# Chapter 5: Electricity

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## Key headlines

**Electricity demand was broadly stable in 2024, increasing 0.5 per cent on last year to 319 TWh.** Demand remained notably below the pre-pandemic levels of 2019.

**Domestic consumption increased slightly on 2023 (+1.9 per cent to 94.4 TWh in 2024) but remains below pre-pandemic averages.** Domestic consumption fell sharply from 2022 following higher energy prices and warmer temperatures and remains 9 per cent down on 2019. Commercial consumption also rose slightly, by 0.4 per cent. However, industrial consumption fell by 2.8 per cent to 82.2 TWh, the lowest level since 1998. This is in line with longer term improvements in energy efficiency and moves from traditional manufacturing to higher value processes.

**Electricity generation fell despite higher UK demand, as record-high imports reduced the need for UK generation.** Electricity generation fell to 285.0 TWh in 2024, down 3.1 per cent from 2023, while net imports rose by 40 per cent from 2023 to reach 33.4 TWh.

**Renewable generation rose by 5.1 per cent to reach a new record high of 143.7 TWh, driven by record high generation from wind and thermal renewables (bioenergy).** Wind generation rose by 1.4 per cent from 2023 to 83.3 TWh, while generation from thermal renewables rose by 17 per cent to 40.3 TWh following outages and lighter use in 2023.

**Fossil fuel generation continued to decline, falling by 16 per cent from 2023 to 90.5 TWh.** Gas remained the single largest fuel, but generation by gas fell 15 per cent to 86.7 TWh. Coal generation fell by 46 per cent to a new record low of 2.0 TWh, as the UK's last coal-fired power plant, Ratcliffe-on-Soar, closed in September 2024.

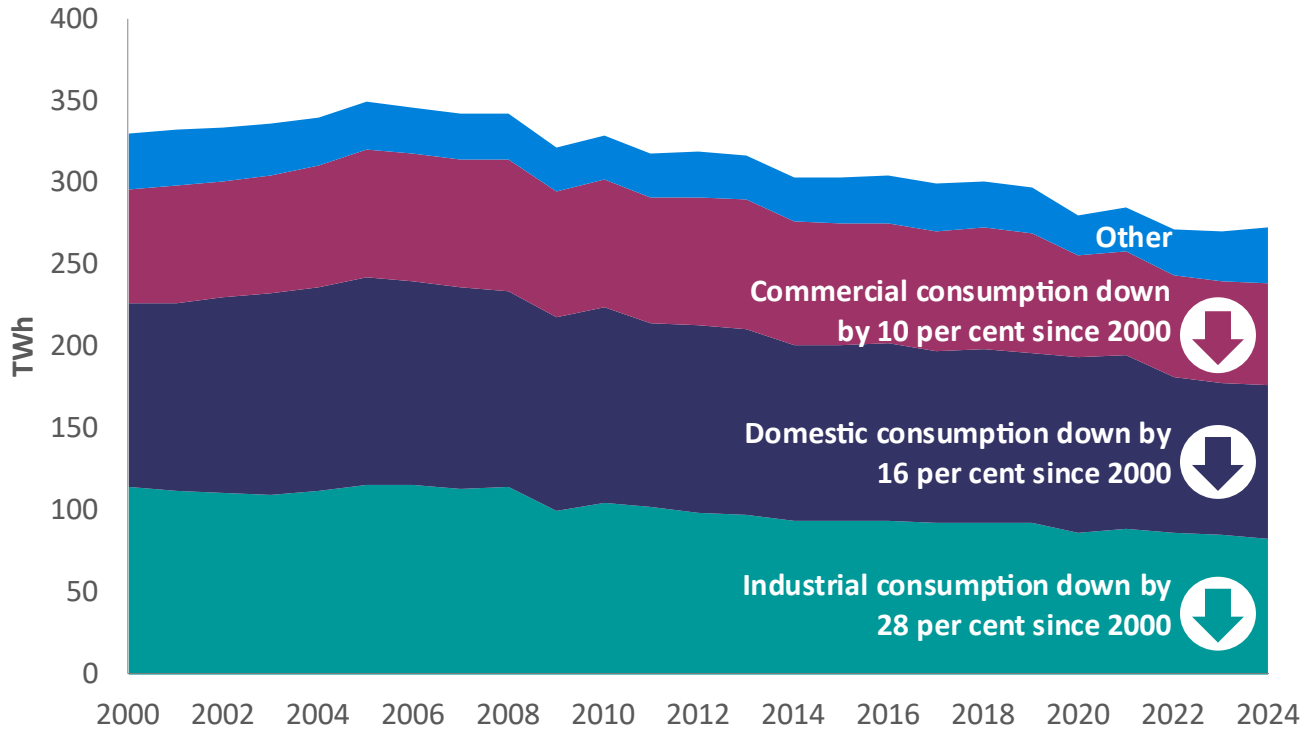
**The share of generation from low carbon sources (nuclear plus renewables) rose to 64.7 per cent, a new record high within the published data series.** This came as the share of generation from renewables increased, and total generation decreased. Renewable sources accounted for 50.4 per cent of generation in 2024, exceeding a share of 50 per cent for the first time in the published data series.

**Total de-rated generation capacity decreased to 71.7 GW in 2024, down 3.0 per cent compared to 2023.** This was due to the closure of the last coal-fired plant, Ratcliffe-on-Soar. The reduction was partly offset by increases in offshore wind, solar and bioenergy capacity. Capacity for renewable technologies increased by 5.3 per cent to 26.8 GW, while fossil fuel capacity decreased 9.0 per cent to 36.3 GW.

