

Compendium

UK environmental accounts

Estimates of oil and gas reserves, energy consumption, atmospheric emissions and material flows.



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1 . Environmental accounts

Environmental accounts are:

- “satellite accounts” to the main national accounts
- compiled in accordance with the [System of Environmental-Economic Accounting \(SEEA\)](#), which closely follows the [United Nations System of National Accounts \(SNA\)](#).

Environmental accounts measure:

- the impact the economy has on the environment
- how the environment contributes to the economy
- how society responds to environmental issues by using the accounting framework and concepts of the national accounts.

Environmental accounts are used to:

- inform sustainable development policy
- model impacts of fiscal or monetary measures
- evaluate the environmental impacts of different sectors of the economy

Environmental accounts data:

- are mostly provided in units of physical measurement (mass or volume)
- can be provided in monetary units, where this is the most relevant or only data available

[Tables 12.1 to 12.5](#) show estimates of oil and gas reserves, energy consumption, atmospheric emissions and material flows. More data, information and other environmental accounts (including fuel use, environmental goods and services sector, waste, environmental taxes, environmental protection expenditure, low carbon and renewable energy economy and experimental natural capital accounts) can be found on the [UK Environmental Accounts release page](#).

2 . Temperature

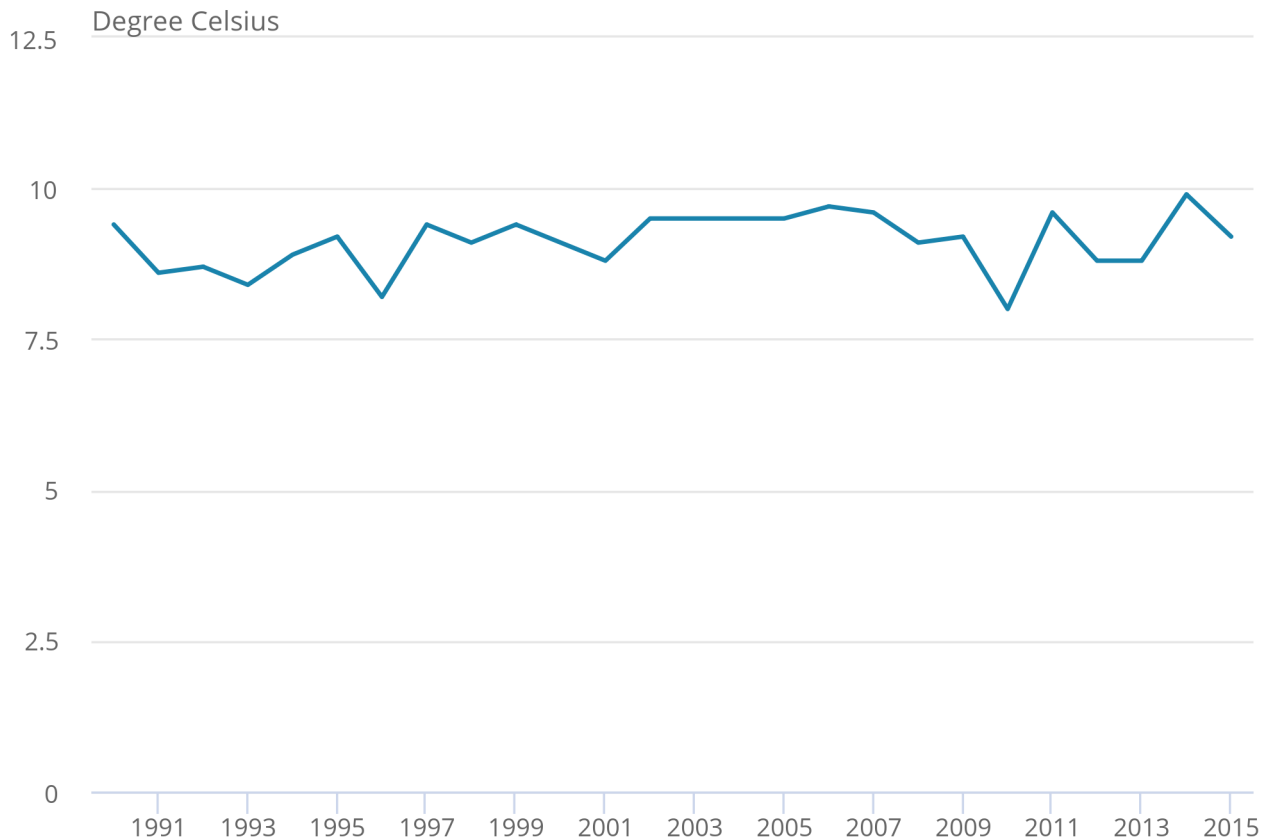
Figure 12.1 shows the change in mean air temperature between 1990 and 2015. This measure helps to contextualise some of the changes observed across the environmental accounts. For example, the average temperature fell to 8.0 degrees Celsius (°C) in 2010 from 9.2°C in 2009, which contributed to the increases in energy consumption and greenhouse gas emissions observed during that year. At the same time, gross domestic product (GDP) started to recover following the economic downturn, which may also explain the increases in consumption and emissions. Between 2014 and 2015, the average air temperature fell by 0.7°C (from a record high of 9.9°C to 9.2°C). Despite this fall, the average air temperature in 2015 was above usual levels.

