Department for Business, Energy & Industrial Strategy

Energy Trends

UK, April to June 2021

About this release

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

In this release

Data tables

Additional data are available online as part of the Energy Trends series:

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

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

Percentage change from April to June 2020

(mtoe basis)	Production	Imports	Exports	Demand
Total energy	**-27%**	**+28%**	**-33%**	**+23%**
Coal	**-17%**	**+58%**	**-45%**	**+19%**
Primary oil	**-32%**	**+38%**	**-25%**	**+15%**
Petroleum products	**+21%**	**+18%**	**-15%**	**+41%**
Gas	**-41%**	**+31%**	**-76%**	**+25%**
Electricity	**-7.8%**	**+26%**	**-16%**	**-7.8%**

Final energy consumption in the second quarter of 2021 was up 33 per cent from last year's record lows when Covid-19 restrictions constrained travel and other activities. Energy requirements for industrial use were up 17 per cent on the same period last year, and demand from other final users (e.g., shops, restaurants, offices, and public buildings) was up 20 per cent. Domestic demand was up 19 per cent reflecting colder weather in the quarter.

Transport fuels increased by 65 per cent compared to the same period last year. Whilst petrol and diesel sales returned to near normal levels, **aviation demand – whilst up on last year - remained at near record lows**, down 78 per cent on 2019.

Production and trade in energy was also disrupted. Overall energy production fell 27 per cent as maintenance activities curtailed output. **Production of oil and gas fell to a record low** following maintenance on the Forties Pipeline. **Imports of gas increased sharply**, with pipeline imports from Norway providing the vast bulk of the imported supply.

Renewable generation fell on the same period last year due to less favourable conditions in 2021, particularly for wind. Windy conditions last year led to record renewable generation and the still weather this year decreased wind generation by 14 per cent. **Fossil fuel generation increased by 36 per cent** as gas was used to make good the shortfall. Fossil fuel generation's share rose to 43.4 per cent, its highest share since the second quarter of 2019. Low carbon generation's share dropped to 53.1 per cent.

Growth in renewable generation capacity remained modest, up 1.4 per cent on the same period last year. Growth in renewable capacity has slowed since the start of 2020.

Section 1: UK total energy

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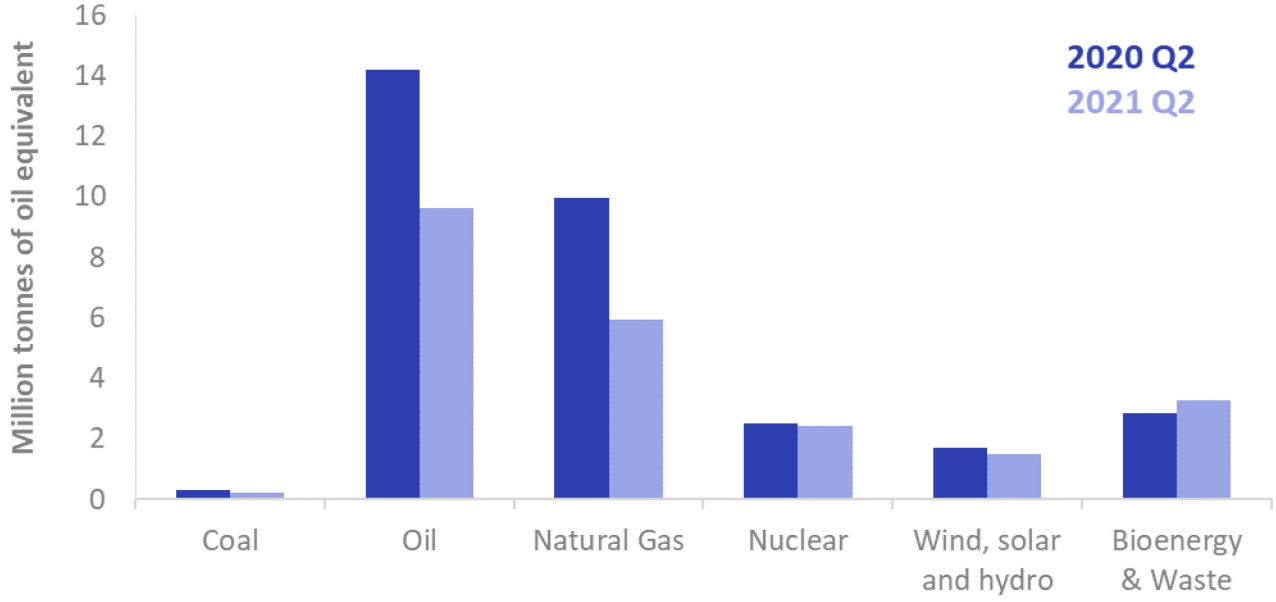
Key headlines

In the second quarter of 2021 **total production was 23.0 million tonnes of oil equivalent, 27 per cent lower** than in the second quarter of 2020, and at a record low quarterly level this century. This is a result of significant maintenance on the North Sea (notably at the Forties Pipeline Kinneil terminal), coupled with lower wind speed and fewer sun hours reducing renewable generation.

Total primary energy consumption for energy uses rose by 25 per cent, recovering from record lows last year when Covid-19 restrictions reduced energy demand for all fuels but particularly petroleum. When adjusted to take account of weather differences, primary energy consumption rose by 14 per cent.

Total final energy consumption (excluding non-energy use) was 33 per cent higher compared to the second quarter of 2020 when the UK first entered a period of lockdown during the Covid-19 pandemic. Transport consumption rose by 63 per cent as travel restrictions were eased, other final users (mainly from the service sector) consumption rose by 20 per cent, domestic consumption rose by 19 per cent with average temperatures colder than a year earlier, and industrial consumption rose by 17 per cent. On a seasonally and temperature adjusted basis, final energy consumption rose by 17 per cent, with rises in all sectors except domestic which fell by 4.7 per cent. Consumption has continued to pick up in the first half of 2021 from the levels seen during the Covid-19 pandemic lockdown periods in 2020, with the easing of travel restrictions resulting in increased transport demand, though many international travel corridors remain closed.

Chart 1.1 UK production

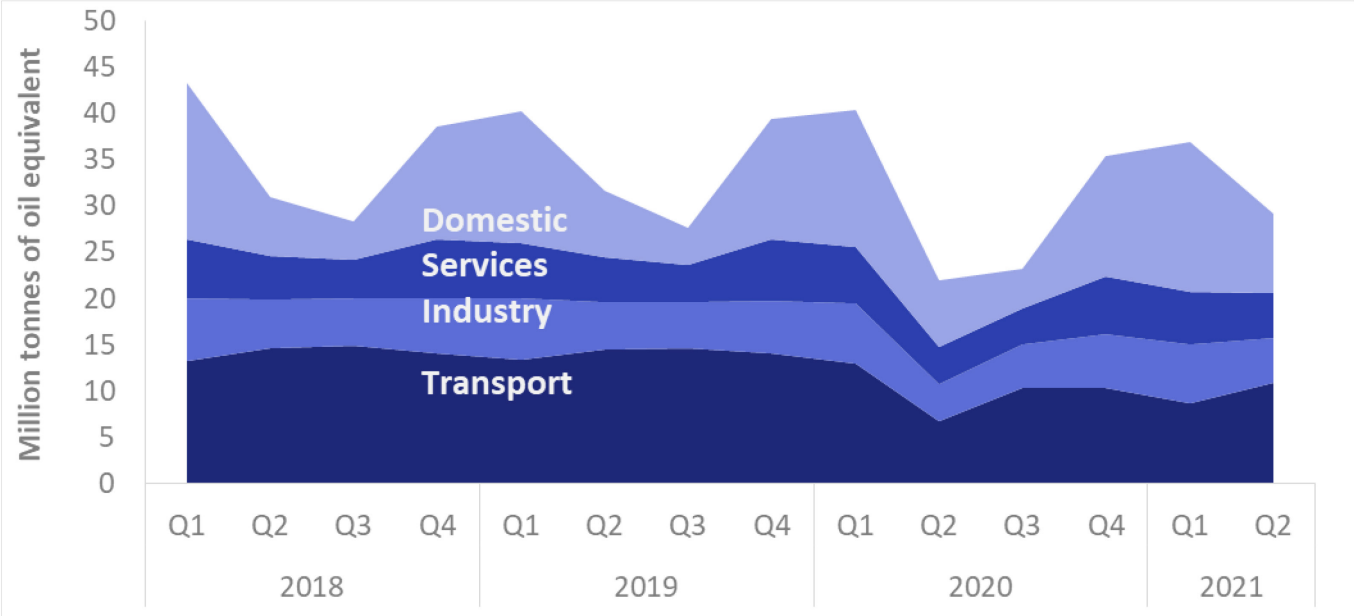


In the second quarter of 2021 **total production was 23.0 million tonnes of oil equivalent, 27 per cent lower** than in the second quarter of 2020, and at the lowest quarterly level recorded in the 21st century. The principal cause was a shutdown of the Forties Pipeline System (FPS) for planned critical maintenance during the quarter. Wind, solar and hydro output fell due to less favourable weather conditions for all renewable technologies.

Chart 1.2 Total inland consumption (primary fuel input basis)

In the second quarter of 2021 **total inland consumption (which includes not only fuel use by consumers, but fuel used for electricity generation and other transformation)** was 173.1 million tonnes of oil equivalent, 14 per cent higher than in the second quarter of 2020, on a seasonally adjusted and annualised rate that removes the impact of temperature on demand - and 6.1 per cent higher than in the first quarter of 2021. This large increase represents the easing of restrictions in 2021 compared with 2020 when many activities were curtailed as a result of the Covid-19 pandemic.

Chart 1.3 Final energy consumption by user



In the second quarter of 2021 **total final energy consumption (excluding non-energy use) was 33 per cent higher** than in the second quarter of 2020 when the UK first entered a period of lockdown during the Covid-19 pandemic. Transport consumption rose by 63 per cent, as lockdown restrictions were lifted particularly for domestic travel, service sector consumption rose by 20 per cent as access to shops and workplaces was opened up, whilst industrial sector energy consumption rose by 17 per cent. Domestic consumption rose by 19 per cent, as people continued to work at home in average temperatures that were 2.0 degrees Celsius colder than a year earlier, with April being noticeably colder, and colder than March for the first time since 2012.

Section 2: Coal and derived gases

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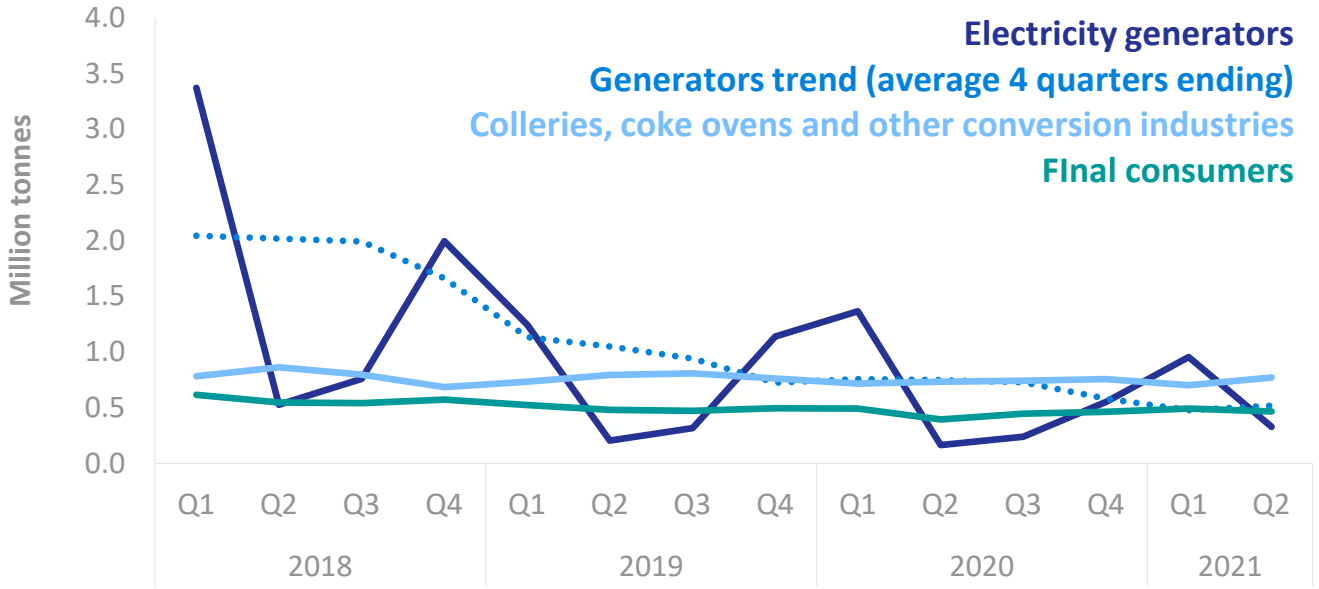
Key headlines

In the second quarter of 2021, demand for coal by electricity generators rose to 330 thousand tonnes. Although this is double the value for the same period last year, the change was from a low baseline following record periods without coal generation in Great Britain in 2020 (as a result of higher than usual wind generation due to storm activity last year). Lower generation from renewable sources and colder weather in April and May also contributed to higher coal generation. With the Drax coal units mothballed at the end of March 2021, just three coal plants remain operational in the UK, with coal use for electricity generation expected to cease completely by October 2024. (Chart 2.1)

Overall coal production **for the second quarter of 2021 fell to 358 thousand tonnes,** down 18 per cent on the second quarter of 2020. Surface mining production fell to 337 thousand tonnes. Mine closures and a pattern of generally falling demand contributed to lower production.

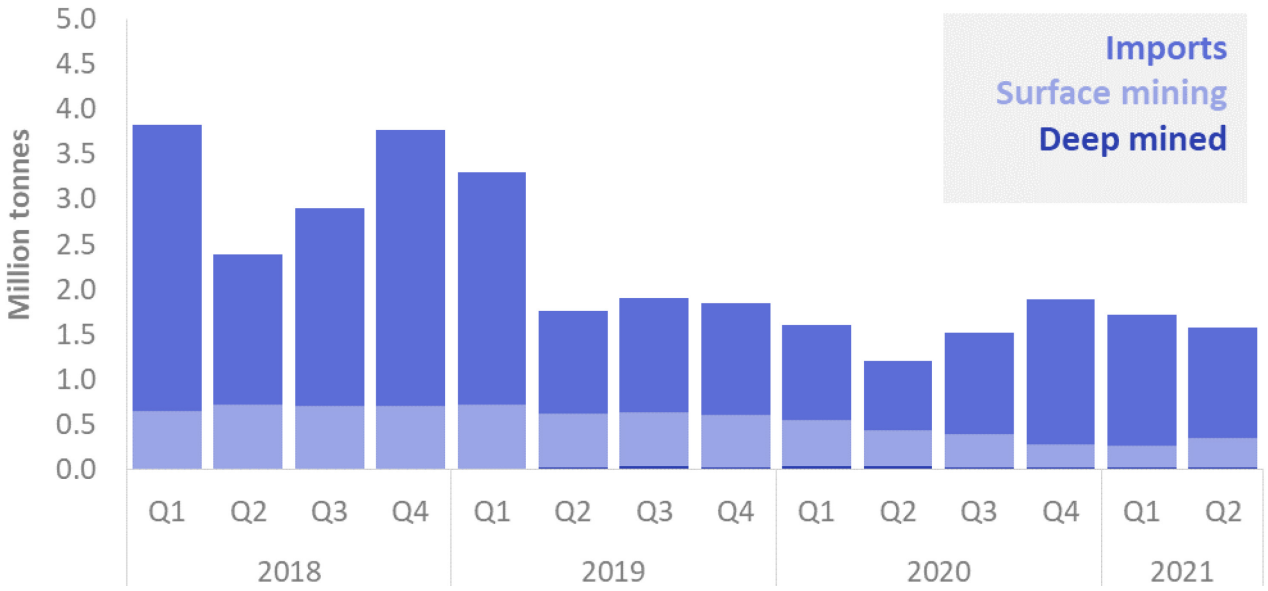
In Q2 2021, **coal imports rose to 1.2 million tonnes**, 60 per cent up on Q2 2021. Net imports accounted for 49 per cent of supply in Q1 2021 (Chart 2.2). Russia (49 per cent), the USA (18 per cent) and Australia (12 per cent) accounted for 79 per cent of total coal imports. (Chart 2.3)

Chart 2.1 Coal Consumption



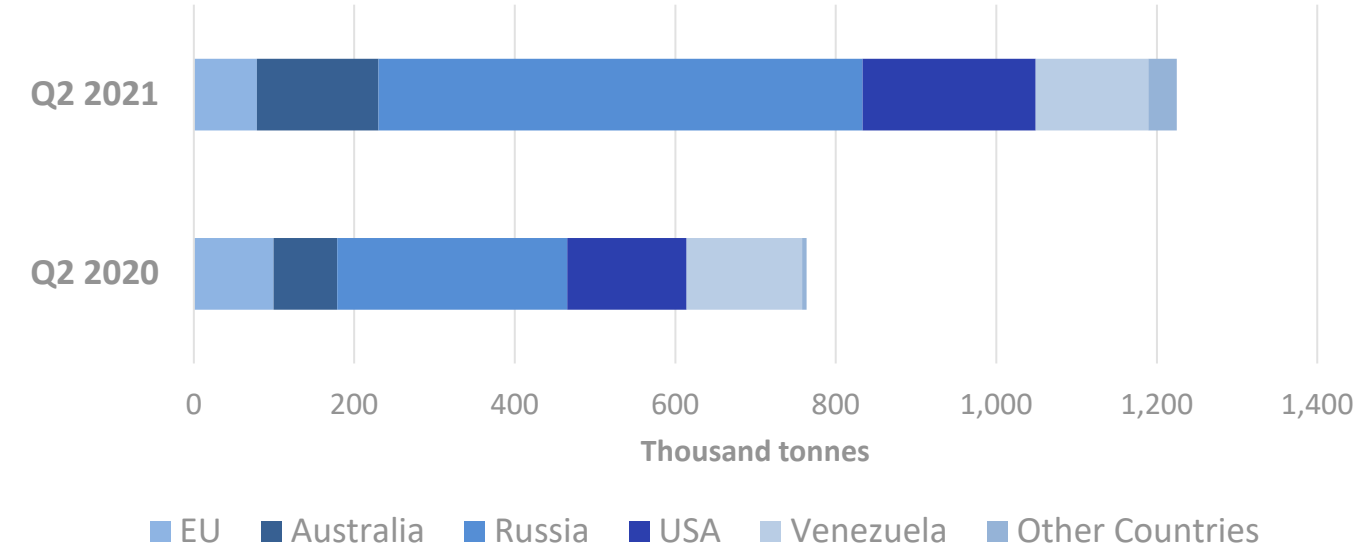
In the most recent quarter, coal demand for coal-fired electricity generation doubled from 166 tonnes in Q2 2020 to 330 thousand tonnes in Q2 2021. This was from a low baseline following record periods without coal generation in Great Britain in 2020 (as a result of higher than usual wind generation due to storm activity last year). Demand for coal-fired generation is seasonal, peaking in winter when conditions are cold and dark; these peaks have declined as coal-fired generation became less competitive economically and gas and renewable sources displaced it.

Chart 2.2 Coal Supply



Domestic coal production has fallen steadily because of coal mine closures and a pattern of generally reduced demand over time, particularly for generation. Imports filled the gap, rising from 764 thousand tonnes in the second quarter of 2020 to 1.2 million tonnes in the second quarter of 2021. However, imports have fallen from the peak of 13.3 million tonnes in the second quarter of 2013 as overall demand dropped.

Chart 2.3 Coal Imports



In Q1 2022 Russia (49 per cent), the USA (18 per cent) and Australia (12 per cent) accounted for 79 per cent of total coal imports.

Section 3: Oil and oil products

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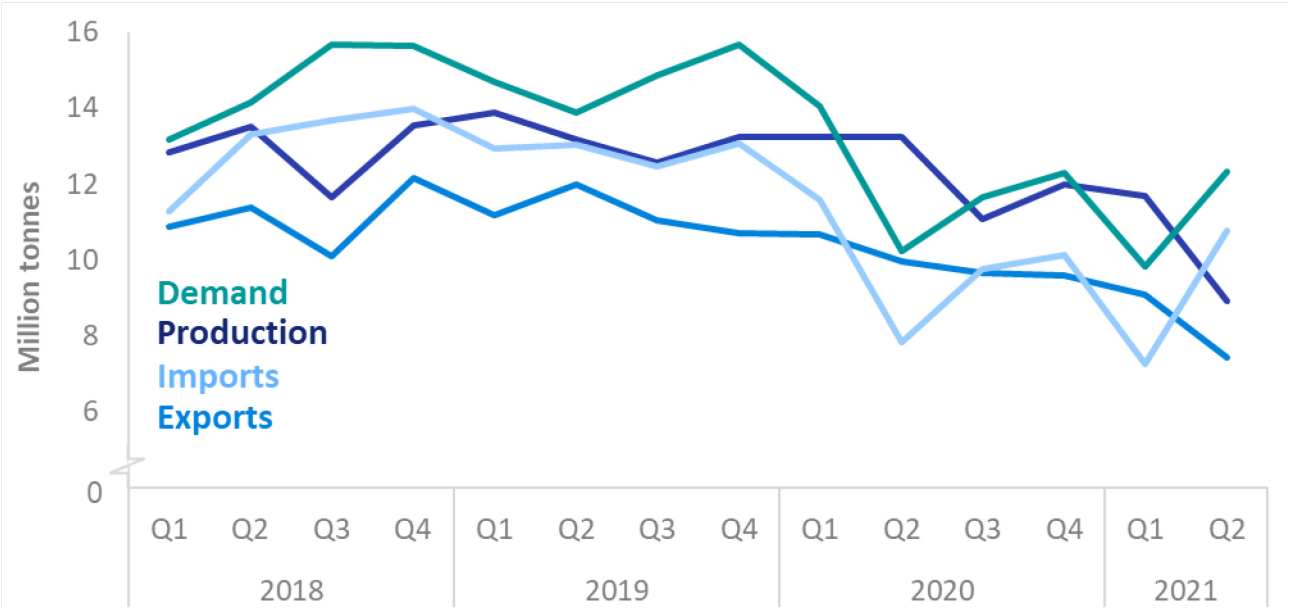
Key headlines

Quarterly production of primary oils fell to the second lowest on record, down by nearly one-third in April to June 2021 compared to the same period in 2020, as scheduled maintenance of the Forties Pipeline System affected upstream operations.