**Electricity demand was broadly stable in 2024 at 319.0 TWh, up 0.5 per cent compared to 2023.** Average temperatures were similar between 2023 and 2024. Electricity demand remains notably below pre-pandemic levels of 2019.

Final consumption rose slightly to 272.4 TWh, a 0.8 per cent increase compared to 2023. 'Final consumption' refers to electricity consumption by end users, excluding electricity consumed in the process of generation and transmission or distribution losses.

**Chart 5.1 Electricity consumption by sector, 2000 to 2024 (DUKES Table 5.1)**



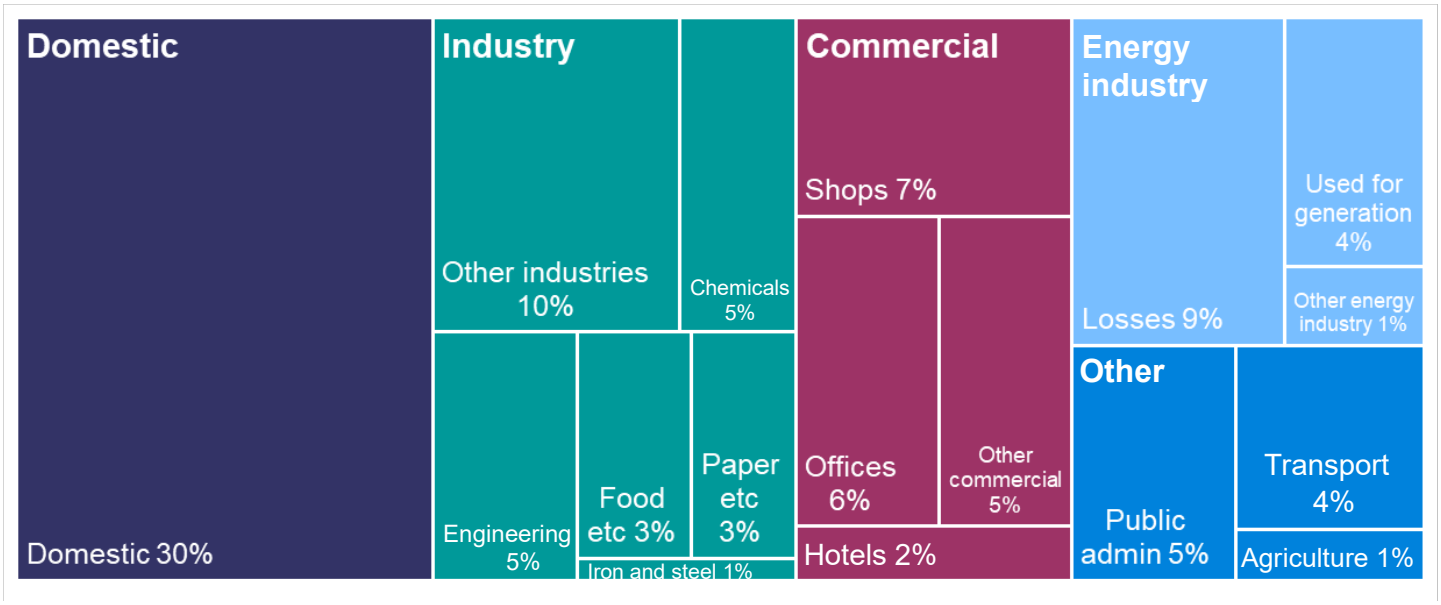

**Domestic consumption rose slightly to 94.4 TWh in 2024, a 1.9 per cent increase compared to 2023. However, it remains substantially below pre-pandemic levels.** Domestic consumption fell sharply in 2022 following high energy prices and warm temperatures, with consumption 9 per cent below 2019. Over the longer time series some of the drop can be attributed to improved energy efficiency of lighting and appliances.

**Commercial consumption increased by 0.4 per cent from 2023 to 62.4 TWh in 2024.**

**Industrial consumption fell by 2.8 per cent in 2024 to 82.2 TWh, the lowest level since 1998.** This is the third consecutive year where industrial consumption has fallen. In common with many other European countries, industrial consumption has contracted over time. Energy efficiency improvements and a move from traditional manufacturing to higher value processes such as pharmaceuticals have contributed to the reduction over the longer term trend.

Total electricity demand is larger than electricity consumption. This is because total demand also accounts for electricity consumed in the process of generation or to produce fuel for generation, as well as for electricity lost in transmission or distribution from where it is generated to where it is consumed. The full breakdown of electricity demand is shown below.

