

Statistical bulletin

UK Environmental Accounts: 2020

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

- Greenhouse gas emissions (GHG) (residency basis) by the transport industry sector increased by just over 5% between 2017 and 2018.
- There were reductions in GHG emissions by the energy supply and manufacturing sectors between 2017 and 2018 of around 4% and 2% respectively.
- The air transport industry accounted for just over 8% of the UK's total GHG emissions in 2018.
- Emissions from all road transport accounted for around one-fifth of total UK GHG emissions in 2018.
- Over two-thirds of environmental tax revenue in 2018 related to road transport, with just under 8% relating to tax on air transport.
- Estimates in this bulletin are based on a residency basis and all sectors and industries mentioned relate to those defined under the [UK Standard Industrial Classification \(SIC\) 2007](#).

2 . Greenhouse gas emissions

The transport sector accounted for 15% of total UK GHG emissions in 2018

Between 2017 and 2018, greenhouse gas emissions (GHG) ([residency basis](#)) by the transport sector¹ increased by just over 5%, mainly because of an increase in emissions from aviation². This increase offset reductions in GHG emissions by the energy supply³ and manufacturing sectors, which fell by just over 4% and 2% respectively. This meant that GHG emissions remained relatively stable between 2017 and 2018, at 564 million tonnes of carbon dioxide equivalent.

Despite a slight increase between 2017 and 2018, GHG emissions have steadily declined since 1990 and were almost a third lower in 2018 than in 1990. This reduction is largely because of 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. More details on this can be found in previous [Environmental accounts bulletins](#).

The transport sector and households⁴ have not seen the same decline in GHG emissions as the manufacturing and energy supply sectors, making them more important in the overall level of GHG emissions. Since 2015, households have been the largest emitters of GHGs, accounting for over a quarter of total emissions in 2018. The transport sector represented 15% of the UK's total GHG emissions in 2018, compared with around 8% in 1990.

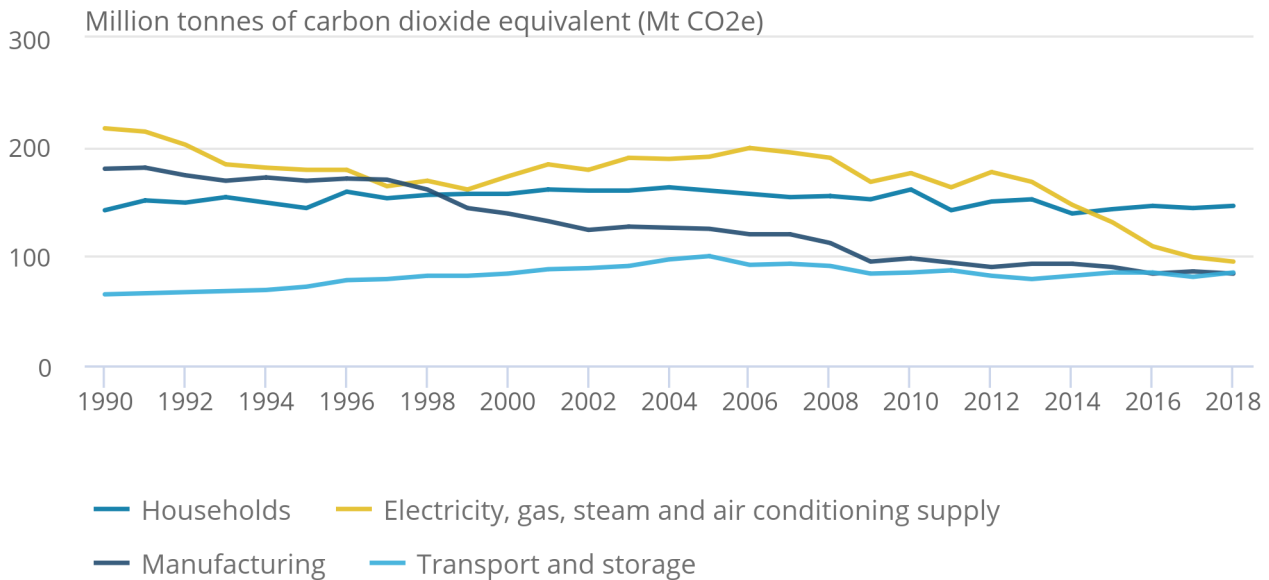
There are several ways of calculating greenhouse gas emissions, which can impact on the estimates. An explanation of the differences and uses can be found in the article [Net zero and the different official measures of the UK's greenhouse gas emissions](#). The [air emissions bridging table](#) illustrates the difference between these estimates.

