Office for National Statistics

Statistical bulletin

UK Environmental Accounts: 2023

Measuring the contribution of the environment to the economy, impact of economic activity on the environment, and response to environmental issues.

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1 . Main points

- UK greenhouse gas (GHG) emissions on a residence basis increased by 3% to just over 502 million tonnes of carbon dioxide equivalent (Mt Co2e) between 2020 and 2021.
- The impact of the coronavirus (COVID-19) pandemic on emissions would likely have been weaker than in 2020 because of fewer UK pandemic restrictions in 2021.
- Consumer expenditure is still the largest single UK emissions contributor, at 26% of the 2021 total; the energy sector was second highest at 17%.
- Energy from renewable sources accounted for 13% of total UK energy use in 2021, decreasing slightly from 14% in 2020.
- Output from the UK environmental goods and services sector (EGSS) was estimated to be £89.6 billion in 2020, up 1.4% from 2019.
- Employment in the UK EGSS was estimated to be 398,800 full-time equivalent employees in 2020, up 2.2% from 2019.

2 . Greenhouse gas emissions

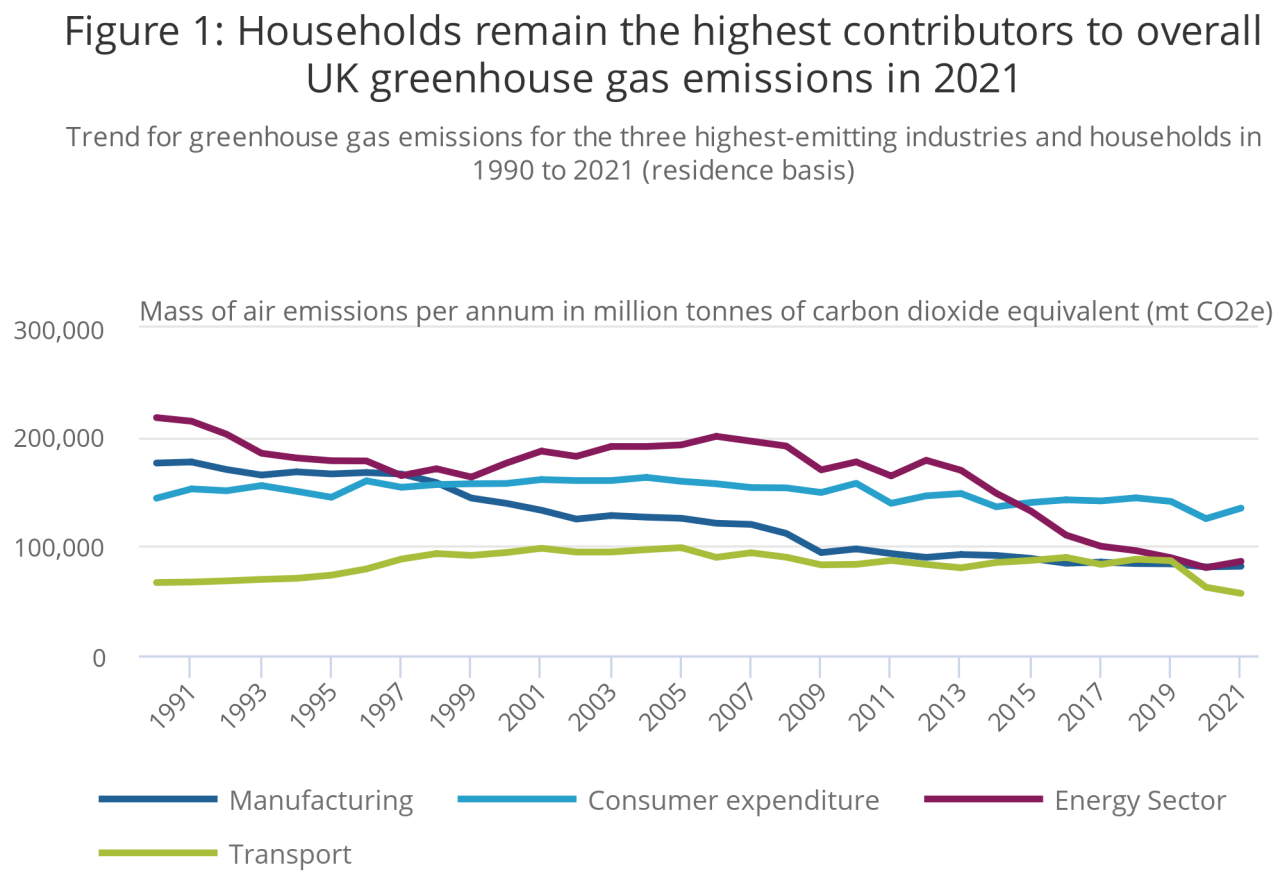
Total UK greenhouse gas (GHG) emissions (residence basis) in 2021 were just over 502 million tonnes of carbon dioxide equivalent (Mt Co2e). Information about the different method used to measure emissions can be found in the Measuring UK greenhouse gas emissions article, available on the UK climate change statistics Portal.

