fuels for heating and cooking, but do not include emissions associated with electricity use as these are included in the energy supply sector. This increase was despite the warmer weather conditions and follows the instruction for people to stay at home for periods of the year, including many more people either working from home or unable to go to work due to the coronavirus restrictions.

Between 1990 and 2020, UK territorial carbon dioxide emissions decreased by 46.4%. While the pandemic led to a notable fall in emissions in 2020, the largest factor behind this long-term decrease was the change in the mix of fuels being used for electricity generation, with a

shift away from coal first to gas in the 1990s, and more recently to 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 23.0% since 1990, and if this figure is adjusted to allow for the effect of temperature, there was a 23.6% decrease over this period.

Figure 2: Actual and temperature adjusted territorial greenhouse gas emissions, UK, Year to Q1 2009 - Year to Q4 2020 (MtCO₂)



Source: Tables 3 & 4, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 Excel data tables

Note: 1. Figures are annual totals including the preceding 4 quarters.
2. From year ending Q1 2020 onwards, figures include provisional data.

As shown in Figure 2 above, temperature adjusted territorial greenhouse gas emissions show a similar overall trend to non-temperature adjusted emissions. Over the most recent ten-year period, temperature adjusted UK territorial greenhouse gas emissions decreased by 27.3%, similar to the fall in actual emissions over this period (32.2%).

Energy Supply

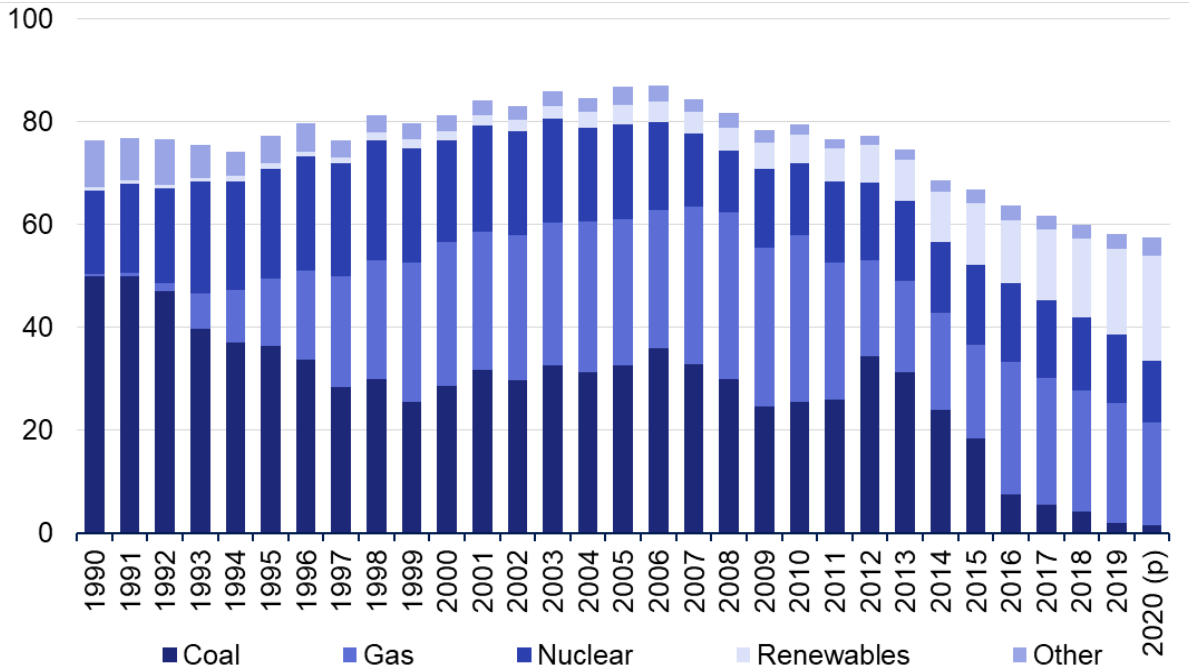
Carbon dioxide emissions from this sector are provisionally estimated to be 79.0 Mt in 2020, a decrease of 11.9% (10.6 Mt) compared to 2019.

