

Statistical bulletin

UK Environmental Accounts: 2019

Measuring the contribution of the environment to the economy, the impact of economic activity on the environment, and society's response to environmental issues. Satellite accounts to the main UK National Accounts.



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1 . Main points

- The continued switch away from coal towards gas and renewable energy resulted in a fall in UK greenhouse gas (GHG) emissions in 2017, the continuation of a long-term trend.
- Households have been the biggest emitter of GHGs since 2015, accounting for one-quarter of total UK GHG emissions in 2017.
- Vegetation in the UK removed an estimated 28 million tonnes (CO2 equivalent) of carbon gases in 2017.
- Households accounted for almost two-fifths of revenue from environmental taxes in 2016.
- Just over half (56%) of all environmental tax revenue in 2018 was related to taxes on petrol, diesel and other fuels used for transport or heating.

2 . Things you need to know about this release

The UK Environmental Accounts show how the environment contributes to the economy (for example, through the extraction of raw materials), the impact that the economy has on the environment (for example, energy consumption and air emissions) and how society responds to environmental issues (for example, through taxation and expenditure on environmental protection).

The UK Environmental Accounts are “satellite accounts” to the main UK National Accounts and they are compiled in accordance with the [System of Environmental Economic Accounting \(SEEA\)](#), which closely follows the UN System of National Accounts (SNA). This means they are comparable with economic indicators such as gross domestic product (GDP).

The UK Environmental Accounts are based on a UK residency basis (as opposed to a territory basis). This means that data relating to UK residents and UK-registered businesses are included, regardless of whether they are in the UK or overseas. Data relating to foreign visitors and foreign businesses in the UK are excluded.

UK figures for [energy](#) and [air emissions](#) on a territory basis are published by the Department for Business, Energy and Industrial Strategy (BEIS) and the Department for Environment, Food and Rural Affairs (Defra). The energy and air emissions bridging tables (see [Section 6: Where to find other environmental accounts data](#)) illustrate the difference between these estimates. Further explanation of the differences can be found in articles on [energy consumption](#) and [alternative approaches to reporting UK greenhouse gas emissions \(PDF, 253KB\)](#).

This bulletin has used data from a small part of the datasets released as part of the full environmental accounts. For a summary of other data available in the environmental accounts see [Section 6: Where to find other environmental accounts data](#).

More detailed information on methods used can be found within [Section 8: Quality and methodology](#).

3 . The switch from coal to renewable energy saw UK greenhouse gas emissions continue to fall in 2017

- The continued switch away from coal towards gas and renewable energy by the energy supply sector resulted in a fall in overall greenhouse gas (GHG) emissions in 2017, the continuation of a long-term trend.
- Households have been the biggest emitter of GHGs since 2015, accounting for one-quarter of total UK GHG emissions.
- GHG emissions by the transport sector had been increasing since 2013 but fell in 2017 due to a decrease in emissions relating to shipping.

The UK government is considering its policy response to the [Committee on Climate Change report](#), which recommends a new greenhouse gas emissions target for the UK: net zero emission by 2050. This bulletin considers trends in estimates of UK GHG emissions to 2017 and information relevant to society's response to combatting air emissions, available from within the environmental accounts: environmental taxation and natural capital accounts – air pollution removal by vegetation.

The use of non-renewable fuels and the level of energy consumption in the UK are reflected in the UK's GHG ¹ emissions. A long-term trend in the reduction of non-renewable fuel use in the UK continued between 2016 and 2017, to 164 million tonnes of oil equivalent in 2017, around three-quarters of such use in 1990. Energy consumption also fell by 2% from 2016 to stand at 198 million tonnes of oil equivalent in 2017.

This resulted in GHG emissions decreasing by just over 2% from 2016 to 2017, standing at 566 million tonnes of carbon dioxide equivalent in 2017. This was almost one-third below 1990 levels.

Energy supply and manufacturing industries increased their use of renewable energy sources and reduced GHG emissions compared with 1990

The overall reductions in GHG emissions from 1990 to 2017 were driven largely by a switch from the use of coal and heavy-polluting fuels by the energy supply and manufacturing industries to other, more efficient, fuels such as natural gas and, more recently, renewable sources.

In 2017, coal use by the energy supply industry was around a tenth of its use in 1990. In June 2019, the [UK National Grid Electricity System Operator](#) reported the UK went two weeks without using coal for electricity generation for the first time since 1882.

When used for electricity generation, coal produces more carbon dioxide (CO₂) than natural gas per unit of electricity produced, so the switch away from coal has led to a reduction in CO₂ emissions. As CO₂ is the most emitted greenhouse gas, changes in CO₂ tend to be reflected in overall GHG emissions.

