

Compendium

Environmental accounts

Estimates of energy consumption, atmospheric emissions, material flows and natural capital.

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1 . Environmental accounts

- Environmental accounts are "satellite " or extended accounts to the main UK National Accounts.
- They are compiled in accordance with the System of Environmental-Economic Accounting (SEEA), which closely follows the United Nations System of National Accounts (SNA).
- They measure the impact the economy has on the environment, how the environment contributes to the economy, and how society responds to environmental issues by using the accounting framework and concepts of the national accounts.
- They are used to inform sustainable development policy, model impacts of fiscal or monetary measures, and evaluate the environmental impacts of different sectors of the economy.
- Data are provided in units of physical measurement (mass or volume) and monetary units, where these are the most relevant or only data available.

In the [accompanying dataset \(XLSX, 3.4MB\)](#):

- Worksheets 12.2 to 12.5 show estimates of energy consumption, atmospheric emissions and material flows
- Worksheets 12.6 to 12.8 show natural capital accounts
- Worksheets 12.9 to 12.12 show data on environmental taxes

More data, information and other environmental accounts (including fuel use, environmental goods and services sector, and environmental protection expenditure) can be found on our [Environmental accounts release web page](#).

2 . Energy consumption

Worksheet 12.2 in the [accompanying dataset \(XLSX, 3.4MB\)](#) presents energy consumption by industry for the UK.

Energy consumption is defined as the use of energy for power generation, heating and transport. This is essential to most economic activities, for example, as input for production processes.

The term "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. Alternatively, "reallocated use of energy" means that the losses incurred during transformation and distribution are allocated to the final consumer of the energy, rather than incorporating it all in the electricity generation sector.

Transformation losses are the differences between the energy content of the input and output product, arising from the transformation of one energy product to another.

Distribution losses are losses of energy product during transmission (for example, losses of electricity in the grid) between the supplier and the user of the energy.

Fossil fuels are the main source of energy for consumption, although other sources (including nuclear, net imports, renewable and waste sources) are becoming increasingly important.

Renewable sources include:

- solar photovoltaic
- geothermal and energy from wind, wave and tide
- hydroelectricity
- wood
- charcoal
- straw
- liquid biofuels
- biogas from anaerobic digestion
- sewage gas

Landfill gas, poultry litter and municipal solid waste combustion have also been included within this definition.

Short-term fluctuations in energy consumption are often attributable to changes in temperature or gross domestic product (GDP). Longer term, the decline in energy consumption for these purposes has largely been driven by the switch away from coal by the energy supply and manufacturing industries to other, more efficient fuels, such as natural gas and, more recently, renewable sources.

Data are provided by Ricardo Energy and Environment.

3 . Atmospheric emissions

Worksheets 12.3 and 12.4 in the [accompanying dataset \(XLSX, 3.4MB\)](#) show emissions of greenhouse gases, acid rain precursors (ARPs) and other pollutants by industry for the UK.

Greenhouse gases (GHG) are covered by the Paris Agreement, which has superseded the Kyoto Protocol. 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).

The greenhouse gases included in the worksheets are:

- carbon dioxide (CO₂)
- methane (CH₄)
- nitrous oxide (N₂O)
- hydro-fluorocarbons (HFC)
- perfluorocarbons (PFC)
- nitrogen trifluoride (NF₃)
- sulphur hexafluoride (SF₆)

Other important atmospheric emissions include acid rain precursors (ARPs). Acid rain is caused primarily by emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x) and ammonia (NH₃), and can have harmful effects on the environment. For comparability, all figures are weighted according to their acidifying potential and presented as sulphur dioxide equivalents (SO₂e).

Emissions levels are influenced by factors such as gross domestic product (GDP) and UK temperatures. They are also influenced by policy initiatives, for example, those encouraging adoption of cleaner technologies or emissions standards on motor vehicles. Changes in energy consumption, particularly energy from fossil fuels, directly influence air emissions.

Data are provided by Ricardo Energy and Environment.

4 . Material flows

Worksheet 12.5 in the [accompanying dataset \(XLSX, 3.4MB\)](#) presents economy-wide material flow accounts, which estimate the physical flow of materials through the UK economy.

Domestic extraction is divided into four categories:

- biomass, which includes material of biological origin that is not from fossil, such as crops, wood and wild fish catch
- non-metallic minerals, which are mainly construction and industrial minerals, including limestone and gypsum, sand and gravel, and clays
- fossil energy materials and carriers, which include coal, peat, crude oil and natural gas
- metal ores, which include precious metals such as gold

For fossil energy materials and carriers (which include coal, crude oil, natural gas and peat), peat estimates were not available from 2016.

Data are compiled from multiple sources including the Department for Environment, Food and Rural Affairs (DEFRA), the United Nations Food and Agriculture Organisation (FAO), the British Geological Survey (BGS), Eurostat, His Majesty's Revenue and Customs (HMRC) and the Department for Energy Security & Net Zero (DESNZ).