Figure 1: Greenhouse gas emissions by the transport sector rose almost 30% between 1990 and 2018

Greenhouse gas emissions for the four highest-emitting industries, including households, UK, 1990 to 2018

Figure 1: Greenhouse gas emissions by the transport sector rose almost 30% between 1990 and 2018

Greenhouse gas emissions for the four highest-emitting industries, including households, UK, 1990 to 2018



Source: Office for National Statistics – UK Environmental Accounts

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), hydro-fluorocarbons (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).

The air transport industry accounted for around 8% of UK’s total GHG emissions in 2018

There was a steady increase in GHG emissions by the transport sector between 1990 and 2005. Despite a gradual decline after 2005, emissions from the transport sector started rising again from 2013. Although still below their 2005 peak, GHG emissions by the transport sector in 2018 were almost 30% above 1990 levels.

These changes in emissions have largely been because of changes in the consumption of fuel oil used in aviation and shipping. 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.

From 1990 to 2018, aviation fuel use in the UK increased by 93%. In the same period, emissions from the air transport industry have more than doubled (Figure 2). In 2018, the air transport industry was responsible for over half (54%) of all GHG emissions by the transport sector and accounted for 8% of the UK's total greenhouse gas emissions. [UK-registered airlines flew over 2.2 billion kilometres in 2018 \(XLS, 18KB\)](#). This distance has been increasing since 2010, when UK-registered airlines flew around 1.7 billion kilometres.

Following a ban on all non-essential travel as part of the UK's lockdown to help contain the coronavirus (COVID-19) pandemic, EUROCONTROL report that [air traffic in the UK during April and May 2020 has fallen on average 90%](#) compared with the same time the previous year. We plan to undertake future analysis of the impact this reduction in travel may have had when 2020 environmental accounts data are available.

Emissions from the water transport industry peaked in 2002. Although year-on-year emissions for this industry fluctuate because of changes in fuel consumption, there has been a general decline since then. Despite a sharp rise between 2017 and 2018 (19%), because of an increase in the use of fuel oil, 2018 emissions were around 38% lower than in 1990. [Global energy efficiency and GHG standards for shipping](#) have been set by the International Maritime Organisation and are currently being reviewed.

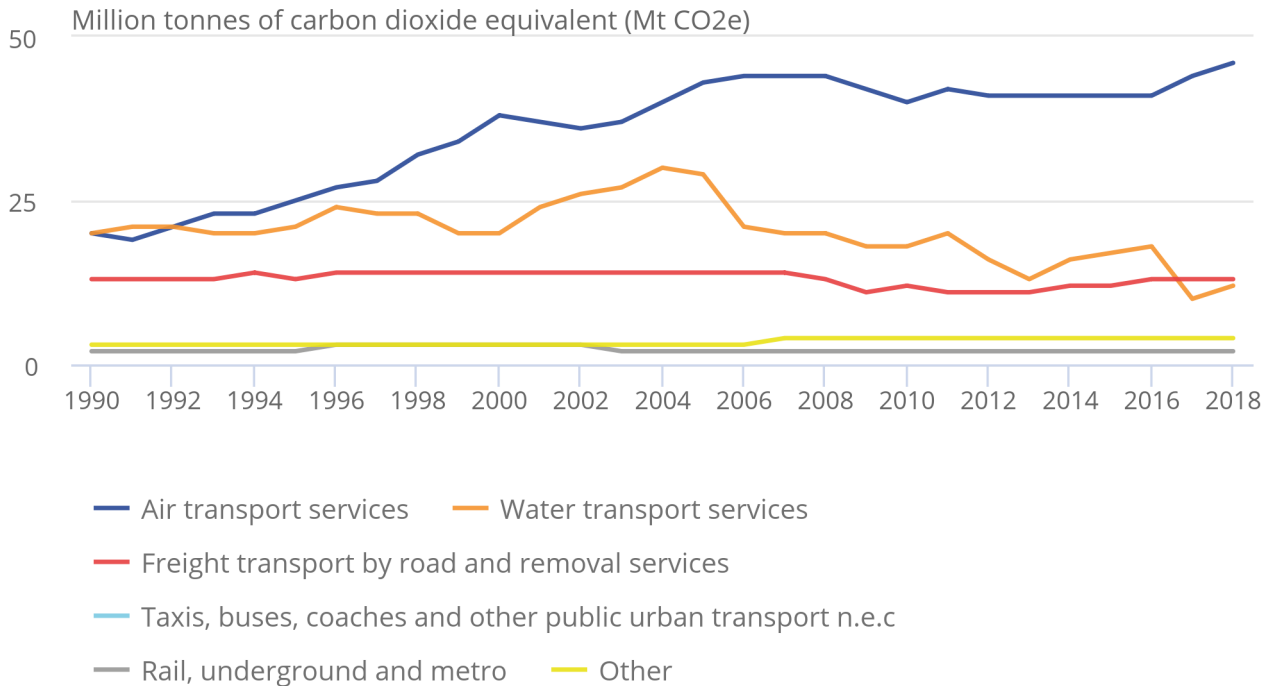
Further information can be found in the Energy use and Atmospheric Emissions datasets released with this bulletin.