From 1990 to 2010, natural gas use by the energy supply industry grew from close to zero to 31 million tonnes of oil equivalent as natural gas use replaced coal use. Natural gas use by the energy supply industry has generally declined since 2010, to 23 million tonnes of oil equivalent by 2017 due to the industry's increasing use of renewable sources.

A similar picture emerges for the manufacturing industry, where there has been a 75% reduction in coal use and a 94% reduction in fuel oil use since 1990. This has helped reduce reallocated ² energy consumption of the manufacturing industry to 40 million tonnes of oil equivalent in 2017, which is 38% below 1990 levels. More recent reductions in the manufacturing industry have been a result of [reduced activity in iron and steel and associated industries \(PDF, 2.23MB\)](#).

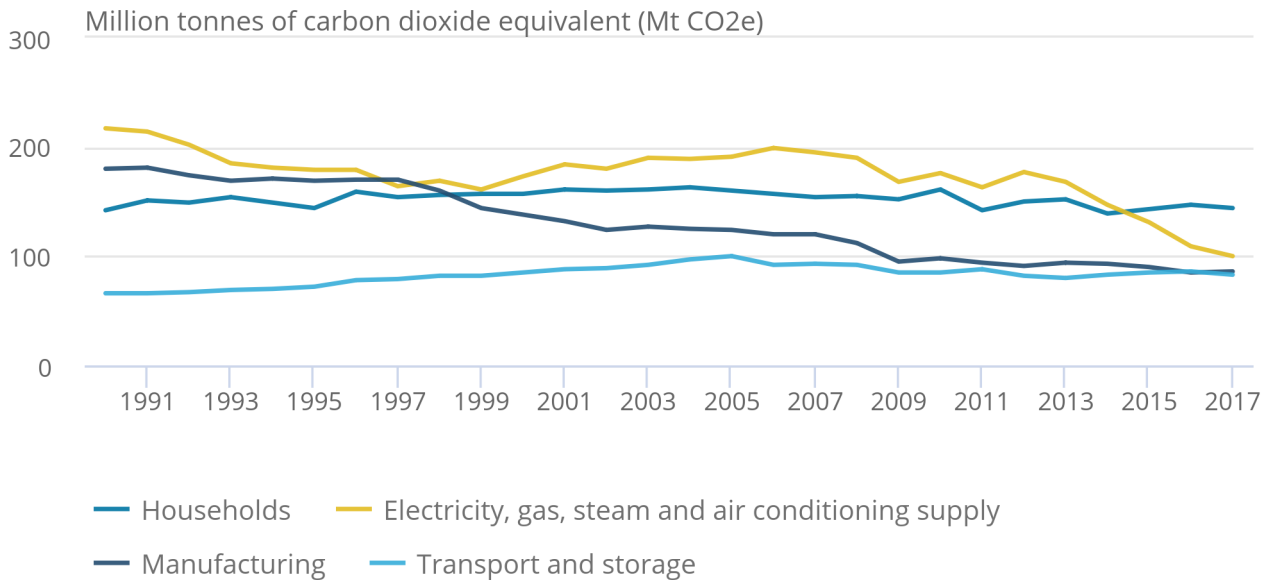
All of these factors contributed to a fall in GHG emissions by these industries. GHG emissions from the energy supply industry have fallen to 100 million tonnes of carbon dioxide equivalent in 2017, from a high of 199 million tonnes of carbon dioxide equivalent in 2006. GHG emissions from the manufacturing industry were 86 million tonnes of carbon dioxide equivalent in 2017, compared with a high of 181 million tonnes of carbon dioxide equivalent in 1991 (Figure 1).

Figure 1: Greenhouse gas emissions from the energy supply industry continued to fall in 2017

Greenhouse gas emissions for the four highest-emitting industries, including households, UK, 1990 to 2017

Figure 1: Greenhouse gas emissions from the energy supply industry continued to fall in 2017

Greenhouse gas emissions for the four highest-emitting industries, including households, UK, 1990 to 2017



Source: Ricardo Energy and Environment, Office for National Statistics

Notes:

1. Industry aggregations are based on the UK Standard Industrial Classification (SIC) 2007. Households include “consumer expenditure” and “activities of households as employers; undifferentiated goods and services – producing activities of households for own use” (for example, employing a cleaner and growing vegetables for your own consumption). The electricity, gas, steam and air conditioning supply sector is referred to as the energy supply sector. The transport and storage sector is referred to as the transport sector.
2. Greenhouse gas emissions include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃).
3. The potential of each greenhouse gas to cause global warming is assessed in relation to a given weight of CO₂ so all greenhouse gas emissions are measured in carbon dioxide equivalents (CO₂e).
4. Households also include services of households as employers as well as all consumer expenditure.