Final consumption increased by 44 per cent mainly due to increases in the transport sector, which was up 65 per cent compared to the same period in 2020. Demand for petrol and diesel increased by 78 and 61 per cent respectively and demand for aviation fuel increased by 77 per cent.

Oil stocks reduced to 10.2 million tonnes in June 2021 following changes to the UK oil stocking protocol and demand returning to more typical levels as pandemic restrictions are eased.

Chart 3.1 Production and trade of crude oil and NGLs



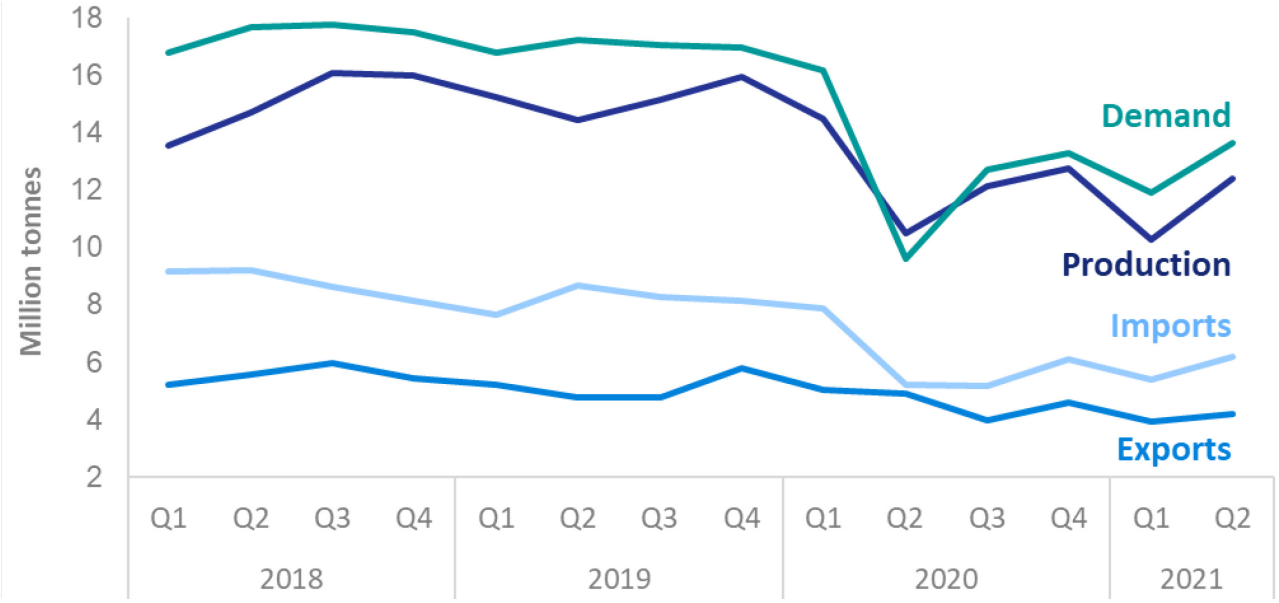
Production of primary oils fell to the second lowest on record because of a shutdown of the Forties Pipeline System for planned critical maintenance during the quarter. Primary oil demand has been met through increased imports and reduced exports. Imports of primary oils increased 38 per cent, whilst exports fell 25 per cent compared with last year.

Demand for primary oils increased by a fifth in April to June 2021 compared to last year, which had been the second lowest on record as refiners reduced operations in the face of much reduced demand during the first UK lockdown. The UK returned to being a net importer of primary oils, by 3.4 million tonnes.

Final consumption increased by 44 per cent compared to April to June 2020 mainly due to an increase in demand for transport fuels, up by two-thirds on the record lows of 2020 during the first UK national lockdown. Petrol demand was up nearly 80 per cent compared with this time last year and diesel by 61 per cent. Jet fuel demand was up by more than three-quarters, although remains very low by historical standards.

The increase in final consumption was met through a one-fifth increase in refinery production as well as a one-fifth increase in imports, with exports down by 14 per cent. The UK once again became a net importer of oil products by 2.0 million tonnes.

Chart 3.2 Production and trade of petroleum products

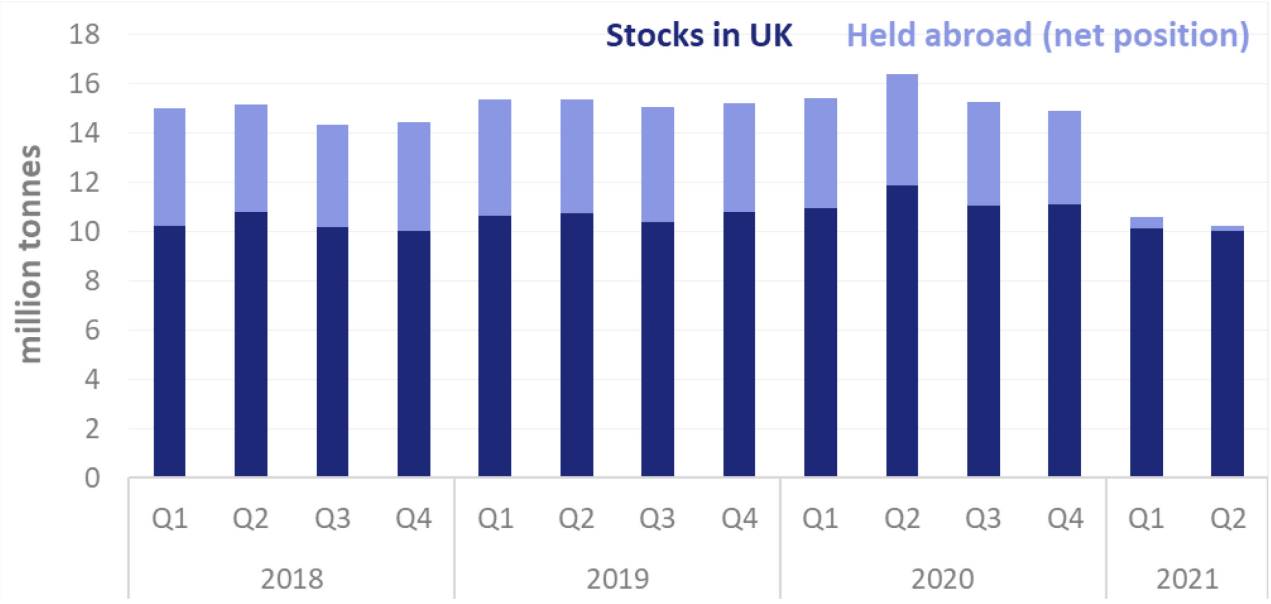


Since leaving the European Union (EU) on the 1st of January 2021 the UK has been obligated to hold emergency stocks of oil under membership of the International Energy Agency (IEA) only. The rules for the IEA are different, so the level of the UK obligation decreased in 2021. Stocks may be held physically within a country or may be 'ticketed', which means that stocks held to meet the obligation of one country may be kept in another country.

Stocks had been at record highs through 2020 because the suppressed demand meant that more oil was placed into storage. However, the pickup in demand as lockdown restrictions have been eased has meant that stocks in the UK have returned to typical levels seen before the pandemic, down by roughly six per cent compared to the 2019 average. Stocks held abroad were no longer required to meet the reduced obligation in 2021. Chart 3.3 shows that these saw the sharpest decrease in June 2021, falling from a net position of 4.5 million tonnes in June 2020 to 0.2 million tonnes in 2021.

Total stocks held for the UK, at 10.2 million tonnes, were equivalent to 200 days of typical net imports (based on 2019 total demand for oil), which is more than sufficient to meet the IEA obligation of 90 days of net imports.

Chart 3.3 Stocks of oil held for the UK, 2018 to 2021



Section 4: Gas

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Key headlines

Production was down over 40 per cent in April to June 2021 compared to the same period in 2020. Major scheduled maintenance took place through June on the Forties Pipeline System, which is a key part of UK offshore infrastructure.

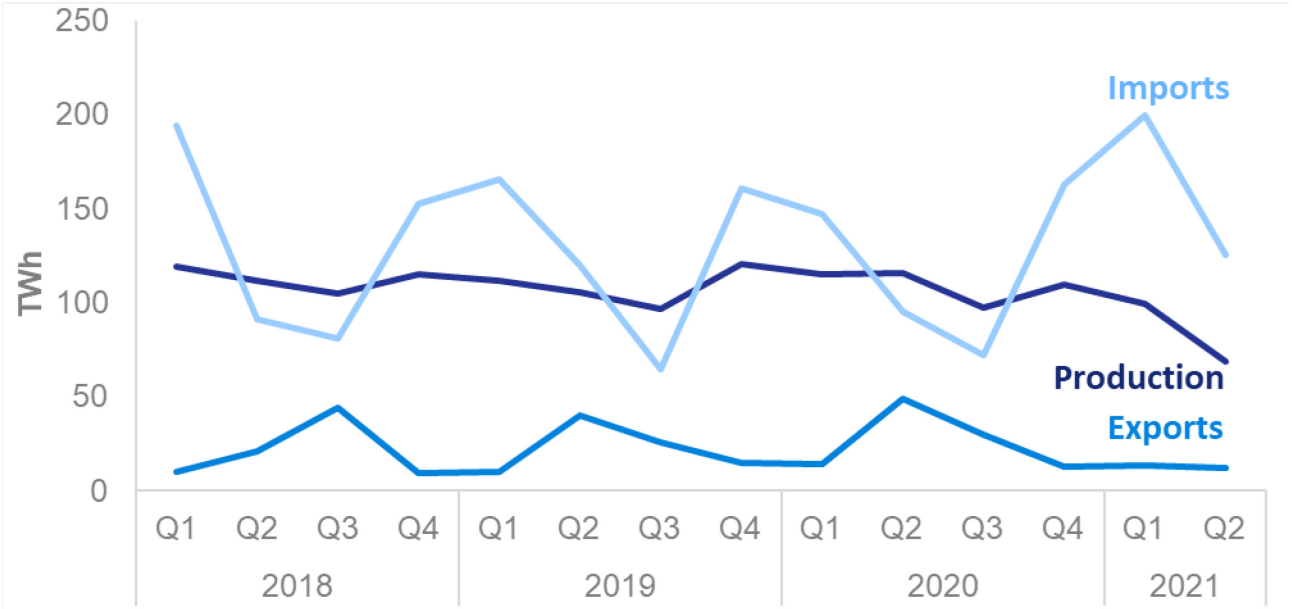
Exports continued to fall whilst imports increased by nearly one-third, resulting in net imports more than doubling in April to June 2021 compared to the same period last year. Norway remained the principal source of UK imports, with volumes doubling compared to the same period last year.

Demand for gas was up by 24 per cent. This was largely a result of increased demand for electricity generation which increased by 45 per cent; owing to reduced output from renewable sources largely because of lower wind speeds compared to this period last year.

Demand in the domestic sector was also up, by more than quarter, as temperatures fell below the seasonal average and following exceptionally warm weather in 2020.

Industrial demand was up by a fifth compared to low demand in April to June 2020, which saw the first national lockdown because of the Covid-19 pandemic.

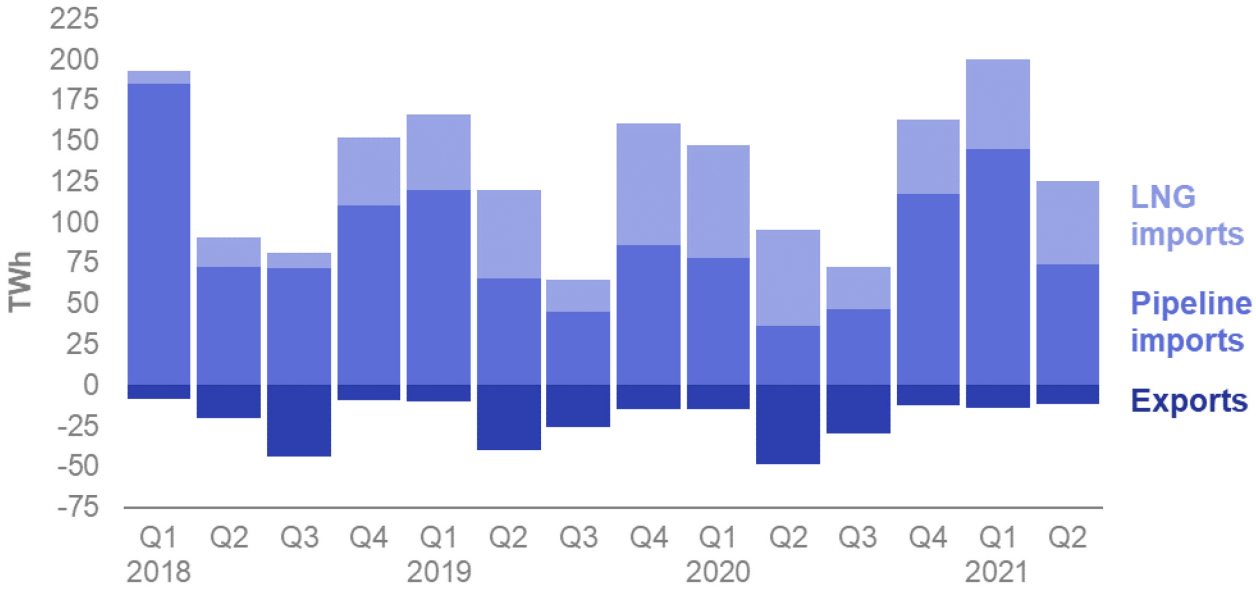
Chart 4.1 Production and trade of natural gas



Gross gas production was down by 41 per cent in April to June 2021 compared to the same period in 2020 because of extensive scheduled maintenance work on the Forties Pipeline System. This is a key piece of UK offshore infrastructure, which is critical for approximately 40 per cent of UK oil and gas production. The work took three weeks, with many connected fields taking the opportunity to complete their own programmes of maintenance. The system came back online towards the end of June and connected fields have since been resuming operations. The work on Forties is now completed.

Net imports more than doubled to meet demand in the face of low production, with imports up by nearly a third and exports down to a quarter of levels in 2020. The UK's principal source of imports during the quarter remained Norway, and Norwegian imports accounted for nearly 60 per cent of total imports.

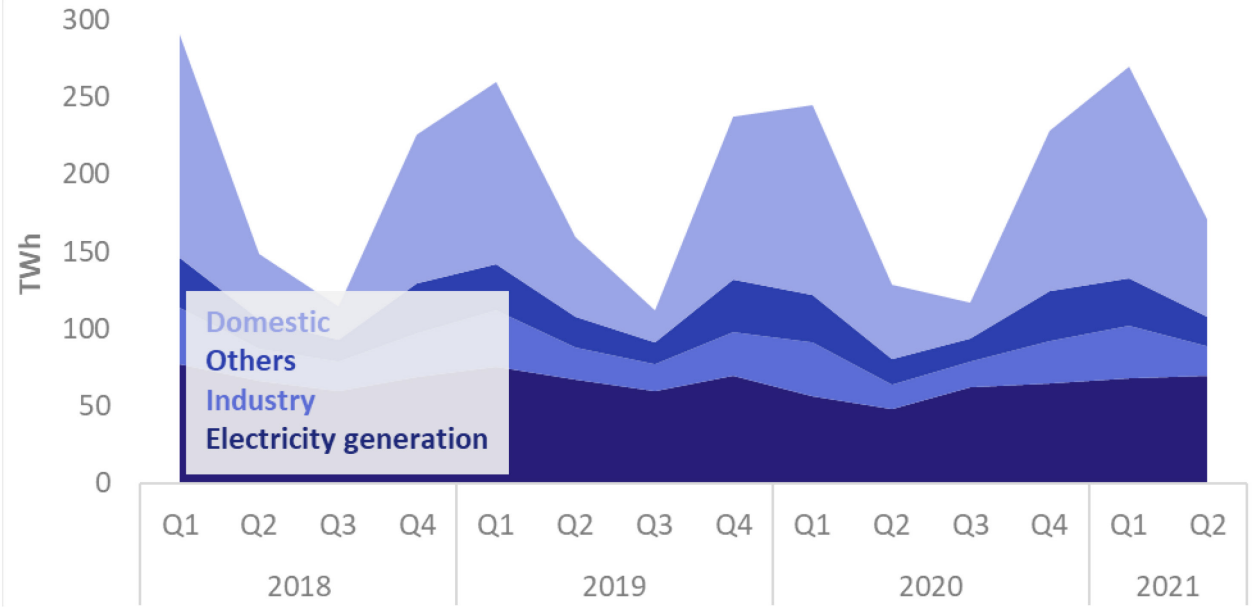
Chart 4.2 Trade in natural gas



Exports fell to less than a quarter of levels in April to June 2020 as trade was used to balance demand in the face of lower production. At just 12.0 TWh, this was the lowest level for exports during this period of the year since 1998. Flows to the Netherlands were down by 85 per cent, with no exports at all to Belgium in the second quarter of the year for the first time since 2000. These reductions more than outweighed the increase of 16 per cent to Ireland and 8.8 per cent to the Isle of Man.

Imports increased by 31 per cent, the highest for this time of year in seven years. Pipeline imports increased by two-thirds, with imports from Norway doubling to 68 TWh. **LNG imports remain substantial** but were down by 14 per cent on the same period in 2020, which were notably high. Qatar accounted for nearly 60 per cent of LNG imports (and 23 per cent of total imports), followed by Russia, the US and Algeria.

Chart 4.3 Demand for natural gas



Demand for natural gas was up by 24 per cent in April to June 2021 compared to last year, mainly because demand for electricity generation was up by 45 per cent. Last year very windy weather led to record renewable generation, which was not the case this year and gas was used to fill the gap.

Domestic demand was up by 27 per cent to 62.0 TWh as temperatures fell below the long-term average and compared to 2020 when temperatures were unusually warm. **Industrial demand was up by a fifth** compared to the same period in 2020, which saw the first national lockdown in place to curb the spread of Covid-19.

Section 5: Electricity

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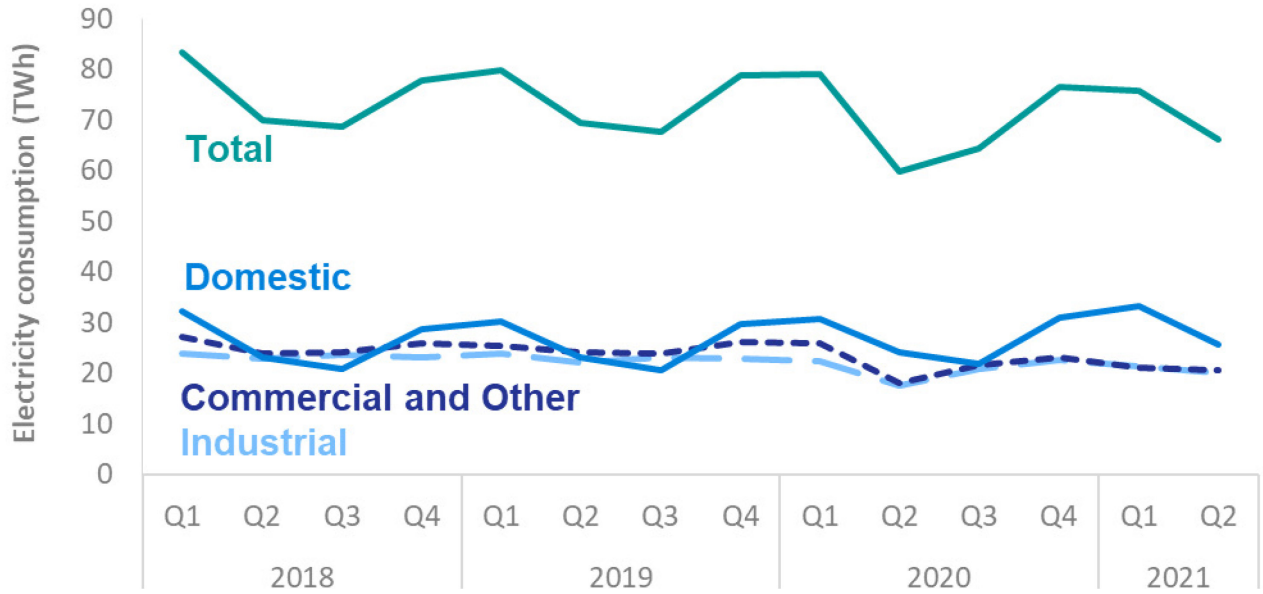
Key headlines

Quarter 2 of 2021 saw higher electricity demand and generation than Quarter 2 2020, when both were reduced by the first Covid lockdown. Demand in Quarter 2 increased by 10.3 per cent while total generation increased by 7.8 per cent, with increased net imports accounting for the difference.

