Department for
Business, Energy
& Industrial Strategy

ENERGY TRENDS
SEPTEMBER 2020

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Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

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Introduction

Energy Trends and Energy Prices are produced by the Department for Business, Energy and Industrial Strategy (BEIS) on a quarterly basis. Both periodicals are published concurrently in June, September, December and March. The September editions cover the second quarter of the current year.

Energy Trends includes information on energy as a whole and by individual fuels. The text and charts provide an analysis of the data in the tables. The tables are mainly in commodity balance format, as used in the annual Digest of UK Energy Statistics. The 2020 edition of the Digest was published on 30 July 2020 and is available on the BEIS section of the GOV.UK website at: www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

The balance format shows the flow of a commodity from its sources of supply, through to its final use. The articles provide in-depth information on current issues within the energy sector.

The text and tables included in this publication represent a snapshot of the information available at the time of publication. However, the data collection systems operated by BEIS, which produce this information, are in constant operation. New data are continually received and revisions to historic data made. To ensure that those who use the statistics have access to the most up-to-date information, revised data will be made available as soon as possible. The tables are available free of charge from the BEIS section of the GOV.UK website. In addition to quarterly tables, the main monthly tables continue to be updated and are also available on the BEIS section of the GOV.UK website. Both sets of tables can be accessed at:
www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy/about/statistics

Energy Trends does not contain information on Foreign Trade, Weather (temperature, heating degree days, wind speed, sun hours and rainfall) and Prices. Foreign Trade and Weather tables are however available on the BEIS section of the GOV.UK website at:
www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy/about/statistics
Information on Prices can be found in the Energy Prices publication and on the BEIS section of the GOV.UK website at: www.gov.uk/government/collections/quarterly-energy-prices

Please note that the hyperlinks to tables within this document will open the most recently published version of a table. If you require a previously published version of a table, please contact Kevin Harris (see details below).

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The main points for the second quarter of 2020:

- Total energy production was 1.5 per cent higher than in the second quarter of 2019.
- Oil production fell by 1.4 per cent when compared with the second quarter of 2019, with crude oil production down 1.6 per cent but Natural Gas Liquids (NGLs) production up 1.1 per cent.
- Natural gas production was 9.7 per cent higher than the second quarter of 2019, mainly due to planned maintenance being postponed. Gas imports and exports both fell in the second quarter of 2020, but LNG imports rose, with imports from Qatar becoming the main source of imports for only the third time ever.
- Coal production fell to a new record low in the second quarter of 2020 and was 29 per cent lower than the second quarter of 2019, due to falling demand. Coal imports were 39 per cent lower and at the lowest value in the published time series covering 22 years. Generators' demand for coal fell by 19 per cent to a record low.
- Total primary energy consumption for energy uses fell by 24 per cent. However, when adjusted to take account of weather differences between the second quarter of 2019 and the second quarter of 2020, total primary energy consumption fell by 19 per cent. This record low quarterly level of consumption was a direct result of the Covid-19 pandemic lockdown which took effect from 23 March 2020, resulting in a significant fall in demand for the main transport fuels (see below).
- Temperatures in the quarter were on average 1.1 degrees Celsius warmer than a year earlier, with all months being warmer than in 2019.
- Final energy consumption (excluding non-energy use) was 30 per cent lower than in the second quarter of 2019. Transport consumption fell by 52 per cent to a record low quarterly level, industrial consumption fell by 19 per cent, other final users consumption fell by 13 per cent, and domestic consumption fell by 4.5 per cent. On a temperature adjusted basis, final energy consumption fell by 22 per cent.
- Demand for transport fuels was at a record low level of 5.6 million tonnes in the second quarter of 2020, as the Covid-19 lockdown impacted domestic and international travel. Aviation fuel fell by 86 per cent, whilst petrol and diesel fell by 48 and 39 per cent respectively.
- Gas demand was 16 per cent lower than the second quarter of 2019 and at a record low level for the second quarter; the reduction was impacted by the Covid-19 pandemic as well as reduced demand from generators who favoured renewable sources, whilst electricity demand was 11 per cent lower than in the second quarter of 2019.
- Electricity generated in the second quarter of 2020 fell by 11 per cent to 67.5 TWh, the lowest value on the published time series.
- Of electricity generated in the second quarter of 2020, coal accounted for only 0.5 per cent, a new record low, whilst gas accounted for 34.4 per cent. Nuclear generation accounted for 17.6 per cent of total electricity generated in the second quarter of 2020.
- Low carbon electricity's share of electricity generation rose to 62.1 per cent in the second quarter of 2020, compared to 52.8 per cent in the second quarter of 2019.
- Renewables' share of electricity generation was a 44.6 per cent in the second quarter of 2020, up 9.0 percentage points on the share in the second quarter of 2019, partly due to increased capacity.
- Renewable electricity generation was 30.1 TWh in the second quarter of 2020, an increase of 12 per cent on the 27.0 TWh in the second quarter of 2019.
- Renewable electricity capacity was 48.5 GW at the end of the second quarter of 2020, a 5.4 per cent increase (2.4 GW) on a year earlier, with just under 80 per cent of the increase coming from offshore wind.

Section 1 – UK Total Energy
April to June 2020

Key results show:

Total energy production was 1.5 per cent higher than in the second quarter of 2019. (**Charts 1.1 & 1.2**)

Total primary energy consumption for energy uses fell by 24 per cent. However, when adjusted to take account of weather differences between the second quarter of 2019 and the second quarter of 2020, primary energy consumption fell by 19 per cent. This record low quarterly level of consumption was a direct result of the Covid-19 pandemic lockdown which took effect from 23 March 2020, resulting in a significant fall in demand for the main transport fuels. (**Chart 1.3**)

Final energy consumption (excluding non-energy use) fell by 30 per cent compared to the second quarter of 2019. Transport consumption fell by 52 per cent to a record low quarterly level, industrial consumption fell by 19 per cent, other final users (mainly from the service sector) consumption fell by 13 per cent, and domestic consumption fell by 4.5 per cent. (**Charts 1.4 & 1.5**)

On a seasonally and temperature adjusted basis, final energy consumption fell by 22 per cent, with falls in all sectors except domestic. (**Chart 1.5**)

Net import dependency was 17.1 per cent, down 16.3 percentage points from the second quarter of 2019. (**Chart 1.6**)

Fossil fuel dependency was at a record low of 72.1 per cent, in the second quarter of 2020. (**Chart 1.7**)

Relevant tables

1.1: Indigenous production of primary fuels
1.2: Inland energy consumption: primary fuel input basis
1.3: Supply and use of fuels, and Seasonally adjusted and temperature corrected final energy consumption

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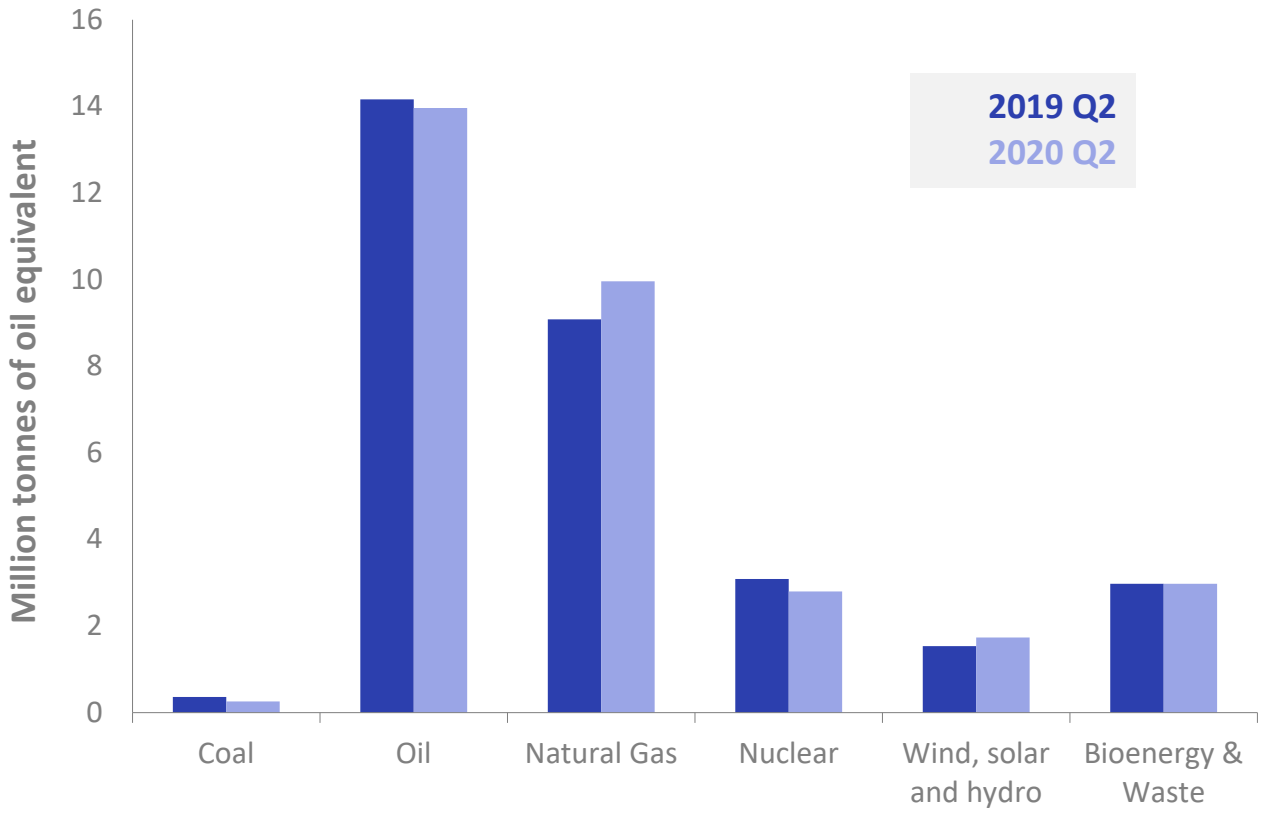
Chart 1.1 Production of indigenous primary fuels (Table 1.1)



Total production in the second quarter of 2020 was 31.7 million tonnes of oil equivalent, 1.5 per cent higher than in the second quarter of 2019.

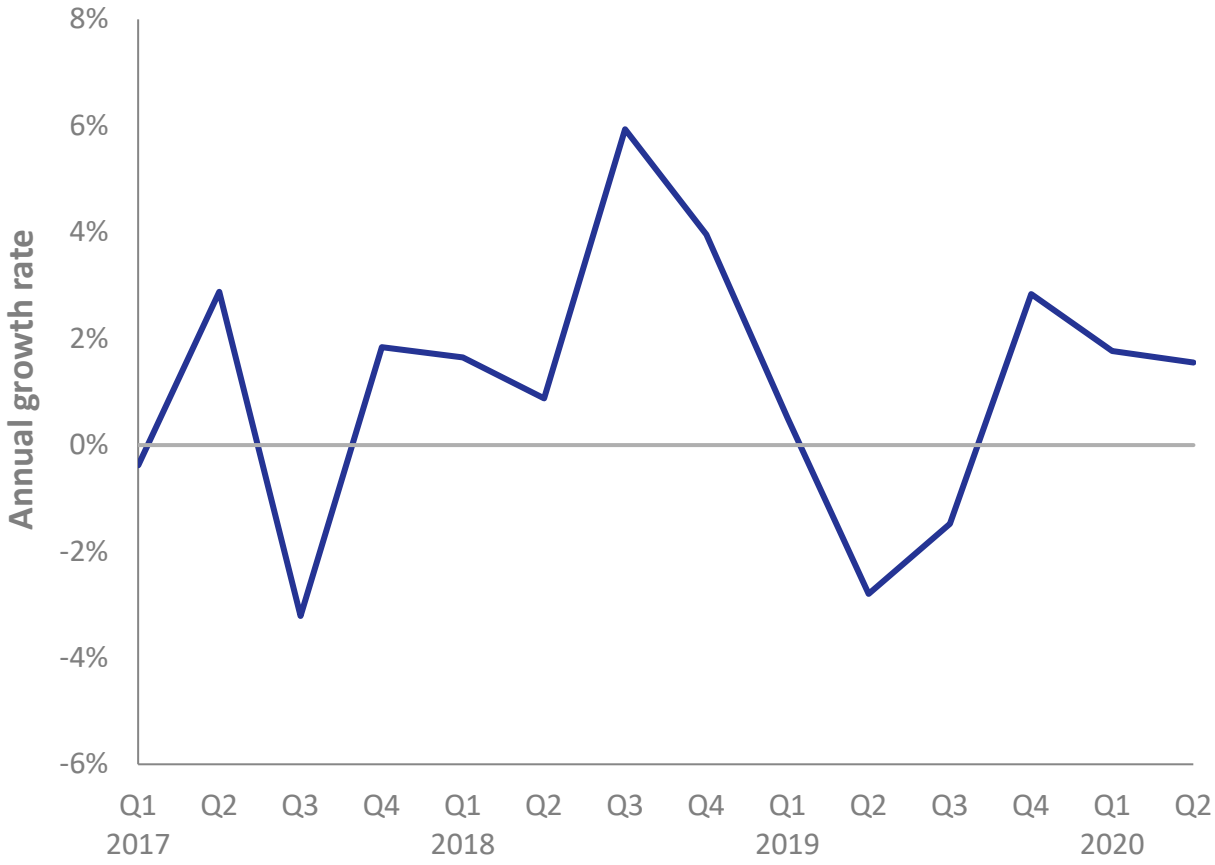
Production of oil fell by 1.4 per cent, whilst production of natural gas rose by 9.7 per cent due to planned summer maintenance being postponed due to the social distancing measures required because of the Covid-19 pandemic.

Primary electricity output in the second quarter of 2020 was 1.9 per cent lower than in the second quarter of 2019. Nuclear electricity output was 9.2 per cent lower, and at the lowest quarterly level since Q3 2010, as maintenance outages continued at Dungeness B, Hinkley Point B, Hunterson B and Sizewell B, whilst output from wind, hydro and solar pv was 13 per cent higher, with record levels of solar generation in the quarter and in the month of May 2020 due to increased capacity and more sun hours than in 2019.

Production of bioenergy and waste was 0.1 per cent higher compared to the second quarter in 2019.

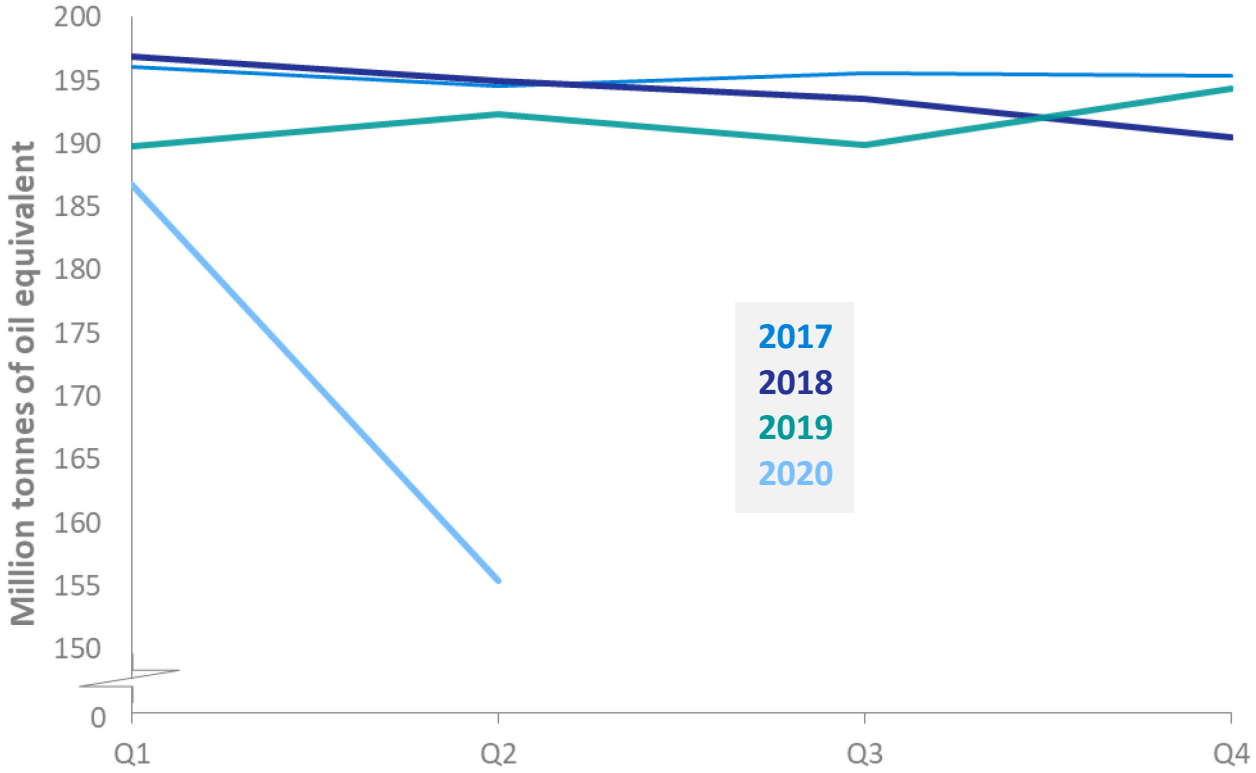
In the second quarter of 2020 production of coal and other solid fuels was 29 per cent lower than the corresponding period of 2019 and at a record low level, due to reduced demand from electricity generators.

Chart 1.2 UK production (annual growth rate) (Table 1.1)



In the second quarter of 2020, the annual growth rate of UK quarterly production was +1.5 per cent on the same quarter last year with increases in gas, bioenergy & waste and wind, solar and hydro output offset by decreases in coal, oil and nuclear output.

Chart 1.3 Total inland consumption (primary fuel input basis) [1] (Table 1.2)



(1) Seasonally adjusted and temperature corrected annual rates

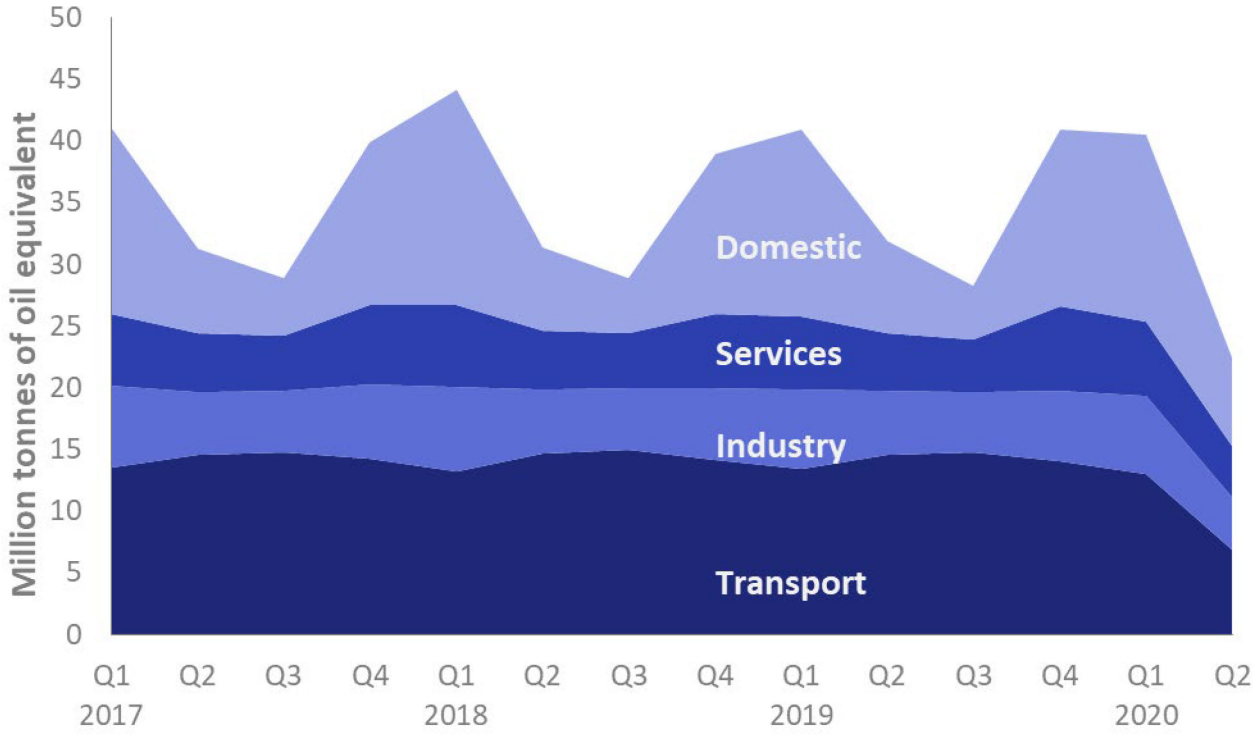
Total inland consumption on a primary fuel input basis (seasonally adjusted and temperature corrected annualised rate), was 155.4 million tonnes of oil equivalent in the second quarter of 2020, 19 per cent lower than in the second quarter of 2019. This record low quarterly level of consumption was a result of the Covid-19 pandemic lockdown which took effect from 23 March 2020, resulting in a fall in oil consumption to a record low quarterly level (38.2 million tonnes of oil equivalent), as demand fell significantly for the three main transport fuels of petrol, diesel and aviation turbine fuel.

On the same basis, natural gas consumption fell by 8.2 per cent between the second quarter of 2019 and the second quarter of 2020. Gas consumption is heavily influenced by temperatures, which in the second quarter of 2020 were 1.1 degrees Celsius warmer than the same period a year earlier, because of its main use being for heating. However, in Q2 2020 demand was also impacted by the Covid-19 pandemic lockdown as schools, shops and workplaces were all forced to close.

Between the second quarter of 2019 and the second quarter of 2020 coal and other solid fuel consumption fell by 4.3 per cent, in part due to no coal being burnt in Great Britain between 10 April and 16 June 2020.

Also, on a seasonally adjusted and temperature corrected basis there was a fall of 9.3 per cent in nuclear consumption, but rises in wind, hydro and solar pv (up 13 per cent) and of bioenergy & waste (up 1.9 per cent) consumption.

Chart 1.4 Final energy consumption by user (Table 1.3a)



Total final energy consumption fell by 29 per cent between the second quarter of 2019 and the second quarter of 2020 to a record low quarterly level, as consumption levels were severely impacted by the Covid-19 pandemic lockdown restrictions introduced on 23 March 2020.

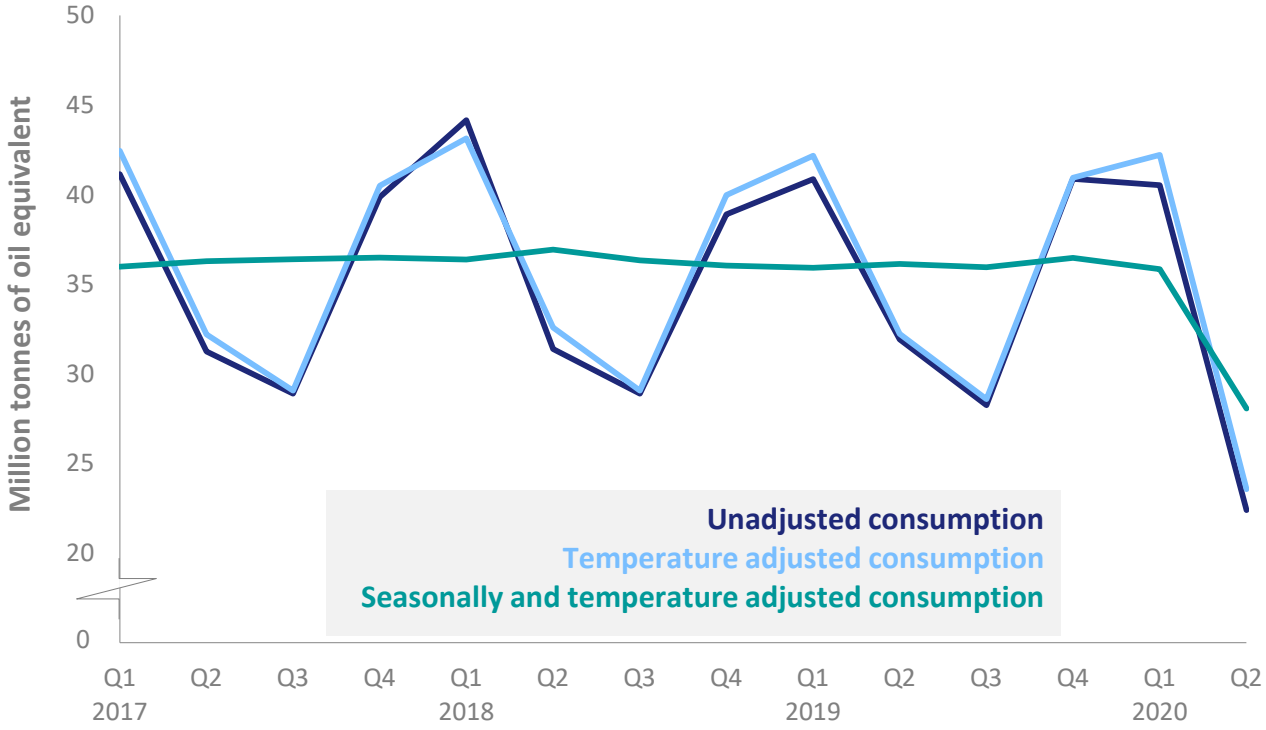
Domestic sector energy consumption fell by 4.5 per cent, even allowing for an increase in home working during lockdown. Average temperatures in the second quarter of 2020 were 1.1 degrees Celsius warmer than a year earlier, with April and May being 1.3 and 1.4 degrees Celsius warmer than in 2019.

Service sector energy consumption fell by 13 per cent as many schools, shops and workplaces were forced to close.

Industrial sector energy consumption fell by 19 per cent.

Transport sector energy consumption fell by 52 per cent to a record low quarterly level, as domestic and international travel was significantly reduced during the lockdown period.

Chart 1.5 Seasonally adjusted and temperature corrected final energy consumption (Table 1.3c)

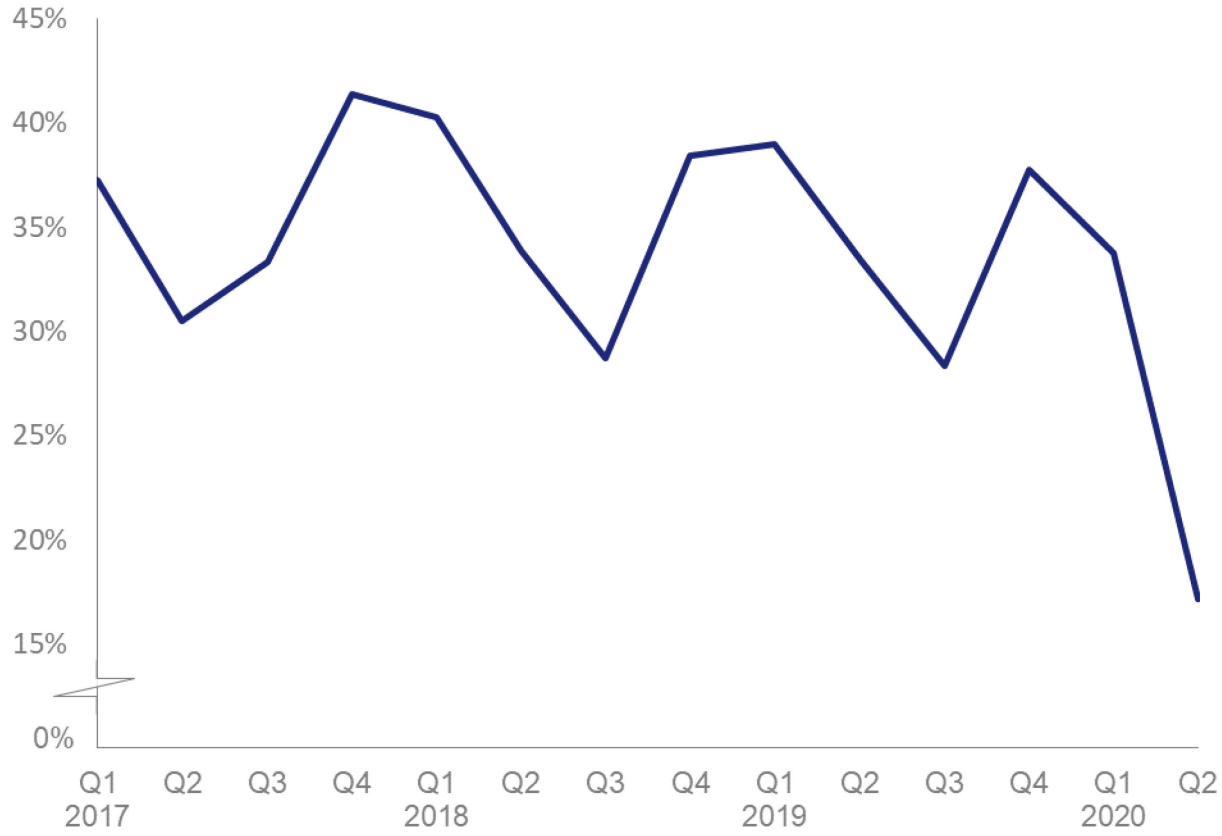


Total unadjusted final energy consumption (excluding non-energy use) fell by 30 per cent between the second quarter of 2019 and the second quarter of 2020.

On a seasonally and temperature adjusted basis final energy consumption (excluding non-energy use) fell by 22 per cent between the second quarter of 2019 and the second quarter of 2020.

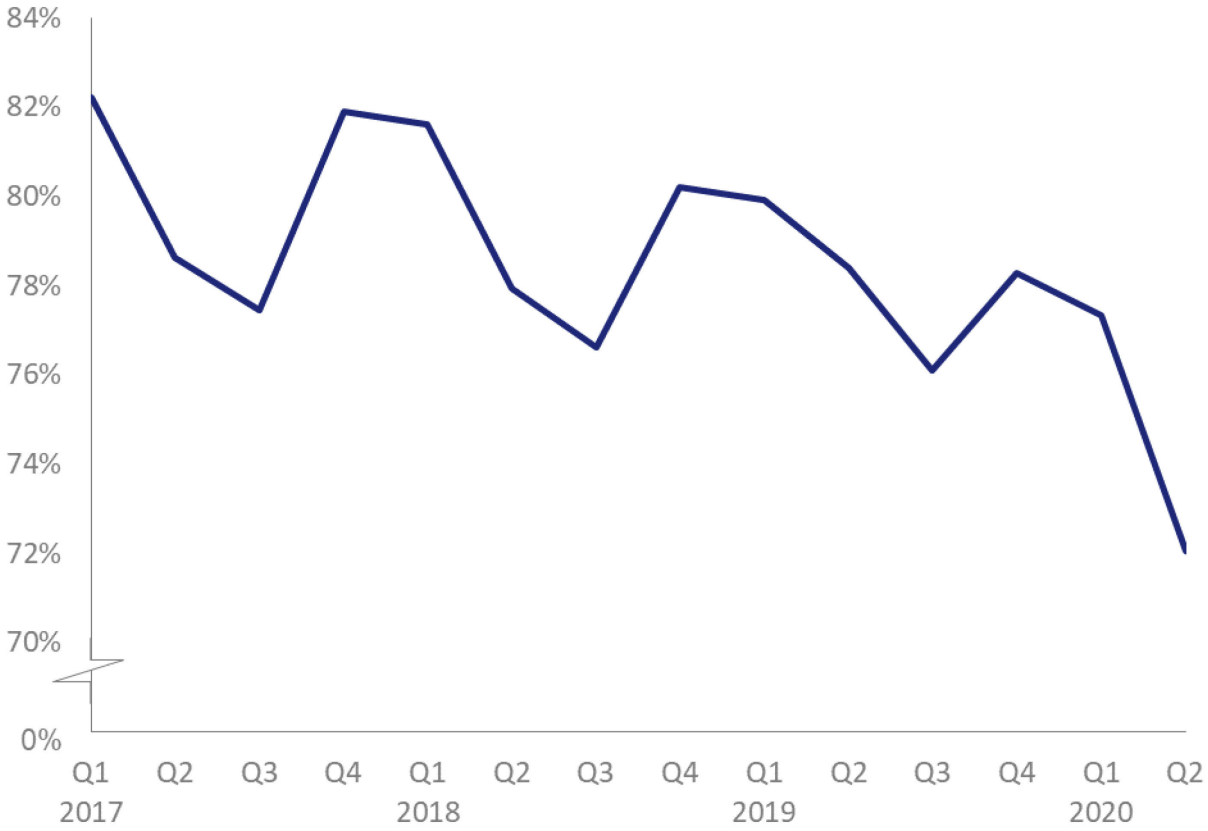
Unadjusted domestic consumption fell by 4.5 per cent over the same period but was up 6.5 per cent on a seasonally and temperature adjusted basis.

Chart 1.6 Net import dependency (Table 1.3a)



In the second quarter of 2020 net import dependency was 17.1 per cent, down 16.3 percentage points from the second quarter of 2019, and at its lowest level since the second quarter of 2007, with imports and exports volumes falling by 33 and 14 per cent respectively on a year earlier.

Chart 1.7 Fossil fuel dependency (Table 1.3a)



In the second quarter of 2020 fossil fuel dependency was at a record low of 72.1 per cent, down 6.3 percentage points from the second quarter of 2019.

Section 2 – UK Solid Fuels and Derived Gases April to June 2020

Key results show:

Overall coal production in the second quarter of 2020 fell to a record low of 0.4 million tonnes, down 29 per cent compared with the second quarter of 2019. Surface mining production fell to 336 thousand tonnes. This is as a result of mine closures and falling demand for coal for electricity generation. **(Chart 2.1)**

Coal imports fell to 0.8 million tonnes, 39 per cent down on the second quarter of 2020; this was the lowest level in the recorded time series. **(Charts 2.1 and 2.2)**

The demand for coal by electricity generators in the second quarter of 2020 fell to a record low of 166 thousand tonnes and was 19 per cent lower than demand in the second quarter of 2019. The decline was due to high carbon prices, an increase in renewables generation, the closure of Fiddlers Ferry power station, and the coronavirus lockdown from 23 March. This quarter included the longest period without coal generation in Great Britain since the 1880s with the National Grid not using coal-fired electricity from 10 April to 16 June **(Chart 2.3)**

Total stock levels were down 39 per cent to 3.7 million tonnes compared to a year earlier. **(Chart 2.4)**

Relevant tables

2.1: Supply and consumption of coal
2.2: Supply and consumption of coke oven coke, coke breeze and other manufactured solid fuels
2.3: Supply and consumption of coke oven gas, blast furnace gas, benzole and tars
2.4: Coal imports

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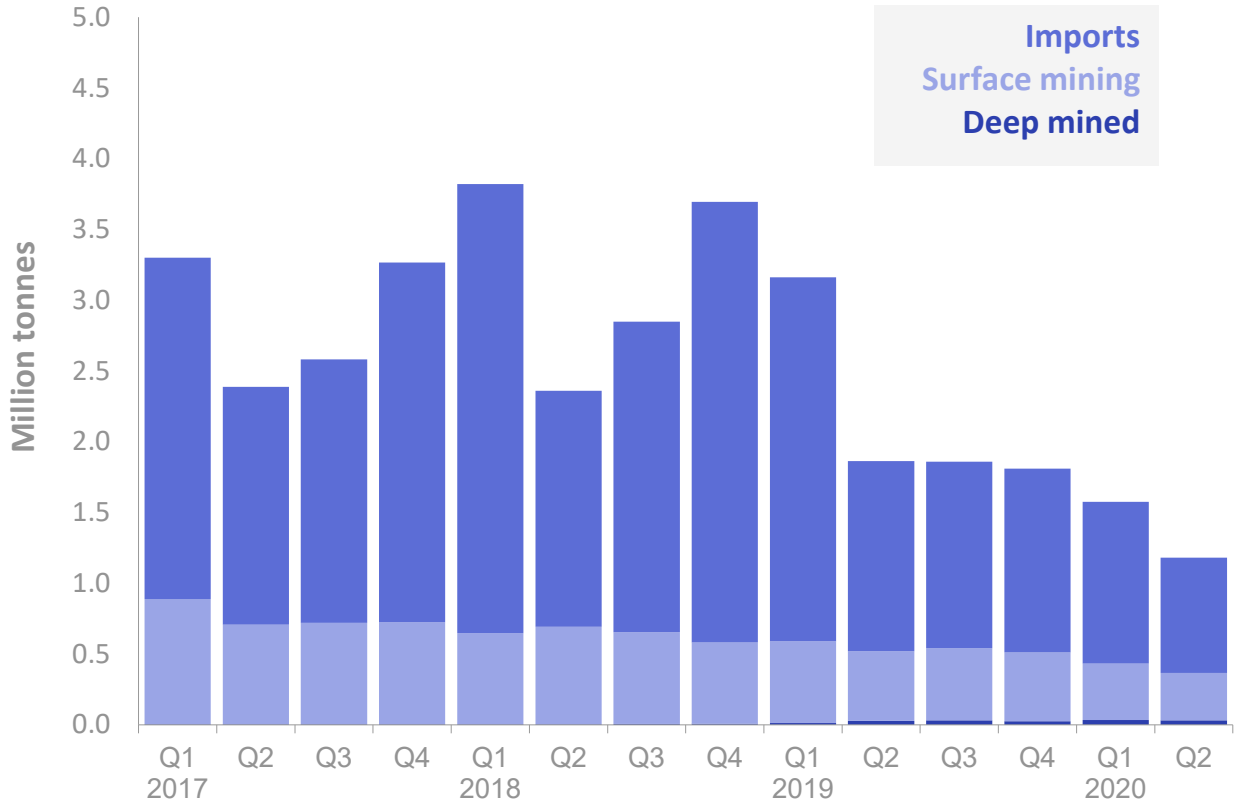
Chart 2.1 Coal supply (Table 2.1)

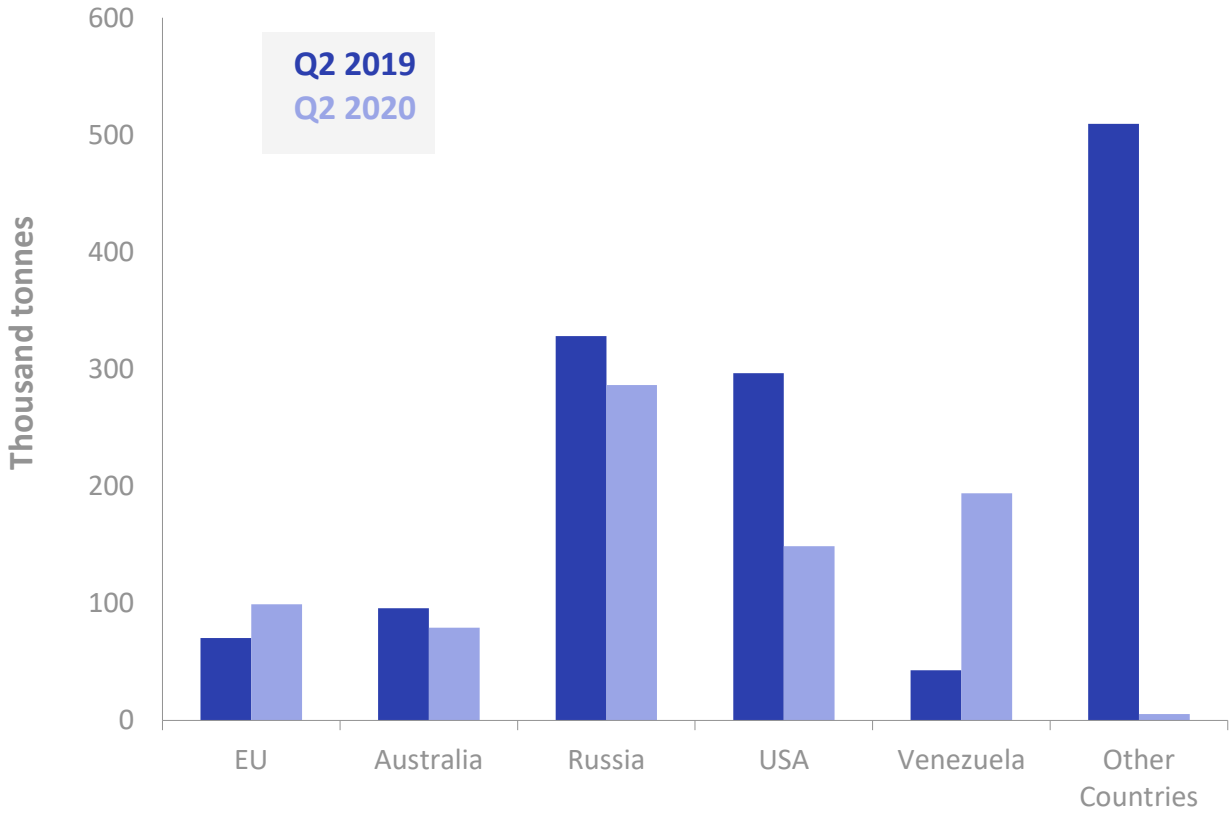


Coal production in the second quarter of 2020 fell to a record low of 0.4 million tonnes, 29 per cent down compared to the second quarter of 2019. The decrease came from the contraction in surface mine output.

Although output from deep mines has increased since the Aberpergwm colliery came back into operation in September 2018, it is only 8.5 per cent of total production (and a small fraction of previous production, with June's output at 5.4 per cent of the value in December 2015, the month that the last large deep mine closed). Only seven small deep mines remain.

The falls were due to decreased demand, particularly for electricity generation, but also because some mines are working towards closure whilst other mines are classed under 'care and maintenance' and 'not producing currently'.

Chart 2.2 Total coal imports (Table 2.4)



In the second quarter of 2020, total coal imports decreased by 39 per cent to a record low of 0.8 million tonnes. Net imports accounted for 39 per cent of supply in the second quarter of 2020.

Russia (35 per cent), Venezuela (24 per cent) and the USA (18 per cent) accounted for 77 per cent of total coal imports. Venezuela had become the second highest supplier as the overall level of imports had fallen. Colombia which had been in the top three suppliers of steam coal imports continuously for the last nine years did not export coal to the UK in the second quarter of 2020.