Despite the move to more renewable energy consumption by these industries and its impact on GHG emissions, around 10% of energy consumption in the UK as a whole was from renewable sources in 2017, this compares with just under 1% in 1990.

Further information can be found in the Atmospheric emissions and Energy use datasets, see [Section 6: Where to find other environmental accounts data](#).

Households were responsible for one-quarter of all GHG emissions in the UK in 2017

The level of GHG emissions by households has remained relatively stable since 1990, with fluctuations tending to be explained by temperature, as households consume more or less energy depending on the weather. Due to falls in emissions from the energy supply industry, households became the largest emitters of GHGs from 2015 (Figure 1).

Around 44% of fuel used by households in 2017 relates to travel, such as domestic car use and flights.

The [increasing number of cars](#) (PDF, 2.19MB), the majority of which are registered to households, may help explain why energy consumption and GHG emissions by households have not been falling. While the number of alternative fuel cars has been increasing in the UK, at the end of 2018 there were around 620,000, or 2% of all licensed cars.

[UK-registered airlines flew around 2 billion kilometres in 2017 \(XLS, 17.6KB\)](#), this distance has been increasing since 2010, when such airlines flew around 1.7 billion kilometres.

Further information on energy use by households can be found in the Energy use: carbon-based fuels by fuel type and industry [dataset](#).

GHG emissions from road transport by all industries increased between 2013 and 2016. 2017 saw a slight decrease, although these emissions still accounted for around one-fifth of total UK GHG emissions. Emissions from the majority of other pollutants from road transport have been falling, due largely to more stringent emissions standards.

Further information can be found in the Atmospheric emissions: road transport [dataset](#).

GHG emissions from the transport industry fell in 2017 but remain a quarter higher than in 1990

The transport industry has not seen the same reduction in GHG emissions as the energy supply and manufacturing industries. The “transport industry” refers to the industry classification, not all transport by UK residents and businesses.

For the transport industry, there was a steady increase in energy consumption between 1990 and its peak in 2005. This was due to an increase in fuel oil used for shipping and aviation. In the UK Environmental Accounts, emissions from international aviation and shipping relating to UK operators are included. These are excluded from the data compiled for [United Nations Framework Convention on Climate Change \(UNFCCC\)](#) purposes.

Between 2005 and 2013, energy consumption by the transport industry fell by 20%, due largely to a reduction in the use of fuel oil and fuel used in diesel-engine road vehicles (DERV). However, this trend has reversed since 2013, with increases in the use of DERV and gas oil contributing to an overall increase in energy consumption by the transport industry to 30 million tonnes of oil equivalent in 2016, a 6% rise on 2013.

Energy consumption by the transport industry then decreased by 4% to 29 million tonnes of oil equivalent in 2017, this decrease was due to a reduction in energy consumption relating to shipping. [Global energy efficiency and GHG standards for shipping](#) have been set by the International Maritime Organisation and are currently being reviewed.

Further information can be found in the Energy use: carbon-based fuels by fuel type and industry [dataset](#) and Energy use: total [dataset](#).

These changes in energy consumption are reflected in GHG emissions by the transport industry shown in Figure 1. In 2005, GHG emissions by the transport industry peaked at 100 million tonnes of carbon dioxide equivalent (Mt CO₂e), 52% above 1990 levels.

Between 2005 and 2013, emissions for this industry declined, before starting to increase again between 2013 and 2016.

Between 2016 and 2017, GHG emissions by the transport industry decreased slightly due to a reduction in emissions from shipping, to stand at 83 million tonnes of carbon dioxide equivalent in 2017. While this is 17% below 2005 levels, it is still just over a quarter higher than GHG emissions by the transport industry in 1990.

Notes for: The switch from coal to renewable energy saw UK greenhouse gas emissions continue to fall in 2017

1. GHG emissions include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydro-fluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃). The potential of each greenhouse gas to cause global warming is assessed in relation to a given weight of CO₂ so all greenhouse gas emissions are measured as carbon dioxide equivalents (CO₂e).
2. Direct use of energy refers to the energy content of fuel for energy at the point of use, allocated to the original purchasers and consumers of fuels. Whereas, for reallocated use of energy, the losses incurred during transformation and distribution of energy are allocated to the final consumer of the energy rather than incorporating being assigned entirely to the energy supply sector.