Figure 2: Greenhouse gas emissions from the air transport industry more than doubled between 1990 and 2018

Greenhouse gas emissions for industries within the transport sector, UK, 1990 to 2018

Figure 2: Greenhouse gas emissions from the air transport industry more than doubled between 1990 and 2018

Greenhouse gas emissions for industries within the transport sector, UK, 1990 to 2018



Source: Ricardo Energy and Environment, Office for National Statistics – UK Environmental Accounts

Notes:

1. Industry aggregations are based on the UK Standard Industrial Classification (SIC) 2007. Taxis, buses, coaches and other public urban transport not elsewhere classified (n.e.c.) relates to the "Buses, coaches, trams and similar public urban transport n.e.c" and "taxis and other renting of private cars with driver" industries combined. Rail, underground and metro is the "rail transport" and "underground, metro other non interurban rail services" combined. Other is all other industries in section H, found in the Atmospheric Emissions: Greenhouse Gases by Industry and Gas dataset.
2. Greenhouse gas emissions include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydro-fluorocarbons (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).

Around 46% of GHG emissions by households related to travel in 2018

Fluctuations in GHG emissions by households tend to be explained by temperature, as households consume more or less energy depending on the weather. However, around 46% of GHG emissions by households in 2018 related to travel, mostly from domestic car use. This equated to 67 million tonnes of carbon dioxide equivalent, almost 12% of the UK's total GHG emissions in 2018.

The [increasing number of cars \(PDF, 410KB\)](#), 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 2019 there were around [795,000, or 2.4% of all licensed cars \(XLS, 29KB\)](#).

On 23 March 2020, the UK announced a lockdown to help contain the coronavirus (COVID-19) pandemic. This included a ban on non-essential travel in the UK. It led to an immediate decrease in the usage of all types of transport. [Road traffic fell dramatically, with car use reaching lows of 22% in April, although there has been a gradual rise to 51% on 15 May \(XLSX, 283KB\)](#) as rules have started to relax. We plan to undertake future analysis of the impact this reduction in travel may have had when 2020 environmental accounts data are available.

Further information on energy use by households can be found in the Energy use and Atmospheric emissions datasets released with this bulletin.

GHG emissions from road transport by all industries and households accounted for one-fifth of total GHG emissions in 2018

While the environmental accounts focus on energy use and emissions by sector and industry, it is also useful to consider certain types of emissions across all industries. GHG emissions from road transport by all industries and households were stable between 2017 and 2018, at 118 million tonnes of carbon dioxide equivalent. This was almost 6% higher than in 1990 and represented around one-fifth of total UK GHG emissions in 2018.

Emissions from the majority of other pollutants from road transport have been falling, largely because of more stringent emissions standards.

Information on emissions related to road transport can be found in the Atmospheric emissions: road transport [dataset](#).

Notes for: Greenhouse gas emissions

1. The transport sector refers to the transport and storage industry section as defined under the UK Standard Industrial Classification (SIC) 2007. Emissions relate to this sector rather than all emissions related to transport.
2. 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.
3. The Electricity, gas, steam and air conditioning supply industry section is referred to as the energy supply sector.
4. 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).