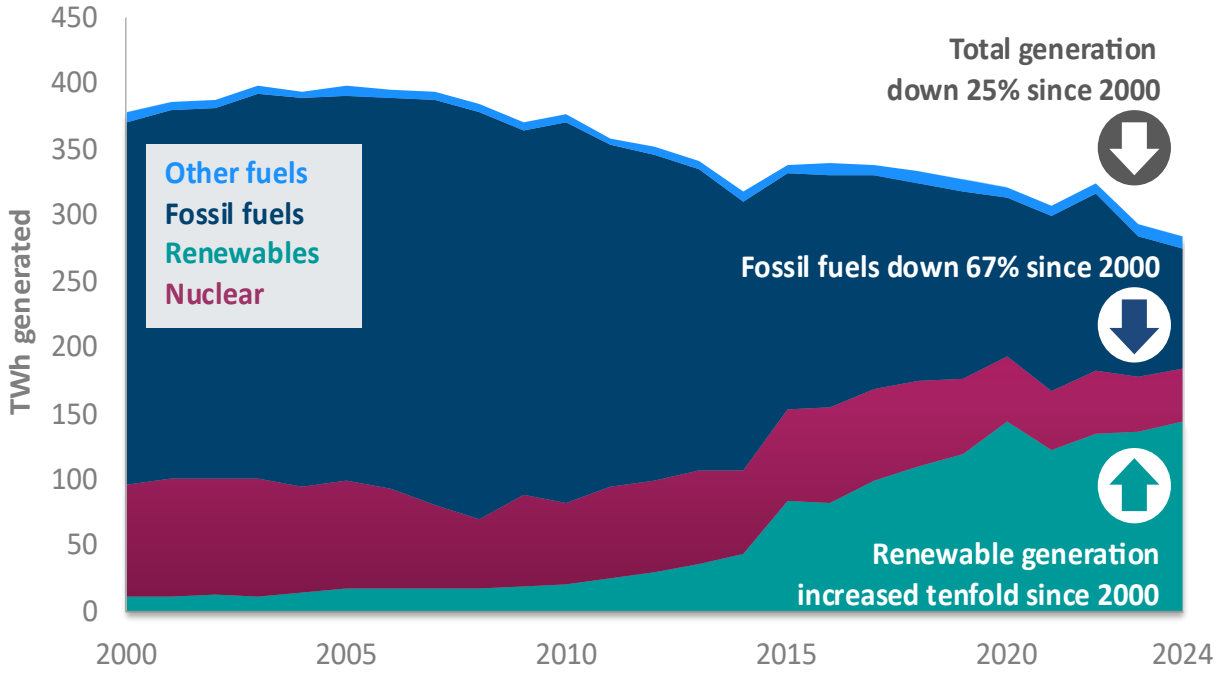
**Chart 5.2 Share of total electricity demand split by sector, 2024 (DUKES Table 5.2)**




**Domestic users accounted for the largest share of total electricity demand (29.6 per cent), which is 0.4 percentage points above the 2023 share (29.2 per cent).** Industrial consumption made up 25.8 per cent, which is 1.4 percentage points lower than 2023's share (27.2 per cent), while commercial consumption accounted for 19.6 per cent, similar to the previous year.

**Electricity generation fell by 3.1 per cent, as record electricity imports reduced the need for UK generation.** Electricity generation measures what is generated while electricity supply measures what was supplied to consumers, excluding the electricity used in the process of generation or consumed on site by the generator. Total electricity supplied plus imports matches with demand as electricity is supplied until demand is met. Demand for electricity is usually met by UK generation and supplemented with imports from Europe when price differentials are favourable. This differed in 2022 as outages in the French nuclear fleet meant that large amounts of electricity were exported via the France-UK interconnectors, leading to the UK being a net exporter. This led to increased UK generation and supply, despite lower demand in the UK.

**Chart 5.3 Electricity generated by fuel, 2000 to 2024 (DUKES Table 5.6)**




**Despite broadly stable UK demand, electricity generation fell to 285.0 TWh in 2024, down 3.1 per cent from 2023.** This was due to record-high electricity imports which displaced some UK-based generation. Major Power Producers (MPPs) generated 229.0 TWh, down 3.7 per cent compared to 2023, while generation from autogenerators and other generators decreased slightly, down 0.6 per cent to 55.9 TWh. The share of generation from MPPs decreased by 0.5 percentage points to 80.4 per cent.

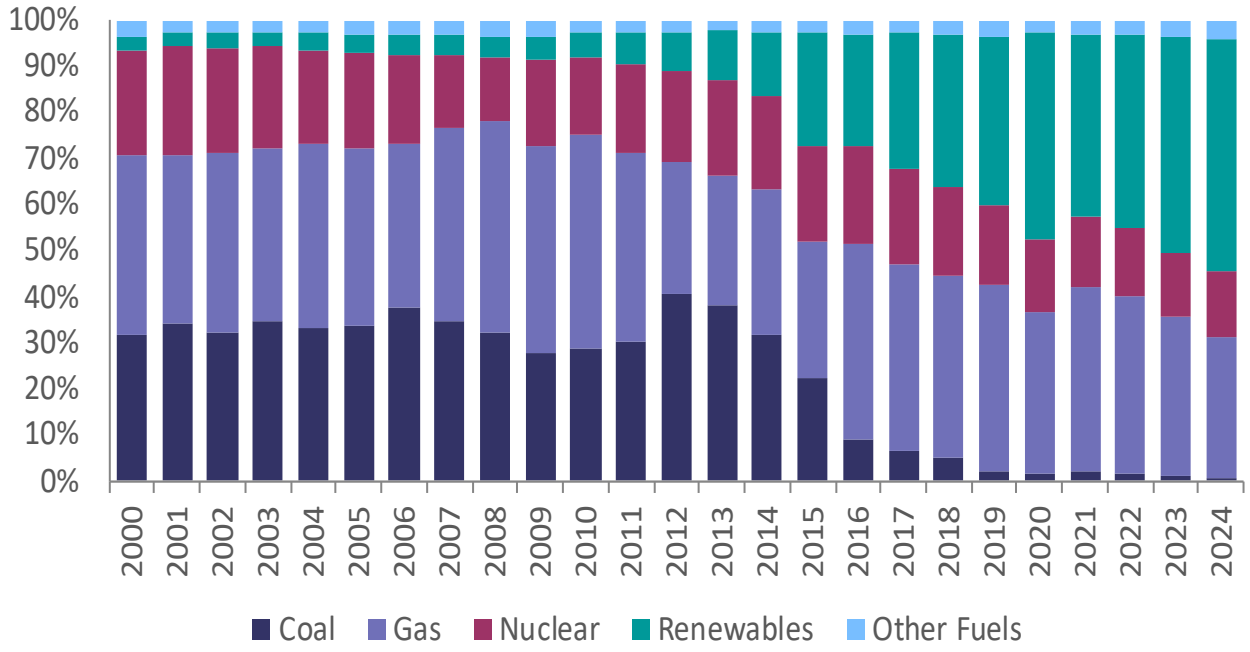
**Renewable generation increased by 5.1 per cent from 2023, reaching a new record high of 143.7 TWh, driven by record high generation from wind and thermal renewables (bioenergy).** In line with increased capacity and slightly higher average wind speeds during 2024, wind generation increased by 1.4 per cent on 2023 levels, to 83.3 TWh. Generation from thermal renewables rose by 17 per cent to 40.3 TWh, as key bioenergy sites were utilised more heavily than in 2023. Similarly, hydro generation rose by 6.1 per cent from 2023 to 5.8 TWh, following increased rainfall within key hydro areas. Due to 2024 having lower average sun hours than 2023, solar generation dropped by 1.9 per cent to 14.4 TWh. However, this is still the second highest value within the recorded time series.

