Department for Business, Energy & Industrial Strategy

Energy Trends

UK, July to September 2020

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.

ktoe	Production	Imports	Exports	Demand
Total energy	-9%	-19%	-9%	-13%
Coal	-39%	-1%	+108%	-10%
Primary oil	-12%	-21%	-11%	-20%
Oil products	-21%	-38%	-18%	-25%
Gas	-4%	+10%	+18%	+3%
Electricity	-13%	-27%	+54%	-13%

Energy consumption in the UK remains low as Covid-19 restrictions affect economic output, leisure, and travel. Whilst consumption has trended upwards since the record low in May it is still substantially below the same quarter of 2019.

Whilst energy requirements for industrial use and services (e.g., shops, restaurants, offices) are both down nearly 10 per cent on last year, the most notable fall is in transport demand, down 30 per cent. In particular, air transport demand has been affected, and is down nearly two-thirds on last year.

Covid-19 disruptions have also impacted on energy production this quarter with overall production down 9 per cent, with drops in oil and gas production following maintenance activity delayed from earlier this year. Coal production reached another record low.

Electricity generation from coal was down nearly 30 per cent on the same period last year and now comprises just 0.7 per cent of total generation. Despite a relatively small increase in renewable capacity year-on-year, renewable generation is up to 40.2 per cent of total generation, a significant increase on the 8.2 per cent in the same quarter 10 years ago.

Whilst renewable generation has increased on last year, low carbon generation has fallen on the same period following reduced output from nuclear. Nuclear generation reached a record low in the quarter as a result of maintenance activities across the estate.

Warren Evans 0300 068 5059 energy.stats@beis.gov.uk
Media enquiries 020 7215 1000 newsdesk@beis.gov.uk

Section 1: Total Energy

Key headlines

Total energy production this quarter was 8.8 per cent lower than in the Q3 2019. (Chart 1.1)

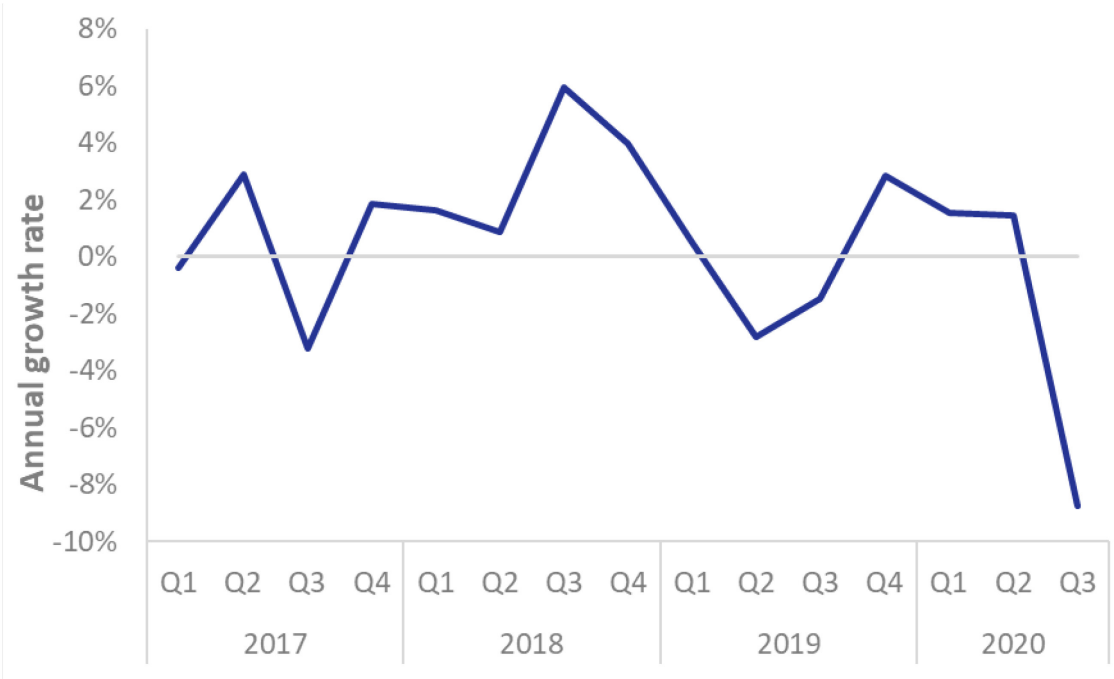
Total primary energy consumption for energy uses fell by 14 per cent. When adjusted to take account of weather differences, primary energy consumption fell by 13 per cent. Consumption has picked up from earlier this year but the continued impact of Covid-19 on demand has remained into this quarter, with a notable fall in demand for the three main transport fuels. (Chart 1.2)

Final energy consumption (excluding non-energy use) fell by 18 per cent compared to the third quarter of 2019. Transport consumption fell by 30 per cent, industrial consumption fell by 8.4 per cent and other final users (mainly from the service sector) consumption fell by 7.8 per cent. Domestic consumption rose by 2.5 per cent as home working hours increased. (Chart 1.3)

On a seasonally and temperature adjusted basis, final energy consumption fell by 16 per cent, with falls in all sectors.

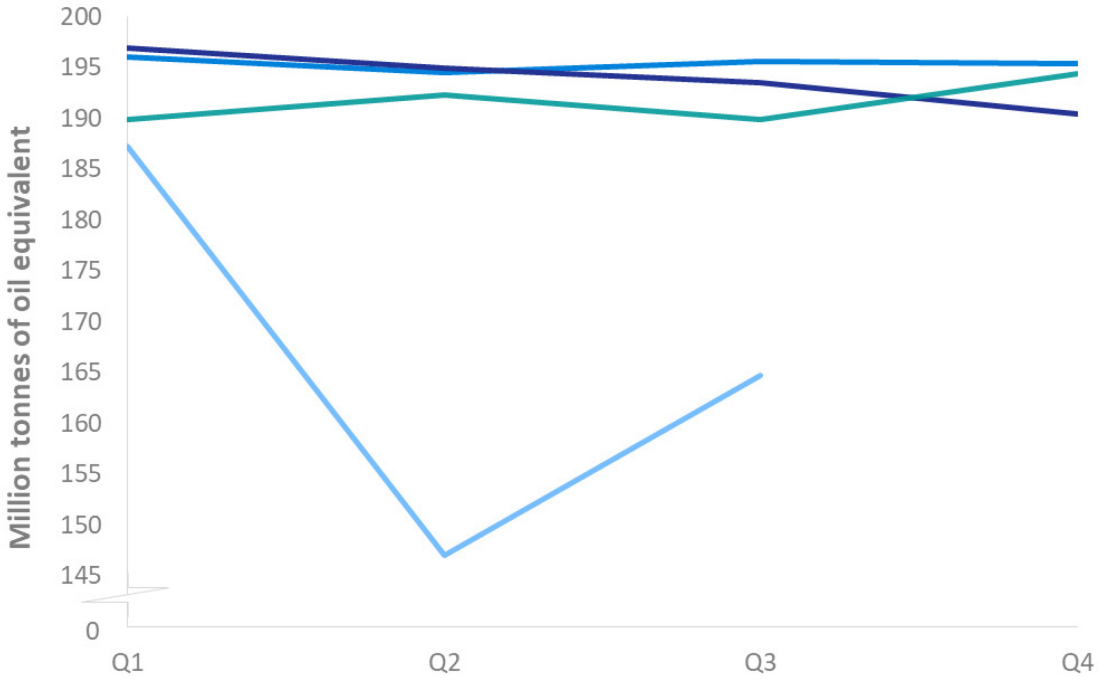
Net import dependency was 20.8 per cent, down 7.5 percentage points from Q3 2019, whilst fossil fuel dependency was 74.6 per cent, down 1.5 percentage points from the same period last year, but up 3.4 percentage points from the record quarterly low level in Q2 2020.

Chart 1.1 UK production (annual growth rate)



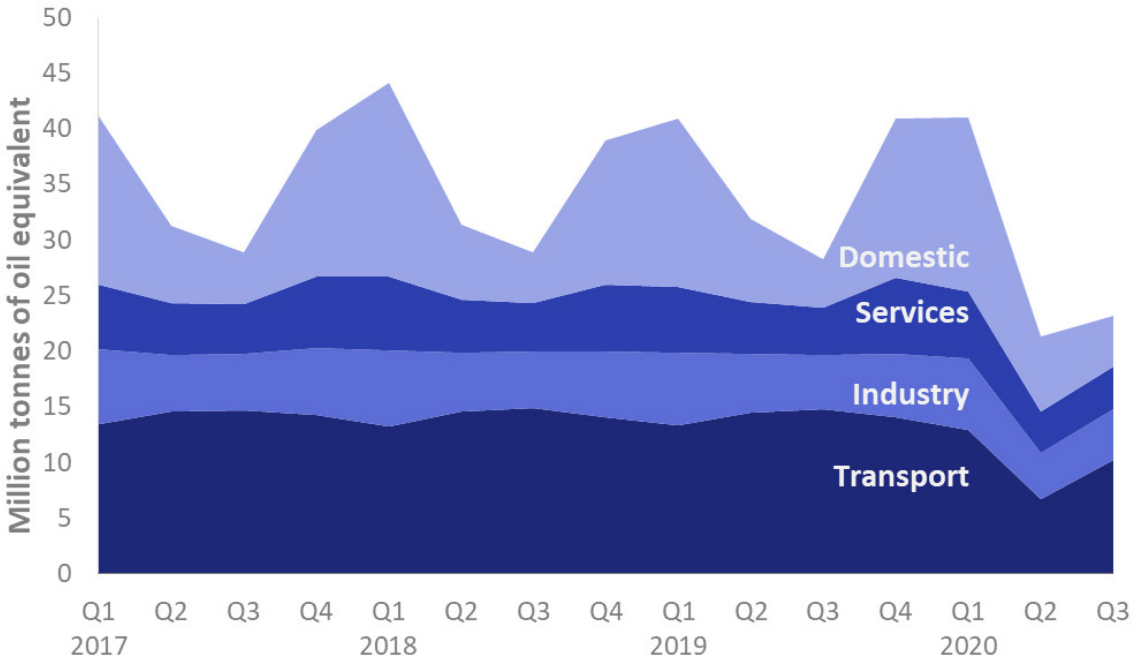
In Q3 2020, the annual growth rate of UK quarterly production was -8.8 per cent on the same quarter last year with falls in coal, oil and gas due to maintenance activities being delayed in 2020 because of the Covid-19 pandemic, nuclear due to outages, and onshore wind, solar and hydro output, which more than offset rises in bioenergy & waste, and offshore wind due to increased capacity.

Chart 1.2 Total inland consumption (primary fuel input basis)



Total inland consumption (this includes not only fuel use by consumers, but fuel used for electricity generation and other transformation) was 164.8 million tonnes of oil equivalent – that is on a seasonally adjusted and annualised rate that removes the impact of temperature on demand. This is 13 per cent lower than Q3 2019. Whist inland consumption increased 12 per cent on Q2 2020, when lockdown restrictions were at their strictest, the continuing impact of the Covid-19 pandemic on consumption this quarter remains evident.