3 . Environmental taxes

Over two-thirds of environmental tax revenue in 2018 related to road transport

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. In 2019, revenue from environmentally-related taxes stood at £51.6 billion, equivalent to 6.9% of total taxes and social contributions and 2.3% of the UK's gross domestic product (GDP).

Up to 68% of environmental tax paid in 2018 related to road transport. These include indirect taxes like Fuel Duty as well as direct taxes like Vehicle Tax.

The largest single contributor to revenue from environmental taxes is Hydrocarbon Oil Duty, also known as Fuel Duty. This tax covers petrol and diesel fuels despite being classified as an energy tax. In 2019, Fuel Duty accounted for 54% of total revenue from all environmental taxes, equivalent to £27 billion.

Transport taxes consist mainly of taxes related to the ownership and use of motor vehicles, although taxes on other transport and related transport services are also included. In 2019, revenue from transport taxes was £12.4 billion, 24% of all environmental tax revenue. The majority of this (£7.2 billion) was from tax on motor vehicles.

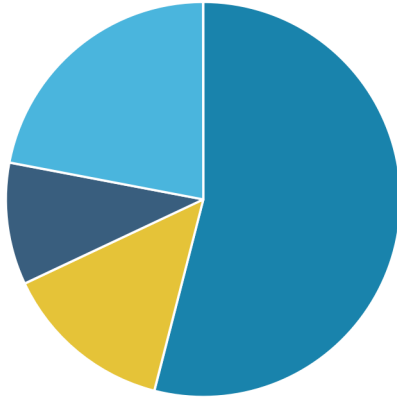
Figure 3: Motorists, including commercial motorists, paid two-thirds of environmental taxes in 2019

Environmental tax revenue by type, UK, 2019

Total transport tax, 24%

Figure 3: Motorists, including commercial motorists, paid two-thirds of environmental taxes in 2019

Environmental tax revenue by type, UK, 2019



Source: Office for National Statistics – UK Environmental Accounts

Notes:

1. Fuel duty is tax on hydrocarbon oils and includes petrol, diesel and other fuels used for transport or heating. It is classed as an energy tax.
2. Transport tax on motor vehicles includes Vehicle Registration Tax, motor vehicle duties paid by household and business, and Northern Ireland Driver Vehicle Agency.
3. Other transport taxes include Air Passenger Duty, Air Travel Operators Tax, and Rail Franchise Premia.
4. Other environmental taxes include pollution/resource taxes and energy taxes except fuel duty.

Motor vehicle taxes paid by households accounted for over two-thirds of total transport tax revenue in 2019

Looking at individual transport taxes, motor vehicle taxes paid by households accounted for 37% of total transport tax revenue in 2019. Motor vehicle duties are also known as Vehicle Excise Duty, this is payable annually by owners of most types of vehicles. The drop in revenue in 2001 was likely because of changes to taxes relating to road transport. Fuel tax for road vehicles was reduced following national protests, and 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.