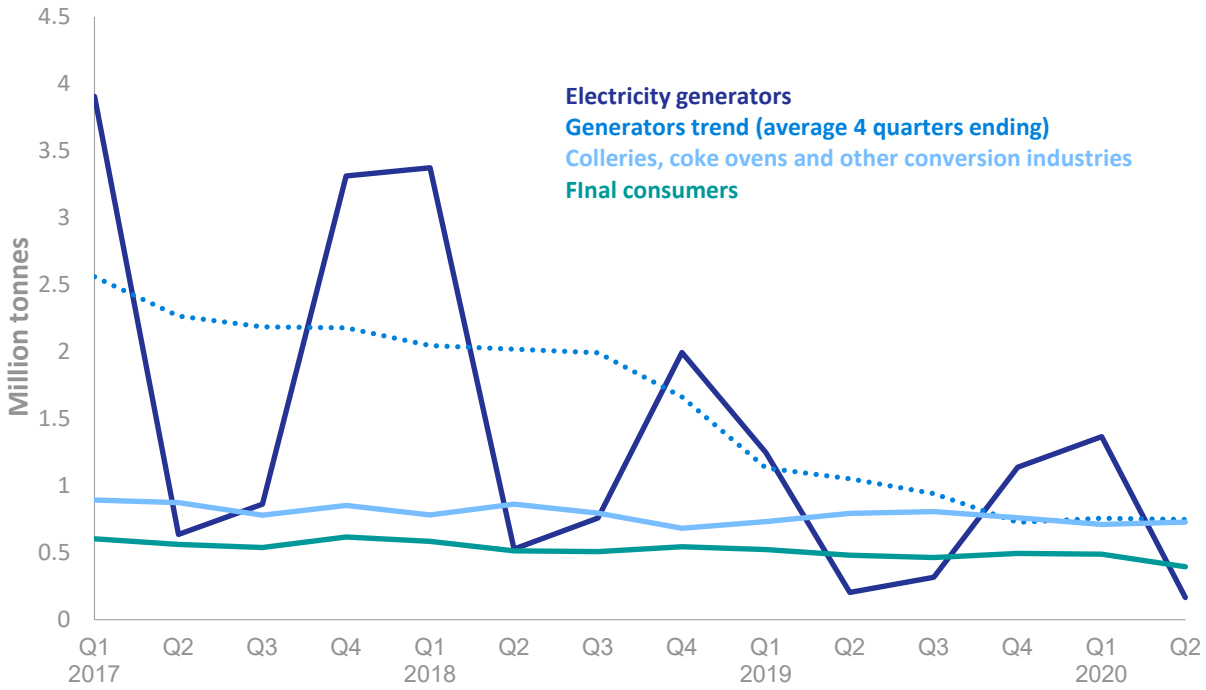
Steam coal imports in the second quarter of 2020 fell by 58 per cent to 0.3 million tonnes. Steam coal imports accounted for 42 per cent of total coal imports. Coking coal imports in the second quarter of 2020 fell by 14 per cent to 0.5 million tonnes and accounted for 56 per cent of total coal imports, with small volumes of anthracite comprising the remainder.

Table 2A Coal imports by origin

Thousand Tonnes

	2018	2019	2019 Q2	2020 Q2p
European Union	344	420	70	99
Venezuela	0	137	43	194
Russia	4,695	2,421	328	287
Colombia	635	1,078	412	0
USA	3,573	1,769	297	149
Australia	630	423	96	79
Other Countries	268	281	98	5
Total Imports	**10,144**	**6,529**	**1,343**	**813**

Chart 2.3 Coal consumption (Table 2.1)

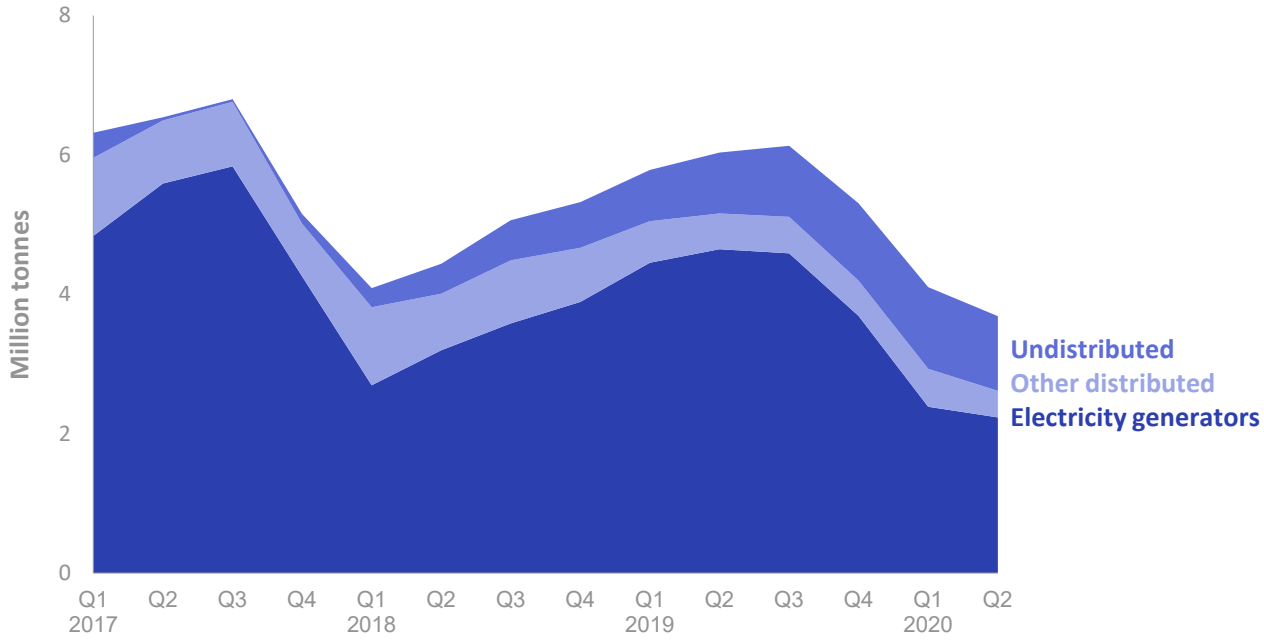


Total demand for coal in the second quarter of 2020, at 1.3 million tonnes, was 13 per cent lower than in the second quarter of 2019.

Consumption by electricity generators was down by 19 per cent to a record low of 166 thousand tonnes. Electricity generators accounted for 13 per cent of total coal use in the second quarter of 2020, similar to last year. Demand for electricity fell significantly during the coronavirus lockdown which began on 23 March as schools, manufacturing plants and business closed. During this period Great Britain set a record for its longest coal free period with no coal-fired electricity being produced for 67 days from 10 April 2020. On 16 June 2020 one of the remaining coal-fired power stations came briefly back online during maintenance work, adding power to the national grid. The closure of Fiddlers Ferry on 31 March 2020 has also contributed to lower generation, leaving only four major coal-fired power stations in the UK. Coal-fired electricity generation continues to remain less economically favourable due to low gas prices and higher carbon pricing. Higher renewable generation has also contributed to the fall in coal-fired electricity generation. Solar power increased as average daily hours of sun were high at 7.9 hours and records were set consecutively in April (0.6 TWh) and May (0.7 TWh). (see Energy Trends table 5.4).

In the second quarter of 2020, sales to industrial users fell by 22 per cent to 288 thousand tonnes whilst sales to other final consumers (including domestic) decreased by 3.7 per cent to 108 thousand tonnes. Coal used in blast furnaces was down 12 per cent compared to the second quarter of 2019, to 277 thousand tonnes.

Chart 2.4 Coal stocks (Table 2.1)



Coal stocks fell by 0.4 million tonnes from the first quarter of 2020 and at the end of June stood at 3.7 million tonnes. This was 2.3 million tonnes lower than at the end of June 2019. This was due in the main to the burning of stocks at Fiddlers Ferry before its decommissioning.

The level of coal stocks at power stations at the end of the second quarter of 2020 was 2.2 million tonnes, which was had fallen by more than half of the stock level at the end of June 2019.

Stocks held by coke ovens were 336 thousand tonnes at the end of the second quarter of 2020, 30 per cent lower than stock levels at the end of June 2019.

Stocks held by producers (undistributed stocks) at the end of the second quarter of 2020 were 1.1 million tonnes.

Section 3 – UK Oil and Oil Products
April to June 2020

Key results show:

Covid-19 has impacted demand for petroleum products considerably and affected trade patterns, however the UK's production of primary oil remained steady, down by just 1.4 per cent. Imports and exports of primary oils have reduced, resulting in the UK becoming a net exporter of primary oils by 1.8 million tonnes for the first time since 2005. **(Chart 3.1)**

Indigenous production of petroleum products is at a record low of 10.5 million tonnes as refineries run at reduced capacity due to low demand. Although exports of petroleum products remained stable and imports have reduced by more than a third, the UK remains a net importer of products at 0.6 million tonnes. **(Chart 3.2)**

Final consumption of petroleum products has fallen by 45 per cent as demand for transport fuels fell dramatically. However, demand in the domestic sector increased by 40 per cent and in other sectors fell by just 2.0 per cent despite lockdown restrictions, as customers took advantage of lower prices. **(Chart 3.4)**

Demand for aviation fuel fell by 86 per cent and petrol and diesel also fell, by 48 and 39 per cent, respectively. **(Chart 3.5)**

Overall stocks were up 6.4 per cent at end of Q2 2020. Stocks of primary oils remained steady whilst product stocks were up 13 per cent with the largest contributor being stocks of kerosene which almost doubled. **(Chart 3.6)**

Relevant tables

3.1: Supply and use of crude oil, natural gas liquids and feedstocks
3.2: Supply and use of petroleum products
3.4: Supply and use of petroleum products: latest quarter
3.5: Biofuels sales and sales through supermarkets
3.6: Stocks of petroleum at end of period

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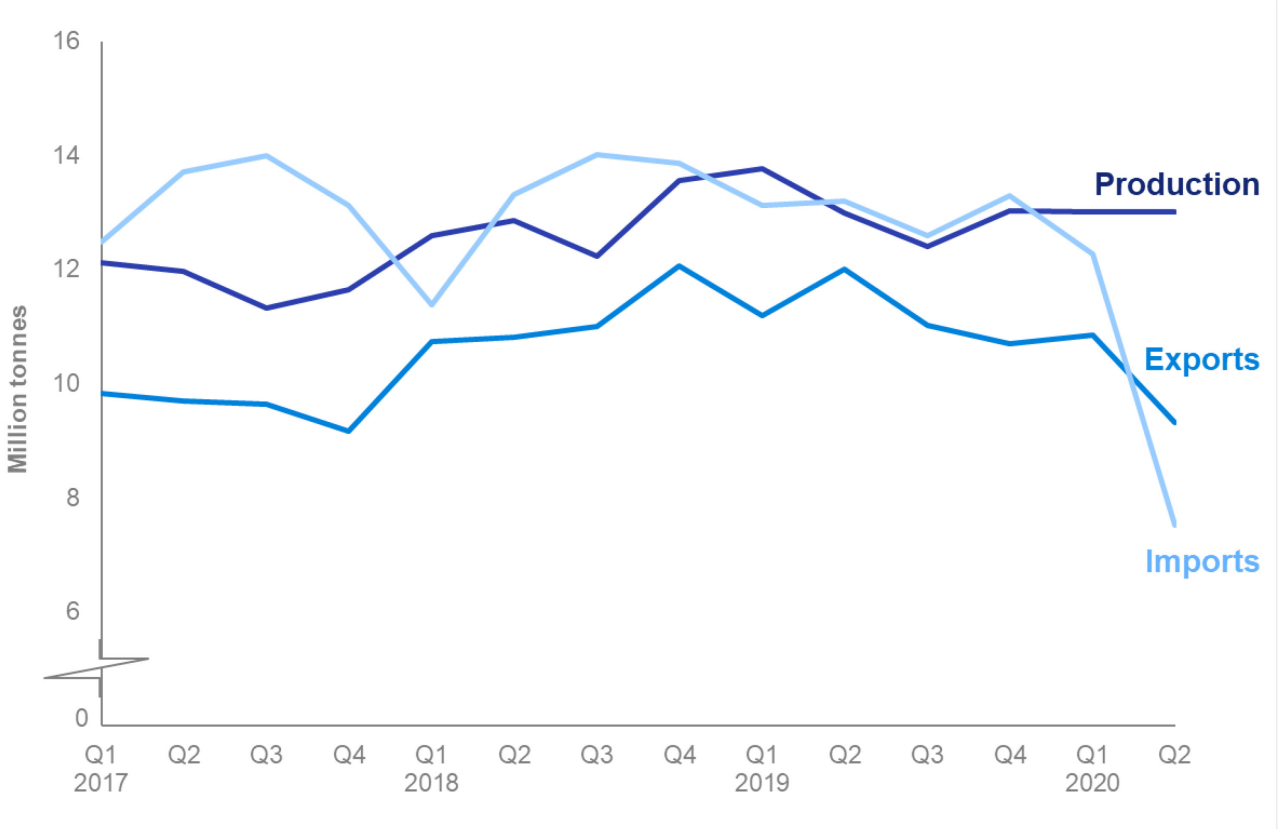
Chart 3.1 Production and trade of crude oil and NGLs (Table 3.1)



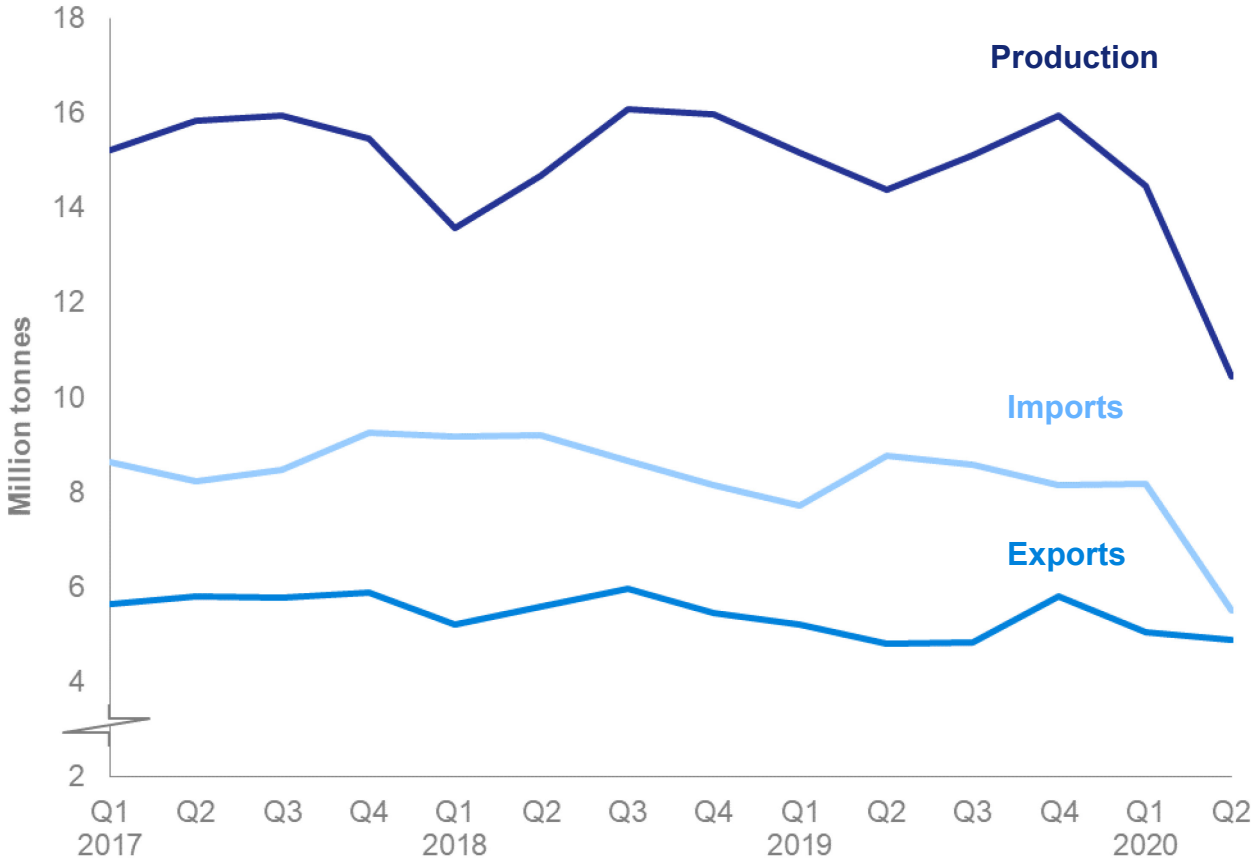
Production of primary oils has remained steady in Q2 2020, down 1.4 per cent, despite the effects Covid-19 has had on demand as well as reduced throughput at refineries.

Demand for primary oils fell to the lowest on record as refinery operations were minimised in response to depressed demand for refined products (mainly for transport fuels) during the Covid-19 pandemic. Additionally, the impact of the pandemic on global oil prices has meant that the Brent-WTI differential has fallen below $3 a barrel, making indigenously produced crude an attractive option for UK refineries.

The result of the reduction in demand and increased receipts from the North Sea has been that imports contracted substantially, by more than two-fifths in Q2 2020 compared to 2019. Exports also fell but by just over one-fifth.

The changes in trade resulted in the UK becoming a net exporter of primary oils for the first time since 2005, by 1.8 million tonnes.

Chart 3.2 Production and trade of petroleum products (Table 3.2)

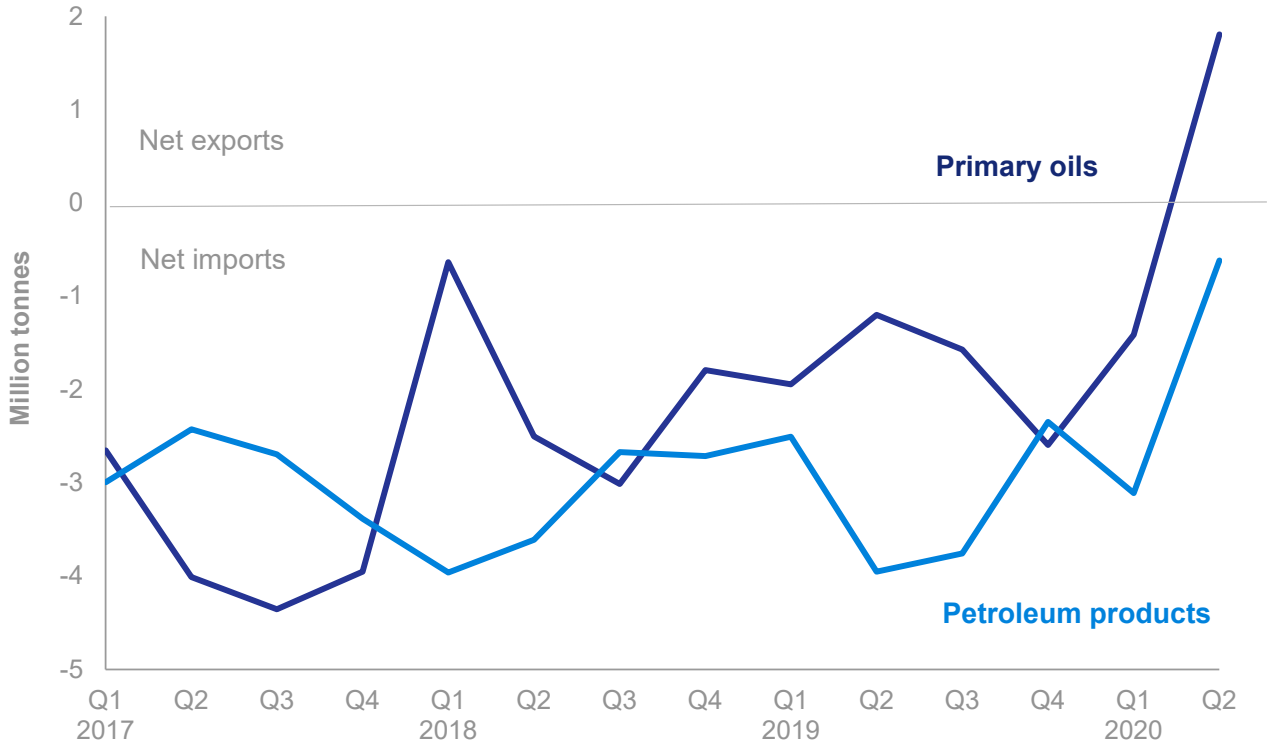


Indigenous production of petroleum products in Q2 2020 is at a record low because of reduced demand, down more than one-quarter compared to the same period a year ago at 10.5 million tonnes. This low demand comes from restrictions being placed on unnecessary travel to reduce the spread of Covid-19, resulting in transport fuel demand falling dramatically.

Imports have reduced by over a third whilst exports remained steady, up 1.6 per cent compared with Q2 2019.

The UK remains a net importer of petroleum products at 0.6 million tonnes.

Chart 3.3 Overall trade in primary oils and petroleum products (Table 3.1)

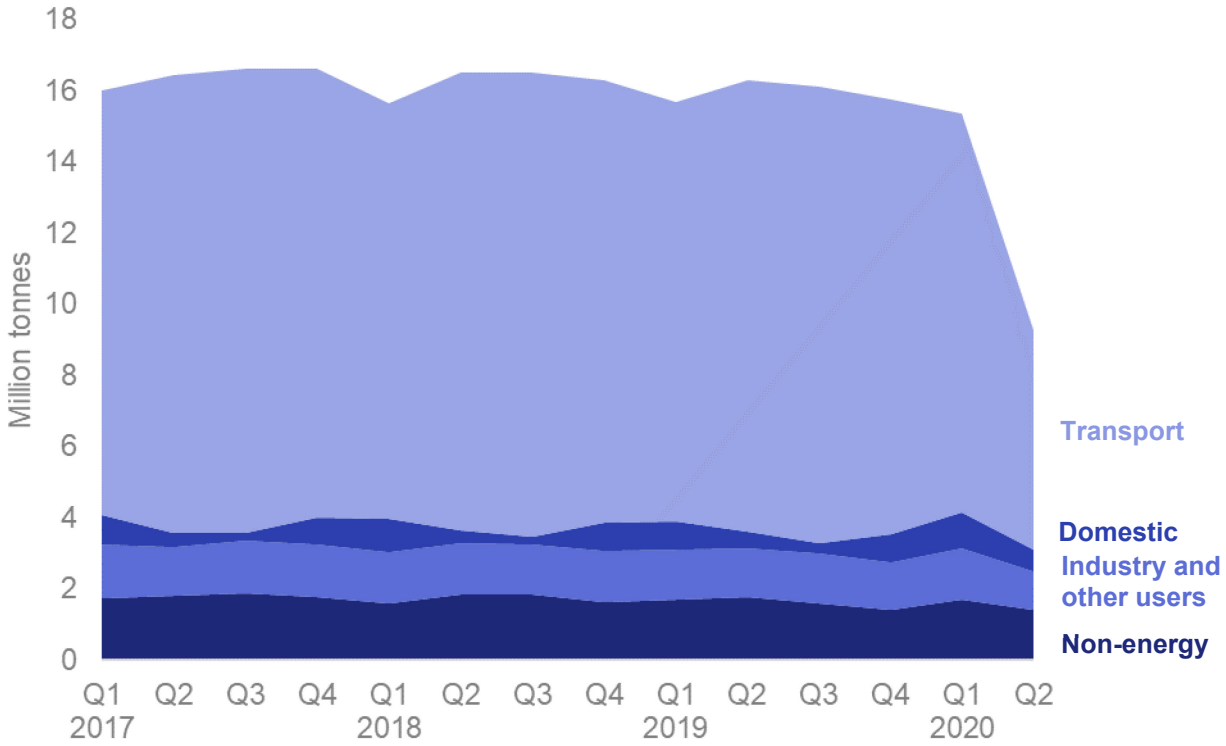


In Q2 2020 the UK became a net exporter of primary oils (crude, NGLs and feedstocks) by 1.8 million tonnes for the first time since 2005.

Demand reached a record low as refiners sought to minimise operations during a period of suppressed demand due to the Covid-19 pandemic.

Due to this reduced demand, imports fell by 43 per cent to a record low (with a reduction of only 22 per cent in exports) making the UK a net exporter for the first time in 15 years.

Chart 3.4 Final consumption of oil (Table 3.4)

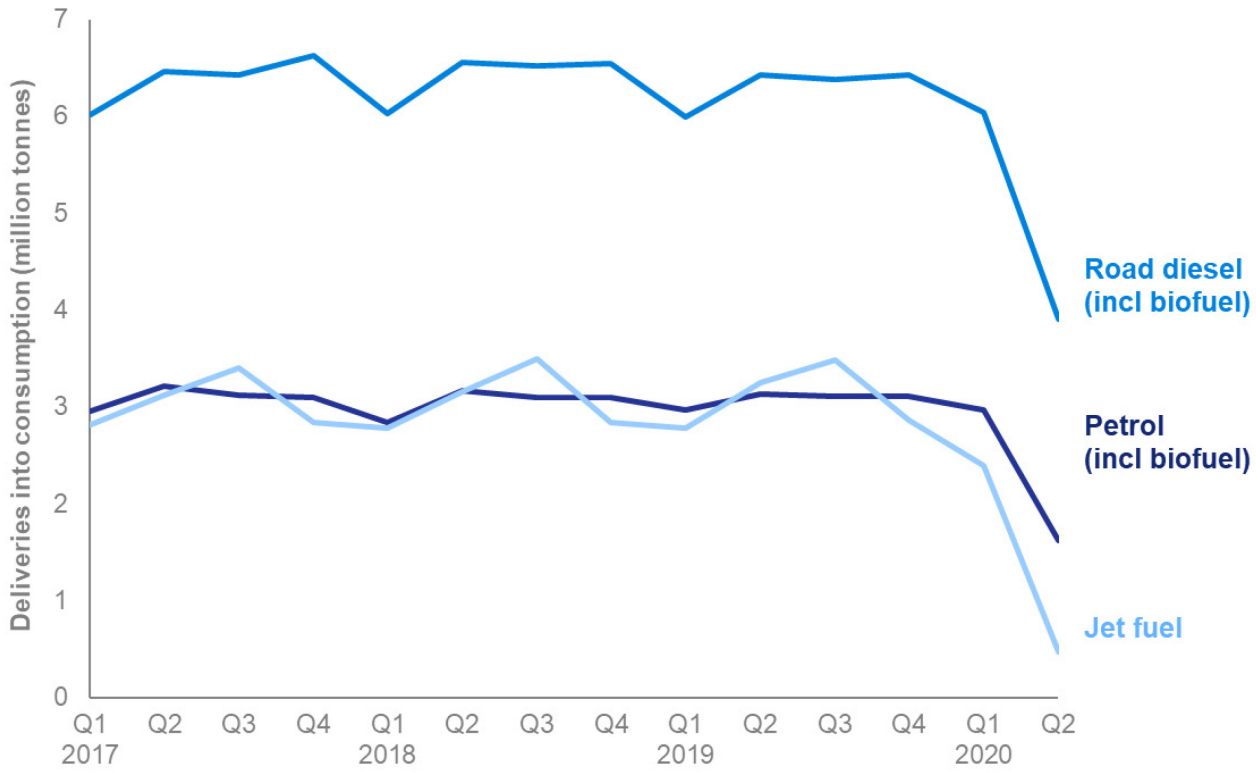


In Q2 2020 final consumption of petroleum products was down by 45 per cent compared to Q2 2019 as transport and non-energy use fell by more than one-half and one-fifth, respectively.

Transport typically accounts for over three-quarters of UK final consumption but fell to two-thirds in Q2 2020. We have seen a record low for aviation fuel, falling by 86 per cent on the same period last year. Both petrol and diesel fell by almost one-half for petrol and two-fifths for diesel when compared with the same period a year ago (see 3.5 below).

However, we did see demand in the domestic sector increase, up 40 per cent compared to Q2 2019. This was in part due to a 46 per cent increase in domestic demand for burning oil and 28 per cent in gas oil as households continued to take advantage of the lower prices at the beginning of Q2 this year.

Chart 3.5 Demand for key transport fuels (Table 3.4 and Table 3.5)

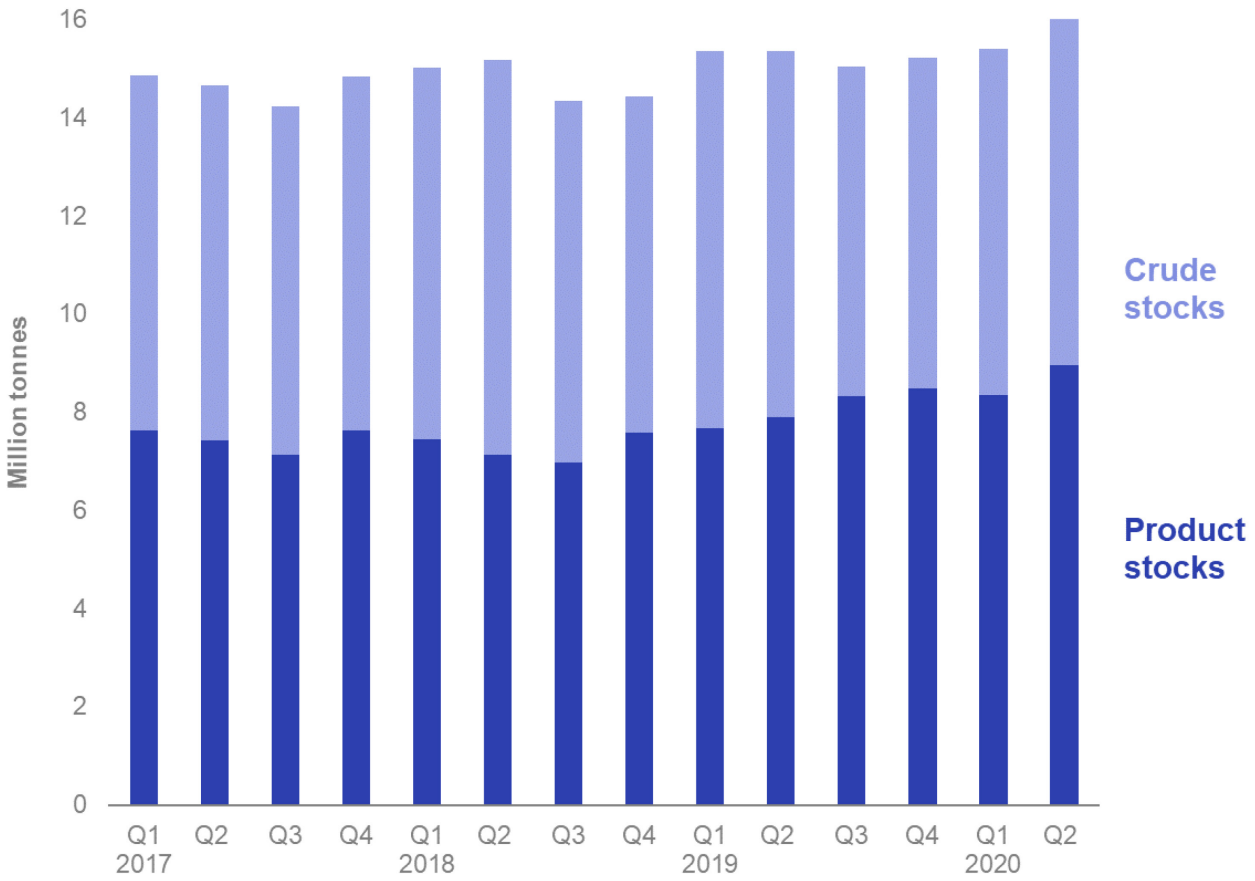


Due to Covid-19 travel restrictions being implemented in late March, overall demand for the three main transport fuels (petrol, road diesel, jet fuel) fell by more than one-half compared to Q2 2019. This means Q2 2020 has set a record low of 5.9 million tonnes for transport, less than half the quarterly average since 1999. Road fuels (including biofuels) fell by 42 per cent compared with Q2 2019. Covid-19 travel restrictions affected all domestic and international travel, with restrictions easing as the quarter progressed.

Overall diesel demand (including the biofuel element) was down by 39 per cent and petrol down 48 per cent (again including the biofuel element). The smaller reduction we see in diesel is partially attributed to some commercial fleets still operating through the UK-wide lockdowns. These commercial vehicles predominantly have diesel engines and most petrol demand comes from smaller vehicles, such as cars, which are owned for private use.

Demand for jet fuel has fallen dramatically, down by 86 per cent compared to Q2 2019 to just 0.5 million tonnes, the lowest on record. This dramatic drop is attributed to lockdowns being put in place worldwide and because most UK airports are international airports with only a limited number of domestic routes.

Chart 3.6 UK oil stocks (Table 3.6)



At the end of Q2 2020 total stocks for all oil were up by 6.4 per cent (1.0 million tonnes) compared to the same point in 2019.

At 16 million tonnes this is the highest annual level of stockholding since 2002 and derives from a high level of product stocks because of reduced demand in the wake of the Covid-19 pandemic and its impact on transport.

Product stocks were up by 13 per cent compared with Q2 2019. The largest contributor to this increase was kerosene - stocks have almost doubled as the demand for aviation and international travel fell abruptly as restrictions came into force globally. We also saw motor spirit and gas/diesel oil stocks increase whilst bilaterals of products reduced by 3.6 per cent.

Stocks of primary oils were down by 1.0 per cent, however the locations of stocks held has altered. There has been a reduction in stocks at refineries, terminals and bilaterals but stocks held offshore have more than doubled when compared to Q2 2019.

Chart 3.6 combines stocks of products with the product equivalent of stocks of crude oil to give an overall level of UK stocks of key products.

At the end of Q2 2020 the UK held 16.3 million tonnes (including commercial stocks held over and above the obligated volumes), equivalent to broadly three months of consumption.

Further information on how the UK meets its oil stocking obligations are set out at:
www.gov.uk/government/publications/uk-emergency-oil-stocking-international-obligations

Section 4 – UK Gas
April to June 2020

Key results show:

The most notable development this quarter relates to demand in the wake of the Covid-19 pandemic. UK demand for natural gas in Q2 2020 dropped off sharply, by 16 per cent, to just 155 TWh. This was a Q2 record low. Gas demand is typically associated with temperatures because of it is mainly used for heating. However, in Q2 2020 demand was impacted by the Covid-19 pandemic as well as reduced demand for generation **(Chart 4.6)**:

- Demand in the industrial sector and by other final users was down by 19 per cent and 11 per cent, respectively, caused by the lockdown restrictions.

- Demand for generation was down by 27 per cent to just 49 TWh, a record low for Q2 of any year and the second lowest volume in the series as electricity from renewable sources in Q2 2020 was the second highest on record.

- Warmer temperatures in Q2 2020 compared with 2019 meant there was less demand for heating. Domestic demand was down by 11 per cent, a smaller decrease than expected given temperatures but this is likely related to the increased time that people have spent at home this year compared to normal.

Following a near halving of pipeline imports in Q2 2020, Qatar became the main source of imported gas, with a share of more than 50 per cent of total imports. Overall Liquified Natural Gas (LNG) comprised 65 per cent of total imports, beating the record of 62 per cent previously set in 2011 **(Chart 4.5)**.

Production was up by 9.7 per cent despite reduced demand because planned maintenance was postponed ensuring there was minimal manning at terminals to aid with social distancing during the Covid-19 pandemic **(Chart 4.1).**

Relevant table

4.1: Natural gas supply and consumption

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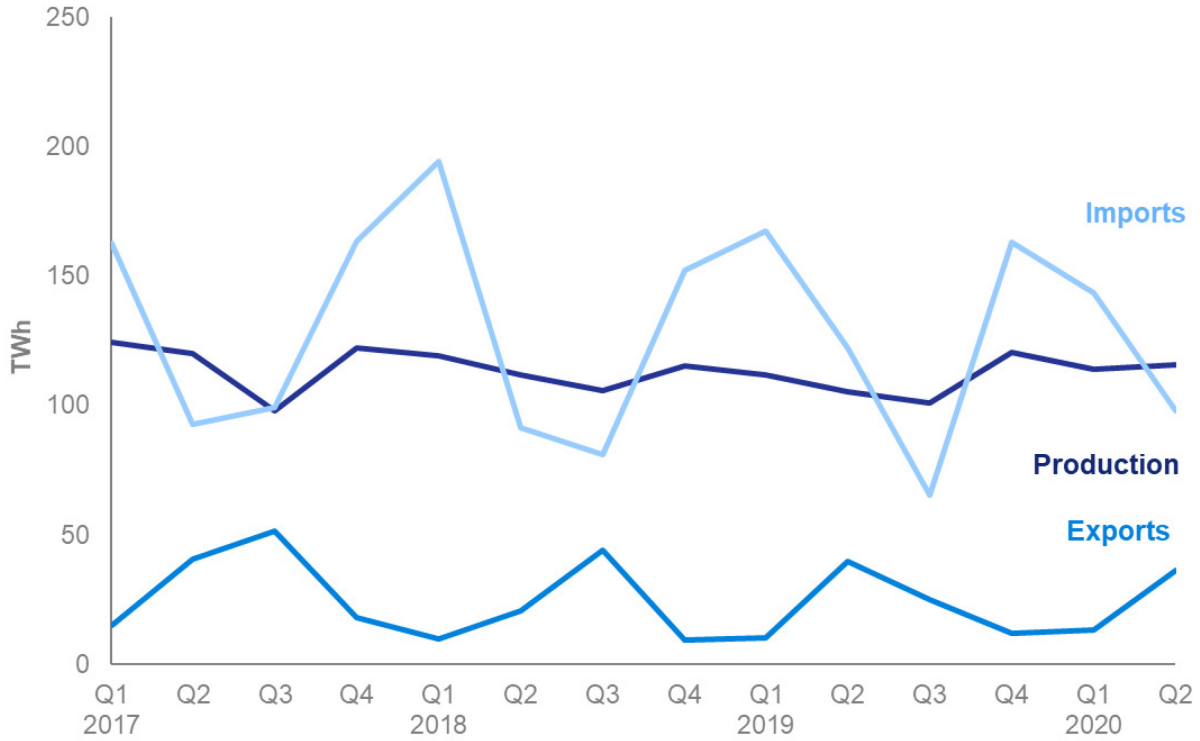
Chart 4.1 Production and nominated flow trades of natural gas (Table 4.1)



Production of natural gas in the second quarter of 2020 was up by 9.7 per cent compared with the same quarter of 2019 as terminals suspended maintenance which usually happens at this time of year. Works have been suspended to keep minimal manning at terminals to aid with social distancing during the Covid-19 pandemic.

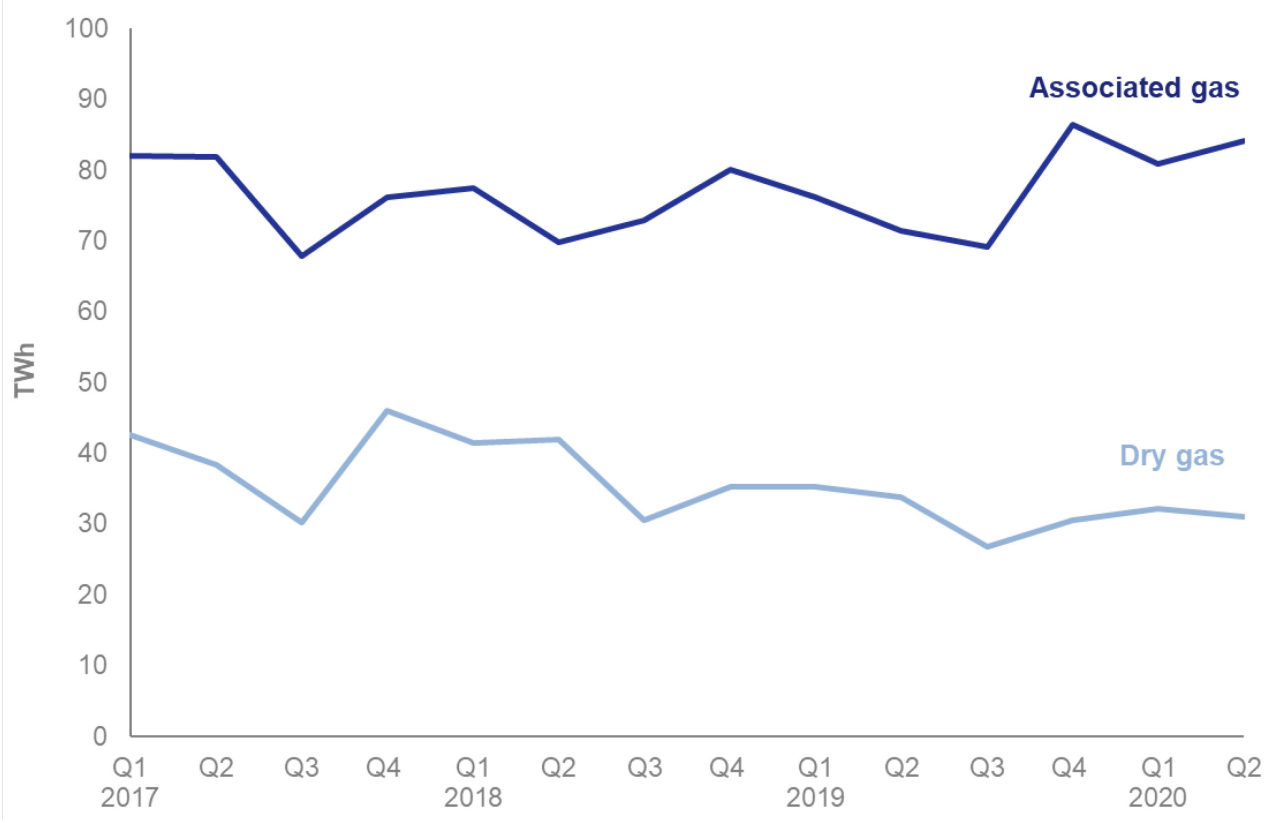
Current volumes of production are less than 64 per cent of the average quarterly production in 2000 when gas production peaked and follows the general annual trend of decline.

Imports in Q2 2020 decreased substantially on 2019, by more than one-fifth, to 95 TWh as demand fell in the wake of the Covid-19 pandemic restrictions. The fall in imports outstripped the 9.0 per cent fall in exports, meaning that net imports were down by nearly 30 per cent (on a nominated flow basis[1]).

For more detail on trade, see Charts 4.4 and 4.5.

[1] Nominated flows include some trade with Belgium whereby gas has been traded between companies, but then 'sold back' before the gas has been physically transferred. Table 4.3 shows physical flows.

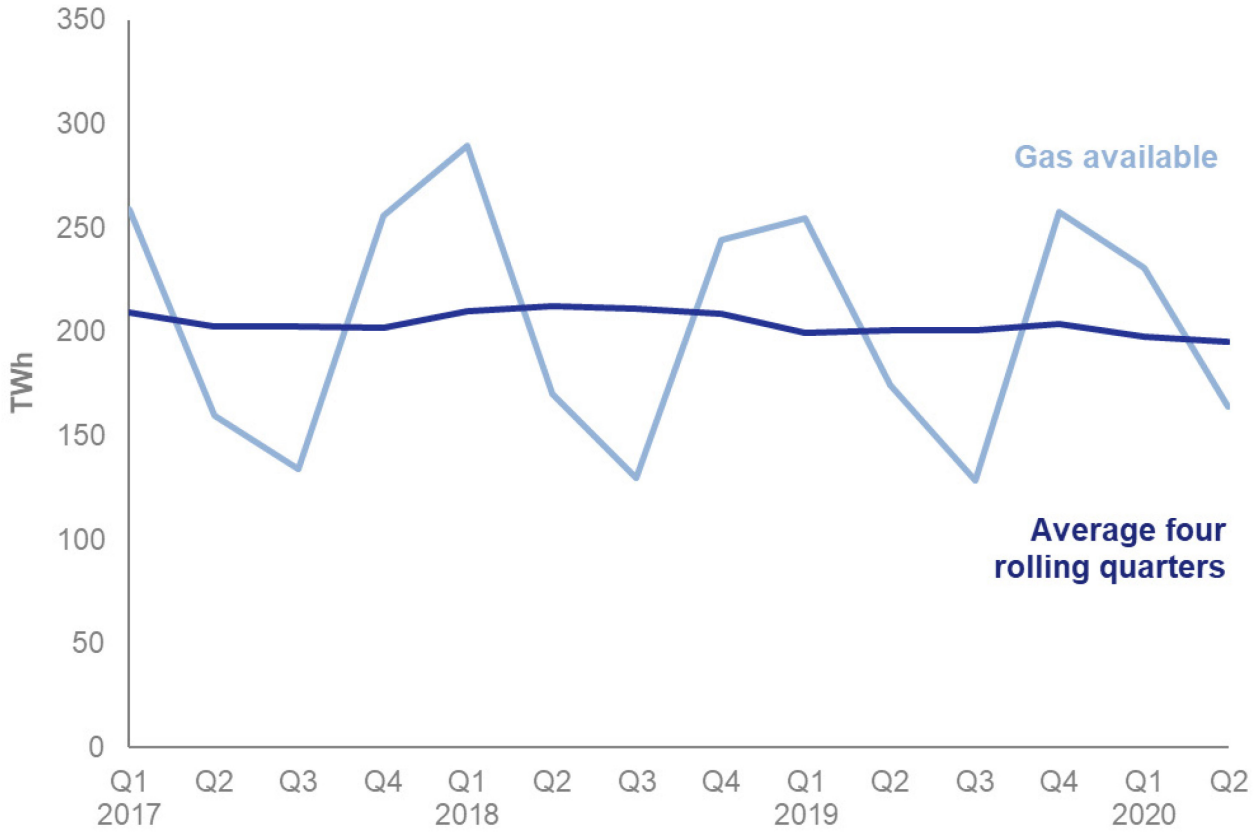
Chart 4.2 Production of dry gas and associated gas (not shown in published tables)



Production of associated gas (natural gas produced from oil fields) in Q2 2020 was up by 17 per cent compared to the same quarter last year, from 76 to 84 TWh.