The transport sector's emissions reduced by 9% in 2021 following a 28% fall in 2020; the largest decrease (34%) of all sectors since 2019.

Emissions from households, accounted for through consumer expenditure, are the largest single contributor to UK emissions. In 2021, emissions related to consumer expenditure – primarily from heating homes and travelling – rose 7% to 135 Mt Co2e in 2021, 26% of the total. The second highest emitter was the energy sector, rising 7% to reach 86 Mt Co2e, 17% of the total.

Figure 1: Households remain the highest contributors to overall UK greenhouse gas emissions in 2021

Trend for greenhouse gas emissions for the three highest-emitting industries and households in 1990 to 2021 (residence basis)



Source: UK Environmental Accounts from Ricardo Energy and Environment, and the 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 . Greenhouse gas emission intensity

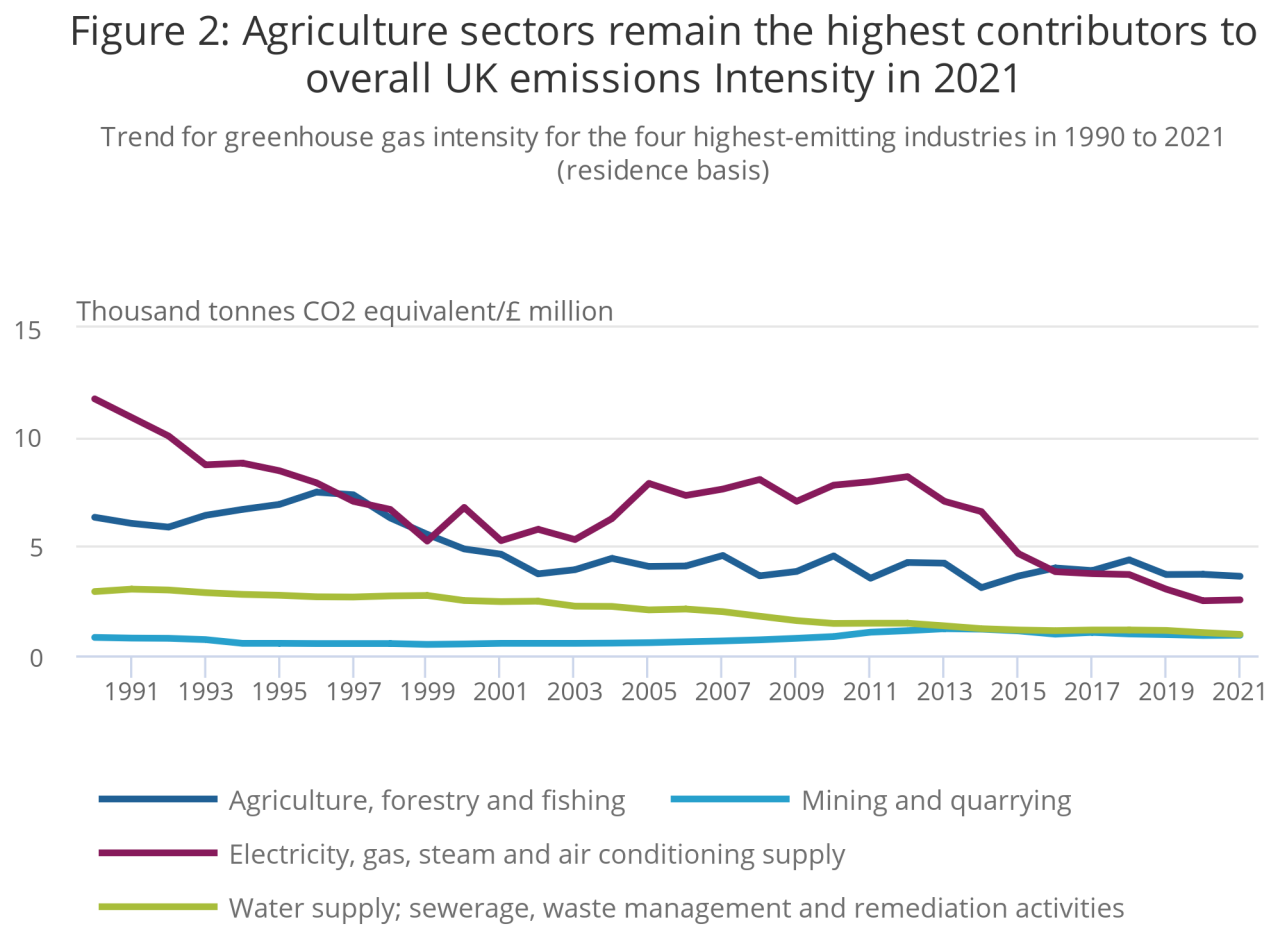
A reduction in overall UK greenhouse gas (GHG) emission intensity would, in theory, indicate that the UK is moving towards a lower carbon economy.