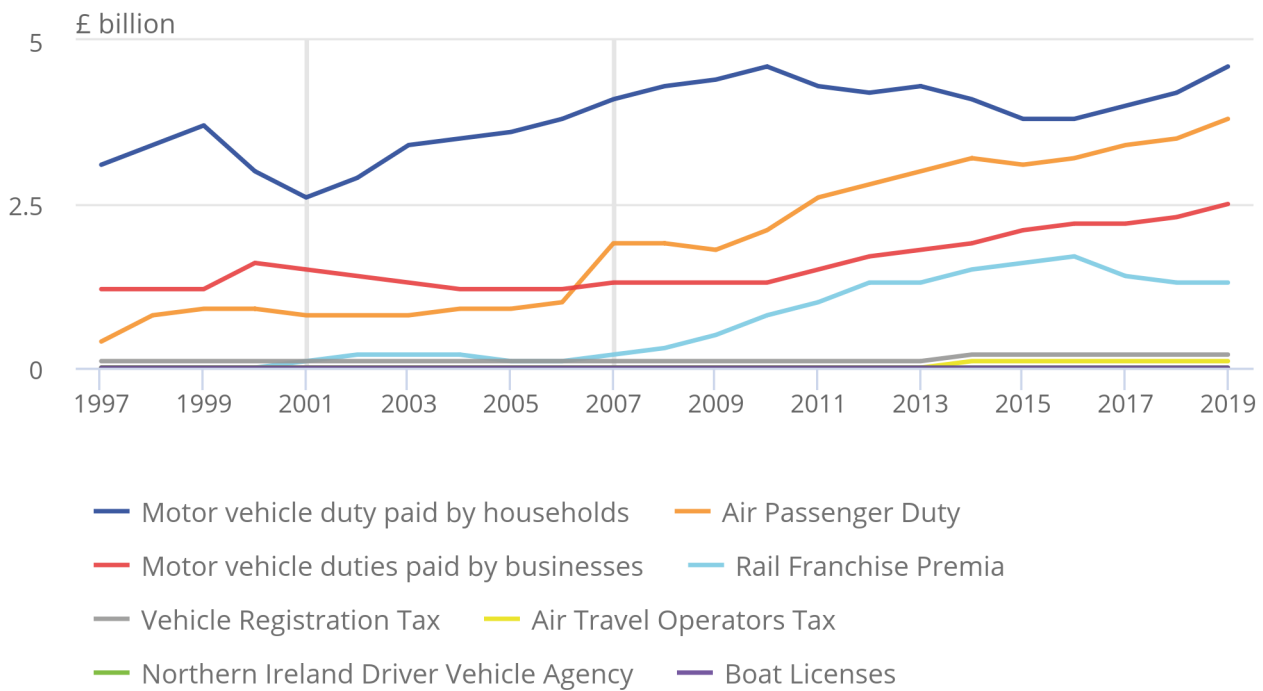
Air taxes accounted for 31% of total transport taxes in 2019, and around 8% of all environmental taxes. Air Passenger Duty (APD) is levied on passenger flights from UK airports and is chargeable per passenger. The rate doubled in 2007 to £10 for flights to Europe and £20 for flights to the rest of the world.

Figure 4: Environmental transport taxes generated £12.4 billion in tax revenue in 2019

Environmental transport tax revenue, UK, 1997 to 2019

Figure 4: Environmental transport taxes generated £12.4 billion in tax revenue in 2019

Environmental transport tax revenue, UK, 1997 to 2019



Source: Office for National Statistics – UK Environmental Accounts

Notes:

1. The chart shows government revenue from environmental transport taxes from 1997 to 2019. Data are available from other types of environmental tax in the Environmental taxes dataset.
2. Figures have been rounded to the nearest billion.
3. Road fuel tax was cut in 2001 following national protests.
4. Air Passenger Duty rates doubled in 2007.

4 . Environmental accounts data

[Atmospheric emissions: greenhouse gases by industry and gas](#)

Dataset | Released 3 June 2020

Data on the emissions of carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons, sulphur hexafluoride, nitrogen trifluoride and total greenhouse gas emissions, UK, 1990 to 2018.

[Energy use: total](#)

Dataset | Released 3 June 2020

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 2018.

[Energy use: fossil fuels by fuel type and industry](#)

Dataset | Released 3 June 2020

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 2018. This table excludes biofuels and waste.

[Environmental taxes](#)

Dataset | Released 3 June 2020

Data on the UK government's revenue from environmental taxes (including energy, transport and pollution or resource taxes), 1997 to 2019 (where available).

5 . Glossary

Greenhouse gas

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).

Residency basis

Estimates compiled on a residency basis include data relating to UK residents and UK-registered businesses, regardless of whether they are in the UK or overseas. Data relating to foreign visitors and foreign businesses in the UK are excluded.

Territory basis

Estimates of greenhouse gas emissions compiled on a territory basis include emissions within UK borders. [UK air emissions statistics on a territory basis](#) are published by the Department for Business, Energy and Industrial Strategy.

Environmental taxes

Environmental taxes are taxes 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. They are 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.

6 . Measuring the data

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). They cover topic areas including energy use, air emissions, material flows, environmental protection expenditure and environmental taxes.

Air emissions

The air and energy accounts in the UK Environmental Accounts are compiled by Ricardo Energy and Environment on behalf of the Office for National Statistics (ONS).