**Fossil fuel generation decreased by 16 per cent in 2024 to 90.5 TWh, a level last seen in the mid-1950s when electricity demand was a third of today's requirement and over 95 per cent fuelled by coal and oil-fired generation.** In 2024**,** most fossil fuel generation continued to come from gas, which fell 15 per cent to 86.7 TWh. Coal generation fell by 46 per cent to a new record low of 2.0 TWh, as the UK's last coal-fired power plant, Ratcliffe-on-Soar, closed in September 2024. Oil generation fell by 9 per cent to 1.8 TWh.

**After falling by 14 per cent in 2023 due to outages within all the UK's nuclear plants throughout the year, nuclear generation remained at a very similar level in 2024 (40.6 TWh).** These included outages for refuelling as well as planned and unplanned maintenance.

As well as absolute generation, it is also useful to consider the overall shares of generation, which are less affected by changes in demand. This allows trends in different fuels to be examined, including the share of electricity generated from low carbon sources.

**Chart 5.4 Shares of electricity generation by fuel, 2010 to 2024 (DUKES Table 5.6)**




**Renewable sources accounted for 50.4 per cent of generation in 2024, exceeding a share of 50 per cent for the first time in the published data series.** The share of generation from renewables rose by 3.9 percentage points compared to 2023 levels. Wind generation continued to account for more than a quarter of generation in 2024, up 1.3 percentage points from 2023 to a record 29.2 per cent share. Similarly, the share from bioenergy rose by 2.4 percentage points to a record share of 14.1 per cent. Hydro's share rose slightly by 0.2 percentage points to 2.0 per cent, while the share of generation from solar remained the same as last year at 5.0 per cent, matching last year's record high.

**The share of generation from fossil fuels fell 4.8 percentage points to record low of 31.8 per cent.** This was driven by increases within wind generation and generation from bioenergy, along with increased imports of electricity reducing the need for fossil fuel generation. This is the first time fossil fuels contributed to less than a third of total generation within the published data series. Gas continued to be the fossil fuel with the highest share, standing at 30.4 per cent of total generation. This is the lowest the share for generation by gas since 2015, when it was 29.5 per cent, and is down 4.2 percentage points on 2023 levels. Finally, the share of generation from coal fell to 0.7 per cent, as the UK's last coal-fired power plant, Ratcliffe-on-Soar, closed in September 2024.

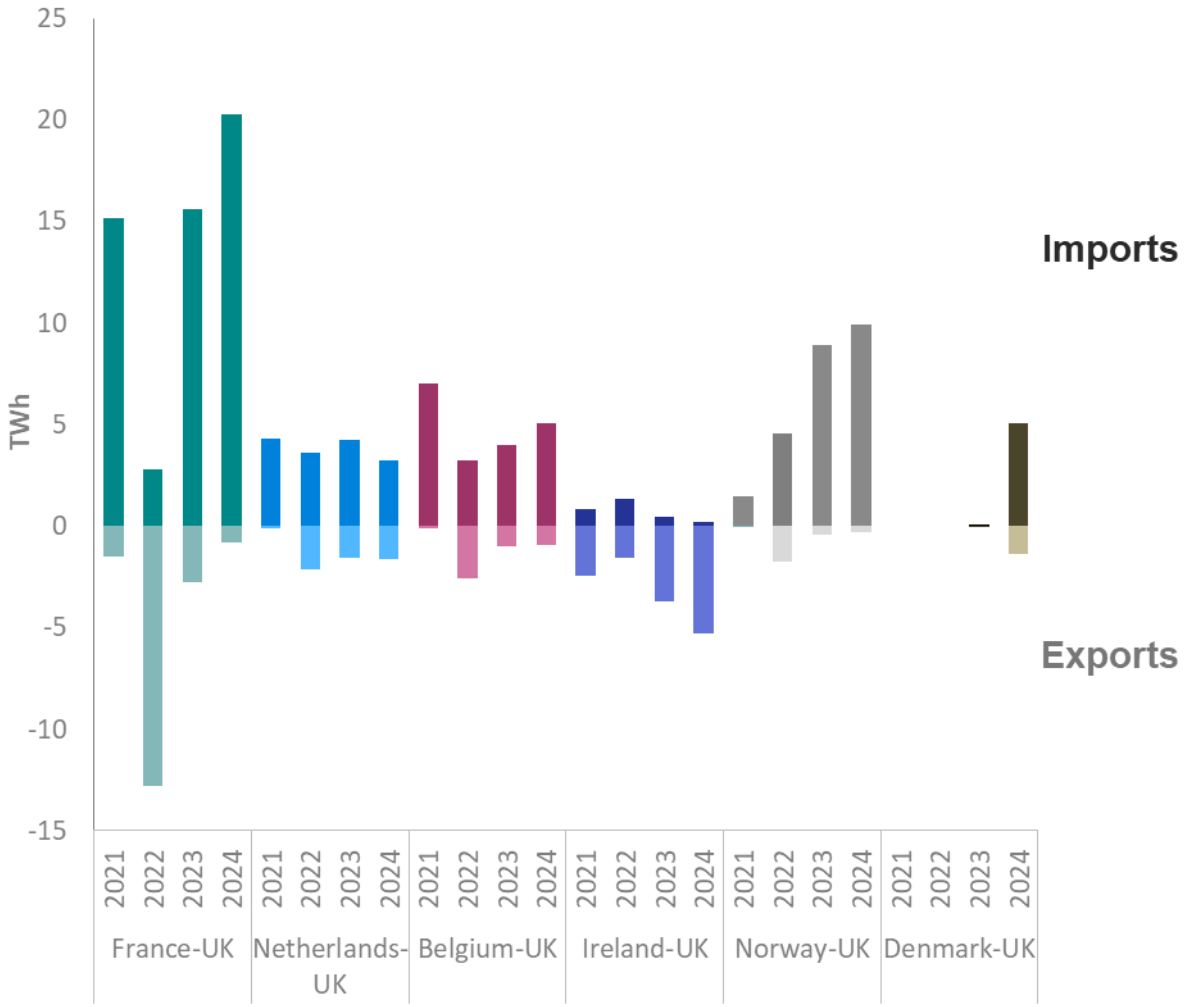
**Nuclear generation accounted for 14.2 per cent of generation in 2024, up 0.4 percentage points from 2023.** However, this increase is due to a fall within total generation rather than an increase in nuclear generation itself. The share of generation coming from low carbon sources (nuclear plus renewables) rose to 64.7 per cent in 2024, a new record high within the published data series and 4.4 percentage points higher than in 2023.