In comparison, dry gas production (natural gas composed mainly of methane) decreased by 8.1 per cent, from 34 to 31 TWh.

Chart 4.3 Gas availability (Table 4.2)



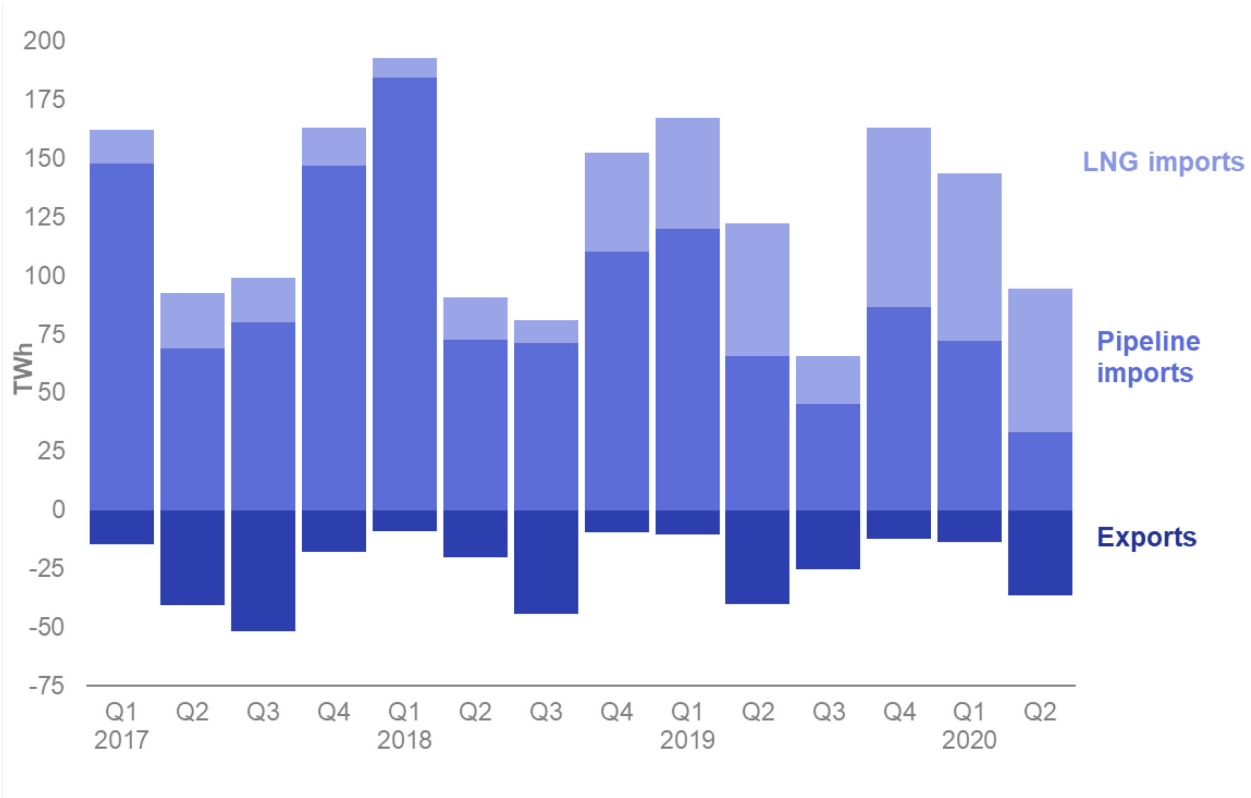
Gas available at terminals is roughly equal to gross gas production minus producers' own use, plus net imports.

Gas availability is seasonal and peaks during Q1 and Q4 each year, associated with the colder temperatures over the winter months because of its predominant use for heating. However, in Q2 2020 demand was also heavily impacted by the lockdown restrictions in place in the UK, announced on 23rd March, in response to the Covid-19 pandemic.

Gas availability in the second quarter of 2020, at 161 TWh, was down by 8.4 per cent on Q2 2019. This was the result of the fall in net imports, a response to the sharp contraction in demand in the industrial and commercial sectors during the months of April and May 2020 (see Chart 4.6).

The average availability of gas over four rolling quarters was lower than the average for Q2 2020 because of the impact of Covid-19 restrictions on demand.

Chart 4.4 Physical imports and exports of natural gas (Table 4.3 and Table 4.4)



Map 4.1 shows the flows of gas between the UK and the continent, as well as imports into the three Liquefied Natural Gas (LNG) terminals. The UK typically imports natural gas primarily from Norway (predominantly via the SAGE, FLAGS and Vesterled pipelines). Smaller volumes are imported from Belgium (via the UK-Belgium Interconnector) and the Netherlands (via the Balgzand to Bacton line).

However, in Q2 2020 pipeline imports fell by nearly half[2], particularly because flows via Langeled fell by 60 per cent. At 17 TWh, this was the lowest quarterly figure for Q2 in any year since the pipeline began operation in 2006. This reduction in Norwegian imports is attributable to maintenance works that have been taking place on that infrastructure.

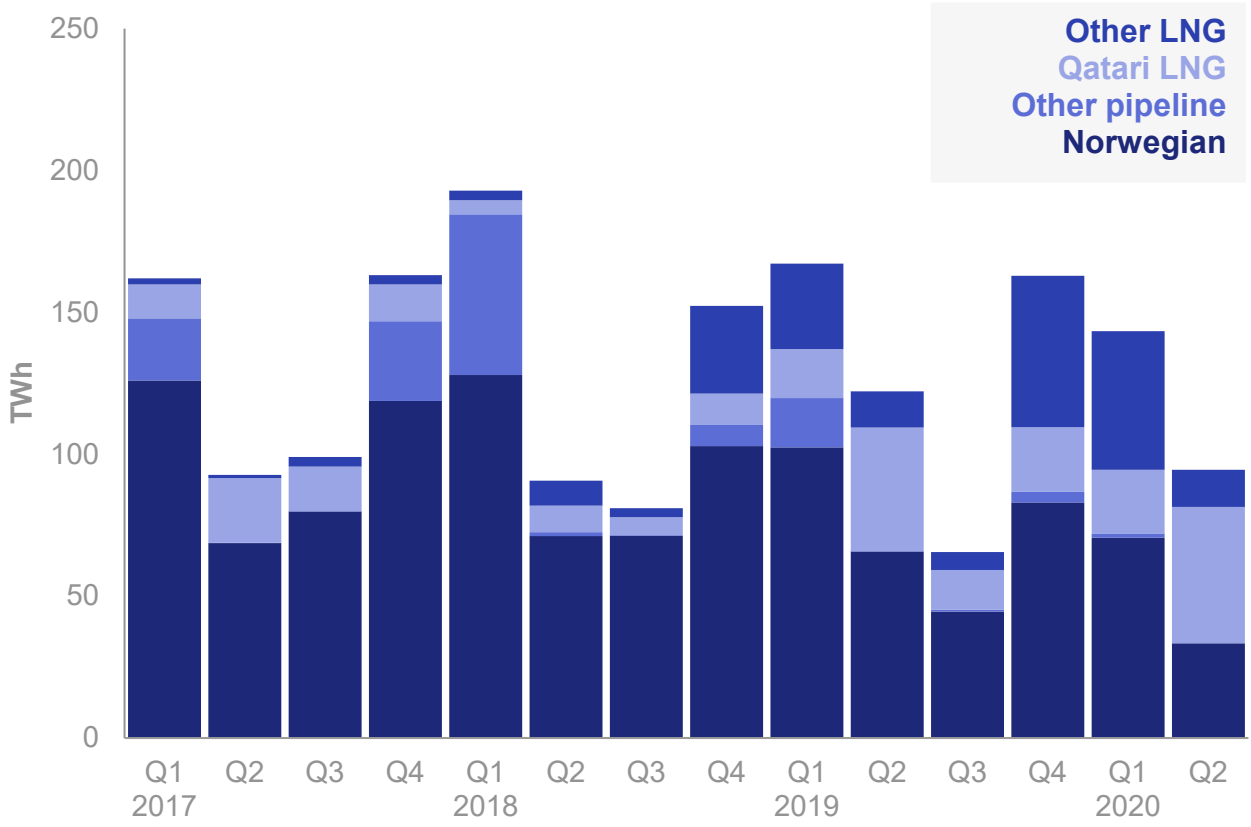
The diversification of the global Liquefied Natural Gas (LNG) market and established import infrastructure in the UK meant that the shortfall in supply via pipelines could be met by LNG imports. While total imports in Q2 2020 were down by 23 per cent, imports of LNG were up by 8.4 per cent. The share of total imports met by LNG notably comprised 65 per cent of the total, beating the prior record of 62 per cent set in 2011 (see Table 4.4 for further detail on import sources).

Imports of LNG from Qatar exceeded imports from Norway for the third time ever, following only the notably cold winter of 2010-2011 and the impact of the Fukushima disaster on global LNG markets in 2014.

Total exports in Q2 2020 fell by 8.0 per cent, driven by reduced flows to Belgium despite increases to both Ireland and the Netherlands. As a result, net imports were down by 29 per cent.

[2] The export total in Tables 4.3 only includes gas that has physically flowed through pipeline border points and is lower compared to the nominated flows in Tables 4.1 and 4.2.

Chart 4.5 Imports by origin (Table 4.4)



Following the decrease in pipeline imports in Q2 2020, Qatar became the main source of imported gas for the third time on record.

In Q2 2020, the UK imported 48 TWh from Qatar (51 per cent of total imports) compared to just 33 TWh from Norway (35 per cent of total imports).

LNG from Qatar was roughly 80 per cent of all LNG imports with other cargoes arriving from the USA, Russia and Trinidad & Tobago, among others.

Overall, LNG comprised 65 per cent of total imports, beating the record of 62 per cent previously set in 2011.

A complete country breakdown for physical pipeline and LNG imports is provided in Energy Trends Table 4.4 - *Supplementary information on the origin of UK gas imports*.

Map 4.1: UK physical imports and exports of gas Q2 2020

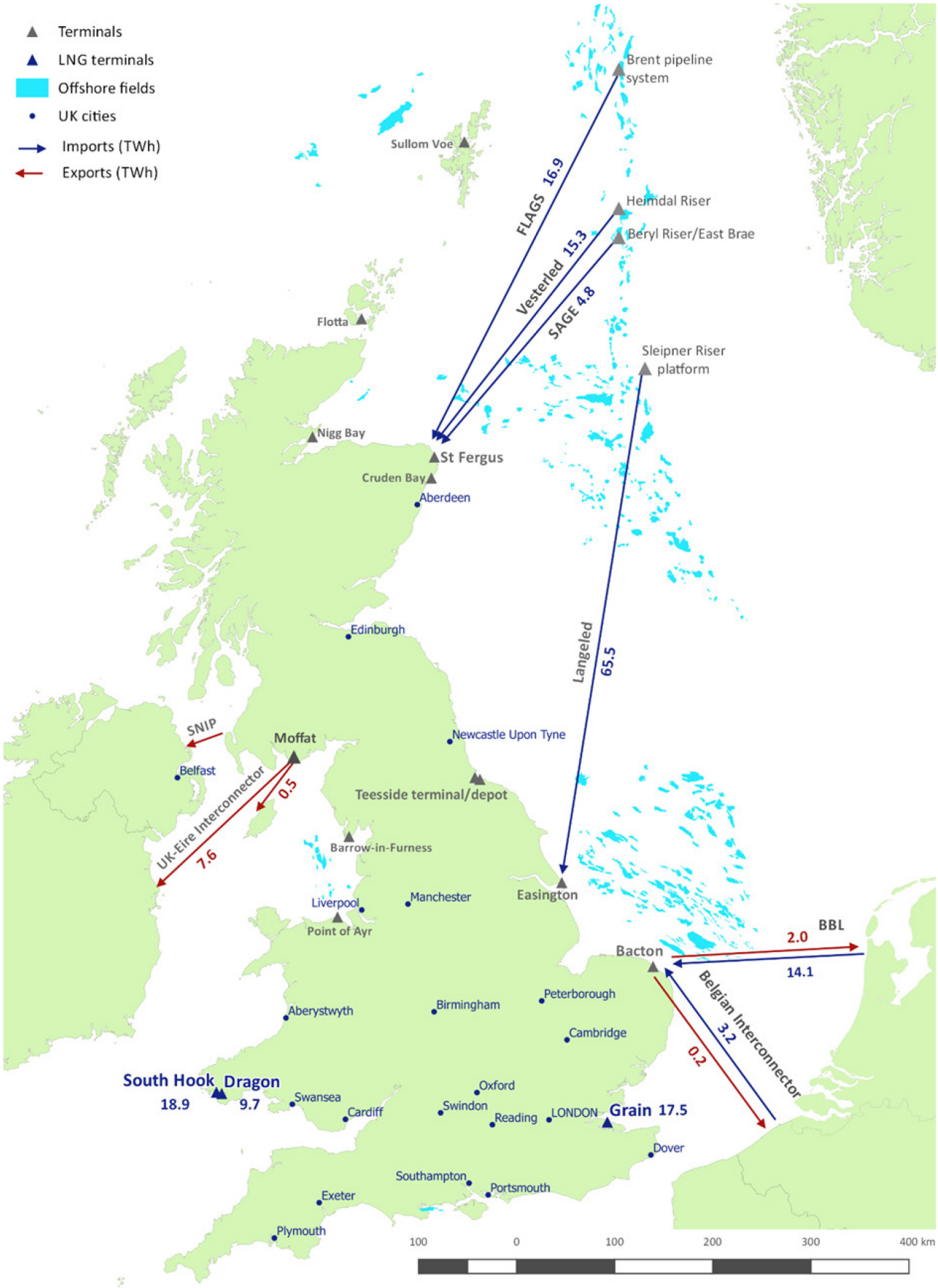
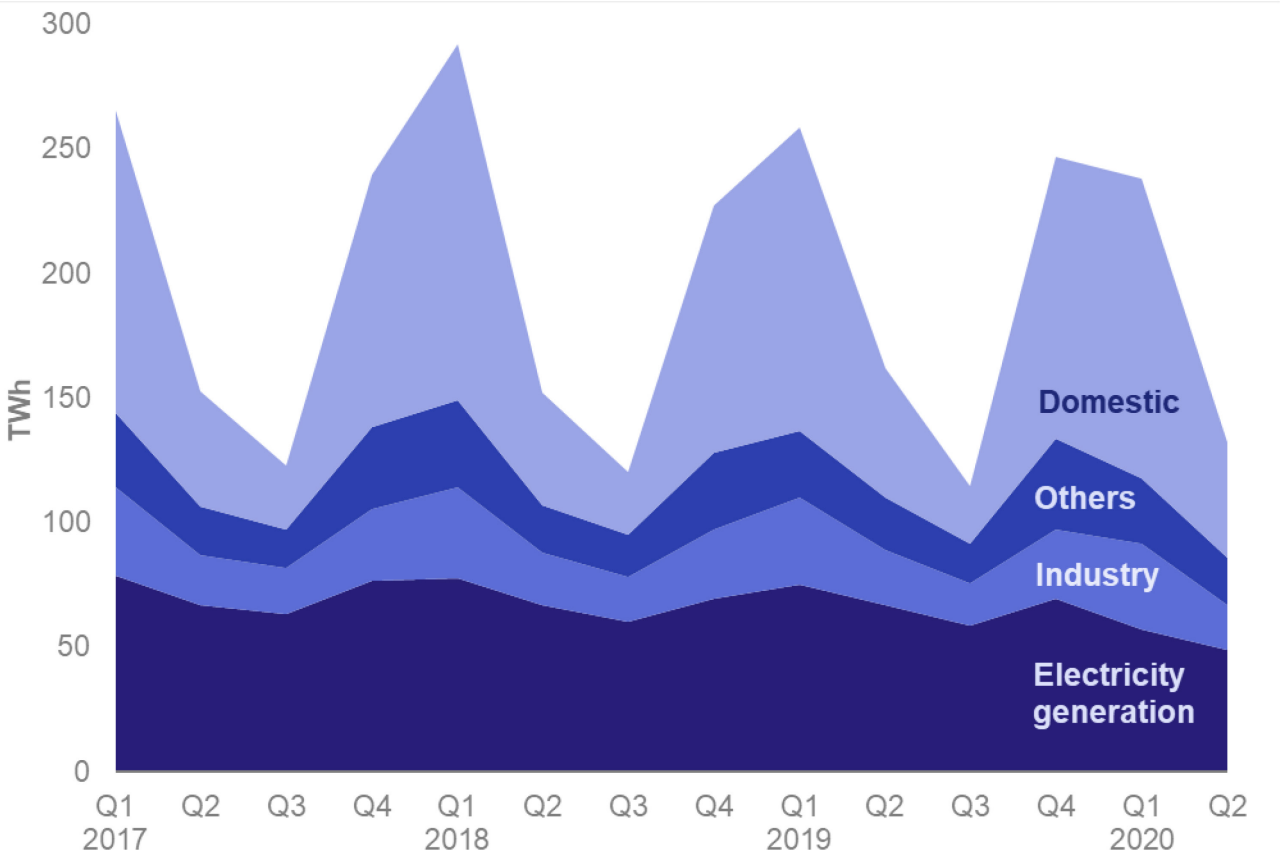


Chart 4.6 UK demand for natural gas (Table 4.1)



UK demand for natural gas in Q2 2020 dropped off sharply, by 16 per cent, to just 155 TWh. This was a record low in Q2. Gas demand is typically associated with temperatures because of its predominant use for heating. However, in Q2 2020 demand was also heavily impacted by the Covid-19 pandemic as well as near record generation from renewable sources:

Impact of Covid-19 pandemic
Demand in the industrial sector and by other final users was down by 19 per cent and 11 per cent, respectively, caused by the lockdown restrictions in place in the UK during April and continuing into May in response to the Covid-19 pandemic. This markedly affected hospitality and catering, which are sectors that are typically heavy gas consumers.

Reduced demand for generation
Demand for generation was down by 27 per cent to just 49 TWh, a record low for Q2 of any year and the second lowest volume in the series. Generation from fossil fuels has been on a downward path and electricity from renewable sources in Q2 2020 was the second highest on record after Quarter 1 2020, and the second consecutive quarter in which more electricity was generated from renewable sources than from fossil fuels.

Increased temperatures
Warmer temperatures in Q2 2020 compared with 2019 meant there was less demand for heating. Domestic demand was down by 11 per cent. The reduction is smaller than may have been anticipated given temperatures but is likely related to the increased time that people have spent at home during lockdown compared to normal.

A complete breakdown for gas demand is provided in Energy Trends table 4.1 - *Natural gas supply and consumption.*

Section 5 – UK Electricity
April to June 2020

Key results show:

Electricity generation is driven by demand, which fell by 12 per cent over this period because of the lockdown restrictions imposed in response to the COVID-19 pandemic. As a result of the low demand, total electricity generation was 67.5 TWh in Quarter 2 of 2020, the lowest value on the published data series. **(Chart 5.1).**

Renewable generation in Quarter 2 2020 exceeded the total from fossil fuels, up 12 per cent to 30.1 TWh. There were increases for all forms of renewable energy. Coal generation fell to record low levels, as a result of the 67-day coal free period in Great Britain[1] between March and June, the longest since the 19th century. **(Chart 5.1).**

The share in electricity generated from renewables was 44.6 per cent in Quarter 2 2020, the second highest share on the published data series. There was a corresponding decrease in the share of generation coming from fossil fuels to 35.1 per cent. This is only the second time that the share of generation from renewables exceeded the share of generation from fossil fuels. **(Chart 5.2)**

Low carbon electricity accounted for 62.1 per cent of electricity generated, 9.3 percentage points higher than in Quarter 2 2019. This increase was driven by the increase in share for renewables, as the share of generation from nuclear was similar in both years. **(Chart 5.3).**

Fuel used in electricity generation continued to fall in Quarter 2 2020, to a total of 13.2 Mtoe (million tonnes of oil equivalent), an 11 per cent decrease compared to Quarter 2 2019. This was the lowest amount of fuel used for any quarter on the published data series and reflects the unusually low demand for electricity. **(Chart 5.4).**

Final electricity consumption was down by 13 per cent to 60.5 TWh, the lowest level in the published data series. Consumption decreased in all sectors with domestic consumption down 1.7 per cent, industrial consumption down 17 per cent and consumption by other final users (including the commercial sector) down 20 per cent. Consumption in both non-domestic sectors was at the lowest quarterly value on the published data series. **(Chart 5.5).**

The UK had total net imports in Quarter 2 2020 of 4.5 TWh, 6.5 per cent of total electricity supply (excluding own use) over the period. Net imports were down 21 per cent compared to Quarter 2 2019, with imports down 9 per cent to 5.6 TWh and exports more than doubling (up 121 per cent) to 1.1 TWh. **(Chart 5.6)**

Relevant tables

5.1: Fuel used in electricity generation and electricity supplied
5.2: Supply and consumption of electricity
5.6: Imports, exports and transfers of electricity

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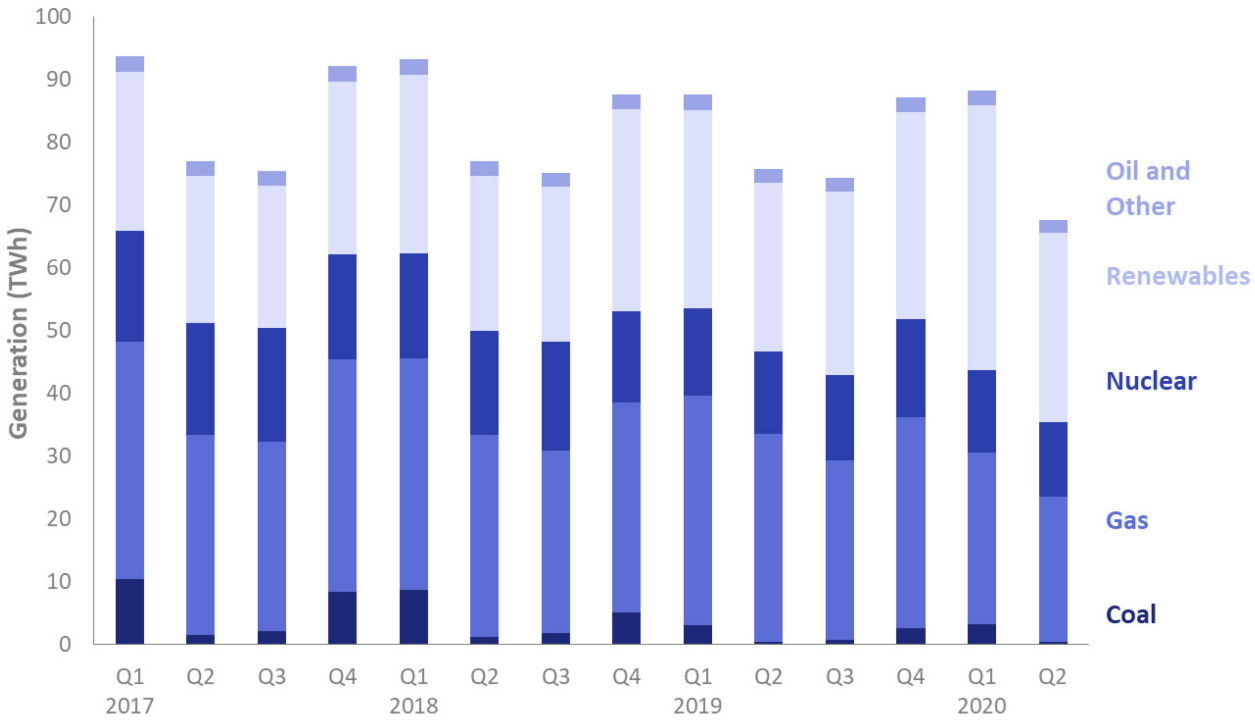
Chart 5.1: Total electricity generated by fuel type (Table 5.1)



Total electricity generation was 67.5 TWh in Quarter 2 of 2020, the lowest value on the published data series and a decrease of 11 per cent compared to the same period the previous year. Electricity generation is driven by demand, with electricity generated or imported as needed and demand fell by 12 per cent over this period. This was mainly because of the lockdown restrictions imposed as a result of the COVID-19 pandemic, but warmer average temperatures also reduced electricity demand for heating.

In Quarter 2 2020, gas was the single fuel with the highest generation at 23.2 TWh, despite a decrease of 30 per cent compared to Quarter 2 of 2019. Taken as a group, generation from renewable sources (comprised of wind, solar, hydro and bioenergy) was higher than the amount from gas, at 30.1 TWh. This was the second quarter where renewable generation exceeded gas generation, which first happened in Quarter 1 2020. Since coal generation remained low, this also meant that renewable generation in Quarter 2 2020 exceeded the total from fossil fuels.

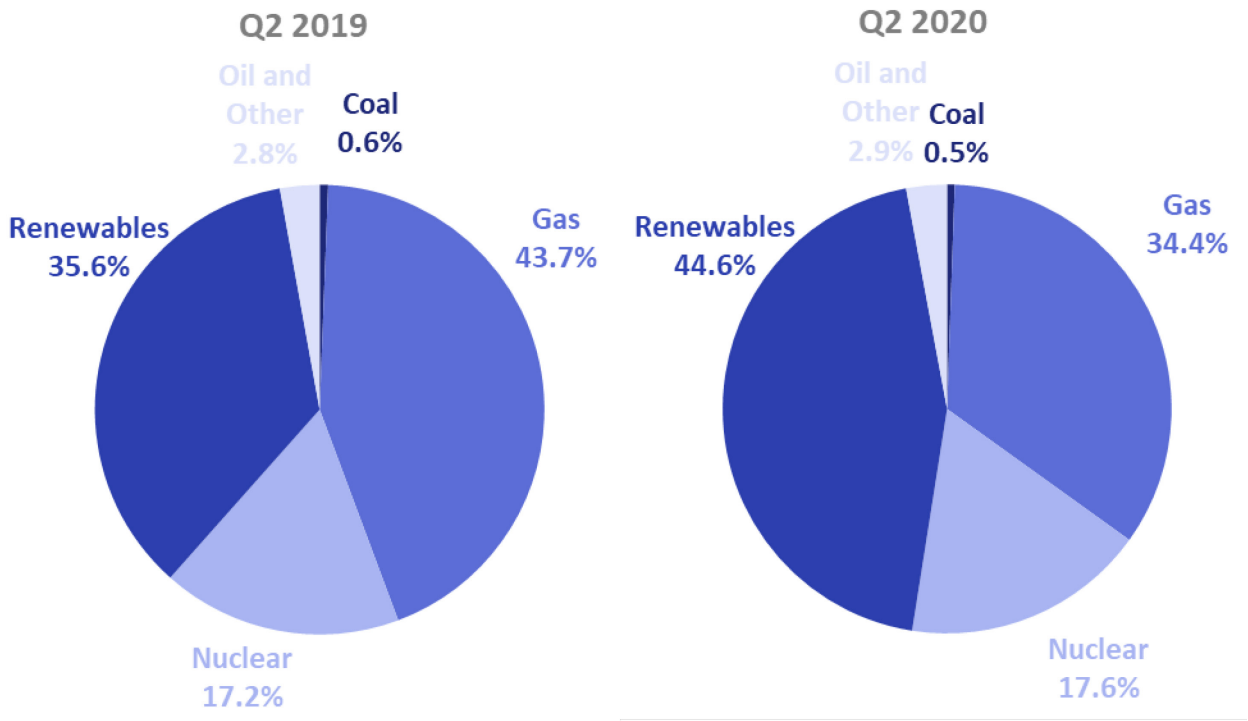
Renewable generation increased by 12 per cent in Quarter 2 of 2020 compared to the same period in 2019. Increases in generation were seen for all forms of renewable energy with the largest increase for offshore wind, up 31 per cent compared to Quarter 1 2019. Average wind speeds were up slightly but this also reflects increased offshore wind capacity, up 21 per cent over the same period.

Nuclear generation fell by 9.2 per cent compared to Quarter 1 2019, to 11.9 TWh. The low nuclear generation was linked to outages, with an outage completed at Heysham 2 but continuing at Dungeness B, Hunterson B and Hinkley Point B and starting at Sizewell B.

Coal generation fell to a record low level of 0.4 TWh, down 20 per cent on the same period last year. The quarter also saw a 67-day coal-free period in Great Britain[1] between March and June, the longest since the 19th century.

[1] Data for these statistics was provided by Elexon. Half-hourly electricity generation data is available from their website.

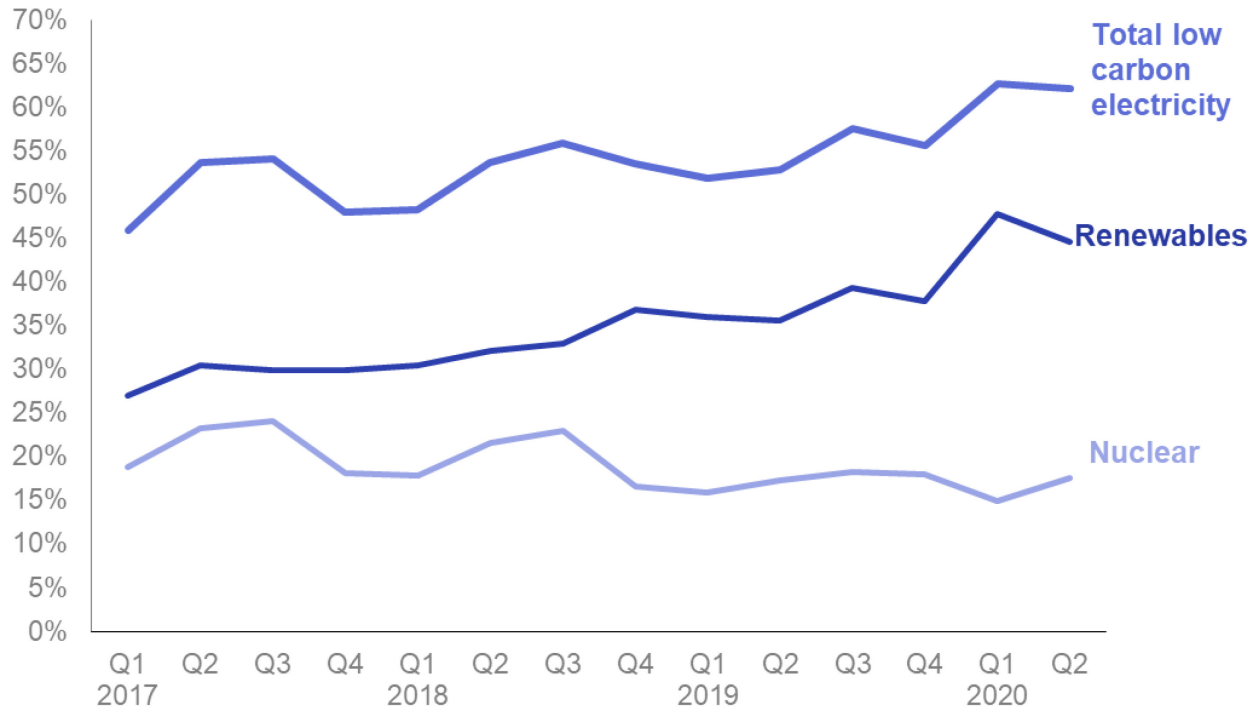
Chart 5.2: Shares of electricity generation (Table 5.1)



The shares of electricity generation by fuel for Quarter 2 2020 showed similar patterns to the total generation, with a substantial increase for renewables and an equivalent decrease in the share from gas. The shares for other fuels remained relatively consistent. The share in electricity generated from renewables was 44.6 per cent in Quarter 2 2020, up from 35.6 per cent in Quarter 2 2019, the second highest share on the published data series after Quarter 1 2020.

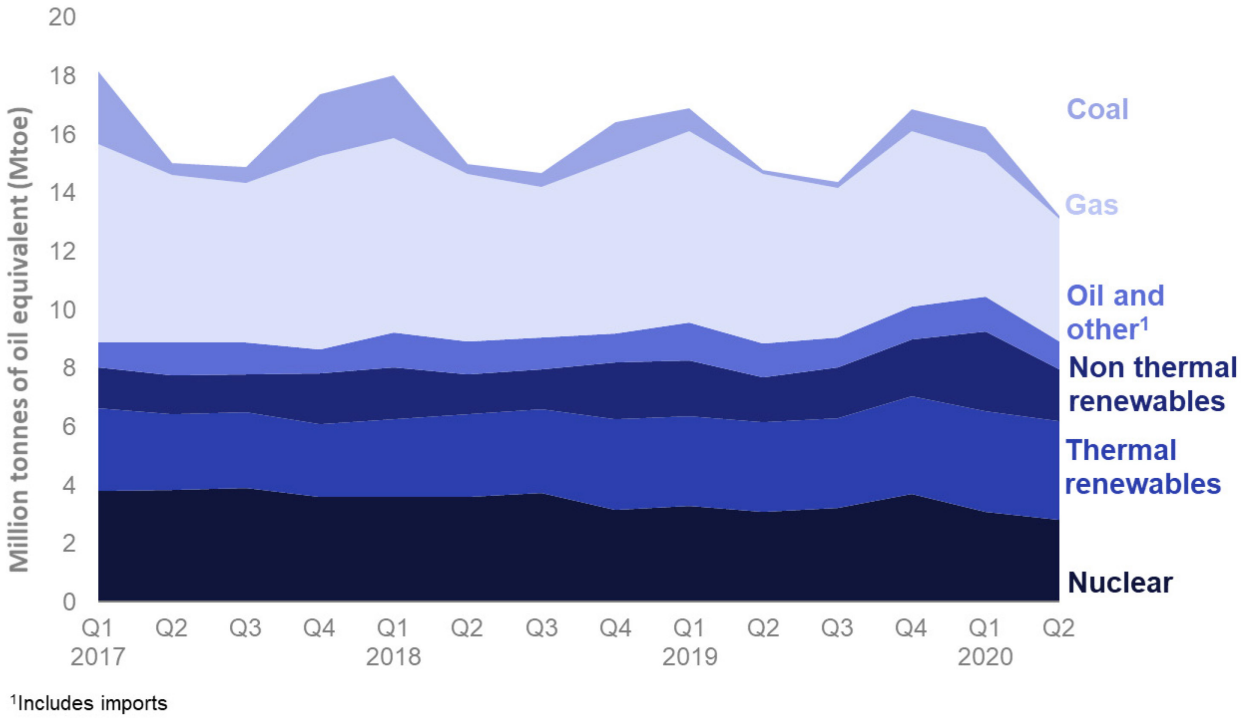
There was a corresponding decrease in the share of generation coming from fossil fuels, which is mainly gas generation. The fossil fuel share was 35.1 per cent in Quarter 2 2020, which was the second lowest share on the published data series and only the second time that the fossil fuel share has dropped below 40 per cent of generation. Quarter 2 2020 was also the second time that the share of generation from renewables exceeded the share of generation from fossil fuels.

Chart 5.3: Low carbon electricity's share of generation (Table 5.1)



Low carbon electricity accounted for 62.1 per cent of electricity generated in Quarter 2 2020. This was 9.3 percentage points higher than in Quarter 2 2019 and just slightly lower than the record high proportion in Quarter 1 2020 (62.6 per cent). This increase was driven by the increase in share for renewables, as the share in generation from nuclear was similar in both years (up 0.3 percentage points compared to Quarter 2 2020).

Chart 5.4: Fuel used in generation (Table 5.1)



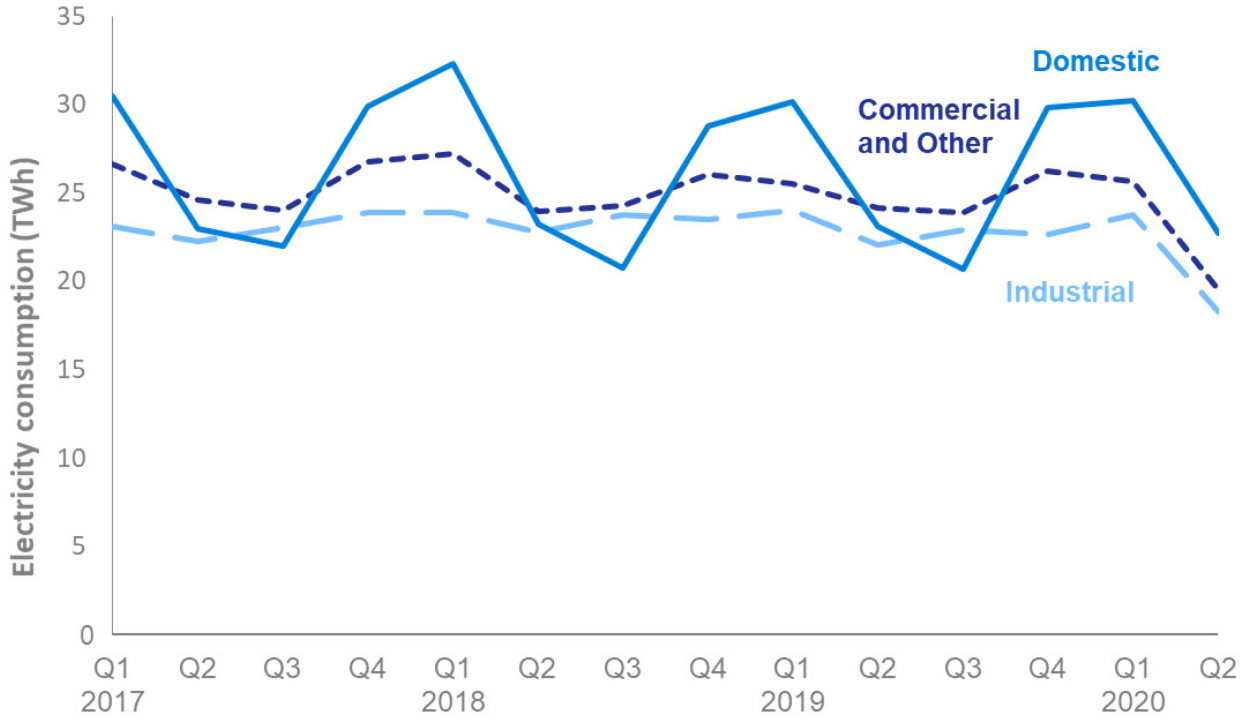
[1]Includes imports

Fuel used in electricity generation continued to fall in Quarter 2 2020. The total used over this period was 13.2 Mtoe (million tonnes of oil equivalent), an 11 per cent decrease compared to Quarter 2 2019. This was the lowest amount used for any quarter on the published data series and reflects the unusually low demand for electricity as a result of the COVID-19 lockdown restrictions as well as the continuing shift towards more efficient non-thermal renewable sources.

Aside from non-thermal renewables, thermal renewables (bioenergy) was the only fuel with an increase in Quarter 2 2020. Bioenergy use was up by 10 per cent to 3.4 Mtoe, the highest quarterly total for bioenergy fuel use on the published data series. This reflects an equivalent increase in electricity generated from bioenergy, up 9.7 per cent compared to Quarter 2 2019.

The other fuels showed decreases in Quarter 2 2020 in line with their lower generation. The amount of gas used fell by 27 per cent to 4.2 Mtoe and coal use was down by 19 per cent to 0.1 Mtoe. Similarly, fuel used by nuclear generators was down by 9.2 per cent as a number of outages reduced the amount of electricity generated from nuclear sources.

Chart 5.5: Electricity final consumption (Table 5.2)



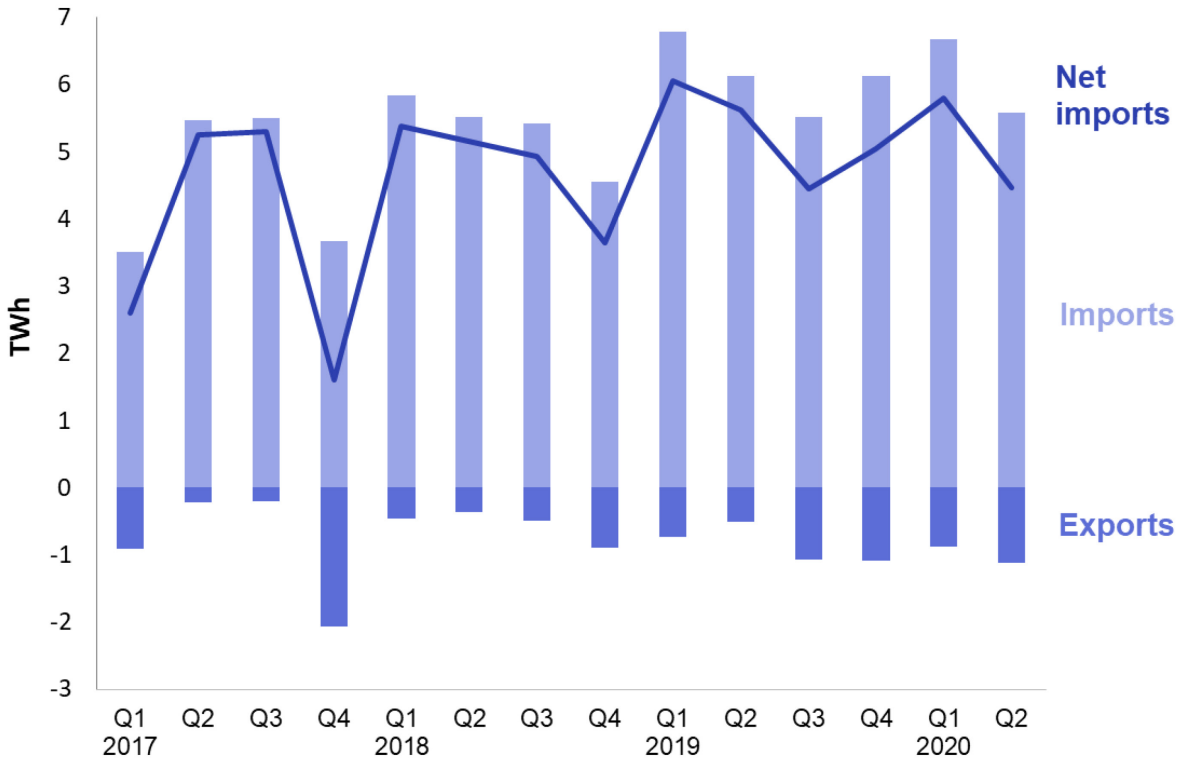
Quarter 2 2020 saw a substantial fall in electricity consumption. This was mainly a result of the lockdown in response to COVID-19 which began at the end of March and continued throughout the quarter, though with some restrictions lifted in May. There was also warmer weather in all three months, reducing the demand for electricity for heating. Final electricity consumption was 60.5 TWh in Quarter 2 2020, down by 13 per cent compared to the same period in 2019 to the lowest level in the published data series.

