Department for Energy Security & Net Zero

Digest of UK Energy Statistics
Annual data for UK, 2024

About this release

Information on energy production, trade, and consumption in the UK for total energy and by specific fuels.

In this release

Data tables

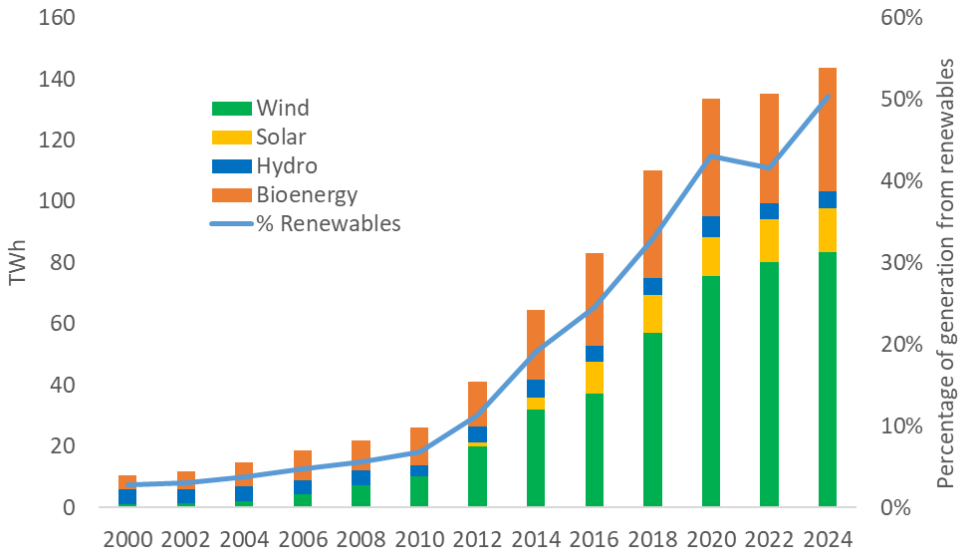
See the full list of tables and annexes for more information. Additional data are available online as part of the DUKES series:

Total energy
Coal and derived gases
Oil and oil products
Gas
Electricity
Renewables
CHP

This publication is based on a snapshot of survey data from energy suppliers. New data are incorporated in line with the revisions policy.

The share of UK electricity generation from renewable technologies reached a new record high of 50.4 per cent in 2024, up from 46.5 per cent last year**.** Generation from wind reached a record high, solar output matched last year's record high, and bioenergy generation increased by 17 per cent. **Fossil fuel reached a record low of 31.8 per cent of generation**, with coal generation ceasing in September of 2024. Gas remained the principal form of UK generation at 30.4 per cent, slightly outpacing wind's contribution of 29.2 per cent of generation.

Volume and percentage of electricity generated from renewable sources, 2000 – 2024



UK energy production dropped to a new record low, down 6 per cent on 2023. Both oil and gas production were at record 21st century lows as output from the UK's mature basin continues to decline. Output from wind, solar and hydro technologies reached a record high but currently forms under 10 per cent of UK production.

Overall energy demand increased on last year's low but remains lower than pre-pandemic levels, due in part to higher temperatures and higher energy and other prices than seen in 2019. Domestic consumption increased 4 per cent on last year, with transport up 3 per cent. Industrial consumption dropped 1 per cent on last year and remains at the lowest level since the 1950s as improvements in energy efficiency and shifts from manufacturing towards high value outputs such as pharmaceuticals contribute to reducing energy needs.

Overall trade volumes were broadly stable on last year, with a 2 per cent increase in imports and 6 per cent fall in exports compared with 2023, although this masks some variation by fuels. Import dependency in 2024 increased to 43.8 per cent, up from 40.3 per cent in 2023.

Chapter 1: Energy

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Key headlines

Energy production fell by 6.5 per cent to a record low level as production from the UK's mature continental shelf continues to decline. Oil production fell by 8.8 per cent and gas production fell by 10 per cent with both at record lows for the century. Oil and gas production is 75 per cent below the peak recorded in 1999 and 34 per cent below pre-pandemic (2019) levels reflecting the decline in output from the UK's mature continental shelf. **Wind, solar and hydro output rose by 1.2 per cent to a record high level** due to increased offshore wind and solar capacity.

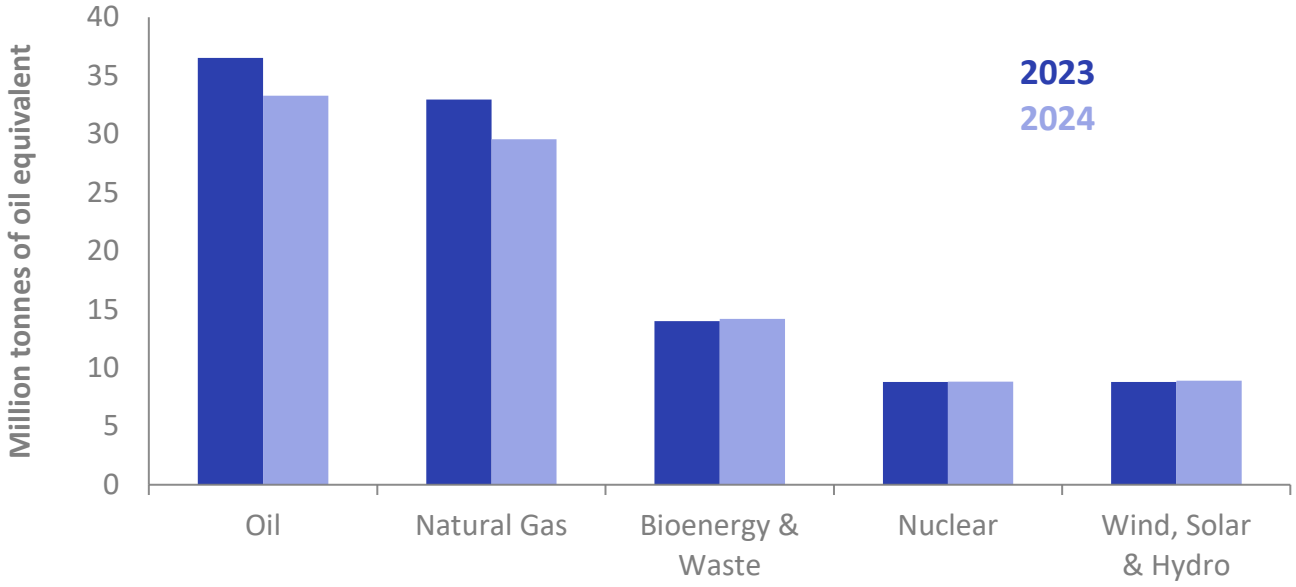
Energy consumption in 2024 rose by 2.6 per cent on 2023 but remains down 9.4 per cent on 2019. Consumption levels in 2024 rose for all sectors except for industry due to cooler weather as well as some easing from the higher energy prices in 2023. Domestic and services sector consumption both rose by 3.8 per cent, but industrial sector consumption fell by 1.2 per cent and remained at record low levels.

Transport demand rose by 2.9 per cent compared to last year but remains 4.0 per cent below pre-pandemic (2019) levels. **Aviation fuel demand rose by 9.4 per cent** and is now 1.3 per cent above 2019 levels.

Net imports rose by 8.9 per cent. Imports rose by 1.8 per cent but **exports fell by 5.5 per cent to a record 21st century low level.** The UK's net import dependency stood at 43.8 per cent, up from 40.3 per cent in 2023.

The bulk of the UK's energy imports, over 90 per cent, comprise oil and gas and **Norway is the UK's primary supplier of energy imports**. The largest share of oil imports in 2024 arrived from the United States, whilst Norway provides the largest share of gas imports.

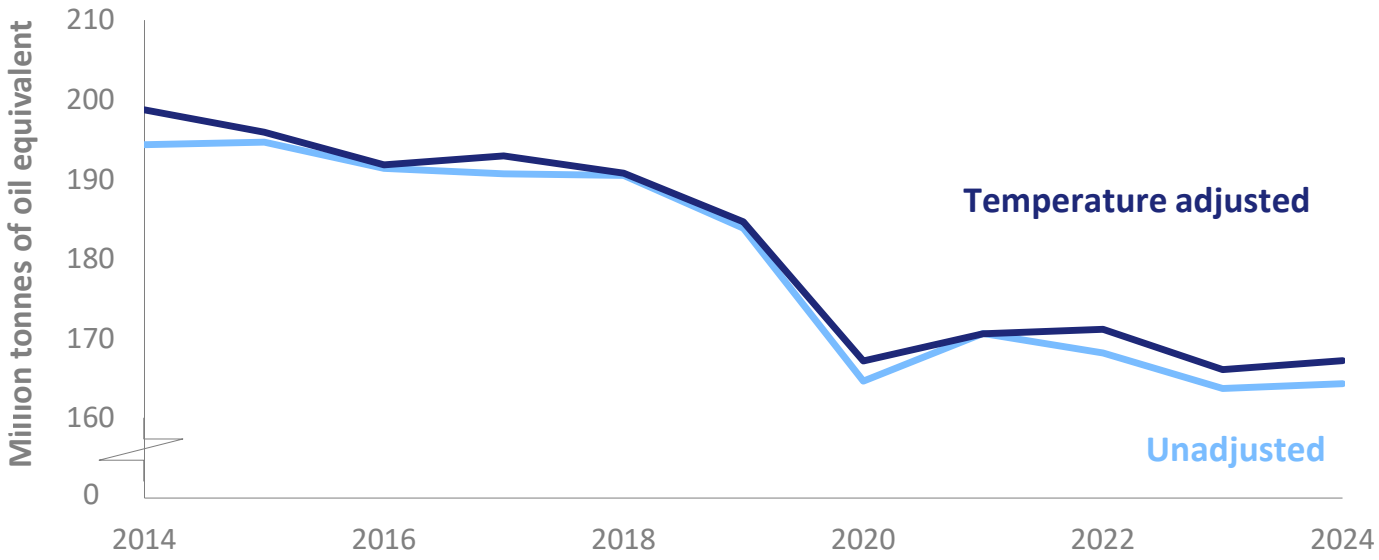
Chart 1.1 Production by fuels, 2023 and 2024 (DUKES Table 1.1)



In 2024 total production was at a record low level of 94.8 million tonnes of oil equivalent, 6.5 per cent lower than in 2023, and 26 per cent lower than pre-pandemic (2019) levels. Production levels for all fuels except bioenergy & waste, nuclear and wind, solar & hydro are down on 2023, with **coal, oil and gas output at record lows for this century**. UK production is 68 per cent below the peak recorded in 1999.

In 2024 oil production fell by 8.8 per cent to a record low level, with output down by 42 per cent on pre-pandemic (2019) levels. Natural gas production fell by 10 per cent to a record low level, with output down by 21 per cent on pre-pandemic (2019) levels. Oil and gas production is 75 per cent below the peak recorded in 1999 reflecting the decline in output from the UK's mature continental shelf. Coal output in the UK is now de minimis due to the last large surface mine Ffos-y-Fran closing at the end of November 2023. Nuclear output rose marginally from the record 21st century low level of 2023. Production of bioenergy and waste rose by 1.4 per cent, whilst wind, solar and hydro output rose by 1.2 per cent to a record high level due to increased offshore wind and solar capacity.

Chart 1.2 Primary energy consumption, 2014 to 2024 (DUKES Tables 1.1 and 1.1.4)



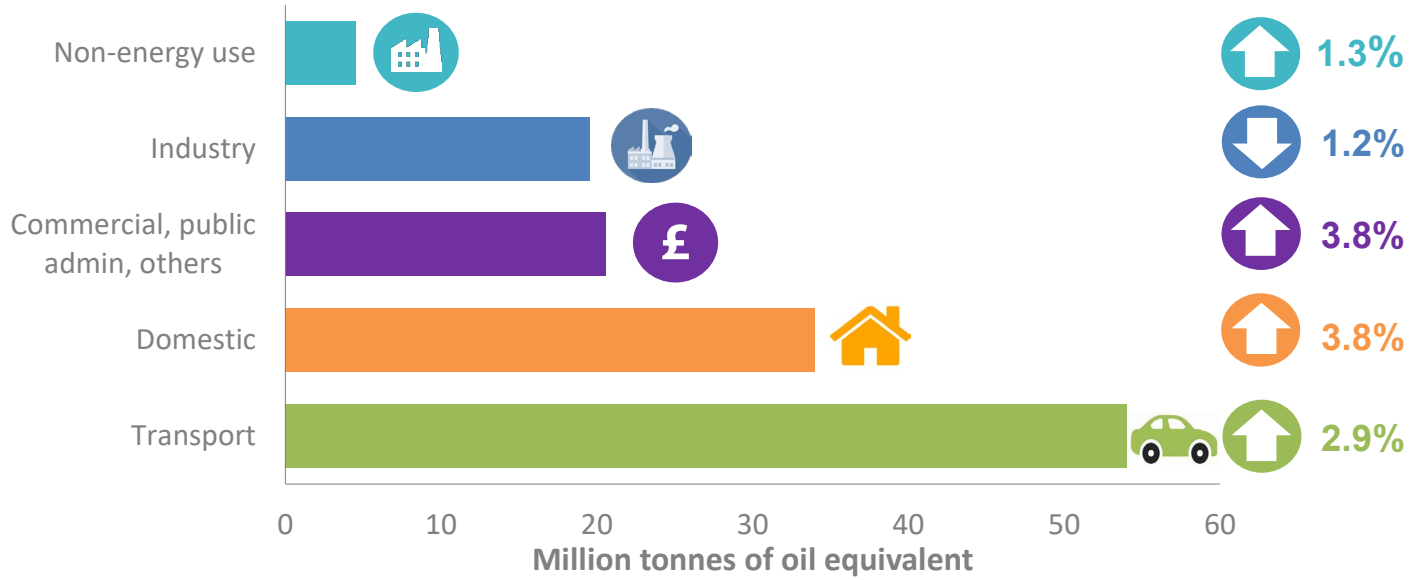
In 2024 total primary energy consumption was 164.4 mtoe, 0.4 per cent higher than in 2023, with cooler temperatures and an easing of the higher energy and other prices a key factor in the increased consumption levels.

Primary energy consumption includes use by consumers, fuel used for electricity generation, and other transformation activities. On a seasonally adjusted and annualised rate that removes the impact of temperature on demand, consumption was 167.2 mtoe, 0.7 per cent higher than in 2023. Total consumption levels on both an unadjusted and adjusted basis are now similar to 2020, when consumption levels were severely impacted by the COVID-19 pandemic, but this masks some variation between fuels.

In 2024 total primary energy consumption levels rose for all fuels except for coal and other solid fuels and gas. Consumption of oil rose by 2.1 per cent, within which aviation fuel sales were up on 2023 and at pre-pandemic levels. Consumption of bioenergy & waste rose by 8.3 per cent. Primary electricity consumption rose by 4.9 per cent, within which nuclear rose by 0.3 per cent, wind, solar and hydro rose by 1.2 per cent, and net imports rose by 40 per cent boosted by the Denmark-UK interconnector being in operation for its first full year.

Consumption of coal and other solids fell by 44 per cent due to there being no coal fired generation in the UK since the closure of the Ratcliffe-on-Soar power plant at the end of September 2024. Natural gas consumption fell by 2.1 per cent as electricity generators made more use of renewable sources as well as increased electricity imports; conversely, gas demand in the commercial and domestic sectors increased as prices eased.

Chart 1.3 Final energy consumption by sector, 2024 (DUKES Table 1.1)



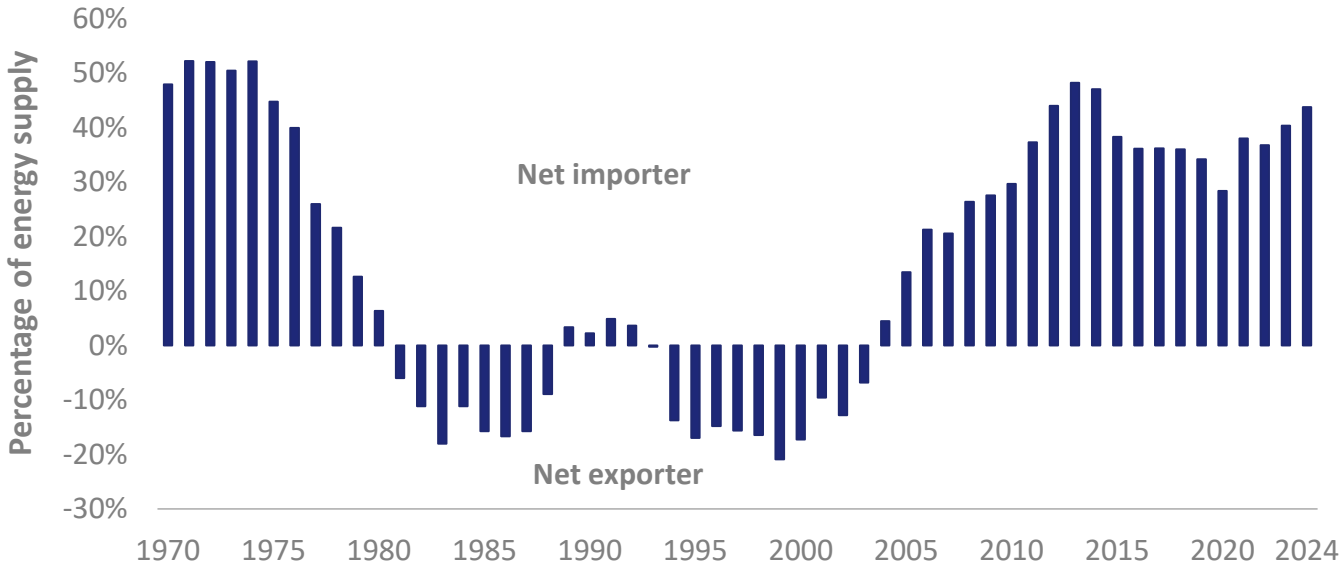
In 2024 total final energy consumption including non-energy use was 132.6 mtoe, 2.6 per cent higher than in 2023, but 9.4 per cent lower than pre-pandemic (2019) levels.

Except for industry, consumption levels in 2024 all rose with jet fuel for air transport rising to pre-pandemic (2019) levels.

Domestic sector consumption rose by 3.8 per cent, with average temperatures in 2024 marginally cooler than in 2023 as well some easing from the higher energy prices in 2023 likely contributing to the rise. Service sector consumption rose by 3.8 per cent with the easing from the higher energy price last year also likely a factor in the increased consumption levels. Transport sector consumption rose by 2.9 per cent, with road transport (petrol and diesel) consumption rising slightly and air consumption increasing by 9.4 per cent. Overall transport demand is 4.0 per cent below pre-pandemic (2019) levels. Industrial sector consumption fell by 1.2 per cent, to the lowest level in at least 50 years. In common with many other European countries, industrial consumption has contracted over time and the UK's industrial energy consumption has fallen 45 per cent since 2000. Improvements in energy efficiency and a move from traditional manufacturing to higher value processes such as pharmaceuticals have contributed to the fall.

Final energy consumption excluding non-energy use rose by 2.6 per cent, whilst on a temperature corrected basis consumption rose by 3.0 per cent with rises in all sectors except industry. Domestic consumption rose by 5.0 per cent, other services consumption rose by 4.3 per cent, transport consumption rose by 2.7 per cent, whilst industry consumption fell by 0.8 per cent.

Chart 1.4 Net import dependency, 1970 to 2024 (DUKES Table 1.1.3)



In 2024 net import dependency was 43.8 per cent[1], 3.4 percentage points higher than in 2023.

Imports in 2024 at 138.9 mtoe were 1.8 per cent higher than in 2023, but 23 per cent lower than their peak in 2013. Gas imports fell 8.4 per cent to the lowest level recorded since 2008. Pipeline imports rose 20 per cent but Liquefied Natural Gas (LNG) imports fell 47 per cent. Conversely crude oil imports rose 7.6 per cent to the highest level recorded since 2019.

Exports in 2024 at 64.1 mtoe were 5.5 per cent lower than 2023 and were at a record 21st century low level. Gas exports fell 33 per cent as trade returned to 'typical', pre Russia-Ukraine conflict levels. Exports to Belgium fell 56 per cent in 2024 compared to 2023, conversely, exports to the Netherlands and the Republic of Ireland rose by 7.8 per cent and 4.6 per cent respectively over the same period.

Net imports at 74.8 mtoe were 8.9 per cent higher than in 2023 and at the highest level recorded since 2015, and accounted for 43.8 per cent of consumption in 2024, up from 40.3 per cent in 2023 and at the highest dependency share level since 2014.

Despite net imports rising, the UK decreased its use of fossil fuels. The main fossil fuel sources in the UK are coal, gas and oil. In 2024, the share of primary energy consumption from fossil fuels fell to a record low 75.2 per cent from 76.6 per cent in 2023, whilst that from low-carbon sources stood rose to a record high 21.7 per cent from 20.8 per cent in 2023.

[1] Net imports as a proportion of primary supply (including an addition for the energy supplied to marine bunkers).

Chapter 2: Solid Fuels and Derived Gases

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Key headlines

Demand for coal fell in 2024, by 52 per cent to 2.1 million tonnes compared to 2023. The fuel mix has shifted towards other sources of fuel, particularly for electricity generation.

Consumption of coal for electricity generation fell 55 per cent to 0.7 million tonnes in 2024. The last coal-fired power plant, Ratcliffe-on-Soar, closed on 30 September 2024. Coal use has been phased out as electricity generation now favours gas, nuclear and renewables.

Production of coal fell to another record low, down 79 per cent from 2023 to 107 thousand tonnes. This was due to the last large surface mine, Ffos-y-Fran, closing at the end of November 2023. There is currently no large-scale surface mining in the UK. Deep mined coal rose by 30 per cent in 2024 compared to the previous year but was only a fraction of the total in 2015 when the last large deep mines closed. In the last ten years, UK coal production has fallen by 99 per cent.

Coal imports fell 49 per cent in comparison with 2023 to 1.8 million tonnes in 2024. In 2024, Colombia was the largest exporter of coal to the UK with a share of 37 per cent of total UK imports. This was followed by the European Union with 26 per cent and South Africa with 17 per cent. Coal exports rose by 48 per cent compared to 2023 as surplus stocks from closed coal-fired electricity generators were sold.

In 2024, coal comprised 0.9 per cent of UK energy demand, down from 1.8 per cent in 2023. Over a longer period, the trend reflects the transition away from coal in the UK's energy mix; coal demand has fallen from a 16 per cent share of UK energy demand in 2000. Most of this coal is used for electricity generation, coke manufacture, or in blast furnaces in the steel industry.

The Sankey diagram at the end of this chapter shows flows of coal from production and imports through to consumption. It is a way of visualising the figures that can be found in the commodity balance for coal in Table 2.4. The chart illustrates the flow of coal from the point of supply (on the left) to its eventual final use (on the right).

Reduced demand for coal drove a substantial contraction in supply, with UK coal production down 99 per cent since 2015. In 2024, coal production fell to a record low of 107 thousand tonnes, down 79 per cent on 2023 (Chart 2.1).

Deep mined production rose to 106 thousand tonnes and comprised 99 per cent of production in 2024. Eight deep mines remained open, and five mines reported coal production in 2024. This compares to 2015 when deep mined production provided nearly a third of total coal production, and when the last three large deep mines closed – Hatfield, Thoresby and Kellingley.

The last large surface mine, Ffos-y-Fran, closed at the end of November 2023. There is currently no large-scale surface mining in the UK.

Chart 2.1 UK coal supply and demand, 2000 – 2024 (DUKES Table 2.1)

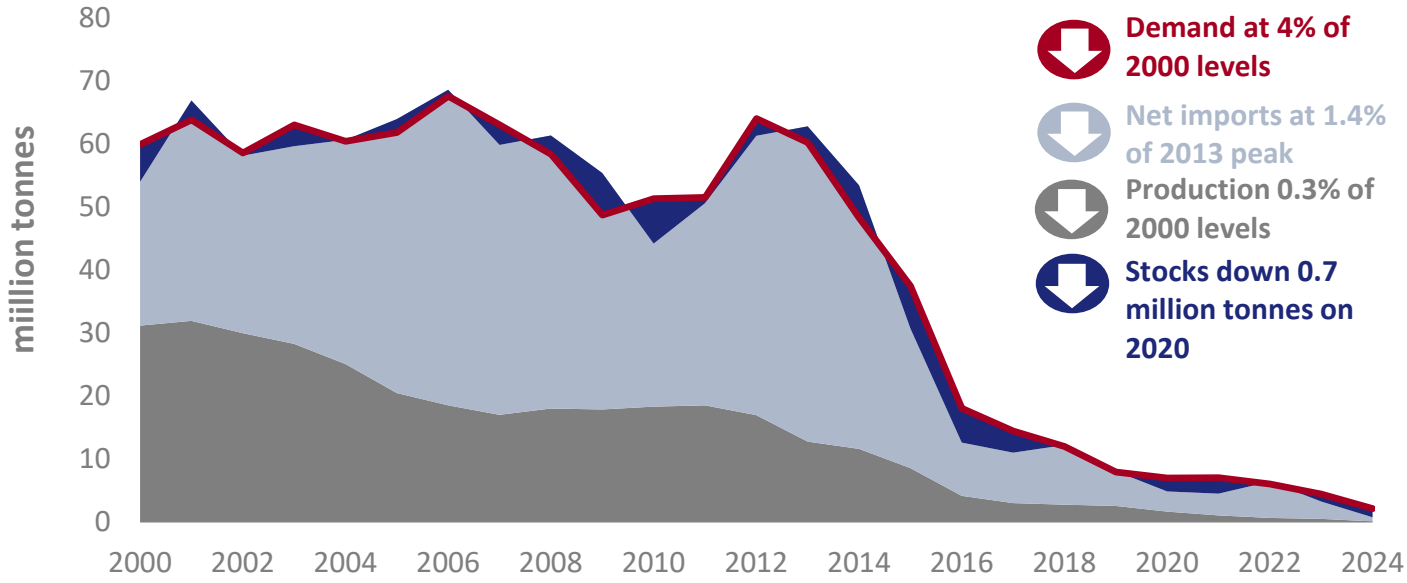
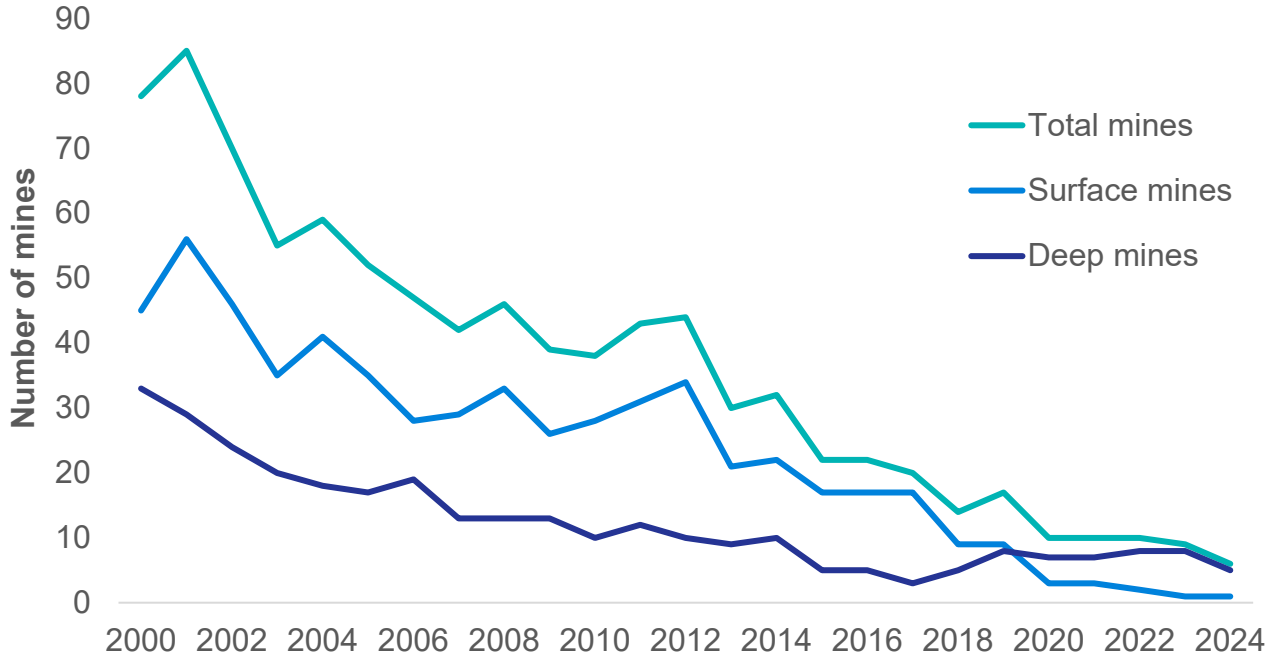
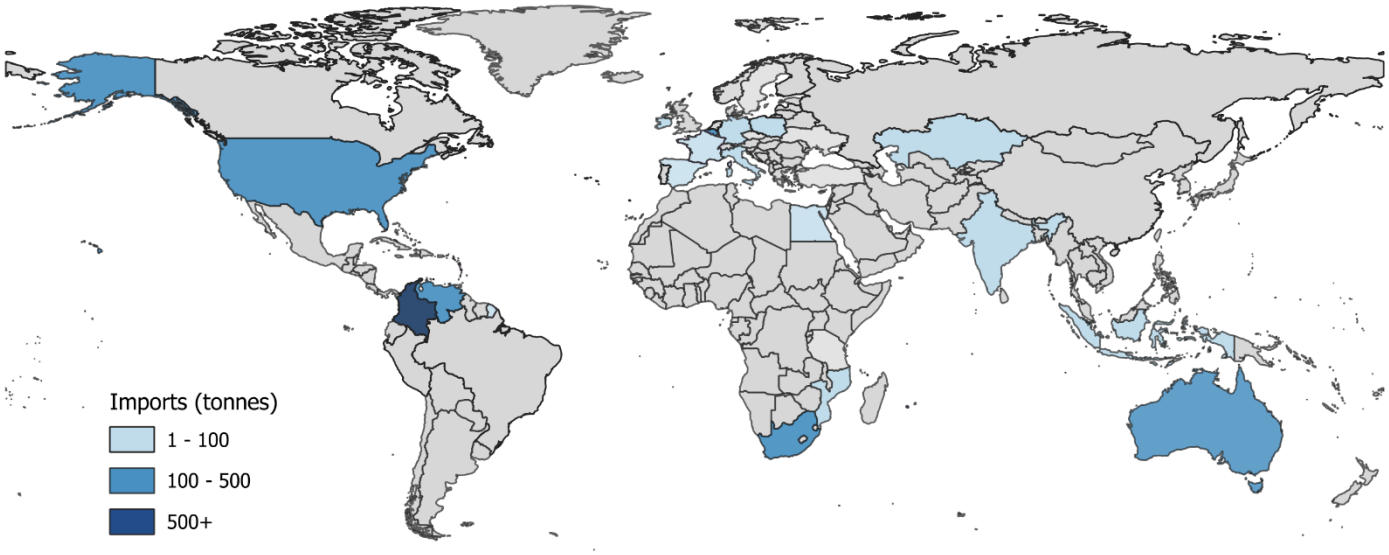


Chart 2.2 Number of coal mines producing in the UK, 2000 – 2024 (DUKES Table 2.5)



Net imports of coal also fell substantially, down 99 per cent from the peak in 2006. This is again a result of the sharp fall in demand for coal. However, in 2024, net imports fell by 75 per cent from 2023 levels to 0.7 million tonnes. In 2024, net imports accounted for 32 per cent of the UK's coal supply. Coal exports rose by 48 per cent compared to 2023.