**The total fuel used for electricity generation decreased by 1.7 per cent in 2024 to 44.7 million tonnes of oil equivalent (Mtoe).** This was due to a 3.1 per cent fall in UK generation due to increased electricity imports. The decrease in fuel used was greater than the drop in overall electricity generated due to growth in non-thermal renewables which do not incur conversion losses[1]. Fuel used for electricity has fallen 35 per cent in the last ten years.

[1]For wind, hydro and solar, in line with international reporting standards, primary production of energy is defined as extraction of energy products in a useable form from natural sources. For wind this is the electricity generated by the wind turbine. Therefore, for these technologies, the fuel used is assumed the same as the electricity generated, unlike thermal generation where conversion losses are incurred. Therefore, for example, if one unit of electricity produced from coal is switched to wind, the fuel used will show a fall from around three units (as coal's thermal efficiency is around one-third) to one unit.

Trends in fuel used broadly mirror those in electricity generation, with a decrease in fossil fuel use, and increases in fuel used for bioenergy and assumed fuel used by wind and solar generators. Gas continues to dominate the UK generation mix, with 15.4 Mtoe used in 2024, while coal use decreased to 0.4 Mtoe.

**Chart 5.5 Electricity imports and exports by country, 2021 to 2024 (DUKES Table 5.13)**




**Net imports rose by 40 per cent from 2023 to reach 33.4 TWh, the highest value within the published time series.** Total imports rose by 31 per cent to 43.7 TWh, a new record high within the published time series. Meanwhile, total exports increased by 9 per cent from 2023 to reach 10.3 TWh. This is the second highest value for total exports within the published time series, after 2022. In 2022, the UK had been a net exporter for the first time in more than 40 years, with total exports of 20.8 TWh, and net exports totalling 5.3 TWh. The primary reason for this atypical situation was the widespread outages in the French nuclear fleet, increasing the demand for exported electricity to France.