Consumption decreased in all sectors in Quarter 2 2020, particularly for non-domestic consumers as the lockdown restrictions closed services and industries during the quarter. Consumption in both non-domestic sectors was at the lowest quarterly value on the published data series. Electricity consumed by the industrial sector fell by 17 per cent to 18.3 TWh, reflecting a drop in the manufacturing Index of Production2[2]. Consumption by other final users (including the commercial sector) was 18.1 TWh, a decrease of 20 per cent.

Domestic electricity consumption was less affected by the lockdown restrictions, but still decreased to 22.7 TWh in Quarter 2 2010, a decrease of 1.7 per cent compared to Quarter 2 2019. This reflects higher average temperatures over the period reducing the electricity demand for heating.

[2] 2. For more information on the Index of Production, please see the latest publication from the Office for National Statistics: www.ons.gov.uk/economy/economicoutputandproductivity/output/bulletins/indexofproduction/previousReleases

Chart 5.6: UK trade in electricity (Table 5.6)



UK based electricity generation is supported by five interconnectors allowing trade with continental Europe: England-France (2 GW capacity), England-Netherlands (1 GW), England-Belgium (1 GW), Northern Ireland-Ireland (0.6 GW) and Wales-Ireland (0.5 GW). The England-Belgium 'Nemo Link' interconnector is the newest and became fully operational on 31st January 2019.

The UK has been a net importer of electricity since Quarter 2 2010, with total net imports in Quarter 2 2020 of 4.5 TWh. This accounted for 6.5 per cent of total electricity supply (excluding own use) over the period. Net imports were down over a fifth (-21 per cent) in Quarter 2 2020 compared to the same period the previous year, with imports down 9 per cent to 5.6 TWh and exports more than doubling (up 121 per cent) to 1.1 TWh. The increase in exports is linked to lower demand for electricity, because of the UK's Covid-19 lockdown restrictions and also warmer average temperatures compared to Quarter 2 of 2019.

Net imports decreased on most of the UK's interconnectors with Europe, down 36 per cent on the UK -Netherlands interconnector, 19 per cent on the UK - Belgium interconnector and 12 per cent on the UK -France interconnector. The interconnector from Northern Ireland to Ireland remains the UK's only net exporting interconnector.

Section 6 – UK Renewables
April to June 2020

Key results show:

Renewables' share of electricity generation was 44.6 per cent in 2020 Q2, a record for the second quarter and up 9.0 percentage points on the share in 2019 Q2. This was largely due to a drop in total electricity generation from non-renewable sources. **(Chart 6.1)**

Renewable electricity generation was 30.1 TWh in 2020 Q2, an increase of 12 per cent on the 27.0 TWh in 2019 Q2, but 29 per cent lower than the previous quarter which was the highest on record for renewable electricity generation (42.1 TWh). **(Chart 6.2)**

Offshore wind increased by 31 per cent to 7.8 TWh however this was a decrease of 45 per cent from the record generation in the previous quarter as average wind speeds dropped sharply back to typical seasonal levels. Onshore wind generation dropped by 0.8 per cent to 6.1 TWh compared to 2019 Q2 and dropped by 53 per cent compared to the previous quarter. **(Chart 6.2)**

Renewable electricity capacity was 48.5 GW at the end of 2020 Q2, a 5.4 per cent increase on a year earlier, and a 1.1 per cent increase on the previous quarter, with 77 per cent of the increase on last year's capacity coming from offshore wind. **(Chart 6.3)**

Liquid biofuels consumption decreased by 24 per cent, from 444 million litres in 2019 Q2 to 337 million litres in 2020 Q2. This was driven by reduced consumption of all transport fuels as Covid-19 restriction decreased demand. The biofuel share of road fuels increased to 6.3 per cent, 1.2 percentage points greater than Q2 2019. **(Chart 6.6)**

Relevant tables

6.1: Renewable electricity capacity and generation
6.2: Liquid biofuels for transport consumption

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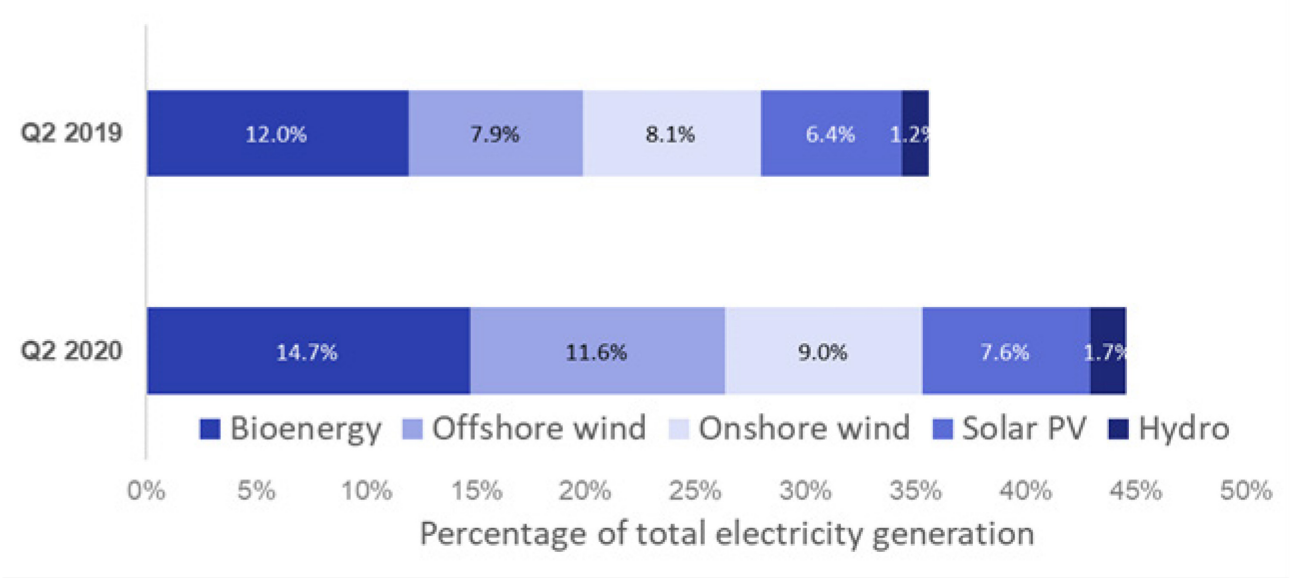
Chart 6.1 Renewables' share of electricity generation (Table 6.1)



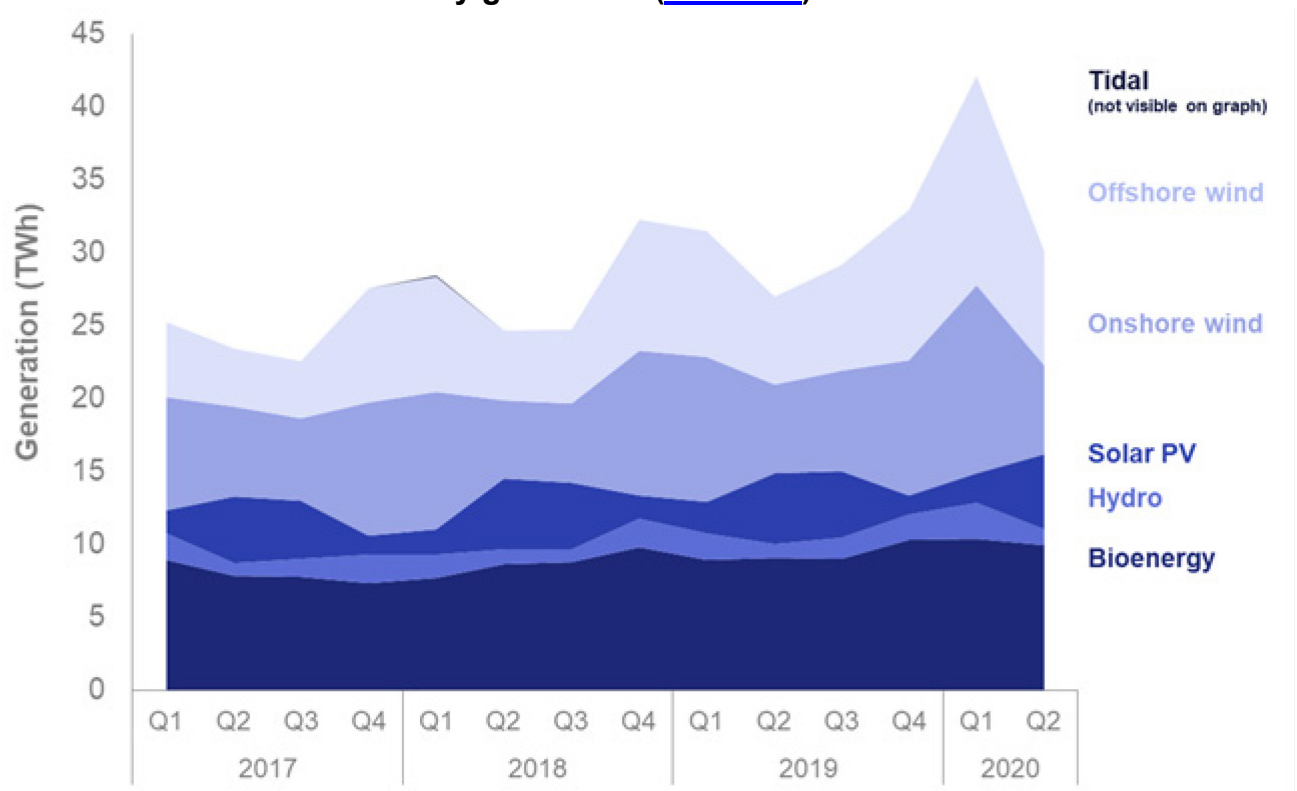
Renewables' share of electricity generation increased to 44.6 per cent in 2020 Q2 from 35.6 per cent in 2019 Q2. The share in 2020 Q2 is the second highest share on renewable generation on record. The share of generation fell by 3.2 percentage points from 2020 Q1 when very high wind speeds boosted load factors to record highs for both offshore and onshore wind.

The increased share on a year earlier mostly reflects a drop of 23 per cent in fossil fuel generation, particularly from gas, due to a decrease in total demand.

Total electricity generated from renewables in 2020 Q2 was up by 3.1 TWh (12 per cent) on 2019 Q2, to 30.1 TWh, but dropped by 12.0 TWh (29 per cent) lower than the previous quarter which had been a new record quarterly high at 42.1 TWh. The percentage share of electricity generated from renewables decreased from the previous quarter of 2020 by 3.2 percentage points, lower renewable generation was partly offset by lower total electricity generation.

Total electricity generation figures (all generating companies) can be found in table ET 5.1, at: www.gov.uk/government/statistics/electricity-section-5-energy-trends

Chart 6.2 Renewable electricity generation (Table 6.1)



In 2020 Q2, electricity generated from onshore wind remained within 1 per cent of 2019 Q2 at 6.1 TWh. Generation from offshore wind, however, saw at significant increase, up by 31 per cent (1.8 TWh), to 7.8 TWh but this was a drop of 45 per cent compared to the previous quarter when average quarterly wind speeds were at the highest level in over a decade. Wind speeds in 2020 Q2, at 7.8 knots, were lower than the long-term mean (8.4 knots) but were slightly higher than average wind speeds for the last 2 years. See Energy Trends table 7.2 at: www.gov.uk/government/statistics/energy-trends-section-7-weather.

Generation from solar photovoltaics was at a new quarterly high, exceeding 5 TWh for the first time. Totals for 2020 Q2 increased by 5.6 per cent (0.3 TWh) compared to 2019 Q2. Capacity increased by 1.4 per cent whilst average daily sun hours grew by 1.9 in 2020 Q2 to 7.9 hours compared to 2019 Q2. This was a record high for the second quarter of the year in our time series - see Energy Trends table 7.3.

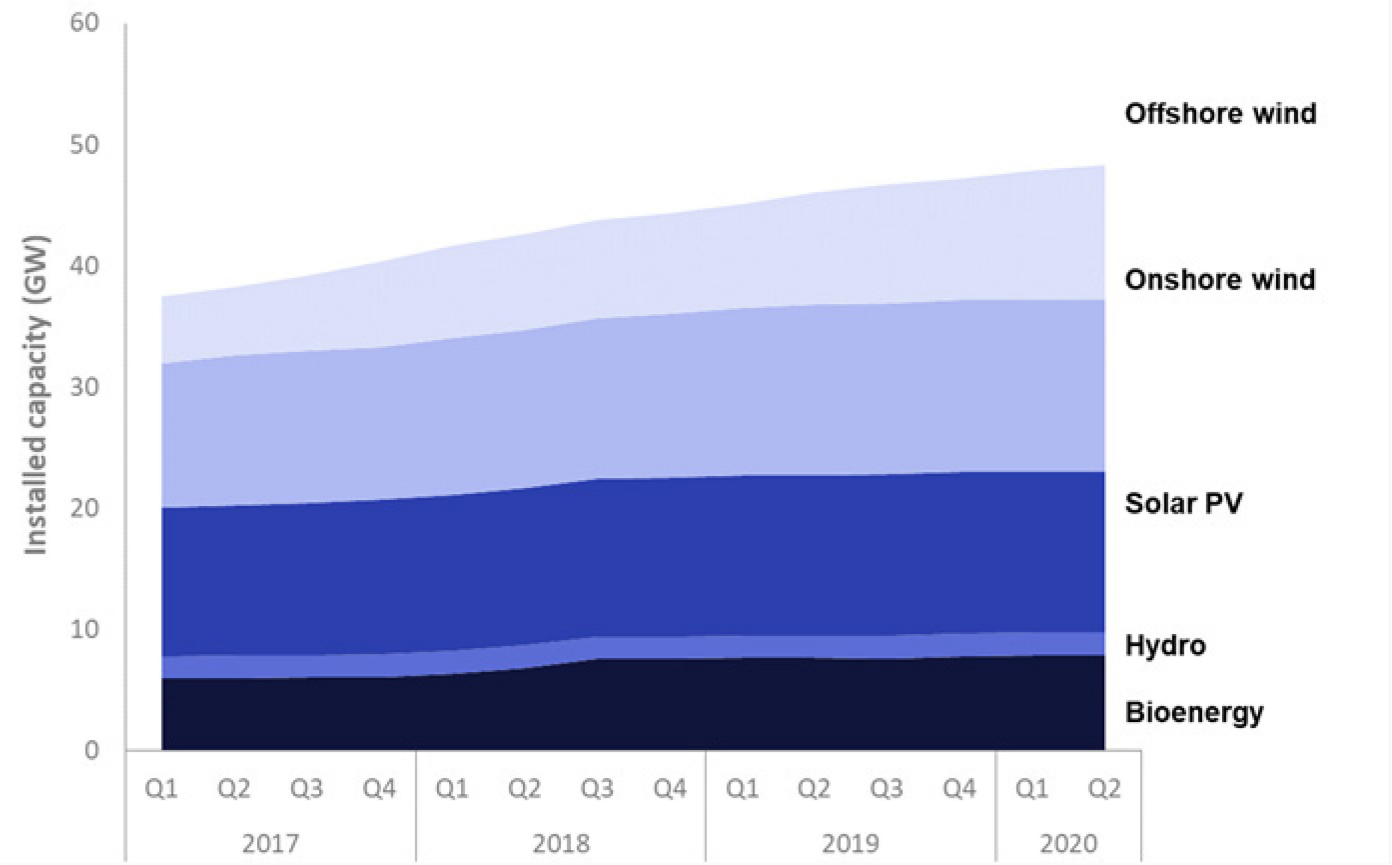
Hydro generation increased by 20.3 per cent to 1.1 TWh. Capacity remained stable as did average rainfall on a national level however actual generation depends on the precise location and timing of rainfall, rainfall had been very high in Q1 which may have added to generation in Q2 - see Energy Trends table 7.4.

In 2020 Q2, generation from bioenergy[1], at 9.9 TWh, was up by 9.7 per cent on a year earlier. Within this, the largest increase came from plant biomass (mainly wood pellets) which was up by 0.7 TWh (12 per cent) on 2019 Q2. Plant Biomass makes up 69 per cent of total bioenergy.

Bioenergy had the largest share of renewable generation (33.1 per cent), 26.0 per cent came from offshore wind as well as 20.2 per cent from onshore wind, 17.1 per cent from solar PV and 3.7 per cent from hydro.

[1] Bioenergy consists of: plant biomass, animal biomass, biodegradable municipal solid waste, landfill gas, sewage gas, anaerobic digestion and co-firing (generation only)

Chart 6.3 Renewable electricity capacity (as at end of quarter) (Table 6.1)



At the end of 2020 Q2, the UK's renewable electricity capacity totalled 48.5 GW, an increase of 5.4 per cent on that installed at the end of 2019 Q2, and 1.1 per cent higher than the previous quarter.

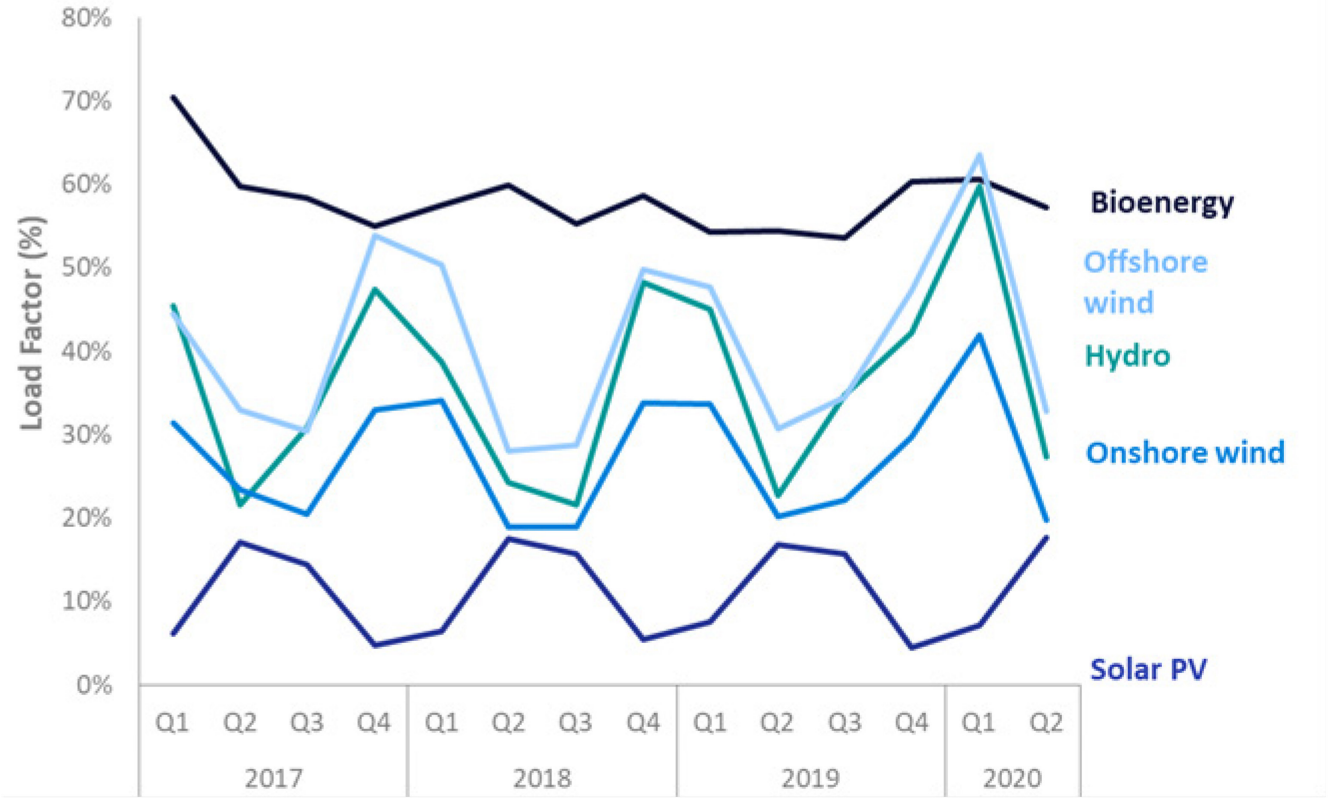
At the end of 2020 Q2, wind accounted for just over a half of total renewable generating capacity with 29.2 per cent for onshore wind and 23.0 per cent for offshore wind. After onshore wind, solar PV had the highest share of renewable technologies at 27.7 per cent. Bioenergy represented 16.2 per cent of capacity and hydro 3.9 per cent.

Compared with 2019 Q2, the largest increase in absolute terms was in offshore wind capacity which rose by 21 per cent to 11.2 GW. Additions to offshore wind include the final turbines being constructed at Hornsea One and more capacity coming online at East Anglia One which now stand at 1218 MW and 680 MW respectively. Increased onshore wind capacity includes Clocaenog Forest in Wales and Slieve Divena 2 in Northern Ireland.

Bioenergy capacity increased by 3.1 per cent to 7.9 GW. Solar PV capacity increased by 1.4 per cent to 13.4 MW. The increases in Solar PV capacity are slower than the rapid expansion seen in 2010–2016, partly due to the closure of the Renewables Obligation (RO) and Feed in Tariffs (FiTs) at the end of March 2019. The statistics published here do not currently include unsubsidised installations below 1MW capacity that are not registered on the MCS database. We are reviewing data sources to improve coverage.

Chart 6.4 Renewable electricity load factors (Table 6.1)

Load factors are calculated as electricity generated by a technology as a proportion of maximum potential generation over the period, given the installed capacity.



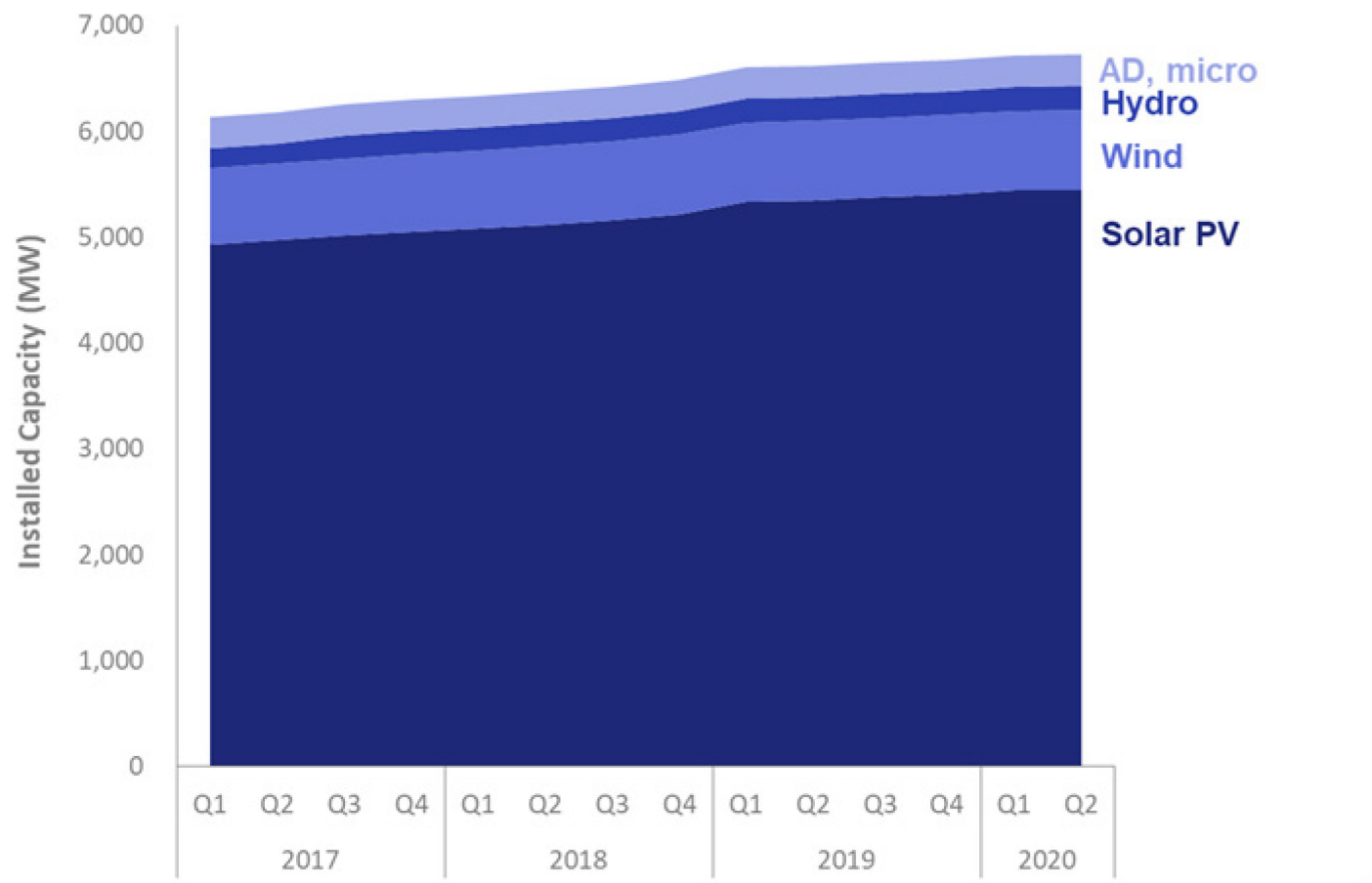
In 2020 Q2, onshore wind's load factor decreased by 0.5 percentage points, from 20.2 per cent in 2019 Q2 to 19.7 per cent. However offshore wind's load factor increased by 2.1 percentage points, from 30.7 per cent in 2019 Q2 to 32.8 per cent. Wind speeds can vary across the country and can be different at sea. The precise timing of capacity coming online can also affect load factors, in particular, a lot of capacity was added at Hornsea 1 in June 2019, this contributed to the capacity at the end of that quarter but did not add to generation in the first two months of that quarter. This resulted in a lower load factor in Q2 of 2019.

The load factor for solar PV rose from 16.8 per cent in 2019 Q2 to 17.5 per cent in 2020 Q2 as average sun hours grew to 7.9 per day.

Hydro's load factor in 2020 Q2 decreased by 4.6 percentage points, from 22.7 per cent in 2019 Q2 to 27.3 per cent despite a small decrease in average rainfall. Quarterly load factors are affected by the precise timing and location of rainfall as there is a lag between rain falling and generation. Rainfall had been very high in Q1 of this year and this may have had some effect on generation in the latest quarter.

For bioenergy, the load factor in 2020 Q2, at 57.2 per cent, was up by 2.9 percentage points on a year earlier. However, this was lower than the previous quarter by 3.3 percentage points. Generation may have been affected by lower total demand due to COVID 19.

Chart 6.5 Small scale generators: installed capacity (as at end of quarter)



The Feed in Tariff (FiT) scheme[2] closed to new entrants at the end of March 2019. BEIS continues to monitor small scale generation using the Central FiTs Register as well as records of installations that register with the Micro Generation Certification Scheme (MCS) and the Renewable Energy Planning Database (REPD). The statistics published here do not currently include unsubsidised installations below 1MW capacity that are not registered on the MCS database. We are reviewing data sources to improve coverage.

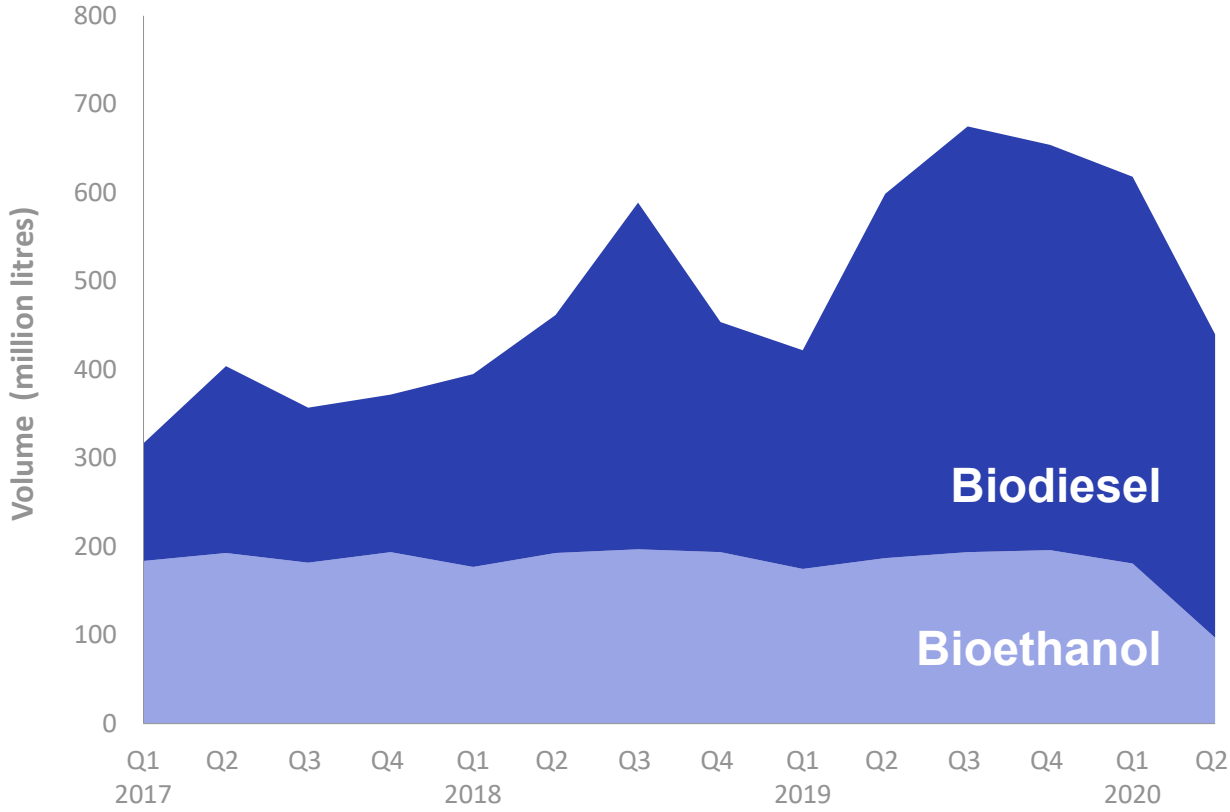
There were over 1 million small scale installations (less than 5 MW) installed at the end of Q2 2020, with a total capacity of 6,722 MW. This accounts for 14 per cent of total renewable capacity.

Solar photovoltaics (PVs) represent the overwhelming majority of small-scale installations at 1.013 million (99 per cent) and also the majority of capacity at 5.5 MW (81 per cent).

Statistics on Feed in Tariffs can be found at:
www.gov.uk/government/collections/feed-in-tariff-statistics

Following the closure of the FIT scheme to new installations, government laid legislation in June 2019 to introduce a new supplier-led smart export guarantee (SEG) in Great Britain from 1 January 2020. Under the SEG, licensed electricity suppliers (with 150,000 domestic customers or more) are required to offer small-scale low-carbon generators a price per kWh for electricity exported to the grid. Further information on the SEG is available at: www.gov.uk/government/consultations/the-future-for-small-scale-low-carbon-generation

Chart 6.6 Liquid biofuels for transport consumption (Table 6.2)



In the second quarter of 2020, 440 million litres of liquid biofuels were consumed in transport, a decrease of 27 per cent on the total of 599 million litres in the second quarter of 2019. This sharp drop in consumption reflects an overall drop in all transport fuel consumption as COVID-19 lockdown measures reduced travel.

Bioethanol consumption fell by 48 per cent from 187 million litres in the second quarter of 2019 to 97 million litres. Biodiesel consumption decreased by 17 per cent, from 412 million litres in Q2 2019 to 343 million litres in Q2 2020.

Biodiesel represented 78 per cent of biofuels consumption, with bioethanol accounting for the remaining 22 per cent.

Despite the drop in biofuel consumption the share of biofuel consumption as a proportion of total transport fuel continued to increase. In Q2 2020 bioethanol accounted for 4.6 per cent of motor spirit, up from 4.4 per cent in Q2 2019. Biodiesel represented 7.0 per cent of diesel (DERV) consumption, an increase from the 5.4 per cent seen in the second quarter of 2019. The combined contribution of all biofuels increased by 1.2 percentage points to 6.3 per cent, with the increase in biodiesel leading to a new record share of biofuels in transport.

Renewable electricity in Scotland, Wales, Northern Ireland and the regions of England in 2019

Introduction

This article provides information and analysis on the amount of electricity from renewable sources, disaggregated below UK level. It includes information on capacity, generation and number of operational sites, as well as derived load factors, for the four UK countries, the nine English regions and, from 2014, UK Local Authorities[1] [2]. It updates the published figures in the September 2019 edition of *Energy Trends.*

These data are consistent with those published for the UK in Table 6.4 of the Digest of United Kingdom Energy Statistics 2020 (DUKES), and use similar categories[3]. The UK totals published here are consistent with the figures published in Energy Trends. However, there are small differences between the totals published for England, Northern Ireland, Scotland and Wales published here and those published in ET 6.1 . Some sites cannot be allocated to local authorities where it would disclose the generation of individual schemes. There are also a number of installations that cannot be allocated to specific local authorities or regions in this article and the related tables, this is because their precise location is not known. In ET 6.1 the location of this sites and their generation is estimated so that all generation is recorded as either England, Northern Ireland, Scotland or Wales. It is planned that in next years release there will be a change of methodology so that the national totals are consistent.

These data cover all renewable electricity schemes, including those accredited under the Renewables Obligation (RO), Feed in Tariff (FiT) and Contracts for Differences support mechanisms. These data also include some schemes that are not eligible for support, such as pre-April 2002 large-scale hydro and non-CHP energy from waste schemes and those schemes that are registered with the MCS (Microgeneration Certification Scheme) but are not accredited to FITs. However, small-scale schemes that are not supported by government subsidy schemes or have not registered with the MCS are not included in these figures. As a result, the solar PV capacity and generation figures are likely to be underestimated. We are looking at options for extending our data coverage.

Consistent time-series data for each year from 2003 for regional and Local Authority data from 2014, are available as Excel spreadsheets[4]. The spreadsheets include detailed data and additional charts for generation, capacity, number of sites, generation per GVA and load factors by country of the UK, region of England and by Local Authority.

Key points – 2019

Renewable generation in the UK grew by 9.5 per cent from 110 TWh in 2018 to 120.5 TWh in 2019. Within this:

- Generation in England was **up 7.8 per cent**
- Generation in Northern Ireland was **up 6.0 per cent**
- Generation in Scotland was **up 14.3 per cent**
- Generation in Wales was **up 9.4 per cent**

[1] Offshore wind is allocated to the region to which its output is connected. The exceptions are Robin Rigg, which comes ashore at Seaton, Cumbria but whose generation is associated with Scotland, and Burbo Bank, which comes ashore in Wales but whose generation is associated with the North West. Hornsea Project One, going live this year, lands in the East Midlands but grid connection is in Yorkshire and the Humber.

[2] Where disclosure of confidential generation data was likely at the site level the data have been removed, and added to the unallocated row at the bottom of the Local Authority listings.

[3] On occasion, it has been necessary to combine some renewable sources into categories so that information about individual sites provided in confidence (rather than from publicly available sources) to Ricardo Energy & Environment and (BEIS) is not disclosed.

[4] www.gov.uk/government/statistics/regional-renewable-statistics

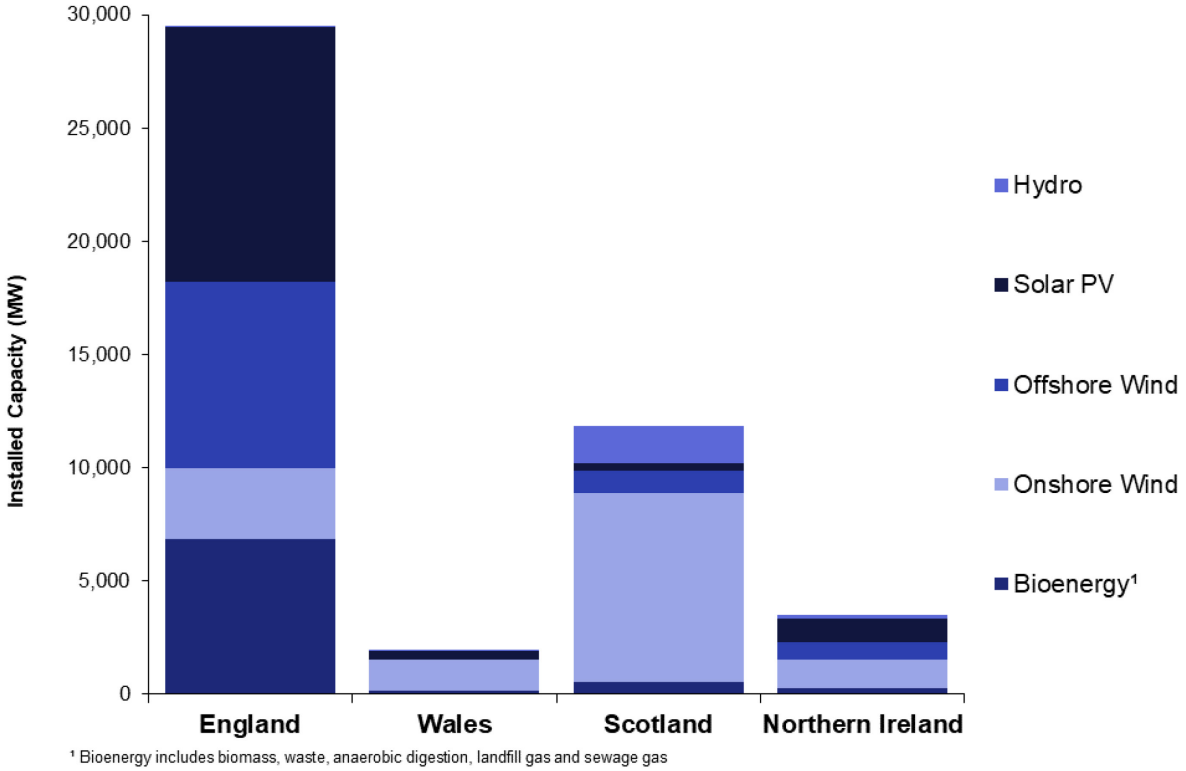
Generation in all countries was boosted by new capacity coming online. Overall capacity increased by 6.5 per cent from 44.3 GW at the end of 2018 to 47.2 GW at the end of 2019. Within this:

- Capacity in England was **up 6.1 per cent**
- Capacity in Northern Ireland was **up 2.5 per cent**
- Capacity in Scotland was **up 7.6 per cent**
- Capacity in Wales was **up 5 per cent**

Capacity

- England had the most renewable capacity and generation, about two and a half times that for Scotland. This is largely due to the fact that England has 89 per cent of the UK's bioenergy capacity (mostly from four biomass units at Drax and the Ferrybridge Multifuel Power Station in Yorkshire and the Humber), 84 per cent of the PV capacity and 34 per cent of the offshore wind capacity. Chart 1 shows a breakdown of capacity at the end of 2019 by technology and country.

Chart 1 – Renewable capacity at the end of 2019 by technology and country



¹ Bioenergy includes biomass, waste, anaerobic digestion, landfill gas and sewage gas

- The technology with the highest growth in capacity was **offshore wind** which grew by 21 per cent in the UK. The additional capacity was largely in Yorkshire & the Humber (69 per cent) where capacity more than tripled over the course of the year. This was driven by Hornsea Project One with the addition of 1,218 MW capacity. Scotland (20 per cent) then followed with a capacity increase of 315 MW from Beatrice Offshore windfarm.
- **Onshore wind** grew by 4.2 per cent in the UK – 73 per cent of the new capacity was in Scotland, 24 per cent in Wales, 2 per cent in Northern Ireland but just 1 per cent in England.
- **Solar PV** capacity grew by 2.1 per cent, with Yorkshire and Humber having the largest percentage increase at 8.0 per cent.
- **Biomass and waste** grew by 3.8 per cent overall. Within this, capacity grew by 2.5 per cent in England. The additional capacity was primarily in Yorkshire and Humber (44 per cent) including a further 76 MW at Ferrybridge Multifuel and 41 MW at Templeborough Biomass. Scotland grew by 13 per cent from Dunbar (37 MW) and Glasgow GGREC (15 MW).

Table 1 shows the largest new schemes (including capacity increases) in 2019:

Table 1 - Largest new schemes

Onshore wind	Dorenell Wind Farm (capacity increase)	Scotland	177 MW
	Clocaenog Forest	Wales	96 MW
	Kype Muir Wind Farm	Scotland	88 MW
	Middle Muir Wind Farm	Scotland	51 MW
	Tom Nan Clach	Scotland	39 MW
	Mynydd y Gwair Wind Farm	Wales	33 MW
	Coire Na Cloiche	Scotland	30 MW
Offshore wind	Hornsea Project One - Heron & Njord	Yorkshire & H	1,218 MW
	Beatrice Offshore windfarm (capacity increase)	Scotland	315 MW
	East Anglia 1 (capacity increase)	East of England	179 MW
	Kincardine Offshore Windfarm	Scotland	49 MW
Solar PV	York Solar Farm	Yorkshire & H	35 MW
	Huntington Water Treatment Works	North West	7 MW
Biomass and waste	Ferrybridge Multifuel Power Station (additional capacity)	Yorkshire & H	76 MW
	Templeborough Biomass Power Plant (additional capacity)	Yorkshire & H	41 MW
	Dunbar	Scotland	37 MW
	Beddington	London	30 MW
	SIMEC Power 2 Limited	Wales	18 MW
	Full Circle Energy Park	N Ireland	15 MW
	Glasgow Renewable Energy and Recycling Centre	Scotland	15 MW
	Javelin Park EfW	South West	15 MW

The regions with the highest capacity in England (including PV) are:

- Yorkshire and the Humber – 6,269 GW (50 per cent from biomass and waste - mostly from Drax and Ferrybridge – and 37 per cent from wind – mostly from Hornsea Project One)
- East of England - 5,580 GW (55 per cent from wind and 35 per cent from PV)
- South East - 4,268 GW (50 per cent from PV and 37 per cent from Wind).