Map 2A showing UK Coal Imports in 2024 (thousand tonnes)



For more detail on coal imports and exports see DUKES Tables 2.7 and 2.8

Steam coal imports were 34 per cent lower at 1.4 million tonnes in 2024 compared to 2023. Colombia was the largest provider of UK's steam coal (47 per cent). This was followed by South Africa (22 per cent) and the European Union (15 per cent). Steam coal accounted for 78 per cent of total coal imports. Coking coal imports were down 86 per cent at 0.2 million tonnes compared to 2023. The USA was the largest provider of UK's coking coal (47 per cent). This was followed by the European Union (38 per cent). Coking coal accounted for 11 per cent of total coal imports. The UK banned Russian coal imports in August 2022.

In 2024 the UK exported 1.1 million tonnes of coal, primarily to European countries. This included 0.9 million tonnes of steam coal, 0.1 million tonnes of coking coal and 0.01 million tonnes of anthracite. Steam coal exports included surplus stocks from closed coal-fired electricity generators.

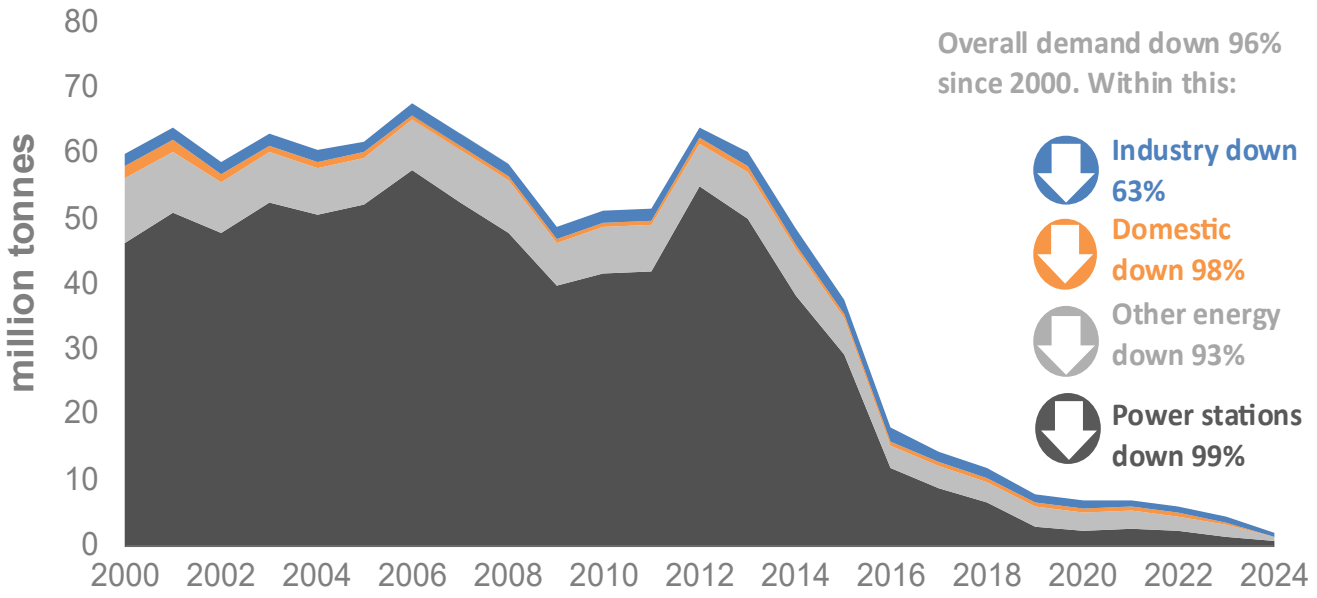
Coal stocks fell in 2024 continuing its downward trend. In line with much of what we see with coal, the main change to coal stocks came post 2014 when stocks began to gradually decline and power plants closed. There was a temporary rise in coal stocks in 2022, as generators rebuilt their stocks so that coal could be used for electricity if needed during winter 2022/23. However, stocks fell again in 2023.

As of June 2025, the Coal Authority estimates that in total there were 68 million tonnes of economically recoverable coal resources (Table 2.6). Of the economically recoverable and minable coal resource in current operations (including those in the planning or pre-planning process), 67 million tonnes are in underground mines and 1 million tonnes in surface mines. Overall, Wales had a 93 per cent share of UK current mines and licenced resources and England had a 7 per cent share.

The reduction of underground figures is due to the decline of the industry. An additional 2,050 million tonnes of prospects for underground mines and 778 million tonnes of prospects for surface mines were estimated in June 2022. Table 2.6 gives details of the resource assessment by England, Scotland and Wales as at June 2024.

Demand for coal fell by 52 per cent to 2.1m tonnes in 2024, compared to 2023 (table 2.2). Much of this decrease was driven by the 55 per cent fall in coal-fired generation to 0.7 million tonnes. The last coal-fired power plant, Ratcliffe-on-Soar, closed on 30 September 2024. Coal use has been phased out as electricity generation now favours gas, nuclear and renewables.

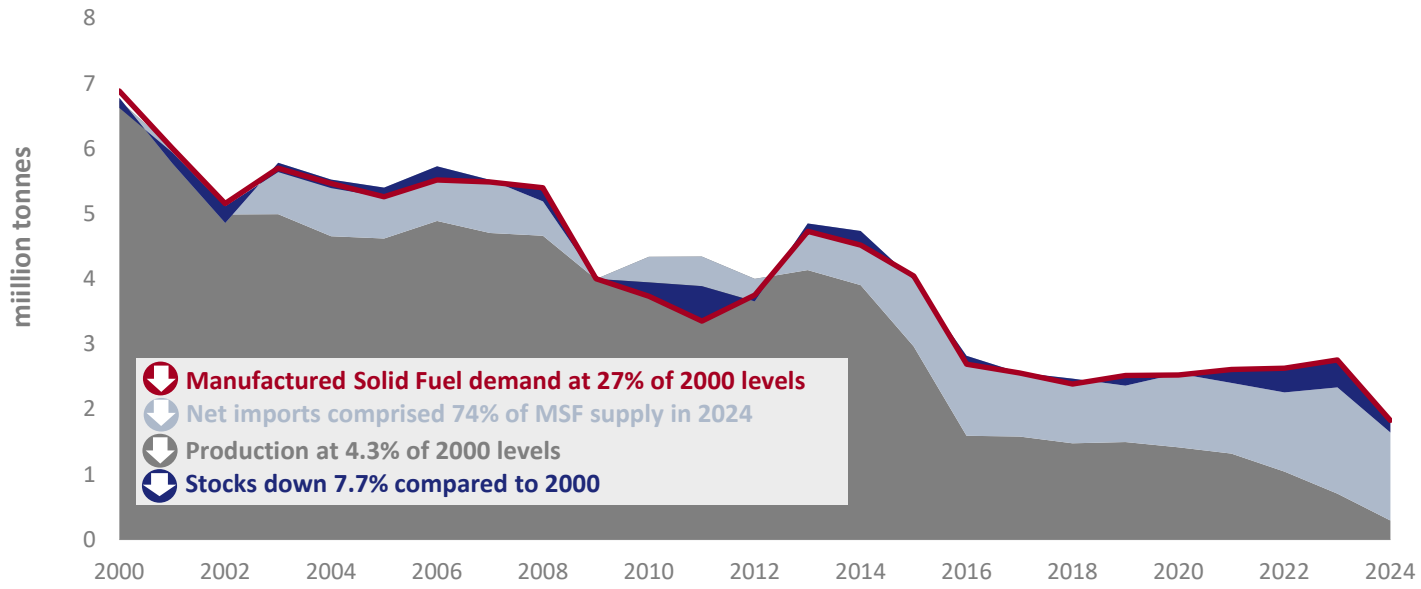
Chart 2.3 Coal Demand, 2000 – 2024 (DUKES Table 2.2)



The iron and steel industry is one of the main non-generation users of coal, for coke manufacture, blast furnaces and direct consumption. In 2024 it used 0.6 million tonnes of coal, just over a tenth of what it used in 2015 (5.2 million tonnes). In terms of total share, it comprised 27 per cent of UK coal demand in 2024, up from 14 per cent in 2015.

In addition to coal production and consumption, the UK has significant (but decreasing) supply and demand for a range of manufactured solid fuels that are used for domestic, industrial and transformation processes. Coke is the solid product obtained from the carbonisation of coal, principally coking coal, at high temperature and is used for smelting iron and steel.

Chart 2.4 Total manufactured solid fuels supply and demand, 2000 - 2024 (DUKES Table 2.3)

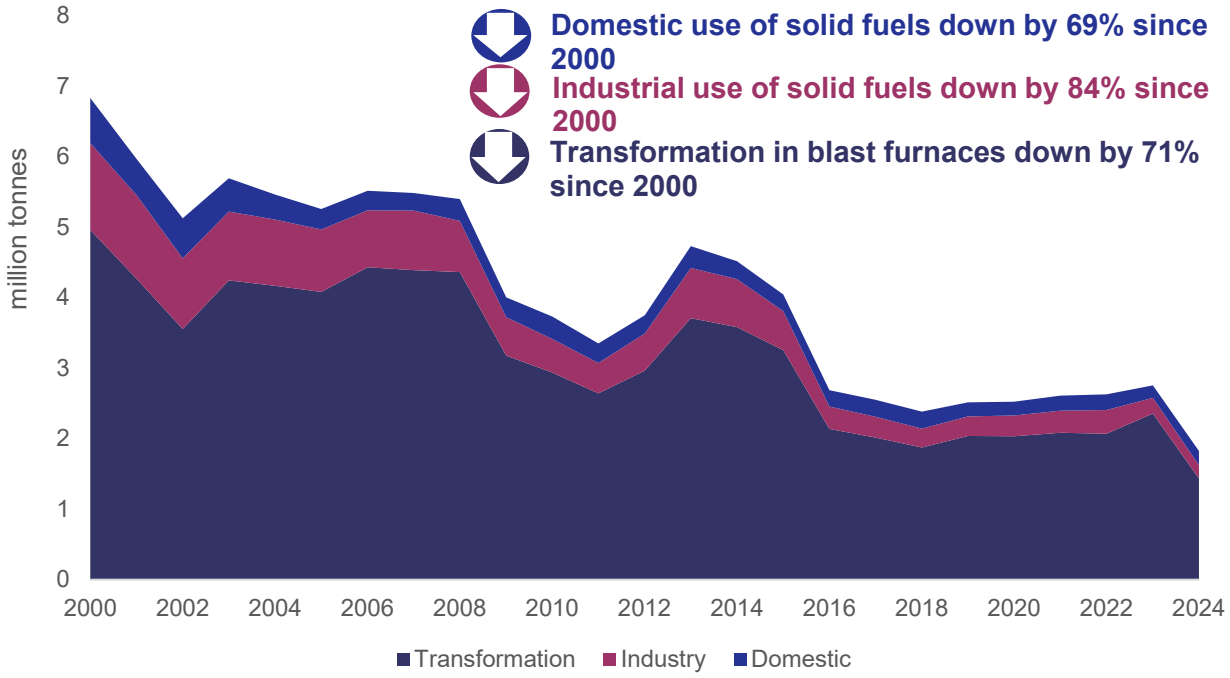


Production of coke oven coke, coke breeze and other manufactured solid fuels was 290 thousand tonnes in 2024. This was a decrease of 59 per cent compared to 2023. No coke and breeze was produced from the second quarter of 2024 after Port Talbot closed its coke ovens on 20 March 2024.

Monckton Coke and Chemicals, the only dedicated coke plant in the UK closed in December 2014. There has been a fall in steel production in the UK since 2015. Notably, SSI steelworks at Redcar ceased production in mid-September 2015 (with the subsequent closure in October). Scunthorpe steelworks closed on 12 June 2023.

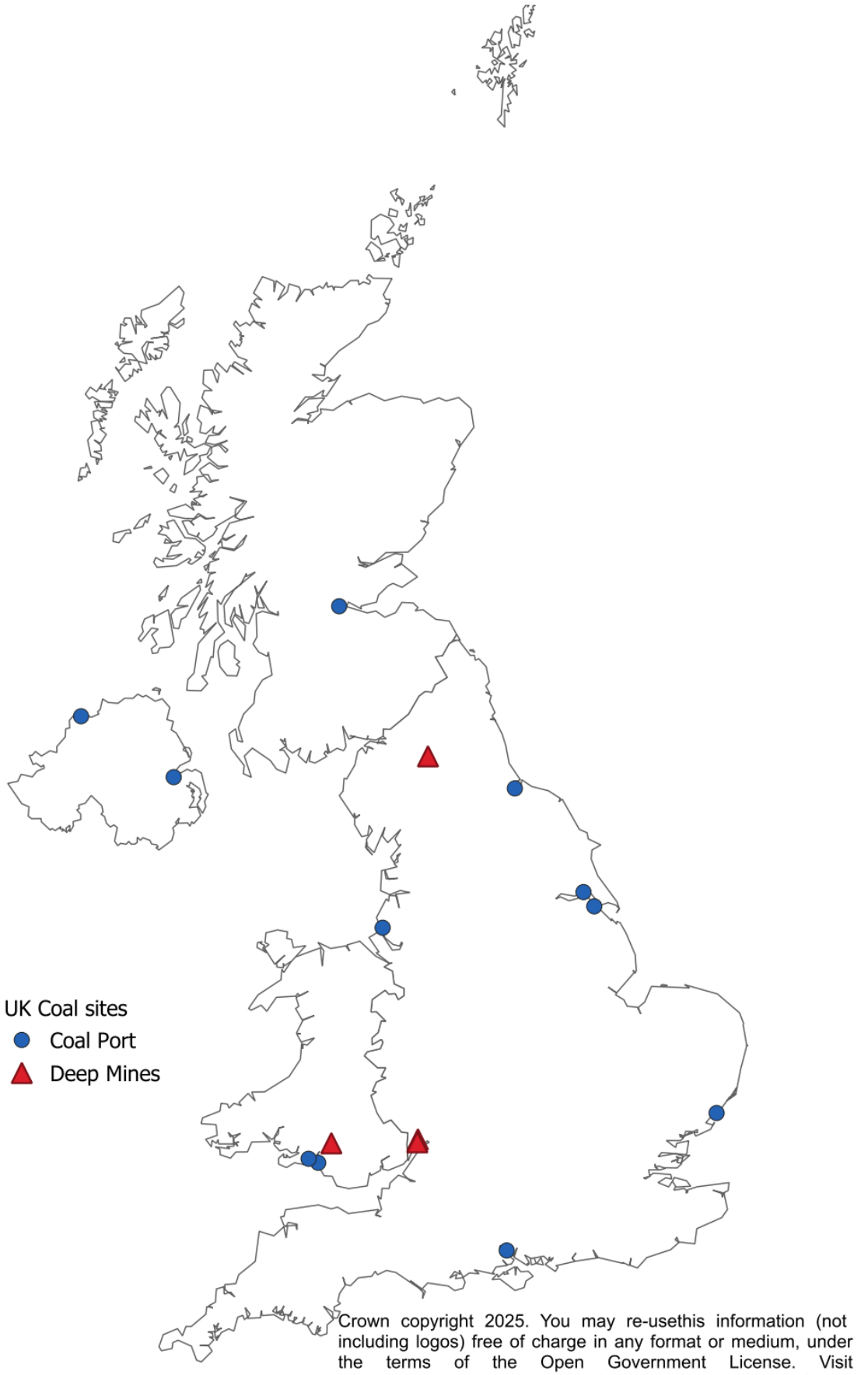
Other manufactured solid fuels (patent fuels) rose by 6.0 per cent to 193 thousand tonnes in 2024 compared to 2023.

Chart 2.5 Total manufactured solid fuels consumption in the UK, 2000 – 2024 (DUKES Table 2.3)



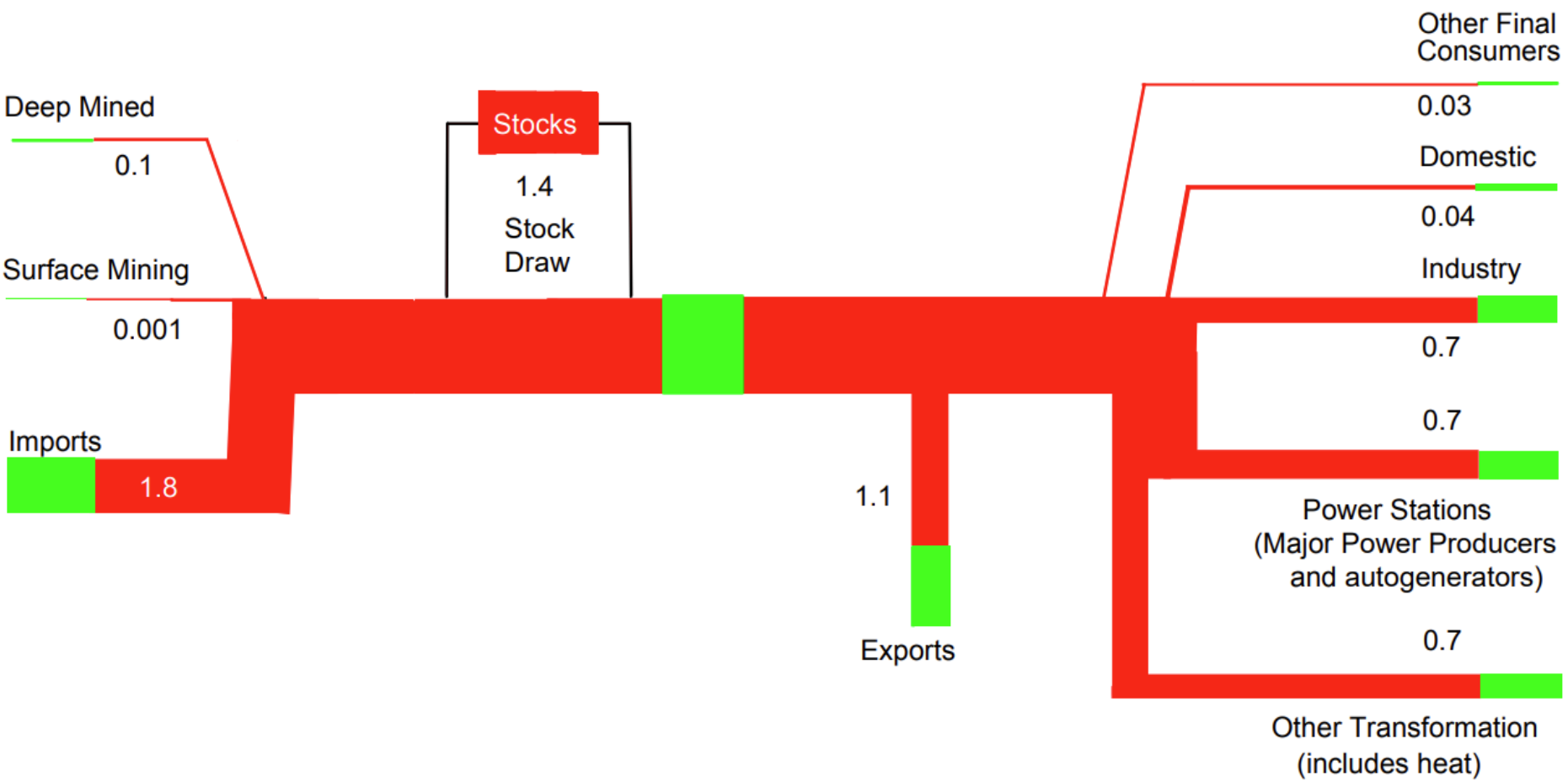
In 2024, coke oven coke comprised 59 per cent of demand for manufactured solid fuels, with coke breeze at 30 per cent and other manufactured solid fuels at 11 per cent. Almost all coke oven coke and coke breeze in the UK is used in blast furnaces for steelmaking.

Map 2B Location of UK coal production sites and ports as at end 2024



Note: Only ports that imported more than 10,000 tonnes are shown

Coal Flow Chart 2024 (million tonnes)



Note:

This flow chart is based on the data in Tables 2.1 and 2.2.
The numbers on either side of the flow chart will not match due to losses in transformation.

Chapter 3: Oil and Oil Products

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Key headlines

In 2024, UK production of primary oils fell 8.9 per cent to 31 million tonnes, the lowest level since North Sea production was established in the 1970s and continuing the ongoing pattern of decline from the mature North Sea basin. Net imports of primary oils increased by 12 per cent to 20 million tonnes.

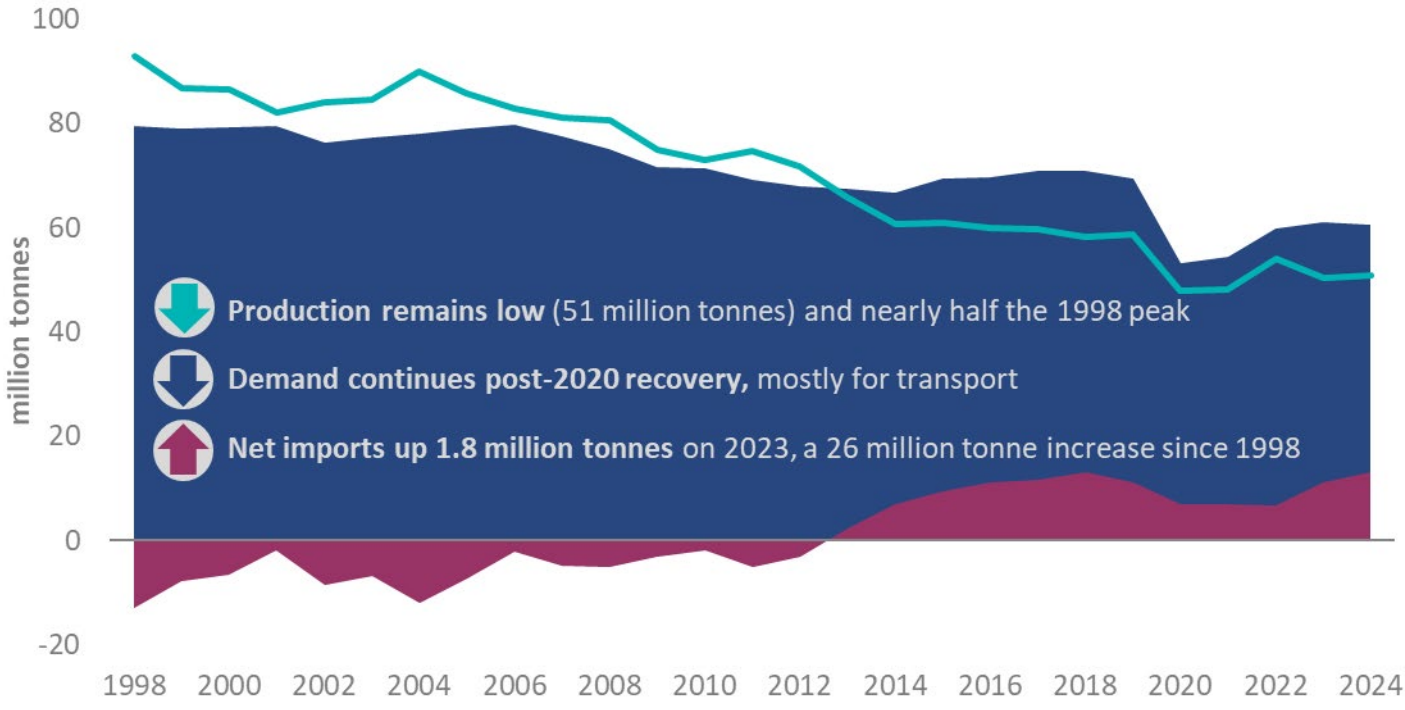
Refinery production remained low at 51 million tonnes, 14 per cent below pre-pandemic (2019) levels and around 60 per cent of 2000. The UK was a net importer of products by 13 million tonnes in 2024, the second highest figure since the UK became a net importer in 2013.

Overall demand for products increased by 2.0 per cent on 2023. As part of the continuing recovery of air travel following the COVID-19 pandemic, demand for hydrocarbon jet fuel was up 7.9 per cent to nearly pre-pandemic levels. While energy industry use was down by 8.5 per cent, final consumption was up by 2.9 per cent with increases in transport (up 2.4 per cent), domestic (up 13 per cent) and industry (up 2.2 per cent).

The UK held 11.2 million tonnes of oil stocks, exceeding the 90 days required by the International Energy Agency (IEA). **UK oil stocks increased by 18per cent compared to 2023,** partly because stocks were being re-built following an IEA-coordinated release of oil stocks in 2022, and because of an uplift in the UK obligation in July as part of the regular annual re-calculation.

Total demand for petroleum products increased by 2.0 per cent in 2024 compared to 2023 (total demand includes transformation, energy industry use and final consumption). This continued recovery to 61 million tonnes is the highest annual demand since the onset of the COVID-19 pandemic. However, demand remains 10 per cent below 2019 levels and a fifth lower than 25 years ago in 2000.

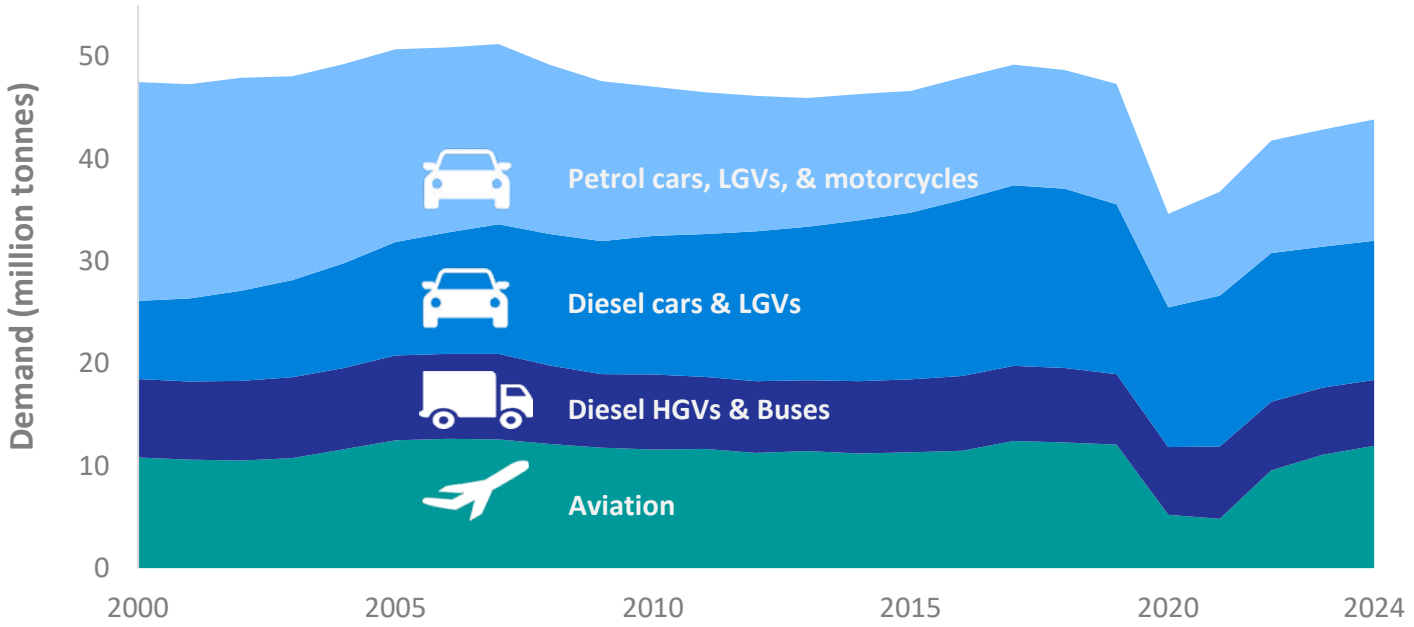
Chart 3.1 Supply and demand for petroleum products, 1998 – 2024 (DUKES Table 3.2)



Refinery production was up by 1.1 per cent compared to 2023 but remained low at 51 million tonnes and around 60 per cent of that seen 25 years ago in 2000[1]. Compared to 2019, production in 2024 was down by 14 per cent, and corresponds with a 10 per cent fall in demand – and a 17 per cent increase in net imports.