This fall was mainly as a result of a 13.3% (7.7 Mt) fall in carbon dioxide emissions from power stations. In 2020, carbon dioxide emissions from power stations, at 50.1 Mt, accounted for 15.4% of all carbon dioxide emissions. Carbon dioxide emissions from power stations were 75.3% lower in 2020 than in 1990. This is despite consumption of electricity being provisionally estimated to be around 1.1% higher in 2020 than in 1990 (although it peaked in 2005 and has decreased since then).

This long-term 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 2020 coal made up 2.6% of fuel used for electricity generation, compared to 65.3% in 1990. Nuclear and

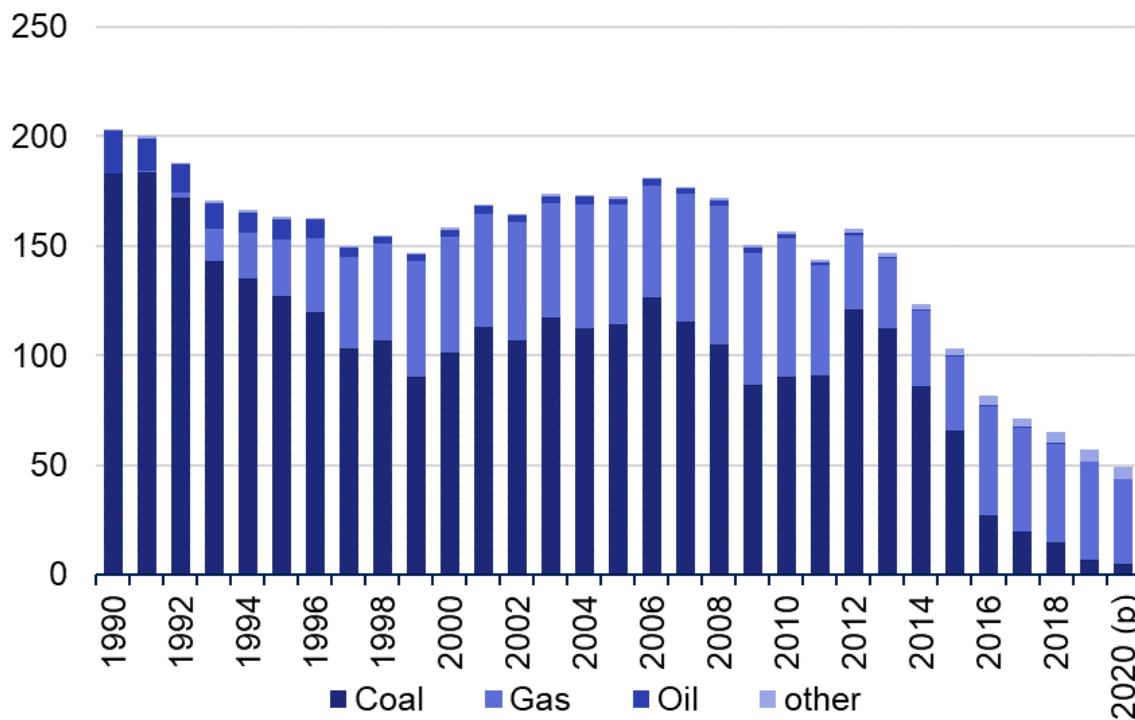
renewables, which are low carbon energy sources, accounted for 56.3% of fuel used for electricity generation in 2020, up from 22.2% in 1990.

Figure 3: Fuel mix for UK electricity generation, 1990-2020 (Million tonnes of oil equivalent)