Demand increased in all sectors in Quarter 2 2021 as Covid restrictions were gradually lifted during the quarter. Electricity consumed by the industrial sector was up 13 per cent while consumption by other final users (including commercial users) increased by 12 per cent. Domestic electricity consumption increased by 6.0 per cent.

Lower wind speeds were a significant contributory factor to a 9.6 per cent decrease in renewable generation in Quarter 1 of 2021 and resulted in a 36 per cent increase in fossil fuel generation to meet increased demand over the quarter. The share of fossil fuel generation increased 8.9 percentage points to 43.4 per cent, whilst the renewable generation share fell to 37.3 per cent. Nuclear generation fell by 3.9 per cent in Quarter 2 2021 as outages continued at many of the UK's nuclear plants. As a result, low carbon generation also fell, down 9.1 percentage points on last year's record high to 53.1 per cent.

Chart 5.1 Electricity consumption by sector



Total consumption of electricity was 66.2 TWh in Quarter 2 2021, with year on year increases in all three sectors. This was a 11 per cent increase compared to Quarter 2 of 2020, but 4.7 per cent lower than Quarter 2 of 2019. This reflects the ongoing effects of Covid-19 restrictions on business and industry which have meant that consumption has not yet returned to pre-pandemic levels.

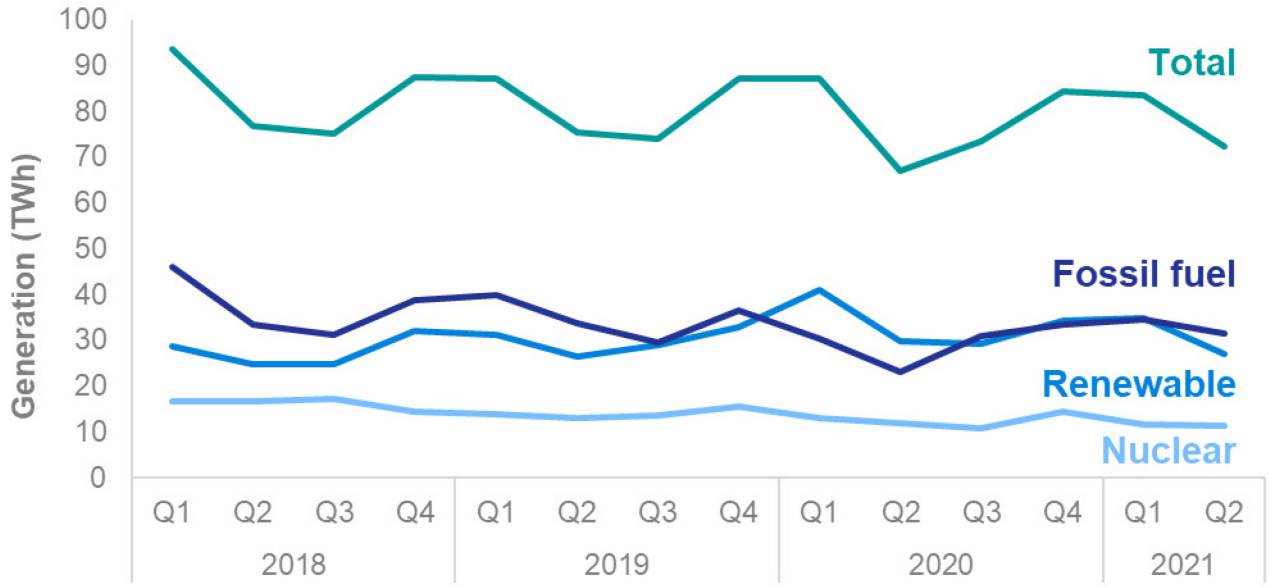
Domestic consumption remained high in Quarter 2 2021, up 6.0 per cent to the highest value for Quarter 2 since Quarter 2 2013. This reflects the Covid-19 restrictions in place during this time which meant that people continued to spend more time at home than usual. Quarter 2 2021 also saw lower average temperatures than the same period in 2020 which increased electricity demand for heating.

Both non-domestic sectors saw increased consumption levels in Quarter 2 2021 compared to the same period in 2020. This increase reflects the unusually low electricity consumption during the same period in 2020, as a result of the first national lockdown in response to Covid-19 (commencing 23rd March 2020). Non-domestic consumption remained below 2019 levels as some Covid restrictions remained throughout April to June 2021, though these were gradually eased throughout the three months.

Electricity consumed by the industrial sector increased by 13 per cent compared to Quarter 2 2020, though remained 10 per cent below the value for the same period in 2019. This broadly mirrors the trends shown in the manufacturing Index of Production.

Consumption by other final users (including the commercial sector) increased by 12 per cent in Quarter 2 2021 compared to the same period in 2020. This reflects the gradual reopening of offices, leisure venues and non-essential shops throughout April to June 2021. Despite the increase, consumption in this sector was 15 per cent lower than the same period in 2019.

Chart 5.2 Electricity generated, by fuel type



Quarter 2 of 2021 saw total electricity generation of 72.2 TWh, which was a 7.8 per cent increase compared to Quarter 2 2020. This was in line with the 9.9 per cent decrease in total demand over the same period, with a 36 per cent increase in net imports reducing the need for generation to meet demand.

Renewable electricity generation was 26.9 TWh in Quarter 2 2021, 9.6 per cent lower than the same period in 2020. This fall was primarily driven by a 14 per cent reduction in wind generation because of lower average wind speeds, which were below the averages for the same months in 2020 and substantially below the 10-year averages. Solar and hydro generation also decreased due to less favourable weather conditions.

Fossil fuels generated 31.4 TWh in Quarter 2 2021, substantially higher than renewable sources. This was a 36 per cent increase compared to the unusually low fossil fuel generation in Quarter 2 2020, when low demand as a result of Covid restrictions and high generation from renewables reduced the need for fossil fuel generation. Gas remained the fuel with the highest generation at 30.3 TWh, 34 per cent higher than in Quarter 2 2021. Coal generation remained low at 0.8 TWh, but this was double the coal generation for the same period in the previous year.

Low carbon sources generated 53.1 per cent of the total in Quarter 2 2021, down 9.1 percentage points on the previous year, due to lower renewable and nuclear generation. Nuclear generation fell by 3.9 per cent to 11.4 TWh in Quarter 2 2021, with outages at all but one of the UK's nuclear power stations. The share of fossil fuel generation increased 8.9 percentage points to 43.4 per cent, whilst the renewable generation share fell to 37.3 per cent.

Section 6: Renewables

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Key headlines

In Quarter 2 2021, renewable electricity generation was 26.9 TWh, the lowest value since Quarter 2 2019, and 9.6 per cent lower than the same quarter in 2020.

The growth rate of renewable capacity remains muted, with 134 MW added over the quarter. During the last twelve months, capacity grew by **1.4 per cent** (681 MW), most of which was in wind (both onshore and offshore) and Solar PV.

Renewables share of electricity generation was 37.3 per cent in Quarter 2 2021, falling under fossil fuels' generation share, this was largely a result of much less favourable weather conditions for renewable generation with lower wind speeds and fewer sun hours.

Chart 6.1 Change in renewable generation and capacity between Q2 2020 and Q2 2021

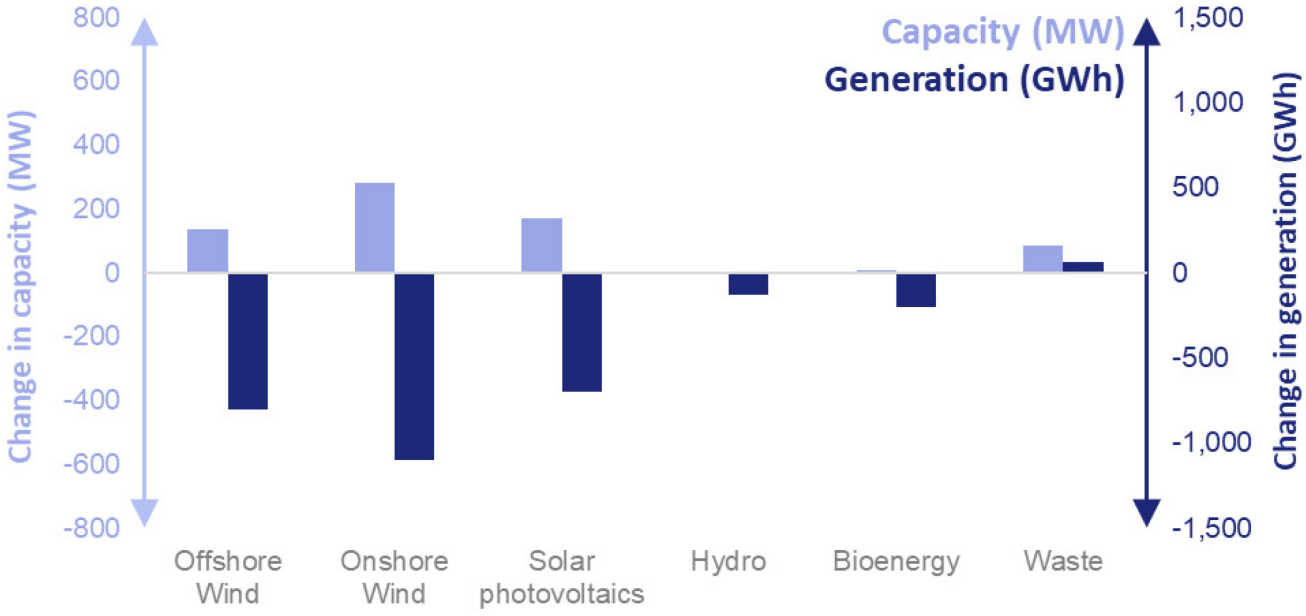
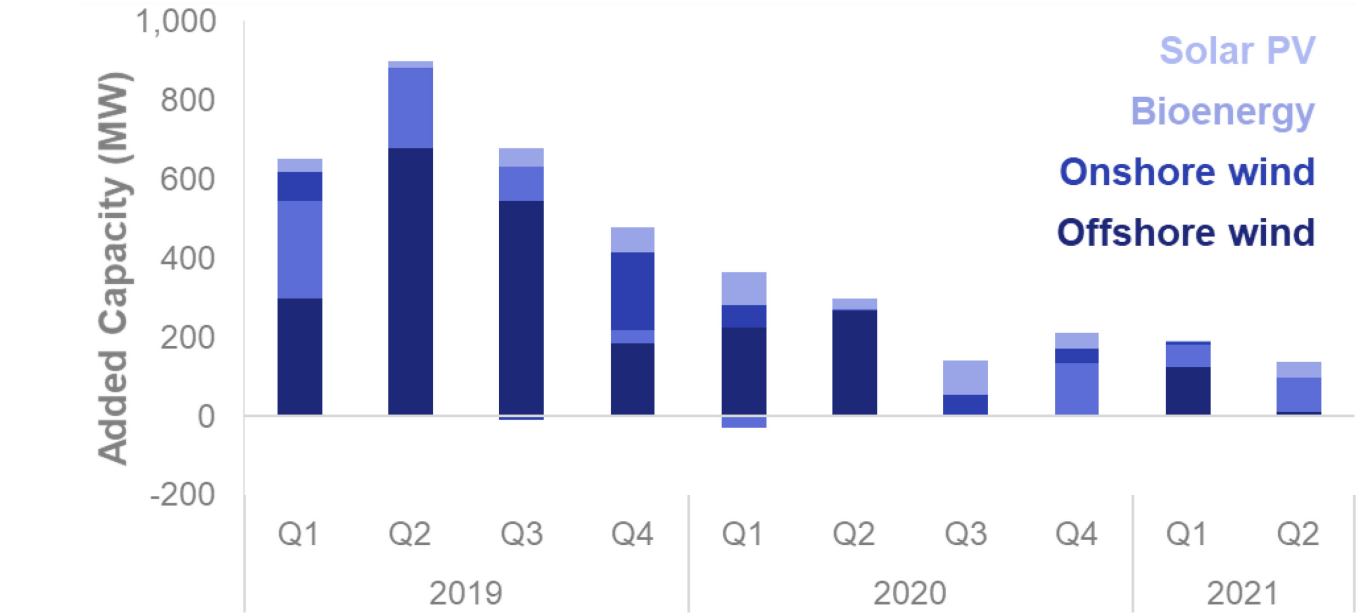


Chart 6.1 compares changes in capacity and generation by technology for Quarter 2 in 2020 and 2021. Where capacity and generation trends conflict, it tends to indicate the dominance of weather effects, most strikingly in wind generation. With only modest increases in wind capacity, generation fell by 13 per cent for onshore and 15 per cent for offshore as a result of lower wind speeds relative to Quarter 2 2020. Generation fell by a greater rate than wind speeds as, planned maintenance at several major plants affected generation. Solar PV generation fell 13 per cent with less sunlight more than offsetting a modest 1.3 per cent increase in capacity[1]. Hydro generation decreased by 12 per cent, with average rainfall[2] being down by about a quarter on Quarter 2 2020. Capacity in bioenergy increased by 1.2 per cent, while generation dropped by 1.4 per cent, as a result of a decrease in sewage sludge digestion and landfill gas generation.

[1] The Feed in Tariff (FiT) scheme[2] closed March 2019. BEIS continues to monitor small scale generation using the Central FiTs Register, and Micro Generation Certification Scheme (MCS) registrations and the Renewable Energy Planning Database (REPD). Currently excluded are unsubsidised installations below 1MW not MCS registered. We are reviewing data sources to improve coverage.
[2] See technical information page for links to weather data.

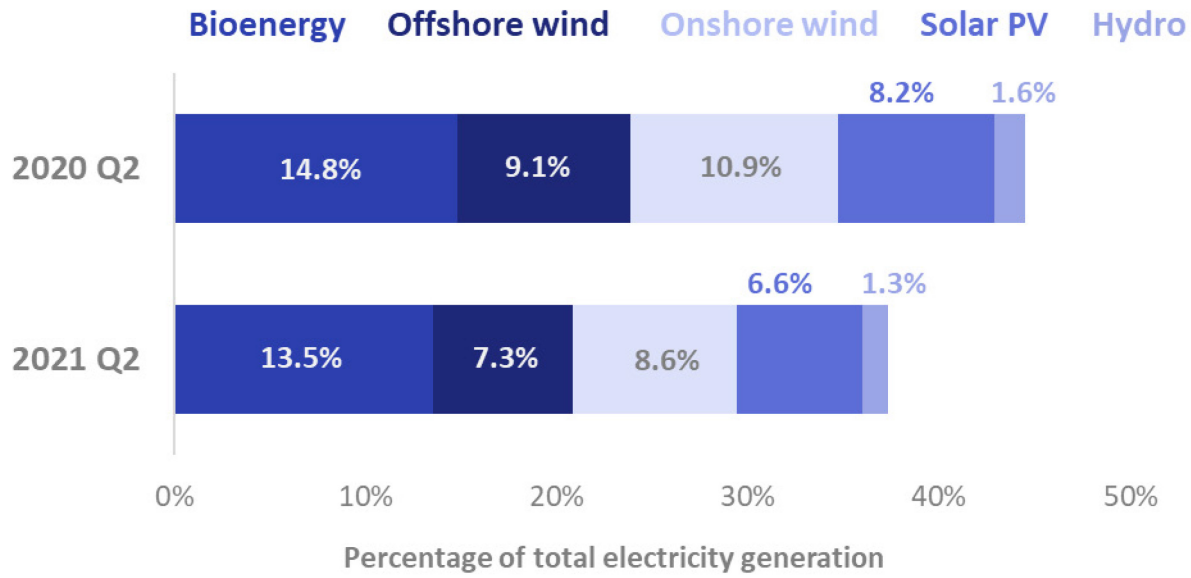
Total renewable capacity grew by just 1.4 per cent between the end of Quarter 2 2020 and Quarter 2 2021, another record low for the quarter on quarter growth rate, compared with a growth of 3.9 per cent from Quarter 2 2019 to Quarter 2 2020, and 7.0 per cent from Quarter 2 2018 to Quarter 2 2019.

Chart 6.2 Added capacity since 2019 for the leading technologies



The only notable increases in capacity were in onshore wind with 281 MW added in the last year (mostly in Quarter 4 2020 and Quarter 1 2021), offshore wind (135 MW added), and 160 MW of Solar PV added mostly during the last two quarters of 2020. Covid-19 restrictions may have caused delays in some projects.

Chart 6.3 Renewables' share of electricity generation – Q2 2020 and Q2 2021



In Quarter 2 2021, renewables' share of generation was 37.3 per cent; this is 7.2 percentage points down on Quarter 2 2020 and lower than the generation share of fossil fuels. This is largely due to an increase in total electricity generated, unfavourable weather conditions and maintenance at several wind farms. Offshore wind's share of total electricity generation was down from 10.9 per cent to 8.6 per cent and has slipped behind bioenergy as the leading renewable technology. Solar PV and hydro's shares were also affected by weather, falling by 1.6 and 0.3 percentage points respectively. Bioenergy's share of electricity generation was also down by 1.3 percentage points as generation from landfill gas, sewage, anaerobic digestion and plant biomass all fell this quarter. These falls were partially offset by increases in generation from renewable waste and animal biomass.

Data tables and special articles

Data in this release

Data are collected by BEIS through surveys of energy suppliers. This publication highlights key stories in energy in the UK for the specified period. Additional data are available in the quarterly and monthly statistical tables for each fuel and total energy. The tables are generally in commodity balance format, showing the flow from the sources of supply through to final use.

Statistical tables*

Data tables available as part of the Energy Trends series:

Total energy
Solid fuels and derived gases
Oil and oil products
Gas
Electricity
Renewables

The full range of special articles is available here: https://www.gov.uk/government/collections/energy-trends-articles

Special articles

Special articles that explore current topics of interest are available alongside this summary report. Included in this publication are:

Renewable electricity in Scotland, Wales, Northern Ireland and the regions of England in 2020

Competition in UK electricity markets

Competition in gas supply 2020

Diversity of supply for oil and oil products in OECD countries in 2020

Aggregated energy balances showing proportion of renewables in production, demand and final consumption

Combined Heat and Power in the regions

Additional sources of information

Index of Production, published by the Office for National Statistics:
https://www.ons.gov.uk/economy/economicoutputandproductivity/output/bulletins/indexofproduction/previousReleases

Index of Services, published by the Office for National Statistics:
https://www.ons.gov.uk/economy/economicoutputandproductivity/output/bulletins/indexofservices/previousReleases

Detailed annual Digest of UK Energy Statistics published on 29 July 2021:
http://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes

Tables showing foreign trade flows of energy:
https://www.gov.uk/government/statistics/dukes-foreign-trade-statistics

Weather tables produced by BEIS using Met Office data:
https://www.gov.uk/government/collections/weather-statistics

Information on Energy Prices:
http://www.gov.uk/government/collections/quarterly-energy-prices

*Hyperlinks will open the most recently published table. If you require a previously published version of a table published by BEIS, please contact Kevin Harris:

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Technical information

Methodology and revisions

More detailed notes on the methodology used to compile the figures and data sources are available on the collection pages for each fuel. The figures have not been adjusted for temperature or seasonal factors except where noted.

Percentage changes relate to the corresponding period a year ago. They are calculated from unrounded figures. They are shown as (+) or (-) when 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/

Table of conversion factors

To	ktoe	TJ	GWh	million therms	To	toe	GJ	kWh	therms
From	Multiply by				**From**	Multiply by			
ktoe	1	41.868	11.63	.39683	**toe**	1	41.868	11.63	396.83
TJ	.023885	1	.27778	.0094778	**GJ**	.023855	1	277.78	9.4778
GWh	.085985	3.6	1	.034121	**kWh**	.000085985	.003600	1	.034121
million therms	2.52	105.51	29.307	1	**therms**	.00252	.105510	29.307	1

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

Sector breakdowns

Categories for final users are defined by Standard Industrial Classification 2007:

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

Revisions policy

Figures for the latest periods are provisional and are liable to subsequent revision. The BEIS statistical revisions policy sets out the revisions policy for these statistics, which has been developed in accordance with the UK Statistics Authority Code of Practice for Statistics.

Related publications

Recent publications of interest

Smart Meters
Statistics on the roll-out of Smart Meters in Great Britain, covering meters operating and meters installed: www.gov.uk/government/collections/smart-meters-statistics

Household Energy Efficiency
Statistics on the Energy Company Obligation (ECO), Green Deal and homes insulated. Monthly updates of ECO measures and quarterly updates of in-depth ECO statistics, carbon savings and the Green Deal schemes: www.gov.uk/government/collections/household-energy-efficiency-national-statistics

Renewable Heat Incentive
Statistics on deployment data for the domestic and non-domestic Renewable Heat Incentive (RHI) to support the uptake of renewable heat: www.gov.uk/government/collections/renewable-heat-incentive-statistics

Energy Consumption in the United Kingdom (ECUK)
Detailed data on end use estimates of energy in the UK: www.gov.uk/government/collections/energy-consumption-in-the-uk

Sub-national total final energy consumption
Findings of the sub–national energy consumption analysis in the UK for all fuels, for the period covering 1 January to 31 December, with gas consumption covering the annual period from mid-May: www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level

Sub-national electricity consumption
Electricity consumption by consuming sector for Great Britain and devolved administration areas. Data are based on the aggregation of Meter Point Administration Number readings as part of BEIS's annual meter point electricity data exercise: www.gov.uk/government/collections/sub-national-electricity-consumption-data.

Sub-national gas consumption
Gas consumption by consuming sector for Great Britain, and devolved administration areas. Data are based on the aggregation of Meter Point Reference Number readings throughout Great Britain as part of BEIS's annual meter point gas data exercise. Data are subject to a weather correction factor to enable comparison of gas use over time: www.gov.uk/government/collections/sub-national-gas-consumption-data.