The UK was a net importer of products in 2024 by 13 million tonnes, an increase of 16 per cent on the previous year. This is the second highest level since the UK became a net importer in 2013, and 17 per cent above pre-pandemic 2019. Product exports remained stable in 2024, but imports rose by 5.9 per cent because the increase in refinery production did not keep pace with the 2.0 per cent increase in demand.

Chart 3.2 Annual demand for transport fuels, 2000 to 2024[2] (DUKES Table 3.2)



As is usual, transport was the largest demand sector for petroleum products, accounting for three-quarters of the UK's total product demand. Transport demand increased by 2.4 per cent compared to last year. In the longer term, transport demand dipped by 13 million tonnes in 2020 compared to 2019 due to travel restrictions that were put in pace to curb the spread of COVID-19. It has recovered by more than a quarter since 2020 but remains 7.5 per cent down on 2019.

Over 40 per cent of transport fuel demand was accounted for by diesel vehicles – cars, goods vehicles and buses. Nonetheless, diesel demand has not shown the post-pandemic recovery that petrol and jet fuel have but rather has continued decreasing steadily since a peak of 25 million tonnes in 2017. From 2000 to 2017, demand from diesel vehicles increased by 60 per cent. From 2017 to 2024, demand fell by one fifth. This is partly due to an increase in biodiesel, but also the increasing popularity of electric vehicles, and motorists switching away from diesel due to environmental concerns since the emissions scandal around 2017 to 2018[3].

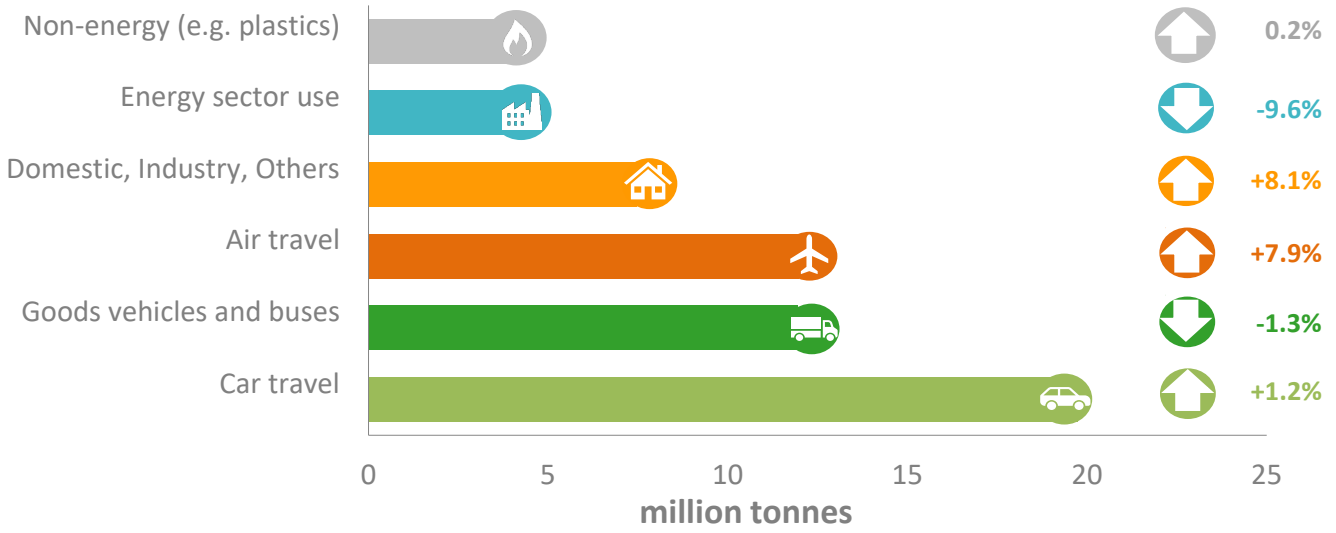
Just over 70 per cent of transport demand was for road fuels. This share is down 1.4 percentage points on 2023, reflecting the increase in fuel used for air travel.

Hydrocarbon jet fuel demand increased by 7.9 per cent in 2024 compared to 2023. The COVID-19 pandemic brought restrictions on air travel which caused jet fuel demand to drop by more than half between

[1] See Annex 2 for a map and further detail on UK refinery nameplate capacities in the methodology note
[2] See UK Energy in Brief for detailed breakdown of fuel consumption by vehicle type
[3] For further analysis see Energy Trends special article Road Diesel Demand Drivers (DESNZ, June 2025)

2019 and 2020. In 2021, demand dropped to its lowest since 1984 but by 2024 had more than doubled since the pandemic years of 2020 and 2021 and hydrocarbon jet fuel demand is now only 0.9 per cent below 2019[4].

Chart 3.3 Oil consumption in the UK, 2024 (DUKES Table 3.2)



Petroleum product demand increased by 2.0 per cent overall and total final consumption saw a 2.9 per cent increase, showing a rise across most sectors.

Notably, the domestic sector, 88% of which is composed of burning oil, increased by 13 per cent on 2023. This was despite temperatures being comparable to the year before. In recent years, domestic demand for heating oil (burning oil or gas oil) has followed price fluctuations more closely than changes in temperature. It is typical with domestic heating oil for consumers to purchase in bulk when prices are low. As such, low prices in 2020 prompted people to buy in bulk despite stable demand. Demand dropped again in 2022 as the Russian invasion of Ukraine caused prices to rise. Moving forward, price reductions in 2023 and 2024 meant that demand rose by 8.4 per cent and 13 per cent in each year respectively.

Other sectors that generally show demand trends in line with temperatures – namely public administration and agriculture – showed similar increases due to price drops.

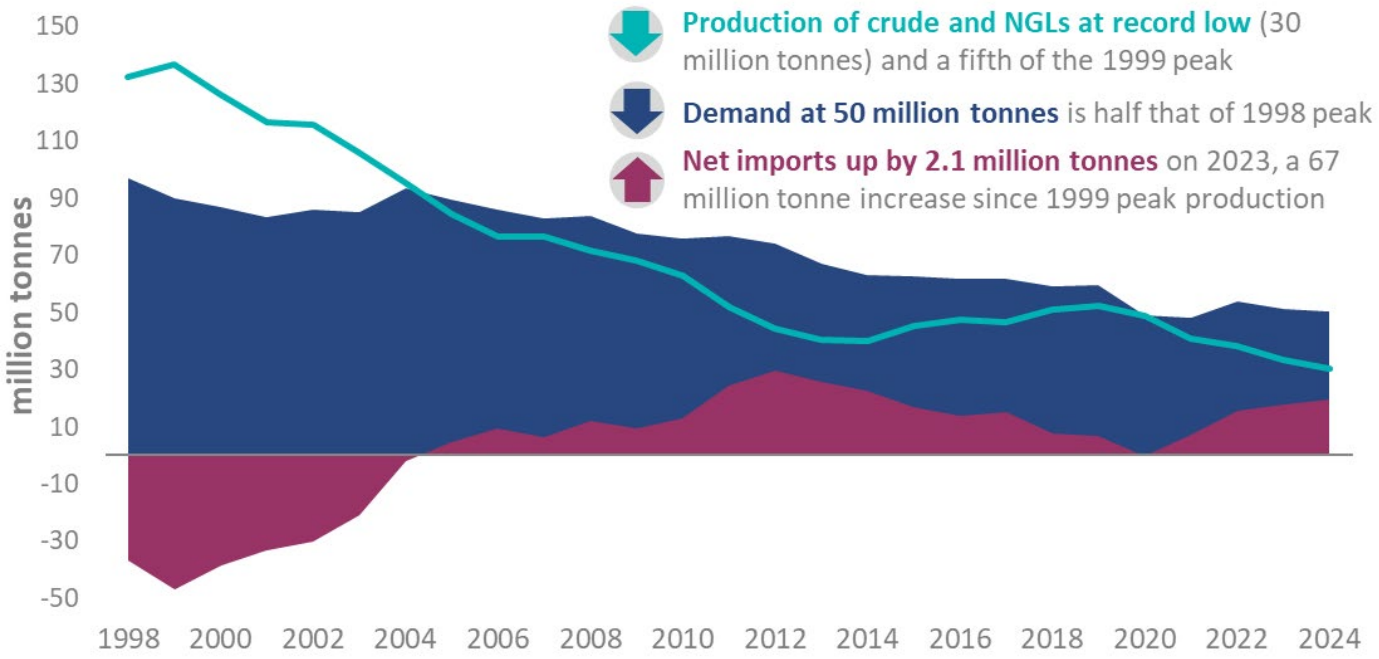
Industry demand increased by 2.2 per cent in 2024. However, over the longer-term industry oil demand has fallen by nearly two-thirds since the year 2000. Improvements in energy efficiency and a move from traditional manufacturing to higher value processes have contributed to the drop. The commercial sector also saw an increase, of 4.9 per cent. Non-energy use remained stable with petrochemical sector demand for naphtha remaining low because the plant at Teesside has been offline since the end of 2020.

Oil production reached a new record low of 31 million tonnes in 2024, down by 8.9 per cent on 2023 and in line with declining output from the mature North Sea basin. Offshore oil production began in the UK during the 1970s and peaked in 1999 at 137 million tonnes – current production is a fifth of that peak despite new fields temporarily providing a boost from 2015 until 2019. Production has been in decline since 2020, with a sharp drop in 2021 caused by planned extensive maintenance of the Forties Pipeline System, which transports a significant proportion of UK oil to onshore terminals.

Demand for primary oils increased by 1.2 per cent compared to 2023. With production down this led to a 12 per cent increase in net imports, which reached 20 million tonnes and were at the highest since 2014. Imports were up by 6.4 per cent to 48 million tonnes and exports up 2.9 per cent to 28 million tonnes.

[4] Note that once the increased use of sustainable aviation fuel (SAF) in the sector is accounted for, aviation demand is 1.3 per cent on 2019. See Table 1.1 of DUKES.

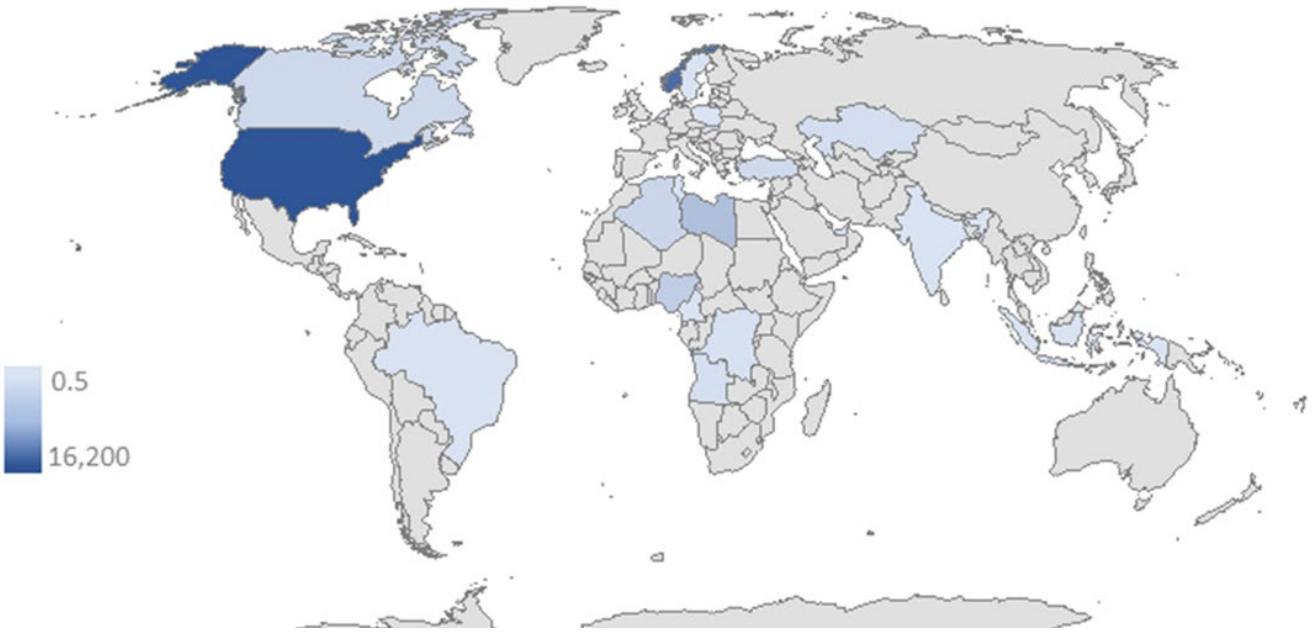
Chart 3.4 Supply and demand for primary oils, 1998 – 2024 (DUKES Table 3.1)



Note: Demand excludes transfers and stock changes

Refineries took receipt of 4.0 million tonnes of crude produced from the UK Continental Shelf in 2024, down by 41 per cent compared to 2023 and meeting just 7.7 per cent of refinery demand compared to 13 per cent in 2023[5]. Historically, UK refineries took receipt of more North Sea crude as a share of total supply but changes in maritime shipping fuel rules since 2020[6], prices on the global market, and Grangemouth being prepared for closure in early 2024, mean more crude has been imported - mainly from the US and Norway.

Map 3A Sources of UK crude oil imports 2024 (thousand tonnes, DUKES Table 3.7)



[5] See Energy Trends Table 3.10
[6] International Maritime Organization 2020, cutting sulphur oxide emissions

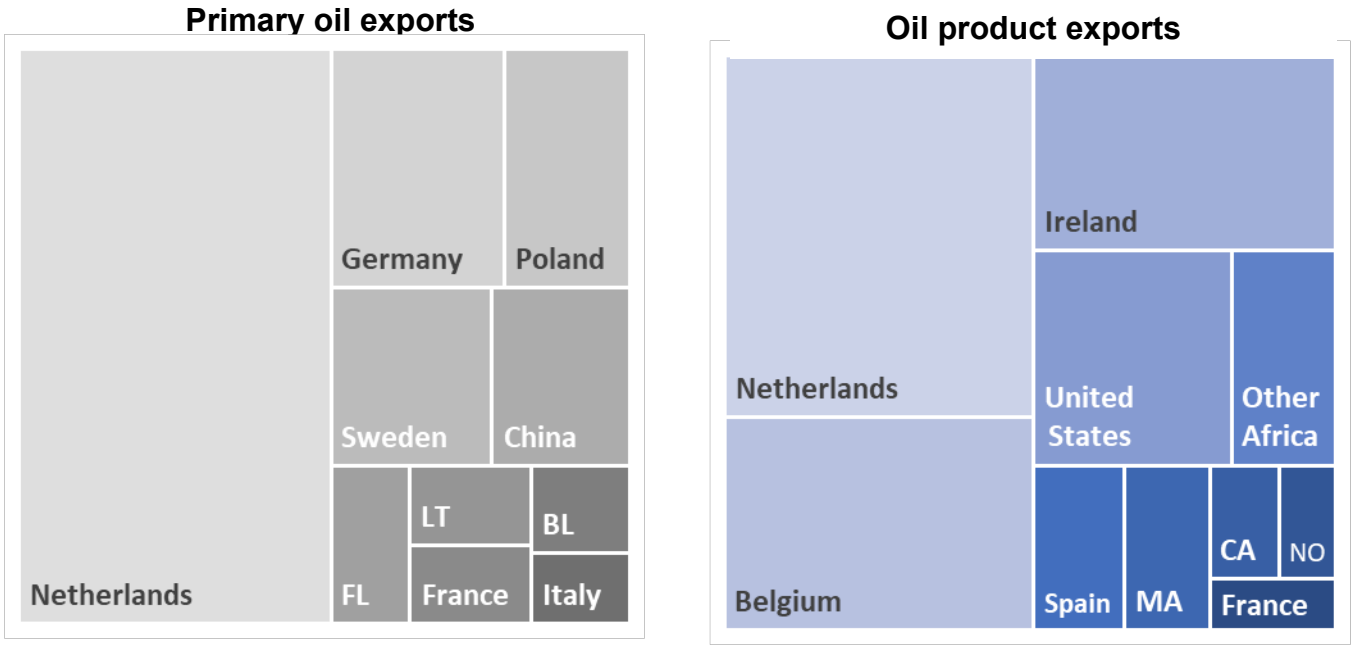
In 2024 the United States took back its position from Norway as the number one exporter of crude oil to the UK by almost three million tonnes. Imports from the US accounted for over a third of total crude imports and were up by 23 per cent compared to 2023, a year in which Norway exported over one million tonnes more crude to the UK than the US. At 16 million tonnes, 2024 was a record year for UK crude imports from the US.

Norway was the second largest source of crude imports at 13 million tonnes, down 6.3 per cent on 2023, but still accounting for 31 per cent of the UK's imported crude.

The ban on imports of Russian oil introduced on 5th December 2022 forced importers to diversify and seek different crude sources. The UK has not imported any oil from Russia since the ban. Crude sourced from current OPEC countries increased by over a third from 2022 to 2023 following the ban and increased another 9.1 per cent from 2023 to 2024. In 2024, OPEC countries were the source of 20 per cent of UK crude imports. The UK also exports a significant amount of crude oil, mainly to the Netherlands and other European countries, with crude exports up by 1.6 per cent compared to 2023.

UK exports of total primary oils were up by 2.9 per cent in 2024 compared to 2023, with 90 per cent going to the EU and mainly to the refining hubs in the Netherlands where it is processed into road diesel, gas oil, and heating fuels – oil types that the UK relies on imports to meet demand.

Chart 3.5 UK primary oil and oil product export destinations (DUKES Table 3.8)

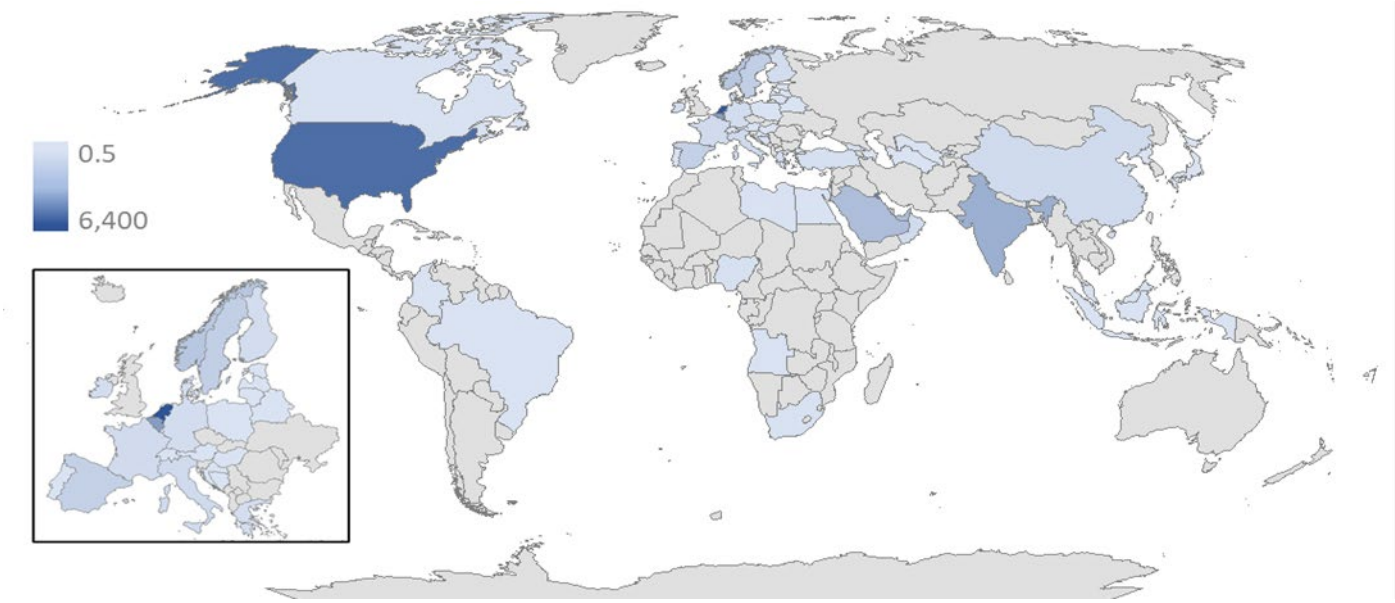


Key
BL Belgium, **CA** Canada, **FL** Finland, **LT** Lithuania, **MA** Morocco, **NO** Norway

Oil product exports were stable compared to 2023, with the majority (around 70 per cent) going to the EU. The UK is more than self-sufficient for petrol, so petrol is typically around half the product export total. In 2024 the UK exported 2.3 million tonnes of petrol to the Netherlands, 2.0 million tonnes to the US, and 1.9 million tonnes to Belgium (together more than 70 per cent of petrol exports). While the UK is reliant on imports to meet demand for jet fuel, exports of 1.4 million tonnes to Ireland in 2024 were 97 per cent of total UK jet fuel exports.

Overall petroleum product imports increased by 5.9 per cent compared to 2023, reflecting the increase in demand and continued low refinery production. Just under 40 per cent of product imports were diesel, with the United States (35 per cent), the Netherlands (21 per cent) and Belgium (16 per cent) collectively making up just over 70 per cent of those imports, reflecting a change since the 2022 sanctions given that Russia used to be an important source of diesel for the UK.

Map 3B Sources of UK petroleum product imports 2024 (thousand tonnes, DUKES Table 3.7)

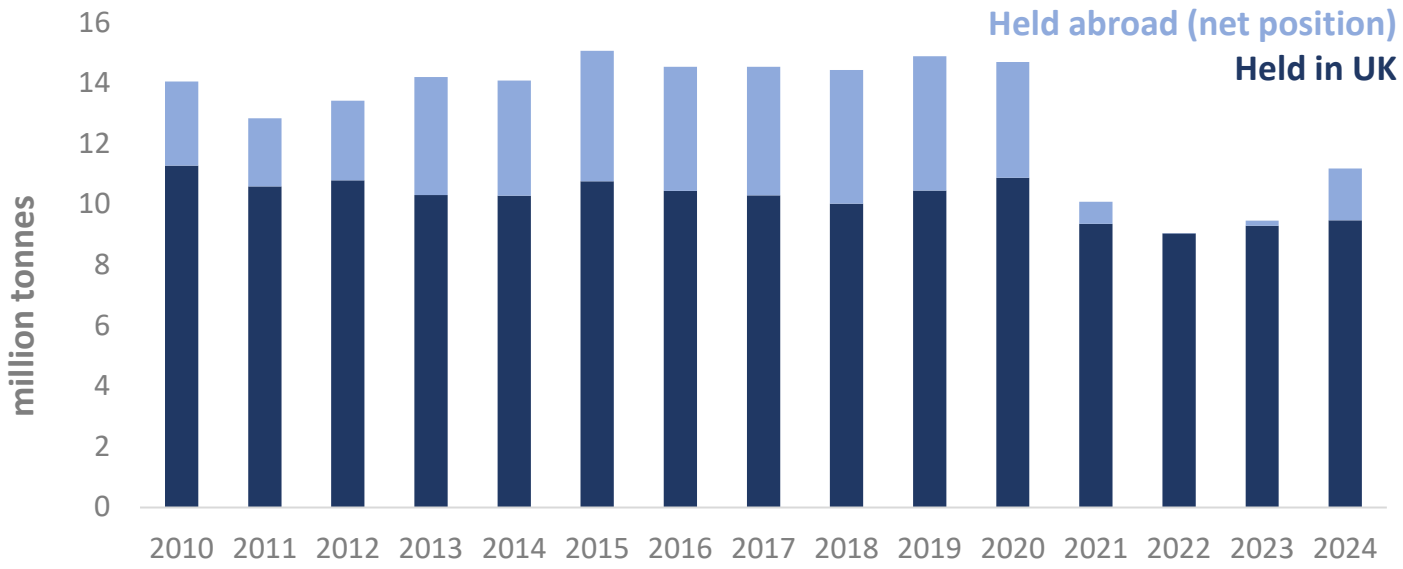


The Netherlands is the UK's closest major oil refining and trading hub, so accounts for most oil trade with the UK. Dutch product imports represented a fifth of the total at 6.4 million tonnes, with the next highest source being the United States, accounting for 16 per cent of the total at 5.3 million tonnes. Imports from Kuwait have been increasing since 2022, and in 2024 Kuwait was the third largest source of product imports at 14 per cent (see information on jet fuel below).

Jet fuel made up one-third of product imports and increased by 9.5 per cent in 2024. This uptick met a 7.9 increase in demand as UK hydrocarbon jet demand recovered to within one per cent of pre-pandemic levels, recovering from the low air traffic because of COVID-19 travel restrictions. In recent years, Kuwait has become the primary source of imported jet fuel for the UK, accounting for 38 per cent of the total at 4.1 million tonnes. India, the UAE, and Saudi Arabia also each supplied more than one million tonnes.

UK government is required to hold stocks of oil which can be released in the event of severe disruption to global supply. Government meets this obligation (under membership of the International Energy Agency) by directing industry to hold stocks. The drop in stocks in 2021 (Chart 3.6) follows the end of the EU transition deal (stocks were 60 days of demand) and the UK move to the IEA stockholding system (90 days of net imports).

Chart 3.6 UK oil stocks, 2010 to 2024 (DUKES Table 3.5)

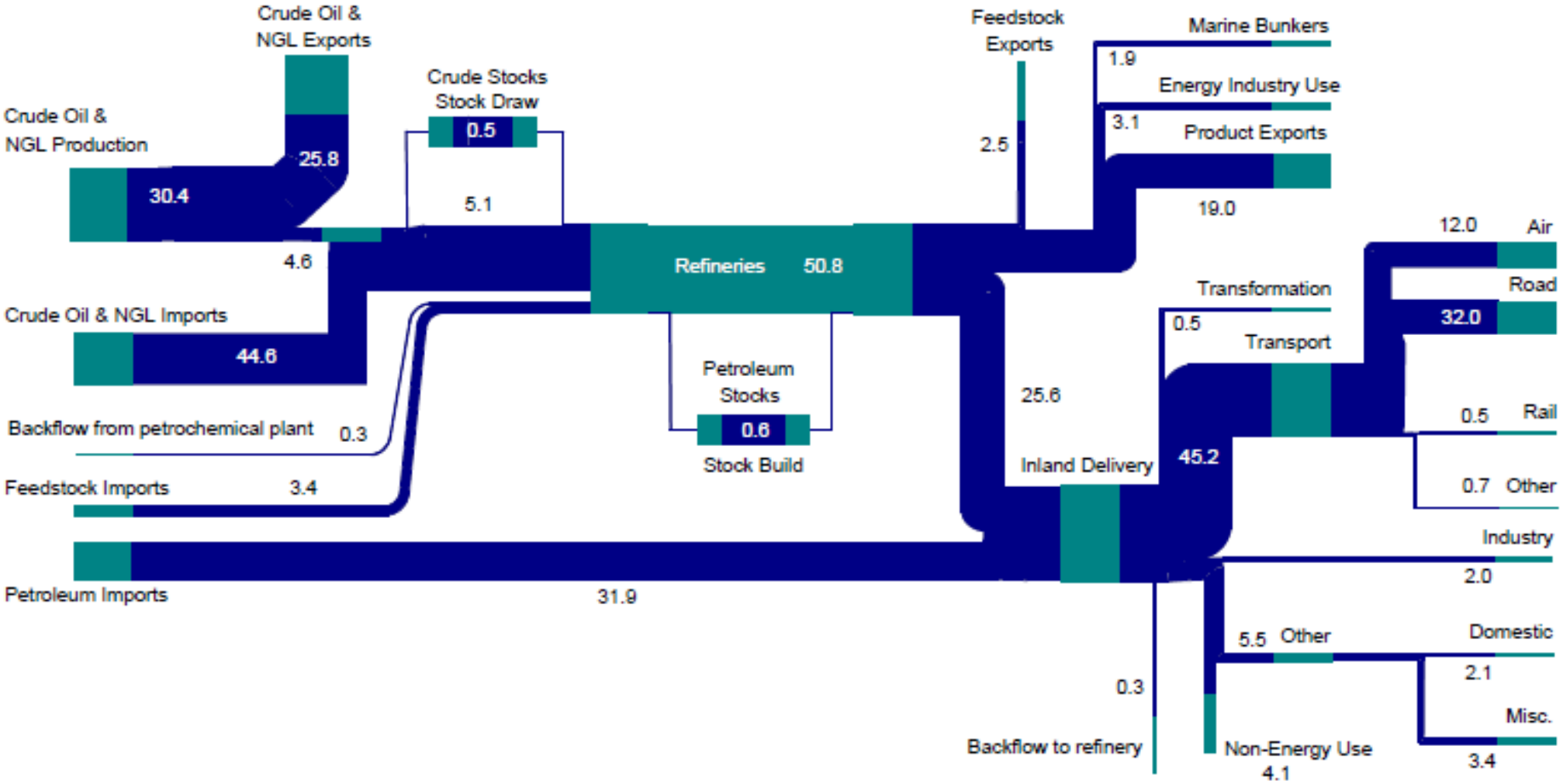


The UK held 11.2 million tonnes of stocks at the end of 2024 (DUKES Table 3.5), more than enough to meet the required 90 days of net imports. In March and April 2022, the UK participated in an IEA co-ordinated release of oil stocks in response to Russia's invasion of Ukraine. Stocks had been re-built after this release by April 2024. Stocks were up by 18 per cent on the year before, partly because of the re-build but also because of an uplift in the UK obligation when the calculation period was rolled over to 2023 in July of 2024. Net imports had been higher in 2023 compared to 2022, meaning the overall obligation increased.

Companies may choose to hold stocks within the UK or abroad via legal agreements with other countries. At the end of 2024 the UK held 9.5 million tonnes (85 per cent) in the UK, with most of that held abroad being in the Netherlands, as well as in Germany and Belgium.

The flow chart shows the movement of primary oils (on the left) into refineries which are then transformed and consumed by various sectors of the UK economy (on the right), in addition to trade. The widths of the bands are proportional to the size of the flow they represent.