In 2021, the UK emitted 0.19 thousand tonnes of Co2e per £ million of gross value added (GVA). This is a drop of 67% since 1990.

Agriculture, forestry and fishing was by far the most emission intensive industry in 2021 after surpassing electricity, gas, steam and air conditioning supply in 2016. This is likely a combination of the agriculture industry being the heaviest emitter of the potent GHG CH4 (Methane) and the reduction in emission intensity from the electricity industry.

Figure 2: Agriculture sectors remain the highest contributors to overall UK emissions Intensity in 2021

Trend for greenhouse gas intensity for the four highest-emitting industries in 1990 to 2021 (residence basis)



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

Notes:

1. Greenhouse gas emissions intensity is calculated by dividing the level of greenhouse gas emissions by gross value added (GVA). GVA is the difference between output and intermediate consumption for any given industry. This means the difference between the value of goods and services produced (output) and the cost of raw materials and other inputs that are used up in production (intermediate consumption). GVA are chained volume measures, in constant prices with 2019 as the base year. All emissions intensity figures are calculated excluding consumer expenditure (often referred to as “households” in the article accompanying this dataset).

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. As part of Blue Book 2022, the 2020 data went through the supply use balancing process where output and intermediate consumption are accurately measured.

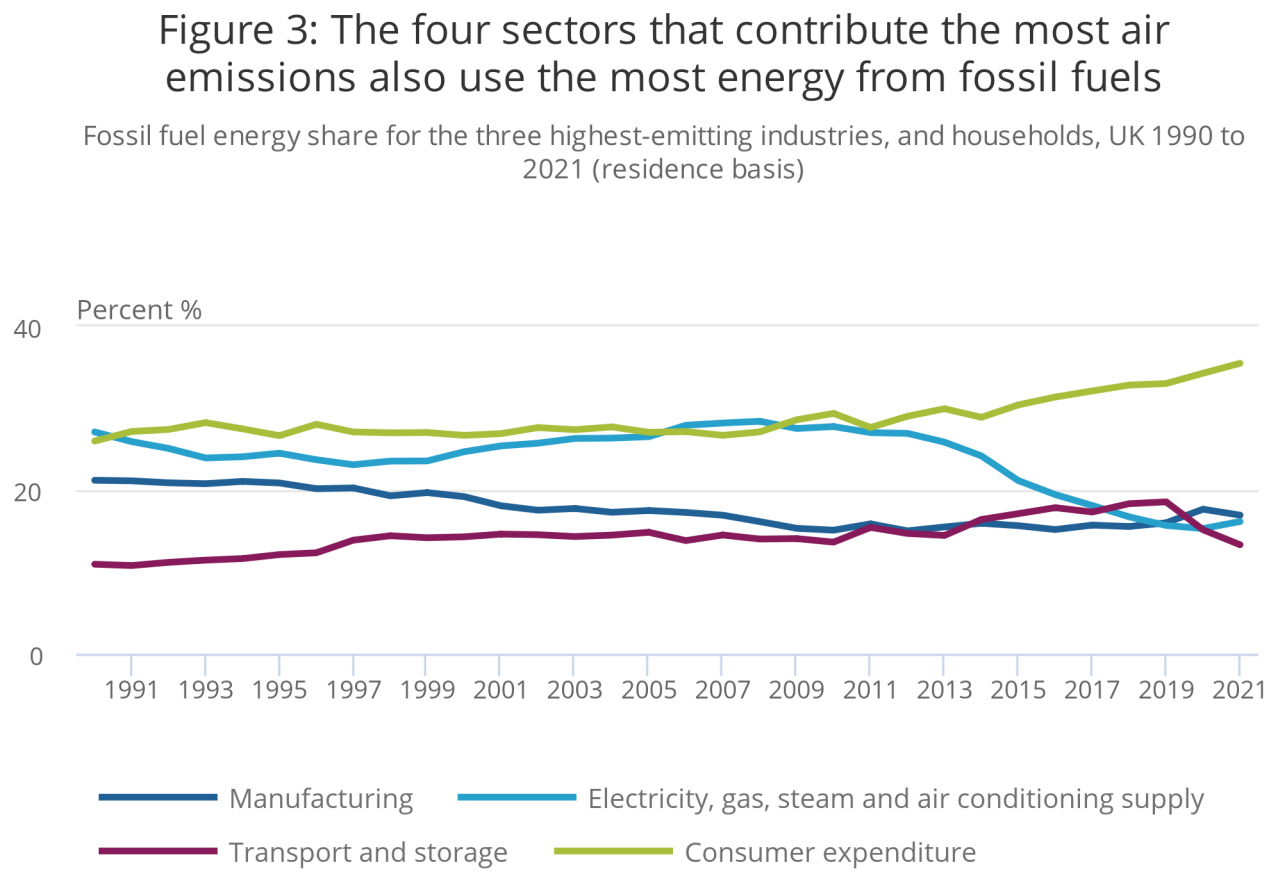
4 . Energy use

Most greenhouse gas emissions are related to energy use. The UK used a total of almost 176 million tonnes of oil equivalent (Mtoe) of energy in 2021, with 80% coming from fossil fuels.

In 2021, energy from renewable sources accounted for 13% of all energy use in the UK, compared with 0.9% in 1990. Energy use from fossil fuels has been falling for the energy and manufacturing sectors, largely because of a switch from the use of coal to other fuels, such as natural gas, which generate lower emissions.

Figure 3: The four sectors that contribute the most air emissions also use the most energy from fossil fuels

Fossil fuel energy share for the three highest-emitting industries, and households, UK 1990 to 2021 (residence basis)



Source: UK Environmental Accounts from Ricardo Energy and Environment, and the 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.

5 . Environmental goods and service sector

Our environmental goods and services sector (EGSS) statistics measure 17 activities across the economy that produce goods and services for environmental protection and resource management purposes.