4 . 28 million tonnes of carbon gases were removed by UK vegetation in 2017

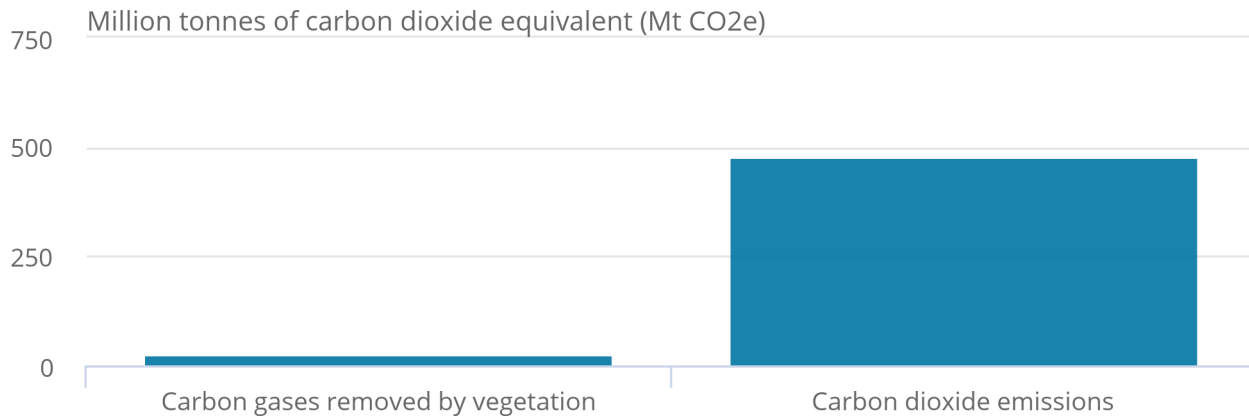
- Carbon dioxide (CO₂) emissions in the UK were 480 million tonnes in 2017, around 85% of all greenhouse gas emissions.
- Vegetation in the UK removed an estimated 28 million tonnes (CO₂ equivalent) of carbon gases in 2017.

Figure 2: 28 million tonnes of carbon gases were removed by UK vegetation in 2017

Carbon dioxide emissions and carbon gases removed by vegetation, 2017

Figure 2: 28 million tonnes of carbon gases were removed by UK vegetation in 2017

Carbon dioxide emissions and carbon gases removed by vegetation, 2017



Source: Ricardo Energy and Environment, UK Greenhouse Gas Inventory and Office for National Statistics

Notes:

1. Estimates of carbon gases removed by vegetation primarily comprise the removal of carbon dioxide.
2. Estimates of carbon gases removed by vegetation relate to their removal from the atmosphere by UK terrestrial-based ecosystems only.
3. Estimates of carbon gases removed by vegetation are calculated on a gross basis and include carbon gases removed by the land use, land use change and forestry sector (LULUCF). Estimates do not account for potential carbon gas emissions from the LULUCF. The LULUCF sector includes forests, grasslands, croplands and wetlands.
4. Estimates of carbon dioxide emissions include any emissions related to UK residents and UK-registered businesses, regardless of whether they are based in the UK or overseas. Emissions related to foreign visitors or foreign businesses in the UK are excluded.

Natural capital refers to the natural wealth of the UK, for example, woodland, mountains or natural coastal areas. Natural capital accounts monitor any changes to these natural assets and the benefits we receive from them over time.

The Department for Environment, Food and Rural Affairs (Defra) and the Office for National Statistics (ONS) have a project to develop natural capital accounts for the UK. Full details about the project can be found in the [2018 Natural Capital Accounting Project Roadmap](#). By 2020 it is envisaged the accounts will be part of the UK Environmental Accounts and integrated as far as possible.

The ONS and Defra publish [UK-level Natural Capital Accounts](#) and more detailed habitat accounts annually, including accounts for [woodland, farmland and freshwater](#).

One part of the UK's Natural Capital Accounts are estimates of the removal of pollutants by vegetation.

Figure 2 shows that in 2017, UK emissions of CO₂, the most abundant greenhouse gas, were 480 million tonnes, whereas an estimated 28 million tonnes of CO₂ and other carbon gases were removed by vegetation in the UK.

Estimates of other air pollutants removed by vegetation are available in [UK natural capital: Ecosystem service accounts, 1997 to 2015](#).

The removal or emission of CO₂ by the UK's natural assets is dependent on their condition. For example, peatlands are rich carbon stores, which have gradually pulled carbon in from the atmosphere over thousands of years. In near natural condition peatland habitats can continue to slowly absorb carbon over the long-term. However, when peatlands are not left in good condition those long-term carbon stores relatively rapidly return that carbon to the atmosphere.