Capacity by English region is shown in Chart 2:

Chart 2 – Renewable capacity at the end of 2019 by English region and technology

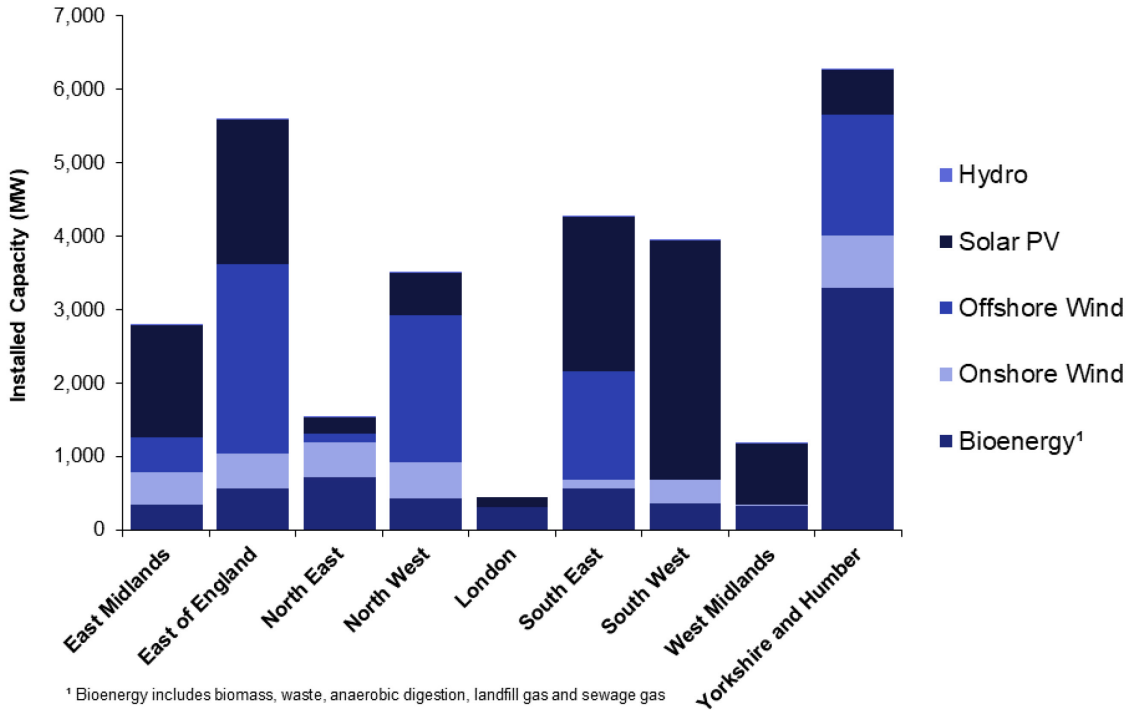


Table 2 summarises capacity growth, the key technologies in each region as well as the major sites:

Table 2: Regional capacity growth

Region	Key Technology	Growth (MW)	Key Schemes
East Midlands	Biomass and Waste	1.8	Lincoln EFW (Survey revision), Technology reassignments
	Solar PV	5.4	Mainly medium and small-scale projects (FIT)
East of England	Solar PV	19.8	Poplars, Volmary Site, Tesco Extra Hazelmere, Mainly medium and small-scale projects (FIT)
	Offshore Wind	178.2	East Anglia 1
	Onshore Wind	5.5	Common Barn (Formerly Highfield Farm), FiT Revisions
North East	Solar PV	3.6	Mainly medium and small-scale projects (FIT),
North West	Solar PV	18.9	BAE Samlesbury Aerodrome, Pilkington, Clifton Marsh Wastewater Treatment Works 1, Clifton Marsh Wastewater Treatment Works 2, Huntington Water Treatment Works, Mainly medium and small-scale projects (FIT)
London	Biomass and Waste	29.9	Beddington
	Solar PV	3.7	Mainly medium and small-scale projects (FIT)
South East	Biomass and Waste	5.2	Milton Keynes Waste Recovery Park
	Solar PV	13.0	Kent Solar Farm, Mainly medium and small-scale projects (FIT)
	Onshore Wind	9.4	New Rides Farm (Clark Recovered)
South West	Biomass and Waste	20.2	Swindon Energy Ltd, Javelin Park EfW
	Solar PV	15.9	Five Mile Drive (Northwick Springhill Extension), Bridgwater, Mainly medium and small-scale projects (FIT)
West Midlands	Solar PV	- 4.5	Mainly medium and small-scale projects (FIT)
Yorkshire and Humber	Biomass and Waste	116.9	Templeborough Biomass Power Plant- Rotherham, Ferrybridge Multifuel 1 ('C') Power Station Plus 2
	Solar PV	45.3	Bransholme Solar (Carlam Hill Education), York Solar Farm, Mainly medium and small-scale projects (FIT)
	Offshore Wind	1,218.0	Hornsea Project One - Heron & Njord
	Onshore Wind	9.0	Withernwick Extension
Northern Ireland	AD	0.5	Bellshill AD (Farm AD), Dufless AD (Farm AD), Randox Biogen (Farm AD), Edenmore Farm (Farm AD), TADA (Farm AD), Carrick Road 200 AD (Farm AD), SDPowerLtd (Farm AD), Annaghroe Road AD (Farm AD), Backhill Road AD (Farm AD), Barnailt Road AD (Farm AD), Creagh Concrete (Farm AD), Derryhirk Road AD (Farm AD), Dowland Road AD (Farm AD), Drumslade Road AD (Farm AD), Dunnalong Road (2) AD (Farm AD), Greenogue Road AD (Farm AD), Just Farm Energy (Farm AD), Lough Road AD (Farm AD), McGrane Nurseries (Farm AD), Milltown Gravel AD (Farm AD)
	Biomass and Waste	25.0	Drumrusk, TGE Dual Fuel, Knockmore, Duncrue Incineration, Full Circle Energy Park
	Solar PV	11.7	Dunore PV Farm, Finvoy Solar Farm
	Onshore Wind	8.8	Mainly small-scale projects
Scotland	AD	1.0	Glasgow Renewable Energy and Recycling Centre (Waste AD), Hatton Farm AD/Grissan Carnside Limited (Farm AD), Portgordon Maltings/Grissan Portside Limited (Farm AD)
	Biomass and Waste	52.1	Glasgow Renewable Energy and Recycling Centre, Dunbar
	Solar PV	9.7	Mainly medium and small-scale projects (FIT)
	Wave and tidal	2.0	Magallanes (FoW - EMEC)
	Offshore Wind	357.6	Beatrice Offshore windfarm (additional capacity), Kincardine Offshore Windfarm
	Onshore Wind	417.0	Galawhistle, Dorenell Wind Farm (Previously Site A and B Scaut Hill), Middle Muir Wind Farm, Kype Muir Wind Farm, Tom Nan Clach, Achlachan, Coire Na Cloiche
Wales	Biomass and Waste	28.8	Biomass UK No 2 Ltd - Barry, SIMEC Power 2 Limited
	Solar PV	0.6	Llancayo Solar Farm, mainly medium and small-scale projects (FIT)
	Onshore Wind	139.5	Mynydd y Gwair Wind Farm, Clocaenog Forest, Bryn Blaen Wind Farm

Generation

- For similar reasons to capacity, generation from renewable sources in England was also more than two and a half times higher than Scotland, with the higher utilisation rates of bioenergy and wind offset by the lower rates of the more intermittent solar PV which account for 14 per cent of English renewable generation.

Number

- Excluding PV, England continues to have the largest number of renewable sites (5,775) following by Scotland, Northern Ireland and Wales; the position for the last two countries is reversed when PV is taken into consideration.
- Excluding PV, Regions with the highest number in England are the South West, East of England and Yorkshire and the Humber. When PV is taken into consideration, the South West still has the highest number of sites but is followed by the South East.

Capacity and Generation per GVA

- Economic activity in each country or region is measured in terms of Gross Value Added (GVA)[5]. Scotland continues to show both the largest capacity from renewables per £ of GVA followed by Wales, Yorkshire and the Humber and Northern Ireland.
- In terms of electricity generated, Scotland also shows the largest generation per £ of GVA, followed by Yorkshire and the Humber (due to Drax), Wales, North East and Northern Ireland.

Load Factors

Load factors are the ratio of how much electricity was generated as a proportion of the total generating capacity. UCLFs or "load factor on an unchanged configuration basis" describes the amount of electricity generated from schemes that have been operating throughout the whole of the calendar year with the same installed capacity configuration[6].

The UCLFs and load factors on a standard basis can be found in the load factor time-series spreadsheets[7]. A summary by country is given in Table 3:

Table 3 - Load factors on an unchanged configuration basis by UK country and technology:

	Onshore Wind	Offshore Wind	Solar PV	Hydro	Biomass and Waste
England	26.4%	40.2%	11.3%	35.1%	65.8%
Northern Ireland	25.4%	n/a	9.3%	37.6%	66.0%
Scotland	26.1%	37.9%	10.1%	36.8%	75.4%
Wales	27.6%	35.0%	10.9%	23.5%	71.7%
UK average	26.2%	39.6%	11.2%	35.5%	66.3%

- Wales now has the highest **onshore wind** load factor (27.6 per cent) followed by England (26.4 per cent), Scotland (26.1 per cent) and Northern Ireland (25.4 per cent). This implies that there have been some outages and curtailments for some large Scottish wind farms.
- England, however, has the highest load factor for **offshore wind.**

[5] GVA is Gross Value Added as published as Total GVA in Regional Gross Value Added (Income Approach), December 2015 at: www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/regionaleconomicactivitybygrossdomesticproductuk/1998to2018 www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry

[6] The formula for calculating this is:

$$\frac{\text{Electricity generated during the year (MWh)}}{\text{Installed capacity of schemes operating throughout the year with an unchanged capacity configuration (MW) x hours in year}}$$

[7] Available at: *www.gov.uk/government/collections/renewables-statistics* These data are only reported where the region contains three or more operational schemes.

- England also has the highest average load factor for **solar PV**, followed by Wales, Scotland and Northern Ireland which is in keeping with the relative solar irradiance in these countries.
- Load factors for other technologies and additional graphs are included in the related spreadsheets.

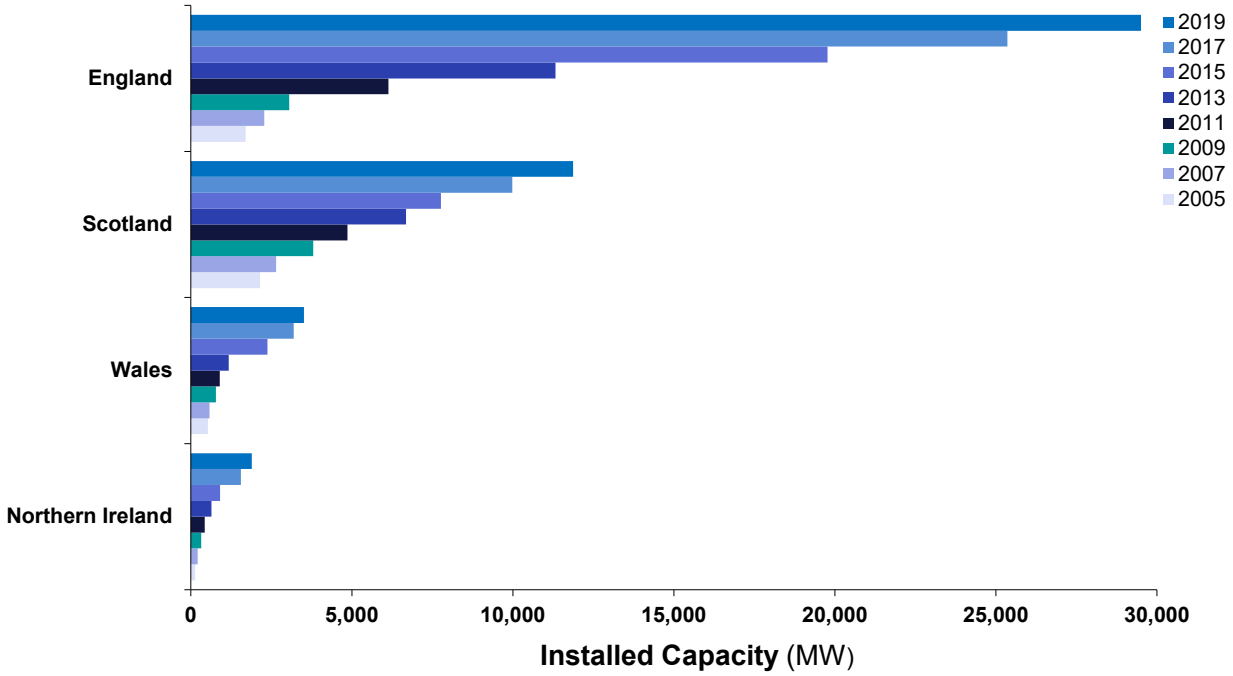
Chart 3 – Onshore wind UC LFs since 2000 by UK country

Time series

- Capacity and generation have grown at different rates in different regions for each technology, which is partly dependent on the available resource and the support mechanism. In the case of the installed capacity for solar PV, following a period of rapid growth encouraged by the RO and FiT schemes, the initial fast rate of growth has slowed down, which is also reflected in the corresponding generation figures; this is probably due to a combination of effects including closure of the RO, a reduction in FiT financial support mechanisms and the rapid exploitation of prime development sites.
- In the case of landfill gas, the rate of exploitation of prime sites reached saturation several years ago but interestingly there is no similar plateauing of generation data which instead decreases with time. This is because biogas production rates reduce with time as the biodegradable resource gets exploited.

Chart 4 shows how capacity has grown over time in each country:

Chart 4 – Total renewable capacity by country 2005 – 2019



Local authority analysis

- Tables 4 to 6 rank the top five Local Authorities (LAs), per: number of installations, installed capacity, and generation for key technologies; these are also shown graphically in the Excel spreadsheets. The Local Authority data used for this analysis has recently undergone some further data cleansing and revisions by Ofgem; as a result, there will be some minor differences when compared with the data published from the Annual Survey in DUKES.
- Since last year, several local authority boundaries have been amalgamated with others and now come under a new name[8]; in once instance there was just a name change. These have been amended in the time-series spreadsheets from 2016 onwards but the order listings remain unchanged so that time-series comparisons can still be made with pre-2016 datasets. Those LAs now amalgamated with others now have no data. A footnote has been included that explains this.
- **Number of sites:** Cornwall remains the top ranked (18,546), reflecting the large number of solar PV schemes installed in the South West. For other technologies, the top ranking LAs for number of installations for onshore wind, hydro, landfill gas, anaerobic digestion and plant biomass are the Orkney Islands, Highland, Thurrock, Shropshire and Mendip respectively.
- **Capacity**: Selby is the top ranked, primarily from Plant Biomass (Drax Dedicated Biomass), followed closely by Highland, primarily from wind and hydro.
- **Generation**: Selby is top ranked, primarily from Plant Biomass: For other technologies, the top ranking LAs are onshore wind (Highland), PV (Cornwall), hydro (Highland), landfill gas (Thurrock), anaerobic digestion (Shropshire) and plant biomass (Selby).
- Wiltshire and Cornwall continue to have large numbers of PV sites with correspondingly high capacity and generation which represents the installation of large solar farms. Interestingly, Sunderland and County Durham between them have an unusually large number of PV sites, especially for a region with low solar irradiance. However, they have much lower capacities

[8] "Bournemouth", "Christchurch" and "Poole" are now "Bournemouth, Christchurch and Poole"; "East Dorset", "North Dorset", "Purbeck", "West Dorset", "Weymouth and Portland" are now "Dorset"; "Forest Heath" and "St Edmundsbury" are now "West Suffolk"; "Suffolk Coastal" and "Waveney" are now "East Suffolk"; "Taunton Deane" and "West Somerset" are now "Somerset West and Taunton". "Shepway" is now called "Folkestone and Hythe".

and generation. This large number of small schemes represents the uptake of domestic installations.

- Highland's overall capacity and generation is driven by the construction of large-scale wind farms. Whilst the Orkneys has the highest number of wind sites, some 3 times that of the Highland's, it has a much smaller capacity and generation, most likely because these are mainly small projects meeting local needs.
- Shropshire continues to show the highest number of AD facilities as well as capacity and generation, this reflects the availability of AD feedstock due to the high level of livestock farming in this District.

Table 4: Local Authority: Number of sites generating electricity from renewable sources, 2019[1]

Number

Onshore Wind		Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total [2]	
Orkney Islands	788	Cornwall	18,076	Highland	299	Thurrock	9	Shropshire	36	Mendip	30	Cornwall	**18,546**
Aberdeenshire	577	Wiltshire	9,609	Argyll & Bute	121	Doncaster	8	Strabane	21	Dumfries & Galloway	18	Wiltshire	**9,639**
Cornwall	436	Peterborough	9,190	Gwynedd	119	North Lanarkshire	8	Herefordshire County of	20	Herefordshire County of	16	Peterborough	**9,198**
Dumfries & Galloway	298	Sunderland	8,876	Perth & Kinross	89	Warrington	8	Dumfries & Galloway	14	East Riding of Yorkshire	10	Sunderland	**8,887**
Highland	267	County Durham	8,707	Dumfries & Galloway	85	Wiltshire	8	Dorset	13	Powys	10	County Durham	**8,828**
										Shropshire	10		
UK Total	**9,887**		**990,966**		**1,535**		**456**		**658**		**435**		**1,004,272**

Table 5: Local Authority: Installed capacity of sites generating electricity from renewable sources, 2019[1]

MW

Onshore Wind		Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total [2]	
Highland	1,825	Wiltshire	595	Highland	805	Thurrock	40	Shropshire	20	Selby	2,663	Selby	**2,720**
South Lanarkshire	1,195	Cornwall	591	Argyll & Bute	296	Central Bedfordshire	33	East Cambridgeshire	18	Northumberland	448	Highland	**2,692**
Dumfries & Galloway	679	Dorset	278	Perth & Kinross	278	Warrington	32	Redcar and Cleveland	10	Fife	77	North East Lincolnshire	**1,497**
South Ayrshire	653	South Cambridgeshire	271	Dumfries & Galloway	151	North Lanarkshire	26	East Riding of Yorkshire	10	Slough	63	Lancaster	**1,381**
Scottish Borders	641	Shropshire	215	Stirling	86	Aylesbury Vale	21	Herefordshire County of	9	Sheffield	62	South Lanarkshire	**1,251**
UK Total	**14,125**		**13,345**		**1,874**		**1,055**		**530**		**4,543**		**47,163**

Table 6: Local Authority: Generation of electricity from renewable sources, 2019[1]

GWh

Onshore Wind		Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total [2]	
Highland	4,138	Cornwall	580	Highland	3,114	Thurrock	116	Shropshire	111	Selby	8,996	Selby	**9,093**
South Lanarkshire	2,681	Wiltshire	575	Perth & Kinross	828	Central Bedfordshire	114	East Cambridgeshire	88	Fife	396	Highland	**7,470**
Dumfries & Galloway	1,624	Dorset	284	Argyll & Bute	587	Havering	111	Strabane	57	Allerdale	361	Lancaster	**3,737**
Scottish Borders	1,451	South Cambridgeshire	274	Dumfries & Galloway	418	Warrington	108	Redcar and Cleveland	56	Breckland	338	East Suffolk	**3,357**
Moray	1,370	Shropshire	193	Stirling	320	Aylesbury Vale	105	East Riding of Yorkshire	52	Sheffield	326	Dumfries & Galloway	**2,912**
UK Total	**32,187**		**13,067**		**5,933**		**3,624**		**2,896**		**25,273**		**120,675**

1 Top five ranked Local Authorities (LAs). Where more than five schemes are listed, this indicates that more than one LA has the same ranking.
2 Totals include offshore wind sites allocated to nearest Local Authority.

Revisions

Historic revisions this year were only carried out to the 2016, 2017 and 2018 datasets which has resulted in changes to both capacity and generation for all but two regions. These are due to several reasons that include the reassignment of unknown FiT data from the Other category, capacity revisions to be consistent with MPP, ROCs and the MSIW Survey returns, the identification of some duplicates, closures and additional schemes and finally, the reallocation of some technologies from Biomass to AD. These revisions are summarised in Table 7:

Table 7: Historic capacity and generation revisions by country

Year	2016		2017		2018	
	MW	GWh	MW	GWh	MW	GWh
England						
East Midlands	-1	-11	0	-7	2	-6
East of England	0	0	0	0	0	0
North East	0	0	0	0	1	1
North West	2	2	3	4	9	7
London	1	1	1	1	3	2
South East	2	3	1	1	10	5
South West	-10	-7	-9	-6	-7	-4
West Midlands	-3	2	-11	-4	-8	-4
Yorkshire and the Humber	0	0	0	0	0	0
Northern Ireland	**3**	**14**	**7**	**33**	**8**	**4**
Scotland	**-2**	**-22**	**4**	**-15**	**8**	**-13**
Wales	**1**	**5**	**1**	**6**	**2**	**8**

Further information

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www.gov.uk/government/statistics/regional-renewable-statistics

Combined Heat and Power in Scotland, Wales, Northern Ireland and the regions of England in 2019

Background

Combined Heat and Power (CHP) is the simultaneous generation of usable heat and power (usually electricity) in a single process. CHP data for the UK as a whole are updated annually and published in the Digest of United Kingdom Energy Statistics (DUKES), the latest edition of which was published in July 2020. This article updates statistics published in the September 2019 edition of Energy Trends and provides a breakdown of CHP in the Devolved Administrations and English regions in 2019[1].

The data presented originates from a CHP database maintained by Ricardo Energy & Environment on behalf of The Department of Business Energy and Industrial Strategy (BEIS). Data relating to the overwhelming majority of CHP electrical capacity (>99 per cent of total capacity) is received from the reliable sources of the Combined Heat and Power Quality Assurance (CHPQA) programme, the Iron and Steel Statistics Bureau (ISSB) and from Ofgem's Renewable Obligations Certificates (ROCs) returns. Another source of data is the sales databases of the Association for Decentralised Energy (ADE). Data from CHP schemes not covered by the above sources are extrapolated from historical data. There is an ongoing data quality assurance exercise in respect of these schemes.

Between 2018 and 2019 there was a net decrease in Good Quality CHP[2] capacity of 13 MWe but a net increase of 50 in the number of CHP schemes in the database (63 new schemes and the removal of 13 schemes). Good Quality CHP capacity in the UK decreased from 6,063 MWe (revised 2018 figure) to 6,050 MWe in 2019. In 2019, 23.5 TWh of Good Quality CHP electricity was generated, which is 2.2 per cent higher than in 2018. This Good Quality CHP electricity constitutes 7.1 per cent of all electricity supplied in the UK.

Regional trends[3]

Tables 1 and 1B show a comparison of the number of schemes, electrical capacity, electricity generated and heat generated in the regions[4] for the period 2017 to 2019. During this time, the total number of schemes increased from 2,406 to 2,547 and the capacity increased from 5,919 MWe to 6,050 MWe. Over this period, every region saw an increase in the number of CHP schemes. However, over the period there was an appreciable fall in capacity in Wales and very slight falls in London and Yorkshire and the Humber. The fall in Wales is substantially due to the closure of one significant industrial scheme.

[1] Similar articles on CHP have appeared in previous Energy Trends publications from 2001 to 2019. The figures within any one article are a snapshot of the position as seen at the time and therefore figures between articles do not constitute a time series.

[2] Good Quality CHP denotes schemes that have been certified as being highly efficient through the UK's CHP Quality Assurance (CHPQA) programme.

[3] Note: The figures for previous years are revised on an annual basis to account for late information submitted after the publication date of the article. This is to ensure that the true trends are captured in the data. The figures herein therefore supersede the previous articles published.

[4] These regions are the Government Office Regions of England and Devolved Administrations of Scotland, Wales and Northern Ireland.

Table 1: Trend in number of CHP schemes and their electrical capacity over the period 2017-2019

	Number of Schemes			Electrical Capacity (MWe)		
	2017	**2018**	**2019**	**2017**	**2018**	**2019**
England	**2,013**	**2,075**	**2,109**	**5,026**	**5,170**	**5,190**
East Midlands	133	136	140	151	166	165
Eastern	198	204	207	348	389	374
London	340	348	352	254	250	252
North East	126	131	134	360	391	393
North West	308	317	322	747	760	764
South East	323	334	338	859	904	906
South West	169	173	178	137	143	146
West Midlands	204	218	221	147	151	167
Yorkshire/Humberside	212	214	217	2,024	2,016	2,023
Scotland	171	184	193	561	564	577
Wales	137	147	146	236	230	183
Northern Ireland	85	91	99	96	99	100
UK Total	**2,406**	**2,497**	**2,547**	**5,919**	**6,063**	**6,050**

Table 1B: Trend in CHP electricity and heat generated over the period 2017-2019

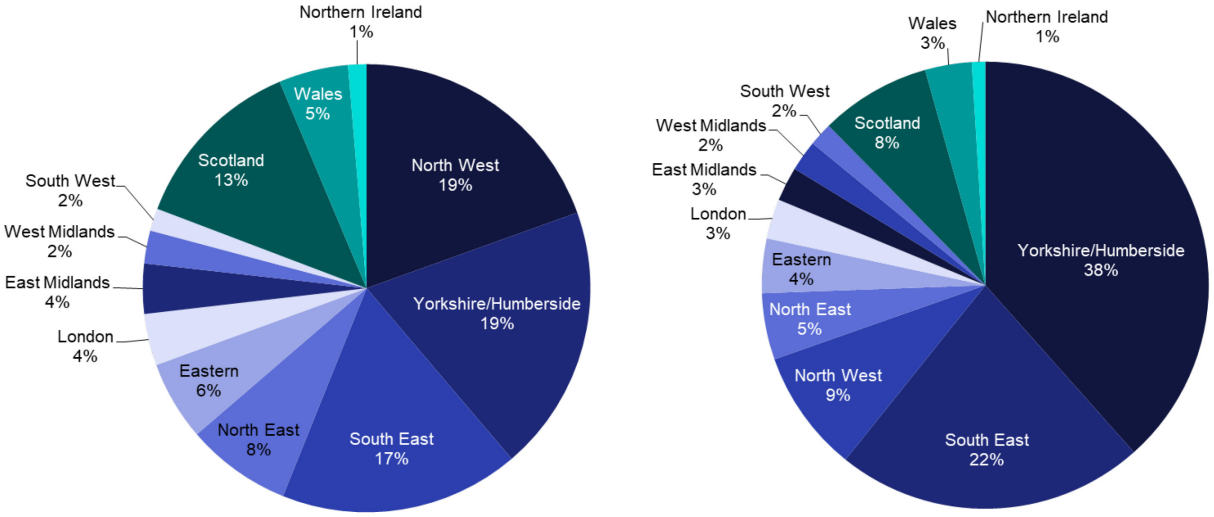
	Electricity Generated (GWh)			Heat Generated (GWh)		
	2017	**2018**	**2019**	**2017**	**2018**	**2019**
England	**17,996**	**19,071**	**19,888**	**33,745**	**33,992**	**33,677**
East Midlands	732	740	762	1,383	1,483	1,505
Eastern	1,489	1,708	1,736	1,973	2,450	2,391
London	786	857	992	1,353	1,482	1,555
North East	1,342	1,184	1,218	4,019	3,496	3,171
North West	2,725	2,770	2,898	7,993	7,926	8,139
South East	3,013	3,730	4,964	6,840	7,011	7,220
South West	677	712	748	626	673	675
West Midlands	600	607	627	883	948	991
Yorkshire/Humbe	6,633	6,763	5,942	8,676	8,523	8,029
Scotland	2,607	2,583	2,304	6,247	6,152	5,374
Wales	785	864	839	2,004	2,147	2,093
Northern Ireland	383	427	431	503	545	553
UK Total	**21,771**	**22,945**	**23,461**	**42,500**	**42,836**	**41,697**

The region with the highest proportion of the UK's Good Quality electrical capacity is still the Yorkshire and Humber region with a 33 per cent share, followed by the South East (15 per cent) the North West (13 per cent) and Scotland (10 per cent). The Yorkshire and Humber region has constituted the largest share since 2003 and hosts the single largest CHP scheme in the UK.

The four largest regions in terms of installed capacity were also the four largest regions in terms of electricity generation. In 2019, the Yorkshire and Humberside region accounted for 25 per cent of all Good Quality electricity generated in the UK. The share of power generation taken up by the Yorkshire and Humberside region has fallen appreciably over recent years and was as high as 34% in 2016. This change is due to two factors: (1) A large increase in the Good Quality electricity generated in the South East, and (2) A fall in the Good Quality generation in the Yorkshire/Humber region. The latter factor is not due to a fall in the absolute quantity of all power generated in this region, but a fall in the electricity generated which is deemed Good Quality, in turn due to a significant decrease in the heat recovered from power generation at one large Chemicals site.

The aforementioned fall in CHP heat generated in the Yorkshire/Humber region in 2019 means that this region no longer has the largest share of CHP heat generated. In 2019, the North West region accounted for the largest share of CHP heat generated (20 per cent), with the Yorkshire/Humber region ranked second (19 per cent), followed by the South East (17 per cent) and then Scotland (13 per cent).

Chart 1: CHP generation by area in 2019



By Heat Generation **By Electricity Generation**

Table 2 shows an overview of CHP plant data broken down between the English regions and devolved administrations. The extent to which CHP capacity is utilised can be expressed by the Load Factor (LF). LF is the actual power generation as a proportion of the theoretical maximum power that can be generated for a given total installed capacity (TPC). The power output that is actually generated is the total power output (TPO). For 2019, the TPC was 8,894 MWe[5] and the TPO was 46,028 GWh, giving a LF of 59.1 per cent. This is 2.0 percentage points higher than in 2018. The LF was higher in 2019 than in 2018 in all regions, with the exceptions of Scotland, Northern Ireland and the West Midlands. The greatest increase in LF between 2018 and 2019 was seen in the South East and this was substantially due to a large increase in the LF of one very large industrial CHP plant. The highest LF over the last ten years was 60.0 per cent in 2016 and the lowest 51.0 per cent in 2013.

Higher LF values tend to be found when CHP is deployed to satisfy industrial heat loads. This is because the demand for heat extends over a greater proportion of the year at industrial sites than at sites where CHP is deployed to satisfy space heating, where demand is seasonal. Consequently, higher LF tend to be see in regions with larger of shares of capacity serving industrial installations.

[5] The Total Power Capacity (TPC) is the registered maximum power generating capacity of a CHP scheme. It should be distinguished from Qualifying Power Capacity (QPC). QPC is defined under the CHPQA Standard and is also known as Good Quality capacity. QPC is the registered power generation capacity that achieves a QI of 100 or more under conditions of Maximum Heat Output under Normal Operating Conditions, as defined in the CHPQA Standard. Where a CHP scheme does achieve a QI of 100 or more under these conditions, its TPC and QPC are the same. Where it does not, then the capacity considered Good Quality is scaled- back and under these circumstances TPC>QPC. Unless otherwise stated, QPC is the basis of all power capacities quoted in this article.

Table 2: Overview of CHP schemes in 2019

	Number of Schemes	Electrical Capacity (QPC)* MWe	Electrical Capacity (TPC) MWe	Heat Capacity MWth	Fuel Used* GWh	Electricity Generated (QPO)* GWh	Electricity Generated (TPO) GWh	Heat Generated GWh	Load Factor** (%)
England	**2,109**	**5,190**	**7,781**	**16,940**	**75,665**	**19,888**	**40,341**	**33,677**	59.2%
East Midlands	140	165	209	636	3,346	762	1,141	1,505	62.3%
Eastern	207	374	374	1,077	5,625	1,736	1,811	2,391	55.3%
London	352	252	285	1,012	3,563	992	1,324	1,555	53.0%
North East	134	393	420	984	5,843	1,218	2,212	3,171	60.1%
North West	322	764	907	4,268	14,487	2,898	4,082	8,139	51.4%
South East	338	906	2,109	3,236	17,458	4,964	10,280	7,220	55.6%
South West	178	146	146	312	2,580	748	781	675	61.0%
West Midlands	221	167	206	655	2,898	627	1,024	991	56.9%
Yorkshire/Humberside	217	2,023	3,126	4,760	19,866	5,942	17,685	8,029	64.6%
Scotland	193	577	731	2,709	10,892	2,304	3,688	5,374	57.6%
Wales	146	183	282	822	4,347	839	1,553	2,093	62.9%
Northern Ireland	99	100	100	219	1,687	431	447	553	50.9%
UK Total	**2,547**	**6,050**	**8,894**	**20,690**	**92,591**	**23,461**	**46,028**	**41,697**	**59.1%**

∗This represents Good Quality CHP capacity (QPC), Good Quality CHP power output (QPO) and the fuel associated with the Good Quality CHP outputs. For further details on how these are defined, see Dukes 2020 Chapter 7 and the Combined Heat and Power Quality Assurance (CHPQA) Standard Issue 5):
www.gov.uk/government/uploads/system/uploads/attachment_data/file/335471/CHPQAStandardIssue5.pdf
** These load factors are based on the total power output (TPO) and total power capacity (TPC) of the CHP (for partially and fully qualified schemes). This gives the true utilisation of the power generating plant.

Importance of CHP in the Regional Economies

Chart 1 shows the CHP outputs of each region and is derived from the data contained in Table 1B. It portrays only a limited picture as it does not account for the varying size of each region's economy. To allow for this, CHP heat capacity and electrical capacity can be compared with the level of economic activity in each region as measured by Gross Value Added (in £ million) in Table 3. Chart 2 maps the heat capacity per unit of GVA for the different regions.

The importance of the chemicals and oil refining industries in Yorkshire/Humber, the North West and Scotland - industrial sectors particularly suitable for CHP – explains the large heat capacities per unit of GVA in these regions.

Table 3: Density of CHP in different areas, ordered by heat capacity

	Heat capacity per unit GVA kWt/ (£million)*	Electrical capacity per unit GVA kWe/ (£million)*
Yorkshire/Humberside	40.16	17.07
North West	24.96	4.47
Scotland	**19.44**	**4.14**
North East	18.48	7.39
Wales	**13.35**	**2.97**
South East	12.29	3.44
England	**10.90**	**3.34**
Eastern	6.92	2.40
East Midlands	6.06	1.57
Northern Ireland	**5.52**	**2.52**
West Midlands	4.90	1.25
London	2.40	0.60
South West	2.34	1.10
UK total	**11.53**	**3.37**

*GVA is provisional gross value added in 2017 (income approach) at current prices[6]

The distribution of CHP capacity across the regions and economic sectors is summarised in Table 4, which shows the proportion of total CHP capacity in a particular economic sector in each region. These data reflect higher level regional patterns seen in the UK economy. For example, 55 per cent of the Iron and Steel and Non-ferrous Metals capacity is located in Yorkshire/Humber and Wales. This is driven by the large capacity CHP plant operated at integrated steel works, which have at their disposal by-product gases which are used as CHP fuel. The last two integrated steel works in the UK are located in these two regions. The high demands for steam in chemical manufacturing make the Chemicals sector ideal for CHP. The historical concentration of chemicals manufacture in the North West, North East and Yorkshire/Humber (specifically Humber) regions of England explain the fact that nearly 83 per cent of Chemicals CHP capacity is located in these three regions. Similarly,

[6] www.ons.gov.uk/economy/grossvalueaddedgva/datasets/regionalgrossvalueaddedincomeapproach

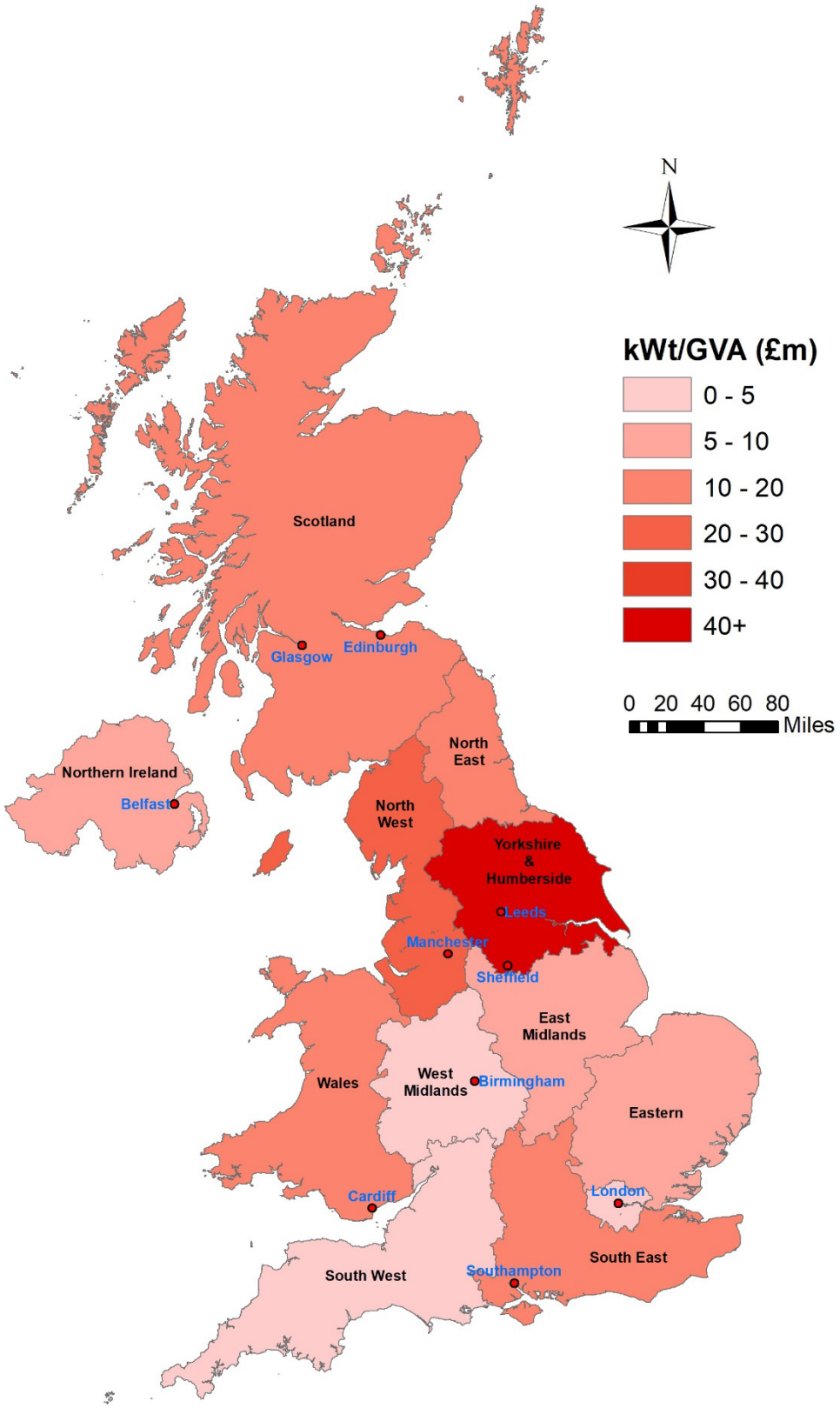
of the six oil refineries now operating in the UK, two are situated in Humber area, explaining the large share of capacity in the Oil Refineries and Gas Terminals sector in the Yorkshire/Humber region. The heat intensive nature of sugar production and the concentration of sugar beet processing in East Anglia explains the fact that over one third of the Food and Drink sector's capacity is located in the Eastern region.

In the non-industrial sectors, the highest shares of the Transport, Commerce and Administration sector's capacity is found in London and the South East and this reflects the importance of the services sector to these regions' economies.

Table 4: Distribution of CHP capacity across the regions and economic sectors in 2019

Region	Sector									
	Iron and Steel and Non-ferrous Metals	Chemicals	Oil Refineries and Oil and Gas Terminals	Paper, Publishing and Printing	Food, Beverages and Tobacco	Metal Products, Machinery and Equipment	Mineral Products	Other Industrial Branches	Transport, Commerce and Administration	Other
England	62.7%	89.1%	88.5%	75.6%	85.5%	84.2%	100.0%	67.0%	82.9%	88.3%
East Midlands	0.0%	1.2%	0.0%	0.0%	8.8%	3.5%	7.7%	7.2%	5.3%	6.1%
Eastern	21.6%	1.4%	0.0%	10.3%	37.4%	0.0%	0.0%	8.1%	6.2%	7.0%
London	15.5%	0.0%	0.0%	0.0%	5.7%	11.7%	0.0%	10.1%	15.5%	11.7%
North East	0.0%	25.4%	0.0%	0.0%	0.0%	0.0%	14.0%	3.8%	6.9%	5.3%
North West	0.0%	23.5%	5.1%	26.4%	15.6%	4.6%	54.9%	7.7%	10.2%	10.1%
South East	0.0%	2.9%	19.9%	31.3%	5.5%	20.9%	0.0%	11.7%	11.9%	20.7%
South West	0.0%	0.7%	0.0%	0.0%	1.6%	5.3%	23.4%	5.3%	9.3%	5.8%
West Midlands	0.0%	0.2%	0.0%	2.2%	2.6%	38.1%	0.0%	7.7%	9.1%	5.6%
Yorkshire and Humber	25.6%	33.8%	63.5%	5.3%	8.4%	0.0%	0.0%	5.2%	8.4%	15.9%
Scotland	0.0%	6.8%	11.5%	16.4%	7.4%	0.6%	0.0%	9.1%	11.0%	6.3%
Wales	29.8%	3.1%	0.0%	8.0%	1.8%	7.5%	0.0%	17.8%	3.4%	2.5%
Northern Ireland	7.5%	1.0%	0.0%	0.0%	5.2%	7.7%	0.0%	6.1%	2.6%	2.8%
UK Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chart 2: Map of CHP density in terms of heat capacity per unit gross value added



Technology type and size

Tables 5 and 6 show the regional split of installed electrical capacity (which qualifies as Good Quality CHP capacity) by prime mover (Table 5) and by size range (Table 6). In a number of regions disaggregation of the data by prime mover or size could result in the disclosure of confidential information and so, for these areas, only totals are shown. The following conclusions can be drawn from the tables:

- Gas turbines, whether on their own or as part of Combined Cycle Gas Turbines (CCGT), continue to dominate the CHP market. In 2019, just 140 schemes of the CCGT and Open Cycle Gas Turbine (OCGT) technologies accounted for 62 per cent of total Good Quality CHP capacity. This proportion of capacity taken up by these technologies has been much higher in the past and was 81 per cent in 2010. Most of this loss in share of capacity has been taken up by the reciprocating engine technology, as there has been a shift towards smaller capacity schemes of the types most conveniently served by reciprocating engines.
- The North West remains the region with the largest steam turbine-based capacity. The large majority of this capacity is situated at industrial sites. Scotland is the region with the second largest steam turbine-based capacity, followed by the Yorkshire and the Humber.
- Reciprocating Engines constitute the vast majority of all CHP schemes (90 per cent of all schemes). The region with the largest number of reciprocating engine schemes is London, followed by the South East and the North West. These high population areas have a large number of sites which are well suited to the capacity range and grade of heat offered by reciprocating engines, namely leisure centres, hotels and retail outlets.

Table 5: CHP electrical capacity (MWe) by area and prime mover in 2019

	Gas Turbines*	Steam Turbines	Organic Rankine Cycle	Gas, Steam Turbine and ORC Subtotal	Reciprocating Engines	Total
England	**3,327**	**457**	**10**	**3,794**	**1,395**	**5,190**
East Midlands	-	-	-	74	91	165
East of England	-	-	-	231	143	374
London	-	-	-	42	209	252
North East	-	-	-	300	93	393
North West	388	202	1	590	174	764
South East	597	35	-	633	273	906
South West	18	26	-	46	100	146
West Midlands	-	-	3.0	24	142	167
Yorkshire and The Humber	1,789	65	-	1,854	169	2,023
Scotland	361	95	4	460	117	**577**
Wales	-	-	6	95	88	**183**
Northern Ireland	-	-	-	33	67	**100**
Grand Total	**3,747**	**615**	**20**	**4,382**	**1,668**	**6,050**

*Includes Combined Cycle Gas Turbines (CCGT)

The CHP market continues to be dominated by large-scale (>10MWe) plant, with 70 per cent of all installed capacity being in this size range. While this proportion is almost the same as last year, it has seen steady decline over the years as larger (usually) industrial based CHP has closed and smaller (often) non-industrial based schemes have opened. For example, in 2010, the proportion of installed capacity that was taken up by schemes > 10 MWe capacity was 83 per cent. Since 2010, the proportion of total capacity provided by schemes in the 2 MWe to 10 MWe range has increased from 11 per cent to 19 per cent

The regional distribution of CHP by capacity tranche is given in Table 6. Nearly 44 per cent of all capacity greater than 10 MWe is to be found in the Yorkshire and Humber region, followed by the South East (15 per cent), the North West (13 per cent) and Scotland (10 per cent). This is consistent with the tendency for heat intensive industries such as oil refineries, chemicals and paper, for which large CHP schemes are needed, to be located in these regions.