Figure 12.1: Mean air temperature

UK, 1990 to 2015

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UK, 1990 to 2015



Source: Met Office

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3 . Oil and gas reserves

[Table 12.1](#) presents non-monetary estimates of the oil and gas reserves and resources in the UK. “Resources” are minerals that are potentially valuable and could eventually be extracted, whereas “reserves” refer to discovered minerals that are recoverable and commercially viable.

Reserves can be proven, probable or possible depending on the confidence level:

- proven reserves (based on the available evidence) are virtually certain to be technically and commercially producible, that is, have a better than 90% chance of being produced
- probable reserves are not yet proven but have a more than 50% chance of being produced
- possible reserves cannot be regarded as probable at present, but are estimated to have a significant (but less than 50%) chance of being technically and commercially producible

This year the Oil and Gas Authority has developed a new category of oil and gas reserves, known as “contingent resources”. Contingent resources are defined as “significant discoveries where development plans are under discussion”. In the past these would have been included as “probable reserves”.

Oil is defined as both oil and the liquids that can be obtained from gas fields. Shale oil is not included in the estimates. Total (discovered; proven and probable, plus possible reserve, contingent resources and undiscovered) oil reserves and resources for 2015 were estimated to be between 1,387 million tonnes and 2,287 million tonnes. The upper range for total oil reserves decreased between 2014 and 2015 by 4.9%, whilst the lower range decreased by 7.8%.

Gas includes gas expected to be available for sale from dry gas fields, gas condensate fields, oil fields associated with gas and a small amount from coal bed methane projects. Shale gas is not included in these estimates. These reserves include onshore and offshore discoveries, but not flared gas or gas consumed in production operations. Total gas reserves and resources were estimated between 872 billion cubic metres (bcm) and 1,507 bcm in 2015. The upper range for total gas reserves and resources had fallen by 5.5% between 2014 and 2015, and the lower range had fallen by 9.1%.

4 . Energy consumption

[Table 12.2](#) 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. “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. For “reallocated use of energy”, the losses incurred during transformation¹ and distribution² are allocated to the final consumer of the energy rather than incorporating it all in the electricity generation sector.

Total energy consumption of primary fuels and equivalent was 202.4 million tonnes of oil equivalent (Mtoe) in 2015, which was 0.6% higher than in 2014. Fossil fuels remained the dominant source of energy supply. Energy consumption from fossil fuels in 2015 was at the lowest level since 1990 at 167.7 Mtoe. This represented 82.9% of total energy consumption.

Although fossil fuels are the main source of energy for consumption, other sources (including nuclear, net imports, and renewable and waste sources) are becoming increasingly important. Total energy consumption from other sources was 34.7 Mtoe in 2015, which was 15.7% higher than in 2014. This is the second largest year-on-year increase across the time series. The largest increase occurred between 2008 and 2009, when energy consumption from other sources rose by 17.1%.

Notes for: Energy consumption

1. 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.
2. 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.

5 . Atmospheric emissions

[Tables 12.3 and 12.4](#) show emissions of greenhouse gases, acid rain precursors (ARP) and other pollutants by industry for the UK.

Atmospheric emissions of greenhouse gases are widely believed to contribute to global warming and climate change. In 2015, emissions of greenhouse gases were estimated to be 595.2 million tonnes of carbon dioxide equivalent (Mt CO₂e), the lowest level since 1990. Across the time series, the largest annual fall in emissions of greenhouse gases occurred in 2009, following the onset of the economic downturn in 2008, when emissions decreased by 8.3%. Between 2014 and 2015, emissions decreased by 12.1 Mt CO₂e (2.0%). This was due primarily to reductions in carbon dioxide and methane emissions from the “energy supply, water and waste” sector.

Unlike the majority of other sectors the “transport, storage and communications sector”¹ has seen an increase in greenhouse gas (GHG) emissions. Between 2014 and 2015, this increase was due largely to increases in emissions from fuel oil used in shipping.

Carbon dioxide (CO₂) was the dominant greenhouse gas, accounting for 84.7% of the UK’s total greenhouse gas emissions in 2015. The remainder of greenhouse gas emissions comprised methane (8.8%), nitrous oxide (3.7%) and fluorinated gases (2.8%).

Acid rain can have harmful effects on the environment and is caused primarily by emissions of sulphur dioxide (SO₂), nitrogen oxide (NO_x) and ammonia (NH₃). For comparability, all figures are weighted according to their acidifying potential and presented as sulphur dioxide equivalents (SO₂e). Since 1990, acid rain precursors (ARP) emissions have decreased sharply, falling by 73.9%, from 6.9 million tonnes of sulphur dioxide equivalent (Mt SO₂e) to 1.8 Mt SO₂e in 2015.