Physical trade balance

The physical trade balance (PTB) shows the relationship between imports and exports and is calculated by subtracting the weight of exports from the weight of imports. The PTB (imports minus exports) is defined in reverse to the monetary trade balance (exports minus imports). Physical estimates can differ quite significantly from monetary estimates.

The UK has a positive PTB, meaning that more materials and products are imported than are exported. This suggests that the UK may be becoming more reliant on the production of materials in other countries.

Material consumption

Direct material input (DMI) (domestic extraction plus imports) measures the total amount of materials that are available for use in the economy.

Domestic material consumption (DMC) (domestic extraction plus imports minus exports) measures the amount of materials used in the economy and is calculated by subtracting exports from DMI.

5 . Natural capital

The natural capital accounts estimate the wealth of the UK's environment. These remain in development, and so are currently classed as [Official Statistics in Development](#).

The UK's natural wealth is reflected in the productivity of its soils, its access to clean water, and its mountains. Any natural resource or process that supports human life forms an important part of our natural capital. Natural capital is one part of a wider move to better understand wealth. In that respect, we are not only estimating what wealth the UK inherited in its islands and seas but what it might provide to future generations.

Natural capital monetary estimates should be interpreted as partial or minimal value of the services provided by the natural environment, as a number of services are not currently measured. Services provided by the natural environment that we can measure include timber provisioning, agricultural biomass provisioning, fish provisioning, water provisioning, coal, oil and gas provisioning, renewable electricity generation, air pollution regulating, greenhouse gas regulating, noise regulating, urban heat regulating and recreation.

We will continue to work to include as much of the economic value of the natural world as possible. Our asset values are narrowly market driven and not an absolute "value" of the natural world. More details are available in our [UK Natural Capital Accounts: 2023 bulletin](#).

These estimates have been developed using updated methodologies, which means they are not comparable with those published previously. Full details of these updated methodologies will be published alongside our UK Natural Capital Accounts: 2024.

This is particularly important for our recreation and aesthetic (house prices) service, where data from the Valuation Office Agency, HM Land Registry and Ordnance Survey are used to estimate the effect of proximity to public green space on house prices.

A unique house-level dataset is produced by linking data, and machine learning techniques are then applied to flexibly model house prices. To obtain an estimate of the average effect of green and blue spaces on house price, we estimate the difference between the predicted price based on the real data and the predicted price based on a "no nature" scenario.

For the "no nature" scenario, the area of the green and blue spaces is set to zero, while the distance for green space is replaced with the average distance for the region, and the distance to the open sea is set to 2,000 metres. Estimates relate to urban properties only, and are defined as built-up areas with a population of 5,000 or greater.

6 . Environmental taxes

Environmental taxes are those whose base is a physical unit, for example, a litre of petrol or a passenger flight, that has a proven negative impact on the environment. These taxes should reduce the activity, and therefore reduce negative environmental impacts. Increases in tax revenue can occur from either rising tax rates, increased activity, or both.

Other initiatives may promote environmentally-positive behaviour but are not considered an environmental tax under this definition. For example, charges on single-use plastic bags by retailers are not classified as a tax.

An environmental tax needs to be defined as a tax (and not another type of payment) in the System of National Accounts (SNA 2008). The [National Tax List](#) is published by the Office for National Statistics (ONS) using the European System of National and Regional Accounts (ESA 2010), which is consistent with the SNA. This definition is also explained in the [Central Framework for the System of Environmental-Economic Accounting](#) from the United Nations, which uses concepts, definitions and classifications consistent with the SNA.

Source data on aggregate revenue for each type of tax are provided to the ONS from HM Treasury, to enable compilation of public sector accounts. We produce a breakdown of the aggregate by industry, including allocation to households and the rest of the world. To do so, we use a number of sources, including supply and use tables.

More information on this environmental taxes measure can be found in our [Environmental accounts on environmental taxes QMI](#).

7 . More information about environmental accounts

More information about environmental accounts, including data rounded to a thousand tonnes, is available on our [Environmental accounts release web page](#).

The residence adjustment is included, as the UK Environmental Accounts are based on a UK residence basis (as opposed to a territory basis). This is in line with national accounting principles, allowing environmental impacts to be compared on a consistent basis with economic indicators such as gross domestic product (GDP).

UK figures for energy and air emissions on a territory basis are published by the Department for Energy Security and Net Zero (DESNZ). Energy and air emissions bridging tables, which show the difference between these estimates, are available.

Further explanation of the differences can be found in our [Energy consumption article](#) and our [Measuring UK greenhouse gas emissions methodology](#).

8 . Cite this chapter

Office for National Statistics (ONS), released 31 October 2024, ONS website, compendium chapter, [Environmental accounts, UK National Accounts, The Blue Book: 2024](#).