The Centre for Ecology and Hydrology (CEH) have reported estimates of [CO₂ emissions from peatland in the UK](#) (PDF, 3.59MB) as 23.1 million tonnes of carbon dioxide equivalent per year. The implication would be that just over 80% of all of the carbon removal from vegetation estimated in Figure 2 is offset by emissions from peat. These estimates are not currently included within the UK's Greenhouse Gas Inventory or the estimates provided in this bulletin but are expected to form part of the UK's official emissions reporting in future.

The recent [Committee on Climate Change report \(PDF, 6.77MB\)](#) on reducing UK GHG emissions to net zero by 2050 cites recognising and restoring peatland as an important part of the UK's contribution to stopping global warming.

For more information on the source of the estimates in this section see [Section 8: Quality and methodology](#).

5 . Households account for almost two-fifths of all revenue from environmental taxes

- Revenue from environmental taxes in the UK has remained relatively stable over the last 20 years when considered as a percentage of gross domestic product (GDP) and was 2.4% of GDP in 2018 raising £50.1 billion in tax revenue.
- Households account for almost two-fifths of revenue from environmental taxes.
- Just over half (56%) of all environmental tax revenue in 2018 was related to taxes on petrol, diesel and other fuels used for transport or heating.

Environmental taxes are designed to promote environmentally positive behaviour, reduce damaging effects on the environment and generate revenue that can potentially be used to promote further environmental protection.

Data on total UK environmental tax revenue are available for the years 1997 through to 2018. All data are reported at current prices so no adjustments have been made to account for the effects of inflation.

Environmental taxes revenue data broken down by economic activity are available to 2016 only. NACE is the European classification system for economic activity, categories are comparable with the Standard Industrial Classifications (SICs) reported elsewhere in this bulletin.

In 2018, revenue from environmentally-related taxes stood at £50.1 billion, equivalent to 2.4% of the UK's GDP.

Total revenue in 2018 (£50.1 billion) was more than double the revenue collected in 1997 (£24.3 billion). This increase was due largely to increases in revenue from hydrocarbon oils, which include taxes on transport fuels. There was a jump in revenue between 1997 and 1998 when the fuel escalator increased from 5% to 6%. Air Passenger Duty also doubled at this time, to £10 for flights to Europe and £20 for flights to the rest of the world.

The drop in revenue in 2001 was likely due to changes to taxes relating to road transport. Following national protests, fuel tax for road vehicles was reduced, resulting in a £1.0 billion fall in revenue. During the same year there was also a change from taxing based on engine size to fuel type and carbon dioxide emissions, further reducing tax revenue. This change in policy is reflected in statistics on fuel use (see [Section 3](#)), which show a switch from petrol to DERV (fuel used in diesel-engine road vehicles).

Fuel tax for road vehicles has been frozen since 2010. The UK government is currently developing policy aimed at reducing emissions from road vehicles as part of the [clean air strategy](#).

Almost two-fifths of environmental tax revenue was generated from households in 2016. In total, households paid £18.8 billion in environmental taxes (Figure 3), equating to £689 per household.