Petroleum flow chart 2024 (million tonnes)



Notes:

This flow chart is based on the data in Tables 3.1 and 3.2.
The numbers on either side of the flow chart will not match due to losses in transformation.
Biofuels are not included.

Chapter 4: Natural Gas

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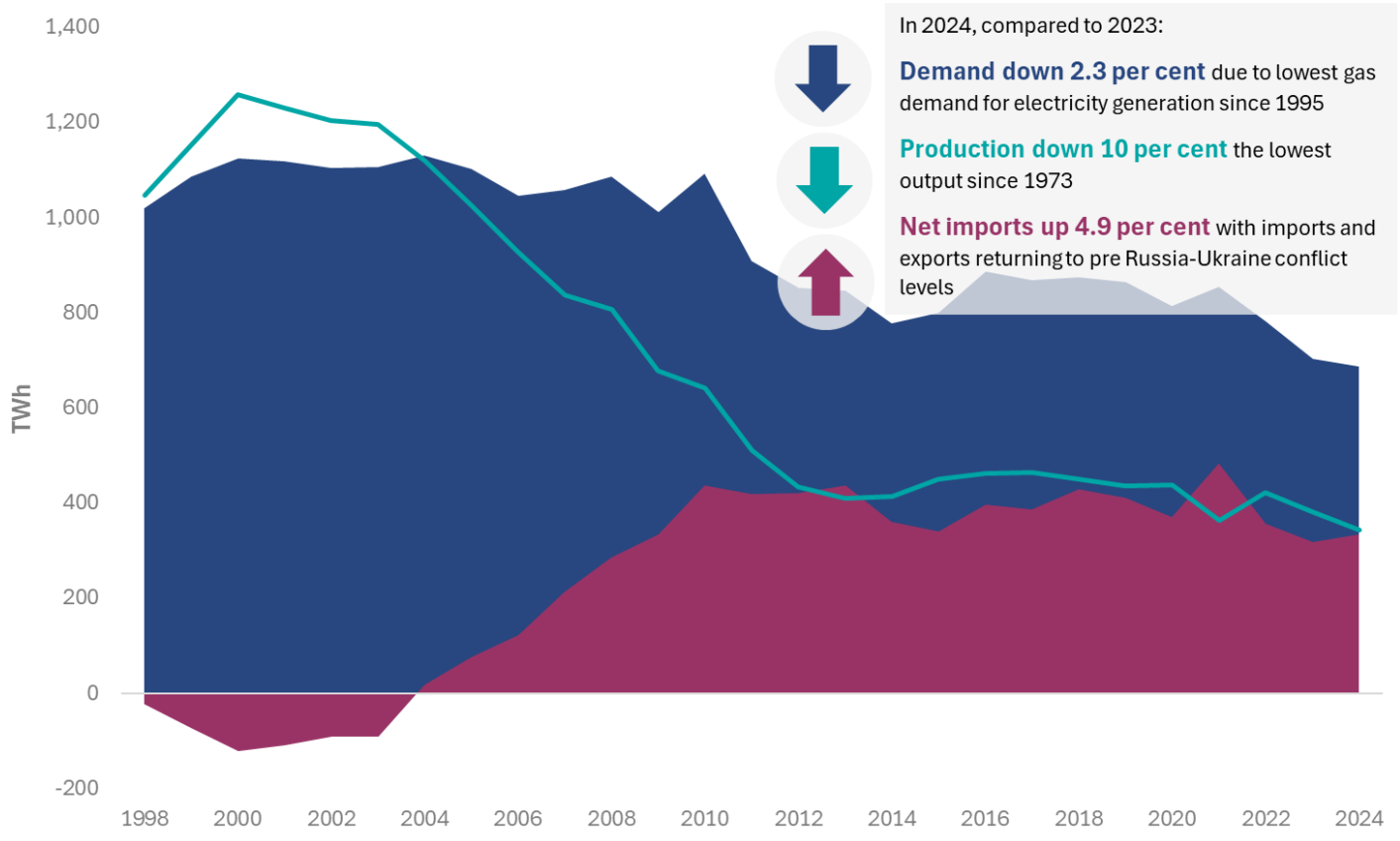
Key headlines

Natural gas production reached the lowest level since 1973. Gas production was down 10 per cent in 2024 on 2023 in line with expected decline of the mature North Sea basin.

Imports and exports of natural gas were down as trade returns to the more 'typical' levels prior to Russia's invasion of Ukraine. Imports and exports fell 8.4 and 33 per cent respectively in 2024 compared to 2023. The decline in gas imports was driven by reduced imports of liquified natural gas (LNG) which fell 47 per cent in the same period. Conversely, pipeline imports from Norway increased by 20 per cent amid record high Norwegian gas production.

Natural gas demand fell in 2024, due to reduced demand for electricity generation; demand fell 2.3 per cent on the 2023 low to the lowest level since 1992. Gas demand for electricity generation fell 14 per cent in the same period; gas demand for generation has been generally falling in recent years with sharp declines in 2023 and 2024, the result of lower electricity demand and increased electricity imports. Conversely, demand in final consumption sectors, such as commercial and domestic, increased with final consumption up 4.3 per cent due to cooler temperatures and potentially indicating some recovery following high prices.

Chart 4.1 Supply and demand for natural gas, 1996-2024 (DUKES Table 4.1)

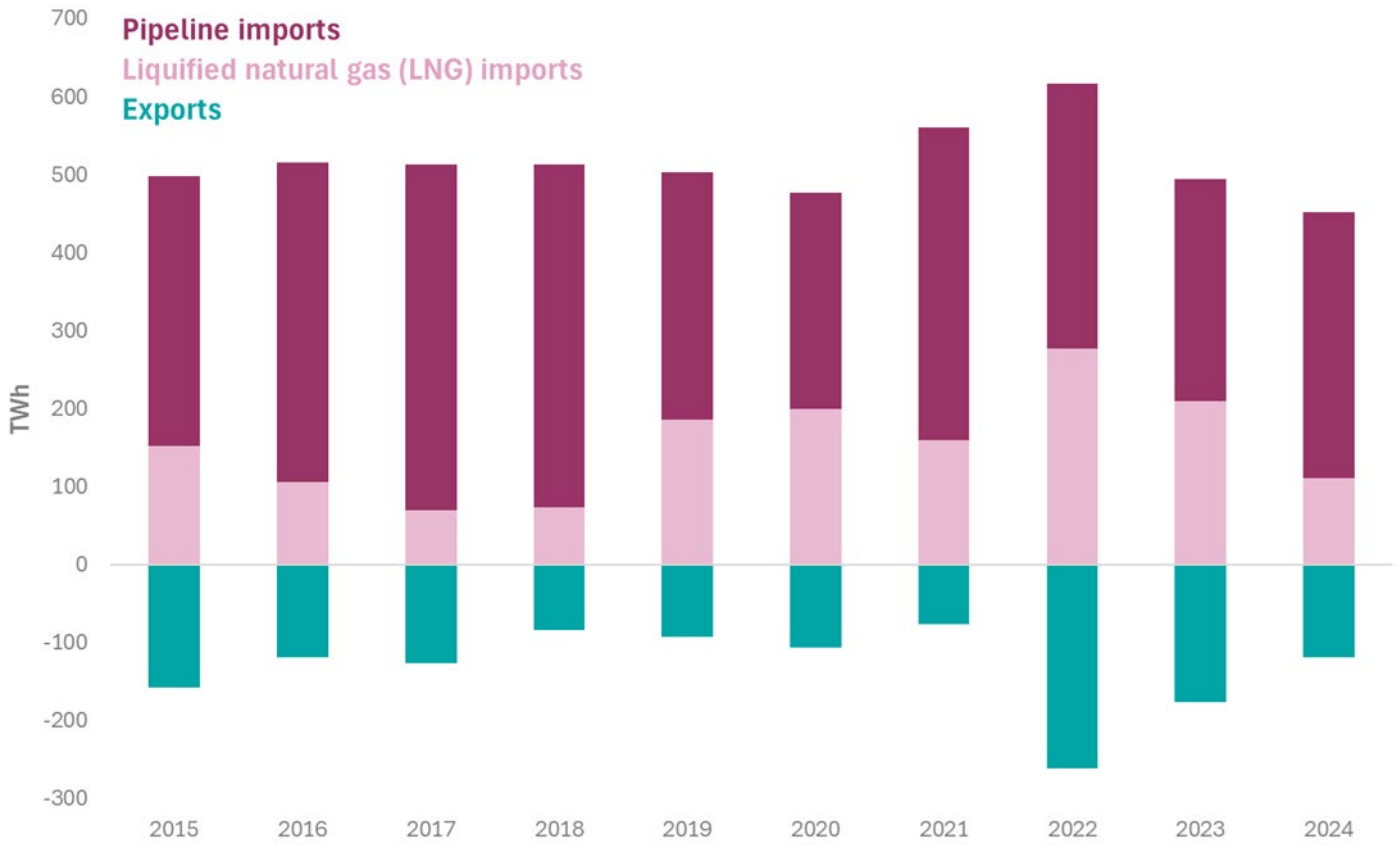


Demand for natural gas fell slightly in 2024, down 2.3 per cent on 2023 which took natural gas demand to the lowest level since 1992. Natural gas demand accounted for 35 per cent of total energy demand in 2024, stable on 2023 (see Chapter 1 for more information).

Production of natural gas reached the lowest level since 1973, down 10 per cent in 2024 on 2023. This continues the downward trend of recent years, in line with declining output from the mature North Sea basin. UK gas production began in the 1970s, peaking in 2000. Subsequently, production generally decreased until 2015 when new fields opened. Production began to decline again in 2019 with a sharp decline in 2021, the result of extensive planned maintenance of the Forties Pipeline System which serves a significant proportion of UK oil and gas production.

Trade in natural gas returned to levels seen before Russia's invasion of Ukraine. Imports and exports decreased but net imports increased by 4.9 per cent accounting for lower production. The UK has been a net importer[1] of natural gas since 2004.

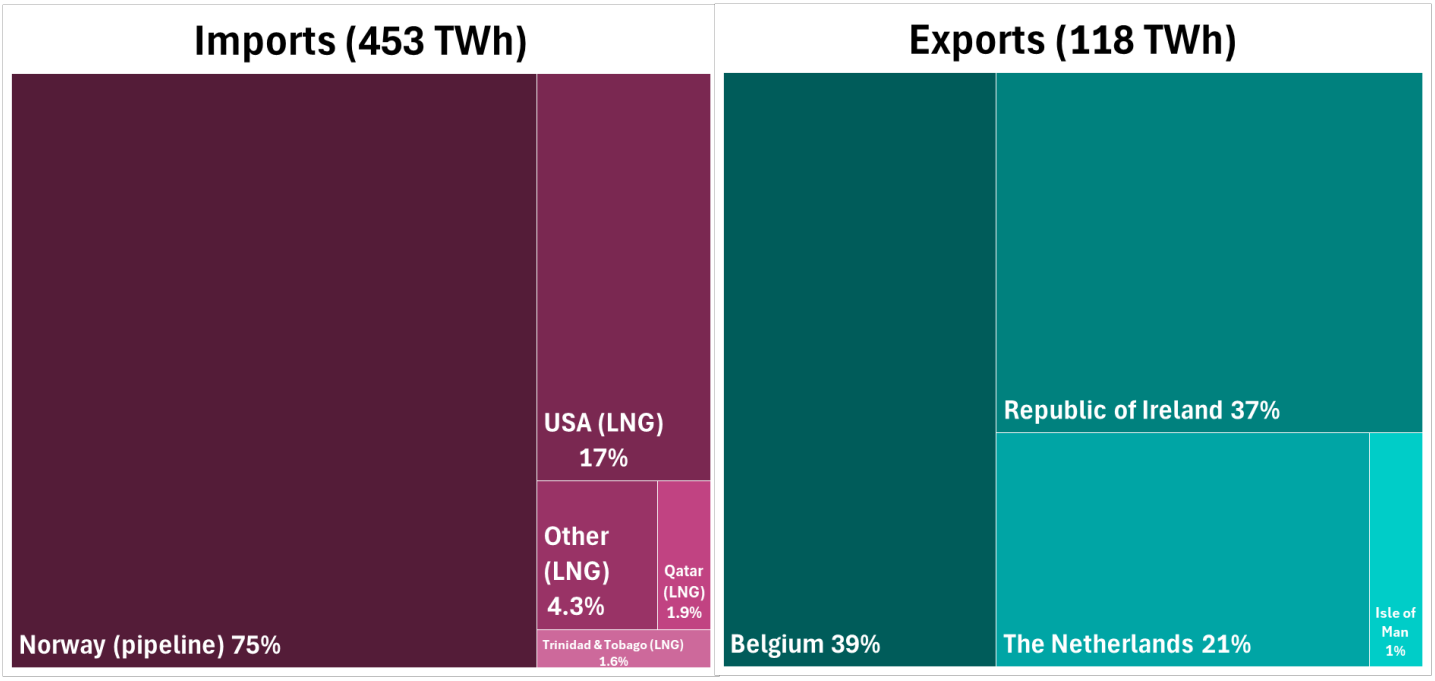
Chart 4.2 Pipeline and LNG imports and exports of natural gas, 2015-2024 (DUKES Table 4.5)



Imports and exports decreased by 8.4 and 33 per cent respectively in 2024 compared to 2023. The reduction in imports was driven by a fall in imports of liquefied natural gas (LNG) which almost halved in the same period. Total gas imports reached record highs in 2022, driven by record high levels of LNG imports. These remained high in 2023 when the UK's substantial LNG regasification capacity and shared infrastructure with mainland Europe was utilised to support efforts to move away from Russian gas. Unlike LNG, pipeline imports increased by 20 per cent in 2024 compared to 2023.

[1] Imports greater than exports

Chart 4.3 Imports and exports of natural gas by country of origin, 2024 (DUKES Table 4.5)



Norway remained the UK's largest import source, accounting for 76[2] per cent of total imports in 2024, up from 58 per cent in 2023. Norwegian imports increased 19 per cent in 2024 compared to 2023. This increase follows record high Norwegian gas production which allowed for a drop in LNG imports, a trend observed across Europe. Norway accounted for almost 100 per cent of pipeline imports as interconnectors with Belgium and the Netherlands were largely used for exports, like in 2023. The UK imports substantial amounts of gas from Norway due to proximity and shared infrastructure in the North Sea.

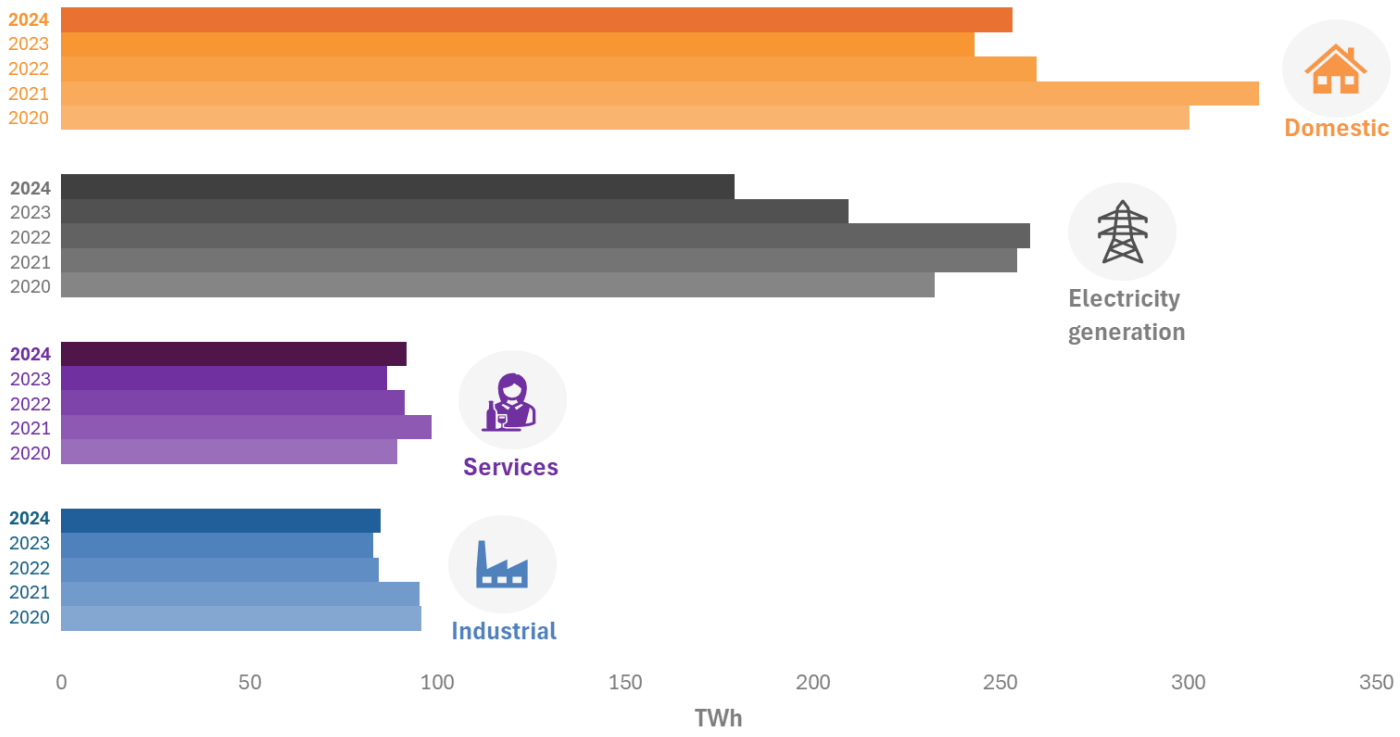
US LNG imports fell 41 per cent in 2024 compared to 2023. Despite this, the US remained the second largest import source and largest source of LNG for the third year in a row, accounting for 17 per cent of total imports. This drop in imports from the US follows substantial imports in 2022 and 2023. Historically, Qatar was the largest import source of LNG to the UK, accounting for nearly 40 per cent of total imports at its peak in 2011. Qatar held this position until 2022, but imports have declined in recent years, with Qatari LNG down a further 71 per cent in 2024 on 2023. Qatar was the third largest import source in 2024 accounting for 1.9 per cent of total imports.

The UK imported LNG from ten countries in 2024, the same as in 2023 and down from a record high of thirteen in 2022. Peruvian LNG imports fell 81 per cent in 2024 compared to 2023, the largest percentage decrease of any country still imported from. LNG imports from other sources including Angola, Norway, Nigeria and Egypt also fell compared to 2023, while LNG imports from Spain fell to zero. LNG imports from Trinidad and Tobago increased by 27 per cent, and the UK imported LNG from Equatorial Guinea in 2024, for the first time since 2019.

Exports to Belgium fell 56 per cent in 2024 compared to 2023, and accounted for 40 per cent of total exports, down from 61 per cent in 2023. Conversely, exports to the Netherlands and the Republic of Ireland both increased by 7.8 per cent and 4.6 per cent respectively in the same period.

[2] 76 including Norwegian LNG imports

Chart 4.4 Sectoral consumption of natural gas, 2020-2024 (DUKES Table 4.1)

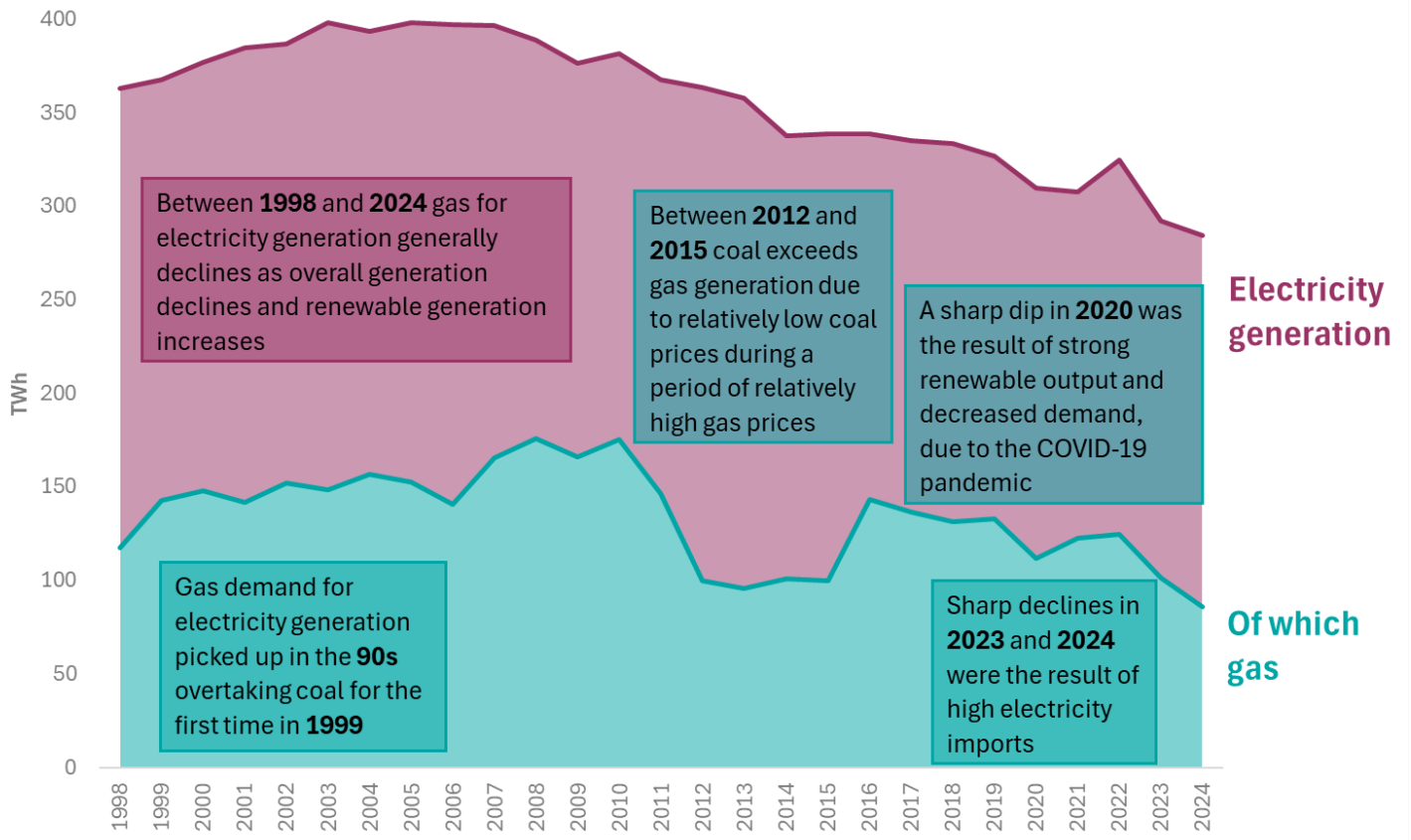


Demand for natural gas decreased slightly, down 2.3 per cent in 2024 on the 2023 low, bringing natural gas demand to the lowest level since 1992. Demand for gas has been declining since 2022 when high temperatures and prices influenced consumer behaviour; this continued into 2023 amplified by a substantial reduction in gas demand for electricity generation. In 2024, decreased demand was driven by another sharp decline in demand for electricity generation. Conversely, demand by final consumers increased, up 4.3 per cent in 2024 compared to 2023.

Demand for domestic (household) consumption increased by 4.1 per cent in 2024 compared to 2023, having been heavily impacted by temperatures and prices in the preceding two years. Despite being up, domestic demand remained below the 2017-2021 average. Demand by the public administration and commercial sectors increased by 6.4 and 5.7 per cent respectively in the same period. Like domestic, demand by these sectors were also impacted by high temperatures and prices in 2022 and 2023. Demand by the services[3] sector was up 6.3 per cent in 2024 compared to 2023 but also remained below the 2017-2021 average. Industrial demand saw a more moderate increase, up by 2.5 per cent in 2024 compared to 2023 potentially indicating some recovery following higher prices. Industrial demand has been generally declining in recent years in line with other fuels and European trends due to improvements in energy efficiency and the decline of traditional fuel intensive sectors.

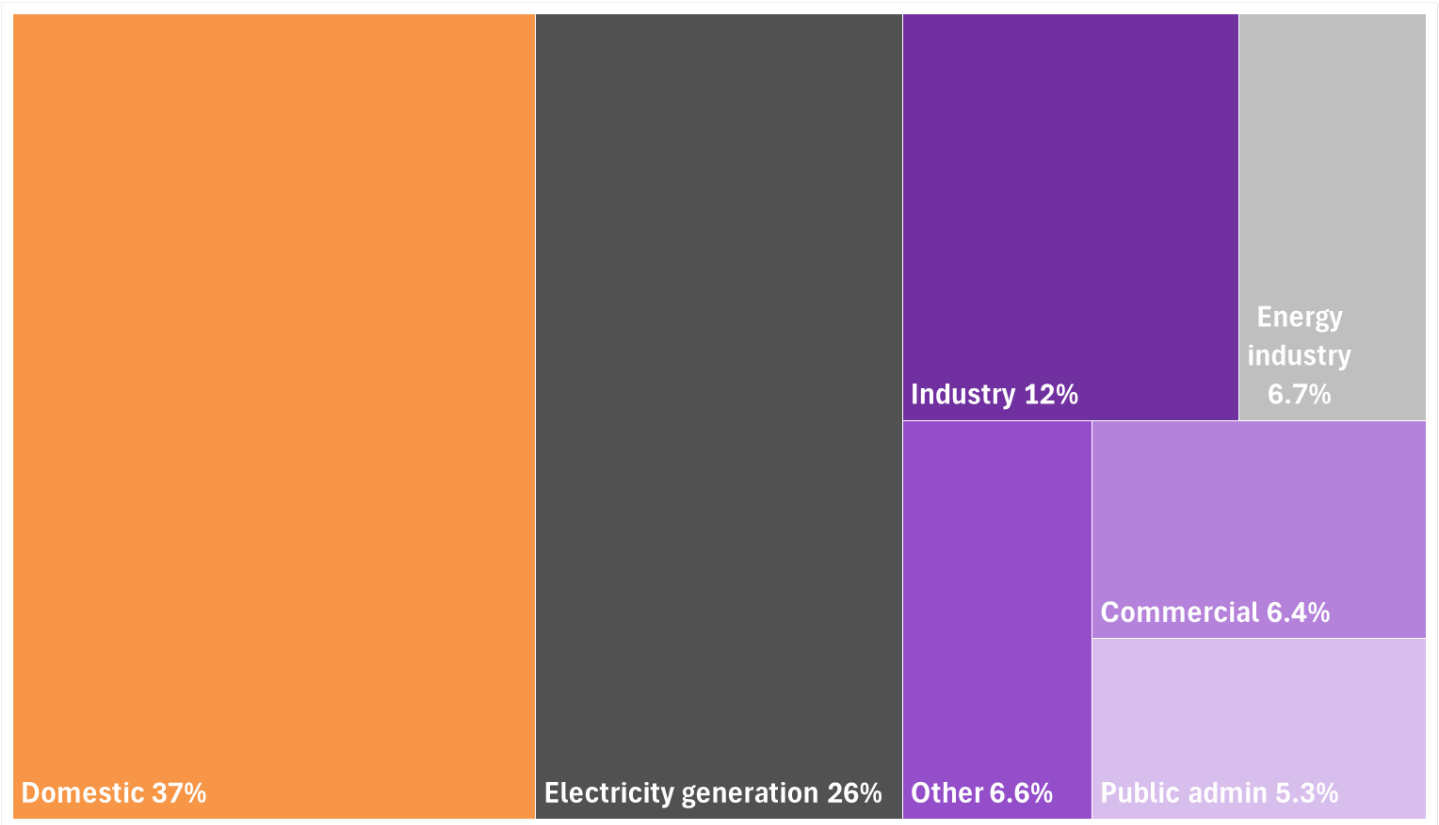
[3] 'Services' combines public administration, commercial and other smaller sectors such as miscellaneous

Chart 4.5 Gas demand for electricity generation, 1998 – 2024 (DUKES Table 5.3)



Between 1998 and 2024 gas demand for electricity generation has been generally declining, as total generation has reduced and renewable generation increased. However, because gas is generally the marginal fuel, demand remains variable and is influenced by numerous factors. Gas demand for generation picked up in the 90s overtaking coal for the first time in 1999. This reversed between 2012 to 2015 when an oversupply in the US reduced coal prices during a period of relatively higher gas prices, making coal more competitive than gas for electricity generation. Since 2016, demand for generation has been steadily declining, with a sharp contraction in 2020 due to strong renewable output and low demand, the latter a result of the COVID-19 pandemic. Sharp declines were also seen in 2023 and 2024 due to increasing electricity imports when high gas prices following the Russia-Ukraine conflict decreased the price differential between generation and imports. For more information about electricity see Chapter 5.