Chart 1.3 Final energy consumption by user



Total final energy consumption (excluding non-energy use) fell by 18 per cent between Q3 2019 and Q3 2020, as consumption levels were impacted by the Covid-19 pandemic lockdown restrictions. Domestic sector energy consumption rose by 2.5 per cent, as home working remained more prevalent than last year. Transport sector energy consumption fell by 30 per cent, as domestic and international travel was reduced due to the lockdown restrictions continuing into the UK summer holiday period. Service sector energy consumption fell by 7.8 per cent as many shops and workplaces were closed, whilst industrial sector energy consumption fell by 8.4 per cent.

Kevin Harris **0300 068 5041** energy.stats@beis.gov.uk

Section 2: Coal and derived gases

Key headlines

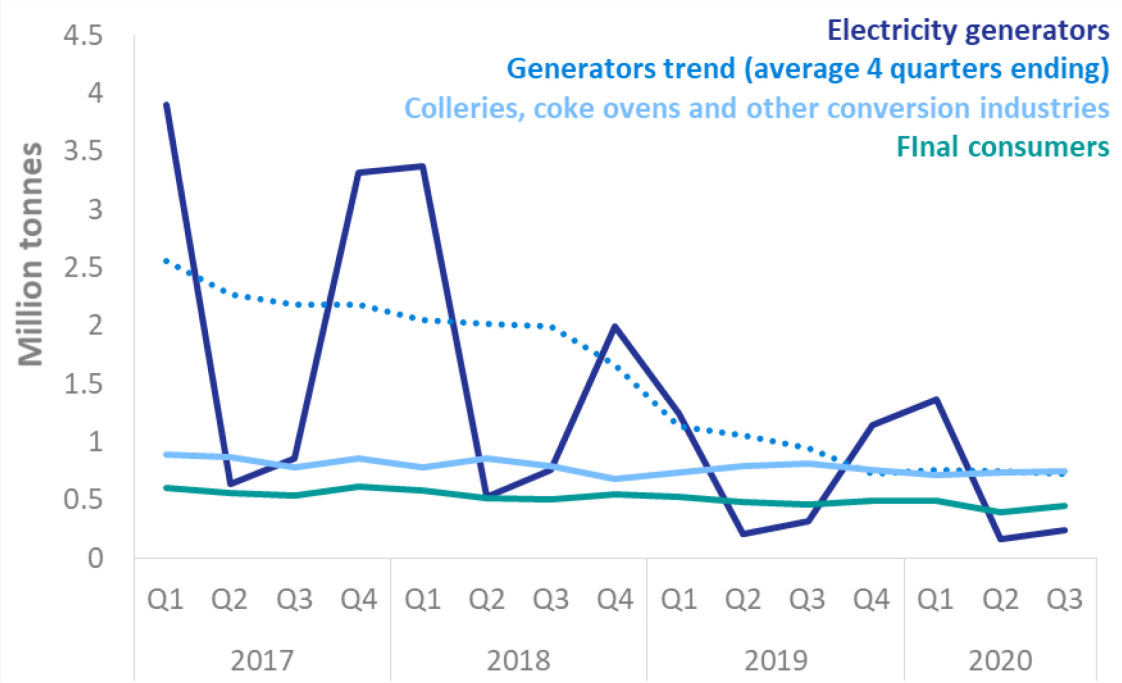
The demand for coal by electricity generators in Q3 2020 fell to 239 thousand tonnes, 25 per cent lower than demand in Q3 2019. This continued decline was due to high carbon prices, an increase in renewables generation and the closure of Fiddlers Ferry power station. This quarter included a record-breaking period without coal generation in Great Britain with the National Grid using coal-fired electricity on only one day from 10 April to 12 August. (Chart 2.1)

Overall coal production in Q3 2020 fell to a record low of 0.3 million tonnes, down 39 per cent compared with Q3 2019. Surface mining production fell to 305 thousand tonnes. This was a result of mine closures and falling demand for coal for electricity generation. (Chart 2.2)

Coal imports fell to 1.3 million tonnes, 2.3 per cent down on Q3 2020. Net imports accounted for 64 per cent of supply in Q3 2020 (Chart 2.2). Russia (54 per cent), the USA (17 per cent) and Venezuela (13 per cent) accounted for 84 per cent of total coal imports. (Chart 2.3)

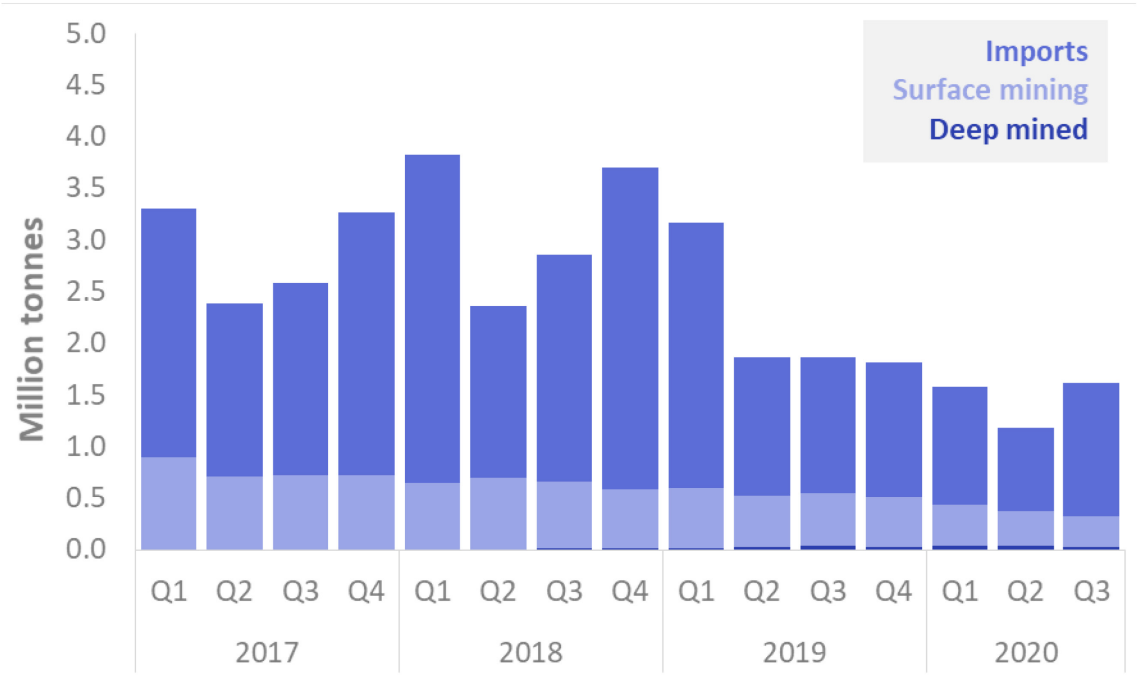
Total stock levels were down 43 per cent to 3.5 million tonnes compared to a year earlier.

Chart 2.1 Coal Consumption



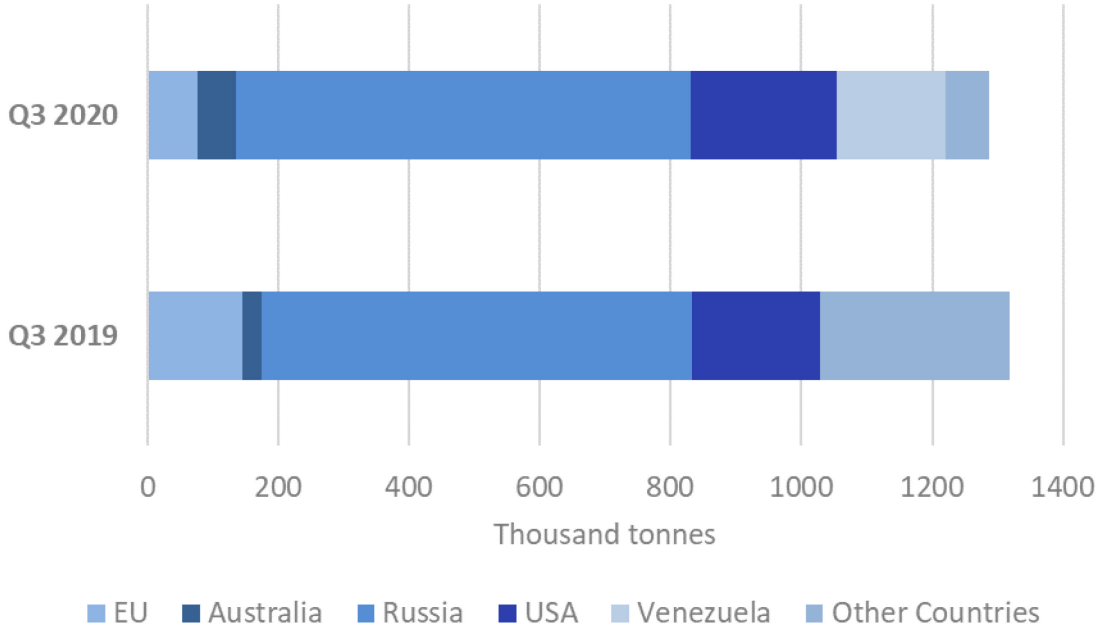
Coal-fired electricity generation fell from 317 thousand tonnes in Q3 2019 to 239 thousand tonnes in Q3 2020, a decrease of 25 per cent. Demand for coal-fired generation peaks in winter; these peaks have declined as coal-fired generation became less competitive economically and is displaced by gas and renewable sources.

Chart 2.2 Coal Supply



Domestic coal production has fallen steadily because of coal mine closures and reduced demand. Imports have filled the gap but have also fallen from 1.9 million tonnes in Q3 2017 to 1.3 million tonnes in Q3 2020 due to a drop in demand for coal.

Chart 2.3 Coal Imports



Russia remained the largest exporter of coal to the UK, increasing its share from 50 per cent in Q3 2019 to 54 per cent in Q3 2020. USA was the second largest exporter up from 15 per cent in Q3 2019 to 17 per cent in Q3 2020. Venezuela, which had not exported any coal to the UK in 2018 or Q3 2019, was the third largest exporter with a 13 per cent share in Q3 2020.