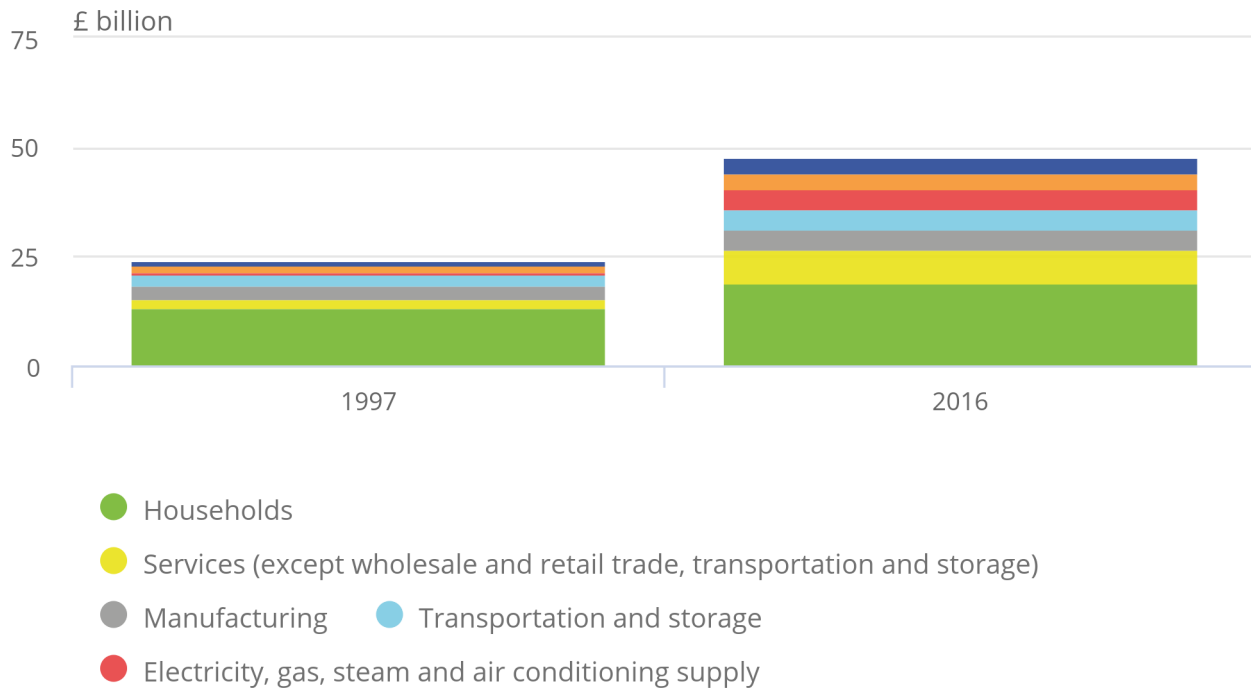
Over half (56%) of all environmental tax revenue in 2016 was related to tax on hydrocarbon oils; these are taxes on petrol, diesel and other fuels used for transport or heating.

Figure 3: £19 billion of environmental tax revenue was generated from households in 2016

Environmental tax revenue by industry, including households, UK, 1997 and 2016

Figure 3: £19 billion of environmental tax revenue was generated from households in 2016

Environmental tax revenue by industry, including households, UK, 1997 and 2016



Source: Office for National Statistics

Notes:

1. For a full list of NACE industries and further information, see the Environmental taxes dataset accompanying this statistical bulletin.
2. Households estimate includes revenue from both households and non-residents.

6 . Where to find other environmental accounts data

This bulletin has used data from a small part of the datasets released as part of the full environmental accounts. This section explains the content of those datasets.

Atmospheric emissions

[Atmospheric emissions: greenhouse gases by industry and gas](#): Data on the emissions of the seven direct greenhouse gases under the Kyoto Protocol: carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons, sulphur hexafluoride, nitrogen trifluoride and total greenhouse gas emissions), UK, 1990 to 2017.

[Atmospheric emissions: greenhouse gas emissions intensity by industry](#): Data on greenhouse gas and carbon dioxide emissions intensity – the level of emissions per unit of economic output, by industry (SIC 2007 section – 21 categories), UK, 1990 to 2017.

[Atmospheric emissions: acid rain precursors by industry and gas](#): Data on the emissions of sulphur dioxide, nitrogen oxide, ammonia, and total acid rain precursors, by industry (SIC 2007 group – around 130 categories), UK, 1990 to 2017.

[Atmospheric emissions: other pollutants by industry and gas](#): Data on the emissions of PM10, PM2.5, carbon monoxide, non-methane volatile organic compound, Benzene and 1,3-Butadiene, by industry (SIC 2007 group – around 130 categories), UK, 1990 to 2017.

[Atmospheric emissions: heavy metal pollutants by industry](#): Data on the emissions of arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium and zinc in the UK, by industry (SIC 2007 group – around 130 categories), UK, 1990 to 2017.

[Atmospheric emissions: road transport](#): Data on the emissions generated from fuel sources used by road transport vehicles in the UK, 1990 to 2017.

[Atmospheric emissions: bridging tables](#): Data showing the relationships between UK Environmental Accounts measures and those of United Nations Framework Convention on Climate Change (UNFCCC) and United Nations Economic Commission for Europe (UNECE), 1990 to 2017.

Energy use

[Energy use: total](#): Data on the UK's direct use of energy (allocated to the original purchasers and consumers of fuels) from fossil fuels and other sources (nuclear, net imports, renewables, biofuels and waste) and reallocated use of energy (losses incurred during transformation and distribution are allocated to the final consumer of the energy rather than the electricity generation industry), by industry (SIC 2007 section – 21 categories), 1990 to 2017.

[Energy use: by industry, source and fuel](#): Data on the UK's energy use by industry (SIC 2007 group – around 130 categories), source (for example, industrial and domestic combustion, aircraft, road transport and so on – around 80 categories) and fuel (for example, anthracite, peat, natural gas and so on – around 20 categories), 1990 to 2017.