Sub-national road transport consumption
Road transport fuels consumption in the UK at regional and local authority level. Data is modelled and provided to BEIS by Ricardo Energy & Environment, with estimates based on where the fuel is consumed, rather than where it is purchased.
www.gov.uk/government/collections/road-transport-consumption-at-regional-and-local-level

Sub-national consumption of residual fuels
Non-gas, non-electricity and non-road transport fuels consumption in the UK. Includes coal, petroleum, solid fuels, and bioenergy not for generation or road use: www.gov.uk/government/collections/sub-national-consumption-of-other-fuels

Further information

National statistics

This is a National Statistics publication. National Statistics status means that our statistics meet the highest standards of trustworthiness, quality, and public value, and it is our responsibility to maintain compliance with these standards.

The Office for Statistics Regulation confirmed continued designation of Energy Trends as National Statistics in 2018 following a compliance check. A full assessment against the Code of Practice was last conducted in June 2014.

Pre-release

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

User engagement

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

This publication is available from: https://www.gov.uk/government/collections/energy-trends

If you need a version of this document in a more accessible format, please email energy.statistics@beis.gov.uk

Please tell us what format you need. It will help us if you say what assistive technology you use.

Renewable electricity in Scotland, Wales, Northern and the regions of England in 2020

Will Spry **0207 215 5394** renewablesstatistics@beis.gov.uk

Key headlines

Renewable generation in the UK grew by 13 per cent from 119.5 TWh in 2019 to 134.6 TWh in 2020. Within this:

- Generation in England was **up 15 per cent**
- Generation in Northern Ireland was **up 8.0 per cent**
- Generation in Scotland was **up 5.9 per cent**
- Generation in Wales was **up 16 per cent**

Generation in all countries was boosted by new capacity coming online, together with increased rainfall, wind and sunshine hours. Overall capacity increased by 2.1 per cent from 46.8 GW at the end of 2019 to 47.8 GW at the end of 2020. Within this:

- Capacity in England was **up 2.4 per cent**
- Capacity in Northern Ireland was **up 0.7 per cent**
- Capacity in Scotland was **up 0.5 per cent**
- Capacity in Wales was **up 2.2 per cent**

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, the number of operational sites and load factors for the four UK countries, the nine English regions and the UK Local Authorities[1] [2]. It updates the published figures in the September 2020 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 2021 (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.

Time-series data for each year for regional (2003 – 2020) and Local Authority data (2014 – 2020) are available as Excel spreadsheets at: https://www.gov.uk/government/statistics/regional-renewable-statistics. 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.

Capacity

The total capacity and number of sites that cannot be allocated to a region or an individual local authority has grown in 2019 and 2020. This is because the Feed in Tariff scheme (FiTs) closed to new entrants and the end of March 2019. Small scale installations that have come online since April 2019 are recorded through the MCS (Microgeneration Certification Scheme) however, the geographic information of the MCS data incomplete. For the first time this year, an attempt has been made to allocate some of the new MCS installations to individual local authorities. This remains an area for further improvement.

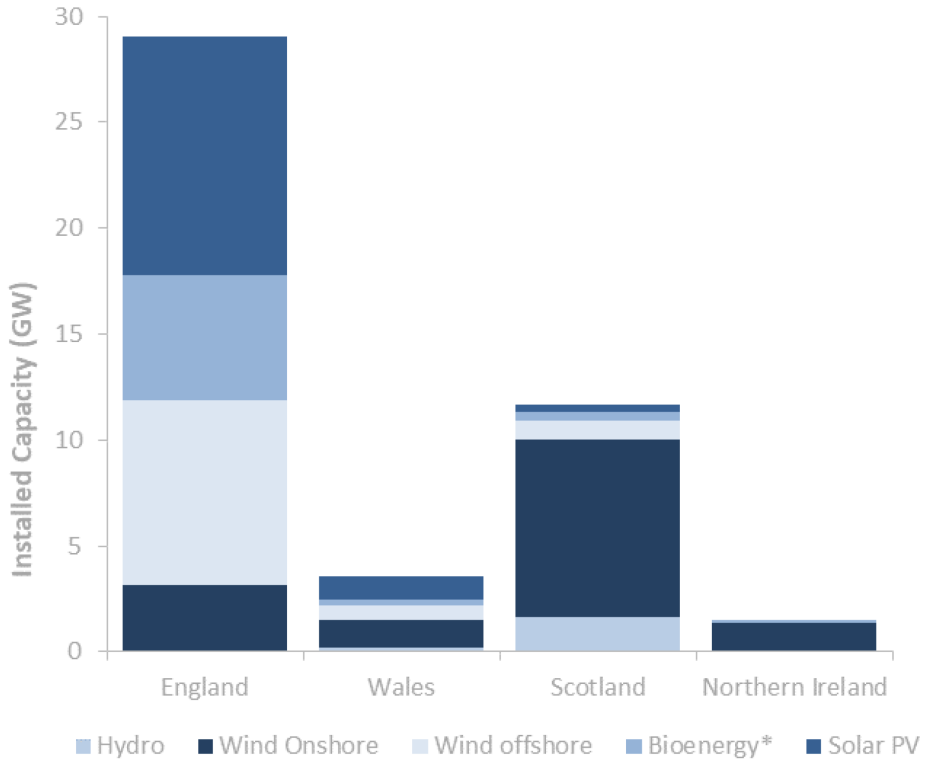
[1] Offshore wind is allocated to the region to which its output is connected. The exceptions are Robin Rigg, which comes ashore at Seaton, Cumbria but whose generation is associated with Scotland, Burbo Bank, which comes ashore in Wales but whose generation is associated with the North West and Hornsea Project One which lands in the East Midlands but with grid connection 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 is not disclosed.

- England had the most renewable capacity and generation, more than two and a half times that for Scotland. This is largely due to the fact that England has 88 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 as well as Lynemouth Power Station in the North East), 83 per cent of the solar PV capacity and 84 per cent of the offshore wind capacity. Chart 1 shows a breakdown of capacity at the end of 2020 by technology and country.

Chart 1 – Renewable capacity at the end of 2020 by technology and country



Includes biomass, waste, anaerobic digestion, landfill gas and sewage gas

- The technology with the highest growth in capacity was **offshore wind** (5.0 per cent) which accounted for half of the total UK growth and associated entirely with the East of England. This was driven by East Anglia 1 with the addition of around 500 MW capacity.

- **Onshore wind** grew by 0.8 per cent in the UK – 47 per cent of the new capacity was in Scotland, 39 per cent in Wales, 10 per cent in England and 5 per cent in Northern Ireland.

- **Solar PV** capacity grew by 1.8 per cent, with East of England having the largest percentage increase at 2.1 per cent.

- **Biomass and waste** grew by 2.2 per cent overall. Within this, capacity grew by 1.9 per cent in England and 8.7 per cent in Wales. The additional capacity was primarily in South East (37 per cent) with the K3 CHP Facility [Kemsley EfW] (50.4 MW), South West (25 per cent), from the Avonmouth Resource Recovery Centre (34.7 MW), and Wales (14 per cent) from Parc Adfer EfW (19 MW).

Table 1 shows the largest new schemes (including capacity increases) in 2020:

Table 1 - Largest new schemes

Onshore wind	Ransonmoor Wind Farm (capacity increase)	East of England	8 MW
	Binn Eco Park	Scotland	9 MW
	Burnfoot East	Scotland	11 MW
	Tralorg	Scotland	19 MW
	Inverclyde (Greenock Resubmission)	Scotland	24 MW
	Solwaybank (Resubmission)	Scotland	30 MW
	Llyn Brenig	Wales	38 MW
Offshore wind	East Anglia 1 (capacity increase)	East of England	501 MW
Solar PV	Creacombe Solar Farm	South West	7 MW
	Lamby Way Solar Farm	Wales	9 MW
	Bumpers Farm 2	South East	12 MW
	Goosehall	East of England	43 MW
Biomass and waste	NewLinks Development Ltd (Grimsby EfW plant) (capacity increase)	Yorkshire and Humber	11 MW
	Parc Adfer EfW	Wales	19 MW
	Avonmouth Resource Recovery Centre	South West	34 MW
	K3 CHP Facility (Kemsley EfW)	South East	50 MW

The regions with the highest capacity in England are:

- Yorkshire and the Humber – 6,265 GW (51 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 - 6,124 GW (58 per cent from wind and 33 per cent from solar PV).
- South East - 4,305 GW (49 per cent from solar PV and 37 per cent from Wind).

Capacity by English region is shown in Chart 2:

Chart 2 – Renewable capacity at the end of 2020 by English region and technology

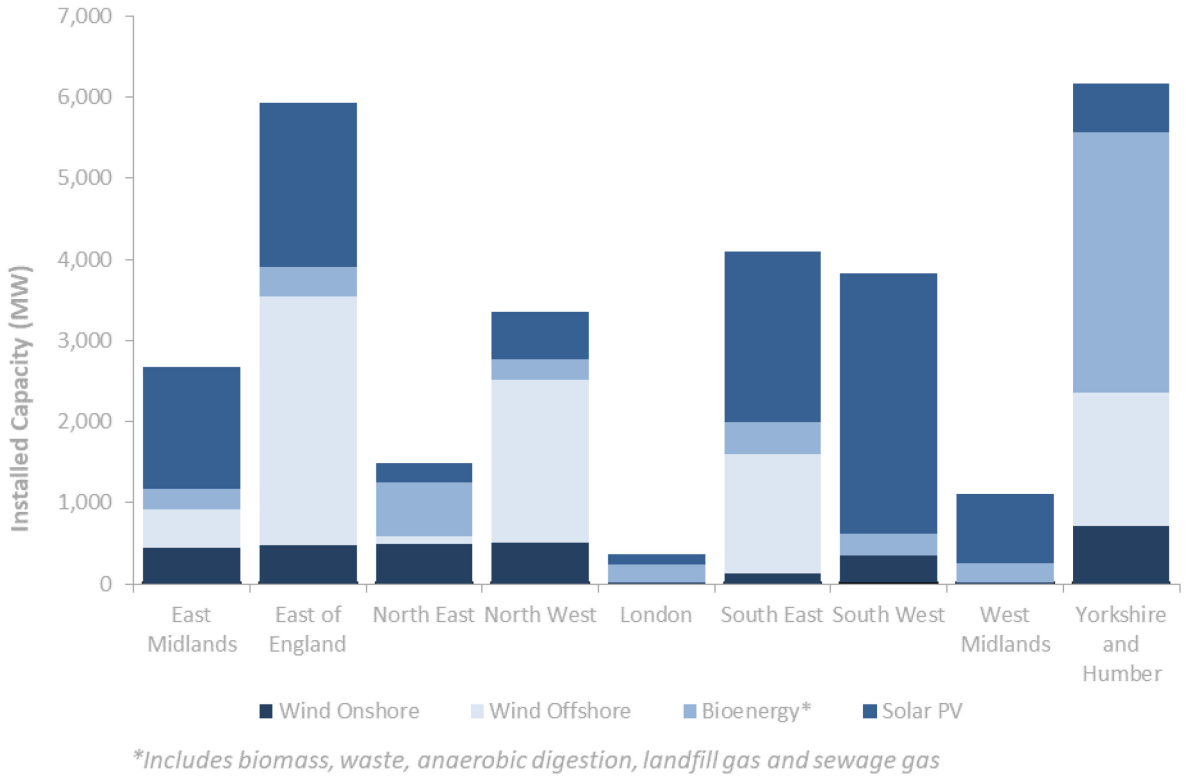


Table 2 summarises capacity growth, the key technologies in each region as well as the major sites:

Table 2: Regional capacity growth

Region	Key Technology	Growth (MW)	Key Schemes
East Midlands	Biomass and Waste	- 2.3	Capacity correction
	Solar PV	0.2	Mainly medium and small-scale projects (includes FIT revisions)
	Onshore Wind	0.7	Featherstone House Farm (Clark Recovered)
East of England	AD	0.6	Greenyard Frozen UK Ltd (Waste AD)
	Biomass and Waste	0.8	Capacity revision
	Solar PV	41.1	Goosehall
	Offshore Wind	501.0	East Anglia 1
	Onshore Wind	11.5	Ransonmoor Wind Farm
North East	Biomass and Waste	8.7	Biopower Hartlepool
	Offshore Wind	- 4.3	Capacity correction
	Onshore Wind	- 2.0	Capacity correction
North West	Solar PV	5.5	Tesco Crab Tree Lane, Kingmoor Park
London	Biomass and Waste	5.0	Capacity revision
South East	AD	1.7	Charlton Lane Eco Park (Waste AD)
	Biomass and Waste	50.4	K3 CHP Facility (Kemsley EfW)
	Solar PV	12.2	Bumpers Farm 2, Tesco Superstore Shripney Road
South West	Biomass and Waste	34.7	Avonmouth Resource Recovery Centre (formerly Severn Road)
	Landfill gas	- 0.8	Closure
	Solar PV	16.5	Building F, Renishaw Factory, Renishaw PLC Factory, Creacombe Solar Farm, Queen Elizabeth The Queen Mothers Hospital
	Onshore Wind	2.2	Ventonteague
West Midlands	AD	0.4	Capacity growth to existing
	Biomass and Waste	1.6	Capacity revisions
	Solar PV	1.4	Salford Lodge, Ibstock
Yorkshire and Humber	Biomass and Waste	11.3	NewLinks Development Ltd (Grimsby EfW plant)
	Landfill gas	- 0.1	Closure
	Solar PV	0.6	Hewitts Avenue Tesco, Tesco Wombwell Lane
	Onshore Wind	- 1.9	Capacity correction
Northern Ireland	AD	2.3	Berry Energy (Farm AD), MillfordAD (Waste AD), Rewyas Energy (Waste AD), Victus Power Annesborough (Waste AD), Glenagri Bioelectric (Farm AD)
	Biomass and Waste	5.2	Glenagri Bioelectric CHP, Hyster, Victus Power Silverwood, Ryobi, Annesborough CHP,
	Solar PV	0.8	Dunore PV Farm, Finvoy Solar Farm
	Onshore Wind	5.1	Loughran - Dunamore Road, Railroad, Castleroddy Road, 16, Curragh Road, 70, Loughmallon Road, 136, Ballyveely Road, 99 (Replacement), GGE 3, McNally- Iveagh Road, Porter-Garvaghy Rd-GP, Poyntzpasswindltd, Quarry Hill Wind, Rea - Boghill Road, Smyth - Garvaghy, Watson-Crewmore Rd – GP, Cooks Wind Station
Scotland	AD	0.6	Angus Hotel CHP_Extension (Waste AD), TECA AD (Waste AD)
	Biomass and Waste	0.5	Capacity revision
	Hydro	2.0	Birkhall Estate
	Solar PV	5.9	Invergordon Academy, Lochaber High School (Resubmission), Parkhill Solar Farm, St Margarets Bay, Finmont Service Reservoir
	Onshore Wind	50.6	Binn Eco Park, Locheport Community Windfarm (Resubmission), Nether Fauldhouse Farm, Burnfoot East, Inverclyde (Greenock Resubmission), Solwaybank (Resubmission), Tralorg, Halsary, Aftonlea, Burnbrae Farm (Strathaven), Greenhill Croft Tubine 2
Wales	Biomass and Waste	19.0	Parc Adfer EfW
	Hydro	- 2.0	Closure
	Solar PV	19.0	Llancadle Farm, Lamby Way Solar Farm, Flint Landfill Site Castle Park
	Offshore Wind	- 2.0	Capacity correction
	Onshore Wind	41.6	Ffrwd Farm, East Williamston Community Turbine, Trefawr Farm, Llyn Brenig, Parc Stormy T2, Longlands Farm

Generation

- For similar reasons to capacity, generation from renewable sources in England was almost three 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 accounted for 13 per cent of English renewable generation in 2020.

Number

- Excluding PV, England continues to have the largest number of renewable sites (5,736) following by Scotland (4,504), Northern Ireland (1,592) and Wales (1,164); 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 and the East of England.

Capacity and Generation per GVA

- Economic activity in each country or region is measured in terms of Gross Value Added (GVA)[4]. Scotland continues to show both the largest capacity from renewables per £ of GVA (around four times higher than England) followed by Wales, Yorkshire and the Humber and Northern Ireland.

- In terms of electricity generated, Scotland also shows the largest generation per £ of GVA, (around four times higher than England) followed by Yorkshire and the Humber, 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[5].

The UCLFs and load factors on a standard basis can be found in the load factor time-series spreadsheets. 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	30.5%	45.8%	11.4%	39.9%	69.1%
Northern Ireland	27.5%	n/a	9.3%	40.0%	68.0%
Scotland	26.7%	44.3%	10.3%	43.0%	65.7%
Wales	32.2%	37.6%	10.9%	25.1%	71.9%
UK average	28.0%	45.1%	11.3%	41.3%	69.0%

[4] 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

[5] The formula for calculating this is:

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

- Wales continues to have the highest **onshore wind** load factor (32.2 per cent) followed by England (30.5 per cent), Northern Ireland (27.5 per cent) and Scotland (26.7 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** (45.8 per cent), followed closely by Scotland (44.3 per cent) and Wales (37.6 per cent). Again, these load factors can be affected by curtailment, where supply exceeds demand and wind farms are required to cut generation by the national grid.

- 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.

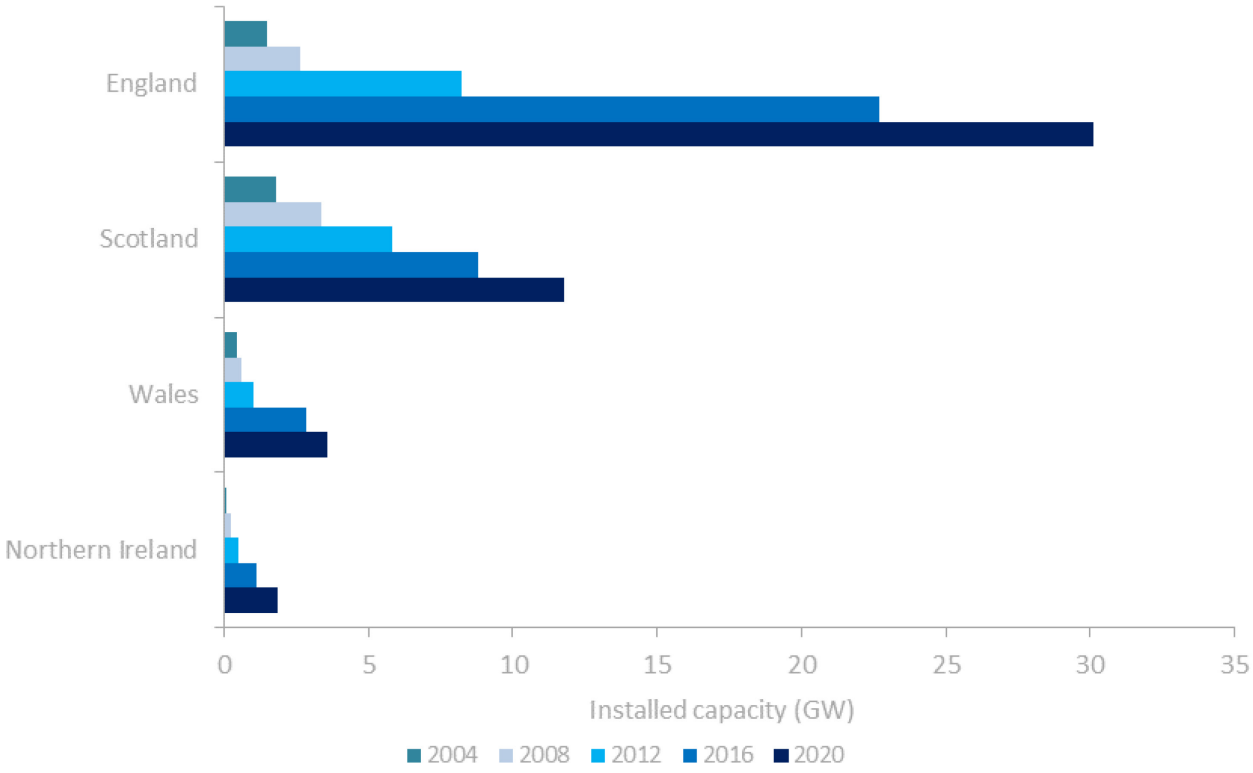
- In the case of the installed capacity for solar PV, following a period of rapid growth encouraged by the RO and FiT support mechanisms, the initial fast rate of growth has slowed down, reflected in the corresponding generation figures. This is probably due to a combination of effects including closure of the RO, a reduction in FiT financial support and the rapid exploitation of prime development sites. Similar patterns are seen for other technologies (onshore wind, landfill gas, sewage gas, and hydro).

- Offshore wind and other bioenergy continue to grow. In the case of other bioenergy, much of this is from biomass and waste.

- In the case of landfill gas, the rate of exploitation of prime sites reached saturation more than a decade ago but 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 2003 – 2020



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.

- Last year several local authorities were amalgamated and now come under a new name or have undergone a name change[6]. This reporting year, an additional amalgamation has taken place[7] which has been amended in the time-series spreadsheets from 2018 onwards but the order listings, as per last year, remain unchanged so that time-series comparisons can still be made with pre-2018 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 (19,033), 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, Buckinghamshire / Thurrock, Shropshire and Mendip. respectively.

- **Capacity**: Selby is the top ranked, primarily from Plant Biomass (Drax), followed closely by Highland, primarily from wind and hydro. For other technologies, the top ranking LAs are PV (Cornwall), landfill gas (Thurrock) and anaerobic digestion (Shropshire).