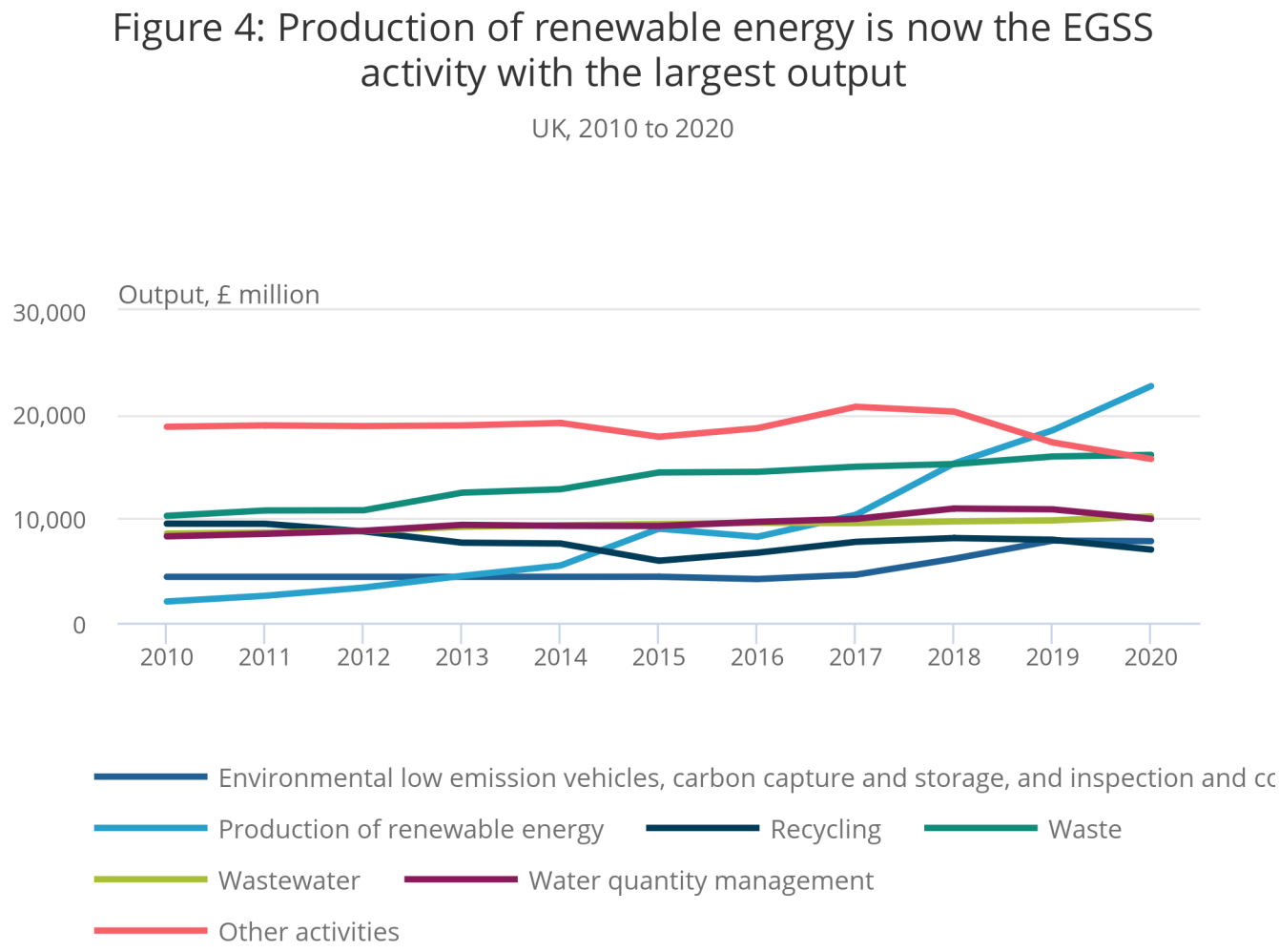
The framework follows the UN System of Environmental-Economic Accounting (SEEA). For more detail see our Environmental accounts on the environmental goods and services sector (EGSS) QMI.

Output

Output from the UK EGSS was an estimated £89.6 billion in 2020, up 1.4% from 2019. This is because output for the production of renewable energy in 2020 increased by £4.2 billion. Without this, UK EGSS output would have fallen 4.3% in 2020. Overall, output has now increased in each year since 2010.