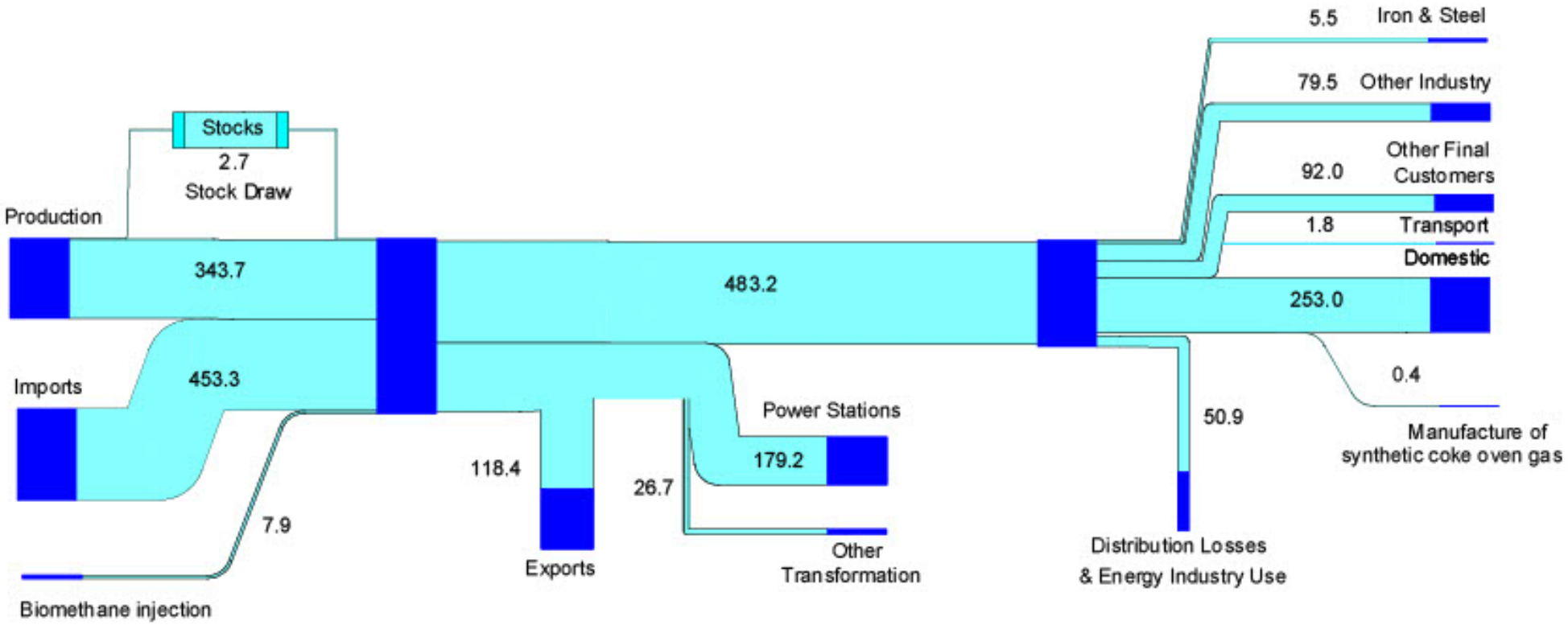
Chart 4.6 Sectoral consumption of natural gas, 2024 (DUKES Table 4.1)



In general gas is used for electricity generation, domestic consumption, and by other sectors (including industry) each making up around a third of demand over the last decade. However, in 2024 gas demand for electricity generation fell whilst demand by final consumers (such as commercial, domestic and industrial sectors) increased, reducing electricity generation's share of total gas demand to 26 per cent.

Natural Gas Flow Chart 2024 (TWh)

The flow chart shows the flows of natural gas from production and imports through to consumption. It illustrates the flow of gas from the point at which it becomes available from indigenous production or imports (on the left) to the final use of gas (on the right), as well as that transformed into other forms of energy or exported. The widths of the bands are proportional to the size of the flow they represent.



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.

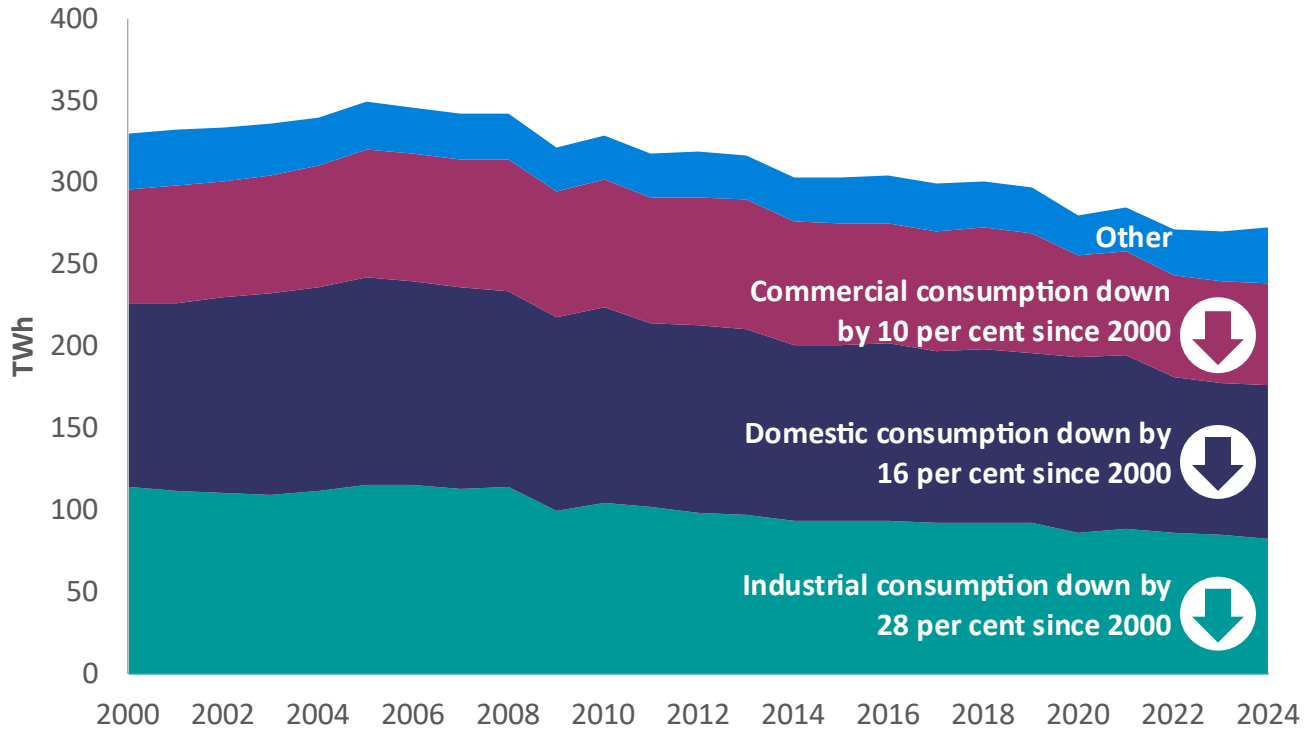
The share of generation from low carbon sources (nuclear plus renewables) rose to 64.7 per cent, a new record high within the published data series. This came as the share of generation from renewables increased, and total generation decreased. Renewable sources accounted for 50.4 per cent of generation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



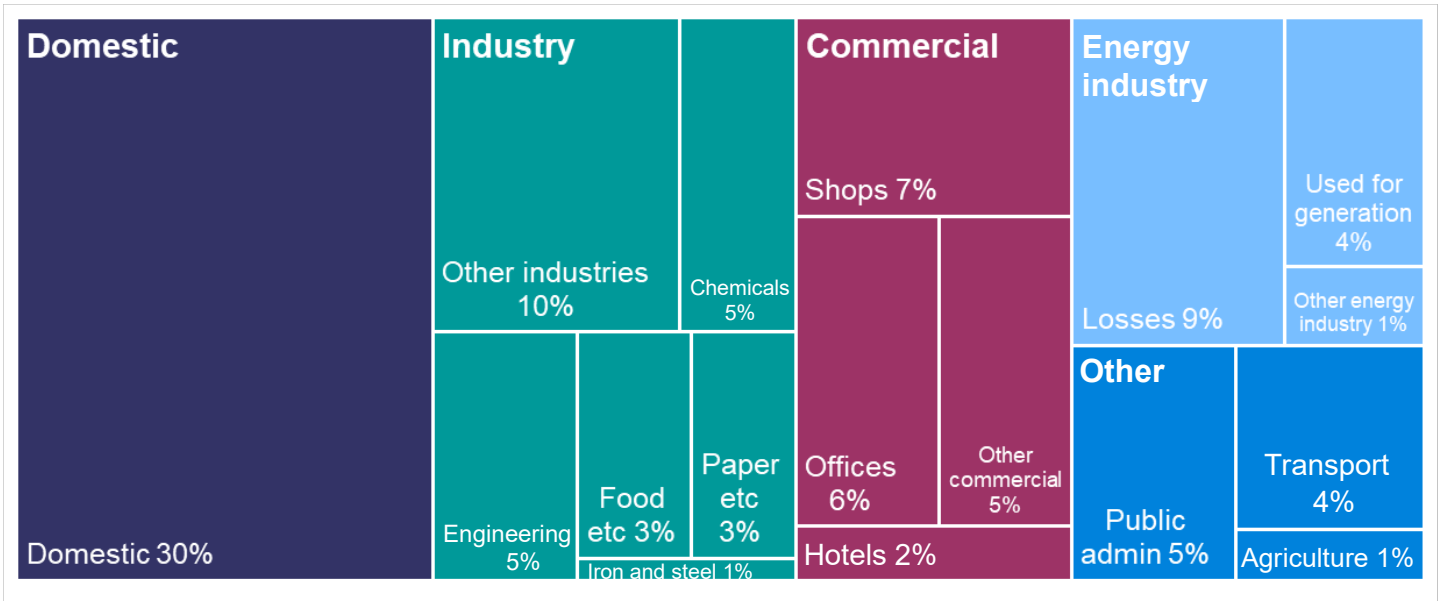
Domestic consumption rose slightly to 94.4 TWh in 2024, a 1.9 per cent increase compared to 2023. However, it remains substantially below pre-pandemic levels. Domestic consumption fell sharply in 2022 following high energy prices and warm temperatures, with consumption 9 per cent below 2019. Over the 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.

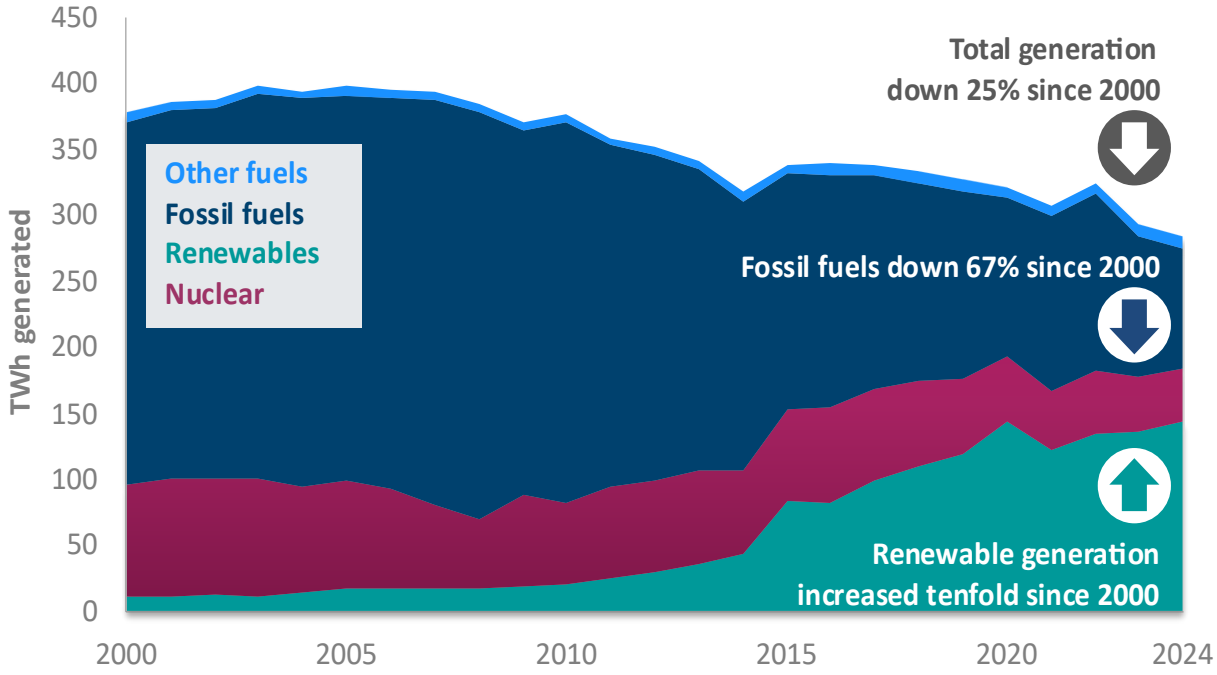
Chart 5.2 Share of total electricity demand split by sector, 2024 (DUKES Table 5.2)



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.

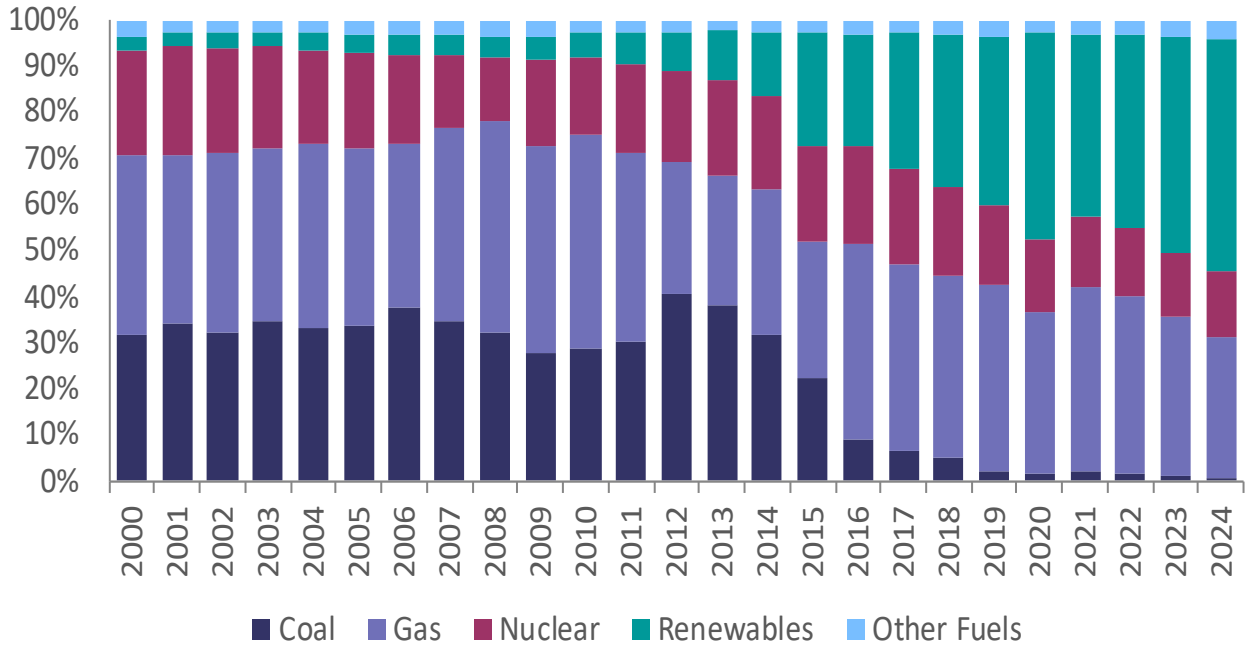
Renewable generation increased by 5.1 per cent from 2023, reaching a new record high of 143.7 TWh, driven by record high generation from wind and thermal renewables (bioenergy). In line with increased capacity and slightly higher average wind speeds during 2024, wind generation increased by 1.4 per cent 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.

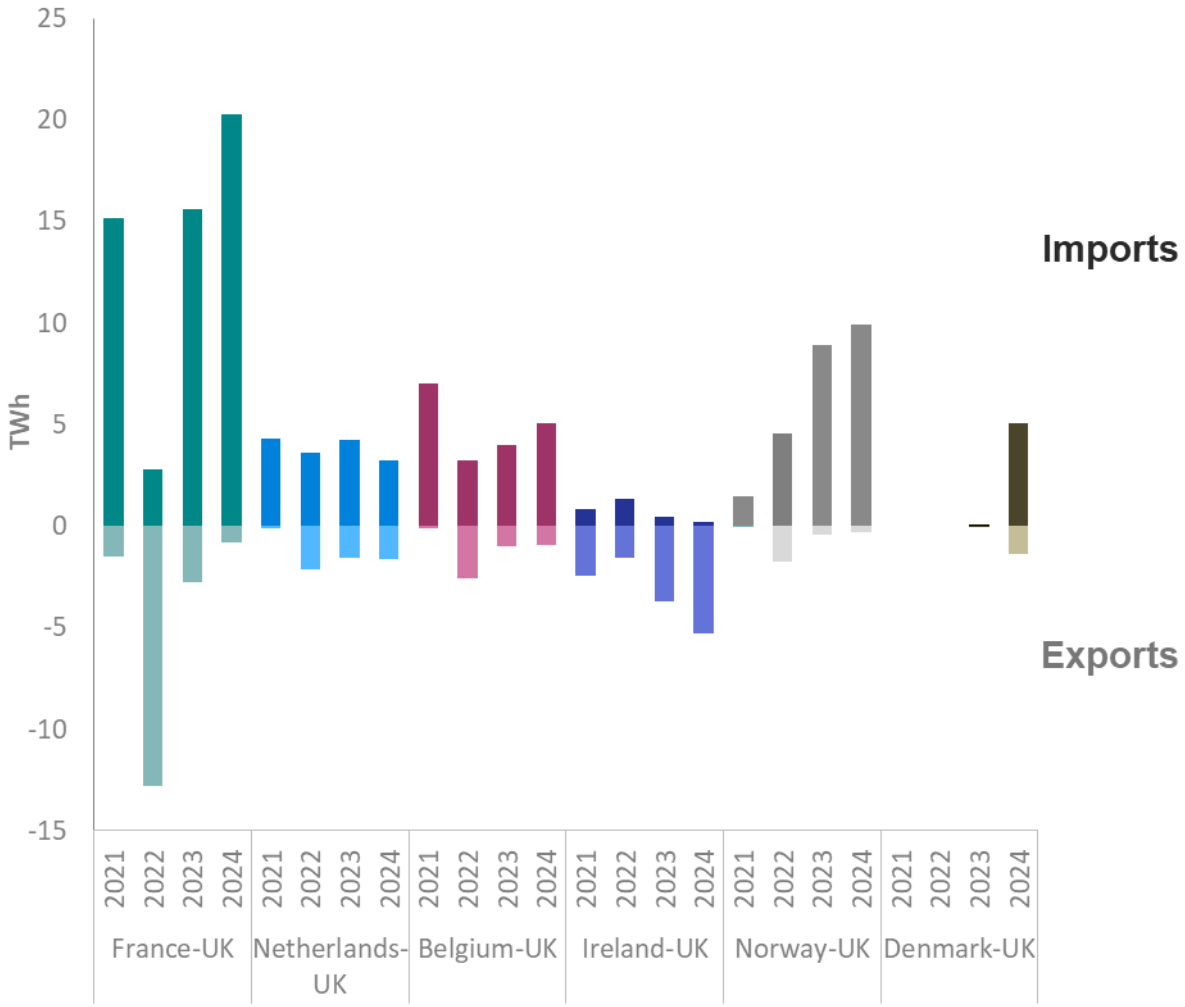
Nuclear generation accounted for 14.2 per cent of generation in 2024, up 0.4 percentage points from 2023. However, this increase is due to a fall within total generation rather than an increase in nuclear generation itself. The share of generation coming from low carbon sources (nuclear plus renewables) 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.

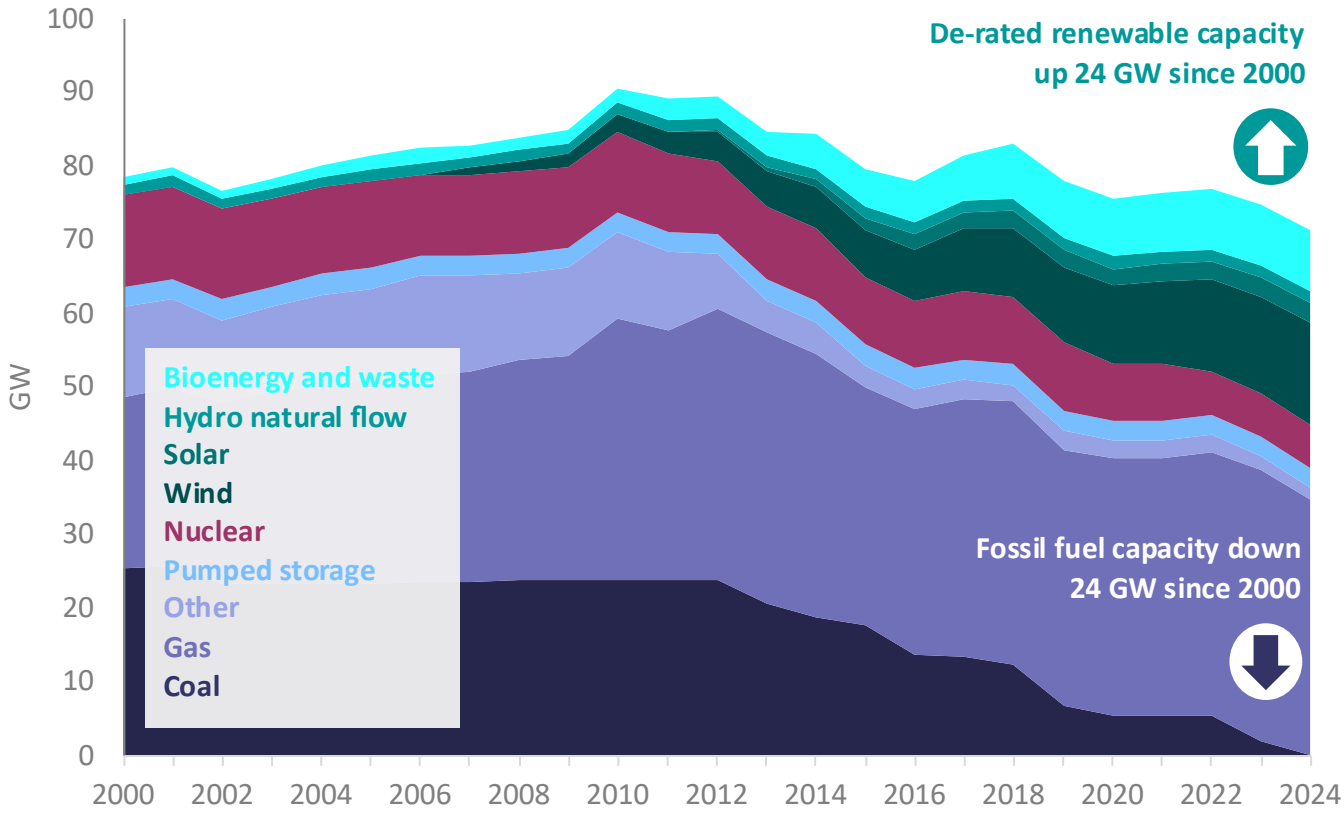
The UK was a net importer from all interconnected countries except the Republic of Ireland, which is connected to the UK through land connections from Northern Ireland and an interconnector cable from Wales. The France-UK interconnectors accounted for 19.5 TWh of net imports, followed by Norway-UK with 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)



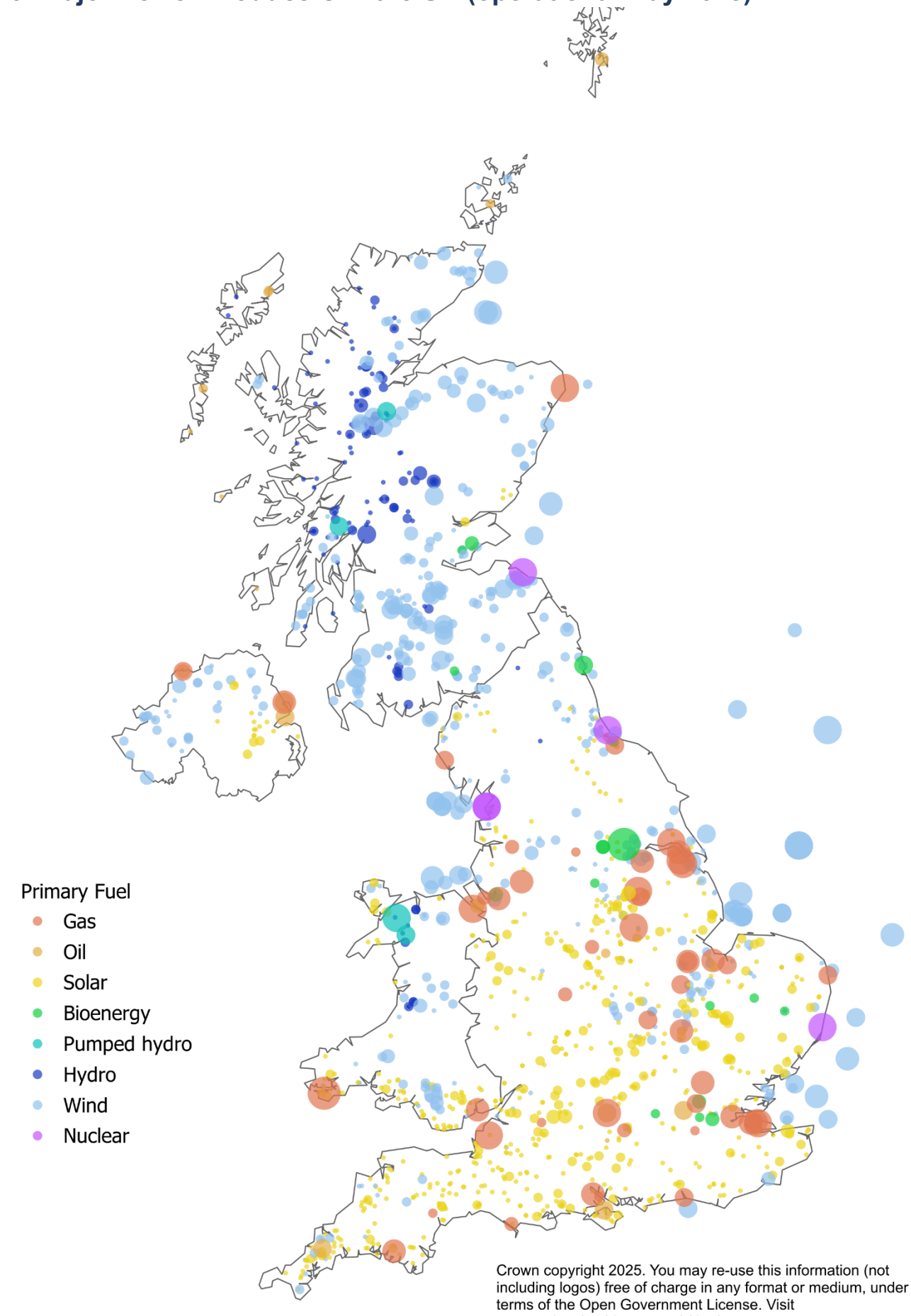
Total de-rated generation capacity decreased to 71.7 GW in 2024, down 3.0 per cent compared to 2023. This was due to the closure of the last coal-fired plant, Ratcliffe-on-Soar. Fossil fuel capacity decreased 9.0 per cent to 36.3 GW. The reduction was partly offset by increases in offshore wind, solar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

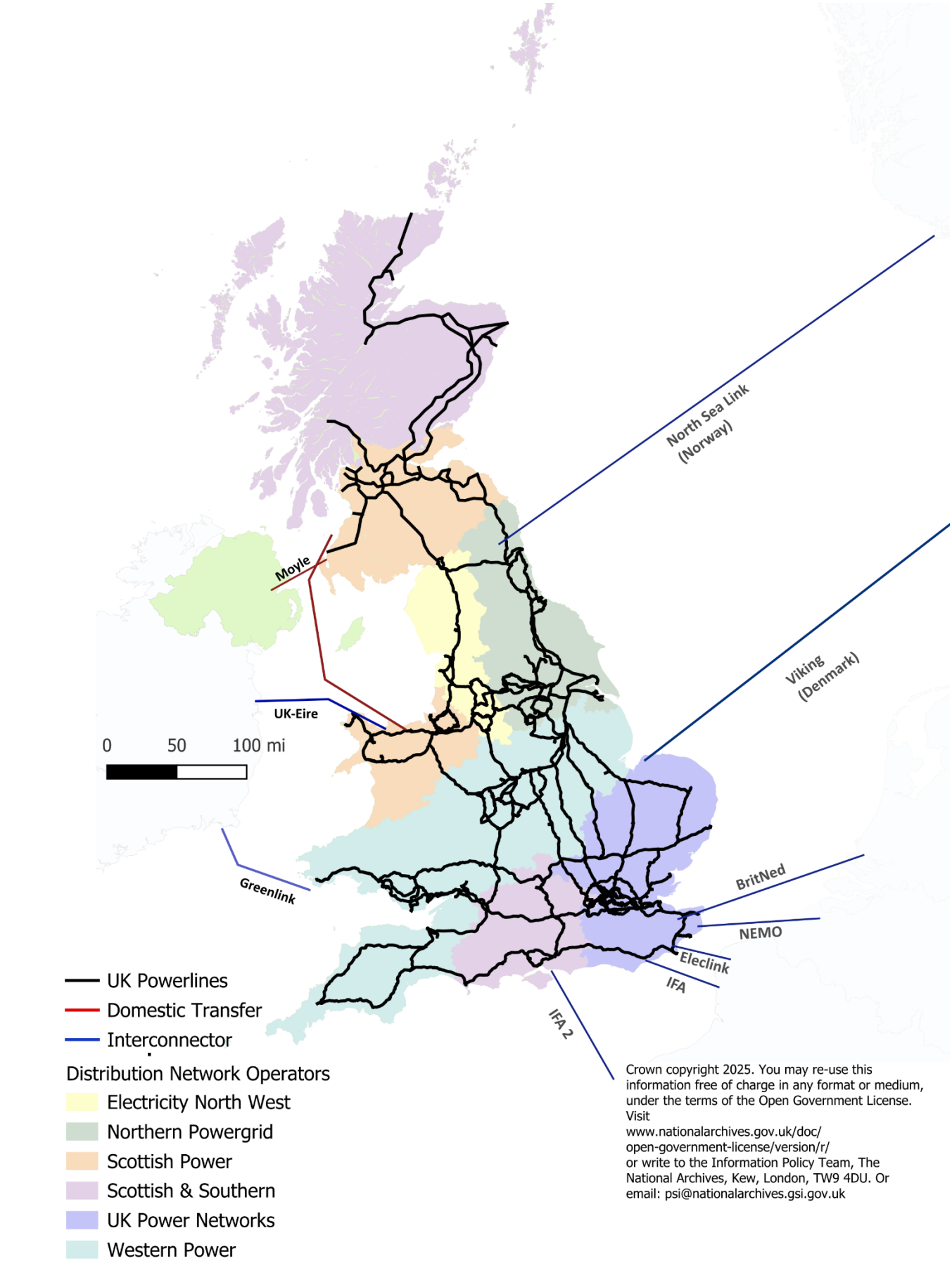
Peak demand in winter fell to 47.4 GW, down by 1.9 per cent compared to the equivalent figure in 2023. As Major Power Producer (MPP) capacity fell by 4.0 per cent in 2023, the peak represented 79.4 per cent of MPP capacity, 2.0 percentage points higher than 2023.