[6] "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".

[7] "Aylesbury Vale", "Chiltern", "South Bucks" and "Wycombe" are now "Buckinghamshire"

- **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 (Buckinghamshire) and anaerobic digestion (Shropshire).

- 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 Peterborough between them have an unusually large number of PV sites, especially for a region like Sunderland with lower solar irradiance. However, they have much lower capacities and generation. This large number of small schemes probably 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, and probably reflects the availability of AD feedstock because of the high levels of livestock farming undertaken in this district.

Table 4: Local Authority: Number of sites generating electricity from renewable sources, 2020[1]

Number

Onshore Wind		Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total [2]	
Orkney Islands	785	Cornwall	18,573	Highland	301	Buckinghamshire	9	Shropshire	36	Mendip	30	Cornwall	**19,033**
Aberdeenshire	573	Wiltshire	9,966	Argyll & Bute	122	Thurrock	9	Strabane	21	Dumfries & Galloway	18	Wiltshire	**9,995**
Cornwall	427	Peterborough	9,256	Gwynedd	119	Doncaster	8	Herefordshire County of	20	Herefordshire County of	16	Peterborough	**9,264**
Dumfries & Galloway	297	Sunderland	8,921	Perth & Kinross	87	North Lanarkshire	8	Dumfries & Galloway	14	East Riding of Yorkshire	10	County Durham	**8,936**
Highland	256	Dorset	8,870	Dumfries & Galloway	83	Warrington	8	Dorset	12	Powys	10	Sunderland	**8,931**
						Wiltshire	8			Shropshire	10		
UK Total	**9,810**		**1,069,788**		**1,561**		**454**		**670**		**441**		**1,048,328**

Table 5: Local Authority: Installed capacity of sites generating electricity from renewable sources, 2020[1]

MW

Onshore Wind		Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total [2]	
Highland	1,822	Cornwall	596	Highland	805	Thurrock	40	Shropshire	20	Selby	2,663	Selby	**2,721**
South Lanarkshire	1,194	Wiltshire	548	Argyll & Bute	297	Buckinghamshire	38	East Cambridgeshire	18	Northumberland	448	Highland	**2,692**
Dumfries & Galloway	676	Dorset	281	Perth & Kinross	277	Central Bedfordshire	33	Redcar and Cleveland	10	Fife	77	East Suffolk	**1,705**
South Ayrshire	652	South Cambridgeshire	279	Dumfries & Galloway	151	Warrington	32	East Riding of Yorkshire	10	Slough	63	North East Lincolnshire	**1,492**
Scottish Borders	641	Shropshire	218	Stirling	86	North Lanarkshire	26	Herefordshire County of	9	Sheffield	62	Lancaster	**1,381**
UK Total	**14,102**		**13,682**		**1,878**		**1,055**		**538**		**4,553**		**47,813**

Table 6: Local Authority: Generation of electricity from renewable sources, 2020[1]

GWh

Onshore Wind		Solar PV		Hydro		Landfill gas		Anaerobic Digestion		Plant Biomass		Total [2]	
Highland	4,036	Cornwall	584	Highland	3,439	Buckinghamshire	172	Shropshire	114	Selby	9,419	Selby	**9,528**
South Lanarkshire	3,014	Wiltshire	542	Perth & Kinross	1,014	Havering	113	East Cambridgeshire	99	Fife	397	Highland	**7,722**
Dumfries & Galloway	1,690	Dorset	295	Argyll & Bute	678	Central Bedfordshire	108	Strabane	58	Breckland	354	Lancaster	**3,967**
Scottish Borders	1,626	South Cambridgeshire	284	Dumfries & Galloway	497	Thurrock	99	Redcar and Cleveland	56	Allerdale	341	East Suffolk	**3,742**
South Ayrshire	1,295	Shropshire	209	Stirling	386	Warrington	98	East Riding of Yorkshire	54	Neath Port Talbot	335	South Lanarkshire	**3,194**
UK Total	**34,688**		**13,158**		**6,761**		**3,496**		**2,904**		**26,845**		**134,603**

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 2018 and 2019 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 the BEIS MPP (Major Power Producers), ROCs (Renewable Obligation Certificates) and the MSIW (Municipal Solid & Industrial Waste) Survey returns, the identification of some duplicates, closures and additional. These revisions are summarised in Table 7:

Table 7: Historic capacity and generation revisions by country

Year	2018		2019	
	MW	GWh	MW	GWh
England				
East Midlands	-14	52	-20	-42
East of England	0	0	0	0
North East	4	1	0	-7
North West	8	5	1	-18
London	5	0	2	-5
South East	-14	-20	-28	-65
South West	-46	-52	-59	-104
West Midlands	16	5	4	-21
Yorkshire and the Humber	0	0	0	0
Northern Ireland	**-52**	**-41**	**-51**	**-107**
Scotland	**-75**	**-268**	**-134**	**-459**
Wales	**2**	**280**	**-2**	**-23**

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Competition in UK electricity markets

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Key headlines

Following privatisation in 1990, the number of UK major electricity suppliers increased from 16 in 1989 to 40 in 2020. In 2020, BEIS surveyed three new suppliers to maintain coverage; three companies which were over the 0.1% market share threshold in 2019 discontinued supply.

Since 2010, electricity market concentration has gradually declined across the domestic, commercial and industrial sectors as more companies entered the market. However, market concentration in 2020 showed slight increases in the domestic and commercial sectors.

The market share of smaller suppliers (outside the top nine) has risen across the past ten years, from 2.7 per cent in 2010 to 23.2 per cent in 2020, as new and smaller suppliers took market share from the large companies.

Major power producers (MPPs) increased in number from 6 in 1989 to 58 in 2020.

The top nine MPPs' share of generation decreased from 82.8 per cent in 2015 to 77.8 per cent in 2020. Their share of capacity decreased from 74.5 per cent in 2015 to 70.1 per cent in 2020 as new smaller generators entered the market.

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 in methodology notes 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 surveyed by BEIS comprising approximately 96% of the market. Major electricity suppliers are classed as those which sold over 0.1% of traded electricity in the reference year (see further information in methodology notes at the end of this article).

Background to changes in the electricity market

The electricity supply industry was restructured in 1990, with competition being 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.

Following the restructuring of the electricity supply industry, 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.

Competition in electricity sales

The number of electricity suppliers rapidly increased following privatisation, from 16 in 1989 to an early peak of 21 in 2004. From 2004 to 2010, the number of companies reduced to 13, 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 level in 2020 of 40 companies. This reflects new market entrants and BEIS engaging with new, 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 2020 in Table 1.

Table 1: Number of companies supplying electricity

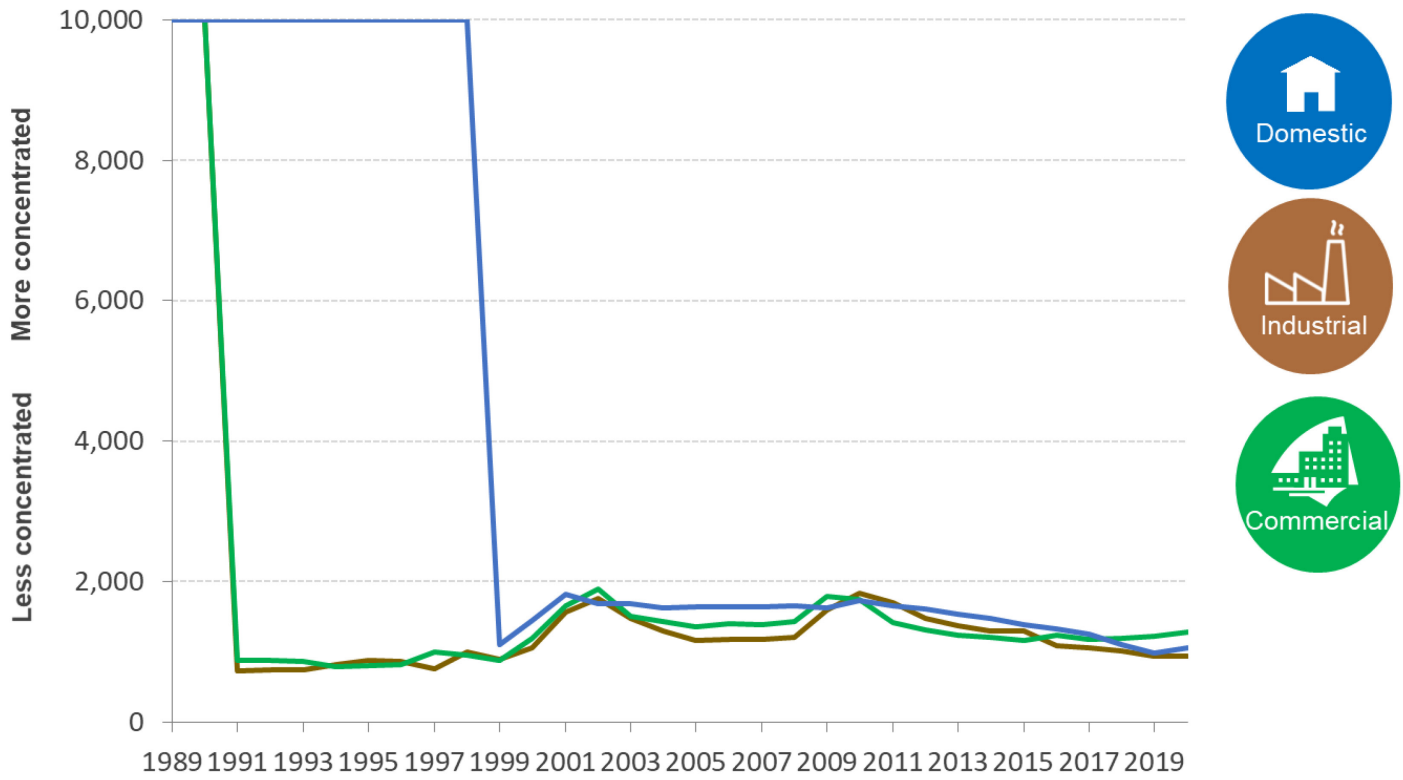
	1996	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018	2019	2020
Domestic Sector	1	11	7	10	9	9	8	11	16	19	28	28	28
Commercial Sector	17	13	11	17	12	13	11	17	22	26	29	28	30
Industrial Sector	18	17	14	20	16	15	12	19	21	25	25	25	27
Total	18	18	17	21	19	18	13	21	27	34	39	39	40

(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.

In 2020, three new electricity suppliers were surveyed by BEIS which supplied over 0.1 per cent of the market, and three smaller suppliers increased market share to over the 0.1 per cent threshold for inclusion. Three companies discontinued supply, and two suppliers reduced market share to below the 0.1 per cent threshold for inclusion. The five suppliers leaving the market sold to the domestic sector, however, five of the new entrants recorded domestic sales so the net total remained at 28. Four of the new companies supplied the commercial sector whilst two of those leaving the market did, increasing the net total to 30. Two of the new companies supplied the industrial sector so the net total increased to 27 in 2020. Across all sectors, there were 40 companies selling electricity in 2020; this is an increase of 27 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 2020



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 industrial sector, as the market became more competitive. In the domestic sector, annual decline in market concentration from 2010 to 2019 was followed by a slight increase in concentration in 2020. Market concentration in the commercial sector also dropped each year from 2010 to 2015 before rising slightly to 2020. This overall 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 2020, the index rose to 1,050 from 974 in 2019, reflecting a spate of mergers.

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 2020, market concentration increased slightly. With 26 industrial electricity suppliers in 2020, the industrial market was less concentrated than in 2010, when there were 12 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 76.8 per cent in 2020. Between 2019 and 2020, the aggregated share of the top six suppliers fell a further 5.8 percentage points from 68.4 per cent to 62.6 per cent. When compared to 2010, the aggregated top six share for 2020 is 28.4 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 23.2 per cent in 2020. 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 shares of total electricity supplied to all consumers

	Market Share (%)								
Electricity Suppliers	2010	2012	2014	2015	2016	2017	2018	2019	2020
Aggregated share of top 3 suppliers	55.4	49.1	47.0	45.0	43.7	42.4	41.8	40.9	38.9
Aggregated share of next 3 suppliers	35.6	36.7	33.9	33.3	31.7	31.1	29.0	27.5	23.7
Aggregated share of next 3 suppliers	6.3	6.2	8.9	10.1	10.9	11.7	12.0	11.6	14.2
Aggregated share of top 9 suppliers	**97.3**	**92.0**	**89.9**	**88.4**	**86.3**	**85.1**	**82.9**	**80.1**	**76.8**
Other suppliers	2.7	8.0	10.1	11.6	13.7	14.9	17.1	19.9	23.2

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 2020 of 58.

Table 3: Number of Major Power Producers

Year	Number	Number producing at least 5% of total generation
1989	6	-
1991	11	-
1993	20	-
1995	25	-
1997	27	-
1999	30	-
2001	36	6
2003	34	6
2005	30	7
2007	34	8
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
2020	58	6

Source: BEIS

Table 4 shows the MPPs aggregated share of generation and aggregated share of capacity for 2015 to 2020. The market share of the top 9 generators in this period peaked in 2013 at 86.7 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. This rose to 77.8 per cent in 2020 due to acquisitions. The top 9 generators held a lower share of capacity (70.1 per cent in 2020) 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)]**					
	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020
Aggregated share of top 3 companies	48.6	48.9	50.7	48.9	48.3	46.4	32.5	32.9	35.3	33.8	42.5	42.2
Aggregated share of next 3 companies	21.4	15.5	15.0	16.6	17.6	21.3	26.8	18.2	22.2	21.4	20.3	15.5
Aggregated share of next 3 companies	12.7	11.4	9.2	9.2	11.6	10.2	15.2	11.4	8.8	11.9	9.2	12.4
Aggregated share of top 9 companies	**82.8**	**75.8**	**75.0**	**74.7**	**77.5**	**77.8**	**74.5**	**62.4**	**66.4**	**67.1**	**72.1**	**70.1**
Other major power producers	17.2	24.2	25.0	25.3	22.5	22.2	25.5	37.6	33.6	32.9	27.9	29.9

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

Data for this article

The data used to produce this article can be found in Tables 1 to 6 of associated Competition in UK Electricity Markets workbook.

Methodology notes

In this article, **'electricity supplier'** refers to the major electricity suppliers surveyed by BEIS, covering approximately 96% of all UK electricity sales in 2018. '**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 for more details.

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.

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Competition in gas supply 2020

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Key headlines

This article describes the number and size of companies supplying gas to the UK, as well as the concentrations of the domestic, commercial, and industrial markets.

The total number of companies supplying over 1,750 GWh has increased from 17 in 2009 to 29 in 2020. The market share of the largest nine companies remained roughly stable, at 69.3 per cent in 2020 compared to 69.4 per cent in 2019.

The market concentration of the domestic sector fell in 2020, with one additional new larger supplier. In the commercial and industrial sectors, the number of large suppliers fell, by one and two, respectively.

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 opened to competition at the end of 1986, with most of the remainder (2,500 to 25,000 therms a year) opened in August 1992. The domestic market was opened between April 1996 and May 1998, with large increases in the number of gas suppliers up to 2000. Since 2000 the number of companies supplying gas decreased by more than 50 per cent from its peak, driven by company mergers, before newer entrants once again began entering the market since the early 2010s.

There are effectively four competitive sectors - sales to electricity generators, and to the industrial, commercial, and domestic sectors. Companies who generate electricity from gas are often the same companies who trade gas meaning that sellers do not know the proportion of gas sold that will be used for generation. As such data for electricity generation competition are not presented here.

Number of large and small suppliers in the market

BEIS collects information from companies licenced to supply gas through two surveys, one a mandatory return for larger companies supplying more than 1,750 GWh a year of gas (~97 per cent of final consumption), the other a voluntary return for smaller companies supplying less than that threshold. As there are many smaller companies, a sample are selected to be surveyed and data is uprated to make the national total.

Chart 1 Total number of companies supplying more than 1,750 GWh of gas annually, and market share of the top nine suppliers, 1998 to 2020

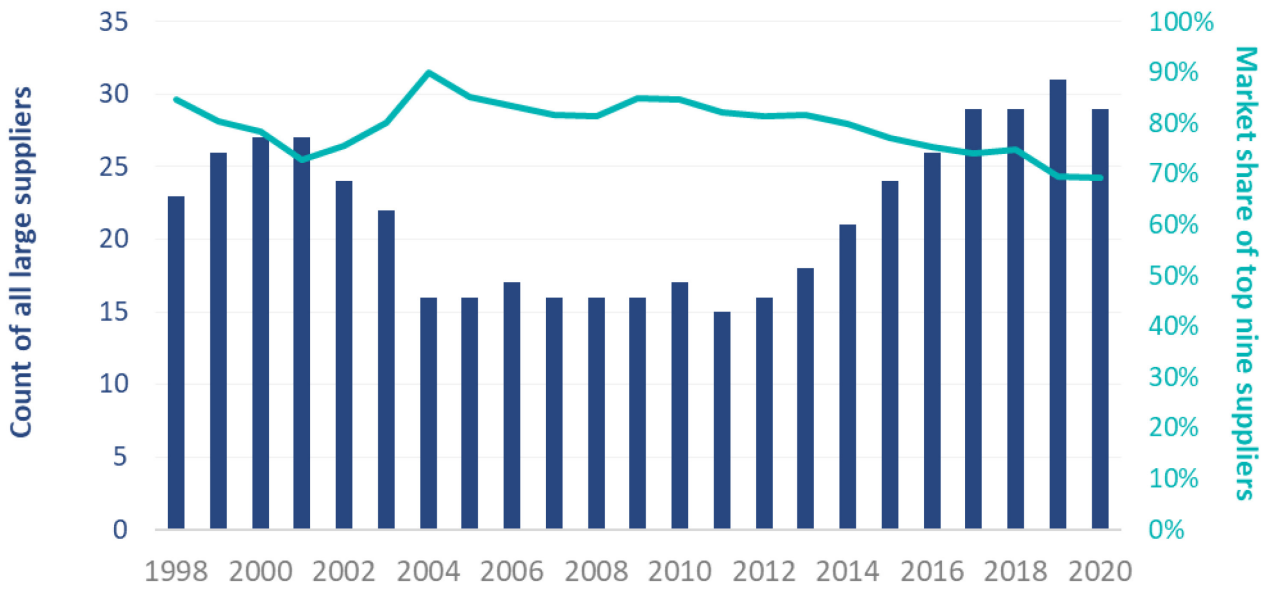


Chart 1 shows the number of all companies supplying more than 1,750 GWh a year of gas, (excluding gas to electricity generation) and indicates a generally sustained pattern of increase since 2011 until this year. The total number of large suppliers fell by two companies in 2020, from 31 to 29, after eight years of successive increases. It also shows the market share of the top nine suppliers and indicates a loss of market share over the same period until 2020 when shares remained stable compared to 2019. The largest nine suppliers to all markets held 69.4 per cent and 69.3 per cent of the market share in 2019 and 2020, respectively. This compares to 85.0 per cent in 2009 just before newer entrants began entering the market once again after a period of mergers.

Table 1 shows how the market shares of the largest nine companies have changed over the last five years in more detail. Over this period the largest three suppliers have been generally losing market share to the remaining top nine companies. However, in 2020 this was reversed and the largest three companies increased their market share within the top nine. Figures are based on total gas supplied excluding gas for electricity generation.

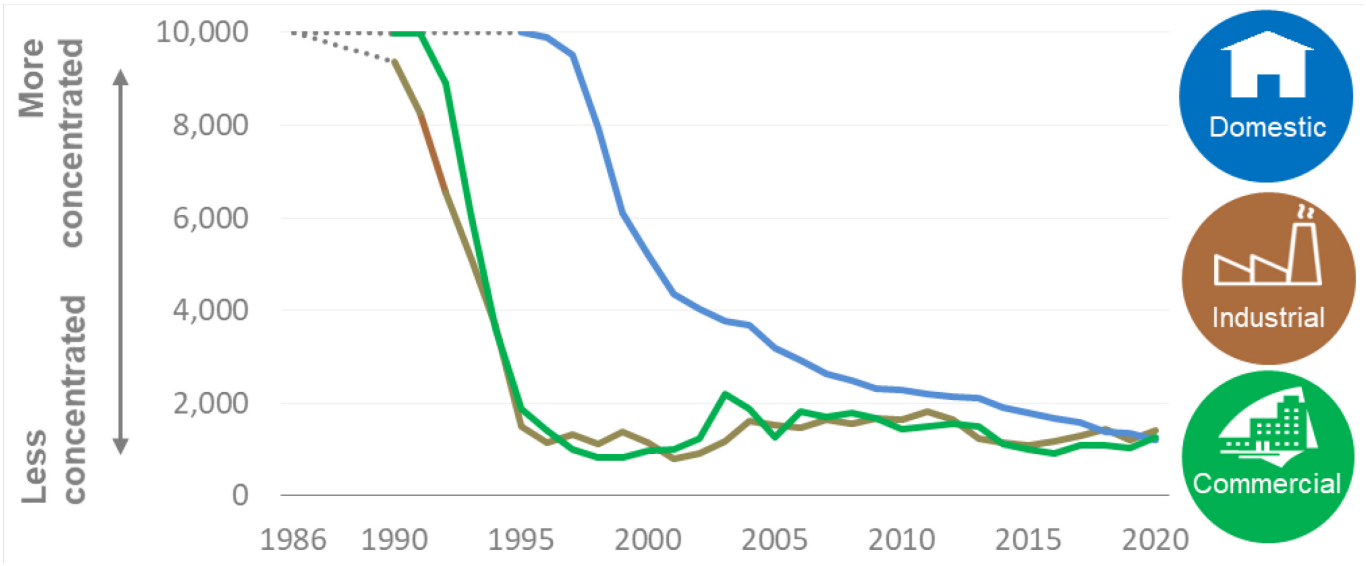
Table 1 Gas supplied to all consumers by aggregated shares

	Market share (%)					
Gas suppliers	2015	2016	2017	2018	2019	2020
Aggregated share of top 3 suppliers	42.2%	40.1%	36.9%	36.5%	35.0%	36.5%
Aggregated share of next 3 suppliers	20.7%	20.1%	21.1%	22.4%	20.0%	19.2%
Aggregated share of next 3 suppliers	14.3%	15.2%	15.9%	15.9%	14.4%	13.6%
Aggregated share of top 9 suppliers	**77.2%**	**75.4%**	**73.9%**	**74.8%**	**69.4%**	**69.3%**
Other suppliers	22.8%	24.6%	26.1%	25.2%	30.6%	30.7%

Competition in gas sales to the domestic, commercial, and industrial sectors, 1986 to 2020

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

Chart 2: Herfindahl-Hirschman Index for market concentration, 1986 to 2020



The market concentration had been consistently decreasing in all three sectors as smaller suppliers entered the market. This was true for the domestic market in 2020, but supply to both commercial and industry sectors bucked this trend.