Figure 4: Production of renewable energy is now the EGSS activity with the largest output

UK, 2010 to 2020



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

Notes:

1. Totals may not sum because of rounding.

2. Data are presented in current prices and have not been adjusted for inflation.

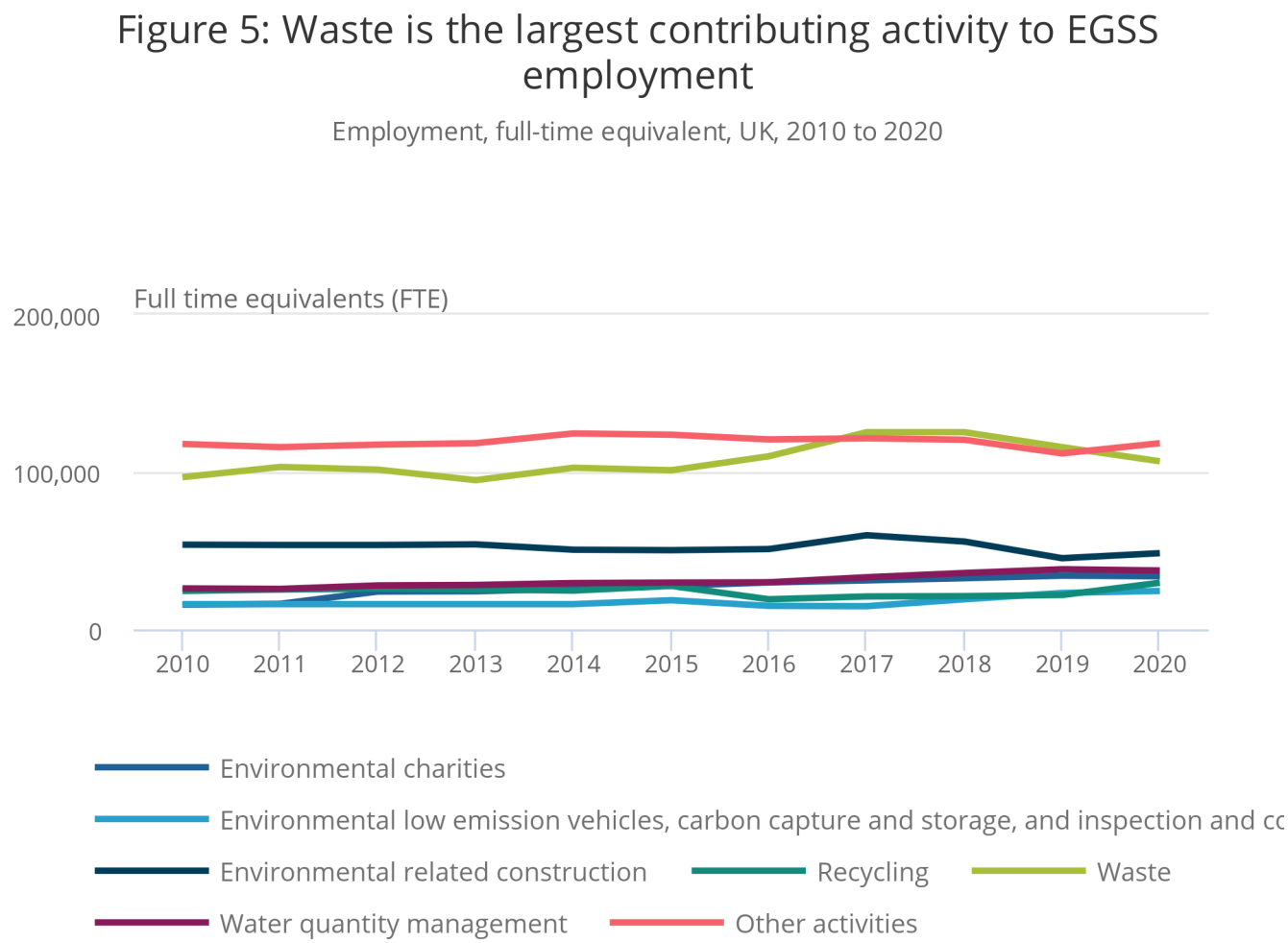
Employment

The UK EGSS was estimated to have 398,800 full-time equivalent (FTE) employees in 2020, up 2.2% from 2019.