Section 3: Oil and oil products

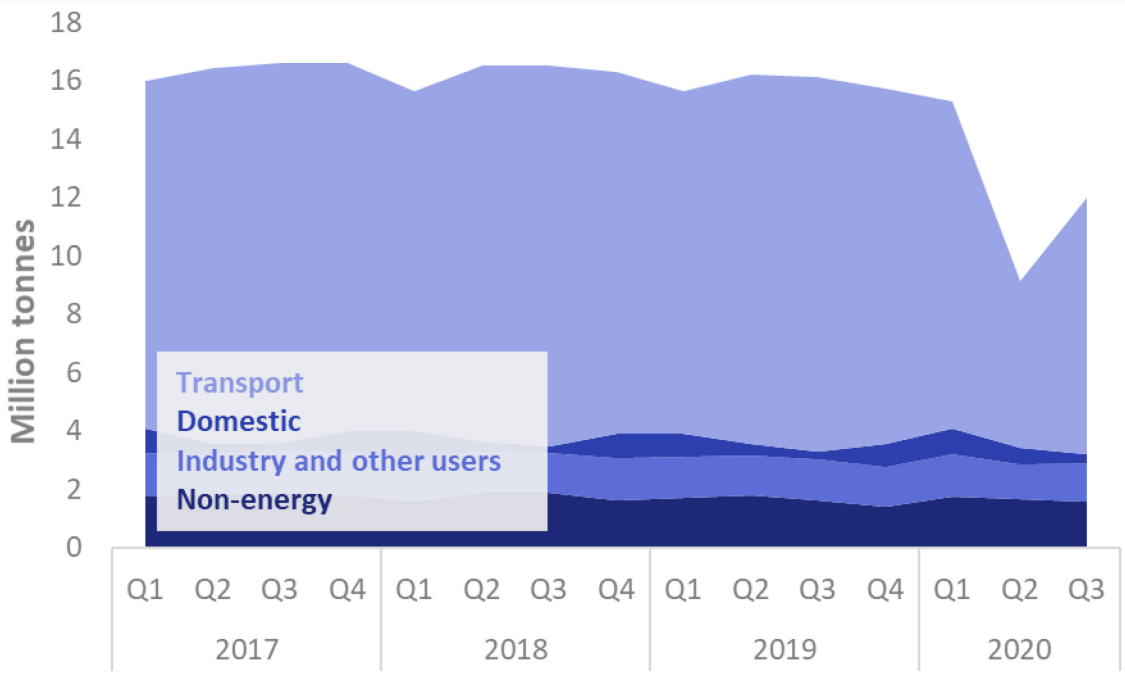
Key headlines

Demand for primary oils and products remains lower than usual in Q3 2020, down by more than one-fifth and one-quarter, respectively. However, there has been a recovery following the record lows of Q2 2020. Primary oil demand was up by 14 per cent compared to Q2 2020 with product demand up by 30 per cent, primarily due to higher demand for transport fuels. Demand for petrol has increased by nearly two-thirds in Q3 2020 compared to Q2, and diesel by 40 per cent as domestic travel restrictions were lifted. (Chart 3.1 and Chart 3.2)

Demand for aviation fuel remains low, less than a third of the levels seen in Q3 2019. However, since international travel restrictions were lifted, and travel corridors initiated with other countries, the demand more than doubled on last quarter to 1.1 million tonnes. (Chart 3.2)

Indigenous production of crude and NGLs has fallen to its lowest level since Q3 2015 as maintenance slows production. The increased demand has been met with imports, once again making the UK a net importer of primary oils. (Chart 3.3)

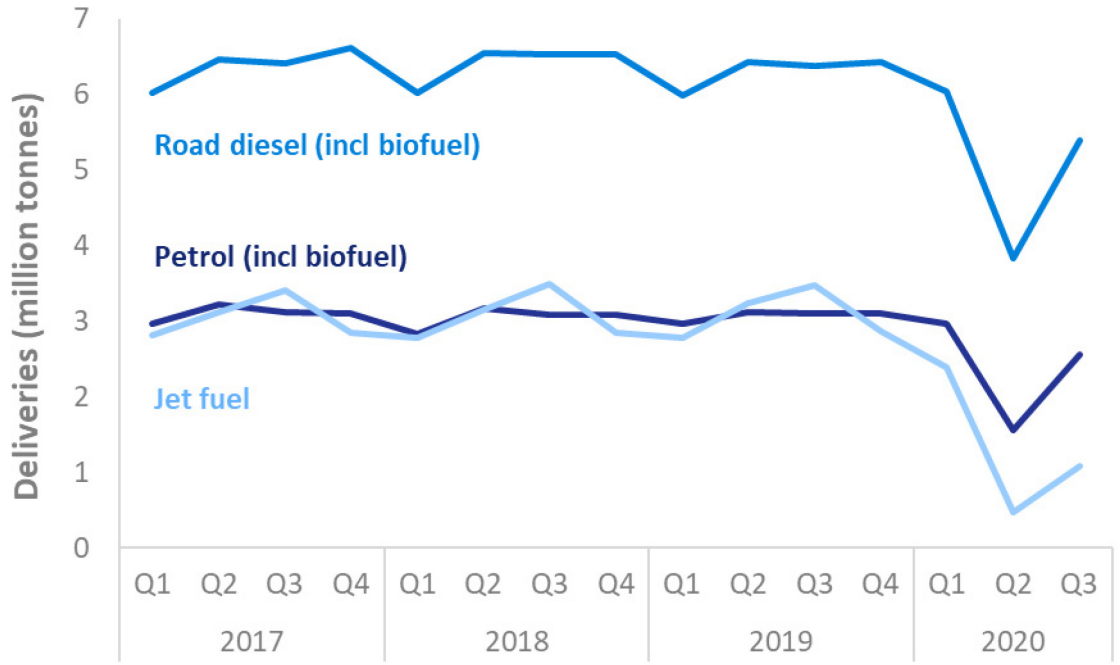
Chart 3.1 Final consumption of oil



Demand for petroleum products remains low in Q3 2020, down by one-quarter compared to Q3 2019. However, there was a 30 per cent increase in demand compared to the record lows seen last quarter. This increase reflects an increase in demand for transport as lockdown restrictions eased during the period.

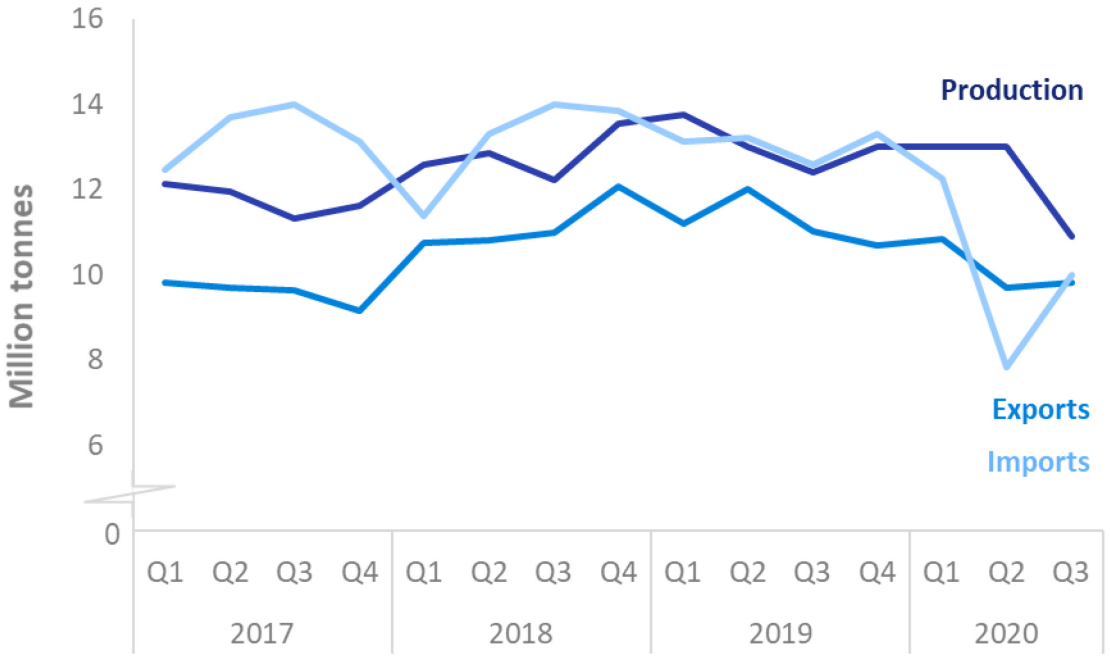
Notably domestic consumption in Q3 2020 has risen by 8.9 per cent compared with last year, but Q3 is the lower than Q2 as customers took advantage of lower prices earlier this year to fill home storage tanks.

Chart 3.2 Demand for main transport fuels



Demand for each main transport fuel increased in Q3 2020 compared with Q2 2020, as both domestic and international travel restrictions were somewhat relaxed. Demand for petrol rose by nearly two-thirds; with reduced exports helping meet domestic demand. Demand for road diesel increased by 42 per cent and was met through production and imports. There was an uptick in jet as demand more than doubled compared to Q2 2020, but Q3 levels remain two-thirds below that in Q3 2019.

Chart 3.3 Production and trade of crude oil and NGLs



Offshore production had remained relatively stable throughout the initial stages of the pandemic but fell in Q3 due to some terminals and fields undergoing maintenance. This resulted in a 15 per cent decrease in production on Q2 2020, with increased imports. The UK was a net importer of primary oils in Q3 this year but by only 0.2 million tonnes. Exports were down by 11 per cent compared with 2019, but at nearly 10 million tonnes remained higher than seen a few years ago prior to the opening of new North Sea projects. Demand for primary oil was down by more than one-fifth compared with the same period last year, although demand has increased by 14 per cent on Q2 2020 as refineries respond to increasing demand for road fuels.

Section 4: Gas

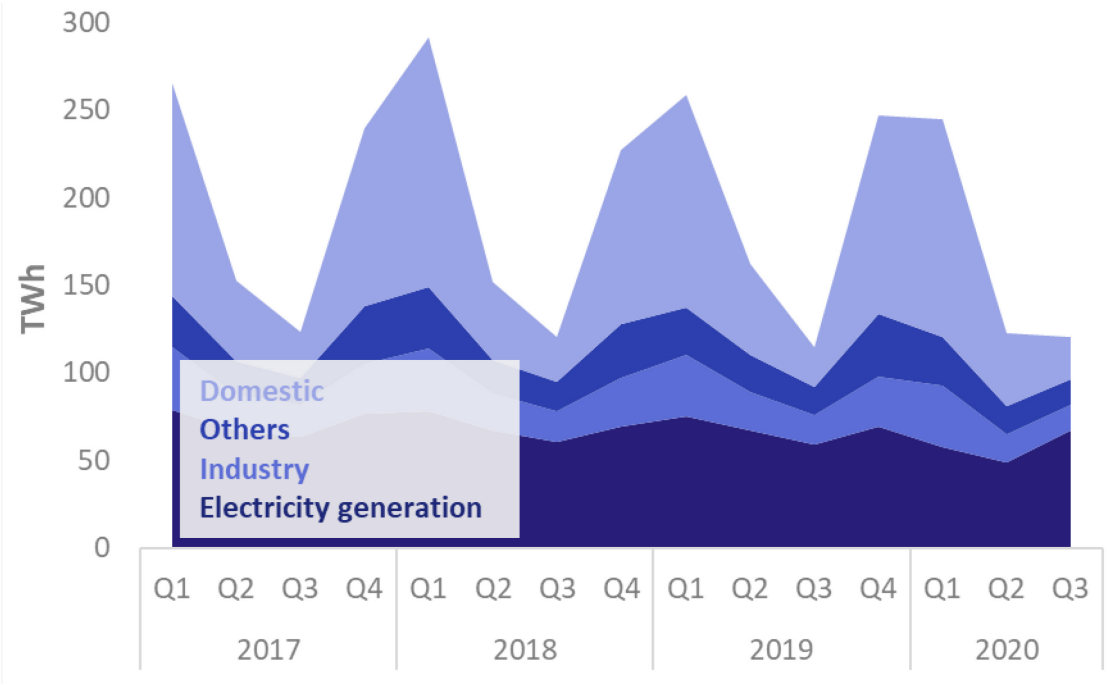
Key headlines

UK demand for natural gas in Q3 2020 was 140 TWh, up by 3.1 per cent compared to Q4 2020. Cooler temperatures and increased demand for generation offset reductions in demand from the hospitality, industrial and services sectors (Chart 4.1).