[Energy use: by industry reallocated to final consumer and energy intensity](#): Data on the UK's reallocated energy use (losses incurred during transformation and distribution are allocated to the final consumer of the energy rather than the electricity generation industry) and energy intensity – the level of usage per unit of economic output, by industry (SIC 2007 group – around 130 categories), 1990 to 2017.

[Energy use: carbon-based fuels by fuel type](#): Data on the UK's fuel use by type (coal, natural gas, petrol, diesel oil for road vehicles (DERV), fuel oil, gas oil, aviation fuel and other), 1990 to 2017. This table excludes biofuels and waste.

[Energy use: carbon-based fuels by fuel type and industry](#): Data on the UK's fuel use by industry (SIC 2007 group – around 130 categories) and type (coal, natural gas, petrol, diesel oil for road vehicles (DERV), fuel oil, gas oil, aviation fuel and other); UK-level fuel use of nuclear, hydro, wind, solar, geothermal aquifers and net imports, 1990 to 2017. This table excludes biofuels and waste.

[Energy use: renewable and waste sources](#): Data on the UK's energy use from renewable and waste sources, by source (for example, hydroelectric power, wind, wave, solar and so on) and industry (SIC 2007 section – 21 categories), 1990 to 2017.

[Energy use: generation of heat from renewable sources](#): Data on the UK's energy use from renewable sources used to generate heat (active solar heating, heat pumps, geothermal aquifers), 1990 to 2017.

Material flows

[Material flow accounts](#): Data on the UK's domestic extraction, imports and exports and flow of materials (such as biomass, gases, fuels and waste), 1990 to 2017.

There is also an associated [methodology article on material footprint](#).

Oil and gas: reserves and resources

[Oil and gas: reserves and resources](#): Estimates of the UK's remaining recoverable oil and gas reserves and resources, 1995 to 2016.

Environmental protection expenditure

[Environmental protection expenditure: general government](#): Data on the UK's environmental protection expenditure by general government according to activity, 1995 to 2017.

[Environmental protection expenditure: industry](#): Estimates for the UK's environmental protection expenditure by industry, 2015 to 2017.

[Environmental protection expenditure: total](#): Estimates for the UK's total environmental protection expenditure, 2010 to 2016.

Environmental goods and services sector

[Environmental goods and services sector estimates](#): Estimates of the UK's environmental goods and services sector: output, gross value added, employment and exports, 2010 to 2016.

Environmental taxes

[Environmental taxes](#): Data on the UK government's revenue from environmental taxes (including energy, transport and pollution or resource taxes), 1997 to 2018 (where available).

7 . Environmental accounts and the Sustainable Development Goals

Sustainable Development Goals (SDGs) were introduced in 2015 and are a universal set of 17 Goals designed to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. [More information about SDGs](#) can be found on the UN website. The [UK data for SDGs](#) are available on the online reporting platform.

Air emissions are monitored under “Indicator 9.4.1: CO2 emission per unit of value added”, or carbon dioxide (CO2) intensity. The aim is to reduce the amount of CO2 emissions through the use of sustainable, efficient and clean industrial processes and technologies.

Other environmentally-focused goals cover clean water and sanitation (Goal 6), clean and renewable energy (Goal 7), climate action (Goal 13), life below water (Goal 14) and life on land (Goal 15).

Material footprint, the amount of domestic and foreign extraction of materials needed to produce the products used by households, governments and charities in the UK in one year, is captured under decent work and economic growth (Goal 8) and responsible consumption and production (Goal 12). The Office for National Statistics (ONS) has released an article that discusses the [various methodological issues associated with measuring a material footprint](#); the article includes estimates compiled using two different methods for 2008 to 2016.

8 . Quality and methodology

Air emissions

The main source of information for this reporting is the National Atmospheric Emissions Inventory ([NAEI](#)). The NAEI is maintained by [Ricardo Energy and Environment](#) on behalf of the Department for Business, Energy and Industrial Strategy (BEIS).

The UK is required to report its air emissions to fulfil a range of international agreements. In addition to measures compiled in accordance with the [System of Environmental Economic Accounting \(SEEA\)](#), greenhouse gas (GHG) emissions are required to fulfil reporting obligations under the UN Framework Convention on Climate Change ([UNFCCC](#)) and for the [Kyoto Protocol](#). While this variety of estimates is potentially confusing for users, the figures are released alongside “[bridging tables](#)”, which explain the differences between the reporting used for the Office for National Statistics (ONS) air accounts and for the UNECE and UNFCCC.