The **domestic market** has become less concentrated due to an increasing number of small suppliers taking an increasing percentage of the market share. Table 2 shows that the number of companies who supplied more than 1,750 GWh has increased by one to 17 in 2020; this figure has been increasing steadily since 2008. The top nine companies held an 84.6 per cent market share in 2020, compared to 85.0 per cent in 2019 and 96.2 per cent in 1998.

The **commercial market** has seen the loss of one company supplying more than 1,750 GWh since 2019 and an increase in the market concentration. The market share taken by the top nine suppliers to the commercial sector has increased with larger suppliers taking 88.4 per cent of the share in 2020 compared to 84.6 per cent in 2019 and 77.2 per cent in 1998.

The **industrial market** has also become more concentrated in 2020, and the number of suppliers fell by two compared to 2019. The top nine suppliers took a 90.0 per cent market share in 2020, compared to 89.4 per cent in 2019 and 83.4 per cent in 1998.

Table 2 shows the number of large 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 2 Number of companies supplying gas

	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018	2019	2020
Domestic	14	12	7	6	6	7	7	9	12	16	16	17
Commercial	10	10	10	7	6	8	8	8	11	11	12	11
Industrial	15	15	10	9	8	8	7	11	11	11	11	9

The data indicate that the number of companies supplying gas above the threshold of 1,750 GWh has increased by one in the domestic sector since 2019 with a decrease of one in the commercial, and two in the industrial, sector.

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.

[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.

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Diversity of supply for oil and oil products in OECD countries in 2020

Skye Trotman **0300 068 5244** **Oil-Gas.Statistics@beis.gov.uk**

Key headlines

Within the OECD, three of the five net exporters of crude oil were the same as the previous year: Canada, Norway, and Mexico. **This year the UK joins these four countries by exporting 1.2 per cent more than demand,** as does Columbia who joined the OECD in 2020**.** Other OECD countries met their demand at least partially through imports, with ten countries not producing any crude oil indigenously.

Eighteen of the OECD countries - including the UK - could meet their petrol demand through indigenous production, four more than last year, with much of Western Europe being net exporters. Subsequently petrol also achieved the highest average diversity index and achieving the highest average security of supply score.

Twelve of the OECD countries were self-sufficient in kerosene production. The self-sufficiency average continues to be greatly increased by the high contributions from Lithuania (meeting 14 times demand).

Fourteen of the OECD countries were self-sufficient in diesel production; Greece, Korea, the Netherlands, and Finland remaining in the top four, the same as in 2018 and 2019. Greece remained the most self-sufficient OECD country for diesel, producing over three times the amount consumed.

Introduction

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 International Energy Agency (IEA) database. The aim is to determine how the UK compares with other OECD countries in terms of how it secures oil supplies.

This year the Covid-19 pandemic has had a profound impact on demand, production and trade of oil and oil products across the globe, with nations taking different measures to curb the spread. These measures have had a notable impact on oil demand, and therefore also on supply. Rather than compare extensively to 2019, this article looks at 2020 supply within the OECD.

Whilst the UK more than met its demand for crude through indigenous production the UK fell to 6th place in security of supply as Columbia and Australia take 4th and 5th respectively. The UK was more than able to meet their demand for petrol through indigenous production, placing in the top half for security of supply. For jet fuel, the UK continues to remain in the lower half of the OECD in terms of indigenous production scores, even though consumption was the third highest. However, with a diversity score of 0.78 the UK remained in the top 50 per cent in terms of security of supply. On diesel, the UK had a self-sufficiency score of 0.59 and was sixth highest for diversity and remains in the top 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** is 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** is calculated using 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.

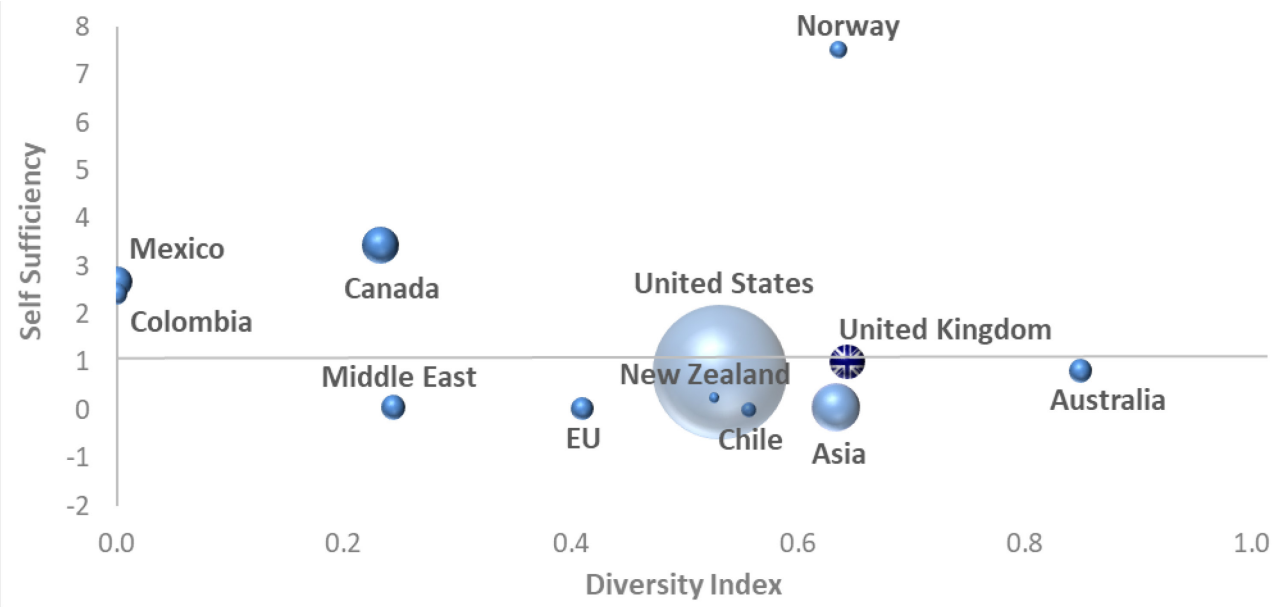
Bar charts
The bar charts provide a means of comparing OECD countries by self-sufficiency and diversity of imports. These profiles combine the proportion of demand that could be met through indigenous production with the diversity and political stability of import origins. The sum of these two components 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.

Crude Oil

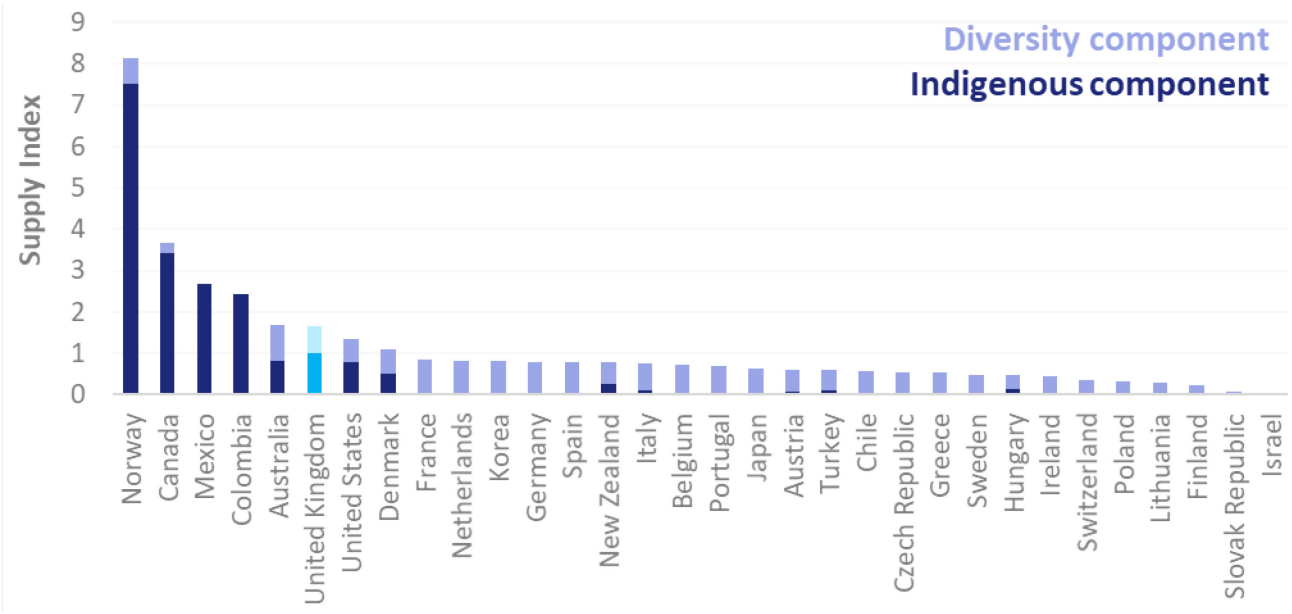
Five OECD countries were self-sufficient for crude oil in 2020 (Chart 1). Norway again by far had the highest self-sufficiency score, producing over seven and a half times its own consumption. With a self-sufficiency score of 1.01, the UK's score has increased on last year and the UK is self-sufficient in 2020, remaining above the OECD average of 0.54 and ranked fifth overall out of all OECD countries. Similarly, the UK's diversity score of 0.66 was above the average score of 0.41.

Chart 1 Diversity and self-sufficiency of crude oil for OECD countries, 2020



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 shows that the UK placed highly in the ranking of OECD countries being one of only a few countries with substantial oil production.

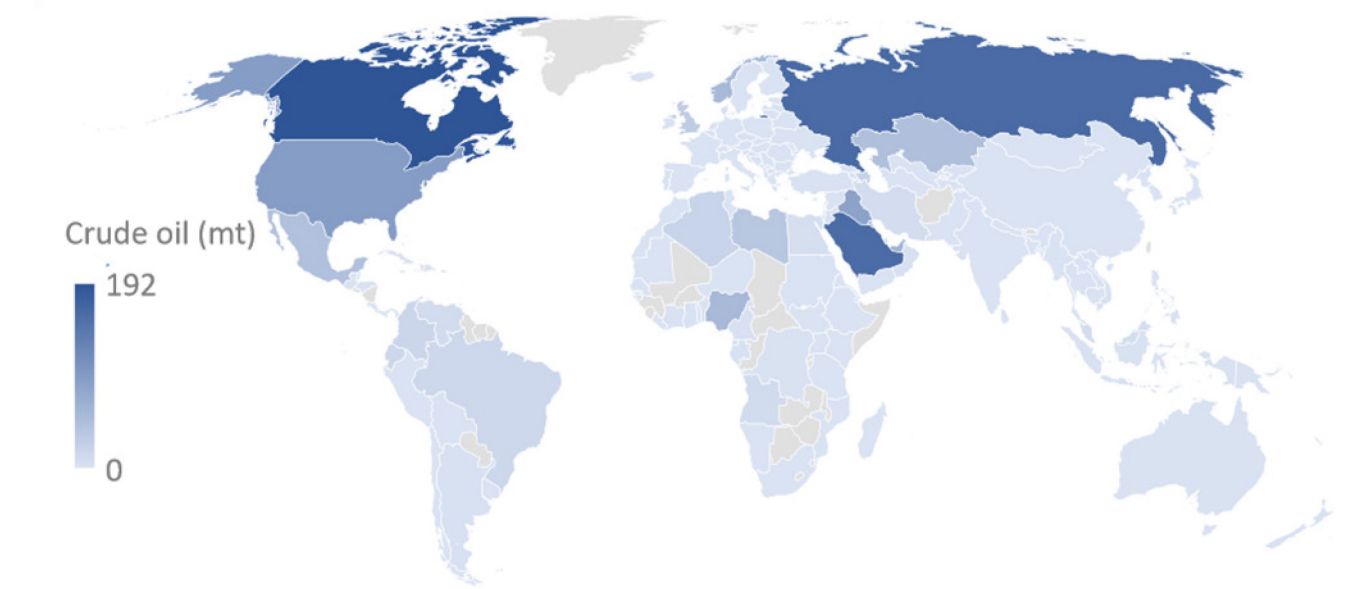
Chart 2 Security of supply of crude oil for OECD countries, 2020



Note: Data not available for Estonia, Iceland, Israel, Latvia, Luxembourg, and Slovenia

Map 1 is an illustration of where crude oil exports originated in 2020. Canada, Russia, and Saudi Arabia are the biggest exporters of crude in the world. Within the OECD, the UK was the fifth largest exporter.

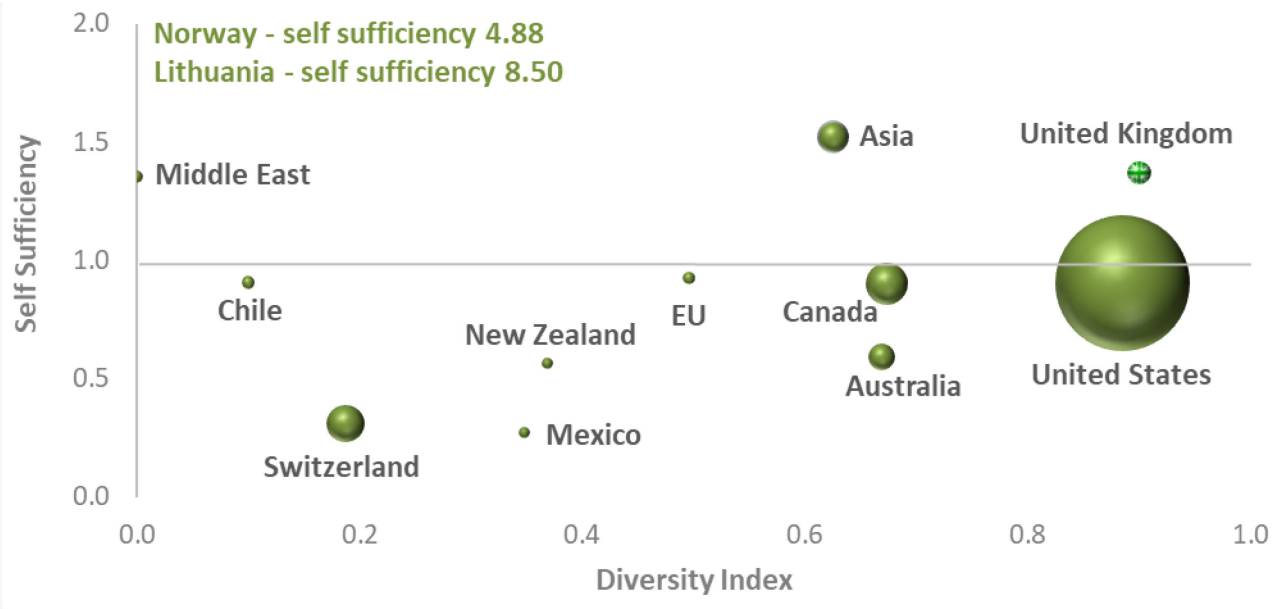
Map 1 Worldwide crude oil exports (million tonnes), 2020



Petrol

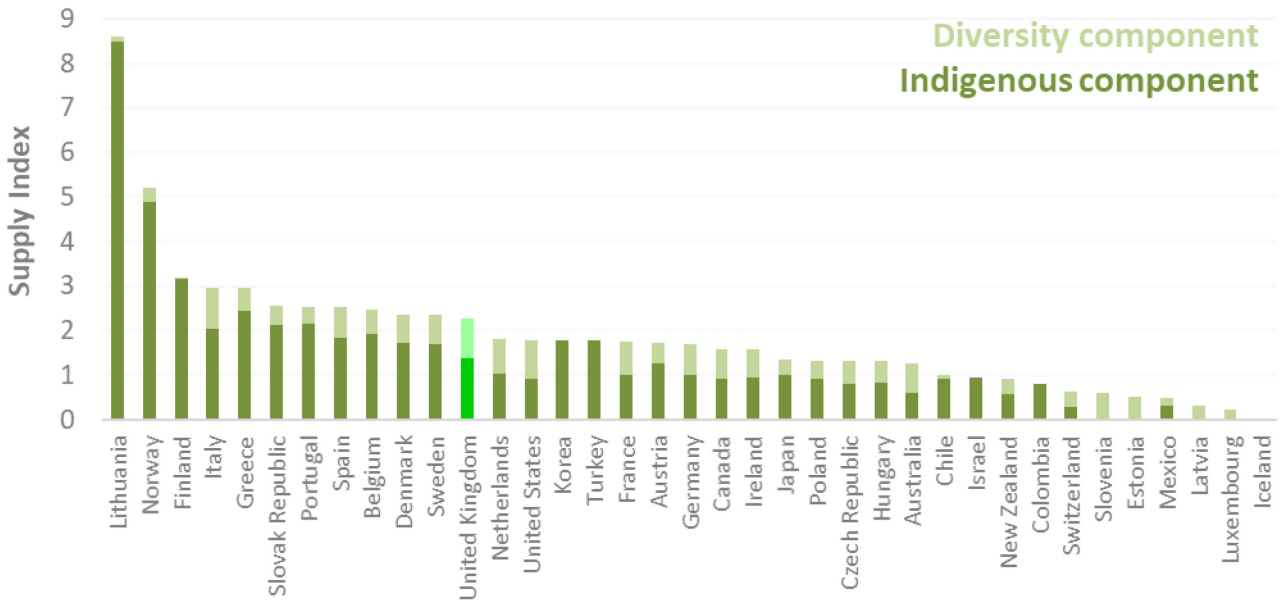
The profiles for petrol are different to that of crude. Eighteen of the 37 OECD countries were self-sufficient in 2020. Lithuania had a self-sufficiency score of 8.50, making it by far the highest ranking in this regard. The OECD average self-sufficiency score was 1.41, compared to 1.42 in 2019. Consumption in the US continues to dwarf that of other OECD countries at just over 60% of total OECD consumption. The UK had a self-sufficiency score of 1.37, meaning we were more than able to meet demand for petrol in 2020. The UK's diversity score of 0.90 was much higher than the OECD average of 0.43 and was second only to Italy with 0.91. The US has dropped from first last year to third in 2020 with a score of 0.88.

Chart 3 Diversity and self-sufficiency of petrol for OECD countries, 2020



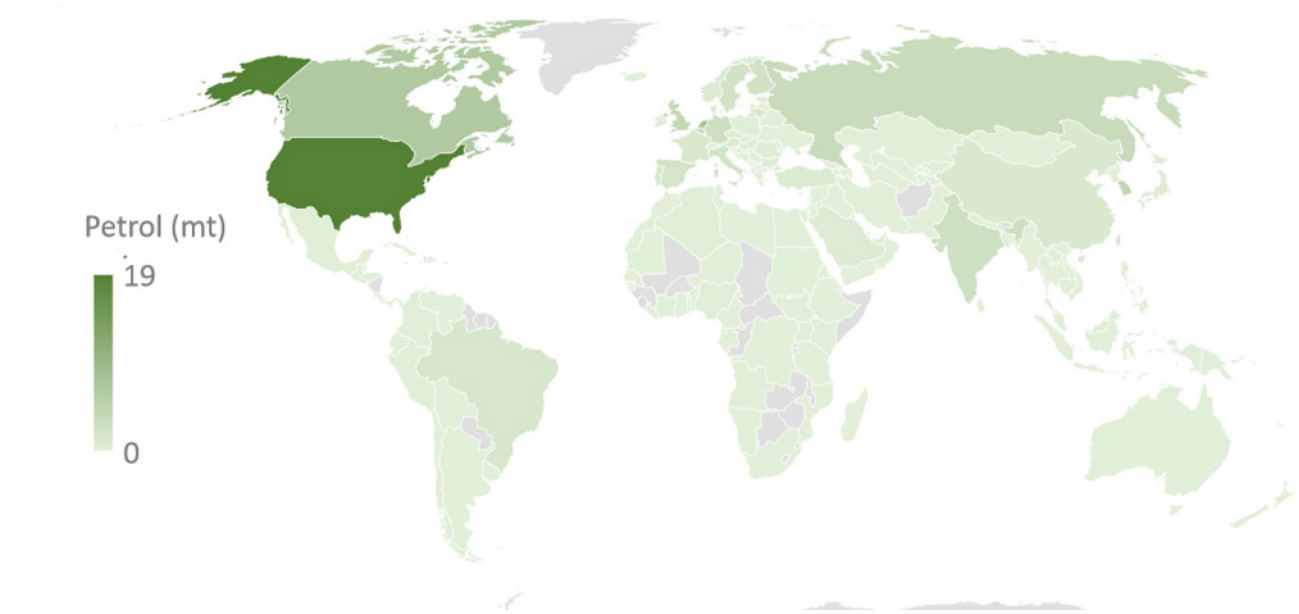
The simplified security of supply index (Chart 4) shows how most countries produce enough petrol to meet their needs and the amount of petrol trade amongst the OECD countries. The UK ranks 12th out of the 37 OECD countries for security of supply of petrol and Lithuania ranks first due to its large production figure.