Total imports were up 10 per cent. After briefly losing its place to Qatar as the largest source of imported gas to the UK in Q2 2020, Norway again became the largest supplier in Q3 2020 at nearly two-thirds of total imports. Liquefied Natural Gas (LNG) imports were up by 28 per cent and comprised just over one-third of the total, down from the record high of 62 per cent seen in Q2 2020 (Chart 4.2).

Production was down by 3.6 per cent compared to the same period last year following planned maintenance which was delayed from earlier in the year due to the Covid-19 pandemic (Chart 4.3).

Chart 4.1 UK demand for natural gas

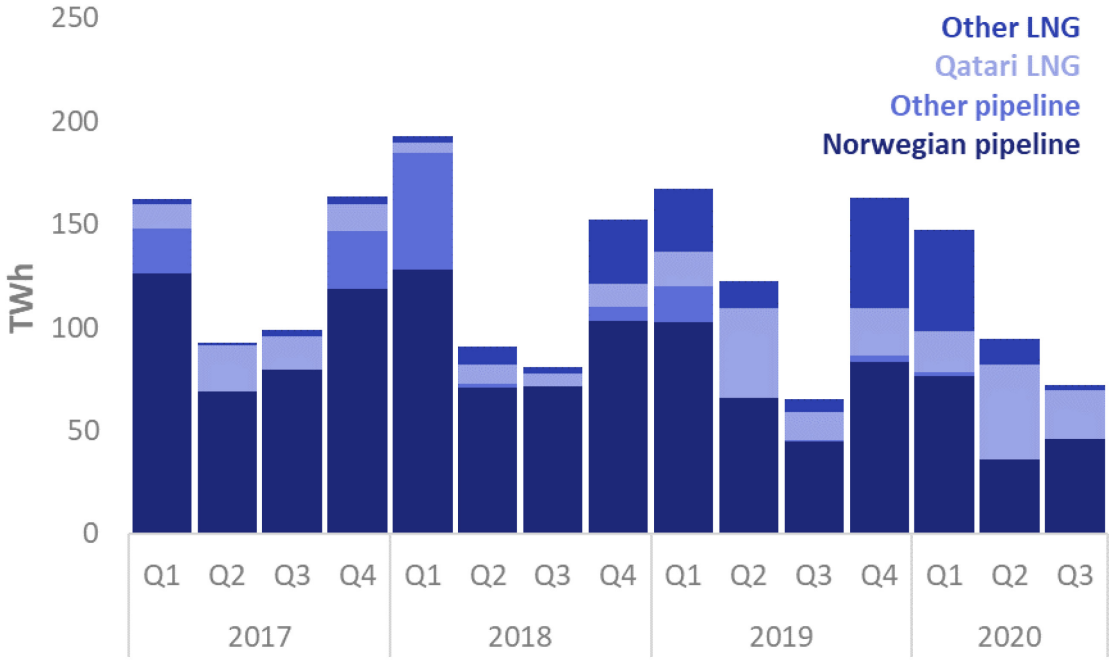


Despite reduced final consumption on the same quarter last year, overall demand for gas was up by 3.1 per cent. This is principally due to increased demand for generation (up by 14 per cent from last year), as drops in output from nuclear and renewables increased gas demand for generation to 67 TWh.

Demand for gas in the industrial sector and by other final users continue to be affected by the Covid-19 pandemic, with demand down by 11 and 9.5 per cent from last year, respectively. The low demand reflects reduced activity in these sectors arising from Covid-19 disruption. See page 14 for additional sources of information and links to related economic data.

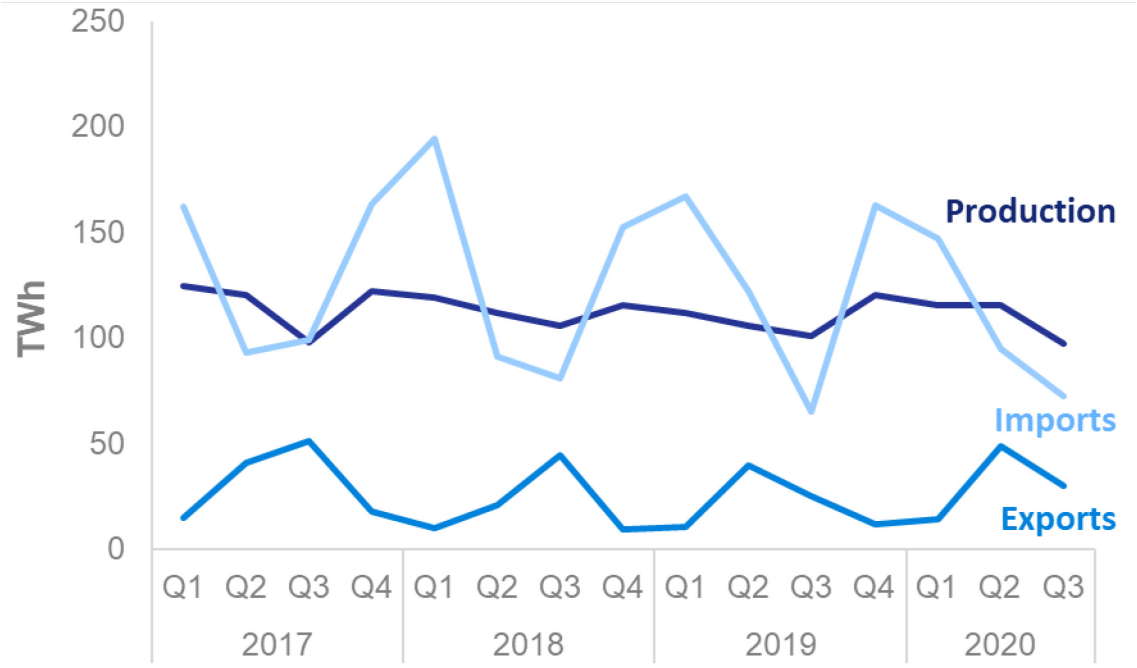
Cooler temperatures as well as increased working from home also led to increased demand in the domestic sector, up by 3.6 per cent to 24 TWh.

Chart 4.2 Imports by origin



Higher levels of imports from Norway and Qatar saw total imports increase by 10 per cent, with pipeline imports up 2.4 per cent and LNG imports up 28 per cent. Pipeline imports from Norway rose to 46TWh, the largest single import supplier at nearly two-thirds of all imports. Overall, LNG comprised just over a third of imports, down from the record share seen in Q2 but up from Q3 2019. Although no longer the largest supplier after record imports in Q2 2020, Qatar continues to be a major import origin, up 68 per cent compared to 2019. Qatar formed 90 per cent of LNG imports in Q3 2020 with the remaining cargoes arriving from the USA.

Chart 4.3 Production and trade of natural gas



Due to essential maintenance that was delayed in Q2 following the Covid-19 pandemic, production of natural gas in the three months to September was down by 3.6 per cent compared to the same quarter last year.

Exports increased by 18 per cent to 30 TWh. This was because of a rise in exports to both Ireland and the Netherlands, following the conversion of the Bacton to Balgzand pipeline to an interconnector, allowing gas to flow from the UK to the Netherlands.

Jeremy Burton **0300 068 5785** oil-gas.statistics@beis.gov.uk

Section 5: Electricity

Key headlines

Quarter 3 of 2020 saw electricity generation and consumption remain low compared to the same period in 2020, but with patterns much closer to their normal seasonal trends than that seen during the last quarter which was affected by the restrictions in response to the Covid-19 pandemic.

Demand for electricity was low in both the industrial and services sectors, though domestic consumption was similar to the same period in 2019 (Chart 5.1).

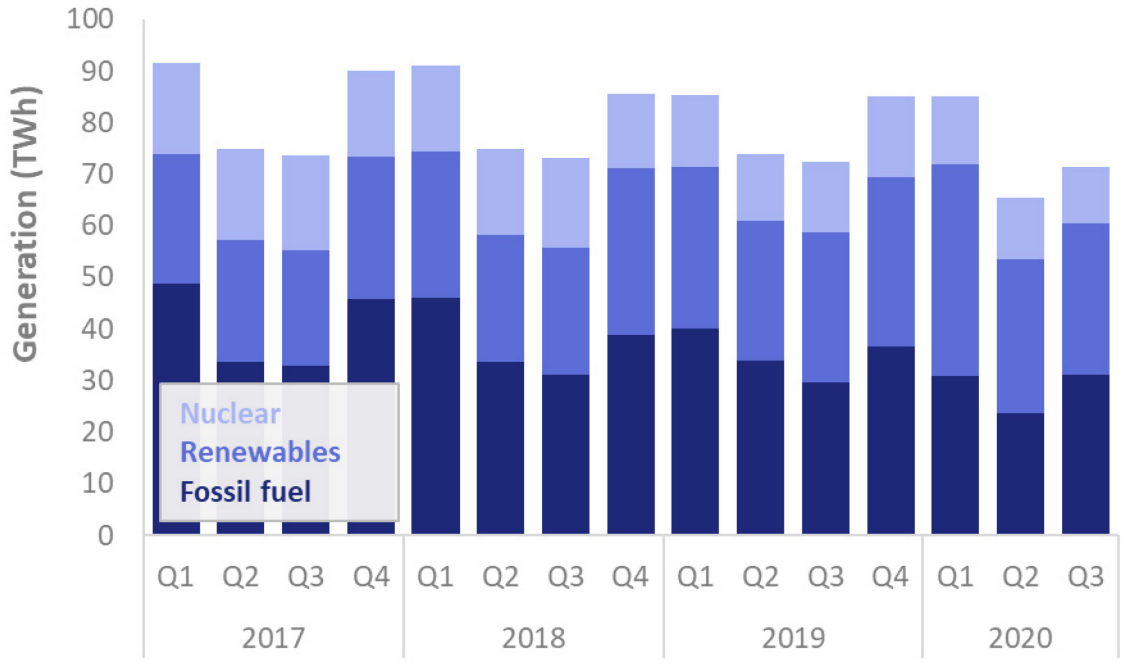
Total electricity generation was 73.2 TWh in Q3 of 2020, down 1.5 per cent compared with the same period the previous year. Nuclear generation fell by 20 per cent in Q3 2020 compared to the previous year because of maintenance outages. This meant that increased fossil fuel generation was needed to meet demand, though renewable generation also increased slightly. (Chart 5.2).