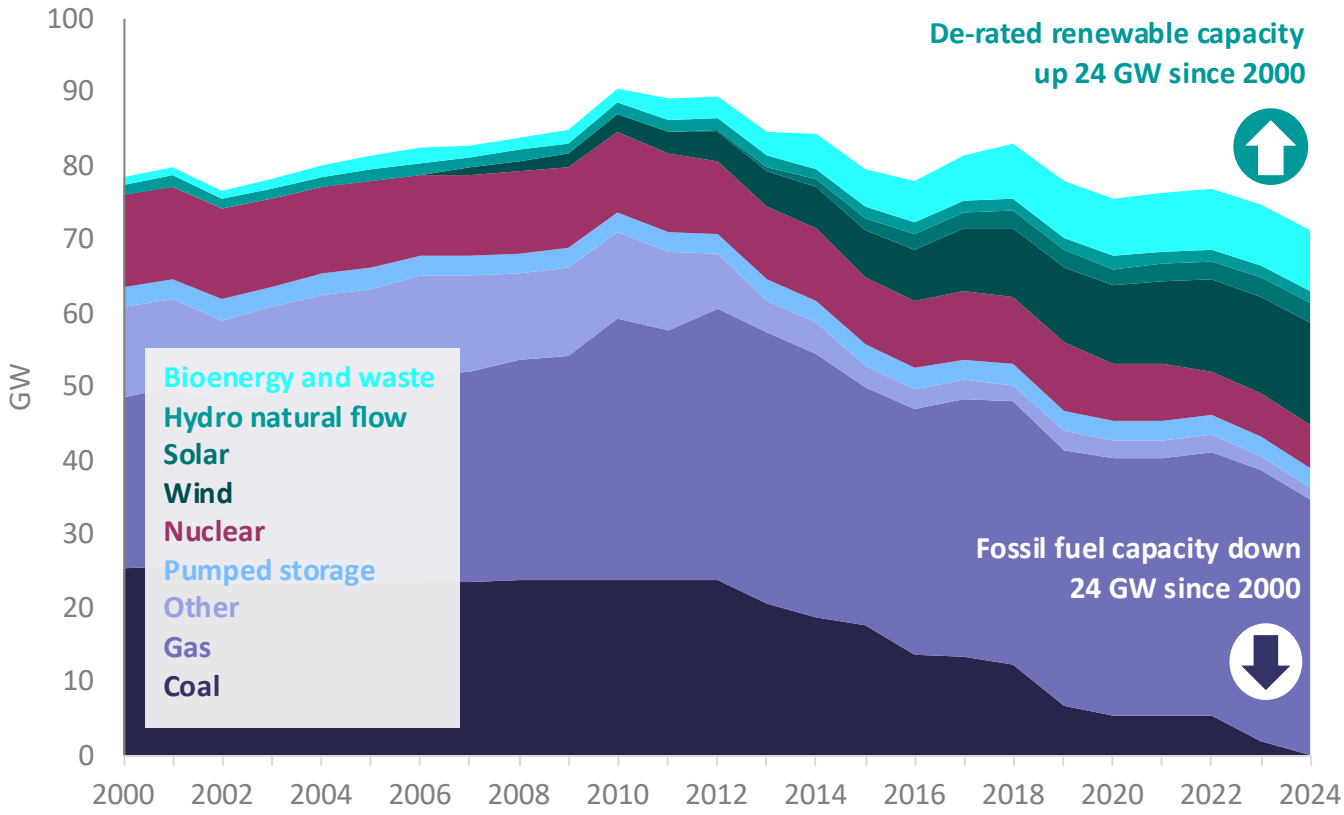
The UK was a net importer from all interconnected countries except the Republic of Ireland, which is connected to the UK through land connections from Northern Ireland and an interconnector cable from Wales. The France-UK interconnectors accounted for 19.5 TWh of net imports, followed by Norway-UK with net imports of 9.6 TWh, Belgium-UK with net imports of 4.2 TWh, and then Denmark-UK with net imports of 3.7 TWh. The interconnectors with both France and Norway supplied record imports in 2024.The Denmark-UK interconnector commenced operation in the last week of December 2023, so 2024 was the first year the interconnector was fully functional throughout.

More electricity was exported to the Republic of Ireland than was imported from there to the UK, leading to net exports from the UK. The Ireland-Wales interconnector saw net exports of 2.7 TWh, and the Northern Ireland-Ireland interconnector contributed 2.4 TWh of net exports to the total.

UK electricity is generated from a range of technologies and fuels are used at different times in response to demand and changes in weather. Monitoring capacity along with load factors (the proportion of potential generation that is realised in the year) can highlight how the capacity is being used to monitor the security of electricity supply.

**In this section, wind, small scale hydro and solar PV capacity is de-rated to account for intermittency**, to enable direct comparison with conventional fuels which are less dependent on the weather. Total installed capacity figures (not de-rated) are available in DUKES Table 5.12.