The reduction in ARPs was due largely to a reduction in sulphur dioxide (SO₂) emissions, which fell by over 90% between 1990 and 2015. This change can be linked to policy initiatives² to discourage the use of high sulphur fuels, control the sulphur content of those fuels and encourage the adoption of cleaner technologies and in particular to the switch from coal to gas in electricity generation.

Notes for: Atmospheric emissions

1. To enable a consistent time series the following SICs have been combined: “transport and storage” and “information and communication” into “transport, storage and communications sector”.
2. Policies include UK National Air Quality Strategy Directive on Integrated Pollution Prevention and Control (IPPC) (Directive 2008/1/EC); Directive on industrial emissions 2010/75/EU (IED); UK Pollution Prevention and Control (PPC) regulations; Large combustion plant directive (LCPD, 2001/80/EC); Limiting sulphur emissions from the combustion of certain liquid fuels by controlling the sulphur contents of certain liquid fuels (Directive 1999/32/EC); Annex VI of the MARPOL agreement for ship emissions, augmented by the Sulphur Content of Marine Fuels Directive 2005/33/EC and the introduction of Sulphur Emission Control Areas.

6 . Material flows

[Table 12.5](#) presents economy-wide material flow accounts, which estimate the physical flow of materials¹ through the UK economy. The quantity of materials extracted in the UK has been gradually declining and fell to 419 million tonnes in 2013, the lowest point since 2000. However, in the last two years, we have observed a rise in domestic extraction. Between 2014 and 2015, total domestic extraction increased by 1.6% to 450 million tonnes.

Domestic extraction is divided into four categories: biomass, non-metallic minerals, fossil energy materials or carriers and metal ores. Biomass includes material of biological origin that is not from fossil, such as crops, wood and wild fish catch. In 2015, there were 135 million tonnes of biomass extracted, 8 million tonnes less than in 2014 (143 million tonnes). Of this, crop residues, fodder crops and grazed biomass accounted for 62.6% (85 million tonnes).

Non-metallic minerals are mainly construction and industrial minerals, including limestone and gypsum, sand and gravel, and clays. There has been an overall fall in extraction of non-metallic minerals since 2000. However, extraction of non-metallic minerals has been increasing since 2012. In 2015, there was a 4.7% increase in the extraction of non-metallic minerals (from 211 million tonnes to 221 million tonnes).

Fossil energy materials and carriers include coal, peat, crude oil and natural gas. The extraction of these increased by 6.0% between 2014 and 2015, to 94 million tonnes. This was the first increase since 2000 and can be attributed to an increase in the production of crude oil and natural gas liquids from the North Sea due to the opening of new fields. Prior to this increase, extraction of fossil energy materials had fallen 66.7% between 2000 and 2014.

Physical imports increased by 32.4% between 2000 and 2015, rising from 210 million tonnes to 278 million tonnes. Contrary to this, physical exports have gradually decreased, peaking at 197 million tonnes in 2002 and falling to 152 million tonnes in 2015 – the lowest point since 2000. The rise in imports partly offsets the decline in domestic extraction.

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 imports². The UK has a positive PTB, meaning that more materials and products are imported than are exported.

In 2000, the PTB was relatively small at 16 million tonnes. It generally increased until 2007, but then fell between 2008 and 2010 during the economic downturn. Since 2010, the PTB has increased, peaking at 148 million tonnes in 2013. However, the PTB decreased by 11.9% in 2015 (to 127 million tonnes). Despite this, the amount of materials and products that were imported (278 million tonnes) was almost twice the amount of materials and products that were exported (152 million tonnes), suggesting that the UK may be becoming more reliant on the production of materials in other countries.

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.

In 2015, the UK consumed 576 million tonnes of material, consisting of 230 million tonnes of non-metallic minerals (40.0%), 173 million tonnes of biomass (30.1%), 159 million tonnes of fossil fuels (27.6%) and 14 million tonnes of metal ores (2.4%).

Between 2000 and 2015, DMI and DMC decreased by 21.5% and 22.0% respectively. DMI and DMC have gradually declined since the start of the economic downturn in 2008. This indicates that fewer material resources were being used and consumed in the UK economy. DMI and DMC fell most sharply between 2008 and 2009 (decreasing by 11.4% and 12.2%, respectively). Between 2014 and 2015, DMI decreased by 1.5%, from 739 million tonnes to 728 million tonnes and DMC decreased by 2.5%, from 591 million tonnes to 576 million tonnes.

Notes for: Material flows

1. Provisional figures for 2014 have been revised and data gaps addressed, resulting in an increase in domestic extraction in the previously reported 2014 figures. Data on minerals and crops are not available for 2015, so estimates have been used in the calculations of the material flow accounts.
2. The physical trade balance (imports minus exports) is defined in reverse to the monetary trade balance (exports minus imports). Physical estimates can differ quite significantly from monetary estimates.

7 . More information

There is more information about environmental accounts on the [UK Environmental Accounts release page](#).