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)



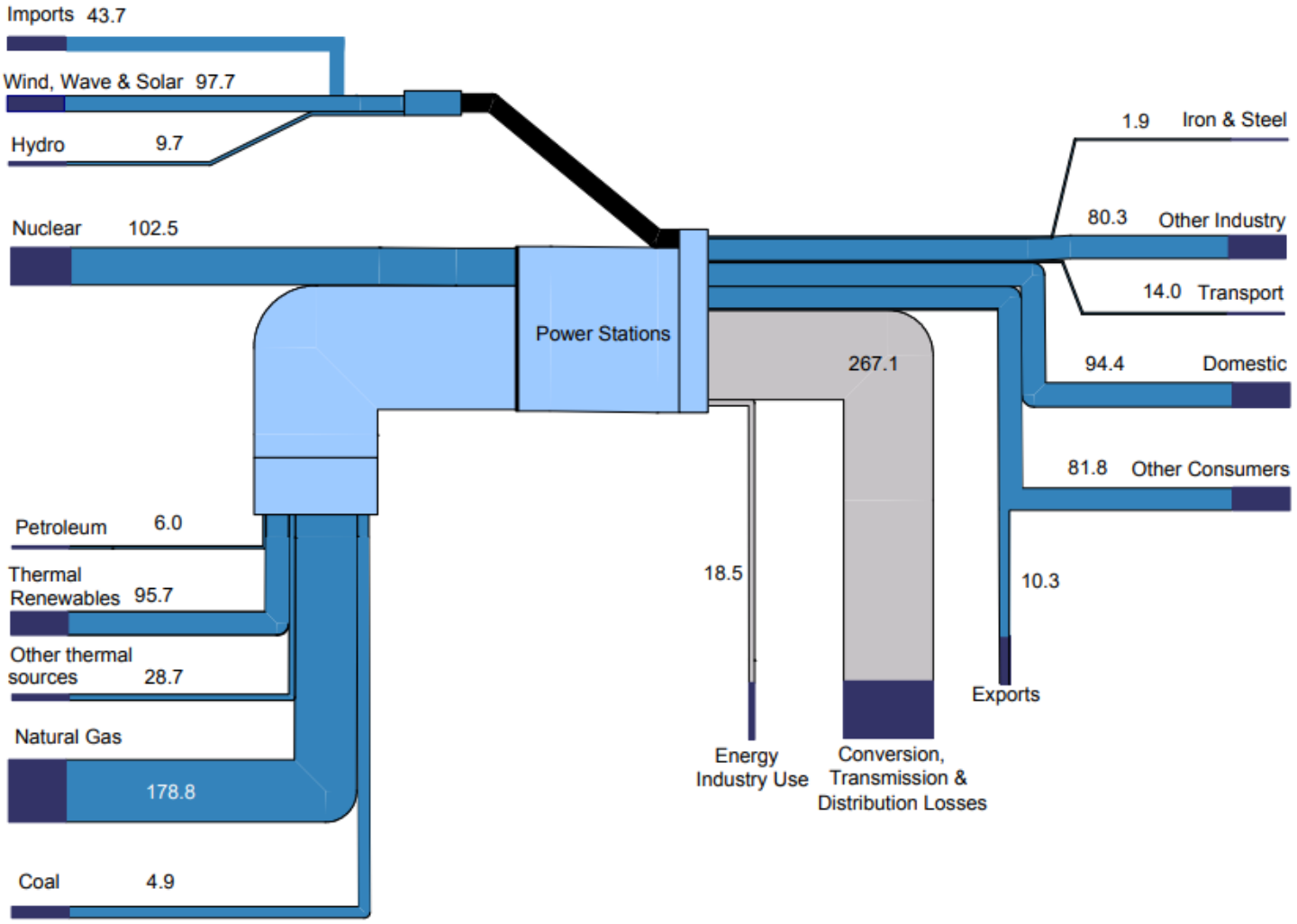
UK Distribution Network Operating Areas and GB Power Lines Map



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).

Chapter 6: Renewable sources of energy

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Key headlines

Renewable generation in 2024 reached a new record of 143.7 GWh. Generation was up by 5.1 per cent on 2023, driven by new capacity and an increase in generation from plant biomass which had been dampened in 2022 and 2023 by reduced output at two major sites.

Renewable capacity increased by 7.3 per cent (4.1 GW). Half of the new capacity was in solar PV, the rest was mainly from onshore and offshore wind.

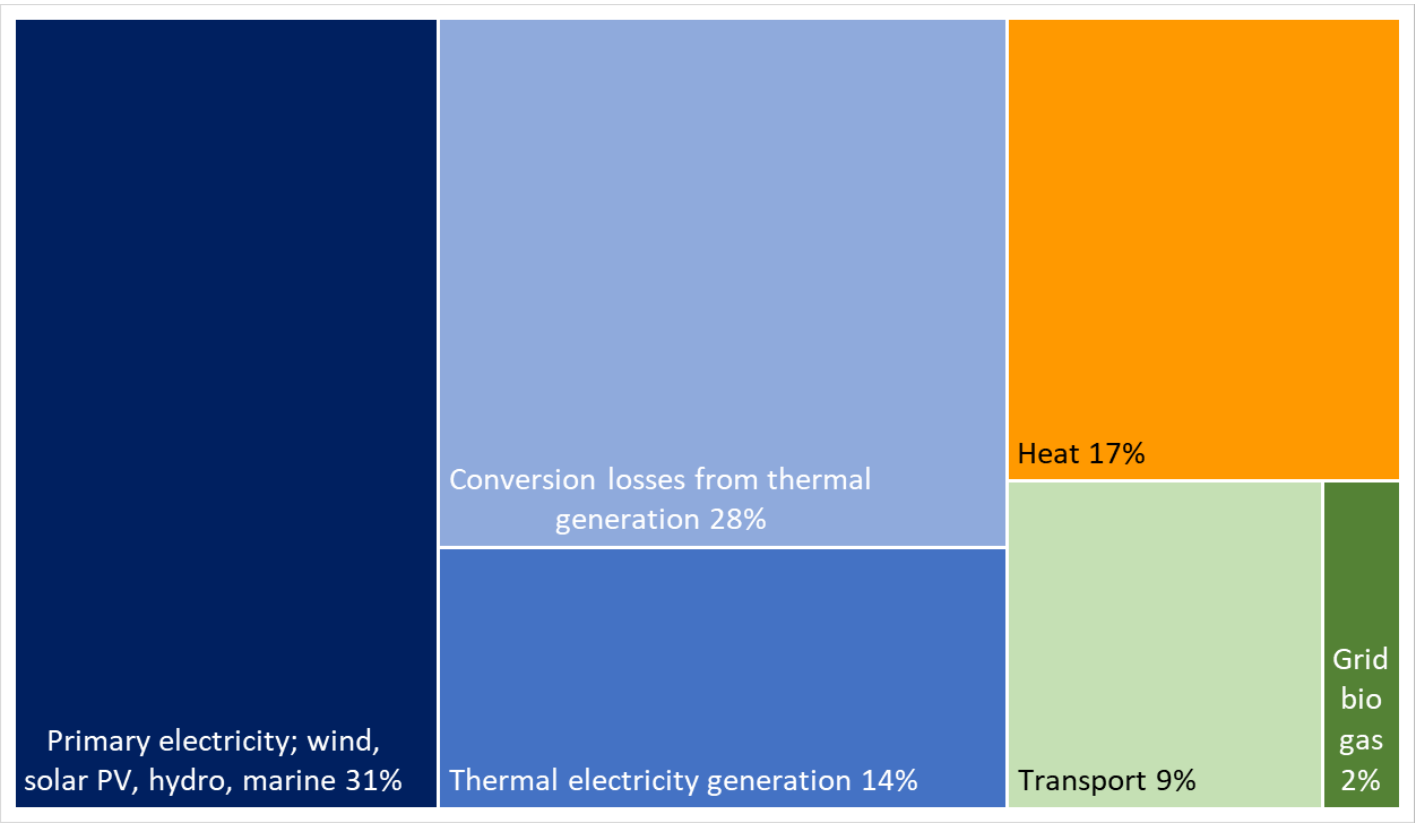
The share of renewable electricity generation in 2024 was 50.4 per cent, a new record and the first time that renewables had accounted for over half of total generation. The generation share was up by 3.9 percentage points on 2023 as a result of greater renewable generation and lower generation from other sources (see Chapter 5 for more details).

Renewable heat increased by just 1.6 per cent with higher heat from heat pumps and wood combustion being offset slightly by decreases in anaerobic digestion and bioliquids. Although heating degree days in 2024 were similar to 2023, higher levels of the stock of heat pumps and domestic wood appliances drove the increase.

As a share of gross final consumption, overall renewables accounted for 16.2 per cent, an increase of 0.5 percentage points on 2023 largely due to relatively higher increases in renewables' consumption compared with total consumption. The largest contribution was from renewable electricity generation.

Renewable fuels include primary energy such as wind, solar, and hydro, and thermal fuels (solid biomass, biogases, and liquids). Thermal fuels are combusted to produce energy and in the case of electricity generation, some is lost during this conversion process. Around 73 per cent of renewable fuels are used for electricity generation, a third of which is lost in the conversion process. Heat accounts for 17 per cent with transport and grid injected biogas accounting for 9.4 per cent and 2.3 per cent. Chart 6.1 below shows the demand for all renewable fuels including losses from the conversion process.

Chart 6.1 Renewable fuel[1] demand, 2024 (DUKES Table 6.4)



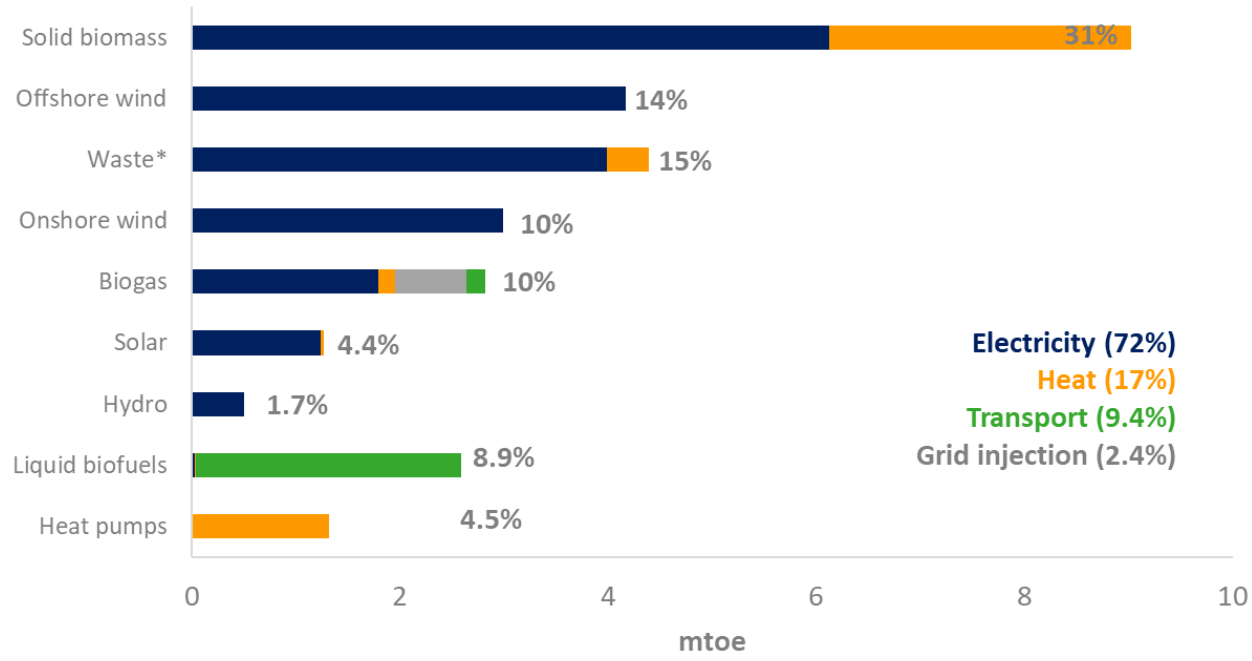
The chart replicates data included in Table 6.4; where this differs to Table 6.2 is the latter includes electricity generation only, i.e. primary generation and thermal generation after losses. The amount of conversion losses depends on the efficiencies of fuels which for renewables varies between around 35 to 40 per cent, with the remainder being lost in conversion. This compares with an efficiency of around 48 per cent for natural gas and around 34 per cent for coal and oil generation.

Some renewable fuels are more versatile than others such as biogases; historically demand had been dominated by electricity generation, but it is now increasingly used for heat generation, injection into the National Grid, and most recently small amounts are consumed within the transport sector. Conversely, primary energy sources such as wind and hydro are consumed solely by the electricity sector and although solar is primarily used in generation, small amounts of solar thermal are used for space and water heating.

Chart 6.2 shows how the individual fuels and technologies are consumed across the end uses (note: thermal fuels include losses incurred during conversion).

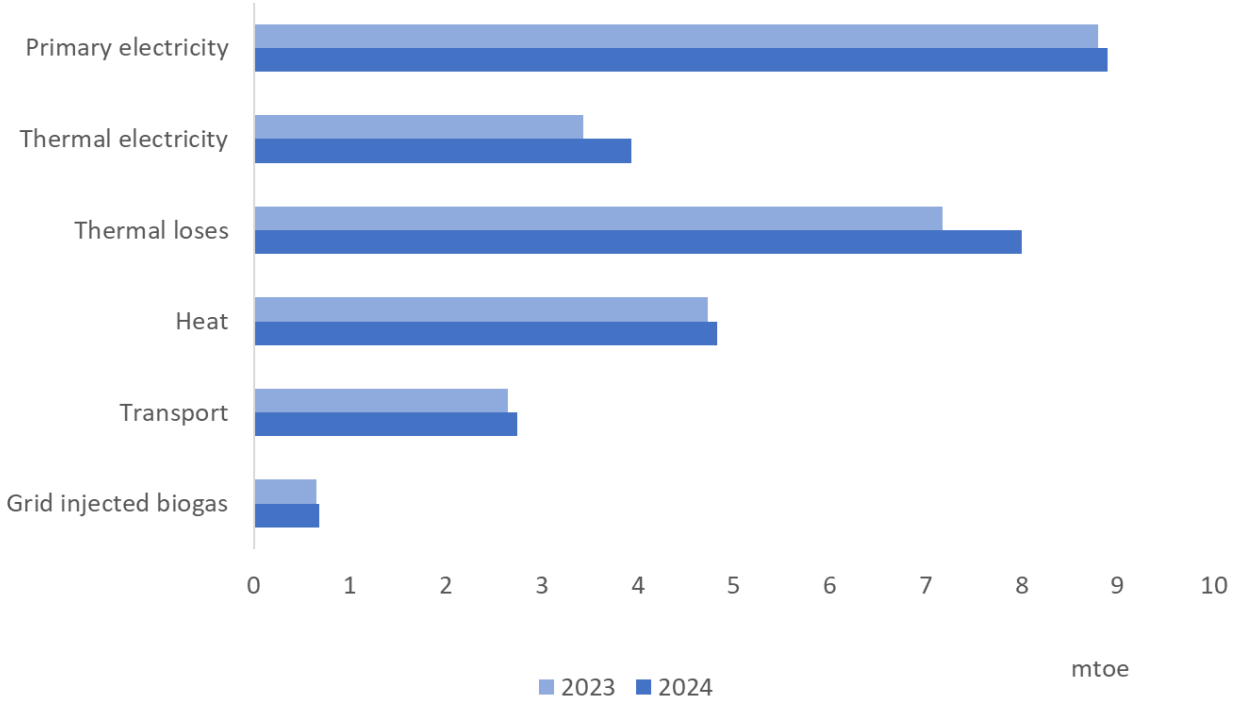
[1] Including non-biodegradable waste

Chart 6.2 Use of renewable fuels, 2024 (DUKES Table 6.4)



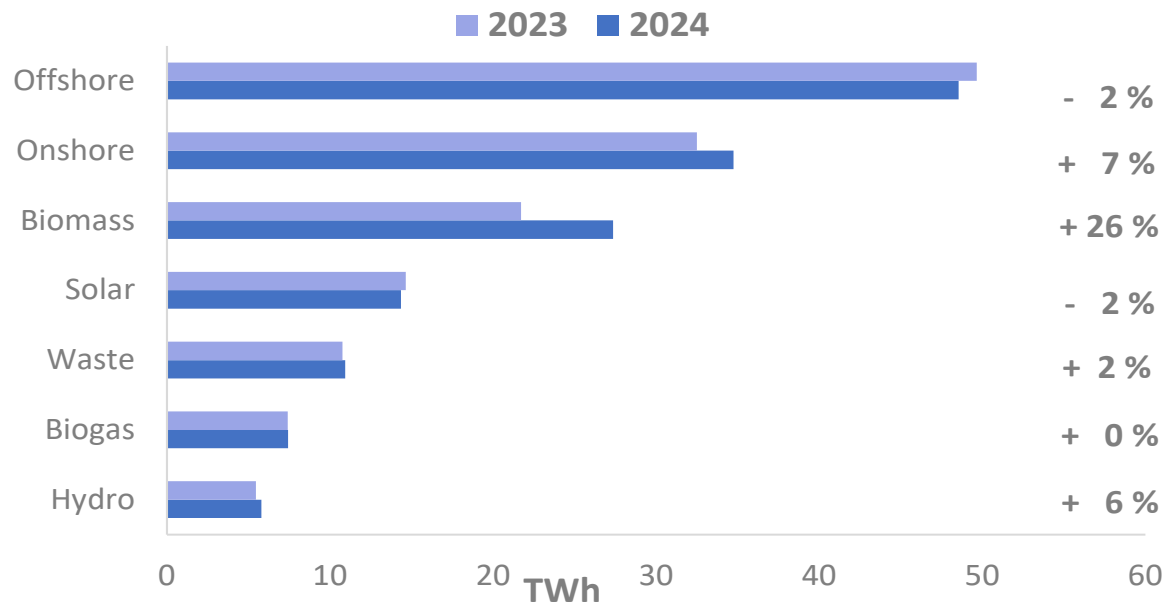
Between 2023 and 2024, overall renewable fuel demand increased by 6.0 per cent with the majority of the increase being from plant biomass as generation returned to more usual levels following reduced output at two major sites in 2022 and 2023. The increase in thermal renewables also drove up conversion losses. Renewable heat demand increased by 2.3 per cent driven by an increase in the stock of heat pumps and domestic wood appliances. Chart 6.3 shows how each component of fuel demand changed between 2023 and 2024.

Chart 6.3 Change in renewable fuel demand 2023 to 2024 (DUKES Table 6.4)



At 143.7 TWh, overall renewable generation exceeded the current record, set in 2023, by 5.1 per cent. The majority of the increase was plant biomass though onshore wind also saw an increase due to additional capacity. Chart 6.4 shows the change in generation between 2023 and 2024 across the technologies both in absolute and percentage terms.

Chart 6.4 Electricity generation by fuel, 2023 – 2024 (DUKES Table 6.2)



Offshore wind generation was down by 2.2 per cent on 2023 to 48.5 TWh. Generation from offshore wind reached record levels in 2023, the figure for 2024 was the next highest on record. Average wind speeds were up slightly in 2024 but offshore wind generation was hampered by planned maintenance, unplanned outages and curtailment. Over the course of the year, capacity increased by 8.1 per cent, this has included Moray West in Scotland (882 MW) as well as the first stages of Dogger Bank (England) and NNG (Scotland), both of which are due to expand in 2025. However, output has been limited at some of the new sites due to connection issues. Conversely, generation from onshore wind was up by 6.9 per cent to 34.7 TWh. Annual generation for onshore wind was the third highest on record after 2020 and 2022. Generation had been relatively low in 2023 due to outages and curtailment.

Solar PV generation was down by 1.9 per cent on 2023. The decrease was due to average sunlight hours being down on last year, 2024 was the least sunny year since our time series began in 2001. This was partly offset by new capacity which increased by nearly 13 per cent over the course of the year.

Hydro generation increased by 6.1 per cent in 2024 to 5.8 TWh, there was a small increase in average rainfall and new capacity (up 2.1 per cent on 2023). Hydro is an established technology and there has been little new capacity in recent years.

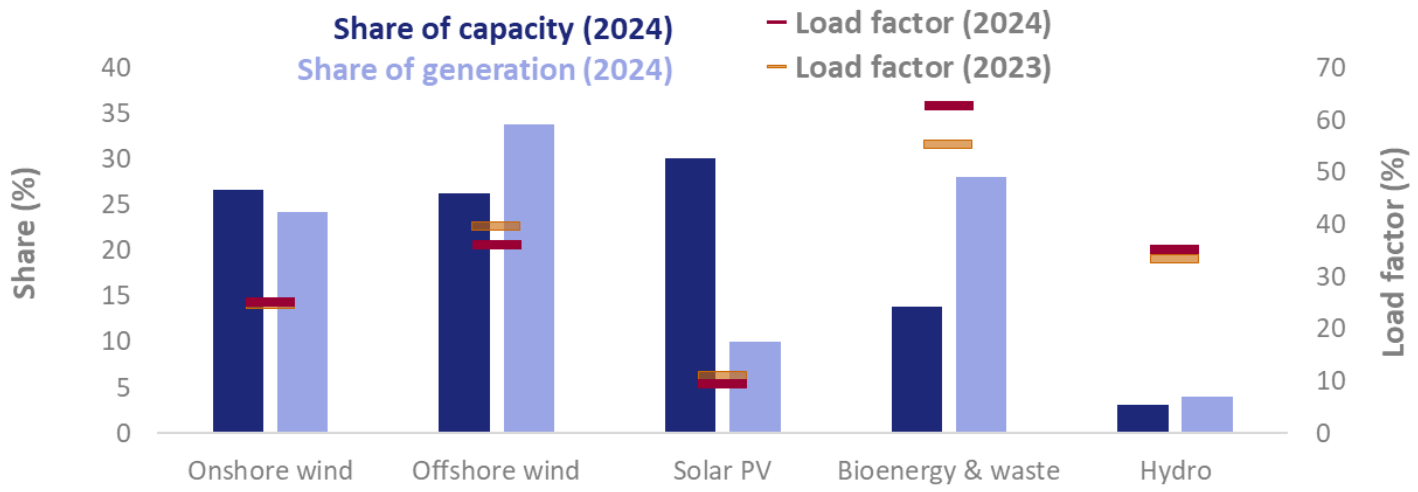
Bioenergy saw the largest increase on last year, being up by nearly 17 per cent. This was driven by an increase in plant biomass generation of 5.6 TWh (27 per cent). Generation had been particularly low in 2022 and 2023 due to reduced output at two major sites. Plant biomass generation was back to a similar level to that last seen in 2021. Elsewhere there were smaller increases for generation from animal biomass, sewage gas, municipal solid waste and anaerobic digestion, the latter two were records. Generation from landfill gas continues to fall in line with falling yields.

Despite a fall in generation this year**, offshore wind continues to be the leading renewable technology in 2024 for generation**, accounting for 58 per cent of all wind generation and 34 per cent of all renewable generation in 2024. Offshore first outstripped onshore generation in 2019, and although offshore capacity still lags onshore, the gap has continued to narrow. The discrepancy between capacity and generation can be explained by a combination of stronger and more consistent coastal wind speeds, and offshore turbines tend to be newer and larger than onshore, often yielding a higher load factor.

Technologies with a high share of capacity do not necessarily have the highest share of generation because **generation is dependent on the load factor**. Load factors are the ratio of how much electricity was generated as a proportion of the total generating capacity**.** Within renewables, load factors can be heavily

influenced by weather conditions: such as wind speeds, sun hours and, to a lesser extent, rainfall. Chart 6.5 compares the key technologies' share of capacity and generation for 2024.

Chart 6.5 Relative share of capacity and generation and load factors 2024 (DUKES Table 6.3)

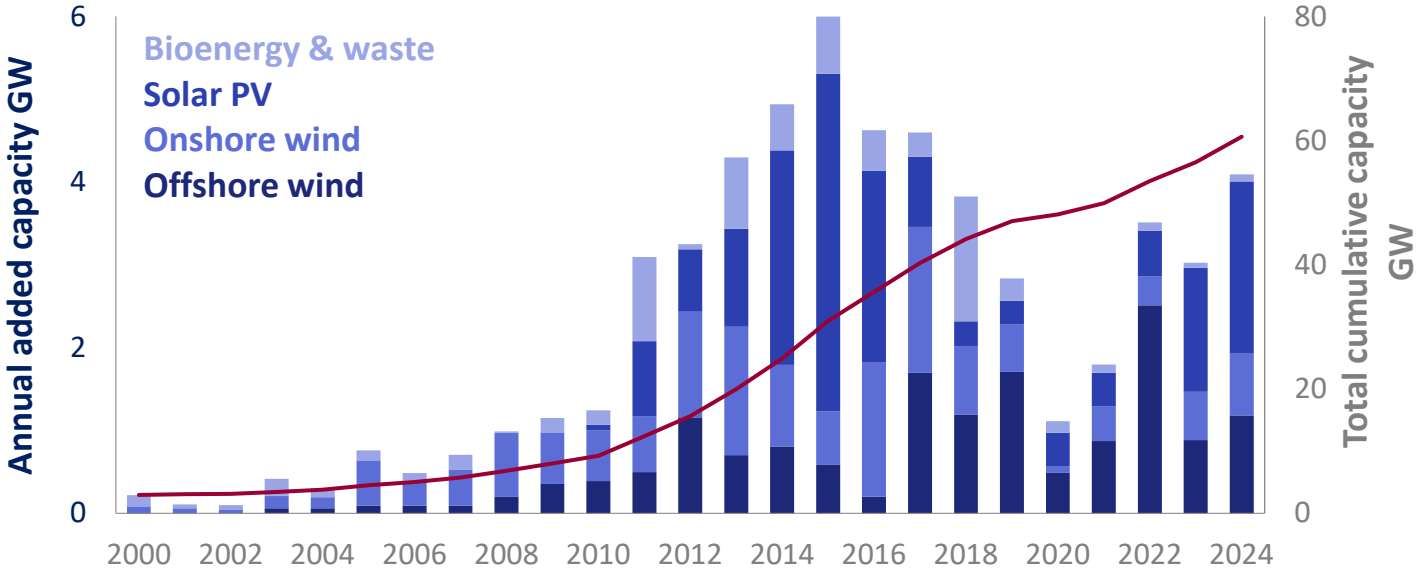


The overall load factor for renewables in 2024 was 28.0 per cent, down slightly from 28.7 per cent in 2023. The load factor was depressed by offshore wind generation which fell despite more capacity.

The load factor for bioenergy and waste was up on 2023, due to the recovery in generation from plant biomass. The average load factor for solar PV slipped below 10 per cent due to the low sunlight hours seen over the year.

Chart 6.6 shows the historic growth in capacity; new capacity recovered in 2024 after the stark slowdown over 2020 and 2021 (some projects may have been delayed in 2020 due to COVID-19 restrictions). 4.1 GW of capacity was added during 2024, the most in a calendar year since 2017. Around half of the new capacity was solar PV. New capacity peaked in 2015 when 6.0 GW was installed, 4.1 GW of which was in solar PV.

Chart 6.6 Annual added capacity 2000 to 2024 (DUKES Table 6.2)



Prior to the launch of the Feed-in Tariff (FiT) in 2010, solar PV represented just 1.0 per cent of renewable generation capacity, but by the end of 2024, its share had increased to 30.1 per cent, with the majority (70 per cent) being installed between 2011 and 2017. Following the closure of The Renewable Obligation to new entrants in 2016, growth began to slow in 2017 further exacerbated by the FiT closure in April 2019. Growth has since improved in the last two years; in 2023 there were more domestic solar panels installed than in any year since 2015[2]. In 2024, 2.1 GW of capacity was added, the most since 2016. The new capacity included nearly 150,000 domestic installations as well as large-scale sites such as Gorse Lane and Thaxted (roughly 50 MW each).

New capacity in onshore wind peaked in 2017 when 1.8 GW was added. Growth then slowed to a low of just 76 MW added in 2020, before picking up again to a recent high of 0.7 GW in 2024. Offshore wind has seen much higher levels of new capacity in recent years with 72 per cent of total capacity being installed over the last ten years. This has included several large sites supported by Contracts for Difference (CfD) such as Hornsea 1 and 2, Triton Knoll, Moray East and Seagreen. In 2024, 1.2 GW of offshore wind capacity was added, up from 2023 but down from the record 2.5 GW installed during 2022. Wind now represents around 53 per cent of installed renewable capacity (see wind map at the end of this chapter showing location by capacity).