**Chart 5.6 De-rated capacity of UK electricity generation assets by fuel, 2000 to 2024 (DUKES Table 5.7)**



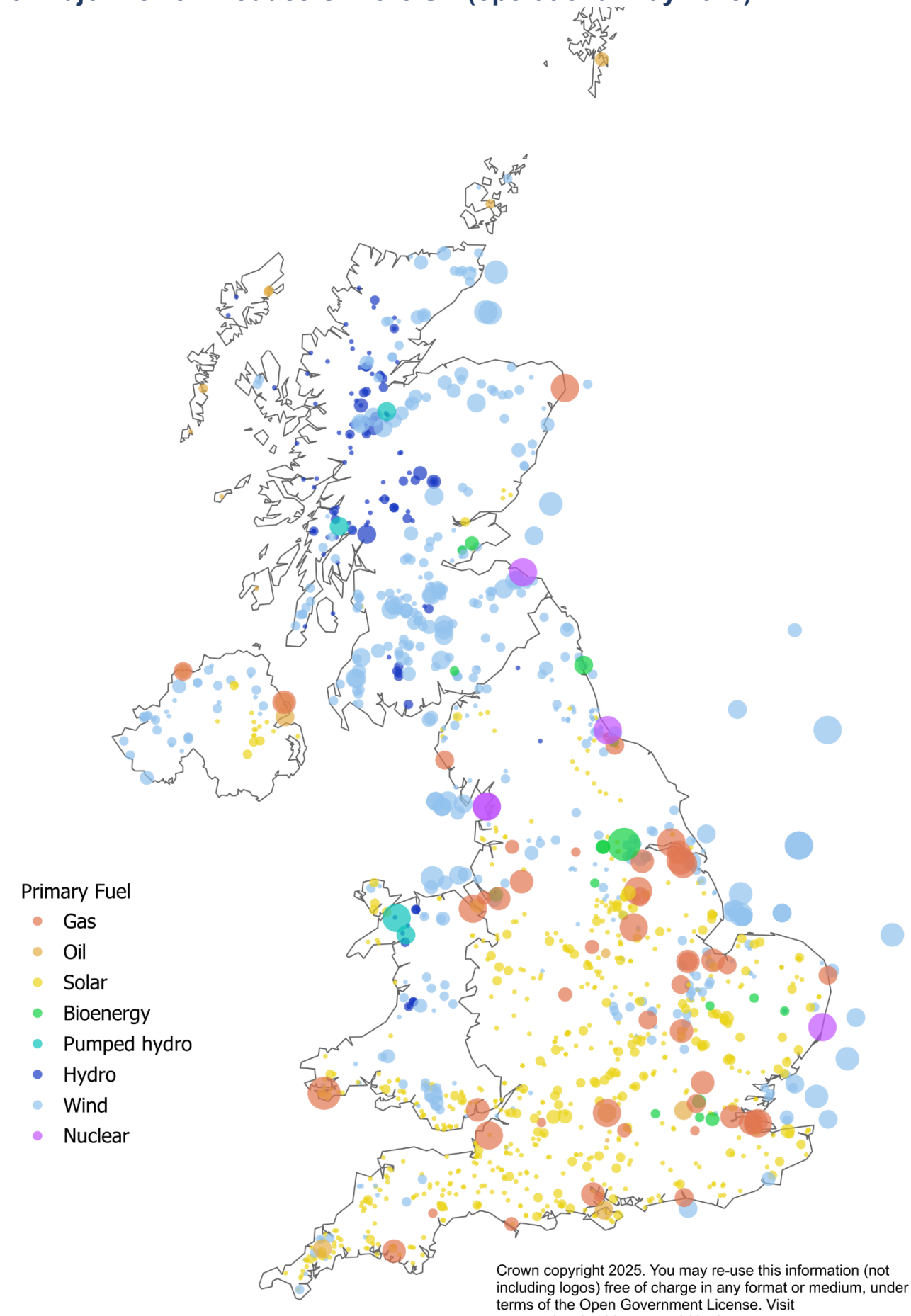

**Total de-rated generation capacity decreased to 71.7 GW in 2024, down 3.0 per cent compared to 2023.** This was due to the closure of the last coal-fired plant, Ratcliffe-on-Soar. Fossil fuel capacity decreased 9.0 per cent to 36.3 GW. The reduction was partly offset by increases in offshore wind, solar and bioenergy capacity.

**De-rated renewable capacity increased 5.3 per cent to 26.8 GW, driven by increases in offshore wind and solar capacity.** Wind capacity increased by 7.1 per cent to 13.8 GW with a 4.8 per cent increase for onshore wind and a 9.6 per cent increase for offshore wind, including Moray West, Dogger Bank and NNG sites. De-rated solar capacity also saw an increase of 12.9 per cent to 3.1 GW.

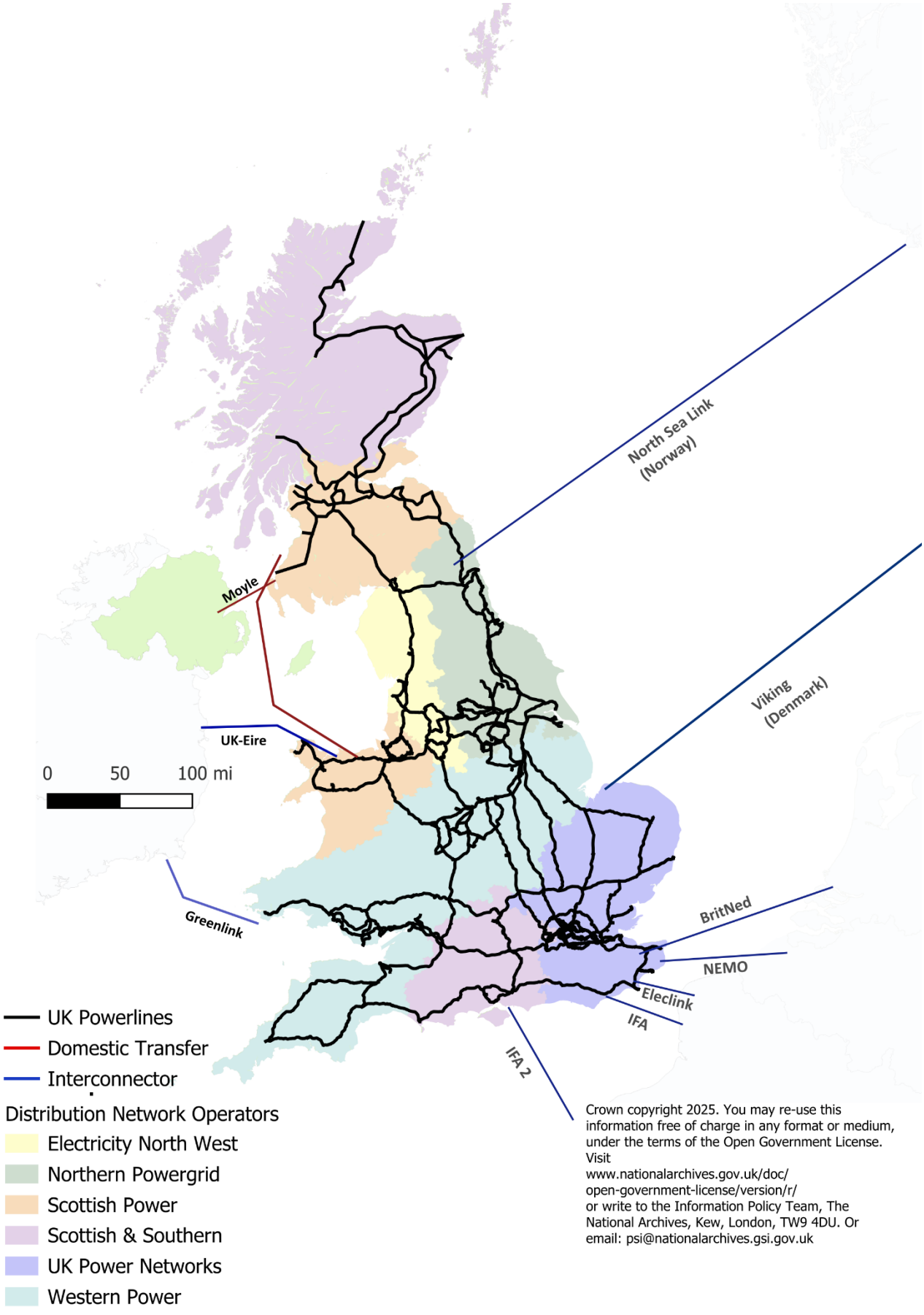
**Peak demand in winter fell to 47.4 GW, down by 1.9 per cent** compared to the equivalent figure in 2023. As Major Power Producer (MPP) capacity fell by 4.0 per cent in 2023, the peak represented 79.4 per cent of MPP capacity, 2.0 percentage points higher than 2023.