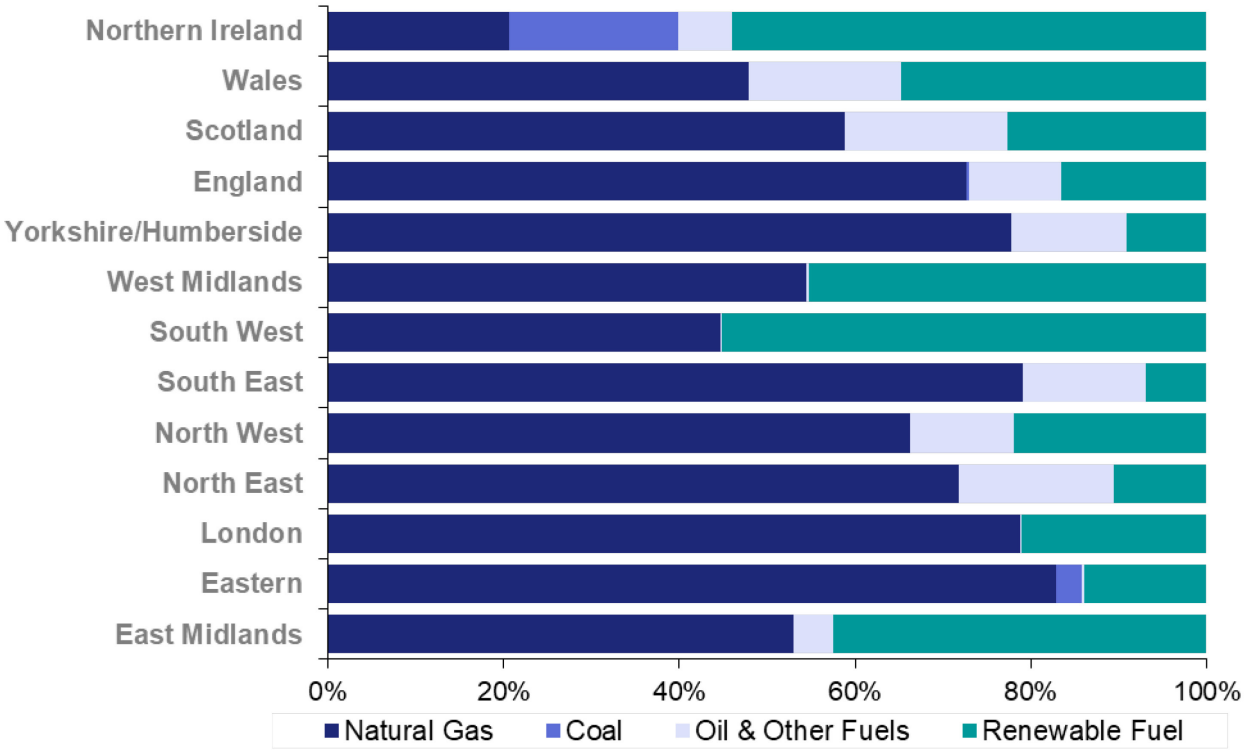
Table 6: CHP electrical capacity (MWe) by area and size in 2019

	<= 100 kWe	> 100 kWe to 1 MWe	>1 MWe to 2 MWe	> 2 MWe to 10 MWe	> 10 MWe +	Total
England	**38**	**292**	**250**	**955**	**3,656**	**5,190**
East Midlands	3	19	25	-	-	165
East of England	3	28	26	-	-	374
London	7	51	29	-	-	252
North East	3	12	13	83	282	393
North West	6	45	46	130	537	764
South East	5	46	39	181	635	906
South West	3	32	20	-	-	146
West Midlands	4	32	24	-	-	167
Yorkshire and The Humbe	4	27	28	127	1,837	2,023
Scotland	3	23	36	94	421	577
Wales	3	20	12	-	-	183
Northern Ireland	1	22	7	-	-	100
Grand Total	**45**	**358**	**306**	**1,126**	**4,216**	**6,050**

The fuel mix

The proportion of coal, gas, renewable fuels and 'oil and other fuels' (comprising oil products, refinery gases, blast furnace gas and other industrial wastes) in the fuel mix for each region is shown in Chart 3.

Chart 3: Proportion of different fuels in the fuel mix for CHP in 2019 for each region



Natural gas represented 70 per cent of all fuel burned in CHP in 2019, and this is virtually unchanged from 2018 (revised). Over the last ten years, the share of all fuel burned that was natural gas has been within the range 69-73 per cent. With the exception of Northern Ireland, Wales and the South West, natural gas accounts for more than half of all fuel burned in CHP plant.

In 2019 17,382 GWh of renewable fuels were consumed by CHP across the UK. This is a 4.4 per cent increase on 2018. The North West had the highest absolute consumption of renewable fuel in 2019 (3,169 GWh, 18 per cent of the total across all regions), followed by Scotland (2,468 GWh,14 per cent of the total) and Yorkshire/Humber (1,803 GWh, 10 per cent of the total). In terms of the share of total CHP fuel input that was renewable, in 2019 that was highest in the South West, where 55 per cent of CHP fuel consumed in that region was renewable, followed by Northern Ireland (54 per cent) and the West Midlands (45 per cent). Between 2018 and 2019, CHP renewable fuel consumption increased in absolute terms in all regions except the North East and Yorkshire/Humber. Over the same period, the share of total CHP fuel that was renewable increased in all regions except the South East, South West and West Midlands.

In 2019 coal was again burned in only two regions (Northern Ireland and Eastern) and was confined to a very small number of schemes.

Summary

Between 2017 and 2019 the number of CHP schemes increased in all regions of the UK. Over the same period, the installed capacity increased in all regions with the exception of the South East and Yorkshire/Humber, which saw very slight falls, and Wales where the closure of one large scheme produced a more noticeable fall.

The deployment of CHP across the UK regions continues to reflect established, regional economic patterns, with CHP deployment in the Chemicals sector being very significant in the Yorkshire/Humber (specifically Humber) region, the North East and North West. The deployment of reciprocating engines in the non-industrial sectors is significant in London, South East and North West, consistent with these high population areas having a large number of non-industrial sites which are well suited to the capacity range and grade of heat offered by reciprocating engines, namely leisure centres, hotels and retail outlets. Oil refineries are well suited to the deployment of large CHP plant, and all but one of the six UK oil refineries use CHP. Consequently, there is significant oil refinery CHP capacity in the North East, Scotland, South East and Yorkshire/Humber.

In 2019 renewable fuels accounted for 19 per cent of CHP fuel consumption, 1.0 percentage points higher than in 2018 (revised). In 2008 the proportion of CHP fuel that was renewable was 3.9 per cent.

In 2019 the region with the greatest consumption of renewable fuels for CHP was the North West, followed by Scotland and Yorkshire/Humber. In relative terms, the region with the highest share of CHP fuel that as renewable was the South West, followed by Northern Ireland and the West Midlands.

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Diversity of supply for oil and oil products in OECD countries in 2019

Introduction and summary

Countries meet their oil needs through a combination of indigenous production and trade. This article is a comparative assessment of how OECD countries manage their crude oil and transport fuel demand using data from the IEA database[1]. The aim is to determine how the UK compares with other OECD countries in terms of how it secures oil supplies.

Within the OECD, the same three countries as the previous year were the only net exporters of crude oil in 2019: Canada, Norway, and Mexico. All other OECD countries met their demand at least partially through imports, with 10 countries not producing any crude oil indigenously. Of these other countries the UK had the highest self-sufficiency, producing over 90 per cent of its crude oil demand.

Sixteen of the OECD countries met their petrol demand through indigenous production, with much of Western Europe being net exporters. Subsequently petrol achieved the highest average security of supply score but also had the second lowest average diversity index above jet fuel.

Eleven of the OECD countries were self-sufficient in kerosene production. The self-sufficiency average was greatly increased by the high contributions notably from Lithuania (meeting 7.7 times the demand) and Korea (meeting 3.2 times the demand).

Thirteen of the OECD countries were self-sufficient in diesel production; Greece, Korea, the Netherlands, and Finland were the top four. Greece remained the most self-sufficient OECD country for diesel, producing almost two and a half times the amount it consumed.

The UK could have met more than 90 per cent of its demand for crude through indigenous production and ranked in the top four for security of supply. The UK was able to more than meet demand for petrol through indigenous production. For jet fuel, the UK was in the lower half of the OECD in terms of indigenous production scores, even though consumption was the second highest. However, with a diversity score of 0.72 the UK remained in the top 50 per cent in terms of security of supply. On diesel, the UK produced just over half of demand and was fourth highest for diversity but fell just into the lower half of OECD countries for security of supply.

Charting oil self-sufficiency and diversity of supply

Bubble charts

The bubble charts demonstrate the relationship between demand, indigenous production, diversity of gross imports and the political stability of import sources. This year we have continued to group the OECD countries in Asia, the Middle East and the EU, using the average scores. See Appendix 1 for a list of the countries included in each of these categories. The profiles show:

- Self-sufficiency: the proportion of a country's demand that could be met through indigenous production is shown on the vertical axis. A score of 1 indicates a country produces as much oil as it uses, a score of 0 indicates that no demand was met with own production.
- A diversity score: the diversity and political stability – defined via the World Bank's governance indicators - of a country's gross imports is shown on the horizontal axis (see Appendix 3 for a methodological note).
- Consumption: is represented by the circle or bubble, the area of which indicates the level of consumption for 2019 for each OECD country.

[1] http://data.iea.org/

Bar charts
The bar charts provide a means of comparing OECD countries by self-sufficiency and diversity of imports. These profiles combine the proportion of demand that could be met through indigenous production with the diversity and political stability of import origins. The sum of these two components is used as a simplified metric for security of supply, and thus does not represent a full description of security of supply beyond import diversity, stability, and self-sufficiency. Appendix 2 shows the underlying data.

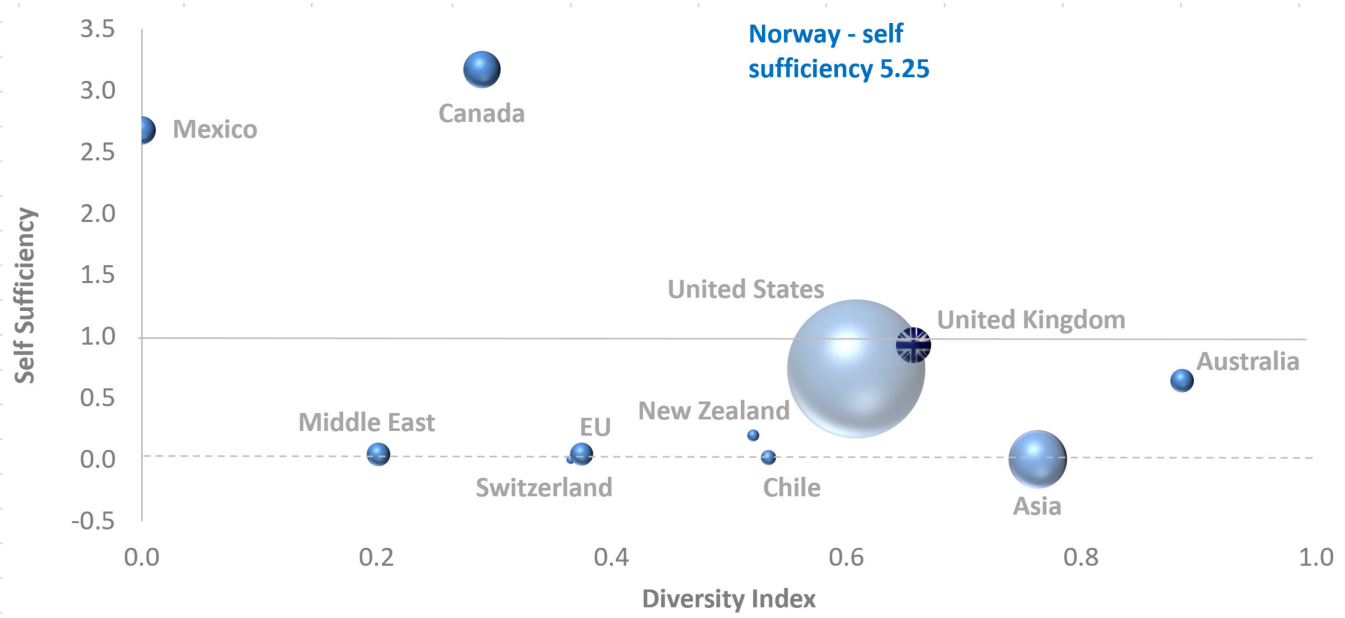
Choropleth map
These maps indicate a visual representation of the source countries and quantities of exports for each product. A darker shade represents that a high proportion of the world's exports originated from that country, whereas lighter shades indicate that fewer exports originated in that country.

Results

Crude oil

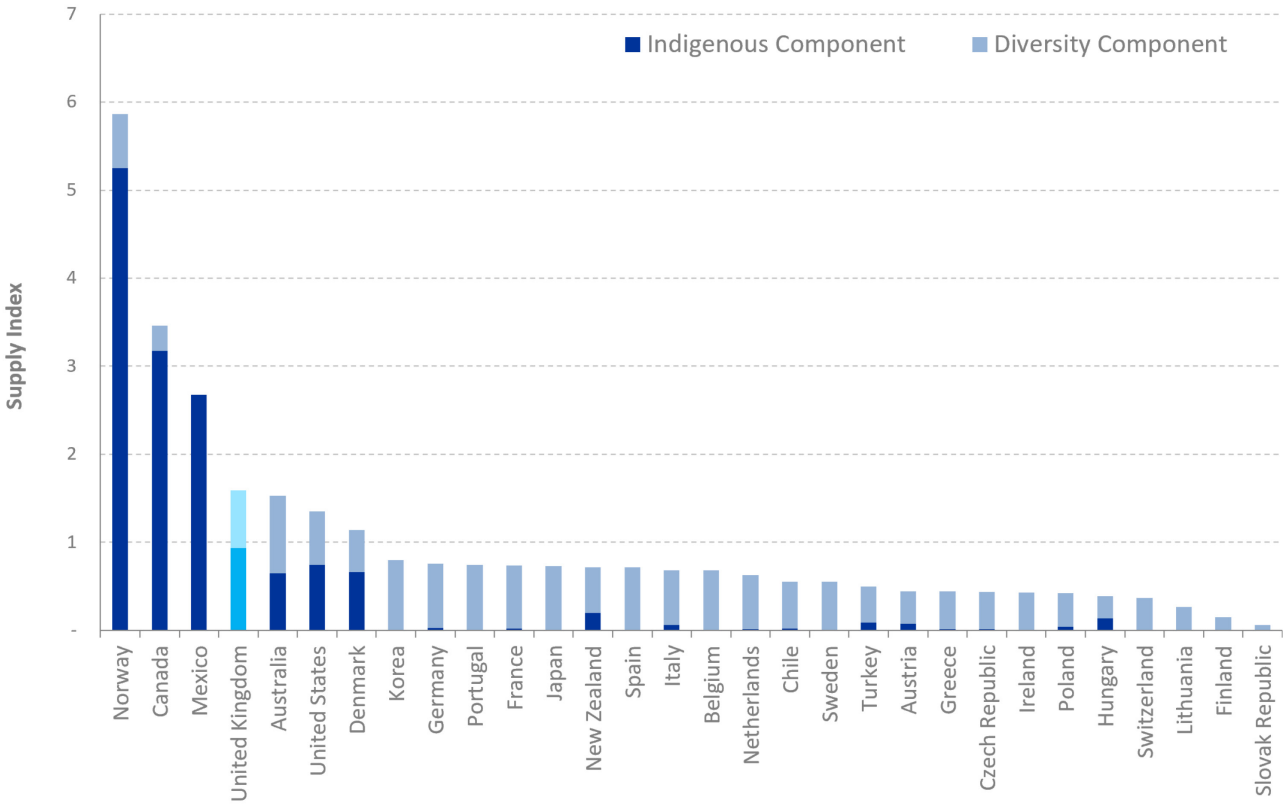
Only three OECD countries were self-sufficient for crude oil again in 2019 (Chart 1). Norway had by far the highest self-sufficiency score, producing nearly five and a half times its own consumption. With a self-sufficiency score of 0.93, the UK was above the OECD average of 0.41 and this marks a marginal increase in self-sufficiency for the UK compared to 2018. Similarly, the UK's diversity score of 0.66 was above the average score of 0.42.

Chart 1: Diversity and self-sufficiency of crude oil for OECD countries, 2019



Most OECD countries showed diversity and political stability scores that reflect a strong trading element, with a relatively small contribution from indigenous production (Chart 2). Chart 2 shows that the UK placed highly in the ranking of OECD countries being one of only a few countries with substantial oil production.

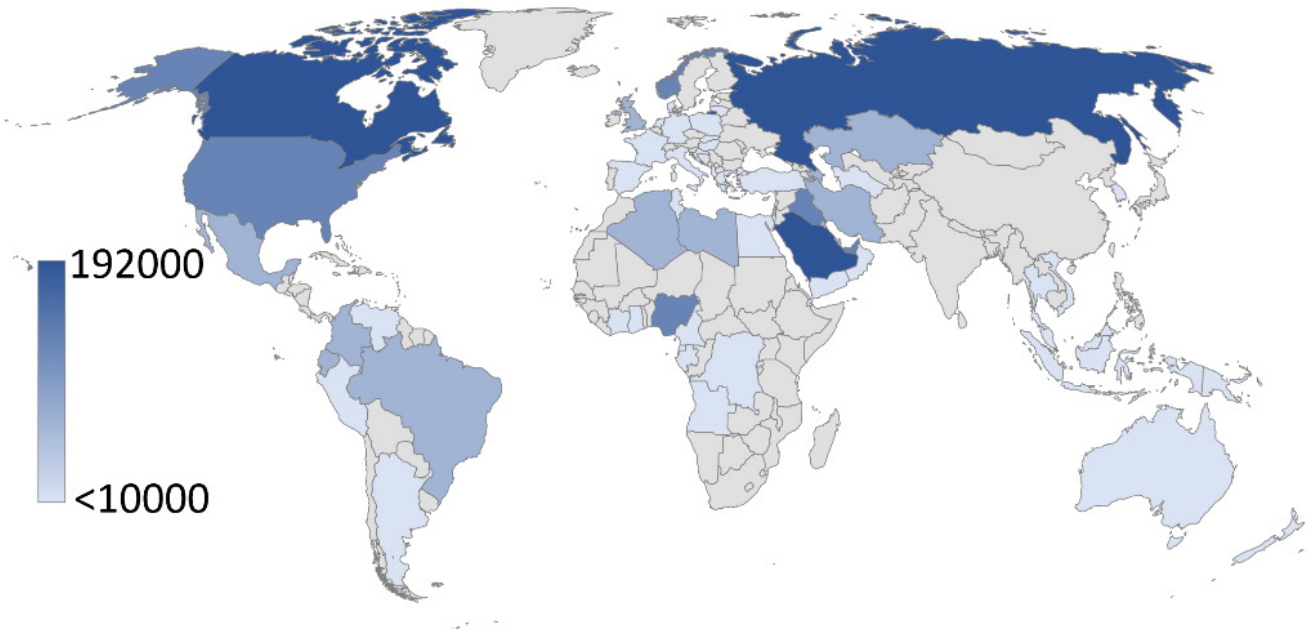
Chart 2: Security of supply of crude oil for OECD countries, 2019



Note: No data was available for Estonia, Iceland, Israel, Latvia, Luxembourg or Slovenia.

Map 1 is an illustration of where crude oil exports originated in 2019. Canada, Russia and Saudi Arabia are the biggest exporters of crude in the world, with the US increasing their share, up almost 35kt compared to 2018. Within the OECD, the UK was the sixth largest exporter.

Map 1: Worldwide crude oil exports (thousand tonnes), 2019



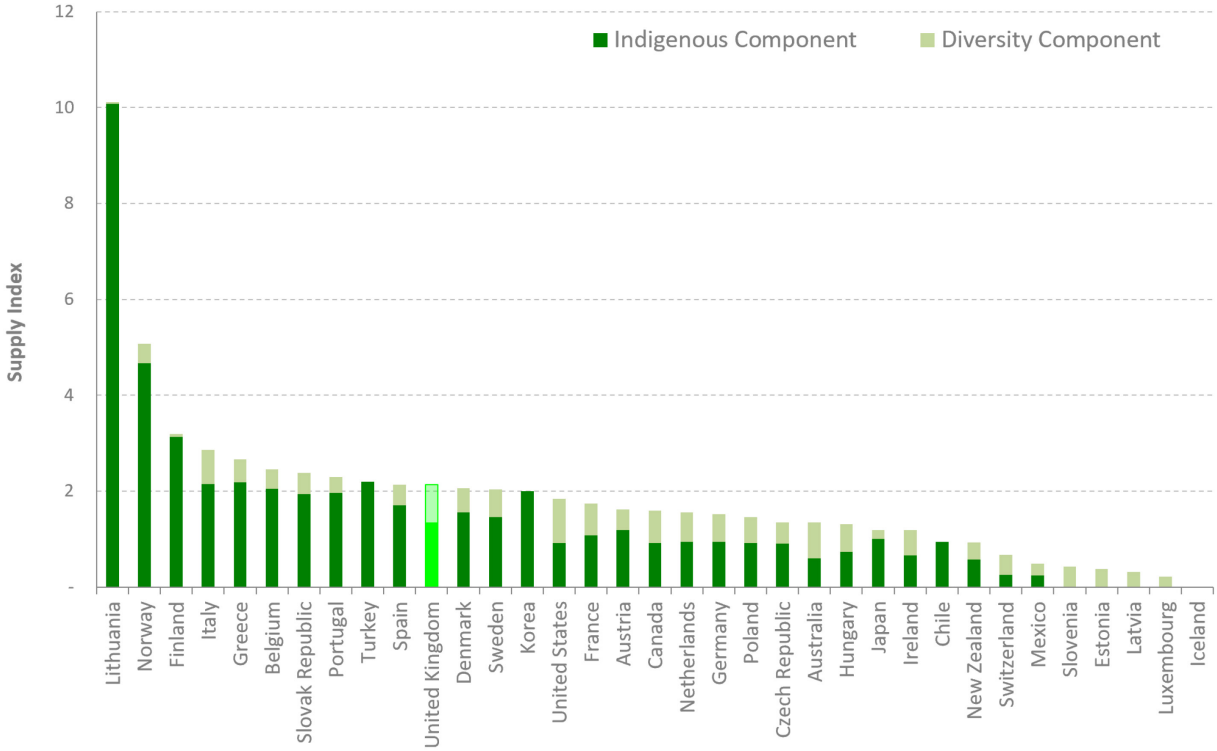
Petrol

The profiles for petrol are different to that of crude. Sixteen of the 36 OECD countries were self-sufficient in 2019 (Chart 3). Lithuania (combined in the EU average and who only joined the OECD in 2018) had a self-sufficiency score of 10.08, making it by far the highest ranking in this regard. The OECD average self-sufficiency score was 1.42, down from 1.53 (revised figure) in 2018. This is largely due to production being down with stable demand in Lithuania, Norway, Sweden and Portugal. Consumption in the US dwarfs that of other OECD countries, equal to nearly 64 per cent of the OECD total. The UK had a self-sufficiency score of 1.34 and would be more than able to meet demand for petrol in 2019 using indigenous supply only. The UK's diversity score of 0.80 was much higher than the OECD average of 0.40 and was second only to the US with 0.92.

Chart 3: Diversity and self-sufficiency of petrol for OECD countries, 2019

Our simplified security of supply index (Chart 4) shows how most countries produce enough petrol to meet their needs and the amount of petrol trade amongst the OECD countries. The UK ranks 11th out of the 36 OECD countries for security of supply of petrol.

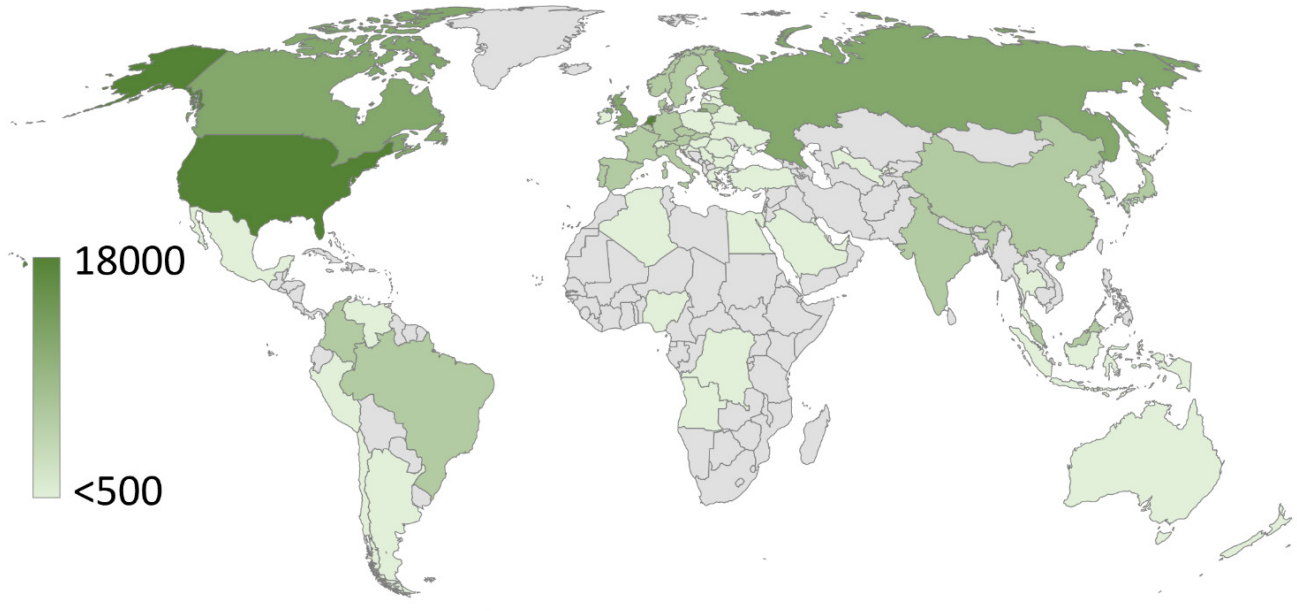
Chart 4: Security of supply of petrol for OECD countries, 2019



Note: No data was available for Israel

The main exporter of petrol around the world is North America, exporting more than twice the amount of Canada, the third biggest exporter. Europe is also shown on the map to be a significant exporter of petrol to the rest of the world, notably including the United Kingdom, Belgium and specifically the Netherlands; the second biggest exporter, exporting 2/3 the amount exported by the United States. Many large economies such as Australia, Japan and China export comparatively low quantities of petrol.

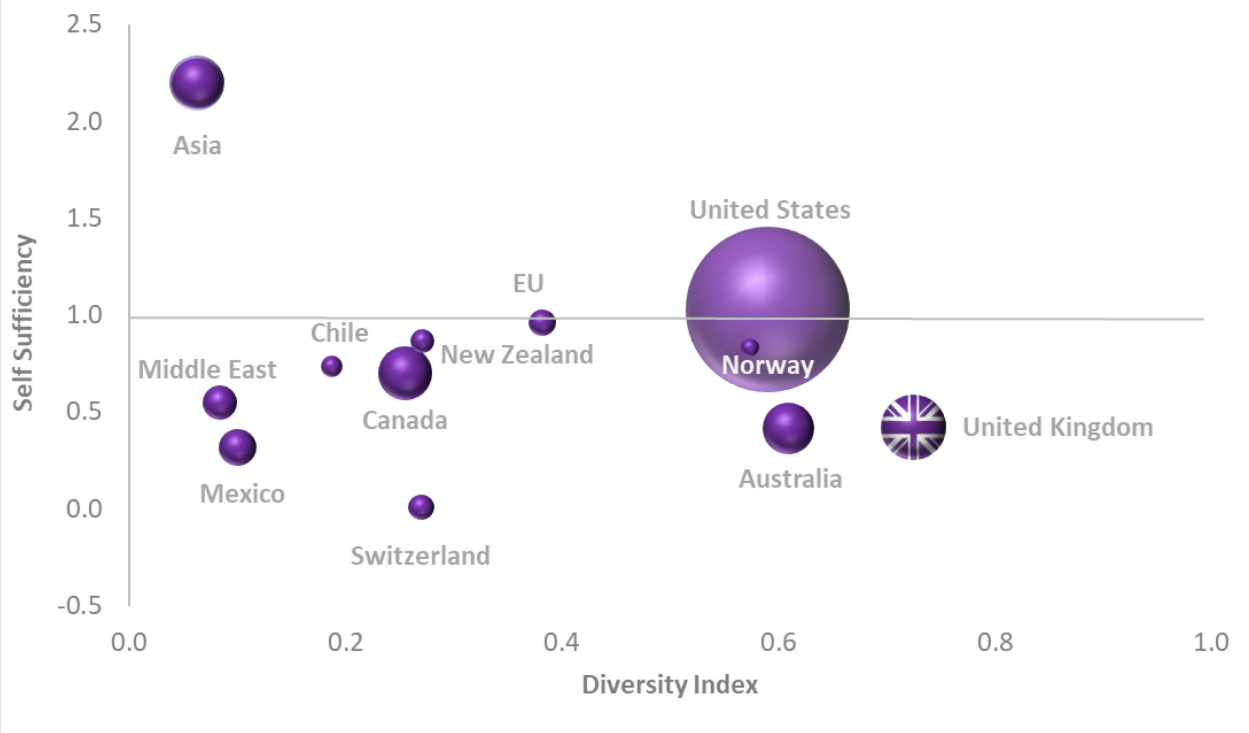
Map 2: Worldwide petrol exports (thousand tonnes), 2019



Jet fuel

Chart 5 shows that the UK, with a score of 0.42, was below both the self-sufficiency threshold of 1 and the OECD average 0.91 for jet fuel. However, the UK's import diversity score of 0.72 was far higher than the average for all OECD countries of 0.35.

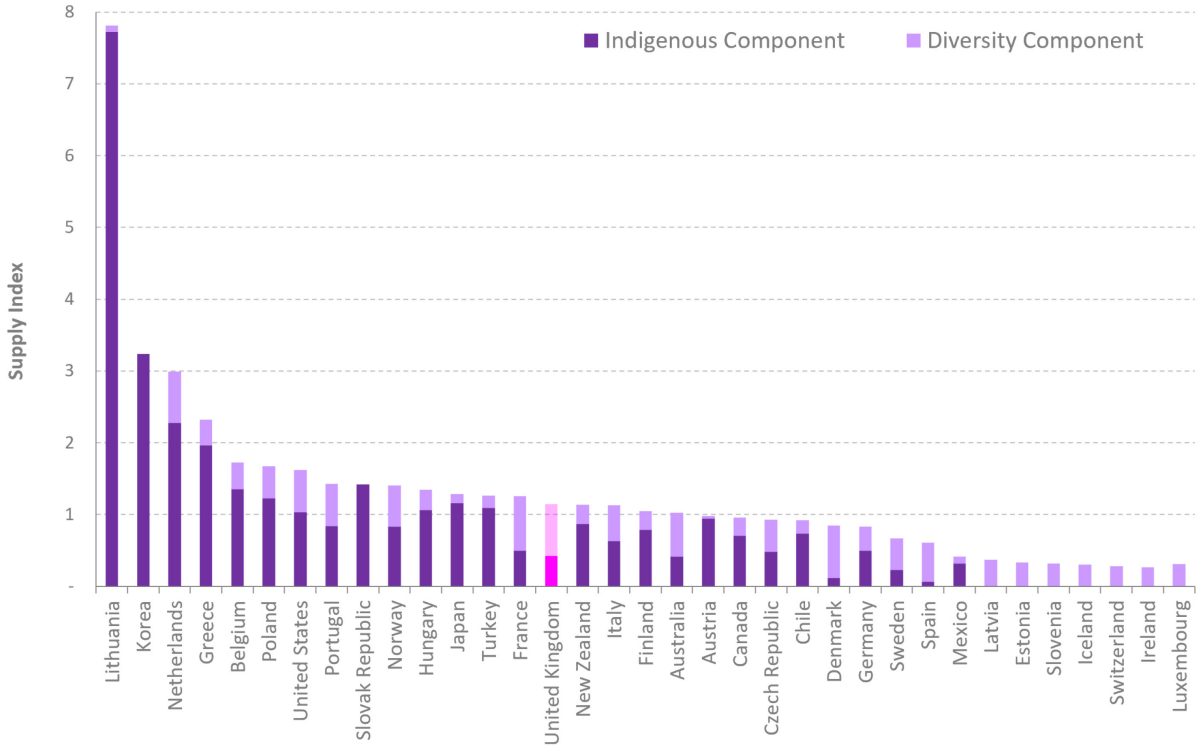
Chart 5: Diversity and self-sufficiency of jet fuel for OECD countries, 2019



Many OECD countries have significant production capacity of jet fuel. For instance, with a refining capacity of approximately 10 million tonnes a year[2] and a relatively low demand, Lithuania produced more than seven times its consumption and Korea more than three times. The UK's low capacity to meet demand through indigenous production is of the largest deficits in the OECD, significantly lower than the OECD and EU average. However, Heathrow (being the busiest airport in Europe), causes the UK to have the second highest demand for jet fuel, behind only the United States.

[2] www.orlenlietuva.lt/EN/Company/OL/Pages/Refinery.aspx

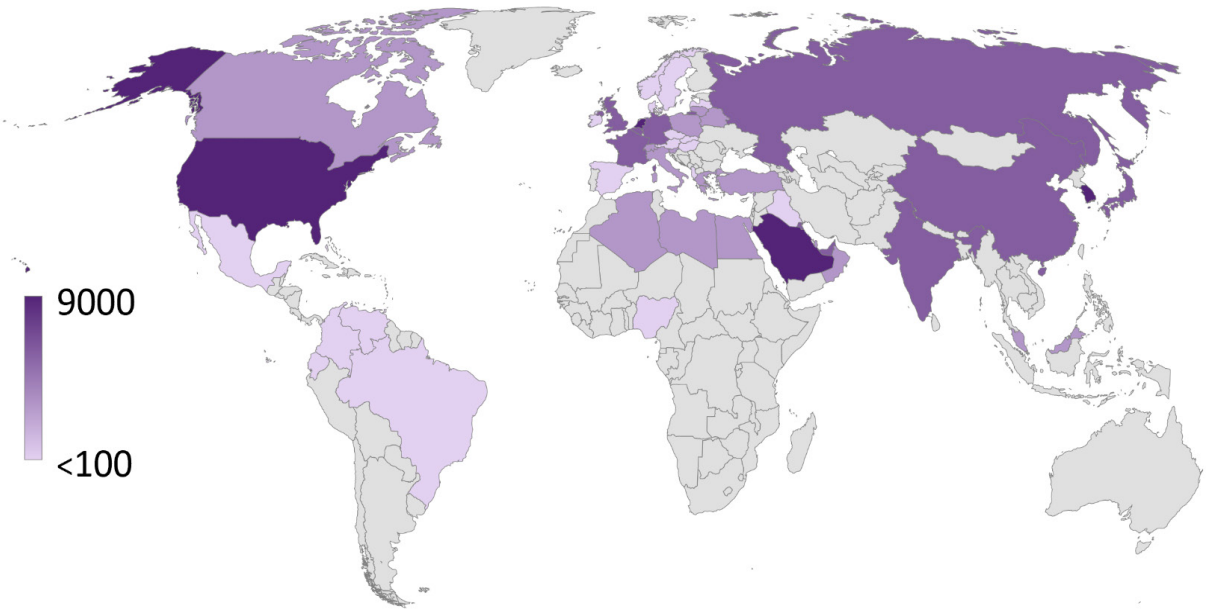
Chart 6: Security of supply of jet fuel for OECD countries, 2019



Note: No data was available for Israel

Jet fuel is only exported in significant quantities in a few countries around the world with Korea, the Netherlands, the United States, Saudi Arabia and the United Arab Emirates exporting the most. The Netherlands is a trading hub for many oil products, with large amounts of imports 're-exported' and not used for the country's own consumption. Europe exports relatively small amounts of jet fuel (excluding the Netherlands), as does Canada and North Africa.

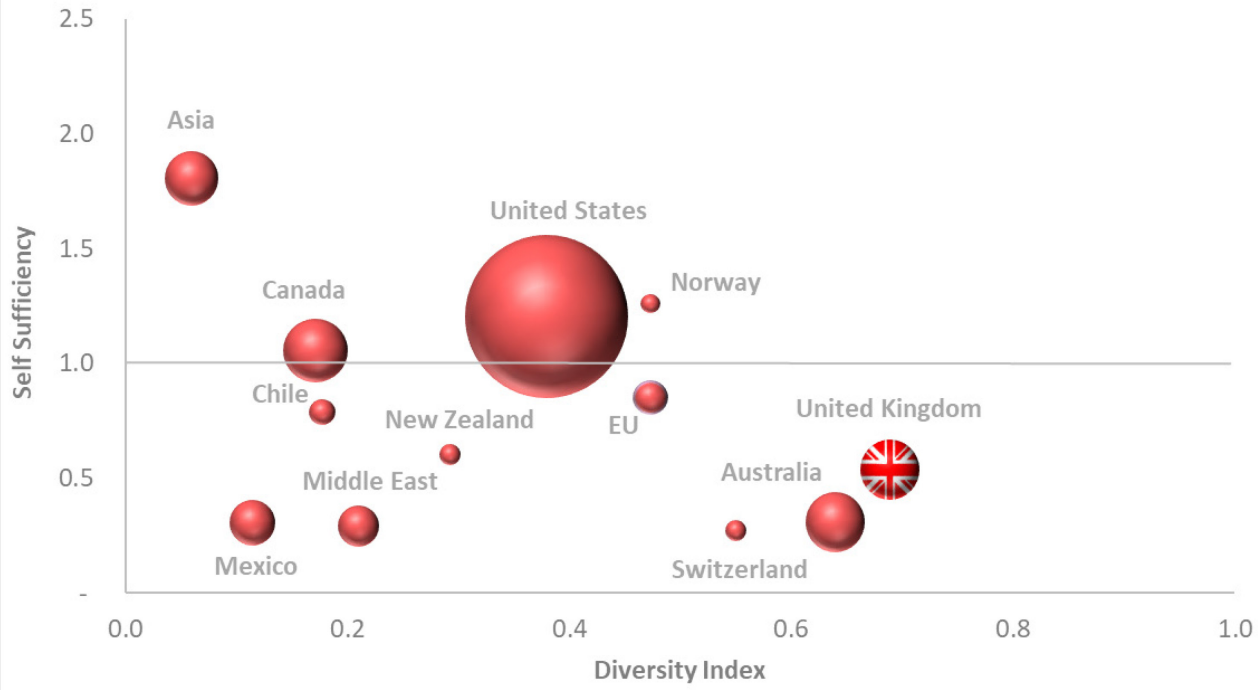
Map 3: Worldwide jet fuel exports (thousand tonnes), 2019



Road diesel

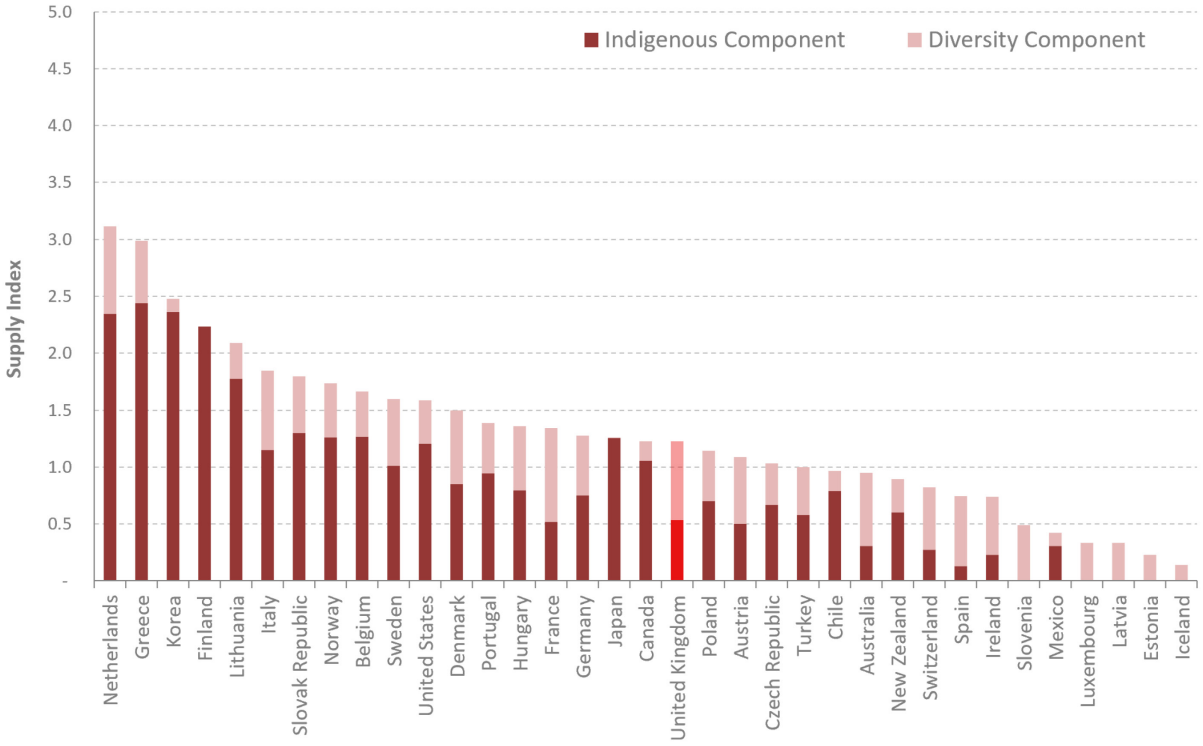
Compared to 2018, the OECD average self-sufficiency has decreased to 0.84 from 0.87 (revised figure). This is largely due to production being down with demand stable in Denmark, Sweden and most notably Greece who saw a 1.52 decrease in their self-sufficiency score to 2.44. At 0.54 on the self-sufficiency axis the UK was below the average OECD self-sufficiency score, producing only just over half the amount of diesel it consumed. However, the UK was in a favourable position in terms of diversity and political stability of imports. The UK's diversity score, at 0.69, was substantially above the OECD average of 0.41, making it the fourth highest only surpassed by Italy, the Netherlands and France, with the largest diversity score of 0.83 (Chart 7).

Chart 7: Diversity and self-sufficiency of diesel for OECD countries, 2019



Most countries either met demand through indigenous production or by a combination of production and diverse imports. The profile shows that although the UK's self-sufficiency score is reasonably low it has ranked in the middle of OECD countries for security of supply owing to its high diversity component (Chart 8).

