

UK Energy and Emissions



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Where do UK emissions come from?

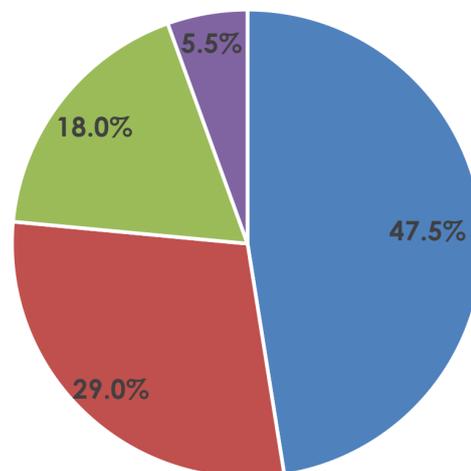
Clean energy trends

What is our energy used for?

Most of the energy used in the UK is derived from fossil fuels – coal, oil and gas, which release carbon dioxide (CO₂) when burnt. Overall UK [energy demand is declining](#); this is due to policies driving the improvement of energy efficiency, the switch from an industrial to a service-based economy, and a move to gas-fired power generation instead of coal.

Renewables – wind, solar and biomass – are becoming increasingly important in electricity generation, while the output from the UK's nuclear fleet is generally falling.

Primary Energy Consumption by Fuel, 2015



■ Oil ■ Natural Gas ■ Electricity ■ Others: coal, renewables, waste

The UK energy market is dominated by the use of oil and gas, together responsible for around three quarters of total energy consumed. Oil is predominantly used in transport, while gas is mainly used in heating. A smaller proportion of the UK's gas use is in electricity generation. Almost all coal use is in power stations. In total, more than 80% of the UK's energy comes from burning fossil fuels.

Electricity accounts for nearly 20% of UK's total energy use. In 2015 gas-fired power stations generated 29% of the UK's power, while the share from coal was around 22%. Coal use fell sharply during 2015 due to increased wind and nuclear output, the conversion of a third unit at the Drax power station to biomass, while an increase in the carbon price floor and low gas prices gave gas-fired power plants an economic advantage. Current government policy aims for the phase-out of coal power stations in the UK by 2025, although some plants are closing before this deadline due to unfavourable market conditions.

Renewable sources generated nearly 25% of the UK's electricity in 2015, overtaking both nuclear and coal for the first time.

Indigenous production of oil rose in 2015, gaining for the first time since 1999 as new oilfields in the North Sea came online. The general trend, however, is downwards, increasing reliance on imports, and production remains around one-third of its 1999 peak.

The UK is a net importer of crude oils, with Norway as the main supplier (50%). OPEC nations, however, are eating into this share and now account for 39% of imports. Likewise, most of our gas is imported, with the majority coming from Norway and Qatar. Indigenous production has largely been replaced by liquefied natural gas (LNG), making up 31% of imports in 2015.

Production of coal fell by 26% to an all-time low in 2015, with imports at their lowest for 15 years as demand for the fuel fell. Russia supplies around 30% of coal, with Columbia and the US also major sources.

Where do UK emissions come from?

Carbon dioxide forms the vast majority (81%) of UK greenhouse gas emissions. Methane accounts for around 10%, and 5% is nitrous oxide. Carbon dioxide is released as fossil fuels are combusted to release chemical energy; while agriculture

and industry responsible for most of the methane emissions. Nitrous oxide emissions come from waste management, agriculture and energy supply.

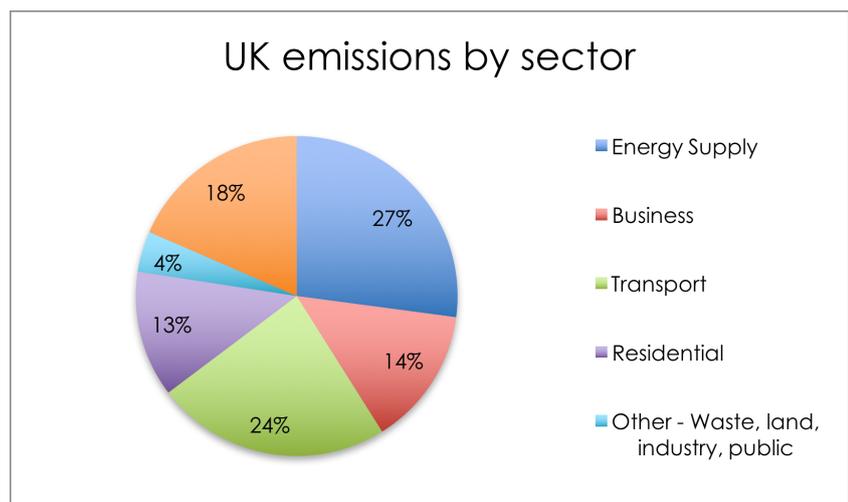
Around 27% of the UK's greenhouse gas emissions in 2015 came from the supply of energy, virtually all being CO₂. Transport accounts for about 24% of total emissions, with 14% from business, 13% from the residential sector and 11% from agriculture. Non-CO₂ greenhouse gases account for 18% of total emissions.