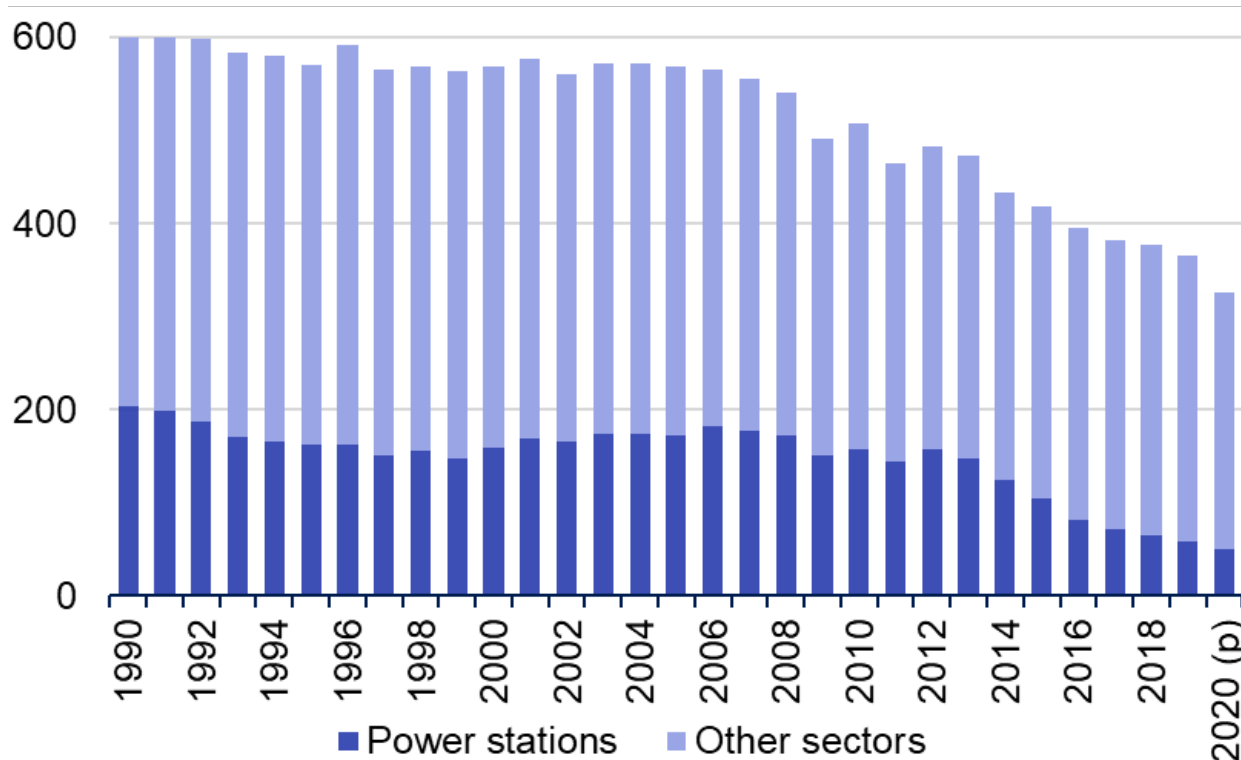
Source: Table 5.1.1, Digest of UK Energy Statistics (DUKES) 1970-2020 and Table 5.1 Energy Trends: March 2021 Excel data tables
 Note: (p) 2020 estimates are provisional.

Figure 4: Territorial carbon dioxide emissions from power stations, UK, 1990-2020 (MtCO₂)



Source: Tables 1 & 2, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 Excel data tables
 Note: (p) 2020 estimates are provisional.

Figure 5: Territorial carbon dioxide emissions from power stations compared to carbon dioxide emissions from other sectors, UK, 1990-2020 (MtCO₂)



Source: Table 1, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 Excel data tables

Note: (p) 2020 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 emissions from the generation of electricity consumed, as these emissions are included in the energy supply sector.

In 2020, the residential sector emitted 67.7 MtCO₂, accounting for 20.8% of all carbon dioxide emissions. Emissions from the public sector were 7.7 MtCO₂, accounting for 2.4% of all territorial carbon dioxide emissions. Between 1990 and 2020 territorial carbon dioxide emissions from the residential sector have fallen by 13.5% and from the public sector 42.2% over the same time period.

Between 2019 and 2020:

- There was a 1.8% (1.2 Mt) increase in residential carbon dioxide emissions
- There was a 2.0% (0.2 Mt) decrease in emissions from the public sector.

These changes were affected by warmer weather in 2020 than the previous year. On a temperature adjusted basis between 2019 and 2020:

- There was a 6.7% (4.8 Mt) increase in residential emissions
- There was a 1.3% (0.1 Mt) increase in emissions from the public sector.