Chart 4 Security of supply of petrol for OECD countries, 2020



The main exporter of petrol around the world is North America, exporting almost three times the amount of Canada, the third biggest exporter. Europe is also shown on the map to be a very significant exporter of petrol to the rest of the world, notably including the United Kingdom, Belgium and specifically the Netherlands; the second largest exporter, exporting two-fifths of 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 (million tonnes), 2020



Jet fuel

In 2020 there were 12 countries that were self-sufficient in jet fuel production the top three were Lithuania, Korea, and Greece, with six countries not producing any jet fuel. Notably, Lithuania's self-sufficiency score almost doubled on last year, at fourteen times more than its demand. Lithuania's refining capacity stands at approximately 10 million tonnes a year and has a relatively low demand. This accompanied by a 50 per cent reduction in demand, most likely caused by the Covid-19 pandemic, and the relatively steady production compared with 2019 has driven up the OECD average to 1.15.

Chart 5 Diversity and self-sufficiency of jet fuel for OECD countries, 2020

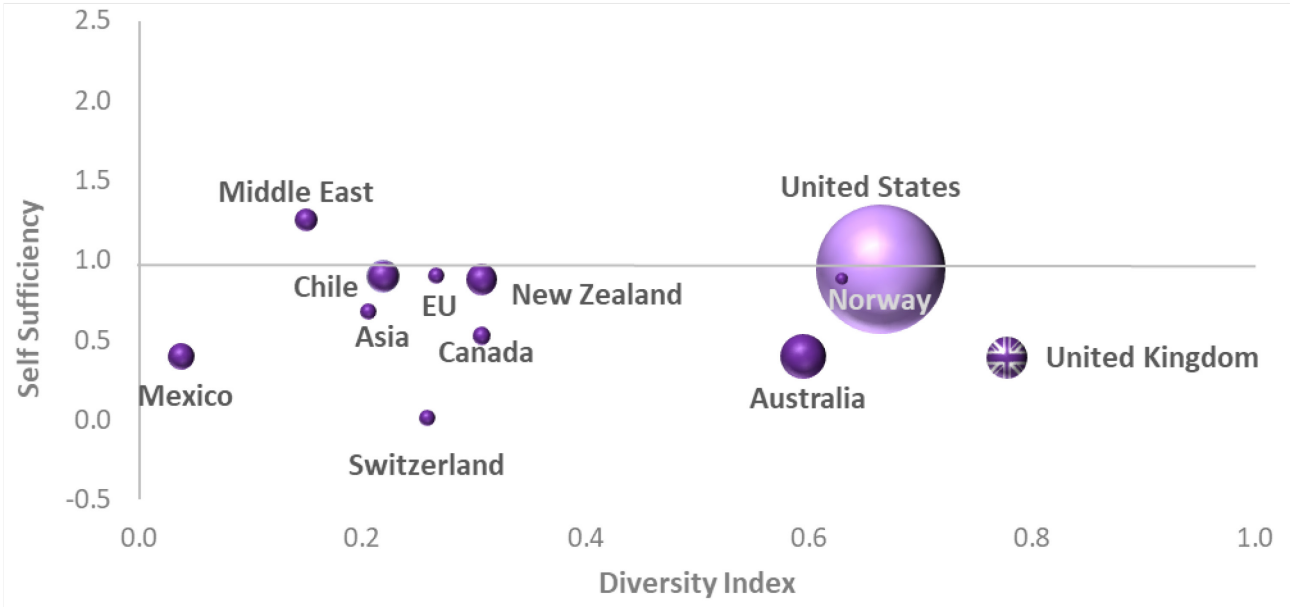
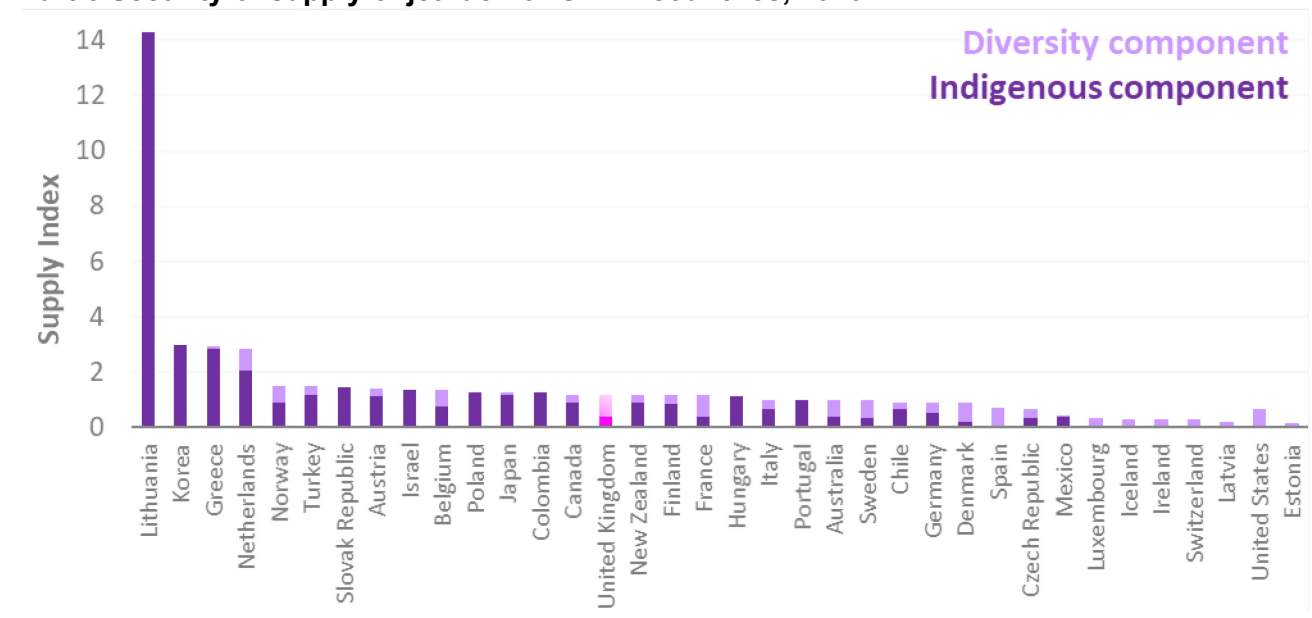


Chart 5 shows that the UK, with a self-sufficiency score of 0.39, was well below both the self-sufficiency threshold of 1 and the OECD average 1.15 for jet fuel. However, the UK's import diversity score of 0.78 was far higher than the average for all OECD countries of 0.30 and only second to the Netherlands but followed closely by France at 0.77.

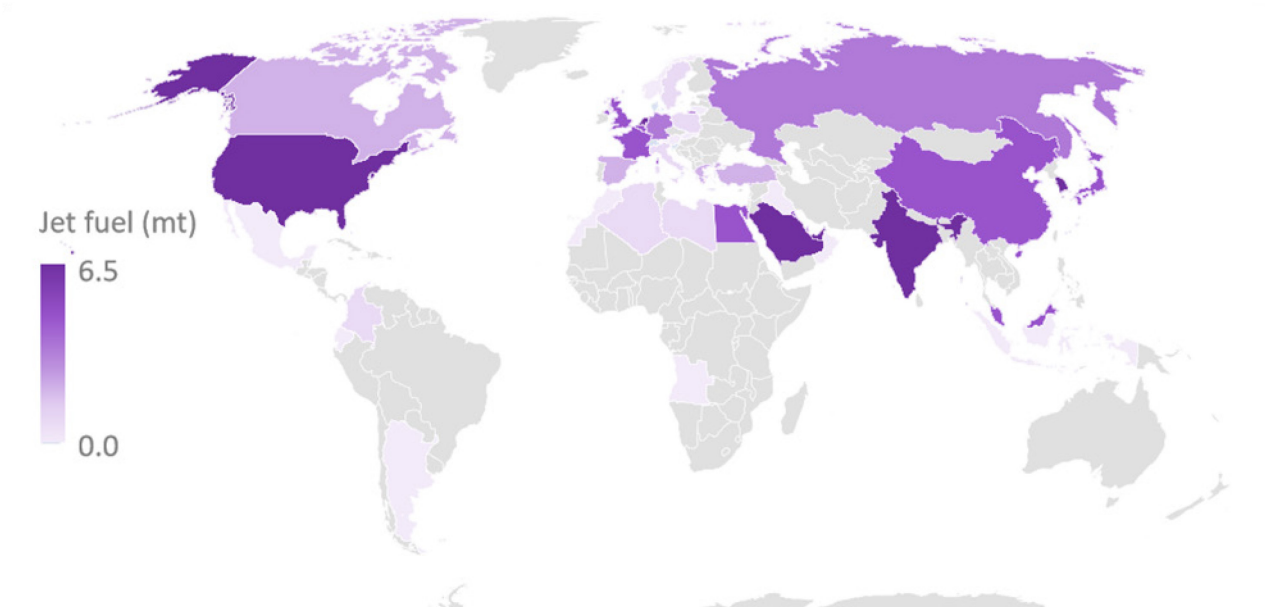
Chart 6 Security of supply of jet fuel for OECD countries, 2020



Note: Data not available for Slovenia

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 third highest demand for jet fuel behind Australia and the United States, whose demand is ten times that of the UK. The UK's security of supply is 1.17 for jet fuel, the sixteenth highest score out of the 37 OECD countries.

Map 3 Worldwide jet fuel exports (million tonnes), 2020



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 in 2020 which was the same in 2019. 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.

Road diesel

In 2020, the OECD average self-sufficiency was 0.85 compared to 0.84 in 2019. Fourteen countries were self-sufficient with Greece, France, Korea, and the Netherlands taking the top four spots and seven countries did not produce any diesel.

Chart 7 Diversity and self-sufficiency of diesel for OECD countries, 2020

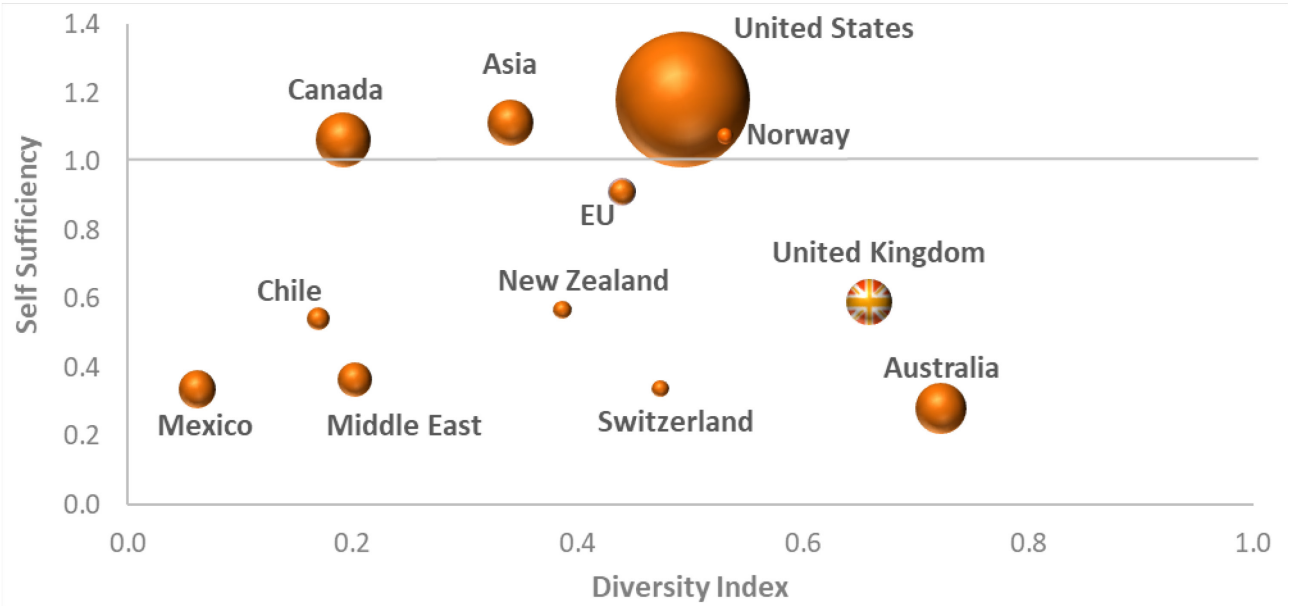
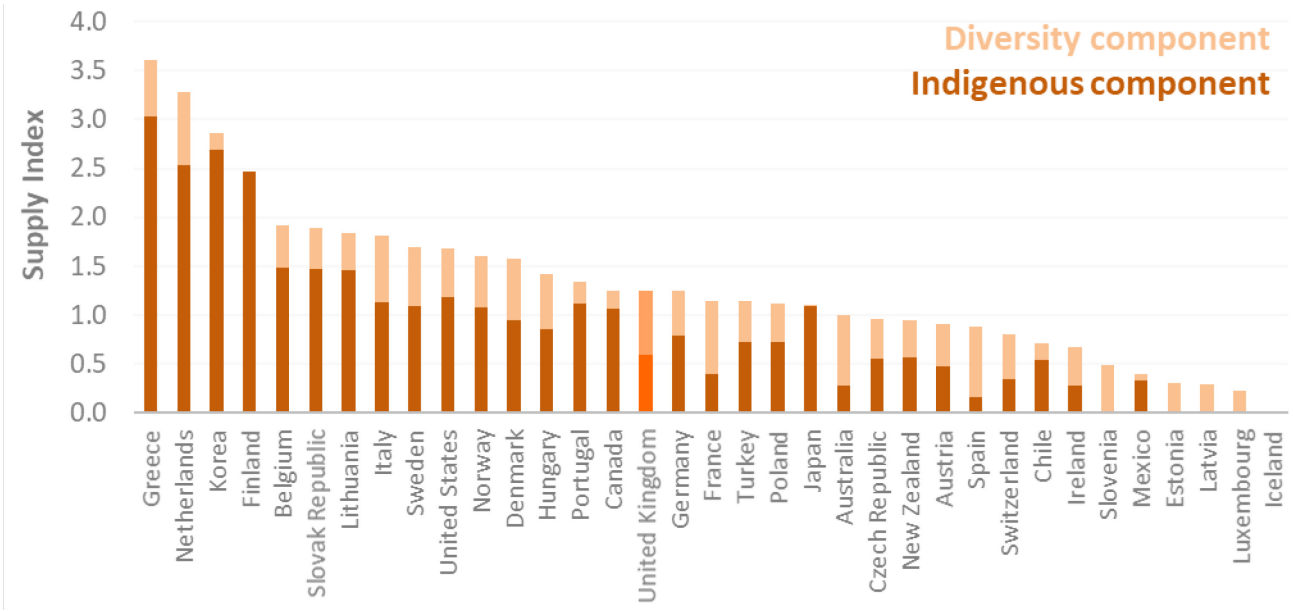


Chart 7 shows at 0.59 on the self-sufficiency axis the UK was still below the average OECD self-sufficiency score of 0.83. However, the score was an improvement from 0.54 in 2019. The UK was in a more favourable position in terms of diversity and political stability of imports. The UK's diversity score, at 0.66, was substantially above the OECD average of 0.39, making it the sixth highest. France has the highest diversity index at 0.77, surpassing the Netherlands with 0.76.

Chart 8 Security of supply of diesel for OECD countries, 2020



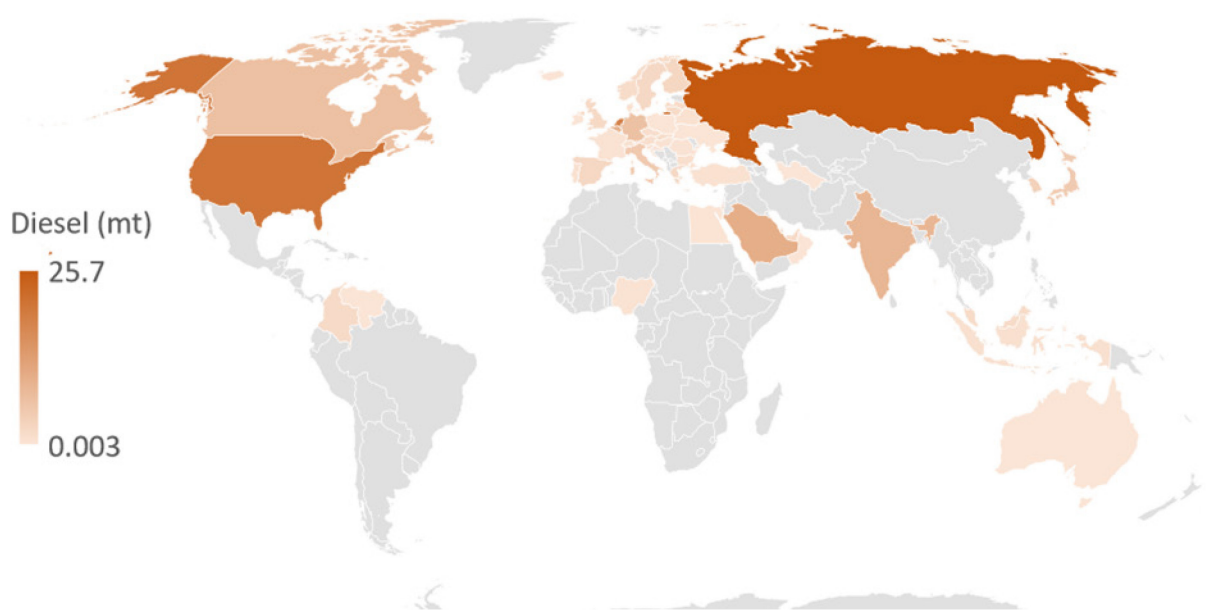
Note: Data nots available for Columbia and Israel

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 at 1.25 it has ranked in the top half of OECD countries for security of supply owing to its high diversity component (Chart 8).

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 12th largest exporter out of the 37 OECD countries in 2020, one place higher than in 2019.

Map 4 Worldwide diesel exports (million tonnes), 2020



Summary

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 0.54, OECD countries are very much dependent on imports of crude oil to meet refinery demand. Despite this, in 2020 crude ranked joint highest on diversity score with petrol, suggesting that supply is comparatively secure.

Total petrol production was less than total consumption with only 95 per cent of consumption being met by production, and 5 countries did not produce any petrol. However, 18 of the 37 OECD countries were self-sufficient; particularly notable were Lithuania, Norway, and Finland, with Lithuania producing more than eight times its demand and Norway almost five times its demand. With an average self-sufficiency score of 1.41 the OECD is well-placed to meet demand for petrol.

For diesel, fourteen of the OECD countries were self-sufficient in 2020. Greece notably produced just over three times the amount it consumed, and seven countries produced nothing. However, with the second lowest average scores for self-sufficiency (0.85) and diversity (0.39) the security of supply for diesel was second from last out of the four oils.

Jet fuel imports amongst OECD countries have led to an average diversity score of 0.30, 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, but OECD countries could have met more than total demand with own production. The UK scored second highest on the diversity index, after only the Netherlands.

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 0.45 OECD average. The UK ranks strongly amongst OECD countries for self-sufficiency; in petrol and crude the UK more than met its 2020 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. Despite this, with diversity scores of 0.78 and 0.66, for jet fuel and road diesel respectively, the UK compares favourably with the OECD averages of 0.30 and 0.39.