Despite waste being the largest EGSS activity by FTE, the 2020 increase from 2019 is largely because of increased employment in recycling (35.8%), and production of renewable energy (36.3%). Excluding these activities would have led to an overall fall of 1.4% in UK EGSS employment in 2020

Figure 5: Waste is the largest contributing activity to EGSS employment

Employment, full-time equivalent, UK, 2010 to 2020



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

Notes:

1. Totals may not sum because of rounding.

2. Estimates are rounded to the nearest 100.

EGSS estimates are also available by Standard Industrial Classification (SIC), allowing comparisons between EGSS and emissions on a residence basis.

Between 2010 and 2020, EGSS employment increased by 14%, while emissions fell by 28%. Emissions for the energy sector fell by 55%, while the sector's EGSS employment increased by nearly 500% from 3,600 FTE in 2010 to 21,500 FTE in 2020.

Emissions for the manufacturing industry fell by 17%, while its EGSS employment increased by 9%. This may reflect reduced manufacturing sector emissions being caused by changes in fuel used and production process improvements. The EGSS definition means that some high-emitting sectors have no EGSS employment, while other sectors have EGSS employment that do not relate to reducing emissions.

6 . Environmental accounts data

Atmospheric emissions: greenhouse gases by industry and gas
Dataset | Released 5 June 2023
The emissions of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, nitrogen trifluoride and total greenhouse gas emissions, by industry (SIC 2007 group – around 130 categories), UK, 1990 to 2020 and 2021.

Energy use: total
Dataset | Released 5 June 2023
The UK's direct use of energy from fossil fuels and other sources (nuclear, net imports, renewables, biofuels and waste and reallocated use of energy by industry (SIC 2007 section – 21 categories), 1990 to 2021.

Energy use: carbon-based fuels by fuel type and industry
Dataset | Released 5 June 2023
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 2020. This table excludes biofuels and waste.

Environmental goods and service sector accounts
Dataset | Released 5 June 2023
First estimates of the UK environmental goods and services sector (EGSS) for 2020 and revised estimates for 2010 to 2019. Included are estimates of output, gross value added, employment and exports.

Environmental protection expenditure: accounts
Dataset | Released 5 June 2023
Estimates for the UK's environmental protection expenditure, output and use by general government, businesses, and households, 2010 (or 2006 where available) to 2020.

View all data used in this statistical bulletin on the Related data page.

7 . Glossary

Greenhouse gases

The following greenhouse gases (GHG) 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)
- nitrogen trifluoride (NF3)

These gases contribute directly to global warming and climate change because of their positive radiative forcing effect. The potential of each GHG to cause global warming is assessed in relation to a given weight of CO2, so all GHG emissions are measured as carbon dioxide equivalents (CO2e).

Residence basis

Estimates compiled on a residence 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 GHG emissions are compiled on a territory basis and include emissions within UK borders. UK air emissions statistics on a territory basis are published by the Department for Energy Security and Net-Zero, formerly the Department for Business, Energy and Industrial Strategy.

Environmental goods and services sector

The environmental goods and services sector accounts, which follow the UN System of Environmental-Economic Accounting (SEEA), measure areas of the economy engaged in producing goods and services for environmental protection purposes. It also includes areas of the economy engaged in conserving and maintaining natural resources.

Environmental protection expenditure

The environmental protection expenditure accounts, which follow SEEA guidance, estimate how much is spent on activities that have the prevention, reduction and elimination of pollution and any other degradation of the environment as their main purpose.

8 . Measuring the data

The UK Environmental Accounts are "satellite accounts" to the main UK National Accounts and are compiled in accordance with the System of Environmental Economic Accounting (SEEA), which closely follows the UN System of National Accounts (SNA).