Chart 5.1: Electricity consumption by sector

Whilst consumption increased in Q3 compared to Q2, demand for electricity remained low in comparison with last year. Overall demand was down 3.4 per cent and final electricity consumption by end users down by 5.1 per cent, in comparison with the same period in 2019. This was largely the result of restrictions imposed in response to the Covid-19 pandemic which reduced consumption in non-domestic sectors.

Electricity consumed by the industrial sector fell by 7.3 per cent compared to Q3 2019, reflecting reduced industrial output from Covid-19. Consumption by other final users (including the commercial sector) decreased by 7.9 per cent. Domestic electricity consumption increased by 0.3 per cent in Q3 2020 reflecting lower average temperatures as well as increased numbers of people continuing to work from home.

Chart 5.2: Total electricity generation by fuel



Total electricity generation was 73.2 TWh in Q3 of 2020, down 1.5 per cent compared with the same period the previous year. Electricity generation is driven by demand, which was down by 3.4 per cent over the same period. Fossil fuel generation totalled 31.1 TWh in Q3, of which almost all was gas. Gas remained the fuel with the highest generation at 30.3 TWh, an increase of 6.0 per cent compared to last year. With coal use for generation continuing to decrease and low electricity demand during the UK's Covid-19 restrictions, there have been long coal-free periods in Great Britain this year, including a record-breaking 67-day period between March and June and a 55-day period between June and August.

Renewable electricity generation was 29.4 TWh in Q3 2020, up 0.8 per cent compared to the previous year. This included higher generation from offshore wind (8.0 TWh in Q3 2020), an 11 per cent increase on the previous year and in line with increased offshore capacity. Renewable generation comprised 40.2 per cent of total generation, slightly less than the fossil fuel share at 42.5 per cent.

Nuclear generation fell by 20 per cent in Q3 2020 compared to the previous year, as just 10.9 TWh was generated by nuclear power, the lowest value in the published time series. During this time, maintenance outages started at Hartlepool and Heynsham 1, and continued at Dungeness B, Hunterston B, Hinkley Point B and Sizewell B. The fall in nuclear generation contributed to a lower figure for low carbon generation (55.1 per cent of the share) than during the same period last year (57.6 per cent).

Section 6: Renewables

Key headlines

Renewable electricity generation was 29.4 TWh in 2020 Q3, a small increase over last year. The largest increase was in offshore generation due to added capacity, though this was offset by reduced generation from solar and hydro due to unfavourable weather conditions.

Renewable capacity growth has slowed this year with 1.2 GW (2.6 per cent) added since 2019 Q3, lower than we have seen previously in the data. Half of the new capacity is offshore wind (up 6.2 per cent) with the rest largely from solar PV (up 1.9 per cent) and Bioenergy (up by 3.9 per cent).

Generation from biodegradable municipal solid waste saw a record in generation due to additional capacity installed in 2019 Q4.

In 2020 Q1, renewable's share of generation exceeded 40 per cent for the first time. Although the share remained above this milestone in Q2 and Q3, at 44.4 per cent and 40.2 per cent respectively, it remained below the record 47.2 per cent achieved in Q1, the result of unusually high wind generation particularly during February when Storms Ciara and Dennis struck.

Chart 6.1 Change in renewable generation and capacity between Q3 2019 and Q3 2020

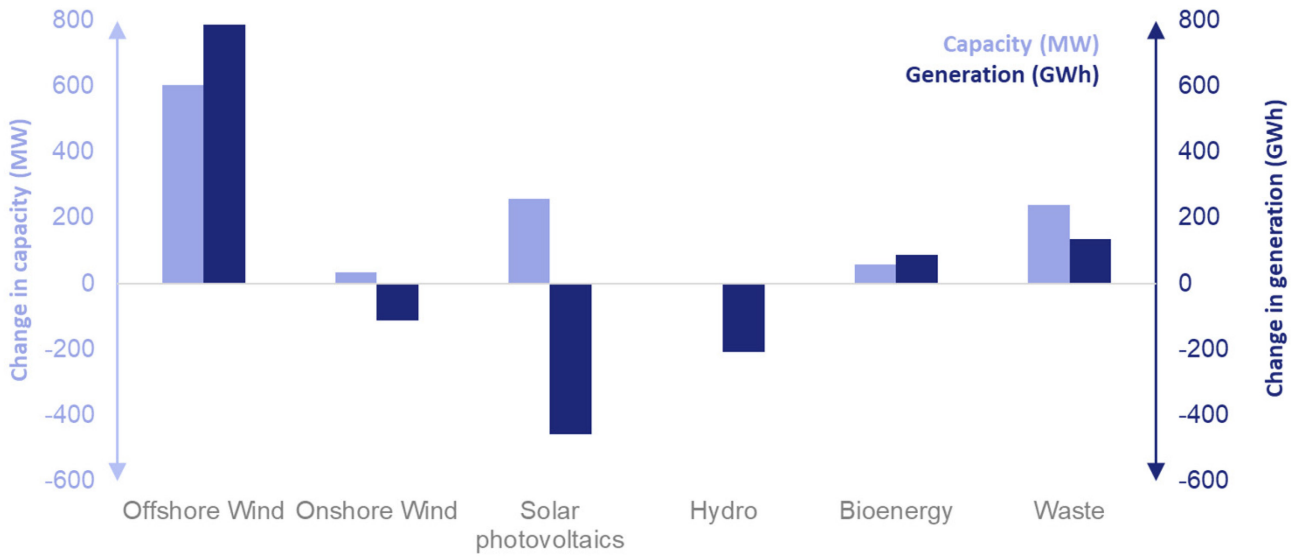


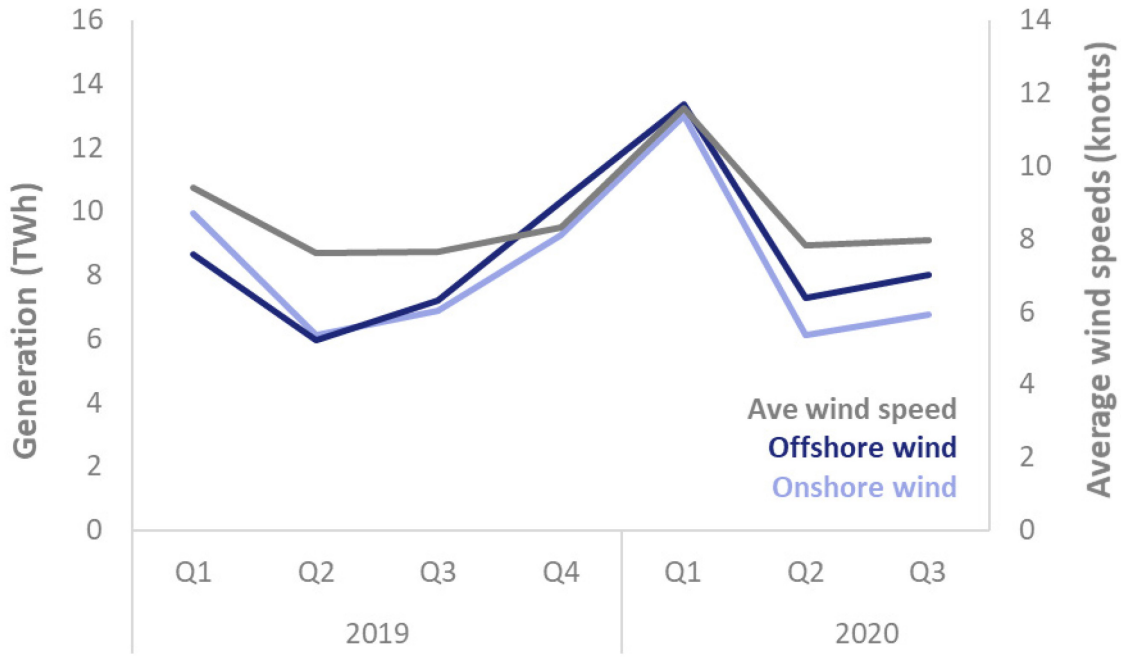
Chart 6.1 shows increases in capacity by technology compared to changes in generation since 2019 Q3; where capacity has increased but generation has fallen (such as solar PV), it tends to indicate the effect of weather conditions. Offshore wind capacity increased by 0.6 GW bringing the total installed capacity to 10.4 GW. This added capacity was the main contributor to the 11 per cent increase in offshore generation with average wind speeds only marginally higher at 4 per cent. The largest new offshore wind site is East Anglia 1.

Onshore wind generation fell by 1.6 per cent; although there was an increase in capacity and average wind speeds, these were marginal with just 35 MW added since Q3 2019. Wind speeds vary across the UK and with 80 per cent of wind generation being in Scotland, this can dominate UK generation. Generation was also affected by outages at major wind farms. Despite a 1.9 per cent increase in solar PV capacity[1], generation decreased by 10 per cent on Q3 2019 with the effect of lower sunlight hours dominating. Hydro generation decreased by 15 per cent as a result of lower average rainfall. Please see the technical information page for links to weather data.

Generation from Bioenergy increased by 0.2 TWh (2.5 per cent) mostly due to increases in municipal solid waste which saw a record high generation and also plant biomass.

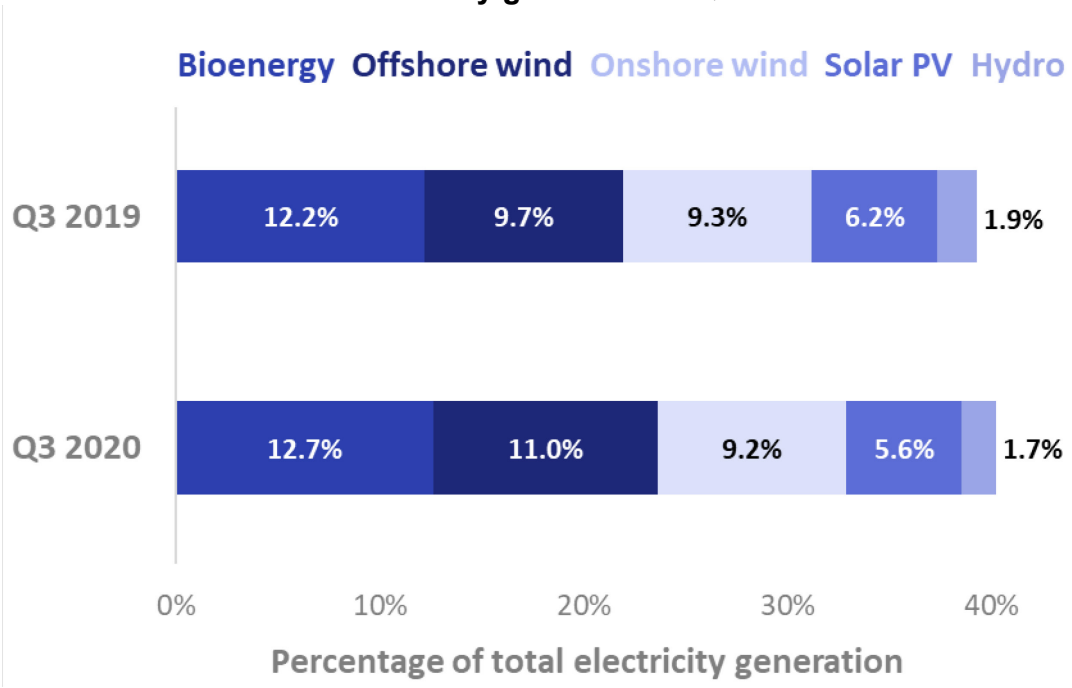
[1] The Feed in Tariff (FiT) scheme[2] closed March 2019. BEIS continues to monitor small scale generation using the Central FiTs Register, and Micro Generation Certification Scheme (MCS) registrations and the Renewable Energy Planning Database (REPD). Currently excluded are unsubsidised installations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

Chart 6.2 Wind generation (LHA) and average wind speeds (RHA)



Although offshore wind capacity still lags onshore (10.4 GW and 14.1 GW respectively), generation in offshore exceeded that for onshore for the first time in 2019 Q3 and has remained higher since. Although generation can be impacted by issues including plant outages, wind generation is generally driven by changes in installed capacity and wind speeds. Chart 6.2 shows the effect of unusually high wind speeds experienced in 2020 Q1 particularly during February when average wind speeds were particularly high with two storms occurring in close succession (Storms Ciara and Dennis). In Q3 2020, generation from offshore is more closely correlated with average wind speeds with onshore reflecting the plant outages and variation in regional wind speeds.