Chart 6.7 Trends in generation by technology 2000 to 2024 (DUKES Table 6.2)

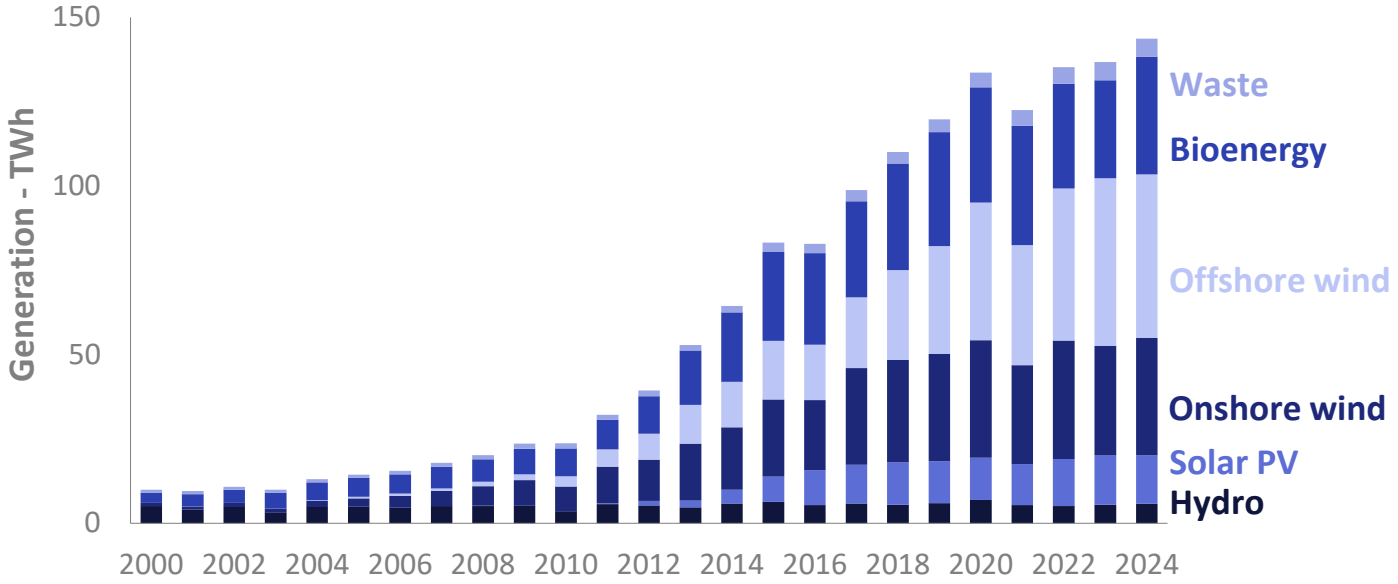


Chart 6.7 shows the overall upward trend in renewable generation and evolving fuel mix since 2000. The underlying trend is driven by increasing cumulative capacity, resulting in a record year for generation in 2024. Year-on-year fluctuations in generation due to weather effects can be observed in the chart, such as the drop in generation between 2020 (an unusually favourable year for wind speeds and rainfall) and 2021.

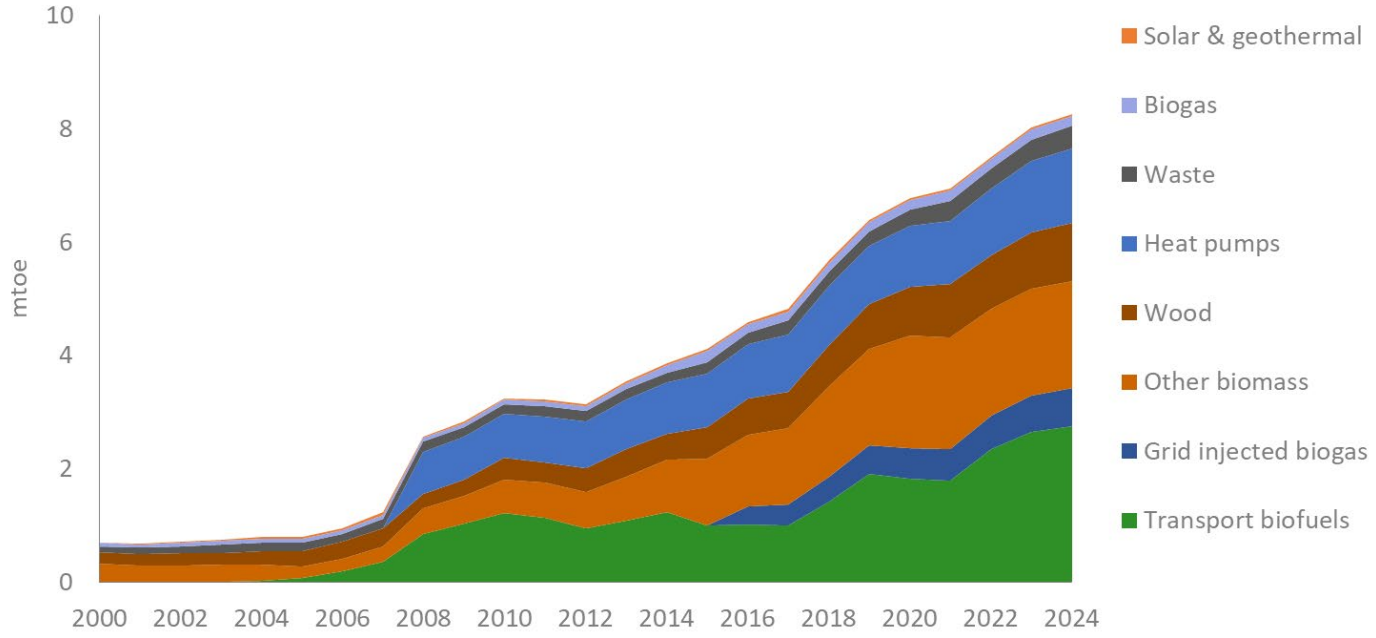
Hydro generation has been the most stable over the timeframe reflecting the maturity of the technology in the UK. With limited new capacity, generation tends to fluctuate in line with rainfall. In contrast, solar PV generation has increased rapidly since 2011 reflecting the surge in new capacity incentivised via the Feed in Tariff (FiT) support scheme. As a result, solar PV's share of renewable generation increased from just 0.2 per cent in 2010 to 10.7 per cent in 2023, this slipped to 10.0 in 2024 due to less favourable weather conditions.

[2] For more information see the solar deployment tables at: https://www.gov.uk/government/statistics/solar-photovoltaics-deployment

Bioenergy has doubled over the last ten years as several large power stations converted from coal to plant biomass (mainly wood pellets). At 26.6 TWh, plant biomass generation was up 27 per cent on 2023, not far short of the record set in 2021 (27.0 TWh). Outages dampened generation in 2022 and 2023 but recovered in 2024. Generation from landfill gas peaked at 5.3 TWh in 2011 but has fallen in each year since then as extraction rates have declined at landfill sites. This fall has been offset by increases in generation from anaerobic digestion so that in total, generation from biogases has remained fairly stable since 2015.

Whilst electricity generation represents the largest share (72 per cent) of renewable fuel demand, heat also accounts for a sizable proportion (17 per cent), followed by transport biofuels (9.4 per cent) and biogas injected into the gas grid (2.3 per cent).

Chart 6.8 Other renewable fuel uses[3]; heat, transport, and grid injected biogas (DUKES Table 6.4)



Renewable heat demand[4] is largely met by solid biomass, accounting for 60 per cent of fuel for heat in 2024, with the next largest share being heat pumps (27 per cent). The remainder is largely made up of wastes and biogases (8.3 per cent and 3.3 per cent respectively), with primary sources (such as active solar heating and geothermal) accounting for around 0.7 per cent. Renewable heat demand increased in 2024 by 1.6 per cent; although average heating degree days were fairly similar, an increase in heat pump installations and domestic wood stoves boosted renewable heat[5].

Renewables used in transport are liquid and gaseous biofuels, supplied either as additives or as a replacement ("drop-in") for fossil fuels. Biogasoline and biodiesel dominate the fuel mix, together representing 82 per cent of renewable transport demand (down from 92 per cent in 2023). Since 2018, small but rapidly increasing amounts of new biofuels became available in the UK. In 2024, 6.9 per cent of renewable transport

[3] Including non-biodegradable waste
[4] Including non biodegradable waste
[5] DUKES 2024 included preliminary results of a new domestic wood survey undertaken by The Department for Environment, Food and Rural Affairs (Defra). Since then, Defra has published its final report available via the following link;
Evaluation of the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 and Monitoring of domestic burning practices in the UK - AQ1043
These final results have had no discernible impact on the baseline compared to 2024; any variations are down to weather effects and the stock of appliances. On this basis, no longer term revision has been undertaken.

fuels were biogases, up from less than 1 per cent in 2018, while bio-LPGs (bio propane and bio butane) accounted for 0.5 per cent, though supply is particularly volatile. Bio-jet fuel accounts for 10 per cent of all transport renewables (up from just 3.2 per cent in 2023) but only 2.1 per cent of total aviation demand.

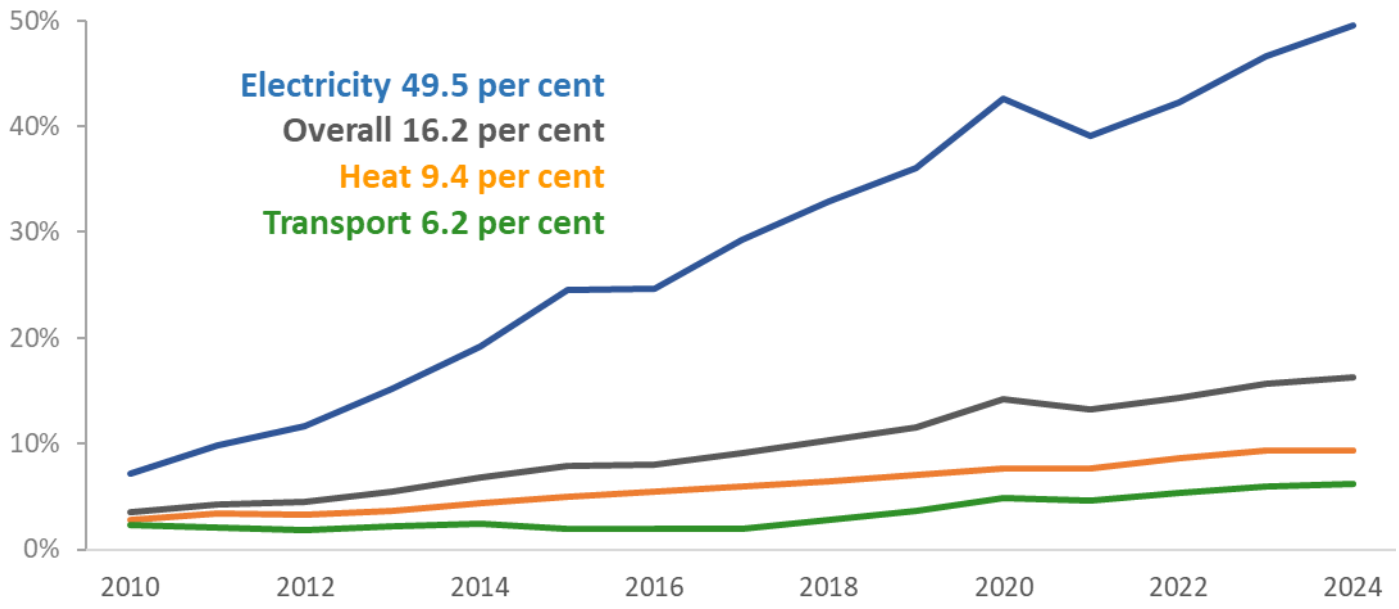
Demand for transport biofuels grew by 3.7 per cent to 2,744 ktoe; biodiesel fell by 15 per cent while biogasoline grew by 8.0 per cent, the latter being driven by the introduction of E10 petrol (i.e. up to 10 per cent bio content) at the pump as well as the general increase in transport fuel use.

Indigenous production of bioliquids decreased by 8.1 per cent in 2024, despite capacity remaining stable. Not all liquid biofuels are consumed in transport; use in autogeneration and non-mobile road machinery consume around 1.4 per cent of total consumption.

To place renewable energy in context, DUKES Table 6.5 provides a measure for the share of renewables across the various energy flows, as well as estimates for the renewable proportion of **Gross Final Consumption (i.e. before losses) for electricity and heat.** The renewable share of transport fuels is on an actual basis as presented in the final consumption by sector chart (Chart 6.9).

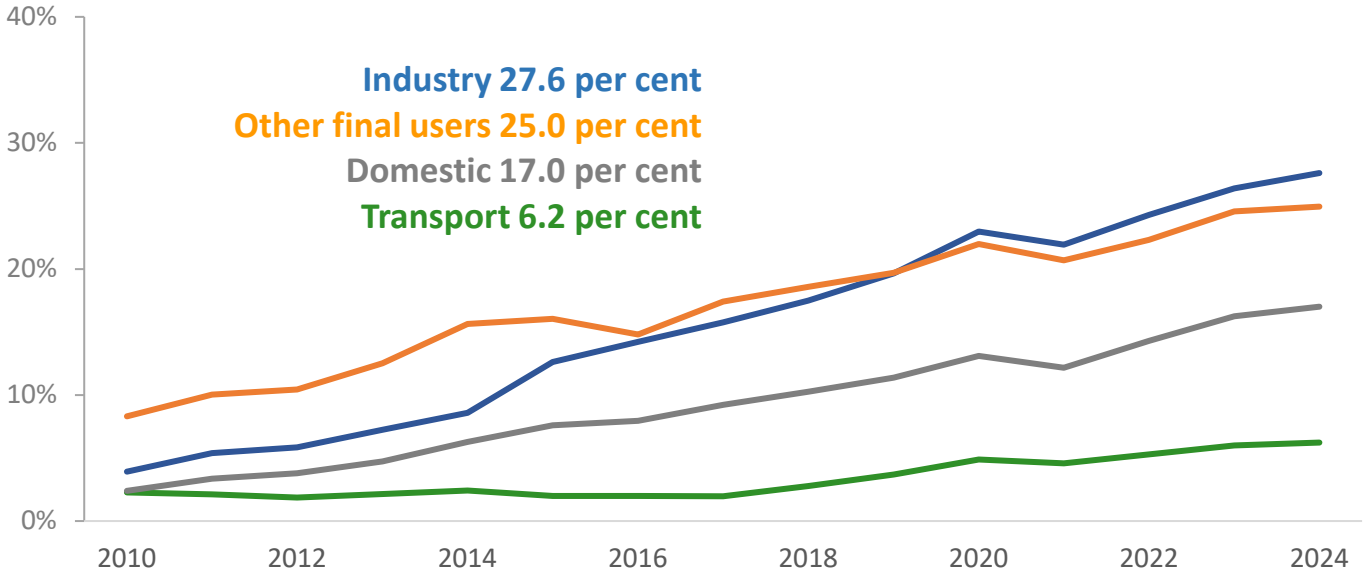
The proportion of electricity from renewables differs to that for generation and supply in that it excludes generation ultimately consumed in transport which is allocated to the transport measure. The underlying trend is however similar in that weather impacts are visible particularly between 2020 and 2021. Weather influences can also be seen between 2015 and 2016; despite this being a period of strong renewable capacity growth, generation was flat for the year with lower wind speeds, sun hours and rainfall. The heat measure is based on renewable fuels allocated to heat in Table 6.4; although some electricity will be consumed for heating purposes, this is allocated to electricity. Although over time, renewable fuels used in transport and heat have increased, both remain modest when compared with renewable electricity.

Chart 6.9 Renewable energy as a proportion of total gross final consumption (DUKES Table 6.5a)



The renewable proportion of fuels consumed by sectors, regardless of end use, varies depending not only on the proportion of thermal fossil fuels and bioenergy, but also on the share of electricity consumption which has seen its renewable proportion dramatically increase over the time period. Chart 6.10 below shows the changing proportion of renewables for each consuming sector.

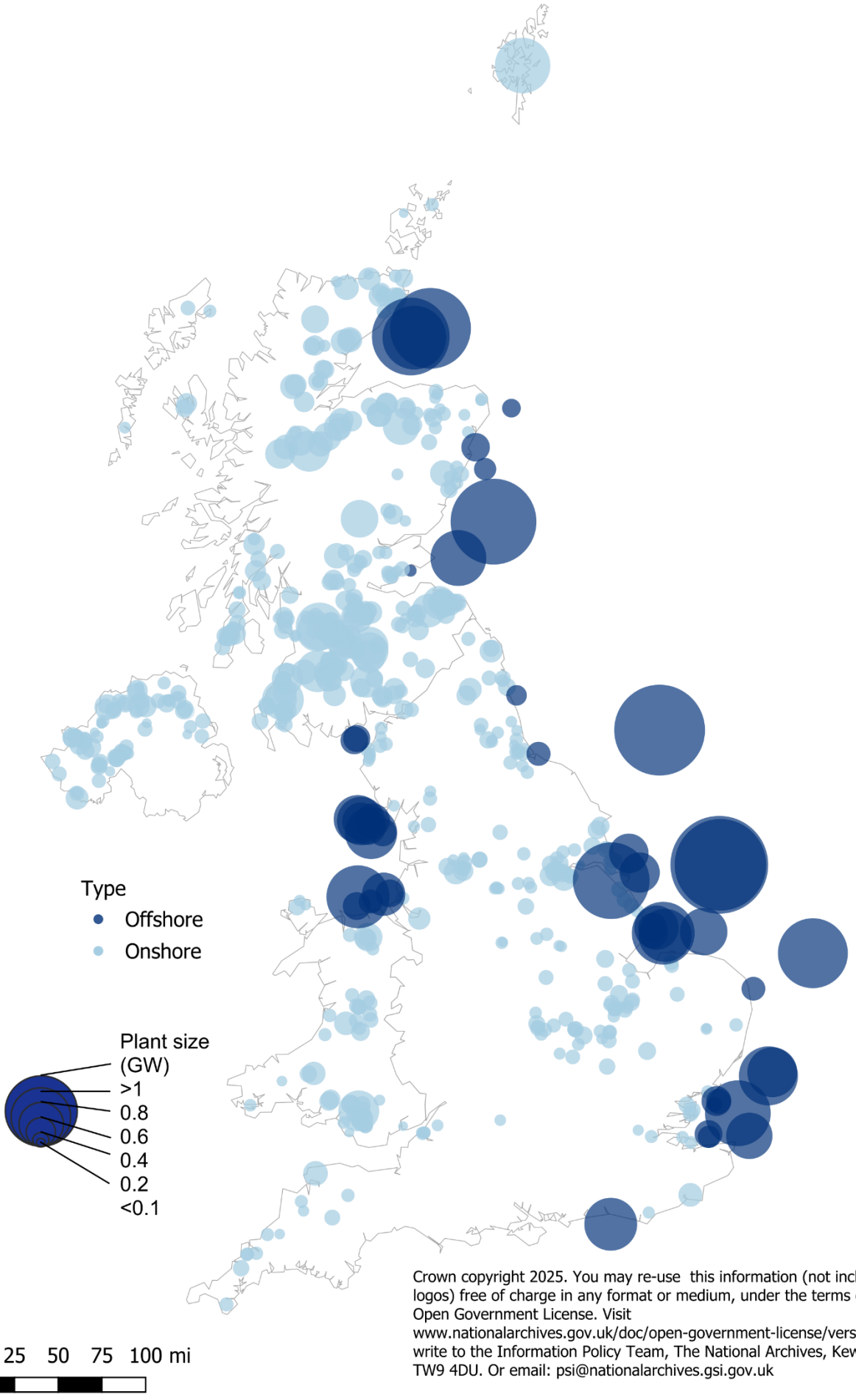
Chart 6.10 Renewables' share of final energy consumption by sector (DUKES Table 6.5b)



All sectors show an increase in their share of renewable consumption, in line with an increase in renewable electricity supply. Between 2016 and 2019, the proportion of renewables consumed by industry aligned with that for other final consumers, though remained slightly lower. This historic trend was driven by the shift from the high-grade heat requirements of heavy industry to lighter, less energy intensive industries. In 2019, industry's share of renewables exceeded other users' share for the first time. Although the fuel switching within sectors over this period is subtle, it has largely been driven by a relatively higher increase in the share of bioenergy and electricity consumption in industry combined with a fall in the share of natural gas, compared to an increase for other sectors. In 2024, industry continued its upward trend of its renewable share; by 1.2 percentage points. The domestic sector showed the next largest increase (0.7 percentage points) followed by other users and transport (0.4 and 0.2 percentage points respectively)

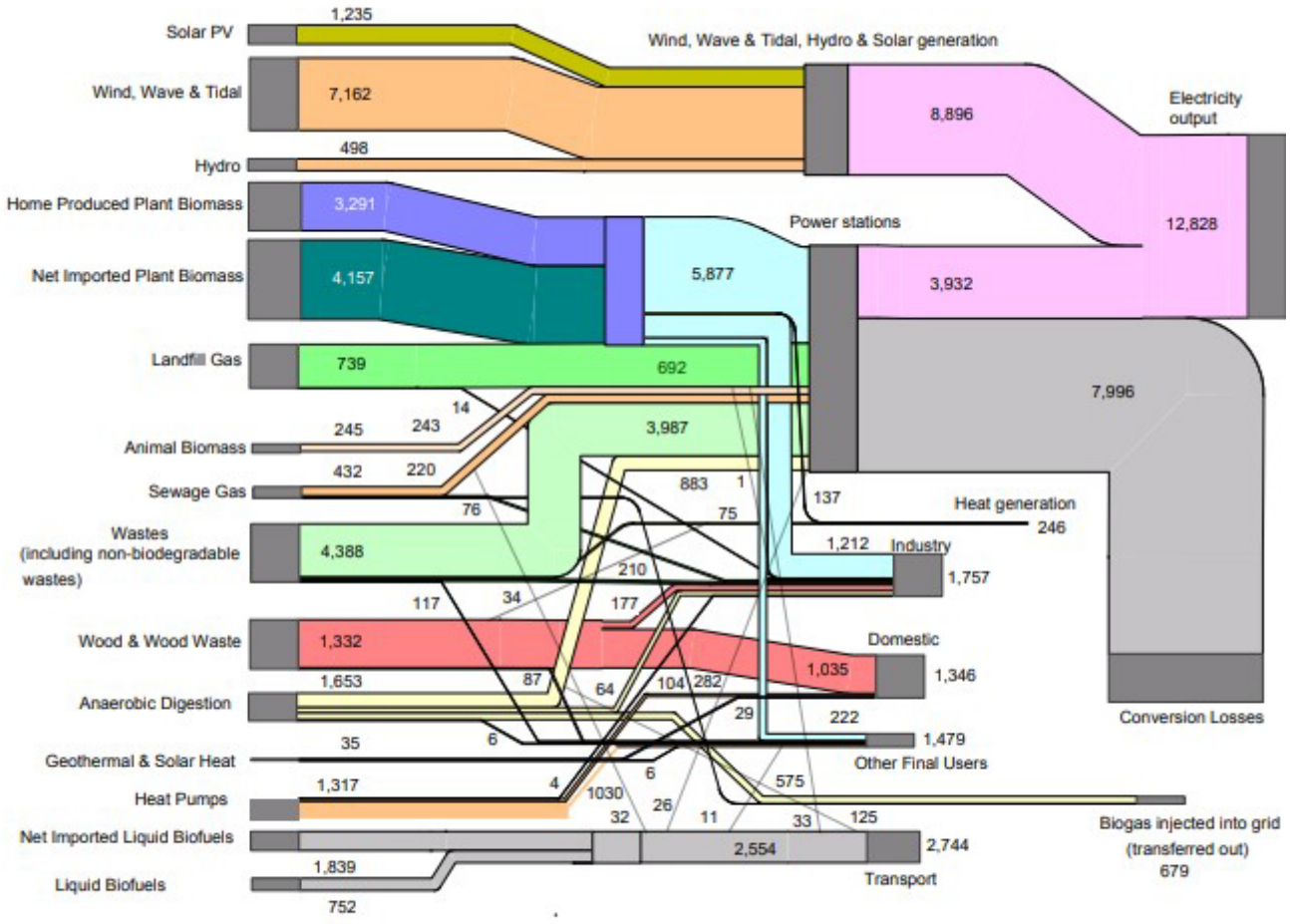
The map below shows UK wind farms that were operational at the end of 2024 with a capacity 5 MW or more; there are around 9,000 sites below this threshold and other sites are excluded due to a lack of precise location data. The locations are representative and not exact.

Map of UK wind capacity 2024



Renewable energy flow chart 2024 (DUKES Tables 6.1 and 6.2)

The renewable energy flow chart overleaf summarises the flows of renewables including production, net imports through to final outputs by sector. It also shows the conversion losses associated with thermal renewable generation. The data are sourced from the commodity balance Table 6.1, and Table 6.2 for electricity outputs.



Chapter 7: Combined Heat and Power (CHP)

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Key headlines

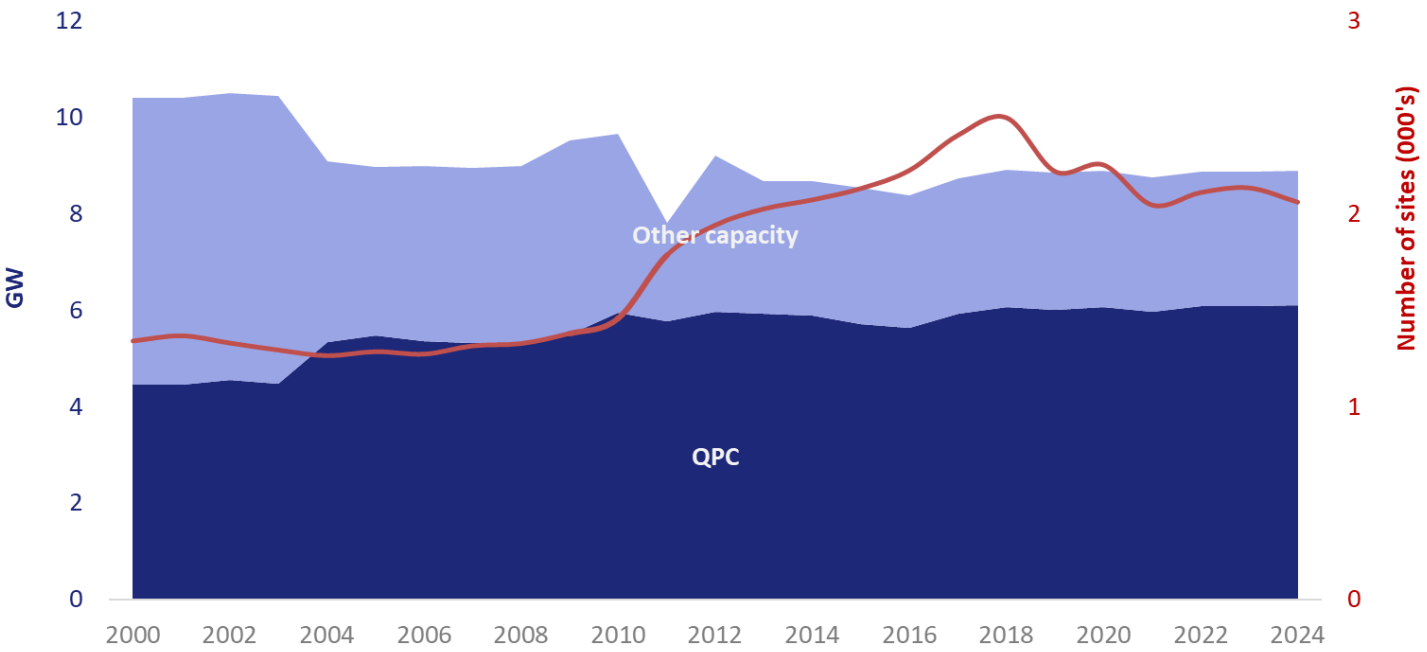
In 2024, renewable fuels accounted for 19 per cent of total CHP fuel input, a new record and one percentage point higher than in 2023.

CHP qualifying electricity output represented 7.3 per cent of total electricity generation, a 0.3 percentage drop on 2023 due to CHP generation falling to a greater extent than total generation.

Gas continues to be the main fuel consumed in CHP plants (around two thirds of fuel input), representing 8.2 per cent of gas demand.

CHP (or cogeneration) is the simultaneous generation of electricity and heat resulting in improved efficiencies when compared to meeting electricity and heat demands separately. The data for this section is primarily collected in support of the CHP Quality Assurance programme (CHPQA) but is supplemented with other sources to provide as comprehensive a picture as possible for UK CHP statistics. The CHPQA programme assesses and certifies schemes eligible for various incentives; not all output from a scheme is eligible, but where it is, it is referred to as 'good quality', or qualifying. Chart 7.1 shows the qualifying and other (non-qualifying) capacity compared to the number of schemes.