**Major Power Producers' power plants were less intensively deployed than they were last year, with a load factor of 37.4 per cent** (DUKES Table 5.10)**.** Load factors indicate the proportion of the time the plant is producing electricity and decreased by 1.3 percentage points compared to 2023, in line with reduced generation by Major Power Producers due to increased electricity imports. Load factors vary by technology, with nuclear stations the highest at 72.3 per cent and the lowest being pumped storage hydro at 11.2 per cent. Full load factors for renewable generation are given in DUKES Table 6.3.

# Map of Major Power Producers in the UK (operational May 2025)



# UK Distribution Network Operating Areas and GB Power Lines Map

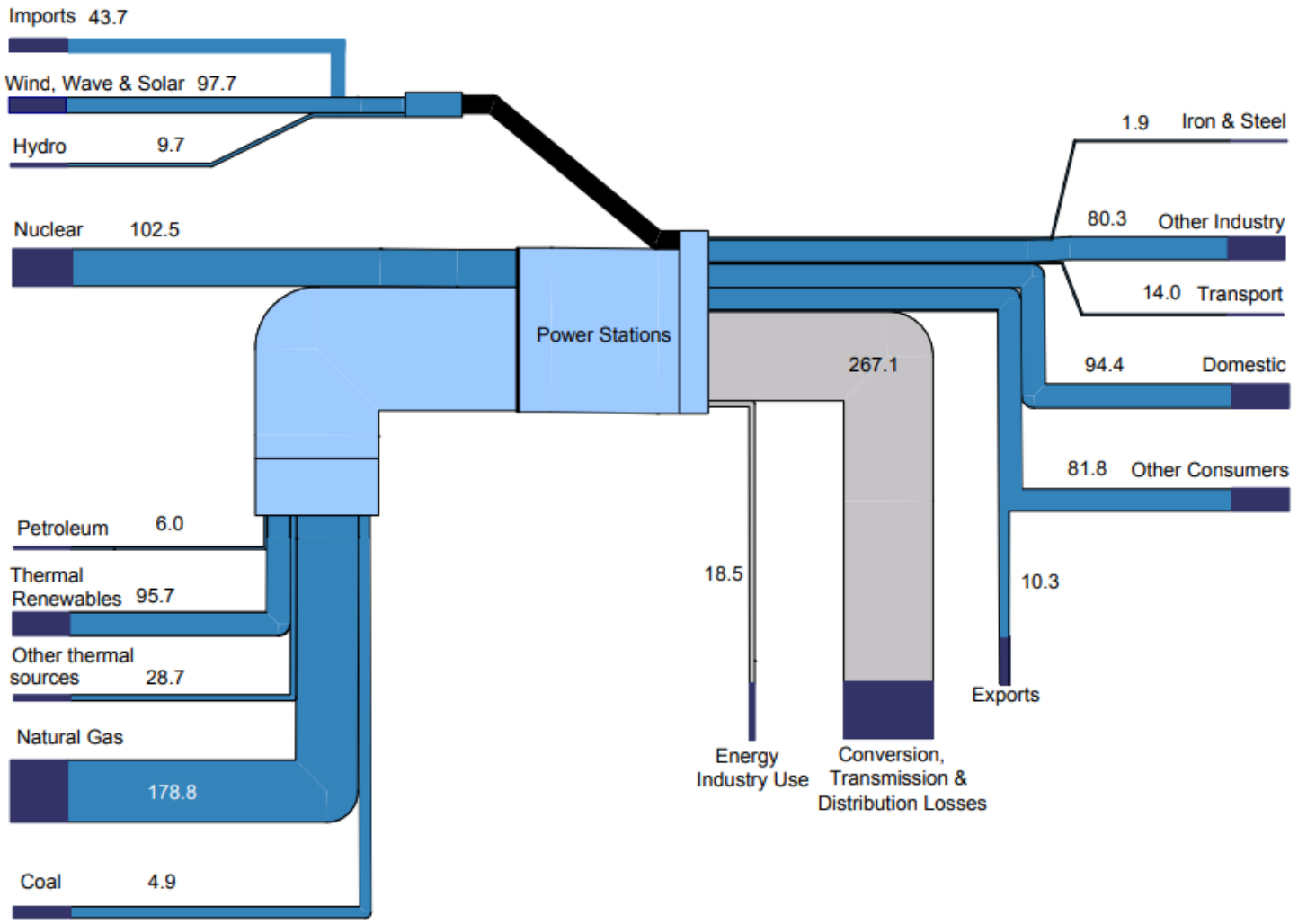





Trade connections are representations of the route, not the actual locations of cables.

Data sources: National Grid Transmission Network (www.nationalgrid.com/uk); DESNZ Distribution Network Operator Data; DESNZ Country Boundary Data.

## Electricity Flow Chart 2024 (TWh)




### Notes on flow chart

This flow chart is based on the data in Tables 5.1 (for imports, exports, use, losses and consumption) and 5.6 (fuel used).
1. Hydro includes generation from pumped storage while electricity used in pumping is included under Energy Industry Use.
2. Conversion, Transmission and Distribution Losses are calculated as fuel used (Table 5.6) minus generation (Table 5.6) plus losses (Table 5.1).

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