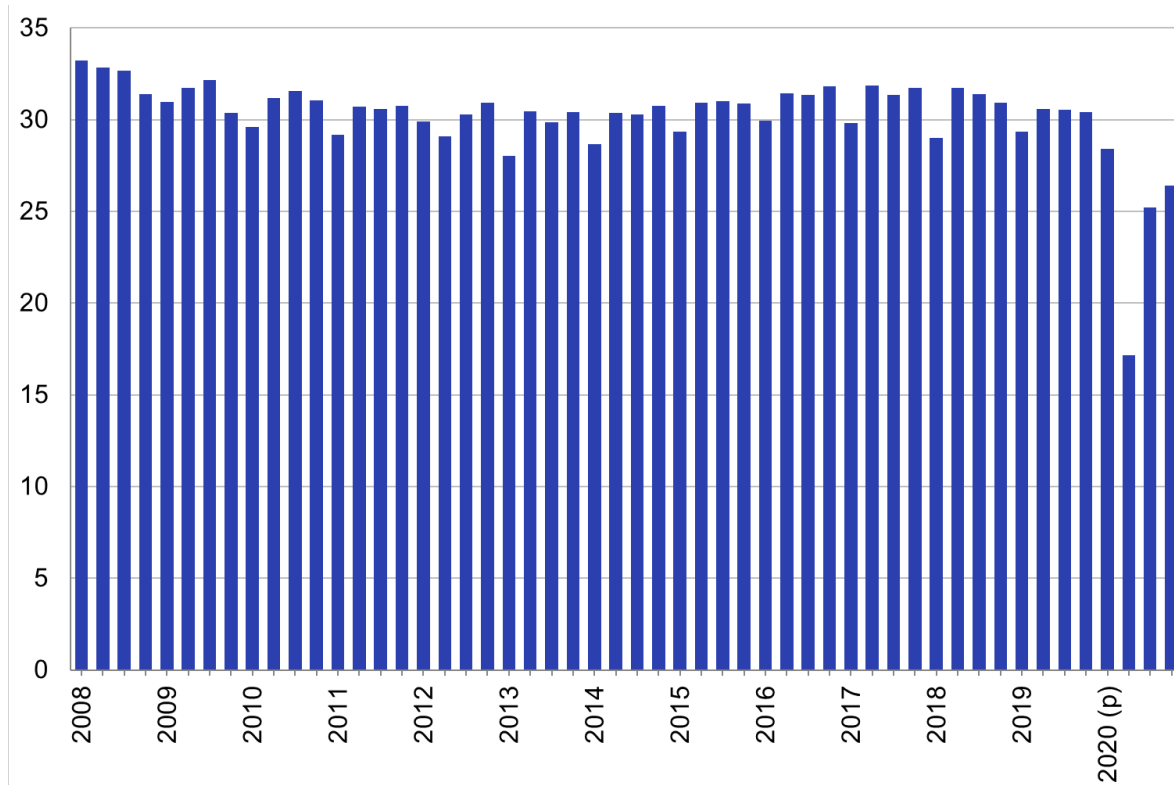
Transport sector

Transport was significantly impacted by COVID-19, as people were instructed to stay at home as much as possible. In 2020, territorial carbon dioxide emissions from the transport sector were 97.2 Mt, 19.6% (23.7 Mt) lower than in 2019, and 22.5% lower than in 1990. In 2020 transport accounted for 29.8% of all territorial carbon dioxide emissions, compared to 33.1% in 2019. The large majority of emissions from transport are from road transport.

Primarily as a result of a continual growth in vehicle kilometres travelled on roads⁷, transport carbon dioxide grew to a peak in 2007, 8.5% higher than in 1990. Since then, emissions from this sector had fallen back to around 1990 levels up until 2019, driven mainly by improvements in new car fuel efficiency⁸, 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.

Figure 6: Territorial carbon dioxide quarterly emissions from Transport, UK, 2008-2020 (MtCO₂)



Source: Table 5, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 Excel data tables

Note: (p) 2020 estimates are provisional.