Chart 6.3 Renewables' share of electricity generation – Q3 2019 and 2020



In 2020 Q3, renewable's share of generation was 0.9 percentage points higher than in the same quarter in 2019, due to a combination of increasing renewable generation and a decrease in total generation. The share of generation from offshore wind generation's increased from 9.7 per cent in 2019 Q3 to 11 per cent in 2020 Q3 reflecting the increased generation whilst solar share fell from 6.2 per cent to 5.6 per cent. The share of generation from bioenergy and waste remains strong at 12.7 per cent of total generation.

Liquid Biofuels - For information on liquid biofuels used in road transport please see Table 6.2

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.

Special articles

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

Diversity and security of gas supply in the EU, 2019

Feed-in Tariff load factor analysis

Electricity generation and supply in Scotland, Wales, Northern Ireland and England, 2016 to 2019

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

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 30 July 2020:
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 (see details below).

Kevin Harris **0300 068 5041** energy.stats@beis.gov.uk

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.

Further information

Recent publications of interest

Smart Meters quarterly statistics
Estimates 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
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

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Diversity and security of gas supply in the EU, 2019

Key headlines

The EU and UK are large consumers of natural gas. In 2019 the EU, including the UK, consumed 496 billion cubic metres (bcm). In 2019 production met nearly one-quarter and one-half of supply for the EU and UK, respectively, with the remainder being met by imports. Pipeline imports made up one-half and one-third of supply for the EU and UK, respectively, with the remainder from imports of Liquefied Natural Gas.

Using a metric to assess diversity of supply we examine the security of supply to each EU country, including the UK, in 2019. The UK ranked as the third highest scoring country in the EU for diversity and security of supply in 2019 owing to our substantial production of gas and range of import supply sources.

Introduction

The EU is a large consumer of natural gas. In 2019, the EU (1) consumed 496 billion cubic metres (bcm). Demand for natural gas is met through indigenous production (2) and trade. The key metric in this article is total supply, which is production plus imports. In 2019, production met 23 and 46 per cent of supply for the EU and UK, respectively. The rest of supply is made up of imports, which can be via pipeline or via shipments of liquefied natural gas (LNG). In 2019, pipeline imports made up 55 and 33 per cent of supply for the EU and UK, respectively. Imports of LNG have increased in recent years; in 2019, LNG made up 22 and 21 per cent of supply for the EU and UK, respectively.

Using statistics from the International Energy Agency (IEA) (3) This article updates a long running series that compares the security of gas supply in the UK with that of neighbouring countries in the EU. Although the UK has now left the EU the comparisons remain illustrative and we will look to widen our comparisons beyond the EU going forward.

Methods

Three indicators were used to analyse the diversity and security of natural gas supply in this article.

Self-sufficiency

Self-sufficiency is a country's ability to meet its natural gas demand through indigenous production alone. It is calculated by dividing the volume of indigenous production by demand. Countries with a self-sufficiency score of 0 did not produce natural gas; countries with a score greater than 0 and less than 1 must meet some demand through imports; countries with a score of 1 produced as much gas as used; and countries with a score greater than 1 produced more gas than they used so are likely net exporters. In general, high self-sufficiency means natural gas supply is secure.

1. EU-27 + 1 (2019 data). Following the UK's departure from the EU the method for this article will be reviewed ahead of publication in 2021 for 2020 data.
2. Marketable production within national boundaries, including offshore production.
3. www.iea.org/data-and-statistics
4. World bank governance indicators, see Appendix 1 for underlying data and Appendix 2 for method.

Abbie Gower 0300 068 5244 oil-gas.statistics@beis.gov.uk Zoe Clark 020 7515 8170

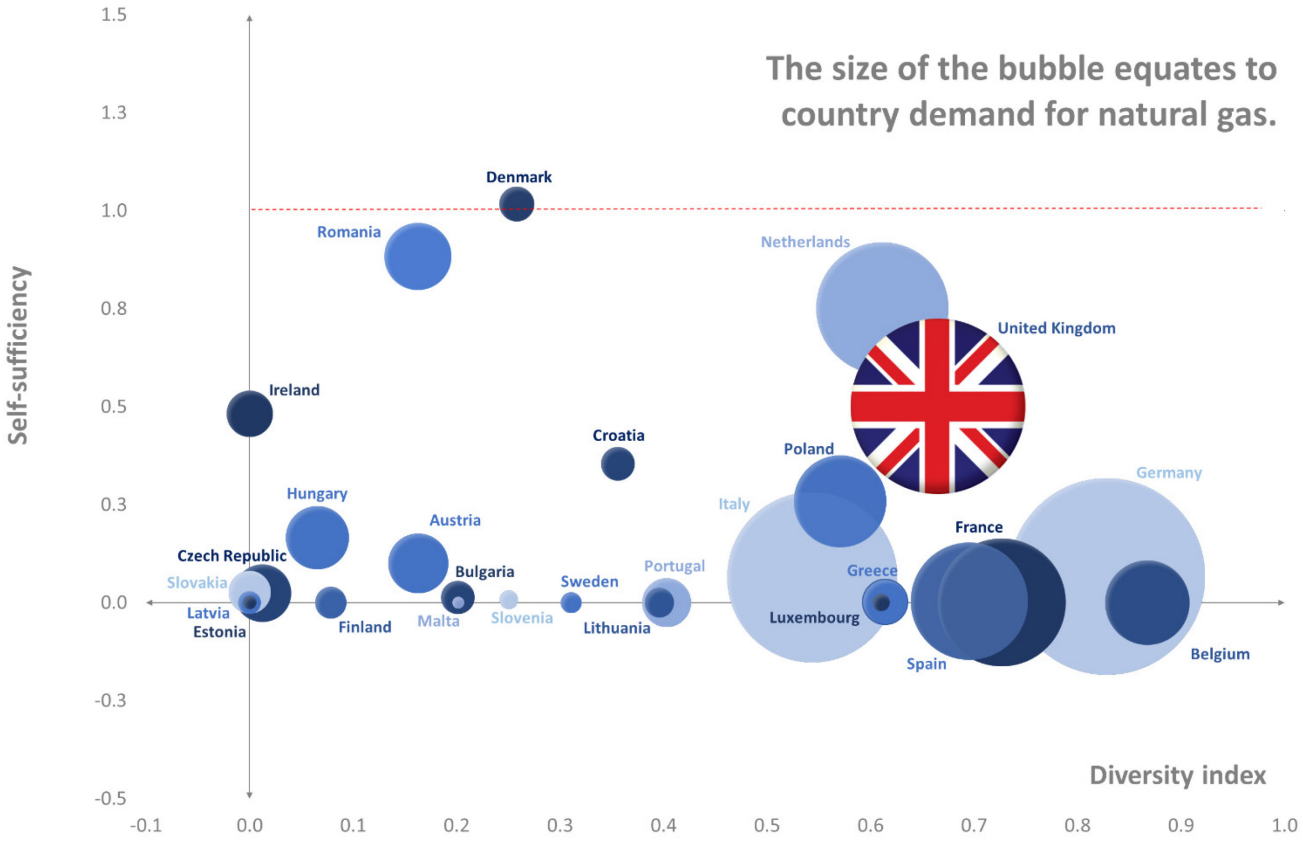
Diversity index

Diversity is used to describe the number of import sources of a given country. This is used along with the political stability (4) of the source country to provide a weighted metric of diversity. This means that a country with many import sources of high political stability will have a high diversity index. Conversely few import sources of low political stability results in a low diversity index. In general, a diverse source of imports means gas supply is more secure. This is further improved if the source countries are politically stable.

Supply index

The supply index combines the self-sufficiency score and diversity index. It is a simple indication of security of supply. A supply index of zero indicates that a country has no indigenous production and only one import source.

Chart 1: Self-sufficiency and diversity index for EU countries, 2019



See Appendix 1 for underlying data

Chart 1 shows the relationship between a country's self-sufficiency score, and diversity index. The size of the bubble indicates each country's demand.