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 2020

	CRUDE			PETROL			JET FUEL			DIESEL		
	DI	S-S	Demand	DI	S-S	Demand	DI	S-S	Demand	DI	S-S	Demand
Australia	0.85	0.82	20,063	0.67	0.59	12,146	0.59	0.40	5,838	0.72	0.28	25,170
Austria	0.54	0.07	7,998	0.46	**1.25**	1,367	0.26	**1.13**	322	0.43	0.47	6,245
Belgium	0.71	0.00	27,189	0.54	**1.92**	1,620	0.60	0.73	1,139	0.44	**1.48**	5,582
Canada	0.23	**3.43**	51,349	0.67	0.90	32,235	0.31	0.88	2,815	0.19	**1.06**	29,535
Chile	0.56	0.01	7,626	0.10	0.91	2,916	0.20	0.68	723	0.17	0.54	4,672
Colombia	0.00	**2.43**	16,949	0.00	0.80	5,123	0.00	**1.24**	590	0.00	0.00	0.00
Czech Republic	0.51	0.02	6,068	0.51	0.81	1,468	0.31	0.33	147	0.40	0.55	4,719
Denmark	0.61	0.50	7,101	0.66	**1.71**	1,237	0.66	0.21	385	0.63	0.95	2,286
Estonia	0.00	0.00	0.00	0.50	0.00	217	0.15	0.00	26	0.30	0.00	514
Finland	0.24	0.00	10,943	0.04	**3.16**	1,332	0.30	0.85	354	0.00	**2.47**	2,332
France	0.81	0.02	33,046	0.76	1.00	7,544	0.77	0.38	3,804	0.76	0.39	32,639
Germany	0.77	0.02	84,245	0.70	**1.00**	19,607	0.34	0.54	4,700	0.45	0.79	34,646
Greece	0.52	0.00	22,242	0.51	**2.44**	1,904	0.11	**2.82**	580	0.57	**3.03**	2,312
Hungary	0.34	0.13	6,714	0.49	0.82	1,356	0.00	**1.14**	108	0.57	0.85	3,373
Iceland	0.00	0.00	0.00	0.01	0.00	103	0.30	0.00	87	0.00	0.00	412
Ireland	0.45	0.00	2,838	0.63	0.94	574	0.28	0.00	378	0.39	0.28	2,654
Israel	0.00	0.01	10,206	0.00	0.94	2,682	0.00	**1.35**	414	0.00	0.00	0.00
Italy	0.66	0.10	55,183	0.92	**2.03**	5,925	0.35	0.64	1,788	0.67	**1.14**	20,126
Japan	0.62	0.00	117,379	0.33	**1.01**	31,633	0.09	**1.15**	4,374	0.01	**1.09**	19,496
Korea	0.80	0.00	133,161	0.00	**1.79**	9,370	0.00	**2.97**	4,816	0.17	**2.69**	15,853
Latvia	0.00	0.00	0.00	0.32	0.00	186	0.21	0.00	57	0.29	0.00	781
Lithuania	0.28	0.00	7,848	0.11	**8.50**	251	0.00	**14.28**	62	0.39	**1.45**	1,699
Luxembourg	0.00	0.00	0.00	0.24	0.00	276	0.32	0.00	461	0.23	0.00	1,395
Mexico	0.00	**2.67**	33,124	0.19	0.31	25,789	0.04	0.40	2,011	0.06	0.34	13,567
Netherlands	0.80	0.02	49,089	0.77	**1.04**	3,703	0.80	**2.06**	2,165	0.75	**2.54**	5,951
New Zealand	0.52	0.25	3,794	0.36	0.56	2,180	0.26	0.90	707	0.38	0.57	3,031
Norway	0.64	**7.51**	11,234	0.31	**4.88**	726	0.63	0.88	422	0.53	**1.07**	2,405
Poland	0.29	0.04	25,599	0.41	0.90	4,406	0.00	**1.28**	460	0.39	0.72	16,822
Portugal	0.68	0.00	10,628	0.38	**2.15**	908	0.00	0.99	635	0.22	**1.12**	4,182
Slovak Republic	0.07	0.00	5,575	0.42	**2.13**	523	0.00	**1.46**	24	0.41	**1.48**	1,800
Slovenia	0.00	0.00	0.00	0.60	0.00	321	0.00	0.00	10	0.48	0.00	1,328
Spain	0.77	0.00	55,151	0.68	**1.84**	4,244	0.65	0.06	2,418	0.72	0.16	19,430
Sweden	0.47	0.00	17,410	0.66	**1.70**	2,099	0.65	0.31	391	0.60	**1.09**	4,837
Switzerland	0.34	0.00	2,814	0.34	0.27	2,072	0.26	0.01	706	0.47	0.34	2,728
Turkey	0.50	0.10	32,647	0.00	**1.77**	2,358	0.31	**1.16**	2,545	0.41	0.73	22,208
United Kingdom	0.64	**1.01**	44,519	0.89	**1.37**	9,608	0.78	0.39	4,983	0.66	0.59	21,046
United States	0.53	0.80	703,671	0.89	0.90	344,657	0.66	0.00	49,707	0.50	**1.18**	180,656
OECD Asia average	**0.71**	**0.00**	**125,270**	**0.16**	**1.40**	**20,502**	**0.05**	**2.06**	**4,595**	**0.09**	**1.89**	**17,674**
OECD EU average	**0.41**	**0.04**	**18,907**	**0.49**	**1.54**	**2,660**	**0.31**	**1.27**	**891**	**0.44**	**0.91**	**7,655**
OECD Middle East average	**0.25**	**0.05**	**21,427**	**0.00**	**1.35**	**2,520**	**0.15**	**1.25**	**1,480**	**0.21**	**0.36**	**11,104**
OECD average	**0.43**	**0.54**	**43,876**	**0.43**	**1.41**	**14,721**	**0.30**	**1.12**	**2,734**	**0.39**	**0.85**	**13,958**

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 ith 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.

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Aggregated energy balances, showing proportion of renewables in production, demand and final consumption

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Key headlines

Renewable sources represented 15.4 per cent of UK energy indigenous production in 2020, The figure has been growing steadily since 2000, when it was less than 1 per cent. A similar trend can be observed in demand, of which renewables represented 14.6 per cent in 2020.

In 2020, 13.3 per cent of final consumption was accounted for by renewables, a 2.5 percentage point increase on 2019, and the highest increase on record.

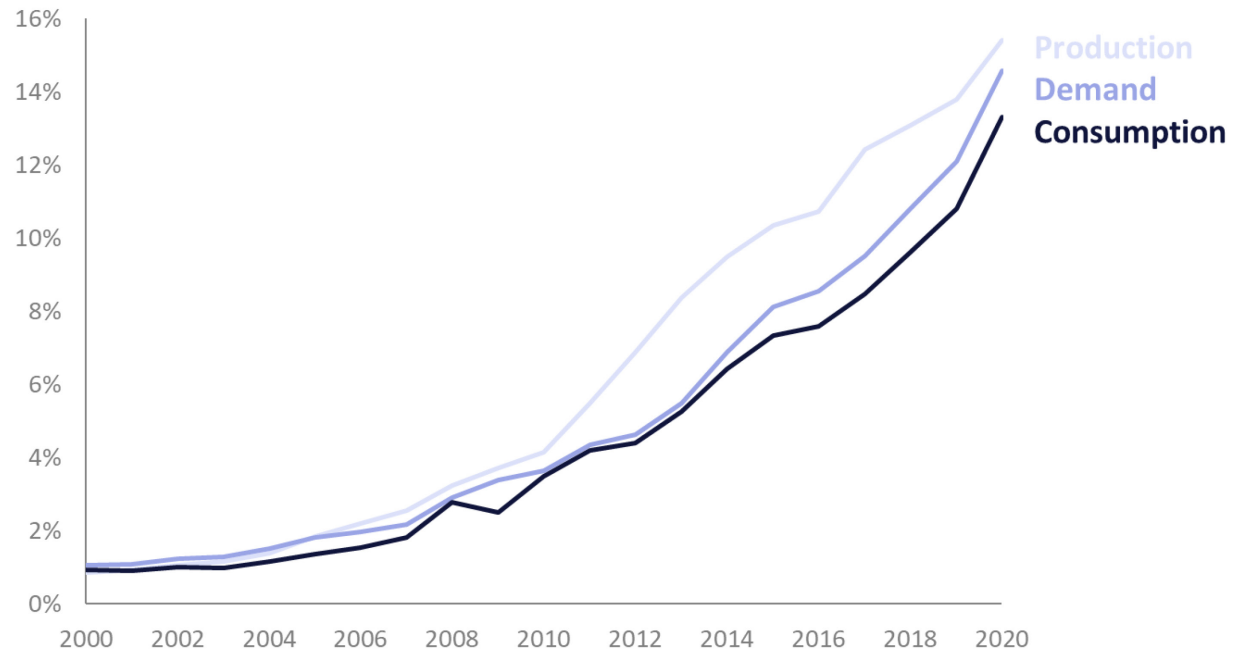
In 2020, for the first time, the renewable proportion in industry was in line with that for other final users (mostly commercial and public administration) at 23.5 per cent and 23.6 per cent respectively.

The proportion of renewable fuels varies across energy production, demand, and final consumption; it also varies across the different sectors, depending on their primary fuel requirement. BEIS has considered that publishing aggregated energy balances together with an “of which renewables” column will provide users with additional insights into renewable energy trends in the UK.

The accompanying spreadsheet contains the supporting data to this commentary mirroring the format of the energy balances.

Highlights and trends

Chart 1. Share of energy supply from renewable sources, 2000-2020.

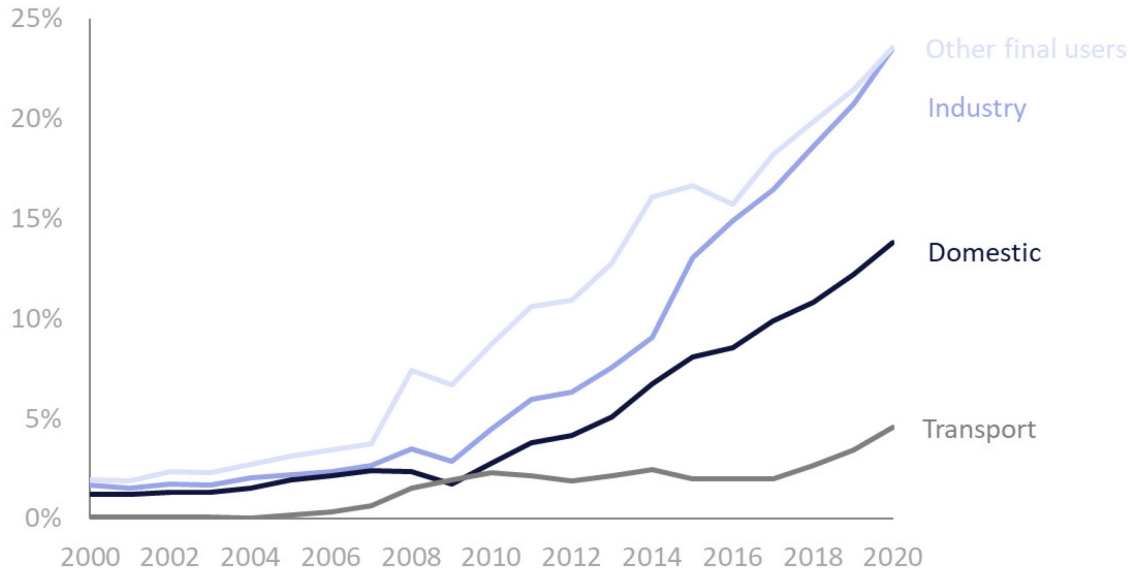


As shown in Chart 1 above, over time, the proportion of renewables in energy supply has been steadily increasing over the years, with production rising from just 0.9 per cent in 2000 to 15.4 per cent in 2020.

For demand, the proportion met through renewables depends on the dominant fuel mix in each 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, particularly primary renewables such as wind, solar, and hydro; Chart 2 below shows the proportions by sector.

The renewable component of total final consumption varies from a low of 4.5 per cent (for transport, mainly from liquid biofuels) to a high of 23.6 per cent for other final users, which is largely the service and commercial sectors that consume relatively large quantities of electricity.

Chart 2. Renewable component of final energy consuming by sector 2000-2020.



In 2020, the proportion of renewables consumed by industry has aligned with that for other final users (23.5 per cent and 25.6 per cent respectively). This reflects the increasing proportion of electricity consumed in that sector; in 2020 electricity in industry was 28 per cent but this has increased to 34 per cent in 2020, whereas for other consumers, it remained stable over this time scale. Consumption for thermal bioenergy and waste increased to a similar extent for both sectors. Although the proportion of renewables consumed in the domestic sector has increased over the time frame it remains low (at 14 per cent) compared to industry and other sectors reflecting gas' continuing dominance to provide space heating in homes. Although there has been an increase in the proportion of electricity, the bulk of the increase is due to wood being more widely burned to provide at least some space heating.

Chart 2 also shows a fall between the years 2015 and 2016 for other final users. This drop 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 the industrial unclassified sector to other sectors including agriculture, public administration, and commerce for 2016 and 2017[1].

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

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Combined Heat and Power in the regions

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Key headlines

London represents the region with the highest number of schemes, 376 out of a total of 2,659 across the UK

Yorkshire and Humberside has the highest generation and capacity in both absolute terms and per unit of economic output

The impact of COVID 19 has been most apparent in London with both heat and electricity generation falling by 3.6 and 3.3 per cent respectively

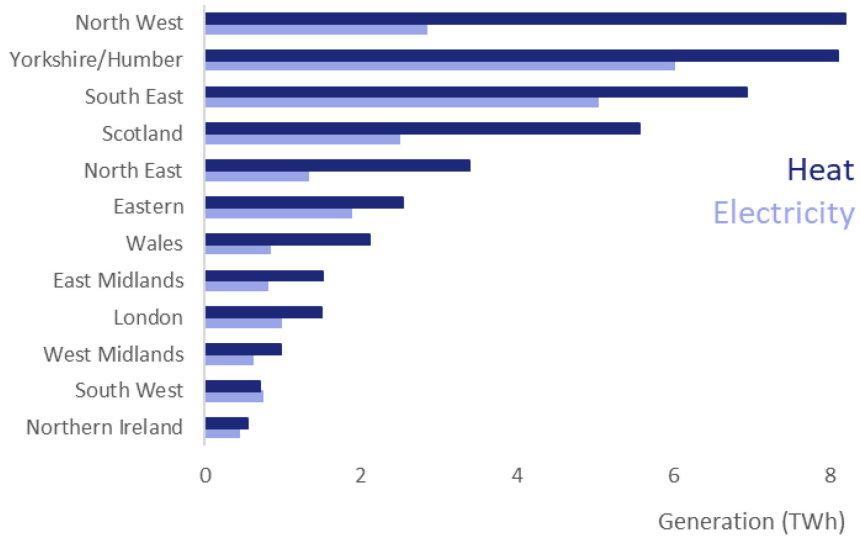
Combined Heat and Power (CHP), sometimes referred to as cogeneration, is the simultaneous generation of electricity and heat resulting in improved efficiencies when compared to meeting electricity and heat demands separately. This article provides additional regional information on CHP using data produced in support of The Digest of UK Energy Statistics (DUKES), Chapter 7;

https://www.gov.uk/government/statistics/combined-heat-and-power-chapter-7-digest-of-united-kingdom-energy-statistics-dukes

In 2020, there was an additional 81 schemes (Table 1), around half of which were in London (18 new schemes), the North West (11 schemes), and the South East (11 schemes). During the year, capacity also increased by 50 MWe (0.8 per cent), 18 MWe of which was in the South East. All regions saw an increase in the number of schemes and only Northern Ireland saw a slight fall in capacity (by 3 MWe, or 1.0 per cent).

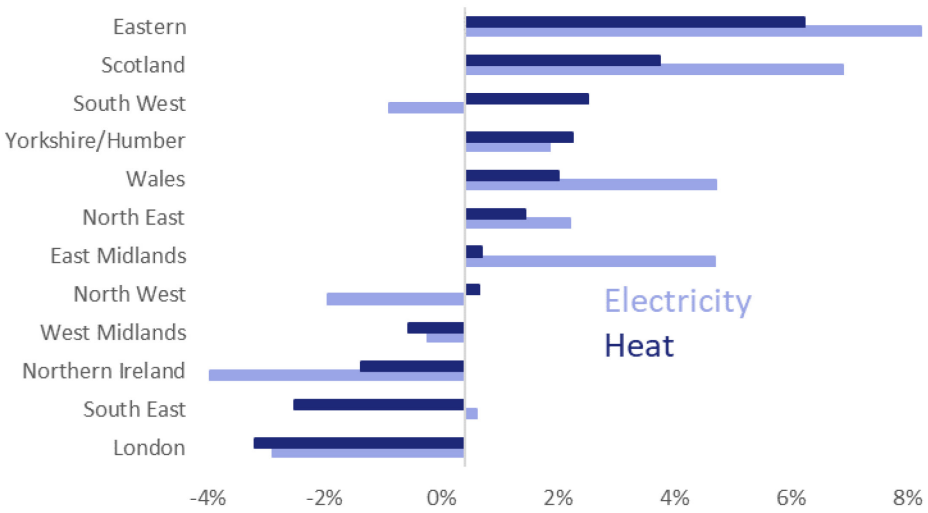
The region with the highest proportion of the UK's electrical capacity is Yorkshire and Humberside with a 33 per cent share, though this region hosts the single largest CHP scheme in the UK. This is followed by the South East with a 15 per cent share, the North West (13 per cent) and Scotland (10 per cent). These regions also represented the highest in terms of outputs, both heat and electricity, with Yorkshire and Humberside accounting for 25 per cent of all qualifying CHP electricity generation and 19 per cent of heat (Table 2).

Figure 1. Heat and electricity generation by region in 2020



UK wide, both electricity and heat outputs increased (by 1.4 per cent and 0.7 per cent respectively) between 2019 and 2020, though there were regional variations.

Figure 2. Percentage change between 2019 and 2020 for heat and electricity outputs



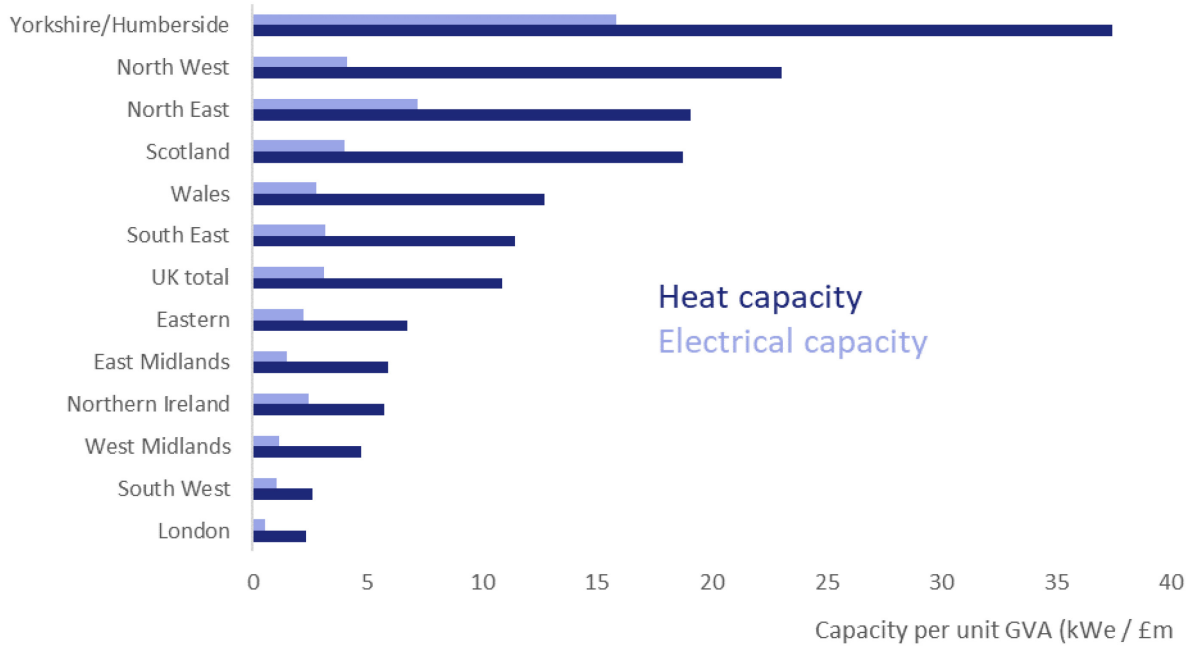
The Eastern region saw increases in both heat and electricity output due to one large site in the industrial sector. Activity levels in certain sectors have been more affected by COVID-19 than others, notably those schemes serving hotels, sporting facilities and district and community heating schemes have seen large falls in output between 2019 and 2020. This trend is most apparent within London where heat output has fallen by 3.6 per cent and electricity by 3.3 per cent. This is also reflected in the low load factor (Table 3) for London at just 50.3 per cent. This compares with 63.4 per cent for Yorkshire and Humberside which has a high proportion of industrial sites including large refineries, a sector ideally suited to CHP.

Table 5 shows the distribution of capacity across the different sectors and regions with London accounting for almost half of all capacity in the electricity, gas, steam and air conditioning supply sector which includes district and community heating schemes. The chemicals sector which, along with oil refineries, is suitable for CHP, is concentrated in the North East, the North West and Yorkshire and Humberside; taken together these regions account for 83 per cent of CHP capacity in those sectors.

The large share of capacity employed in vehicle manufacture in the West Midlands is in line with the importance of this region to the automotive sector. More than a third of all capacity in the food and drink sector is in the Eastern region reflecting the large heat demands associated with sugar manufacture. The concentration of large horticultural sites (i.e. greenhouses) in South East England helps to explain the deployment of 45 per cent of all agricultural capacity in this region. The distribution of capacity serving public administration, mostly hospitals and education, tends to align with population density.

To determine CHP's contribution relative to how much a sector contributes to the regional economy as a whole, capacity per unit of GVA is compared in Table 4 and Figure 3 below. Yorkshire and Humberside represents the highest proportion reflecting not only the concentration of favourable CHP sectors in that region (particularly oil refining on the Humber Estuary) but also its high share of the regional economy. Conversely, although CHP capacity in the vehicle sector is concentrated in the West Midlands (63 per cent), vehicle manufacturing represents a comparatively lower share of the regional economy.

Figure 3. Relative importance of CHP in the regional economies in 2020



Tables 6 and 7 show the regional split of installed qualifying electrical capacity by prime mover (Table 6) and by size range (Table 7). At this level of disaggregation, some regions show only the totals to prevent disclosure due to the small number of sites.

Gas turbines, whether on their own or as part of Combined Cycle Gas Turbines (CCGT), continue to dominate the CHP market. In 2020, just 139 schemes of the CCGT and Open Cycle Gas Turbine (OCGT) technologies accounted for 61 per cent of total qualifying CHP capacity. Almost half of gas turbine capacity is to be found in Yorkshire and Humberside.

Reciprocating Engines represent over 90 per cent of all schemes, around 40 per cent of which are located in London, the South East and the North West, specifically in high population density areas with high heat demand from leisure centres, hotels and retail outlets, suited to the capacity range and heat grade offered by reciprocating engines.

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