⁷ 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>

⁸ 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>

Business sector

Territorial carbon dioxide emissions from the business sector were estimated to be 59.4 Mt in 2020 and accounted for around 18.2% of all carbon dioxide emissions. There has been a 46.8% 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.

Between 2019 and 2020 carbon dioxide emissions from this sector decreased by 8.7% (5.7 Mt). This decrease in 2020 follows the nationwide lockdown and restrictions due to the COVID-19 pandemic, including the closure of non-essential shops, pubs, restaurants and venues during the national lockdowns. Trading volumes decreased, there was an increase in business closures and a decrease in the overall UK economy was reported over the time period⁹.

Other sectors

For the *agriculture, waste management, and land use, land use change and forestry* (LULUCF) sectors provisional territorial carbon dioxide 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 2019. This is also the case for most of the emissions from the *industrial processes* sector.

⁹ Coronavirus (COVID-19) roundup, Office for National Statistics:
<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/coronaviruscovid19roundup/2020-03-26>

Carbon dioxide emissions by fuel type

In the [data tables](#) accompanying this publication, table 2 shows UK territorial 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.

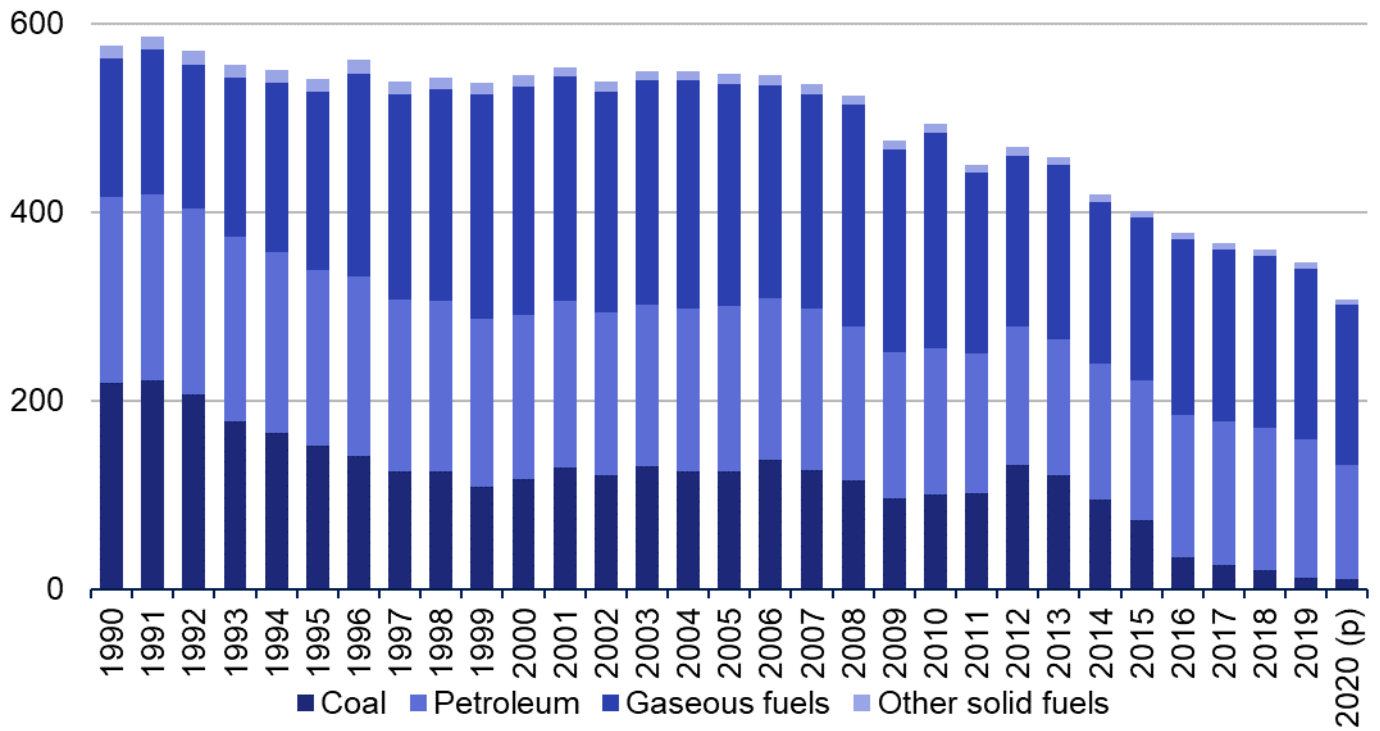
Emissions per unit of electricity supplied from fossil fuels are estimated to have been around 400 tonnes of carbon dioxide per gigawatt hour (GWh) overall in 2020 in the UK. Within this, emissions from electricity generated from coal (1,010 tonnes of carbon dioxide per GWh electricity supplied) were 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 2020 amounted to 180 tonnes per GWh of electricity supplied.