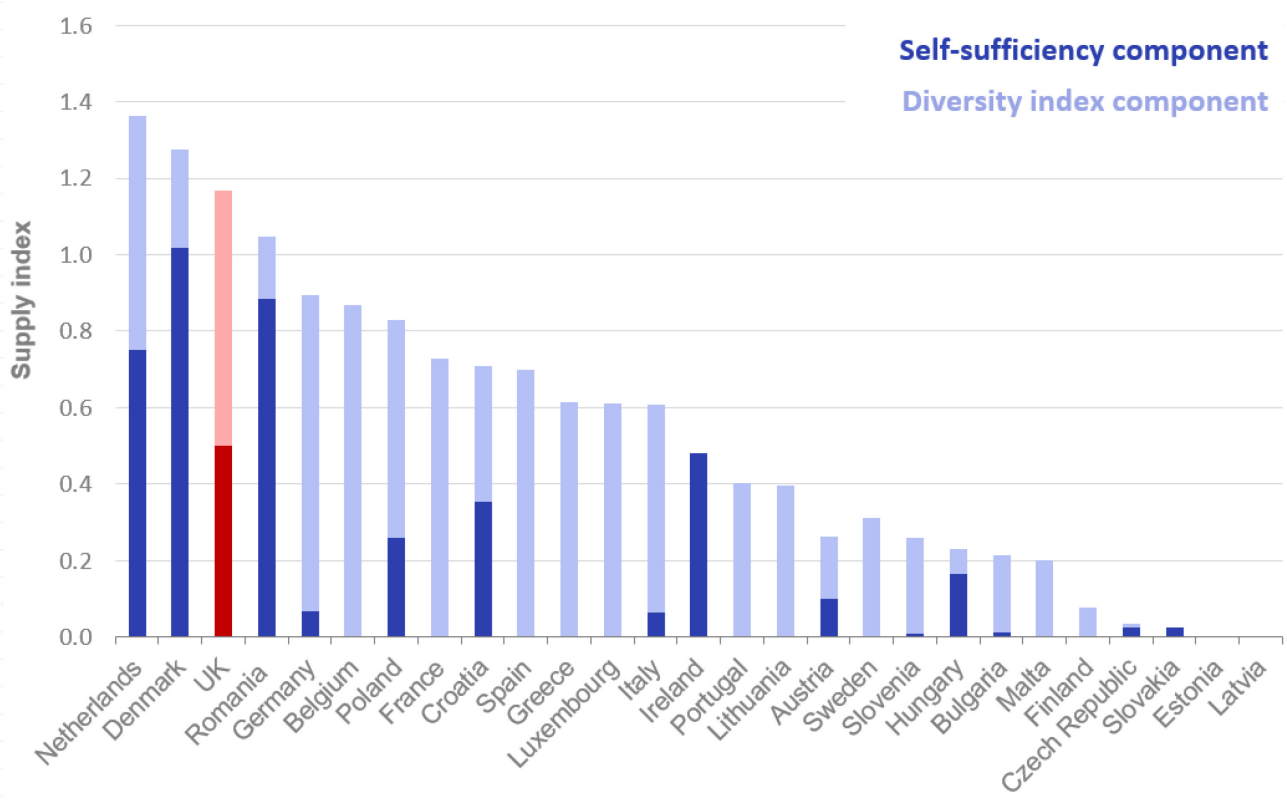
Self sufficiency

On average, 17 per cent of EU demand was met through indigenous production. In 2019, of the EU countries Denmark was the only net exporter of natural gas, exporting to Sweden, the Netherlands, Germany, and Italy via pipeline. All other countries met demand through imports, other than Cyprus which has no natural gas demand and therefore has not been included. Indigenous production met half of UK demand in 2019. This has decreased in the last 10 years, down from two-thirds in 2009. The UK has maintained a self-sufficiency score of around one half since 2016.

Diversity index

To meet the shortfall in supply, the EU and UK import gas from a variety of sources. In 2019, the UK had a diversity index of 0.67, higher than the EU average of 0.34. This high score is because the UK has a high number of import sources, with some high political stability scores. The UK's proportion of total supply from imports has fluctuated between 40 and 60 per cent since 2009. It settled at just over 50 per cent in 2014 and has remained there since; in 2019 imports accounted for 54 per cent of total UK supply of gas.

Chart 2: Supply index of EU countries, 2019



See Appendix 1 for underlying data

Chart 2 shows the supply index for EU countries in 2019. The self-sufficiency score and diversity index have been stacked, indicating the relative contribution of these components to the security of supply ranking.

Supply index

The EU had an average supply index of 0.51. The Netherlands had the highest score at 1.36 and the UK ranked in third place with a score of 1.17, behind Denmark. Estonia and Latvia had no indigenous production and only one import source so have a supply index of zero.

Import Sources: Pipeline and LNG

In 2019, the EU met 77 per cent of supply through imports. Most imports arrive via pipeline because the infrastructure is well-established, and this is a cost-effective way of transporting gas. Pipeline infrastructure means it is often convenient to import gas from neighbouring countries. Therefore, Central and Eastern European countries receive most of their gas imports from Russia. Russia acts as a transit country for gas from Kazakhstan and Turkmenistan, so it should be noted that the origin of this gas is not necessarily all Russian. Twenty EU countries imported gas from Russia in 2019. For Estonia, Latvia and Slovakia, Russia was the only import source.

LNG is natural gas that has been cooled to a liquefied state, making it easier to store and transport. It can then be re-gasified at import terminals or processing facilities before being transferred to the pipeline system. The UK has three LNG import terminals, the Isle of Grain, South Hook and Dragon. Following several years of decline, imports of LNG to the EU and UK have been increasing since 2018 and this trend continued in 2019 when LNG imports to the EU met 22 per cent of supply in 2019 compared to 10 per cent in 2018. For the UK this was 9 per cent of supply in 2018 compared to 21 in 2019.

Chart 3: Sources of gas supply for the EU, 2019

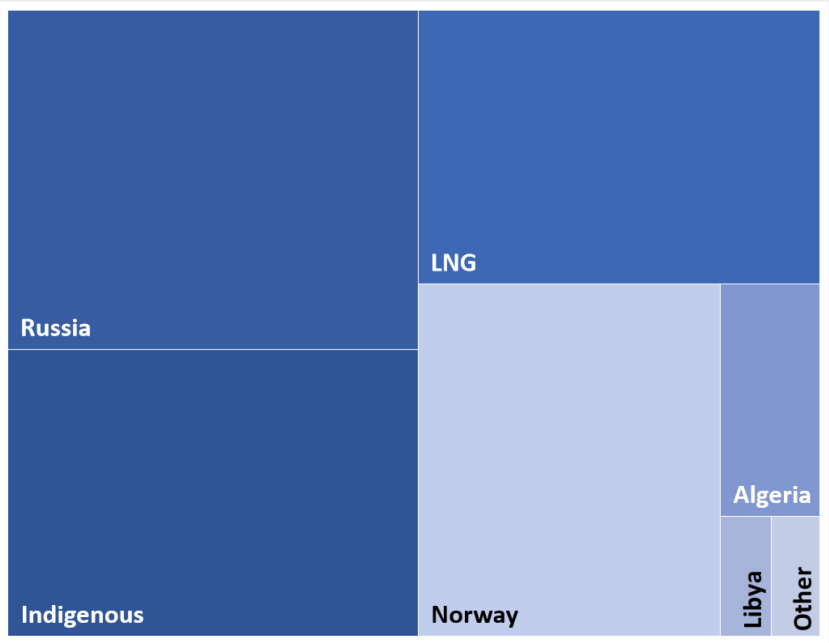


Chart 3 shows the main sources of natural gas for the EU, with pipeline imports broken down by country of origin. When considering EU countries together, imports from Russia were the largest single source, accounting for 27 per cent of supply. Small quantities of gas imports have been grouped together as 'Other'; this includes Ukraine, Turkey, and Switzerland, as well as Non-specified/ Other.

Chart 4: Direct sources of gas supply for the UK, 2019

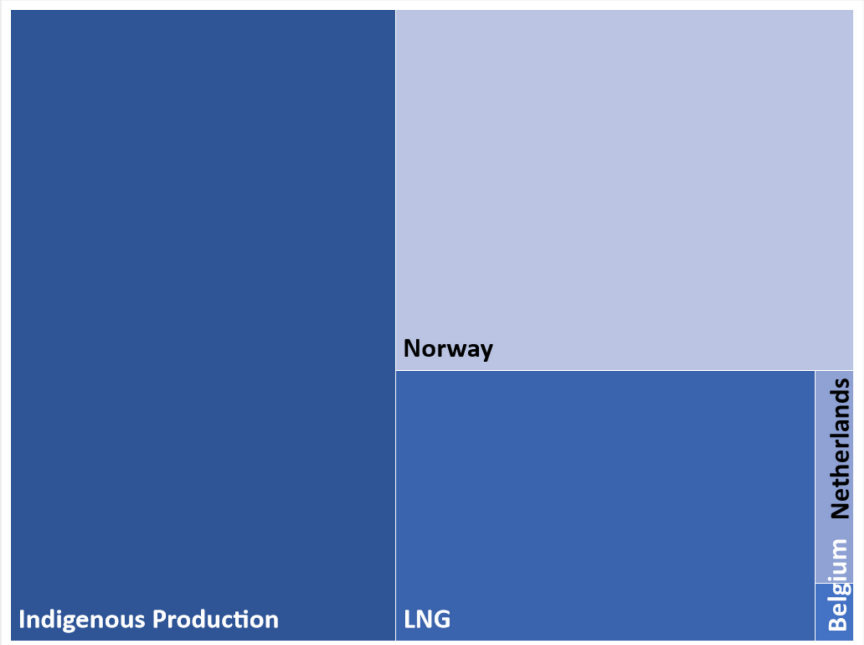


Chart 4 shows for the UK the largest single source of natural gas was indigenous production. This was followed by pipeline imports from Norway which accounted for 31 per cent of supply. This is largely because of the UK's proximity to Norway and shared infrastructure in the North Sea. Norway has a high political stability rating; therefore, these imports are beneficial to the UK's diversity index. The UK imports natural gas from Russia indirectly via the Netherlands and Belgium. The UK receives very small quantities of gas from Russia via pipeline (the central estimate for this is 0.3 per cent of supply but see Appendix 2 for detailed methodology).

Map 1 illustrates the diversity of import supply, as well as the complexities of inter-EU gas trade. For readers wanting a greater level of detail, the IEA have made available an interactive gas map, based on entry and exit points throughout Europe. This map is available free of charge at: www.iea.org/gtf/.