The UK has cut total greenhouse gas emissions by 38% since 1990. The main reason for this downward trend was lower energy supply emissions, largely due to a switch away from coal. This was first to gas and then, increasingly, to renewables.

Emissions from electricity generation have fallen by 44% since 1990, reducing by 13% between 2014 and 2015 alone. Emissions from coal have fallen from 220 MtCO₂e in 1990 to less than 75 MtCO₂e in 2015. With the burning of coal losing favour, natural gas has become the main source of CO₂ emissions, contributing 43% of the total in 2015. Oil is in second place with 36% of the total while coal accounts for less than 20%.

The precise balance of coal and gas in the electricity mix changes daily due to fuel costs, output from renewables and demand, although the long-term trends of coal use and emissions are clearly downwards. Emissions from industrial processes have fallen 40% between 1990 and 2015 due to improvements in technology and a decline in energy-intensive industry.

There have also been significant reductions in greenhouse gas emissions from industrial processes. Improvements to industrial processes have also helped reduce emissions of nitrous oxide and fluorinated gases.



Clean energy trends

Several low-carbon energy technologies are used in the UK, including nuclear and renewables for electricity (hydro, wind, solar, biomass and biogas), and renewables for heat generation (biomass, biogas and heat pumps).

Altogether, renewable energy accounts for a small but growing percentage of energy consumed in the UK, [contributing 9% in 2015](#). When taken as a percentage of electricity generated, renewable energy amounted to [nearly 25%](#) in 2015.

Wind is the UK's largest source of renewable electricity, accounting for just under half of the total in 2015. After wind, the next biggest source of renewable electricity was bioenergy – typically energy crops or burning biomass in converted coal power stations – followed by solar and then hydro.

The percentage of UK electricity generated by renewables varies on a daily basis, changing with weather conditions and total demand. December 2014 saw a new record for an individual day, when wind energy provided [43% of the UK's electricity needs](#).

The relationship between actual output and potential output of a power plant (which correlates directly to installed capacity) is described by the “load factor”. During 2015 the UK's fleet of [offshore wind turbines generated 41%](#) of the total output possible if they had been running flat-out all year (a load factor of 41%). This compares with a load factor of 30% for onshore wind farms and 12% for solar PV. Load factors are increasing annually as technology improves.

UK Renewable Electricity Generation

Total UK renewable capacity jumped by more than [20% between 2014 and 2015](#), topping 30 GW after a surge in solar PV capacity installation. At the end of 2015, onshore wind and solar PV each accounted for [around 30%](#) of total installed renewable capacity. Offshore wind held a 17% share, with hydro around 6%. Bioenergy accounted for just above 17% of

renewable capacity, of which half was plant biomass.

Nuclear power has emissions per unit of electricity equivalent to the cleanest renewables. Nuclear generation provides almost a fifth of electricity but its share is steadily declining as old power stations progressively close. The final remaining Magnox station, at [Wylfa on Anglesey](#), closed at the end of 2015. Seven of the eight second-generation reactors are set to close by 2030, with just Sizewell B operating beyond that date, while uncertainty still surrounds Hinkley C, the first generation three reactor due to begin output in 2025.

What is our energy used for?

Since 1990, energy use in transport has grown to over 40% of the total, making it the largest contributor to final energy consumption. Energy use in air travel has increased by [more than 11%](#), while consumption by road transport has remained steady.

Over the same period, energy consumption in homes has fallen by [6%](#) to around 29% of the UK total. Industrial energy use has also fallen, by 39% to around 17% of the total.

In terms of non-transport energy use, [space heating makes up 48%](#), rendering insulation the single largest procedure to reduce energy use. Installing solid wall insulation can [cut gas consumption by nearly 15%](#), a figure that can be increased to 22% if a new boiler is also installed. A combination of solid wall and loft insulation can see gas use fall by 18%.

UK renewable electricity generation