In 2020, total territorial carbon dioxide emissions from the use of fossil fuels, including fuel used for generating electricity, were estimated at 301.5 Mt. This was 11.3% lower than the 2019 figure of 339.8 Mt. The biggest change in emissions was from the use of petroleum, down 25.3 Mt (17.2%) from 146.7 Mt in 2019 to 121.4 Mt in 2020. This largely resulted from the reduction in road transport in the UK during the nationwide lockdown periods. Coal use also decreased, down 1.8 Mt (15.0%) in 2020, mostly due to the reduced use of coal for electricity generation.

Over the period 1990 to 2020, carbon dioxide emissions from fossil fuels decreased by 46.4%. Over the same period, primary consumption of fossil fuels dropped by 36.2%. This relatively large decrease in emissions can be attributed to a large decrease in the use of coal accompanied by an increase in the use of gas.

Territorial carbon dioxide emissions from gas as a proportion of all carbon dioxide emissions from fossil fuels has increased from 26.0% in 1990 to 56.4% in 2020, whilst emissions from coal as a proportion of all fossil fuel carbon dioxide emissions has decreased from 38.9% to 3.3% over the same period. Oil was responsible for 35.2% of carbon dioxide emissions from fossil fuels in 1990 and this has increased to 40.3% in 2020.

Figure 7: UK Territorial carbon dioxide emissions by fuel type, 1990-2020 (MtCO₂)



Source: Table 2, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 Excel data tables

Note: (p) 2020 estimates are provisional.

2020 temperature adjusted provisional emissions results by sector

In the [data tables](#) accompanying this publication, table 3 shows quarterly moving annual totals for UK emissions and table 5 the totals for individual quarters, with tables 4 and 6 respectively showing the equivalent temperature adjusted estimates.

A temperature adjustment has been applied to the quarterly carbon dioxide emissions to estimate what the overall trend of territorial emissions would have been without the impact of differences in external temperatures. Table 1 compares temperature adjusted and unadjusted carbon dioxide emissions by sector in 2020. The adjustments are based on the estimated historical impacts of temperatures on emissions, although as activity patterns were quite different to usual in 2020 due to the coronavirus (COVID-19) pandemic, the adjustments may be less reliable than in other years at reflecting what emissions might have been had temperatures followed the long-term average rather than the temperature pattern actually seen.