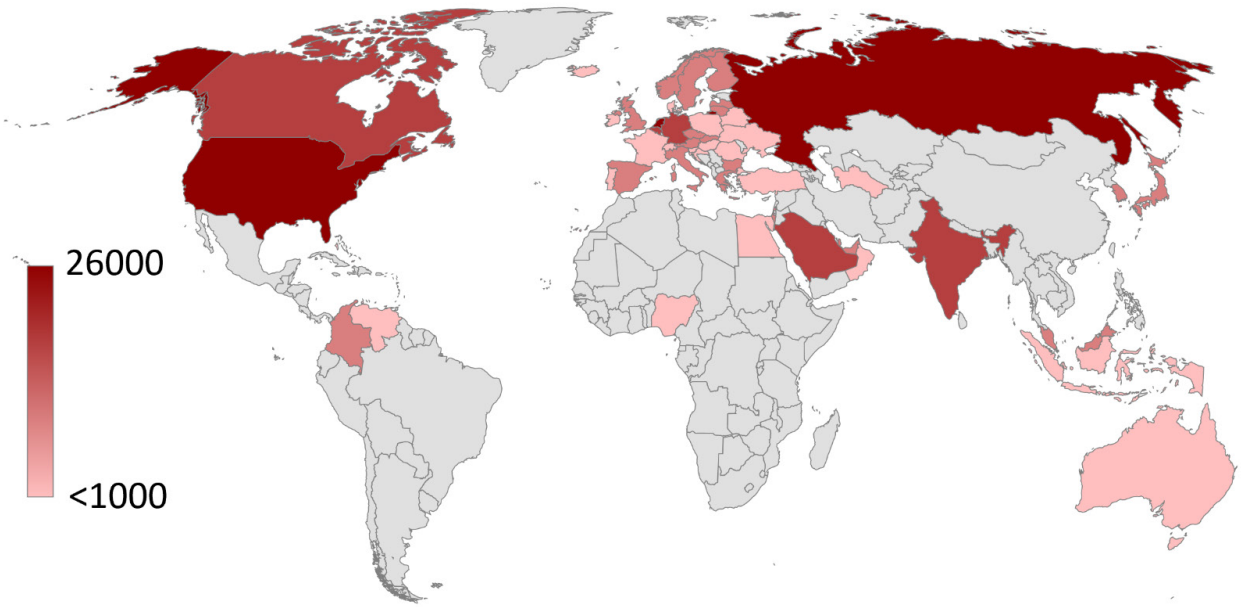
Chart 8: Security of supply of diesel for OECD countries, 2019



Note: No data was available for Israel

Map 4 shows that Russia and the United States are the most significant exporters of diesel. There are limited quantities of exports from Asia and South America, with Europe and Canada exporting diesel in moderate quantities. The UK was the 13th largest exporter out of the 36 OECD countries in 2019, compared to the fourth largest in 2018.

Map 4: Worldwide diesel exports (thousand tonnes), 2019



Summary

Self-Sufficiency and Import Diversity of OECD countries in 2019

The overall picture reflects a higher security of supply for products than for crude oil. This pattern is driven by higher levels of refinery production compared to crude extraction, leading to increased self-sufficiency for transport fuels. However, the scores for transport fuels are dependent on refining crude oil, and as such cannot be decoupled easily from crude oil security of supply. With an average self-sufficiency score of 0.41, OECD countries are very much dependent on imports of crude oil to meet refinery demand, although in 2019 we have seen average self-sufficiency scores remain stable for crude at 41 per cent, with an average diversity score of 0.42.

Total petrol production was almost one and a half times the average consumption in OECD countries. However, only 16 of the 36 OECD countries were self-sufficient; particularly notable were Lithuania, Norway, and Finland, with Lithuania producing more than ten times its demand. With a self-sufficiency score of 1.42 the OECD is well-placed to meet demand for petrol.

For diesel, half of the OECD countries were self-sufficient in 2019, with Greece notably producing nearly two and a half times the amount it consumed. However, Greece's self-sufficiency score has fallen compared to 2018 due to a decrease in production by about a third. On average OECD countries could have met 84 per cent of demand for diesel with own production.

Jet fuel imports amongst OECD countries have led to an average diversity score of 0.35, in part because a few countries such as Saudi Arabia, United Arab Emirates and the US are the key suppliers of jet fuel to the global market. Jet has the lowest diversity score after petrol, but OECD countries on average met 91 per cent of demand with own production. The UK, along with several north-western European countries, scored much higher than average on the diversity index, which offsets the relatively low production and suggests that a number of countries have taken steps to maximise the security of jet fuel supply.

Self-Sufficiency and Import Diversity of the UK in 2019

The UK compares well with other OECD countries for both self-sufficiency and diversity, with strong diversity scores for all oil types. The UK scored 0.66 on the diversity score for crude compared to the 0.42 OECD average, and could have met more than 90 per cent of crude consumption by indigenous production. The UK ranks strongly amongst OECD countries for self-sufficiency. On petrol, the UK more than meets its needs from indigenous production. Conversely, the UK relies on imports to meets its requirements for jet fuel and road diesel because its refineries do not produce sufficient volumes to meet increasing demand. However, with scores of 0.72 and 0.69 the UK compares favourably with the OECD averages of 0.35 and 0.41, respectively.

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We welcome any comments or suggestions on this analysis. Please get in touch at:
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Appendix 1 – List of OECD countries in category averages

Asia
Japan
Korea

EU (excluding UK)
Austria
Belgium
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Lithuania
Luxembourg
Netherlands
Poland
Portugal
Slovak Republic
Slovenia
Spain
Sweden

Middle East
Israel
Turkey

Appendix 2 – Provisional data for 2019

	CRUDE			PETROL			JET FUEL			DIESEL		
	DI	S-S	Demand	DI	S-S	Demand	DI	S-S	Demand	DI	S-S	Demand
Australia	0.89	0.64	22,414	0.75	0.60	13,707	0.61	0.41	7,531	0.64	0.31	24,555
Austria	0.37	0.07	9,124	0.43	**1.19**	1,681	0.04	0.94	955	0.59	0.50	7,031
Belgium	0.68	-	34,525	0.41	**2.05**	2,081	0.37	**1.35**	1,624	0.39	**1.27**	6,423
Canada	0.29	**3.17**	59,501	0.67	0.92	35,501	0.26	0.70	8,357	0.17	**1.06**	29,112
Chile	0.53	0.02	9,286	-	0.95	3,484	0.19	0.74	1,189	0.18	0.79	4,637
Czech Rep.	0.43	0.01	7,823	0.44	0.90	1,616	0.44	0.48	448	0.37	0.67	4,929
Denmark	0.48	0.66	7,644	0.50	**1.56**	1,433	0.73	0.11	1,049	0.65	0.85	2,698
Estonia	-	-	-	0.38	-	279	0.33	-	89	0.23	-	502
Finland	0.14	-	11,937	0.06	**3.13**	1,418	0.26	0.79	953	-	**2.23**	2,520
France	0.72	0.01	49,188	0.66	**1.07**	8,707	0.76	0.49	7,862	0.83	0.52	33,386
Germany	0.73	0.02	87,389	0.58	0.95	21,416	0.33	0.50	10,233	0.53	0.75	37,512
Greece	0.43	0.01	23,026	0.48	**2.19**	2,307	0.36	**1.96**	1,436	0.55	**2.44**	2,449
Hungary	0.26	0.13	6,823	0.57	0.74	1,487	0.28	**1.06**	282	0.56	0.79	3,447
Iceland	-	-	-	0.01	-	122	0.30	-	229	0.14	-	334
Ireland	0.42	-	2,530	0.52	0.66	772	0.26	-	1,062	0.51	0.23	3,079
Israel	-	-	12,307	-	-	3,051	-	-	1,151	-	-	-
Italy	0.62	0.06	66,867	0.71	**2.14**	7,581	0.50	0.63	4,882	0.70	**1.15**	21,122
Japan	0.73	0.00	145,425	0.19	1.00	36,037	0.13	**1.16**	10,548	0.00	**1.25**	21,037
Korea	0.80	0.00	144,780	-	**2.00**	9,924	-	**3.24**	6,632	0.12	**2.36**	19,239
Latvia	-	-	-	0.31	-	186	0.37	-	153	0.33	-	681
Lithuania	0.26	0.00	9,514	0.04	**10.08**	245	0.09	**7.72**	129	0.32	**1.77**	1,754
Luxembourg	-	-	-	0.21	-	370	0.31	-	566	0.34	-	1,792
Mexico	-	**2.68**	33,047	0.25	0.25	33,572	0.10	0.32	3,987	0.11	0.31	14,158
Netherlands	0.61	0.01	55,909	0.62	0.94	4,261	0.71	**2.27**	3,852	0.77	**2.35**	6,656
N. Zealand	0.52	0.20	5,472	0.36	0.57	2,415	0.27	0.87	1,527	0.29	0.60	3,156
Norway	0.61	**5.25**	13,307	0.40	**4.67**	782	0.57	0.83	906	0.47	**1.26**	2,458
Poland	0.39	0.04	27,186	0.55	0.92	4,706	0.44	**1.23**	1,076	0.44	0.70	17,378
Portugal	0.74	-	11,288	0.33	**1.96**	1,073	0.58	0.84	1,601	0.44	0.95	4,668
Slovak Rep.	0.06	0.00	5,110	0.45	**1.93**	583	-	**1.42**	55	0.50	**1.30**	1,959
Slovenia	-	-	-	0.42	-	402	0.32	-	26	0.49	-	1,510
Spain	0.71	0.00	65,648	0.43	**1.71**	5,325	0.54	0.07	6,920	0.62	0.13	23,456
Sweden	0.55	-	16,796	0.59	**1.46**	2,547	0.44	0.23	1,048	0.59	**1.01**	4,536
Switzerland	0.37	-	2,723	0.41	0.26	2,337	0.27	0.01	1,874	0.55	0.27	2,863
Turkey	0.40	0.09	33,615	-	**2.19**	2,415	0.17	**1.09**	5,462	0.42	0.58	23,050
UK	0.66	0.93	52,300	0.80	**1.34**	12,312	0.72	0.42	12,389	0.69	0.54	24,780
USA	0.61	0.74	816,933	0.92	0.92	397,853	0.59	**1.03**	80,380	0.38	**1.20**	188,720
OECD - Asia	0.76	0.00	145,103	0.09	**1.50**	22,981	0.06	**2.20**	8,590	0.06	**1.81**	20,138
OECD - EU	0.37	0.04	21,666	0.42	**1.55**	3,069	0.38	0.96	2,023	0.47	0.85	8,253
OECD - Middle East	0.35	0.30	25,647	-	**1.10**	2,733	0.08	0.55	3,307	0.21	0.29	11,525
OECD ave.	0.42	0.41	51,373	0.40	**1.42**	17,333	0.35	0.91	5,235	0.41	0.84	15,211

Items in **bold** highlight those countries where indigenous capacity exceeded domestic consumption

DI = Diversity Index
S-S = Self-sufficiency
Demand is in thousand tonnes (kt)

Source: IEA (http://data.iea.org/)

Appendix 3 – Methodology

Data for crude oil and transport fuel self-sufficiency

Data for crude oil, petrol and jet fuel were extracted from the IEA database. For diesel, data were provided on request from the IEA. Self-sufficiency was determined from data on indigenous production and consumption (production (kt) ÷ consumption (kt)).

Crude oil and transport fuel diversity indices

The diversity index used here is a product of a standard diversity index and an index for political stability. As a basic index for measuring diversity, we used the Shannon-Wiener diversity index. The Shannon-Wiener index is of the form:

$$\sum_{i=1}^{n} -x_i \ln(x_i)$$

Where x is the proportion of total fuel supply represented by the i^{th} source country and n represents the final source country. A value below 1 signifies a country that is dependent on a small range of import sources, a value above 2 represents a country with a wide range of import sources. The minimum value of zero denotes a country that has one imported fuel source or relies entirely on indigenous production.

A previous comparative study on import diversities in Energy Trends March 2011 used the Herfindahl Index as the basic diversity index. Although both of these indices have their advantages, the Shannon-Wiener was chosen here as this represents the data with less skew, as well as placing more weight on the diversity of contributions from smaller countries and lessening the impact of larger nations.

Political stability was determined using data from the World Bank worldwide governance indicators. Specifically, the index reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism. These data were standardised between 0 and 1.

Source: **World Bank** (http://info.worldbank.org/governance/wgi/index.aspx#home)

Once Shannon-Wiener and political stability indices were determined, these were multiplied and summed:

$$\sum_{i=1}^{n} -x_i \ln(x_i)\, b_i$$

Where b is an index of political stability of producing country. This is called the SWNI (Shannon-Weiner-Neumann index), in line with previous work.

Each SWNI index was normalised for each petroleum product between 0 and 1, to have a standardised index. This was done by working out a maximum diversity score, by assuming maximum diversity was equivalent to importing products in line with proportional contributions of exporting countries (e.g. if a single country were responsible for exporting 50 per cent of all product, and five other countries were responsible for 10 per cent each, we assumed maximum import diversity at a ratio of 5:1:1:1:1:1). This maximum diversity score then acted as our upper score of 1, with all other scores divided by this maximum to standardise the data.

Competition in gas supply

Introduction

This article describes the number of companies operating, the market concentrations of the domestic, commercial, and industrial markets, and data on the size of the companies operating.

Key Points

- The total number of companies supplying over 1,750 GWh has increased from 17 in 2009 to 30 in 2019 (up from 29 in 2018).
- The market concentration of the domestic and industrial sectors has decreased since 2018, although 2019 saw an uptick in the commercial sector.
- Reflecting longer term market trends, the total market share of the largest companies decreased. In 2019 the share of the top nine suppliers was 71 per cent, down from 75 per cent in 2019. This value remains significantly lower than the 2010 figure of 85 per cent.

Background to changes in the gas market

Three-quarters of the non-domestic market for gas (customers with demand above 25,000 therms per year) was effectively opened to competition at the end of 1986. Most of the remainder (between 2,500 and 25,000 therms a year) was opened in August 1992. The domestic market was opened for competition between April 1996 and May 1998, with large increases in the number of gas suppliers up to 2000.

By the mid-2000s the number of companies supplying gas had fallen by nearly half from 30 in the year 2000, driven by company mergers. By 2012, this number had increased back up to 30 and in 2019 there were a total of 60 companies supplying gas to the UK. There are effectively four competitive sectors - sales to the electricity generators, the industrial sector, the commercial sector, and the domestic sector.

Competition for electricity generation cannot be calculated accurately due to complexities associated with this sector. BEIS collect data on final sales from gas companies; companies who generate electricity from gas are often the same companies who trade gas, therefore at the point of sale, sellers do not know the proportion of gas sold which will be used for generation and that which will be traded on. As such data for electricity generation competition are not presented here.

Number of companies supplying gas at least 1,750 GWh of gas

The table below shows the number of companies supplying gas to final consumption in the domestic, commercial, and industrial sectors. The table shows only those companies supplying at least 1,750 GWh of gas to each respective sector.[1]

Table 1: Number of large suppliers of gas

	2002	2004	2006	2008	2010	2012	2014	2016	2017	2018	2019
Domestic sector	12	7	6	6	7	7	9	12	15	16	16
Commercial sector	10	10	7	6	8	8	9	11	10	11	10
Industrial sector	15	10	9	8	8	7	11	11	11	11	9
Total	**24**	**16**	**17**	**16**	**17**	**16**	**21**	**26**	**29**	**29**	**30**

(1) Companies can supply into more than one market and are counted in each market they supply. Companies who supply less than 1,750 GWh within each sector are excluded. In September 2019 Ofgem data indicate that 230 suppliers were licensed to supply gas to domestic customers, but some suppliers have more than one supply licence and own or part own more than one supply company.

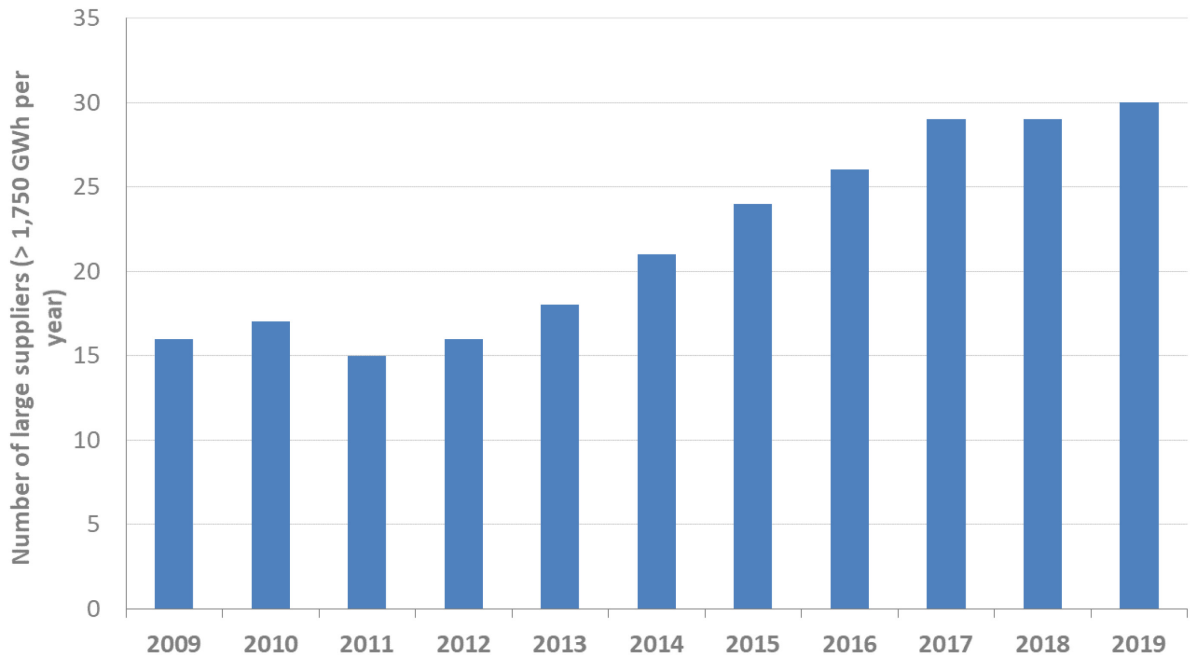
[1] This represents a methodological change from previous data shown in Energy Sector Indicators where the cut-off was previously 0.25 per cent of the market share for each market. The methodological change brings the table in line with the collection methodology used by BEIS.

The data indicate that the number of companies supplying gas above the threshold of 1,750 GWh has fallen since 2018, with a decrease in the commercial, and industrial sectors. The domestic sector remained stable at 16 large suppliers, although within this we saw some of the newer suppliers cease operation and other companies crossing the larger supplier threshold.

Number of large and small suppliers in the market

Despite a general long-term trend of increases seen since 2009, the total number of large suppliers has remained steady since 2017. Chart 1 shows the number of companies supplying more than 1,750 GWh a year of gas, (excluding gas to electricity generation) and indicates a generally sustained pattern of increase from 16 in 2009, to 30 in 2019.

Chart 1: Total number of companies supplying over 1,750 GWh of gas, 2009 to 2019



Note: Data for 2018 have been revised from 28 to 29

The overall number of larger suppliers increased from 29 in 2018 to 30 in 2019, although within this we saw some of the newer suppliers cease operation and other companies entering the market and crossing the larger supplier threshold.

BEIS collects information from companies licenced to supply gas through two surveys, one a mandatory return for companies supplying more than 1,750 GWh a year of gas, the other a voluntary return for companies supplying less than that threshold (in total ~2 per cent of final consumption). Return rates for the survey of companies over the 1,750 GWh threshold is 100 per cent. There are many smaller companies meaning that BEIS select a sample to survey, and data is weighted up to represent the national total.

Competition in gas sales to the domestic, commercial, and industrial sectors

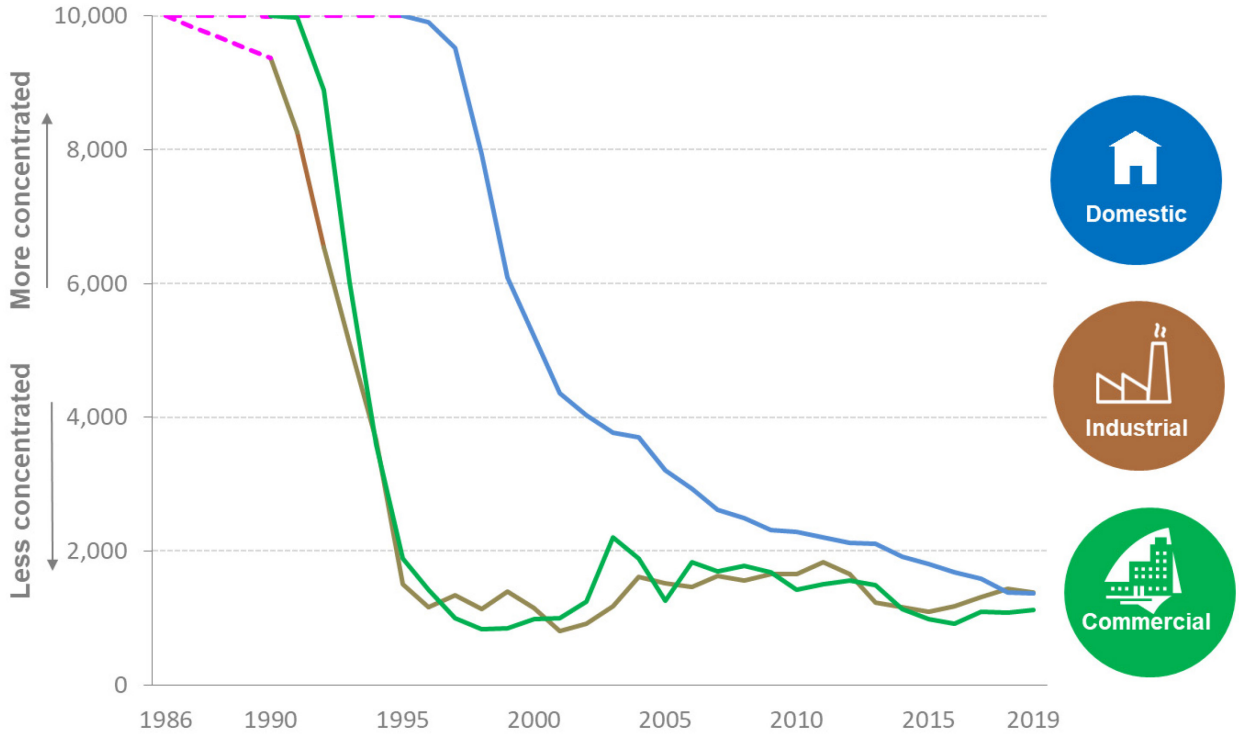
Continuing the trend of recent years, the domestic market has seen market concentrations decrease in comparison to 2018. This is partly due to small suppliers joining the market, but also because larger suppliers have been losing market share to these smaller companies. The domestic market is where we have seen the greatest fall in concentration, with the smaller companies holding a 15 per cent share in 2019, compared to just 2 per cent in 2010.

The notable trend in the mid-1990s was sharply towards increased diversity of supply. Supply to the domestic sector continues this trend into 2019, but the recent trends in the industrial and commercial

sectors have been more volatile. In 2019 the smaller suppliers held 12 per cent and 7 per cent of the market share in the industrial and commercial sectors, respectively.

Chart 2 shows the market concentration as expressed through the Herfindahl-Hirschman index, one of the standard metrics for analysing concentration. Higher numbers indicate more concentration and lower numbers indicate a more diverse market.

Chart 2: Herfindahl-Hirschman Index for market concentration, 1986 to 2019



The domestic market has become less concentrated in 2019 compared to 2018. While the number of larger suppliers here has remained stable at 16 companies, the share held by smaller companies increased from 12 per cent in 2018 to 15 per cent in 2019.

The commercial market has seen the number of companies supplying more than 1,750 GWh fall from 11 in 2018 to 10 in 2019, and these large suppliers held more of the market share, so increasing the market concentration. One large supplier exited the commercial gas market in 2019 and the remaining 10 companies held 88 per cent of the market share in 2019, compared to 85 per cent in 2018.

The number of large suppliers in the industrial market fell from 11 to 9 in 2019, partly because some larger suppliers exited the market, but also because some of the comparatively newer companies were merged. However, the concentration was still down compared to 2018 and larger suppliers held 93 per cent of the market share in 2019.

Gas supplied to all consumers by aggregated shares

Table 2 highlights the long-term decline in share of the largest suppliers in the market, with the share of the nine largest companies falling from 77 per cent in 2015, to 71 percent in 2019. Whilst in previous years the fall was due to a declining market share of the top three suppliers, in 2019 these gained a percentage point share. Instead, the decline in 2019 was due to a decrease in the market share of the suppliers ranked from 4th to 6th largest, from 22 per cent in 2018, to 19 per cent in 2019. Figures are based on total gas supplied excluding gas for electricity generation.

Table 2: Gas supplied to all consumers by aggregated shares

	2015	2016	2017	2018	2019
Share held by top 3 suppliers	42%	40%	37%	36%	37%
Share held by suppliers ranked 4th to 6th largest	21%	20%	21%	22%	19%
Share held by suppliers ranked 7th to 9th largest	14%	15%	16%	16%	16%
Aggregated share of top 9 suppliers	**77%**	**75%**	**74%**	**75%**	**71%**
Other suppliers	23%	25%	26%	25%	29%

Herfindahl-Hirschman

The Herfindahl-Hirschman measures market concentration and monopoly power in relation to other firms within the gas supply industry. It places extra emphasis on the contributions of participants with the largest shares. The measure is commonly used to assess whether mergers should go ahead and whether they will significantly affect the balance of the market in a sector.

It is expressed by the following equation:
Herfindahl-Hirschman measure = the square of each participant's market share added together across all participants in the market

Values vary between zero, which signifies a perfectly competitive industry, and ten thousand, for a pure monopoly.

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Competition in UK electricity markets

Introduction

This article includes information relating to competition in the UK electricity market, formerly published as part of UK Energy Sector Indicators. The article examines the two parts of the industry where there is competition for provision: generation and sales. For both markets, the article describes the number of companies operating, and the market concentrations. The Herfindahl-Hirschman measure (see explanation at the end of this article) is used to provide the market concentration as it provides extra emphasis on the contribution of participants with the largest shares. For electricity sales, this article covers the major suppliers[1] surveyed by BEIS comprising approximately 96% of the market.

Key points

- Major electricity suppliers[1] increased in number from 16 in 1989 before privatisation to 39 in 2019. In 2019, BEIS surveyed three new suppliers to maintain coverage; three companies that were over the 0.1% market share threshold in 2018 discontinued supply.
- Since 2010, electricity market concentration has slowly declined year-on-year across the domestic, commercial and industrial sectors as more companies entered the market. However, market concentration in 2019 showed a slight increase in the commercial sector.
- The market share of smaller suppliers (outside the top nine) rose from 4.0 per cent in 2010 to 20.4 per cent in 2019, as new and smaller suppliers took market share from the large companies.
- Major power producers (MPPs) increased in number from 6 in 1989 to 55 in 2019.
- The top nine MPPs' share of generation decreased from 86.2 per cent in 2012 to 77.5 per cent in 2019. Their share of capacity decreased from 82.2 per cent in 2012 to 72.1 per cent in 2019 as new smaller generators entered the market.

Background to changes in the electricity market

Electricity generation

Following the restructuring of the electricity supply industry in 1990, the former nationalised companies were classified as major generating companies to distinguish them from autogenerators and the new companies set up to generate electricity. However, over the next few years, some new independent companies were beginning to make significant contribution to the electricity supply and therefore a new terminology "Major Power Producers" (MPPs) was introduced to signify those companies whose prime purpose is the generation of electricity. The breakup of the nationalised power suppliers into smaller privatised companies immediately increased market competitiveness, with new companies beginning to build their own Combined Cycle Gas Turbine (CCGT) stations from 1992. Major wind farm companies and major solar photovoltaic (PV) operators are now also included in the MPP definition.

Electricity supply

Competition was introduced to the electricity markets in three phases. First the upper tier of the non-domestic market (customers with a maximum demand of over 1 MW, comprising 30 per cent of the market) was opened to competition in March 1990. Next, the 100 kW to 1 MW tier (15 per cent of the market) was opened to competition in April 1994. Full competition for the remaining 55 per cent of the market (below 100 kW peak load) was introduced in stages between September 1998 and June 1999. This final phase covered domestic consumers who account for over a third of electricity consumed in the UK.

[1] In this article 'electricity supplier' refers to the major electricity suppliers surveyed by BEIS, covering approximately 96% of all UK electricity sales in 2019. Major electricity suppliers include suppliers that sold over 0.1% of traded electricity in the reference year. This differs from previous editions of this article where all suppliers surveyed by BEIS were included. The change allows BEIS to increase its survey coverage whilst still presenting comparable trends in this article. Please see the BEIS Electricity statistics data sources and methodologies and the revisions note below for more details.

Competition in electricity sales

The number of electricity suppliers[(1)] rapidly increased, from 16 before privatisation in 1989 to an early peak of 21 in 2004. The number of companies reduced from 2004 to 2010 (14 companies), as despite new market entrants, other companies were either taken over or bought additional power stations to add to their portfolios. After 2010, the number of companies increased again, reaching their highest levels in 2018 and 2019 of 39 companies. This was a net increase of two companies from 2017 and reflects new market entrants and that BEIS engaged with new and smaller companies, to maintain coverage in the more fragmented market.

The number of companies supplying electricity to each sector is given for selected years between 1996 and 2019 in Table 1.

Table 1: Number of companies supplying electricity [(1)]

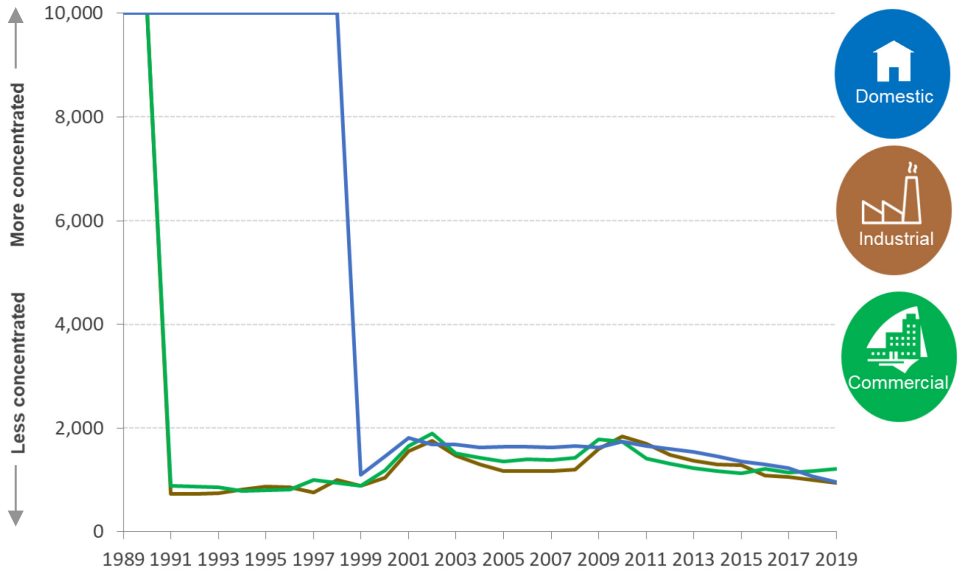
	1996	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018	2019
Domestic Sector	1	11	7	10	9	9	9	12	17	20	27	27
Commercial Sector	17	13	11	17	12	13	12	18	23	27	30	29
Industrial Sector	18	17	14	20	16	15	13	20	22	25	25	25
Total	18	18	17	21	19	18	14	22	28	34	39	39

(1) Companies can supply into more than one market and are counted in each market they supply to. Includes only companies that sold over 0.1% of traded electricity in the reference year.
Source: BEIS.

One of the new electricity suppliers surveyed by BEIS in 2019 supplied over 0.1 per cent of the market and two smaller suppliers increased market share to over the 0.1 per cent threshold for inclusion. Three companies discontinued supply. All six of these suppliers sold to the domestic sector so the net total remained at 27. One of the new companies supplied the commercial sector whilst two of those leaving the market did, decreasing the net total to 29. One of the new companies and one of the exiting companies supplied the industrial sector so the net total remained at 25 in 2019. Across all sectors, there were 39 companies selling electricity in 2019; this is an increase of 25 compared to 2010. Despite some of the new companies supplying a small share of the market, the growth in the number of companies over the last 10 years resulted in a decrease to market concentration.

Chart 1 below shows the market concentration as expressed through the Herfindahl-Hirschman Index. In the chart, higher numbers show more concentration while lower numbers indicate a more diverse market.

Chart 1: Herfindahl-Hirschman Index for electricity sales market concentration, 1989 to 2019



There was an initial sharp decrease in market concentration following privatisation, then a rise between 1998 and 2002, mainly due to a spate of mergers. The market concentration subsequently fell and stabilised between 2003 and 2008, as the number of industrial and commercial suppliers increased. In 2009 and 2010, market concentration increased again, as several closures reduced the number of market participants. Since 2010, electricity market concentration has declined annually across the domestic and industrial sectors, as the market became more competitive; whilst market concentration in the commercial sector also dropped each year from 2010 to 2015 before rising slightly to 2019. For the domestic and industrial sectors, the index fell further across in 2019 and all sectors are now at similar level to 2000. This downward trend in market concentration resulted from increasing numbers of smaller suppliers entering the market and reducing the market share of bigger companies.

The domestic market was a regional monopoly before 1998, dominated by the Regional Electricity Company (REC). Following a decrease in market concentration in 1999 as domestic sales became more competitive, concentration rose until 2002 due to mergers between former RECs, and with other suppliers/generators. Similarly, market concentration rose for industrial and commercial sales over the same period. Between 2002 and 2009, the Herfindahl-Hirschman Index for the domestic sector was broadly stable. In 2010 the index increased, though subsequently the index has decreased annually. In 2019, the index fell again to from 1,074 in 2018 to 957 – the lowest level recorded – reflecting the share of new entrants to the market.

The commercial market had 17 major electricity suppliers in 2004 but this fell to 12 in 2010, leading to an increase in market concentration. Since 2010, there has been a downwards trend in market concentration, as the number of commercial electricity suppliers grew. With the number of commercial companies reducing in 2019, market concentration increased slightly. With 25 industrial electricity suppliers in 2019, the industrial market was less concentrated than in 2010, when there were 13 industrial electricity suppliers. The largest concentration decreases in the industrial sector occurred in 2012 and 2016.

Electricity supplied to all consumers by aggregated shares.

Table 2 shows how the market share of the largest companies have changed since 2010. The market share of the top nine suppliers peaked in 2010, but since has steadily fallen to 79.6 per cent in 2019. Between 2018 and 2019, the aggregated share of the top six suppliers fell a further 2.4 percentage points from 70.4 per cent to 68.0 per cent. When compared to 2010, the aggregated top six share for 2019 is 23 percentage points lower.

As the number of companies supplying electricity has increased, as evidenced in Table 1, the share of these suppliers outside the top nine has grown. The share of those outside of the top nine rose from 2.7 per cent in 2010 to 20.4 per cent in 2019. This reflects the fragmentation of the market from new entrants taking market share from the larger companies. This increase in share of suppliers outside the top nine further reflects the reduced market concentration as evidenced by the Herfindahl-Hirschman Index in Chart 1.

Table 2: Percentage of total electricity supplied to all consumers

	Market Share (%)									
Electricity Suppliers	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Aggregated share of top 3 suppliers	55.4	51.3	49.1	47.7	47.4	45.1	42.5	41.9	41.3	40.4
Aggregated share of next 3 suppliers	35.6	36.0	36.7	35.4	33.5	32.7	32.3	31.1	29.1	27.6
Aggregated share of next 3 suppliers	6.3	6.6	6.2	6.6	8.9	10.1	10.8	11.7	12.1	11.6
Aggregated share of top 9 suppliers	**97.3**	**93.8**	**92.0**	**89.7**	**89.8**	**87.8**	**85.6**	**84.7**	**82.4**	**79.6**
Other suppliers	2.7	6.2	8.0	10.3	10.2	12.2	14.4	15.3	17.6	20.4

Electricity generation competition

Table 3 shows the number of companies that are counted as Major Power Producers (MPPs). The number of companies increased rapidly, from six before privatisation up to an early peak of 36 in 2001, before mergers caused numbers to fall back to 29 in 2006. Starting in 2007, several renewable generators were reclassified as MPPs, leading to an increase in the number of MPPs to 34; this remained stable through to 2009. Since 2010, the number of MPPs has steadily increased as new generators came online, reaching a peak in 2018 of 56 before dropping to 55 in 2019.

Table 3: Number of Major Power Producers

Year	Number	Number producing at least 5% of total generation
1989	6	-
1990	6	-
1991	11	-
1992	14	-
1993	20	-
1994	23	-
1995	25	-
1996	26	-
1997	27	-
1998	29	-
1999	30	-
2000	34	7
2001	36	6
2002	36	7
2003	34	6
2004	32	7
2005	30	7
2006	29	7
2007	34	8
2008	34	9
2009	34	8
2010	39	8
2011	41	7
2012	44	7
2013	44	7
2014	47	7
2015	53	6
2016	52	5
2017	54	4
2018	56	5
2019	55	6

Source: BEIS
(r) shows a revision to the data

Table 4 shows the MPPs aggregated share of generation and aggregated share of capacity for 2013 to 2019. The market share of the top 9 generators in this period peaked in 2012 at 86.2 per cent declining to 74.7 per cent in 2018, as new companies entered the market and reduced the share of total generation produced by the top 9 companies. In 2019 this rose to 77.5 per cent due to acquisitions. The top 9 generators held a lower share of capacity (72.1 per cent in 2019) compared to generation. This indicates that a greater proportion of their generation is from non-renewable sources, which have higher load factors i.e. they operate closer to full capacity.

Table 4: Percentage of total generation and total capacity by Major Power Producers

	Share in Generation (%)						Share in Capacity (%) [1]					
	2012	2015	2016	2017	2018	2019	2012	2015	2016	2017	2018	2019
Aggregated share of top 3 companies	47.0r	48.6	48.9	50.7	48.9	48.3	46.7	32.5	32.9	35.3	33.8	42.5
Aggregated share of next 3 companies	25.8r	21.4	15.5	15.0	16.6	17.6	23.4	26.8	18.2	22.2	21.4	20.3
Aggregated share of next 3 companies	13.4r	12.7	11.4	9.2	9.2	11.6	12.1	15.2	11.4	8.8	11.9	9.2
Aggregated share of top 9 companies	**86.2r**	**82.8**	**75.8**	**75.0**	**74.7**	**77.5**	**82.2**	**74.5**	**62.4**	**66.4**	**67.1**	**72.1**
Other major power producers	13.8r	17.2	24.2	25.0	25.3	22.5	17.8	25.5	37.6	33.6	32.9	27.9

(1) Of the same companies in each band in generation terms
Source: BEIS
(r) shows a revision to the data

User feedback

We welcome all feedback from users; therefore, if you have any comments or queries regarding this analysis, please contact Vanessa Martin using the contact details below.

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Herfindahl-Hirschman

The Herfindahl-Hirschman measure attempts to measure market concentration. It places extra emphasis on the contributions of participants with the largest shares. The measure is commonly used to assess whether mergers should go ahead and whether they will significantly affect the balance of the market in a particular sector.

It is expressed by the following equation: Herfindahl-Hirschman measure = the square of each participant's market share added together across all participants in the market.

Values vary between zero, which signifies a perfectly competitive industry, and ten thousand, for a pure monopoly.

Revisions

In 2019 we revised the method for **Table 1: Number of companies supplying electricity**. In previous years all electricity suppliers in the BEIS electricity survey were included; however, from 2019 we introduced a 'major electricity supplier' definition which includes companies with a market share above 0.1%. This allows us to more accurately reflect the market rather than showing an apparent sharp increase due to smaller suppliers which were added to the BEIS electricity supplier survey to improve its coverage. We are considering further improvements to the electricity and gas articles. Please contact us with your feedback.

Aggregated energy balances showing proportion of renewables in supply and demand

Introduction

In 2016, the Economics and Social Affairs Department of the United Nations published its International Recommendations for Energy Statistics (IRES)[1]. The report recommended countries should include an "of which renewables" column to their energy balances, both absolute values and percentages.

Adding this breakdown provides a fuller picture of renewable energy in the UK. Although DUKES chapter 6 reports progress against the Renewable Energy Directive (RED), it is based on final consumption and is calculated using a methodology specific to the directive[2]. BEIS has considered that publishing this information will provide users with additional insights into renewable energy trends in the UK.

Summary Table

The summary table for 2019 (Table 1 below) uses a simplified version of the annual energy balance shows the renewables components for supply, demand, transformation, and final consumption.

Table 1: 2019 Energy balance, showing proportion of renewables (ktoe)[3]

	Hard Coals	Man. Solid Fuels	Crude Oil & NGL	Petroleum Products	Natural Gas	Bioenergy & Waste	Primary Electricity	Electricity	Heat Sold	TOTAL	of which renewables	share of renewables
SUPPLY												
Indigenous production	1,508	0	56,762	0	37,771	13,761	20,407	0	0	130,209	19,166	14.7%
Imports	4,426	623	57,134	36,380	44,548	5,491	0	2,111	0	150,712	5,851	3.9%
Exports	-493	-8	-49,105	-22,664	-7,539	-385	0	-291	0	-80,485	-502	0.6%
Marine bunkers	0	0	0	-2,492	0	0	0	0	0	-2,492	0	0.0%
Stock change	3	112	-97	-579	-125	0	0	0	0	-685	0	0.0%
Primary supply	5,445	727	64,694	10,645	74,655	18,867	20,407	1,820	0	197,259	24,515	12.4%
Statistical difference	-25	0	30	-34	-343	0	0	30	0	-342		
Primary demand	5,469	727	64,664	10,679	74,998	18,867	20,407	1,790	0	197,602	24,509	12.4%
Transfers	0	24	-379	375	454	-497	-7,154	7,154	0	-23		0.0%
TRANSFORMATION	-4,173	262	-64,285	63,401	-25,614	-11,420	-13,253	20,619	1,563	-32,899	-5,876	17.9%
Electricity generation	-1,839	-513	0	-332	-23,271	-11,180	-13,253	20,619	0	-29,769	-5,785	19.4%
Heat generation	-4	-1	0	-42	-2,343	-240	0	0	1,563	-1,067	-91	8.5%
Petroleum refineries	0	0	-64,689	64,264	0	0	0	0	0	-425	0	
Coke manufacture	-1,375	1,292	0	0	0	0	0	0	0	-83	0	
Blast furnaces	-863	-646	0	0	0	0	0	0	0	-1,508	0	
Patent fuel manufacture	-92	130	0	-46	0	0	0	0	0	-9	0	
Other	0	0	404	-443	0	0	0	0	0	-39	0	
Energy industry use	0	428	0	4,150	5,363	0	0	1,907	319	12,167	798	6.6%
Losses	0	84	0	0	442	0	0	2,268	0	2,794	878	31.4%
FINAL CONSUMPTION	1,296	501	0	70,306	44,034	6,950	0	25,388	1,244	149,719	16,961	11.3%
Industries	927	309	0	2,300	8,750	1,461	0	7,878	673	22,298	4,485	20.1%
Transport	11	0	0	54,448	0	1,737	0	469	0	56,665	1,918	3.4%
Domestic	337	142	0	2,554	26,650	2,449	0	8,927	269	41,328	6,091	14.7%
Other Final Users	22	0	0	3,762	8,233	1,302	0	8,114	302	21,734	4,467	20.6%
Non energy use	0	50	0	7,244	401	0	0	0	0	7,695	0	

The spreadsheet, available at: www.gov.uk/government/collections/renewables-statistics#energy-trends:-articles also shows this on a year-by-year basis from 2000, alongside a time- series without the individual fuels, as shown in Table 2.

[1] https://unstats.un.org/unsd/energy/ires/IRES_edited2.pdf

[2] The key differences are that the RED basis uses net calorific values and a normalisation process to smooth out the effects of extreme weather years for hydro and wind generation.

[3] Note that for a number of rows, the tables do not show the proportion of biofuels. For transformation for instance, the total in the energy balance is the net loss of the transformation process. A renewable component of this can be calculated but it is in itself fairly meaningless.