Air emissions and energy use

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). 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.

Global warming potential (GWP) is an emission metric used to quantify the contributions of different greenhouse gases (GHG) to climate change. Our estimates are reported with a GWP of AR5, aligned with the latest Greenhouse Gas Protocol recommendation. The AR5 reporting standard comes from the Fifth Assessment Report from the United Nations Intergovernmental Panel on Climate Change (IPCC). It summarises the latest scientific knowledge on climate change, including the latest information on GHG and their impact on the environment.

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

Environmental goods and services sector

These data are from a wide range of sources; major sources include:

- supply and use tables
- the Low Carbon and Renewable Energy Economy Survey
- the Annual Business Survey
- the Business Register and Employment Survey

Sources are used in different ways to compile estimates of output, gross value added (GVA), employment, and exports for 17 activities.

Further information is available in our Environmental accounts on the environmental goods and services sector (EGSS) QMI and our UK environmental goods and services sector (EGSS) methodology annex.

Environmental protection expenditure

The environmental protection expenditure (EPE) accounts are produced as part of the environmental accounts and provide estimates for the UK's environmental protection expenditure, output and use by general government, businesses, and households.

The main data sources for the EPE accounts are supply and use tables, the Annual Business Survey, the EPE survey, and the European System of Accounts, Table 11 (general government annual expenditure). Estimates of the EPE accounts cover general government, households and businesses. Estimates from the EPE survey are also published by the ONS and are available in our Environmental protection expenditure: industry dataset.

Further information is available in our Environmental protection expenditure (EPE) survey QMI and our Environmental protection expenditure (EPE) accounts QMI.

Quality

More quality and methodology information on strengths, limitations, appropriate uses, and how these data were created is available in the environmental accounts pages of the ONS website.

Data are subject to revisions; more information is available in our Revisions policies. The ONS data used in this bulletin may therefore differ from previous publications. For example, EGSS estimates use Supply and Use data that have incorporated methodology improvements for Blue Book 2022. These have resulted in revisions across the whole of our data series, back to 2010. Further information on these improvements can be found in our Impact of Blue Book 2022 changes on current price and volume estimates of gross domestic product article.

9 . Strengths and limitations

Environmental goods and services sector

Our latest environmental charities data use an improved approach to estimation. Where data were previously based on modelling from historical Office for National Statistics (ONS) public sector data, we now incorporate information from the Charities Commission combined with updated ONS Public Sector data. This activity is revised back to 2012 for employment data and to 2015 for output and gross value added (GVA) data.

Following last year's environmental goods and services sector release, errors were identified in the dataset across numerous estimates and activities. A correction has since been made to the dataset and corresponding bulletin. For details, see our UK environmental goods and services sector (EGSS): 2019 bulletin.

For information on the strengths and limitations of air emissions and energy accounts, environmental goods and services sector, and environmental protection expenditure, see Section 8: Strengths and limitations in our UK Environmental Accounts: 2022 bulletin.

10 . Related links

UK environmental taxes: 2022
Bulletin | Released 4 May 2023
The value and composition of UK environmental taxes between 1997 and 2022, by type of tax and economic activity, with other European country comparisons.

Material flow accounts: 2023
Dataset | Released 15 May 2023
Data on the UK's domestic extraction, imports and exports and flow of materials (biomass, minerals and fossil fuels), 1990 to 2020.

"Green jobs" update, current and upcoming work: March 2023
Article | Released 13 March 2023
An update to our work on green jobs, including a summary of user engagement, our definition, and future work.

England natural capital accounts: 2023
Bulletin | Released 25 January 2023
Estimates the value of English natural capital and its beneficial effects for the population.

Low carbon and renewable energy economy, UK: 2021
Bulletin | Released 16 February 2023
Estimates of the size of the UK's Low Carbon and Renewable Energy Economy (LCREE), including turnover and employment.

Climate change insights, health and well-being, UK: May 2023
Article | Released 12 May 2023
Quarterly publication bringing together the latest climate change-related statistics and analysis from a range of sources.

11 . Cite this statistical bulletin

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