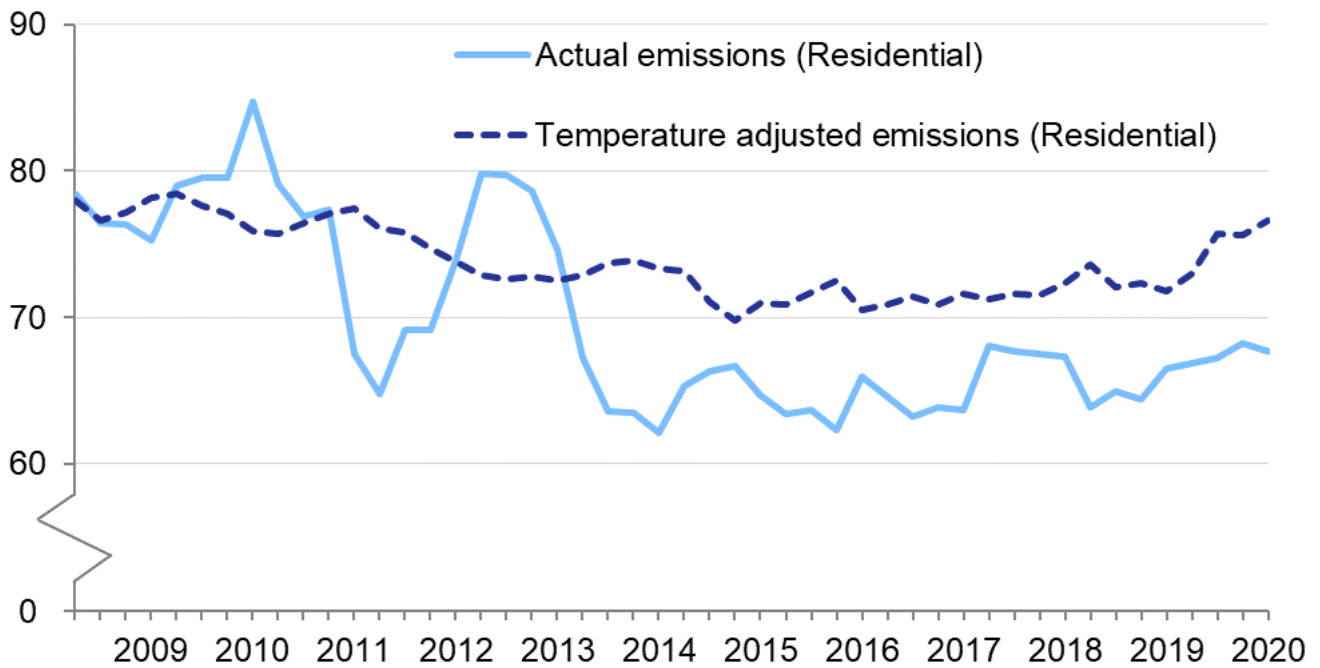
Table 1: Percentage changes in territorial carbon dioxide emissions by sector between 2018 and 2020 based on the temperature adjusted emissions and actual emissions

	Temperature adjusted emissions			Actual emissions		
	2019 (MtCO ₂)	2020 (MtCO ₂)	Percentage change	2019 (MtCO ₂)	2020 (MtCO ₂)	Percentage change
Energy supply	92.6	84.1	-9.3%	89.6	79.0	-11.9%
Business	66.7	62.1	-7.0%	65.1	59.4	-8.7%
Transport	120.8	97.2	-19.6%	120.8	97.2	-19.6%
Public	8.3	8.4	1.3%	7.9	7.7	-2.0%
Residential	71.8	76.6	6.7%	66.5	67.7	1.8%
Other	15.1	15.0	-0.1%	15.1	15.0	-0.1%
Total CO₂	375.3	343.4	-8.5%	365.1	326.1	-10.7%

Source: Tables 3 & 4, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 Excel data tables

The sectors most affected by external temperatures are the residential sector and energy supply sector. 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 8 below.

Figure 8: Actual and temperature adjusted residential carbon dioxide territorial emissions, UK, Year to Q1 2009 - Year to Q4 2020 (MtCO₂)