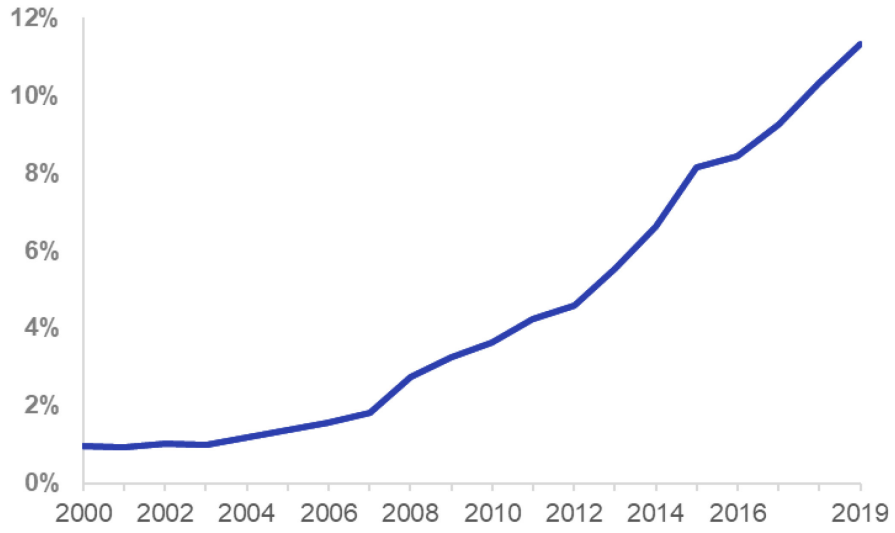
Table 2: Energy balance 2017 to 2019 showing proportion of renewables (ktoe)

	2017			2018			2019		
	TOTAL (ktoe)	of which renewables (ktoe)	share of renewables (%)	TOTAL (ktoe)	of which renewables (ktoe)	share of renewables (%)	TOTAL (ktoe)	of which renewables (ktoe)	share of renewables (%)
SUPPLY									
Indigenous production	126,601	16,908	13.4%	130,433	18,417	14.1%	130,209	19,166	14.7%
Imports	152,464	3,818	2.5%	154,363	4,620	3.0%	150,712	5,851	3.9%
Exports	-79,245	-539	0.7%	-81,456	-386	0.5%	-80,485	-502	0.6%
Marine bunkers	-2,619	0	0.0%	-2,615	0	0.0%	-2,492	0	0.0%
Stock change	3,441	0	0.0%	-143	-9	6.4%	-685	0	0.0%
Primary supply	200,644	20,187	10.1%	200,582	22,642	11.3%	197,259	24,515	12.4%
Statistical difference	168	0	0.0%	-49	0	0.0%	-342	0	0.0%
Primary demand	200,476	20,183	10.1%	200,631	22,656	11.3%	197,602	24,509	12.4%
Transfers	-133	0	0.0%	-62	0	0.0%	-23	0	0.0%
TRANSFORMATION	-35,595	-4,958	13.9%	-34,102	-5,466	16.0%	-32,899	-5,876	17.9%
Electricity generation	-32,623	-4,886	15.0%	-31,295	-5,379	17.2%	-29,769	-5,785	19.4%
Heat generation	-1,065	-73	6.8%	-1,059	-87	8.2%	-1,067	-91	8.5%
Petroleum refineries	-149	0	0.0%	-152	0	0.0%	-425	0	0.0%
Coke manufacture	-84	0	0.0%	-84	0	0.0%	-83	0	0.0%
Blast furnaces	-1,585	0	0.0%	-1,432	0	0.0%	-1,508	0	0.0%
Patent fuel manufacture	-54	0	0.0%	-45	0	0.0%	-9	0	0.0%
Other	-34	0	0.0%	-34	0	0.0%	-39	0	0.0%
Energy industry use	12,069	679	5.6%	12,032	751	6.2%	12,167	798	6.6%
Losses	2,863	713	24.9%	2,863	801	28.0%	2,794	878	31.4%
FINAL CONSUMPTION	149,817	13,834	9.2%	151,573	15,640	10.3%	149,719	16,961	11.3%
Industries	22,808	3,690	16.2%	22,933	4,224	18.4%	22,298	4,485	20.1%
Transport	57,003	1,127	2.0%	56,884	1,514	2.7%	56,665	1,918	3.4%
Domestic	39,837	5,145	12.9%	41,633	5,694	13.7%	41,328	6,091	14.7%
Other Final Users	21,522	3,872	18.0%	21,902	4,208	19.2%	21,734	4,467	20.6%
Non energy use	8,647	0	0	8,221	0	0	7,695	0	0

Trends

- Over time, the proportion of renewables in energy supply has been steadily increasing over the years, rising from 1.1 per cent in 2000 to 11.3 per cent in 2019

Figure 1: share of energy supply from renewable sources



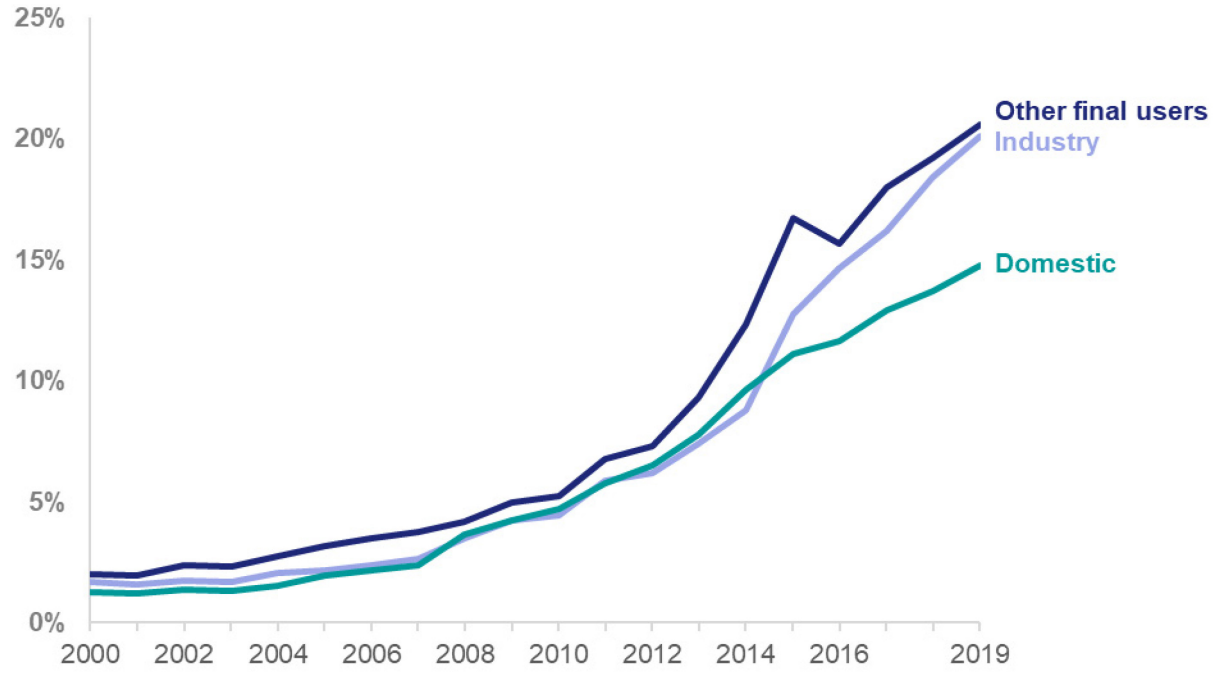
- The trajectory is in line with progress against the RED as reported in DUKES 2020. As the two measures are calculated on a different basis, they do not match exactly.

- For demand, the proportion met through renewables depends on the fuel mix supplied into the sector. The greater the demand met through electricity, in general the greater the proportion of renewables given the relatively high level of renewables within the electricity generation mix.

- Accordingly, the proportion of demand met from renewables varies from a low of 3.4 per cent (for transport, mainly from biofuels) to highs of over 20 per cent for ‘other final users’, which is largely the service and commercial sectors that consume relatively large quantities of electricity, and industry.

Figure 2 below shows a comparison of the final energy consuming sectors (excluding transport) and the changing renewable component since 2000.

Figure 2: share of final energy consumption from renewable sources



Since 2016, the proportion of renewables has been steadily increasing though Figure 2 above shows a fall between the years 2015 and 2016 for 'other final users'. This represents an increase in the denominator, i.e. total demand which resulted in a fall in the renewables proportion. This is due to a re-allocation of oil consumption from unclassified to other sectors including agriculture, public administration, and commerce for 2016 and 2017[4]. This brings the proportion in renewables demand for other users in line with that for the industry sector (21 per cent for the former and 20 per cent for the latter). This compares with 15 per cent renewables in the domestic sector reflecting the high proportion of gas consumption for heating purposes. Table 3 below shows the changes how each individual fuel type has impacted the change between the two years.

Table 3: Fossil fuel consumption in the industrial sector by fuel:

	2016	2017	2018	2019	2016-2019	2016-2019
Hard Coals	1304	1125	1027	927	-377	-29%
Man. Solid Fuels	314	296	266	309	-5	-2%
Petroleum Products	2331	2645	2588	2300	-31	-1%
Natural Gas	8647	8862	8853	8750	104	1%
Renewables	3297	3690	4224	4485	1188	36%

For further information, please contact:

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[4] See paragraph 1.65 in The Digest of UK Energy Statistics 2019;
www.gov.uk/government/statistics/energy-chapter-1-digest-of-united-kingdom-energy-statistics-dukes

Methodological Annex

The following calculations were used to derive the renewable components:

Bioenergy and waste: For bioenergy, the non-biodegradable part of waste which is included in the balances is excluded.

Renewable electricity imports: The renewable mix for those countries exporting electricity to the UK grid (France, Ireland, and The Netherlands) was calculated for each year using data from the International Energy Agency (IEA).

Renewable electricity exports: BEIS assumed that electricity exported from the UK contained renewables in proportion to the overall supply.

Biogas: The ratio of biogas injected into the gas grid to natural gas, is used to calculate the renewable component.

Worked example – domestic renewables consumption

This table illustrates the calculation of the renewables components with reference to domestic consumption in 2016.

Table A.1. worked example (ktoe)

Fuel Source	Fossil	Renewable	Total
Coal	414	0	414
Manufactured Fuel	168	0	168
Petroleum	2525	0	2,525
Natural Gas	26,716	57	26,773
Bioenergy	0	2,079	2,079
Electricity	6,828	2,456	9,284
Heat	51	1	52
Total	36,702	4,593	41,295
Proportion, of which renewables			**11.1%**

Notes for renewable data

Natural gas: BEIS estimate that 165 ktoe of biomethane was injected into the gas grid. If this biogas was consumed equally by all gas consumers, then 57 ktoe were consumed by the domestic sector.

Bioenergy: Sum of domestic consumption of wood, solar thermal and heat pumps.

Electricity: BEIS estimate 26.5 per cent of electricity supply was produced from renewables.

Heat: BEIS estimate that 1.5 per cent of heat sold was generated from renewables.

Supply and demand of transport fuels during COVID-19

Introduction

This article documents trends in supply and demand of road fuels (petrol and diesel) and aviation fuel (collectively, transport fuels) during the disruption to travel that resulted from the COVID-19 pandemic.

Key points

Covid-19 and lockdown measures caused a reduced demand across transport fuels and levels of supply decreased in response to this.

Road Fuels[1]
From the start of lockdown until the Prime Minister's recovery strategy speech (23 March – 10 May 2020):

- Average forecourt sales in Great Britain decreased by around 60 per cent compared to average sales in the eight weeks prior to lockdown,
- Stock levels were high because of a fall in demand and hence a smaller number of deliveries to forecourts was required,
- Average stock levels in forecourts peaked to 59 per cent full.

Following the recovery strategy speech on 10 May 2020:

- As more sectors in England re-opened, demand initially recovered faster in England than Scotland and Wales,
- Demand in Scotland and Wales also increased as sectors re-opened later,
- Demand for road fuels in Great Britain increased in July and reached around 90 per cent of typical levels seen in the eight weeks prior to lockdown by the end of July,
- Supply (stock levels and deliveries to forecourts) returned to average levels by the end of July.

Aviation Fuel

- A larger impact of the pandemic was felt in the aviation sector as the number of flights in and out of UK declined steeply,
- In April - June 2020, UK flight traffic decreased by 90 per cent compared to 2019,
- Flight traffic increased slightly in July following quarantine exemptions to some countries

[1] This article covers data from 27 January 2020 (eight weeks prior to lockdown) – 2 August 2020 (until the impact of opening most sectors is visible). Please see the final section "Further Data" for more information on accessing updated data.

What was lockdown?

The Prime Minister announced an imposed lockdown in the UK from 23 March 2020 because of the spread of Covid-19.

Key dates (England)

March 16 - Stop non-essential travel, avoid pubs, work from home if possible

March 20 - Schools closed, except for children of key workers

March 23 - UK enters lockdown. "Stay at home, protect the NHS, save lives"

May 10 - PM announces recovery strategy, "stay alert, control the virus, save lives". People who cannot work from home should return to work and unlimited outdoor exercise from 13 May

June 15 - Non-essential shops re-opened

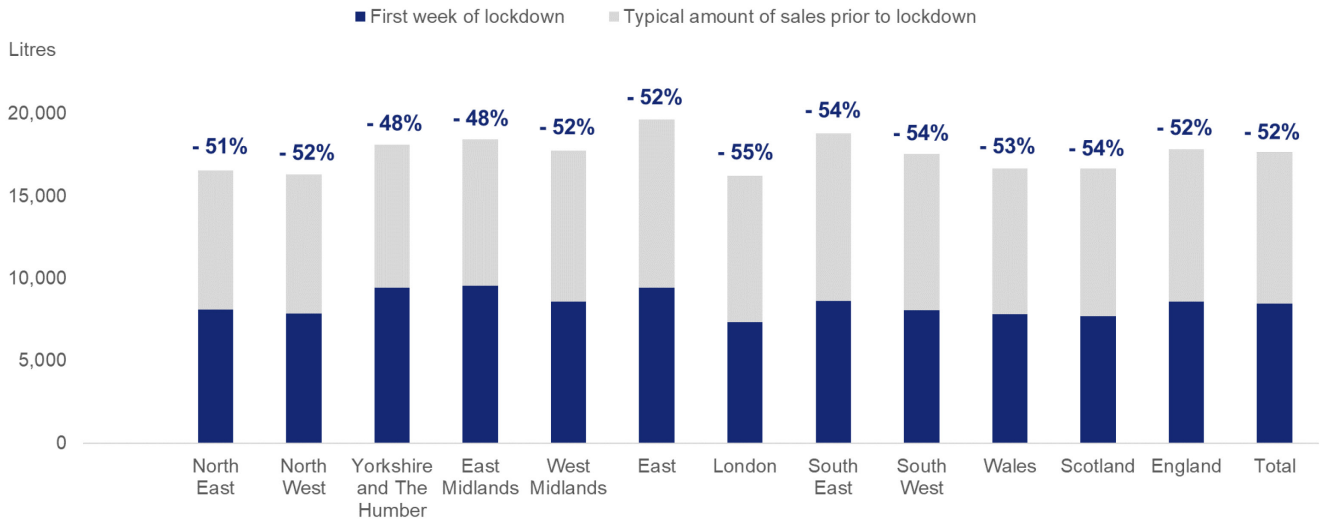
July 4 - Pubs, restaurants and hairdressers reopen. Social distancing is set to 1m+

What happened to demand during lockdown?

Once lockdown began, demand levels further decreased. Average forecourt sales fell from an average of 17,700 litres per filling station per day (in the eight weeks prior to lockdown) to 14,600 litres on the first day of lockdown. This was a decrease of 26 per cent compared with the previous Monday.

The first week of lockdown saw a decrease of around half the sales prior to lockdown across Great Britain. London had the largest decrease (55 per cent) whilst North East had the lowest decrease, (51 per cent). Figure 1 illustrates the average sales in the first week of lockdown (week ending 29 March) by region compared to typical levels prior to lockdown. Demand thereafter continued falling steeply with the first Sunday in lockdown (29 March) seeing a fall in sales of 62 per cent compared to the previous Sunday.

Figure 1: Average road fuel sales in the first week of lockdown compared to typical sales by region, litres



Source: BEIS, data covering 23 March 2020 – 29 March 2020 compared to average typical levels seen in the eight weeks prior to lockdown

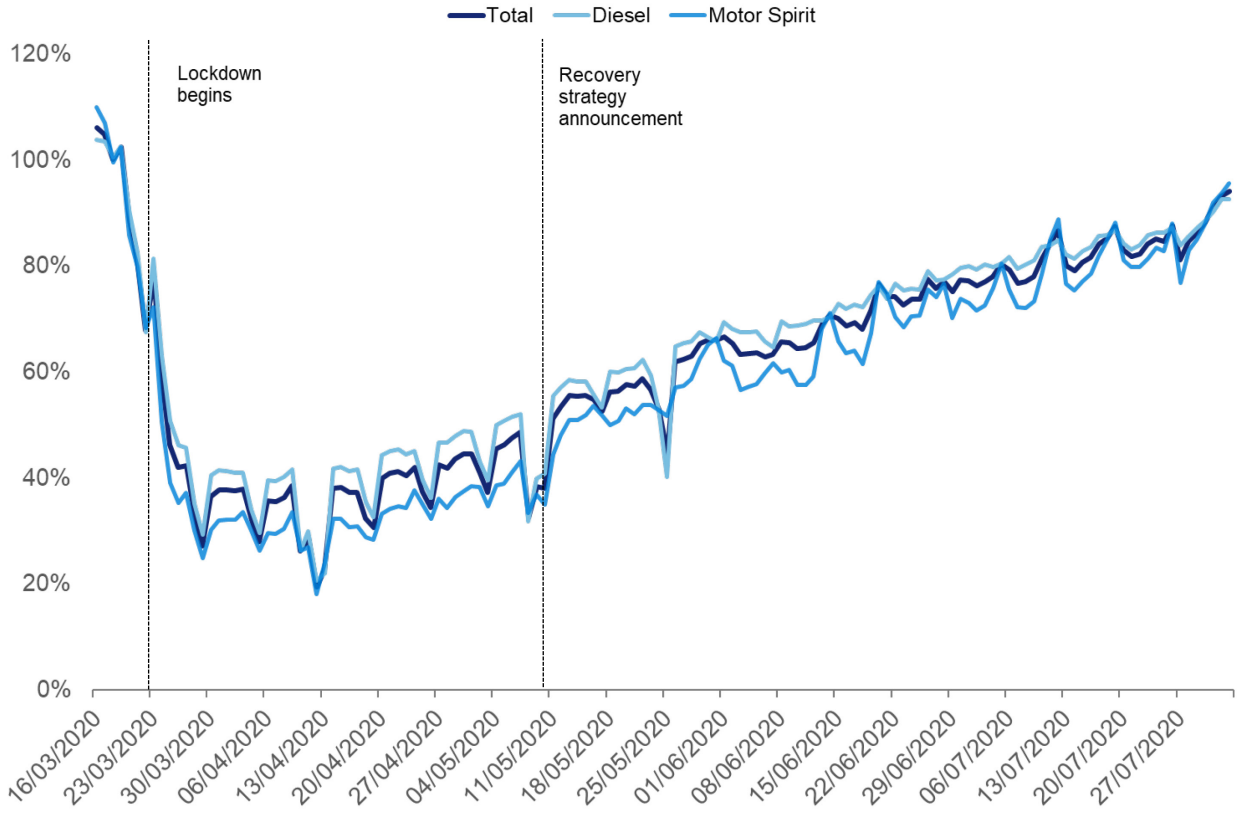
Demand levels in early lockdown varied between around 20 to 60 per cent of typical levels in the eight weeks prior to lockdown (see Figure 2). The lowest level was on Sunday 12 April (Easter Sunday) where demand was at 19 per cent of the typical level prior to lockdown, though demand on Easter Sunday is generally low. The lowest level excluding Bank Holidays was on Sunday 29 March where demand was at 27 per cent of the typical level prior to lockdown.

Following the Prime Minister's recovery strategy speech on 10 May, average forecourt sales continued to increase every day compared with the previous week. From 11 May, average forecourt sales were above 50 per cent of typical levels before lockdown for the first time since lockdown

started. Average forecourt sales boosted upon the reopening of more sectors. Great Britain's demand was higher when non-essential shops re-opened in England on Monday 15 June as average forecourt sales were approximately 13,200 litres (around 70 per cent of the typical levels seen prior to lockdown).

In the final stage outlined by the Prime Minister (the opening of hospitality sectors on Saturday 4 July in England), average forecourt sales reached around 12,200 litres (roughly 80 per cent of typical levels for a Saturday before lockdown). This continued to increase, and demand resumed closer to "normal" where average forecourt sales were as high as approximately 90 per cent of typical levels prior to lockdown, at the end of the period detailed here.

Figure 2: Demand as a proportion of typical levels by fuel type, per cent



Source: BEIS, data covering 16 March 2020 – 2 August 2020

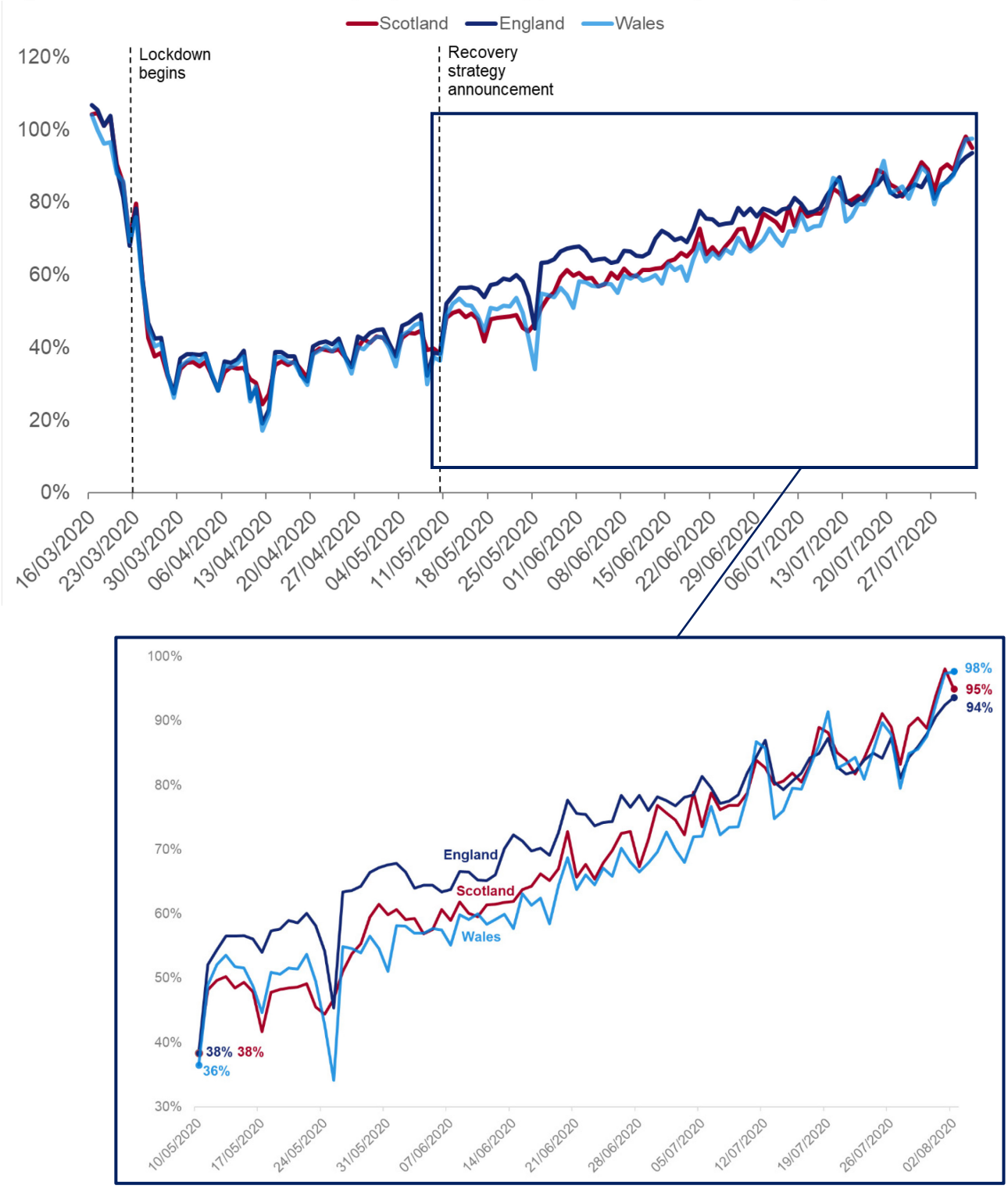
Were there any differences by country in Great Britain?

Demand for road fuels in England, Scotland and Wales followed a similar trajectory during early lockdown. A small divergence occurred following different strategies after 10 May (see Figure 3 for time series). England usually had higher demand levels as the opening of some sectors occurred earlier in England than Scotland and Wales. The highest difference between England and Scotland occurred on 23 May as demand in England was 13 percentage points higher than Scotland. The highest difference between England and Wales occurred on 14 June when demand in England was 15 percentage points higher than Wales.

On average, the proportion of demand compared to typical levels in England was 6 percentage points higher than Scotland until 13 July, at which point the final re-opening of sectors such as pubs and restaurants occurred in Scotland. This resulted in demand levels in Scotland surpassing that of England for a couple of days and being broadly similar thereafter. Whereas, in Wales the proportion of demand levels was slightly lower and hence, demand in England was 8 percentage points higher until 13 July and followed a broadly similar pattern thereafter, once Welsh pubs and restaurants had

also reopened. Towards the end of this time period (end of July), once all countries had similar sectors open, demand in England was lower than Scotland and Wales, most notably on 25 July, when demand levels in England were 7 and 6 percentage points lower respectively.

Figure 3: Demand levels as a proportion of typical levels by country, per cent[2]



Source: BEIS, data covering 16 March 2020 – 2 August 2020

[2] Please note the time series illustrates two low points due to lower sales on Bank Holidays (12 April and 25 May).

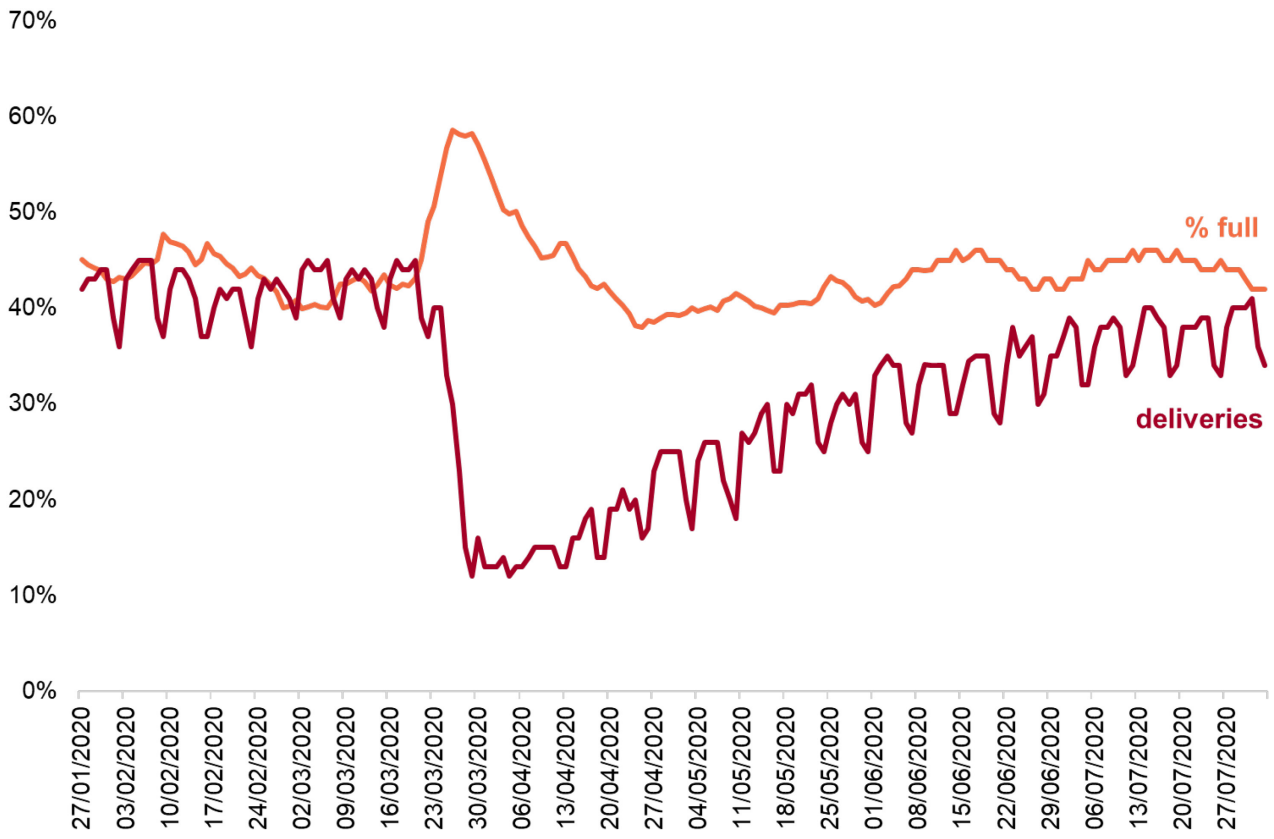
What was supply like during lockdown?

A fall in demand in early lockdown resulted in an increased level of stock. On 26 March, forecourt stock levels on average peaked to 59 per cent full, 16 percentage points higher than average stock levels in the eight weeks prior to lockdown. The downstream oil sector adjusted to the lack of demand by making fewer deliveries whilst stocks were high. Deliveries fell to 12 per cent on 29 March, a decrease of 71 per cent compared with pre-lockdown levels.

Deliveries to forecourts increased once stock levels had fallen below 40 per cent full. Deliveries slightly increased to accommodate the increased demand, particularly after the Prime Minister's recovery strategy announcement. Since average forecourt sales were still lower than sale levels from the eight weeks prior to lockdown, deliveries were also not at average levels.

In the final week of this period (at the end of July), deliveries had increased and reached 38 per cent, 5 percentage points lower than average levels in the eight weeks prior to lockdown. Most notably around 40 per cent of forecourts received a delivery in the last few days of July and stock levels closed at average levels (around 43 per cent full), as seen in Figure 4.

Figure 4: Time series of stock levels (per cent full in forecourts) and proportion of forecourts receiving a delivery



Source: BEIS, data covering 27 January 2020 – 2 August 2020

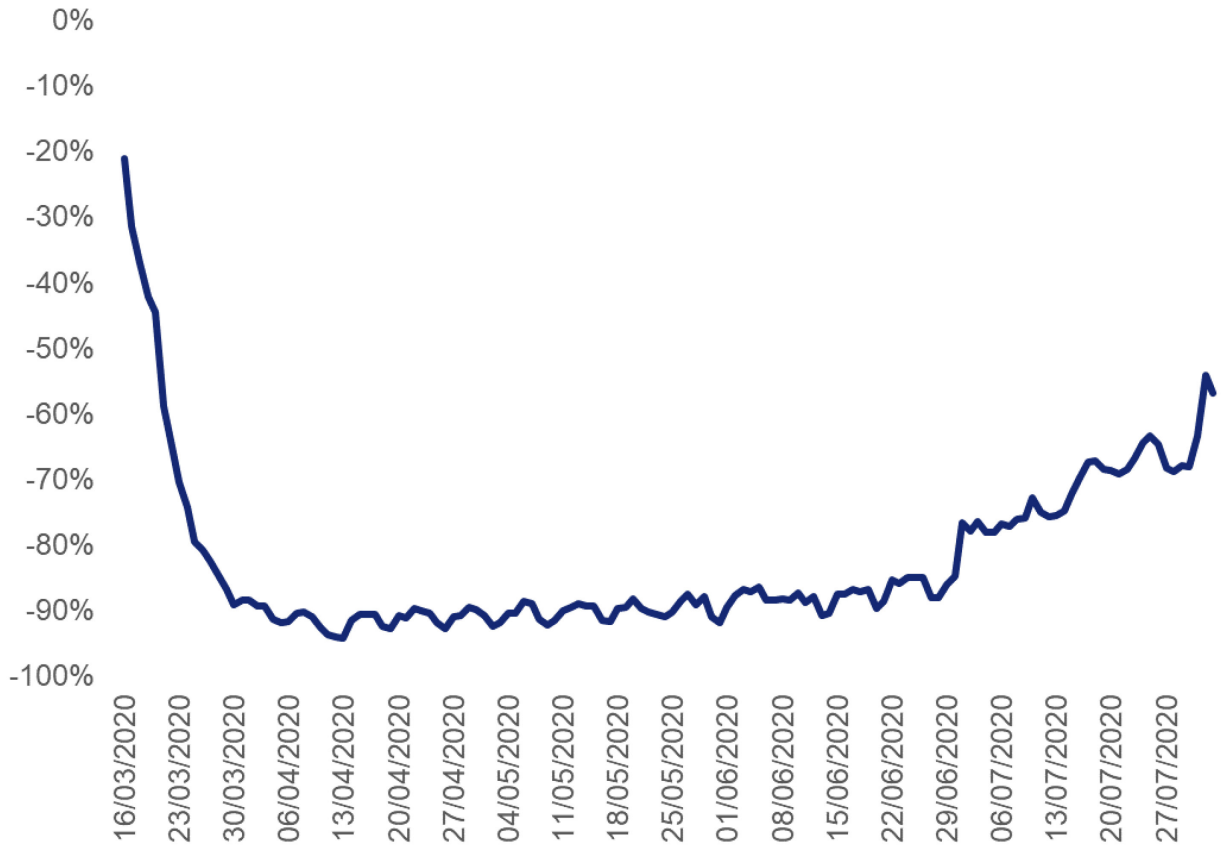
Jet demand during lockdown[3]

The Foreign and Commonwealth Office advised against all non-essential travel on 17 March which had significant implications for air travel. Following this announcement, flight traffic[4] in and out of UK had decreased by a third compared to the same day in 2019. This declined further as the week continued and on the first day of lockdown, flight traffic in and out of the UK had fallen by 70 per cent compared to 2019.

Demand for aviation was most impacted from April to June as these months had an average decline in flight traffic by approximately 90 per cent compared with 2019, with a slight increase in June.

Following the announcement of exemptions to quarantine rules in some countries, flight traffic increased in July despite the overall decline. During July, flight traffic was approximately down by 71 per cent versus 2019. The increase in travel during July was an improvement of roughly 30 percentage points by the end of July compared to April/May 2020.

Figure 5: Percentage change comparison of number of flights



Source: Eurocontrol data (see footnote 2), data covering flights from 16 March 2020 – 2 August 2020 versus the number of flights in the same period in 2019

[3] Source: Aviation data from Eurocontrol: www.eurocontrol.int/Economics/DailyTrafficVariation-States.html
[4] Flight traffic includes flights covering international arrivals, departures, domestics but excludes overflights.

Further data

These statistics are based on the "Experimental Statistics on average road fuel sales and stock levels"[5] at sampled filling stations in Great Britain". That publication has further details on the data sources used in this analysis.

Please be advised our intention is to publish the Experimental Statistics on average road fuel sales and stock levels monthly from the end of September until the end of December 2020. In addition to the monthly release on Thursday 29 October 2020, we intend to publish a draft quarterly release for users to provide feedback on. From Thursday 28 January 2021 we aim to publish these data on a quarterly basis.

We welcome feedback on the publication of the average road fuel sales and stock levels and the new proposed timeline of the publication. Please email any comments or suggestions to Downstream.Oil.Statistics@beis.gov.uk.

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Downstream Oil Resilience Analysis
Tel: 020 7215 8631
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[5] Publication can be found on the last table of www.gov.uk/government/statistics/oil-and-oil-products-section-3-energy-trends

Recent and forthcoming publications of interest to users of energy statistics

Smart Meters quarterly statistics

This publication provides estimates on the roll-out of Smart Meters in Great Britain, covering meters operating and meters installed. The latest release, covering estimates up to the end of June 2020, was published on 27 August 2020 at:
www.gov.uk/government/collections/smart-meters-statistics

Household Energy Efficiency statistics

This series presents statistics on the Energy Company Obligation (ECO), Green Deal and homes insulated. The headline release presents monthly updates of ECO measures and quarterly updates of in-depth ECO statistics, carbon savings and the Green Deal schemes. The latest release was published on 17 September 2020 at:
www.gov.uk/government/collections/household-energy-efficiency-national-statistics

Renewable Heat Incentive statistics

This series presents statistics on deployment data for the non-domestic Renewable Heat Incentive (RHI) to support the uptake of renewable heat in the non-domestic sector, and the domestic RHI to encourage a switch to renewable heating systems in the domestic sector. The latest release was published on 17 September 2020 at:
www.gov.uk/government/collections/renewable-heat-incentive-statistics

Sub-national consumption of residual fuels

This publication presents the findings of the residual fuels sub–national energy consumption analysis in the UK for the period covering 1 January to 31 December 2018. Residual fuels are defined as non-gas, non-electricity and non-road transport fuels, and cover consumption of coal, petroleum, manufactured solid fuels and bioenergy and waste not used for electricity generation or road transport. The release was published on 24 September 2020 at:
www.gov.uk/government/collections/sub-national-consumption-of-other-fuels

Sub-national total final energy consumption

This publication presents the findings of the sub–national energy consumption analysis in the UK for all fuels, for the period covering 1 January to 31 December 2018, with gas consumption covering the period mid-May 2018 to mid-May 2019. The release was published on 24 September 2020 at:
www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level

Sub-national electricity and gas consumption in Northern Ireland

This publication presents estimates of the latest analysis of electricity consumption in Northern Ireland at District Council level, with electricity covering the period 31 January 2018 to 30 September 2019, and with gas consumption covering the period mid-May 2018 to mid-May 2019. The release was published on 24 September 2020 for electricity at:
www.gov.uk/government/collections/northern-ireland-electricity-consumption-data,
and for gas at:
www.gov.uk/government/collections/sub-national-gas-consumption-data#sub-national-gas-consumption-statistics-in-northern-ireland

Energy Consumption in the United Kingdom (ECUK)

This annual publication would normally have been published alongside DUKES at the end of July. However, as the demand increases for statistics and data to measure the impact of the coronavirus (COVID-19) pandemic, we have had to change data gathering and release practices. This is to focus our efforts on priority analysis and statistics. As such, the 2020 release of this publication will now take place on Thursday 22 October 2020.
www.gov.uk/government/collections/energy-consumption-in-the-uk

Energy Trends and Energy Prices: December 2020

Energy Trends and Energy Prices are normally released concurrently on the last Thursday of March, June, September and December. Given that the last working Thursday of December, the 31 December, will fall between Christmas and New Year it has been decided that the release date for the December 2020 editions will be brought forward to Tuesday 22 December 2020.

Sub-national electricity consumption, 2019

This publication looks at electricity consumption by consuming sector for Great Britain, and regional/devolved administration areas, together with some commentary relating to local authority trends. The data analysed in this publication are based on the aggregation of Meter Point Administration Number (MPAN) readings throughout Great Britain as part of BEIS's annual meter point electricity data exercise. The data cover the electricity year between 1 February 2019 and 1 January 2020 for domestic and small consuming non-domestic meters and the calendar year for high consuming non domestic meters. These data follow on from the results produced from similar exercises carried out for 2005 to 2018. The latest release will be published on 22 December 2020, at: www.gov.uk/government/collections/sub-national-electricity-consumption-data.

Sub-national gas consumption, 2019

This publication looks at gas consumption by consuming sector for Great Britain, and regional/devolved administration areas, together with some commentary relating to local authority trends. The data analysed in this factsheet are based on the aggregation of Meter Point Reference Number (MPRN) readings throughout Great Britain as part of BEIS's annual meter point gas data exercise. The data is expected to cover the gas year between mid May 2019 and mid May 2020 and are subject to a weather correction factor. In the domestic sector, gas consumption is predominately used for heating purposes and as a result usage is driven by external temperatures and weather conditions. The weather correction factor enables comparisons of gas use over time, controlling for weather changes. These data follow on from the results produced from similar exercises carried out for 2005 to 2018. The latest release will be published on 22 December 2020, at: www.gov.uk/government/collections/sub-national-gas-consumption-data.

Sub-national electricity and gas consumption at Postcode, LSOA, MSOA and IGZ level, 2019

This publication comprising a series of Excel spreadsheets provides details of domestic and non-domestic electricity and gas consumption at Postcode, Lower Super Output Area (LSOA), Middle Super Output Area (MSOA) and Intermediate Geography Zone (IGZ) for 2019.

The latest release will be published on 22 December 2020, for electricity at:
www.gov.uk/government/statistics/lower-and-middle-super-output-areas-electricity-consumption
and
www.gov.uk/government/collections/sub-national-electricity-consumption-data#postcode-level-data
and gas at:
www.gov.uk/government/statistics/lower-and-middle-super-output-areas-gas-consumption
and
www.gov.uk/government/collections/sub-national-gas-consumption-data#postcode-level-data

Explanatory notes

General

More detailed notes on the methodology used to compile the figures and data sources are available on the BEIS section of the GOV.UK website.

Symbols used in the tables

.. not available
- nil or not separately available
p provisional
r revised; where a column or row shows 'r' at the beginning, most, but not necessarily all, of the data have been revised.
e estimated; totals of which the figures form a constituent part are therefore partly estimated

Notes to tables

- Figures for the latest periods and the corresponding averages (or totals) are provisional and are liable to subsequent revision.
- The figures have not been adjusted for temperature or seasonal factors except where noted.
- Due to rounding the sum of the constituent items may not equal the totals.
- Percentage changes relate to the corresponding period a year ago. They are calculated from unrounded figures but are shown only as (+) or (-) when the percentage change is very large.
- Quarterly figures relate to calendar quarters.
- All figures relate to the United Kingdom unless otherwise indicated.

- Further information on Oil and Gas is available from The Oil & Gas Authority at: www.ogauthority.co.uk/

Conversion factors

1 tonne of crude oil =	7.55 barrels
1 tonne =	1,000 kilograms
1 gallon (UK) =	4.54609 litres
1 kilowatt (kW) =	1,000 watts
1 megawatt (MW) =	1,000 kilowatts
1 gigawatt (GW) =	1,000 megawatts
1 terawatt (TW) =	1,000 gigawatts

All conversion of fuels from original units to units of energy is carried out on the basis of the gross calorific value of the fuel. More detailed information on conversion factors and calorific values is given in Annex A of the Digest of United Kingdom Energy Statistics.

Conversion matrices

To convert from the units on the left-hand side to the units across the top multiply by the values in the table.

To:	**Thousand toe**	**Terajoules**	**GWh**	**Million therms**
From	**Multiply by**			
Thousand toe	1	41.868	11.630	0.39683
Terajoules (TJ)	0.023885	1	0.27778	0.0094778
Gigawatt hours (GWh)	0.085985	3.6000	1	0.034121
Million therms	2.5200	105.51	29.307	1

To:	**Tonnes of oil equivalent**	**Gigajoules**	**kWh**	**Therms**
From	**Multiply by**			
Tonnes of oil equivalent	1	41.868	11,630	396.83
Gigajoules (GJ)	0.023885	1	277.78	9.4778
Kilowatt hours (kWh)	0.000085985	0.003600	1	0.034121
Therms	0.0025200	0.105510	29.307	1

Note that all factors are quoted to 5 significant figures

Abbreviations

ATF	Aviation turbine fuel
CCGT	Combined cycle gas turbine
DERV	Diesel engined road vehicle
LNG	Liquefied natural gas
MSF	Manufactured solid fuels
NGLs	Natural gas liquids
UKCS	United Kingdom continental shelf

Sectoral breakdowns

The categories for final consumption by user are defined by the Standard Industrial Classification 2007, as follows:

Fuel producers	05-07, 09, 19, 24.46, 35
Final consumers	
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
Other final users	
Agriculture	01-03
Commercial	45-47, 52-53, 55-56, 58-66, 68-75, 77-82
Public administration	84-88
Other services	90-99
Domestic	Not covered by SIC 2007