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). These data sources provide air emissions data, calculated from activity data and emission factors, for all relevant sources in the UK as a starting point for generating the air emissions accounts. The residence principle is then applied to these datasets thereby apportioning the emissions to an industrial classification based on Standard Industrial Classification: SIC 2007.

More quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in the [Environmental accounts air emissions QMI](#).

Revisions are made to the environmental accounts estimates of GHG and energy consumption every year, resulting from changes to the underlying data or methodological improvements. Estimates of emissions for a given year may differ from estimates of emissions for the same year reported previously.

For the 2018 datasets, revisions caused by updates to estimates used in their calculations included:

- various revisions to the [Digest of UK Energy Statistics](#) data for 2016 to 2017, for example, industrial coal combustion, domestic natural gas combustion and aviation fuel use
- major revisions to [supply-use tables](#), following incorporation of data from the Annual Purchases Survey

Methodological improvements have also impacted on the figures. The main one of these was the inclusion of Annual Purchases Survey data, in combination with or replacing Purchases Inquiry survey data, as a basis for road-transport, non-road mobile machinery and commercial stationary combustion.

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 2019 and 2020. The June 2019 release was to provide provisional estimates of 2018 GHG emissions and the series was not revised, hence why there is no difference between published figures in 2019 releases.

Table 1: Greenhouse gas emissions as published in the UK Environmental Accounts bulletins of 2019 and 2020, UK, selected years
UK resident basis

	Mass of air emissions in thousand tonnes of carbon dioxide equivalent (Kt CO₂e)								
	1990	1995	2000	2005	2010	2015	2016	2017	2018
June 2019 release:	833,695	793,896	771,743	770,843	686,874	601,898	579,972	566,383	
November 2019 release:	833,695	793,896	771,743	770,843	686,874	601,898	579,972	566,383	563,470
June 2020 release:	833,586	794,216	772,348	771,200	687,087	601,660	577,772	563,508	563,896

Source: Ricardo Energy and Environment, Office for National Statistics – UK Environmental Accounts

Notes

1. Greenhouse gases under the Kyoto Protocol: carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons, nitrogen trifluoride, sulphur hexafluoride. [Back to table](#)

Taxes

Most taxes in the UK are collected by HM Revenue and Customs (HMRC). HMRC provide monthly data to the Office for National Statistics (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](#).

Quality

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

7 . Strengths and limitations

Air emissions and energy accounts

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 United Nations Economic Commission for Europe (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 the Department for Business, Energy and Industrial Strategy.

Estimates of the UK’s greenhouse gas (GHG) emissions can also be calculated on a consumption basis. These are often known as a [carbon footprint](#) and for the UK they are published by the Department for Environment, Food and Rural Affairs (Defra). They provide estimates of UK GHG emissions based on the consumption of all goods and services by households within the UK. They include estimates of emissions associated with each stage of the supply chain for those goods and services, irrelevant of whether or not their production process occurs within the UK. They therefore include emissions associated with what the UK imports but exclude emissions associated with UK exports.

8 . Related links

[UK's carbon footprint](#)

Statistical release | Released 4 May 2020

Annual greenhouse gas and carbon dioxide emissions relating to UK consumption, released by the [Department for Environment, Food and Rural Affairs](#).

[Environmental protection expenditure, UK: 2018](#)

Bulletin | Released 6 May 2020

Estimates of environmental protection expenditure by UK general government and industries for 2018.

[Greenhouse gas emissions intensity, UK: 2018 provisional estimates](#)

Bulletin | Released 6 November 2019

Greenhouse gas and other pollutant emissions intensity for the UK, including breakdown by industry and comparisons with other European countries.

[Low carbon and renewable energy economy, UK: 2018](#)

Bulletin | Released 16 January 2020

Estimates of the size of the UK's green economy from the Low Carbon and Renewable Energy Economy Survey, including turnover, employment, investment and trade.

[Material footprint in the UK: 2017](#)

Article | Released 2 April 2020

The UK's material footprint captures the amount of domestic and foreign extraction of materials needed to produce the goods and services used by households, governments and charities in the UK.

[Road transport and air emissions](#)

Article | Released 16 September 2019

Contribution of road transport to greenhouse gas and air pollutant emissions – further analysis of the UK Environmental Accounts data.