One of the main differences relates to whether estimates are on a territory basis or residency basis. ONS air emissions are on a residency basis. This means that whilst the majority of air emissions will be released into the UK environment, some emissions from UK-resident economic units will be released into the environment of the rest of the world. Air emission accounts for the UK exclude emissions released here by tourists and foreign transport operations and include the emissions of UK residents abroad.

[UK air emissions statistics on a territory basis](#) are published by BEIS.

The greenhouse gases included in the atmospheric emissions accounts are those covered by the Kyoto Protocol: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3). These gases are widely believed to contribute to global warming and climate change. The potential of each greenhouse gas to cause global warming is assessed in relation to a given weight of CO2 so all greenhouse gas emissions are measured as carbon dioxide equivalents (CO2e).

Further detail is available in the [Quality and Methodology Information report](#).

Natural capital

Estimates relate to the removal of carbon gas from the atmosphere by UK terrestrial ecosystems. The approach uses data on the physical changes in subdivisions of the land use, land use change and forestry (LULUCF) sector ([published by BEIS](#)).

Because of data constraints, values related to carbon sequestration by marine ecosystems, including those intertidal areas such as coastal margins, are not included in current estimates. As a result, annual flow values related to carbon sequestration services are likely to be an underestimate.

The LULUCF sector breakdown identifies carbon sequestration activities in the following subcategories:

- forest land remaining forest land
- land converted to forest land
- grassland remaining grassland
- land converted to grassland

Physical estimates of carbon sequestration by land use class are sourced from the [UK greenhouse gas inventory](#).

Taxes

Most taxes in the UK are collected by HM Revenue and Customs (HMRC). HMRC provide monthly data to the ONS detailing each individual tax collected and the amount of revenue associated with that tax.

Environmental taxes data have been compiled by the ONS from 1997 to 2018. Some taxes were introduced and /or collected at different times throughout the time series.

An environmental tax is defined as a tax whose base is a physical unit such as a litre of petrol, or a proxy for it, for instance a passenger flight, that has a proven specific negative impact on the environment.

Measures of environmental taxes should be interpreted and used with care. In particular, the levels of revenues from environmental taxes do not necessarily indicate the relative importance or the success of environmental policy. High environmental tax revenues can result either from high rates of taxes or from high levels of environmental problems (for example, pollution), leading to a large tax base. The broad measure of revenues can also fail to capture the effect of the differential rates that encourage a shift away from higher-impact behaviour (such as the use of leaded petrol).

Further information is available in the [Quality and Methodology Information report](#).

[Methodology for material footprint estimates](#), referred to in [Section 7: Environmental Accounts and Sustainable Development Goals](#), is also available.

[Other methodology documents relating to the compilation of the Environmental Accounts](#) can be obtained.

9 . Revisions

Every year, there are revisions and updates to some of the accounts. This means that when comparing this bulletin with previous years' editions there may be differences in some of the datasets. These are due largely to revisions in data sources and improvements to methodology. Updates, particularly those involving revised methodologies, may affect the whole time series so, for example, estimates of emissions for a given year may differ from estimates of emissions for the same year reported previously.

Greenhouse gas emissions

Revisions to greenhouse gas emissions data are primarily due to new estimates for the biological component of CO₂ emissions from natural gas and combustion, and the fossil-carbon component of CO₂ emissions from bio-fuels in road transport and power stations.

Other changes include additional detail for road-transport biofuel use (sourced from data compiled under the Renewable Transport Fuels Obligation (RTFO)), inclusion of estimates for recreational use of nitrous oxide (N₂O), inclusion of estimates for methane (CH₄) from chemical waste incineration and revisions to methane-flaring estimates.

The cumulative impact of these, and other smaller, changes on the headline figures can be seen in Table 1, which shows the differences between estimates published in UK Environmental Accounts in 2018 and 2019.

Table 1: Greenhouse gas emissions as published in the UK Environmental Accounts bulletins of 2018 and 2019, UK, selected years

| | Mass of air emissions in thousand tonnes of carbon dioxide equivalent (Kt CO₂e) | | | | | | | |
|-------------------|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2016 | 2017 |
| July 2018 release | 834,935 | 795,060 | 772,523 | 771,787 | 687,185 | 599,451 | 576,277 | |
| Feb 2019 release | 834,935 | 795,060 | 772,523 | 771,787 | 687,185 | 599,451 | 576,277 | 566,378 |
| June 2019 release | 833,695 | 793,896 | 771,743 | 770,843 | 686,874 | 601,898 | 579,972 | 566,383 |

Source: Ricardo Energy and Environment, Office for National Statistics

Environmental taxes

Revisions to some of the environmental taxes series may have occurred from 2013 onwards but these were minor.