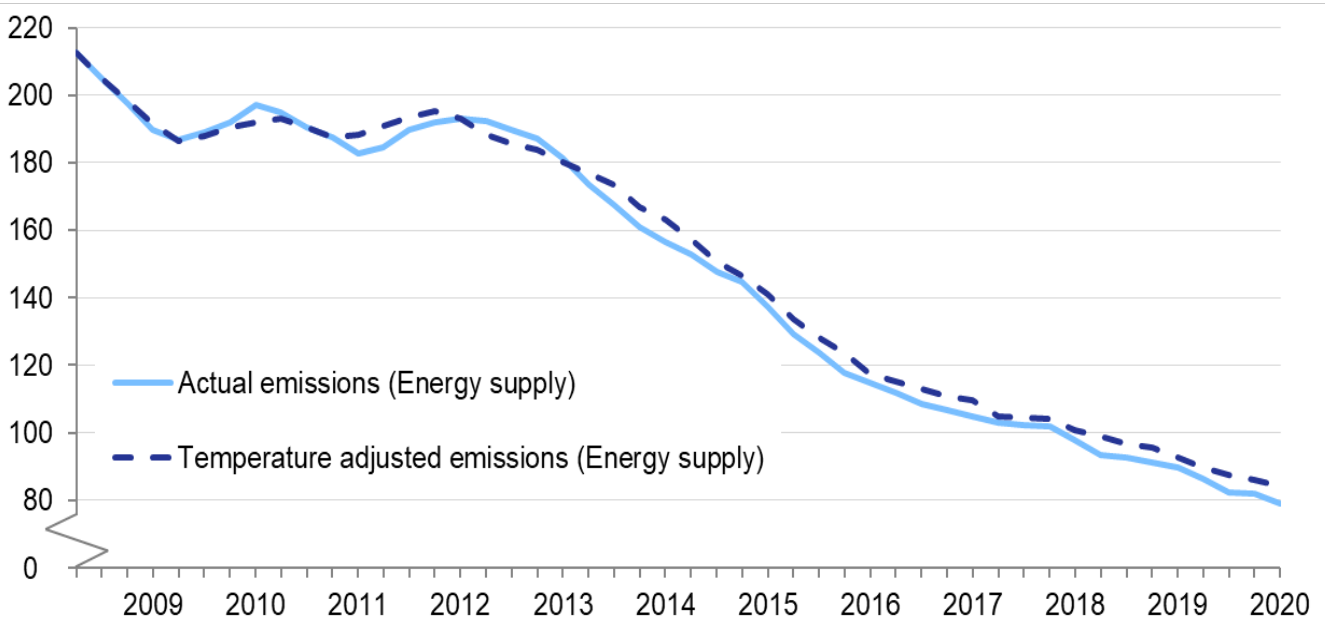


Source: Tables 3 & 4, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 Excel data tables

- Note:
1. Figures are annual totals including the preceding 4 quarters.
 2. From year ending Q1 2020 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 9: Actual and temperature adjusted energy supply carbon dioxide territorial emissions, UK, Year to Q1 2009 - Year to Q4 2020 (MtCO₂)



Source: Tables 3 & 4, Provisional UK territorial greenhouse gas emissions national statistics 1990-2020 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

Basis of the provisional emissions estimates

The estimates of carbon dioxide emissions in 2020 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 (78.8% in 2020). 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-CO₂ gases. Estimates of non-CO₂ gases are based on a simple approach which assumes that emissions of non-CO₂ gases in 2020 will change from the 2019 total in line with the percentage difference between the estimates for the 2019 and 2020 non-CO₂ emissions in the 2019 [Energy and Emissions Projections](#) published by BEIS.

Estimates of emissions of all greenhouse gases for 1990-2019 come from the latest UK greenhouse gas inventory. Information about the methodology behind these estimates can be found in the [2019 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](#). It should be noted that the temperature adjustment methodology for 2020 is the same as in previous years and has not been updated to reflect any impacts in 2020 of the COVID-19 pandemic.

Further information

Future updates to these statistics

On Thursday 24th June 2021 BEIS will publish estimates of carbon dioxide emissions by local authority for 2019. We will also publish estimates of 1990-2019 UK territorial emissions by Standard Industrial Classification (SIC), to supplement the sector breakdown included in the final 2019 UK greenhouse gas emissions publication.

Final estimates of UK greenhouse gas emissions for 2020 will be published as National Statistics in February 2022. These estimates will be based on the UK's Greenhouse Gas Inventory for 1990-2020.

In March 2022, the 1990-2020 UK emissions estimates will be updated to include estimates by end user and by fuel type, and provisional 2021 emissions estimates will be published.

Related publications

- The UK's National Inventory Report (NIR) for 1990-2019 will be submitted to the United Nations Framework Convention on Climate Change (UNFCCC) on 15th April 2021. The report will contain national greenhouse gas emissions estimates for 1990-2019 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.
- 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 2020 are provisional and are based on UK energy statistics. They will be revised when the final 2020 estimates are published in February 2022. 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 2019 and 2020, 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 [2019 final UK greenhouse gas emissions statistics](#).

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

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-CO₂ emissions.
- Providing more methodological and background information about the statistics in the statistical releases.

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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