Chart 7.1 Comparison of total and qualifying electrical capacity from 2000 (DUKES Table 7.1.A)

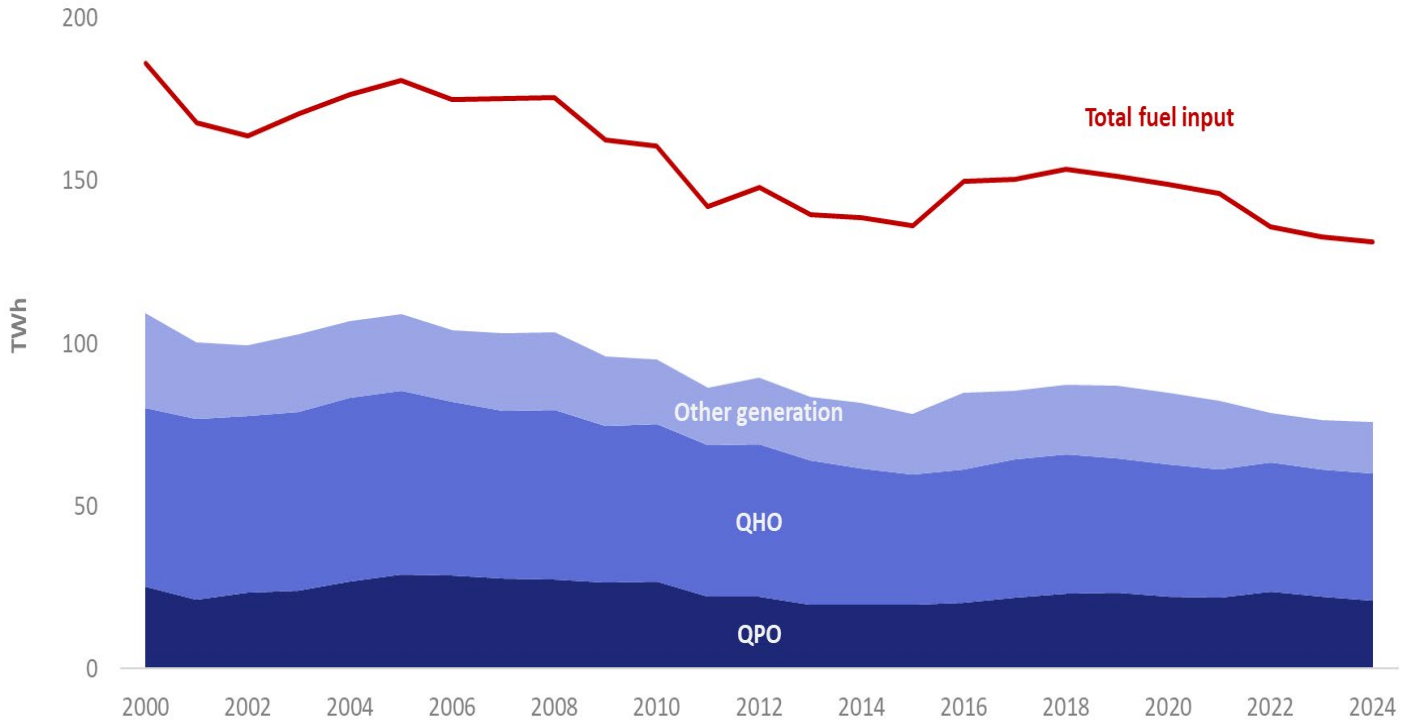


Since 2000, the number of sites remained steady until 2011 and 2012 when an additional data source was identified, and extra schemes were included in the database. The number of schemes then peaked in 2018, before falling by 438 units to 2024. This coincides with a decision taken by DESNZ to remove all schemes for which no new information had been obtained for at least nine years. Most of these schemes were small scale

(non CHPQA schemes) and whilst their removal is apparent in the time series for the number of schemes, the impact on capacity is barely discernible. Since 2000, total electrical capacity has fallen by 15 per cent but qualifying capacity has increased by 37 per cent, resulting in its share increasing from 43 per cent in 2000 to 69 per cent in 2024.

In 2024, 79 per cent of CHP outputs were deemed to be qualifying, around two thirds of which was heat. Chart 7.2 shows CHP outputs, qualifying and non-qualifying, compared to total fuel input.

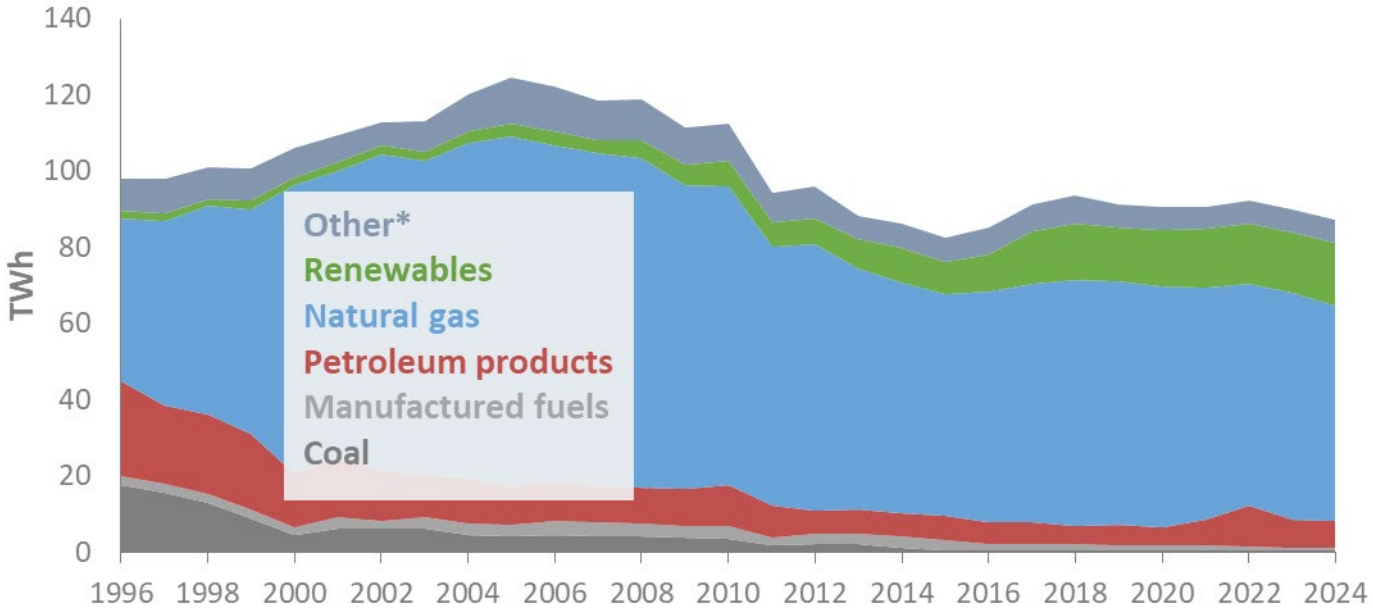
Chart 7.2 Comparison of total fuel and CHP outputs from 2000 (DUKES Table 7.1.A)



Although not a perfect relationship, CHP outputs tend to be driven by the underlying difference between the price of gas and electricity, the spark gap; the larger the gap, the cheaper gas is relative to electricity which makes cogeneration more economically viable. This partly explains the decline from 2006 to 2015 and the subsequent turnaround following a widening of the spark gap in 2013.

Natural gas remains the main fuel consumed by CHP schemes representing 65 per cent of the total in 2024, although its share has fallen slightly over the most recent years. The use of coal and petroleum products continues to fall with renewables increasing its share to 19 per cent in 2024. Chart 7.3 shows this long-term trend.

Chart 7.3 Trends in fuel demand for CHP[1] 1996 to 2024 (DUKES Table 7.1.B)



In 1996, the share of natural gas was just 44 per cent but by 2005, it had reached a maximum of 74 per cent. Although its share then stabilised at around 70 per cent, it has fallen by around 5 percentage points since 2019. Conversely, coal and manufactured fuels' share represented 20 per cent in 1996 but has plummeted to 1.4 per cent in 2024. Use of renewables was stable at around a 2 per cent share until 2007 when growth gained momentum reaching a record high of 19 per cent in 2024.

CHP is deployed across a variety of sectors including power generation, refineries, industry, public administration, and commercial. In 2013, around three quarters of CHP sites were non industrial (public administration, commercial, agriculture, and miscellaneous). This share has now fallen to 62 per cent in 2024, with 'other industries' (mostly waste management) share increasing. However, industrial CHPs are larger in terms of capacity, with refineries alone accounting for the largest share of electrical capacity, 35 per cent, but just 0.5 per cent of the number of sites. In contrast, the commercial sector has 22 per cent of the sites but accounts for just 3 per cent of the capacity.

The concentration and size of CHP schemes also varies across the UK, with the differences often mirroring the needs of the area's most developed economic sectors. Chart 7.4 shows Yorkshire and Humberside has the highest CHP capacity including the UK's largest scheme resulting in the highest average capacity per site (Table 7.8.A) across the regions (10.8 MW, markedly higher than the next highest at 3.6 MW for the South East). The South West has the lowest average capacity per site (1.0 MW), and the region with the highest number of schemes is London (average capacity per site at 1.1 MW).

[1] Fuel demand for heat and qualifying electricity output

Chart 7.4 Number of schemes and capacity by region in 2024 (DUKES Table 7.8)

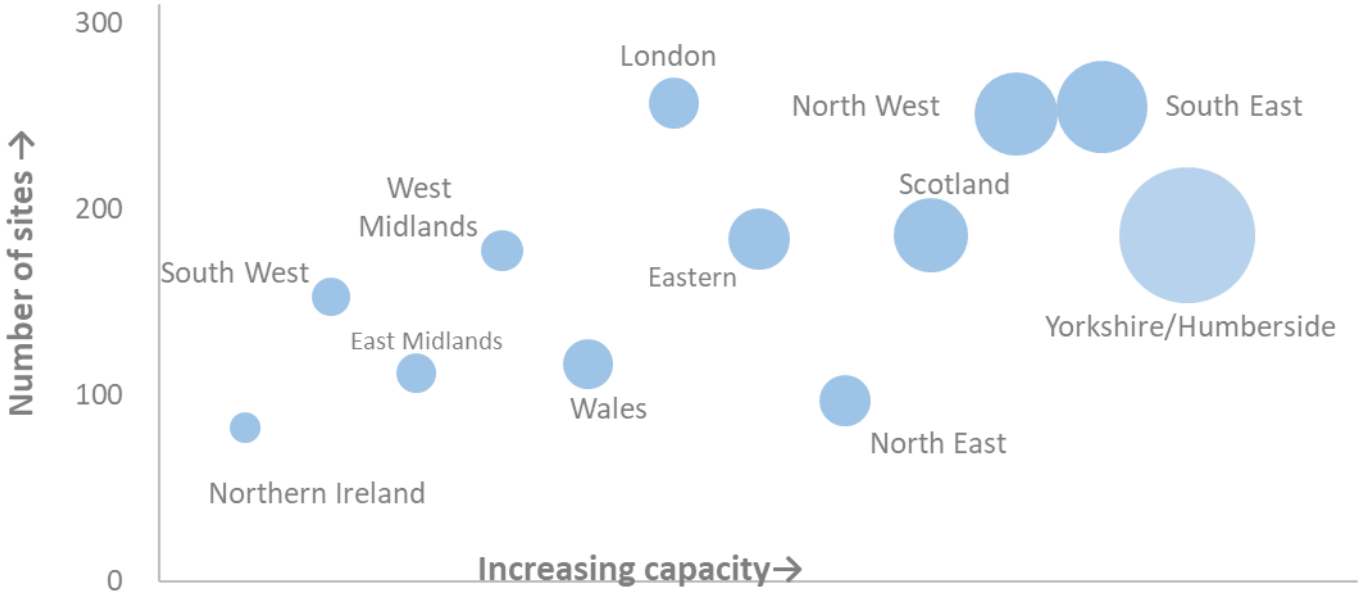


Table 7.8.E shows the distribution of capacity across the different sectors and regions with London accounting for almost half of all capacity in the electricity, gas, steam and air conditioning supply sector which includes district and community heating schemes. The chemicals sector which, along with oil refineries, is suitable for CHP, is concentrated in the North East, the North West and Yorkshire and Humberside; taken together these regions account for over 80 per cent of CHP capacity in those sectors.

More than a third of all capacity in the food and drink sector is in the Eastern region reflecting the large heat demands associated with sugar manufacture. The concentration of large horticultural sites (i.e. greenhouses) in South East England helps to explain the deployment of 40 per cent of all agricultural capacity in this region. The distribution of capacity serving public administration, mostly hospitals and education, tends to align with population density.

In 2024, 29 per cent of qualifying outputs (heat and electricity) were exported with the remaining 71 per cent being used on site. Less than half of qualifying electricity is exported (37 per cent) with the majority being split between power suppliers (i.e. exported to the grid) and sold under contract. Other generation, however, is mostly exported (79 per cent) with exports fairly evenly distributed across the output sectors. Heat is mostly consumed within the CHP scheme but of the heat which is exported, the majority is sold under contract (this heat is reported under the 'heat sold' column in DUKES Table 1.1).

Data tables in this release

Chapter 1 Energy

1.1 Aggregate energy balance
1.2 Value balance of traded energy
1.3 Sales of electricity and gas by sector

Total energy long term trends

1.1.1 Inland consumption of primary fuels and equivalents for energy use
1.1.2 Availability and consumption of primary fuels and equivalents (energy supplied basis)
1.1.3 Comparison of net imports of fuel with total consumption of primary fuels and equivalents
1.1.4 Primary energy consumption, gross domestic product, and the energy ratio
1.1.5 Energy consumption by final user (energy supplied basis)
1.1.6 Expenditure on energy by final user
1.1.7 Mean air temperatures (averages)
1.1.8 Mean air temperatures (deviations)
1.1.9 Mean heating degree days

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2.1 Coal: Commodity balances
2.2 Supply and consumption of coal
2.3 Supply and consumption of coke oven coke, coke breeze, and other manufactured solid fuels
2.4 Supply and consumption of coke oven gas, blast furnace gas, benzole, and tars
2.5 Deep mines and surface mines in production, December 2024
2.6 Identified GB coal resource assessment, June 2025
2.7 Imports of coal
2.8 Exports of coal

Solid fuels long term trends

2.1.1 Coal production and stocks
2.1.2 Inland consumption of solid fuels

Chapter 3 Petroleum

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3.3 Supply and disposal of petroleum
3.4 Additional information on inland deliveries of selected products
3.5 Stocks of crude oil and petroleum products at end of year
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3.7 Imports of crude oil and petroleum products by country of origin
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Oil long term trends

3.1.1 Crude oil and petroleum products: production, imports, and exports
3.1.2 Inland deliveries of petroleum

Chapter 4 Natural gas

4.1 Natural gas: Commodity balances
4.2 Supply and consumption of colliery methane
4.3 UK natural gas losses
4.4 Natural gas stock and storage sites
4.5 Natural gas imports and exports and import and export facilities
4.6 Liquefied Natural Gas imports by terminal

Symbols used in data tables

[x] is used to indicate data not available.

Individual entries in the tables are rounded independently and this can result in totals, which are different from the sum of their constituent items. Some of the data shown in this Digest may contain previously unpublished revisions.

Annexes and annex tables

Full annex documents and tables can be found by visiting the DUKES collection page.

Annex A: Energy and commodity balances, conversion factors, calorific values and density of fuels

A.1 Estimated average gross calorific values of fuels, 1970, 1980, 1990 and 1996 to 2024
A.2 Estimated average net calorific values of fuels, 1970, 1980, 1990 and 1996 to 2024
A.3 Estimated average density of fuels 2002 to 2024

Annex B: Glossary and acronyms

Annex C: Further sources of UK energy publications

Annex D: Major events in the energy industry

Annex E: Energy and the environment

E.1 Gas flared and vented by oil and gas fields and terminals

Annex F: Oil and gas resources

F.1 Crude oil and Natural Gas Liquids production
F.2 Gas production
F.3 Natural Gas Liquids net production
F.4 Disposals of crude oil

Annex G: Foreign Trade

G.1 Volume of imports and exports of fuels
G.2 Value of imports and exports of fuels

Annex H: Flow charts

Annex I: Energy balance net calorific values

I.1 Aggregate energy balance: net calorific values, 2004 to 2024

Annex J: Heat reconciliation

J.1 Heat sold reallocation, 1999 to 2024

Additional information

This section outlines the key principles when presenting energy statistics to help you understand the balance data tables. More information can be found in Annex A: Energy and commodity balances, conversion factors, calorific values and density of fuels. Annex B contains a glossary, which provides definitions of technical terms used. Annexes A and B can be accessed from the main DUKES page.

Balance principles

Balances are divided into two types, each of which performs a different function:

1. Commodity balance - a balance for each energy type that uses specific measurement units usually associated with that commodity. It shows the flow of the commodity from its sources of supply through to its final use. Commodity balances are presented in the individual fuel chapters of this publication.
2. Energy balance - presents the commodity balances in a common unit and places them alongside one another in a manner that shows the dependence of the supply of one commodity on another. The energy balance format is used in Chapter 1.

Both types show the flow of the type of energy from its supply through to its final use. The following sections give an overview of the supply and demand flows shown in each type of balance.

Supply to the energy balances

Production
This covers indigenous production and generation or manufacture of energy using other energy sources as fuel (for example, heating water using gas to produce steam turbine electricity).

Other sources
This covers sources that do not represent “new” supply. These may be recycled products, recovered fuels (slurry or waste coal), electricity from pumped storage plants, or transfers of ethane, propane, and butane from gas stabilisation plants at North Sea terminals.

Imports and exports
These figures relate to energy moving into or out of the UK. Exported commodities are produced in the UK and imported commodities are for use within the UK. The figures thus exclude commodities that move into and out of HM Revenue and Customs bonded areas.

Marine bunkers
These are deliveries of fuels (usually fuel oil or gas oil) to ships of any flag for consumption during their voyage to other countries.

Stock changes
Additions to and withdrawals from stocks held by producers and transformation industries correspond to withdrawals from (- sign) and additions to supply (+ sign), respectively.

Transfers
A movement of a fuel out of one type is shown with a negative sign, to indicate that it has been withdrawn from supply. The movement into the other fuel is shown as a positive. The transfers row would ideally sum to zero, but differences in calorific values can result in non-zero values. There are several reasons why quantities may be transferred from one commodity balance to another:

- a commodity may no longer meet the original specification and be reclassified.
- the name of the commodity may change through a change in use.
- to show quantities returned to supply from consumers. These may be by-products rather than fuels.

The total supply available for national use is obtained by summing these flows in the balance.

Statistical differences

Any excess or shortfall in supply compared to demand is shown as a statistical difference. A negative figure indicates that demand exceeds supply. These arise because data has been gathered from a variety of independent sources and reflect differences in timing, in definition of activity or commodity. Differences also arise in the measurement of the flow of the commodity. A non-zero statistical difference is normal and, within reason, is preferable to a statistical difference of zero, which would suggest that a data provider has adjusted a figure to balance the account.

Demand in the energy balances

The demand section is divided into demand for transformation, for use in the energy industries, and a section covering uses by final consumers.

Transformation
This covers processes and activities that transform the original primary (and sometimes secondary) commodity into another type. Most transformation corresponds to an industry whose main business is to manufacture a particular type of energy such as electricity generators. Some activities produce another commodity as a by-product. All are included in the energy balances.

Electricity generation
Quantities of fuels burned for the generation of electricity. The activity is divided into two parts, covering the major power producers (for whom the main business is the generation of electricity) and autogenerators (who produce electricity as a by-product of another process). Where a generator uses combined heat and power plant, the figures include only the part of the fuel use corresponding to the electricity generated.

Heat generation
Quantities of fuel burned to generate heat that is sold under contract to a third party. This includes heat that is generated and sold by combined heat and power plants and by community heating schemes (also called district heating).

Petroleum refineries
Crude oil, natural gas liquids and other oils needed by refineries for the manufacture of finished oil products.

Coke manufacture and blast furnaces
Quantities of coal for coke ovens and all fuels used within blast furnaces. The consumption of fuels for heating coke ovens and the blast air for blast furnaces are shown under Energy industry use.

Patent fuel manufacture
Coals and other solid fuels used for the manufacture of solid patent fuels.

Other
Any minor transformation activities not specified elsewhere.

Energy industry use
Consumption by both extraction and transformation industries to support the transformation process (but not for transformation itself). Typical examples are the consumption of electricity in power plants, or the use of extracted gases on oil and gas platforms.

Losses
Intrinsic losses that occur during the transmission and distribution of electricity and gas (including manufactured gases). Other metering and accounting differences for gas and electricity are within the statistical difference, as are undeclared losses in other commodities.

Final consumption
This covers consumption of commodities for energy and non-energy uses. The energy disappears from the account after use. Final consumption for energy purposes is divided into use by sector of economic activity. The classification of consumers according to their main business follows, as far as practicable, Standard Industrial Classification codes (SIC 2007). The section on Sector breakdowns below shows the breakdown of final consumers used, and how this corresponds to SIC codes 2007.

Sector breakdowns

Categories for final consumption are defined by Standard Industrial Classification codes 2007:

Category of user	SIC 2007
Fuel producers	05-07, 09, 19, 24.46, 35
Iron and steel	24 (excluding 24.4, 24.53 and 24.54)
Other industry	08, 10-18, 20-23, 24.4 (excluding 24.46), 24.53, 24.54, 25-33, 36-39, 41-43
Transport	49-51 (part*)
Agriculture	01-03
Commercial	45-47, 49-51 (part*), 52-53, 55-56, 58-66, 68-75, 77-82
Public administration	84-88
Other services	90-99
Domestic	Not covered by SIC, defined as deliveries to residential properties

* Note – transport sector includes only energy used for motion/traction purposes. Other energy used by transport companies is classified to the commercial sector.

The qualifications to, and constraints on, use of the classification are described in the energy balance methodology note.

Technical information

Methodology

More detailed notes on the methodology used to compile the figures and data sources are available on the collection pages for each fuel. The figures have not been adjusted for temperature or seasonal factors except where noted. Percentage changes relate to the corresponding period a year ago. They are calculated from unrounded figures. They are shown as (+) or (-) when very large. Figures relate to the United Kingdom unless otherwise indicated. Further information is available from the North Sea Transition Authority at https://www.nstauthority.co.uk/.

Standard conversion factors

This Digest uses the tonne of oil equivalent (toe) as the common unit of energy for comparing and aggregating fuels. The following table gives factors for converting between this unit and alternative units of energy found in this and other publications (see Chapter 1, Technical notes and definitions and Annex A).

To	ktoe	TJ	GWh	million therms	To	toe	GJ	kWh	therms
From	Multiply by				From	Multiply by			
ktoe	1	41.868	11.63	0.39683	toe	1	41.868	11,630	396.83
TJ	0.023885	1	0.27778	0.0094778	GJ	0.023885	1	277.78	9.4778
GWh	0.085985	3.6	1	0.034121	kWh	0.000085985	0.0036	1	0.034121
million therms	2.52	105.51	29.307	1	therms	0.00252	0.10551	29.307	1

ktoe = thousand tonne of oil equivalent toe = tonne of oil equivalent

A selection of estimated average gross calorific values for 2024 (see also Annex A)

Fuel category	GJ per tonne	Fuel category	GJ per tonne
Coal		Renewable sources	
All consumers (weighted average)	26.9	Domestic wood	16.3
Power stations (including imports; weighted average)	26.5	Industrial wood	20.3
		Municipal solid waste	10.1
Iron and steel	30.4		
Other industries (weighted average)	26.7	Petroleum	
Imported coal (weighted average)	28.4	Crude oil (weighted average)	45.7
Exported coal (weighted average)	28.0	Petroleum products (weighted average)	46.3
Coke	29.8	Petrol	47.0
Coke breeze	29.8	Gas/diesel oil	45.3
Other manufactured solid fuel	29.6	Road diesel	45.8
		Fuel oil	43.4
Gases (MJ per cubic metre)			
Natural gas (produced)	40.1		
Landfill gas	21-25		
Sewage gas	21-25		

Geographical coverage

The geographical coverage of the statistics is the United Kingdom. However, within UK trade statistics, shipments to the Channel Islands and the Isle of Man from the United Kingdom are not classed as exports. Supplies of solid fuel and petroleum to these islands, from the UK, are therefore included as part of United Kingdom inland consumption or deliveries.

Revisions policy

Figures for the latest periods are provisional and are liable to subsequent revision. The DESNZ statistical revisions policy sets out the revisions policy for these statistics, which has been developed in accordance with the UK Statistics Authority Code of Practice for Statistics. DESNZ's statements of compliance with the Code are available online, as well as the UK Statistics Authority reports on their regular assessments of energy statistics. The authority's recommendations have been incorporated into this publication and other DESNZ energy statistical publications and outputs.

DUKES tables contain revisions to some of the previously published figures. A table showing the size of revisions to key aggregates is shown below. Statistics on energy in this Digest are classified as National Statistics. This means that they are produced to high professional standards as set out in the UK Statistics Authority's Code of Practice for Official Statistics. The Code of Practice requires that all the public bodies that produce official statistics "Publish a revisions policy for those outputs that are subject to scheduled revisions, and provide a statement explaining the nature and extent of revisions at the same time that they are released". The following statement outlines the policy on revisions for energy statistics.

It is intended that any revisions should be made to previous years' data only at the time of the publication of the Digest. In exceptional circumstances previous years' data can be amended between Digest publication dates, but this will only take place when quarterly Energy Trends is published. The reasons for substantial revisions will be explained in the 'Cover sheet' worksheet of the table concerned.

Valid reasons for revisions of Digest data include:

- Revised and validated data received from a data supplier.
- The figure in the Digest was wrong because of a typographical or similar error.
- In addition, when provisional annual data are published in Energy Trends in March, growth rates are liable to be distorted if the prior year's data are constrained, when revisions are known to be required. In these circumstances the prior year's data will be amended for all affected tables in Energy Trends and all affected Digest tables will be clearly annotated to show that the data has been updated in Energy Trends.

All validated amendments from data suppliers will be updated when received and published in the next statistical release.

All errors will be amended as soon as identified and published in the next statistical release.

Data in energy and commodity balances format will be revised on a quarterly basis, to coincide with the publication of Energy Trends.

This year, the revisions window for DUKES has been opened back to 2021 for primary oil, petroleum products and gas, and from 2022 for all fuels. Details of the methodology changes applied to gas balances from 2022 are explained in an Energy Trends article published in June 2025.

Revisions since DUKES 2024 for 2021 to 2023

Thousand tonnes of oil equivalent	2021	2022	2023	Percentage revisions to 2023 data
Production	2	472	251	0.2%
Primary supply	-216	-457	-12	0.0%
Primary demand	-84	-394	377	0.2%
Transformation	-42	-172	-600	2.3%
Energy industry use	-49	30	9	0.1%
Final consumption	-76	-732	-221	-0.2%
Industry	-92	-613	-668	-3.3%
Transport	-16	-130	-86	-0.2%
Domestic	0	90	489	1.5%
Other users	32	-24	26	0.1%
Non energy use	0	-57	18	0.4%

Background to the Digest

This issue of the Digest of United Kingdom Energy Statistics (DUKES) continues a series which commenced with the Ministry of Fuel and Power Statistical Digest for the years 1948 and 1949, published in 1950. The Ministry of Fuel and Power Statistical Digest was previously published as a Command Paper, the first being that for the years 1938 to 1943, published in July 1944 (Cmd. 6538).

The current publication consists of seven chapters and four annexes. The first chapter deals with overall energy. The other chapters cover the specific fuels, renewable sources of energy and combined heat and power. The annexes cover conversion factors and calorific values, a glossary of terms, further sources of information and major events in the energy industries.

Where necessary, data have been converted or adjusted to provide consistent series. However, in some cases changes in methods of data collection have affected the continuity of the series. The presence of remaining discontinuities is indicated in the chapter text or in footnotes to the tables.

Chapters 6 and 7 summarise the results of surveys conducted by Ricardo Energy & Environment on behalf of DESNZ, which complement work undertaken by DESNZ. These chapters estimate the contribution made by renewable energy sources to energy and combined heat and power (CHP) production and consumption in the United Kingdom.

Acknowledgements

Acknowledgement is made to the main coal producing companies, the electricity companies, the oil companies, the gas pipeline operators, the gas suppliers, National Grid, the Institute of Petroleum, the Coal Authority, the United Kingdom International Steel Statistics Bureau, Ricardo Energy & Environment, the Department for Environment, Food and Rural Affairs, the Department for Transport, OFGEM, Building Research Establishment, HM Revenue and Customs, the Office for National Statistics, and other contributors to the enquiries used in producing this publication.

Accredited official statistics and user engagement

Accredited official statistics

These statistics are accredited official statistics. Accredited official statistics are called National Statistics in the Statistics and Registration Service Act 2007.

These accredited official statistics were independently reviewed by the Office for Statistics Regulation (OSR) in June 2014. They comply with the standards of trustworthiness, quality and value in the Code of Practice for Statistics.

Our statistical practice is regulated by the Office for Statistics Regulation.

OSR sets the standards of trustworthiness, quality and value in the Code of Practice for Statistics that all producers of official statistics should adhere to.

You are welcome to contact us by emailing energy.stats@energysecurity.gov.uk with any comments about how we meet these standards.

Alternatively, you can contact OSR by emailing regulation@statistics.gov.uk or via the OSR website.

Pre-release

Some ministers and officials receive access to these statistics up to 24 hours before release. Details of the arrangements for doing this and a list of the ministers and officials that receive pre-release access to these statistics can be found in the DESNZ statement of compliance with the Pre-Release Access to Official Statistics Order 2008.

User engagement

Users are encouraged to provide comments and feedback on how these statistics are used and how well they meet user needs. Comments on any issues relating to this statistical release are welcomed.

Enquiries about statistics in this publication should be made to the contact named at the start of the relevant chapter. Brief extracts from this publication may be reproduced provided that the source is fully acknowledged. General enquiries about the publication, and proposals for reproduction of larger extracts, should be addressed to DESNZ.

The Department for Energy Security & Net Zero reserves the right to revise or discontinue the text or any table contained in this Digest without prior notice.

Related statistics

The Department for Energy Security & Net Zero make available other publications related to energy supply and demand that may be of interest. A full list of these and other related energy publications can be found in DUKES Annex C: Further sources of UK energy publications.

Energy Trends
More frequent monthly and quarterly data are available for total energy, solid fuels and derived gases, petroleum, gas, electricity, and renewables:
https://www.gov.uk/government/organisations/department-for-energy-security-and-net-zero/about/statistics

Energy prices
Monthly and quarterly prices by consumption sector and international comparisons of prices paid:
https://www.gov.uk/government/organisations/department-for-energy-security-and-net-zero/about/statistics

Energy Flow Chart
Annual publication illustrating the flow of primary fuels from home production and imports to their eventual final uses. They are shown in their original state and after being converted by secondary fuel producers:
www.gov.uk/government/collections/energy-flow-charts.

UK Energy in Brief
Annual publication summarising the latest statistics on energy production, consumption, and prices in the United Kingdom. The figures are taken from this Digest of UK Energy Statistics:
www.gov.uk/government/collections/uk-energy-in-brief

Sub-National Energy Consumption
Annual publication supporting local and regional decision making to deliver national energy policy objectives:
https://www.gov.uk/government/organisations/department-for-energy-security-and-net-zero/about/statistics

UK Greenhouse Gas Emissions
Show progress against the UK's goals, both international and domestic, for reducing greenhouse gas emissions:
https://www.gov.uk/government/collections/uk-territorial-greenhouse-gas-emissions-national-statistics

This publication is available from: https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

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