Map 1: Physical gas flows in Europe, 2019

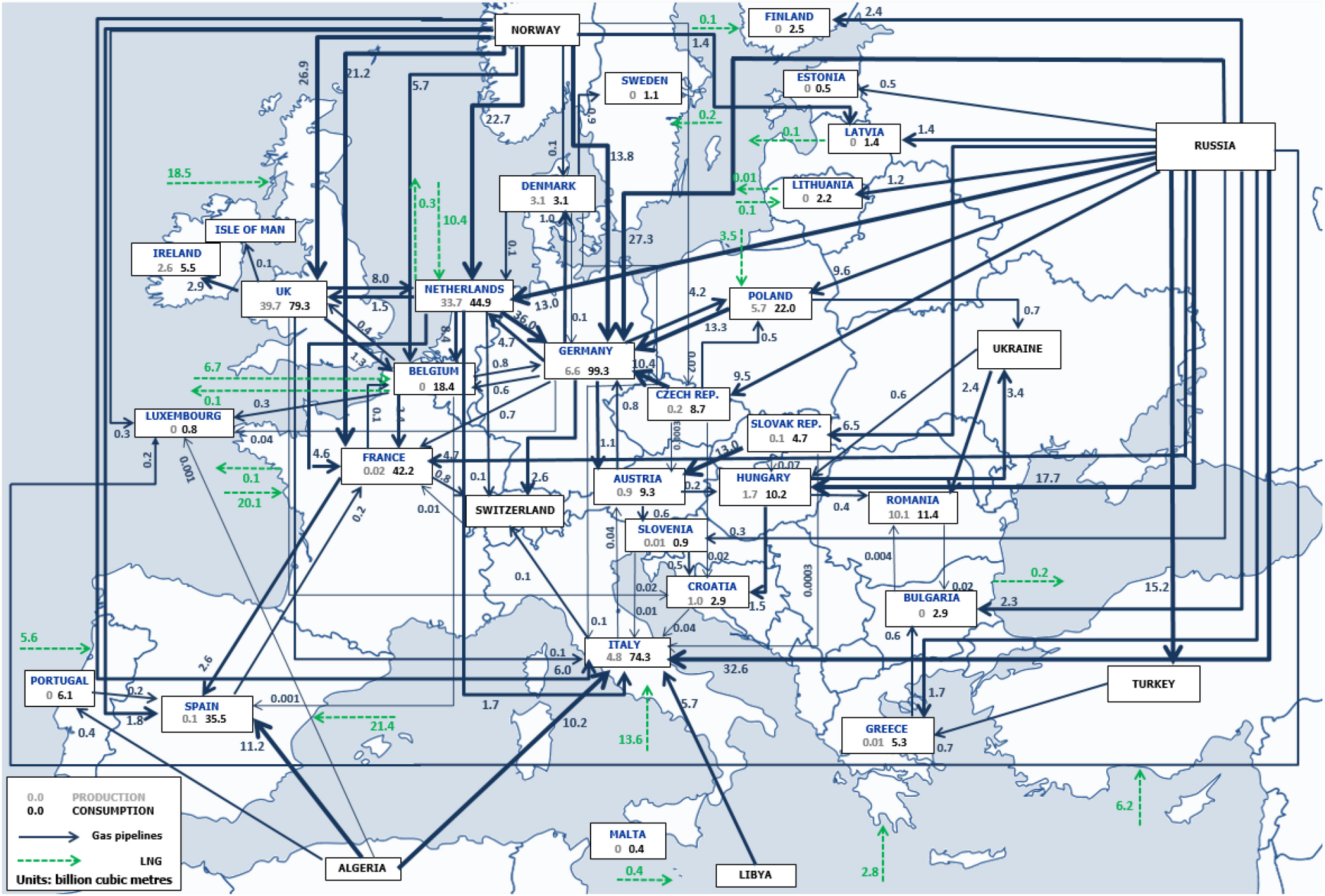


Chart 5: Sources of EU LNG imports, 2019

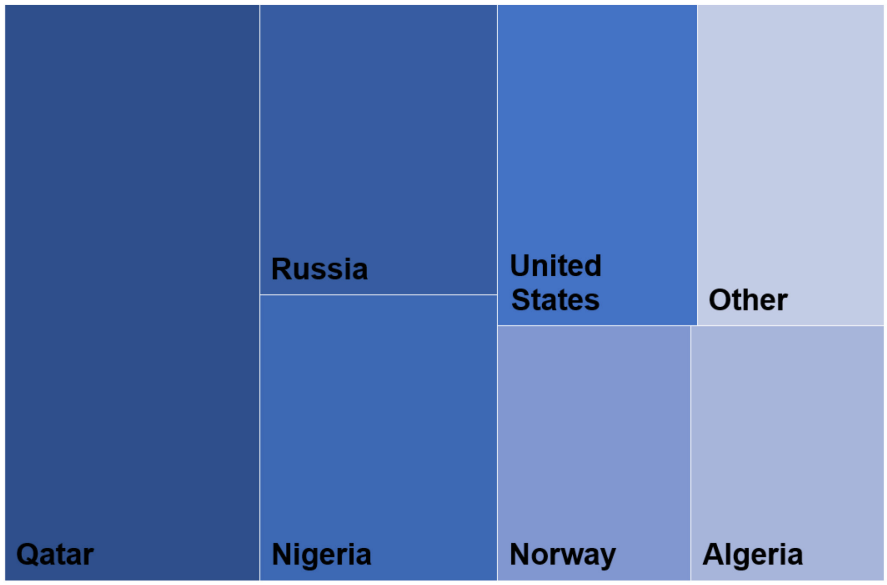


Chart 5 shows the main sources of LNG Imports for the EU. Historically, Qatar has been the largest source of LNG imports for the EU and UK. For the EU, the share of total LNG imports from Qatar has fallen to 29 per cent in 2019 compared to 50 per cent in 2011.The EU received LNG cargoes from more than 20 countries. The second largest LNG imports sources were Russia and Nigeria, each accounting for 14 per cent. The 13 countries included in 'Other' accounted for 12 per cent of LNG imports (see Appendix 1 for a full list of countries included in 'Other').

Chart 6: Sources of UK LNG imports, 2019

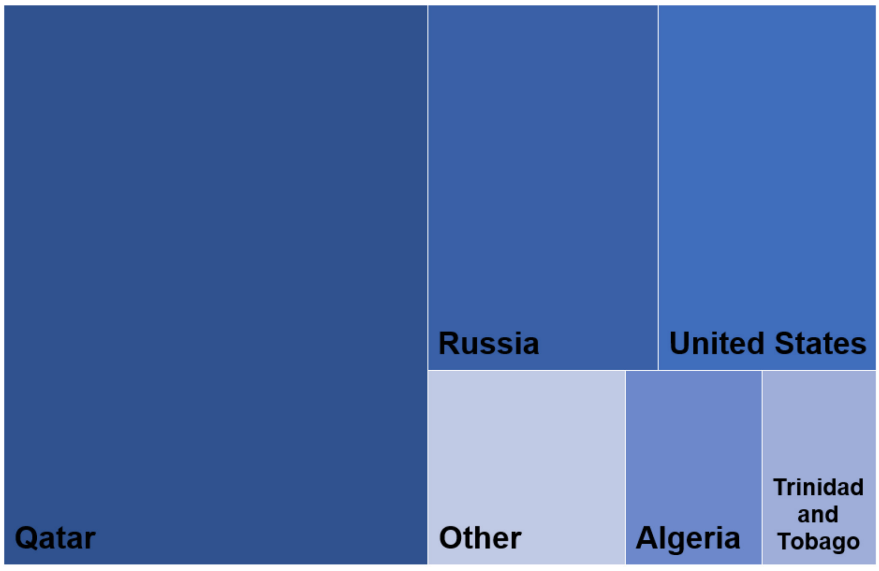


Chart 6 shows the main sources of LNG imports for the UK. Imports of LNG to the UK peaked in 2011 at 25 bcm, and 85 per cent of this was from Qatar. In 2019, the Qatari share of LNG has fallen to just under half. The UK received LNG cargoes from 12 countries. In 2019, 17 per cent of total UK LNG imports were from Russia, with 16 per cent from the United States (up from 6 per cent in 2018). 'Other' included three countries that were new from 2018; Nigeria, Angola, and Cameroon (see Appendix 1 for a full list of countries included in 'Other').

In recent years, the number of LNG import sources has increased as several new LNG projects have come onstream globally. This growth in the global LNG market is expected to continue as several prominent commentators are confident in sustained demand in the medium to long term despite the impacts of Covid-19. Large projects are planned across the world including in North America, East Africa, and Asia, in addition to planned expansion in liquefication capacity in Qatar and Russia.

In 2019, LNG made up roughly a fifth of supply to both the EU and UK, up from approximately 10 per cent in 2018. The growth in European LNG imports from 2018 is largely attributable to market effects. Increasing supply in conjunction with weaker than expected global LNG demand growth saw an oversupplied market. Europe and the UK have competitive and liquid gas markets enabling them to absorb the excess. LNG is analysed in more detail in the special feature article LNG Trends in Trade which is due to be updated in March 2021.

Chart 7: Sources of EU and UK supply, 2019

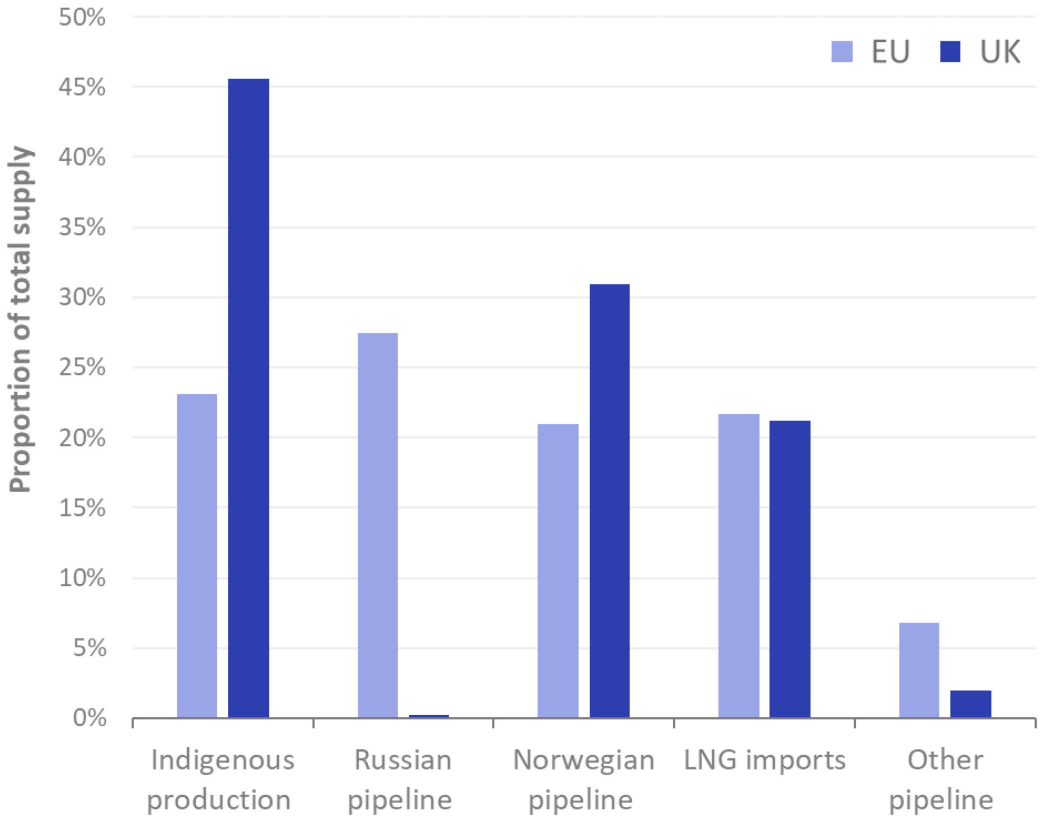


Chart 7 compares gas supply from key sources. The share of supply met by production in the UK is more than double that of the EU total, and the UK imports most of its gas through pipelines from Norway. However, for both the EU and UK, imports of LNG are becoming increasingly important. In 2019, LNG imports made up roughly a fifth of total supply, as shown in Chart 7.

Summary

The EU consumed 496 bcm of natural gas in 2019. One-fifth of this demand was met with indigenous production. Comparatively, the UK met half of its demand through indigenous production. When considering the supply index, the UK had the third most secure supply of EU countries. As well as the comparatively high self-sufficiency score, the UK also had a high number of import sources, many of which have high political stability ratings. These countries include Norway, which provided 31 per cent of all UK natural gas supply. A third of UK supply was met through pipeline imports. Whilst the well-established pipeline infrastructure provides a relatively stable supply story for the EU and UK, LNG provides an increasingly important role in meeting EU and UK natural gas demand.

Supply of LNG to the UK peaked in 2011 and had been in decline before the sharp growth seen in late 2018. Whereas Qatar has historically been the primary source of LNG supply to the UK and EU, global capacity is rapidly increasing, providing a greater number of import sources. Historic trends and the current supply mix of UK and EU imports of LNG are explored in further detail in the special feature article LNG Trend in Trade which is due to be updated in March 2021.

Appendices

Appendix 1: Underlying data for Chart 1 and Chart 2, 2019

EU Country	Self-sufficiency	Diversity Index	Supply Index	Demand (mcm)
Austria	0.10	0.16	0.26	929
Belgium	0.00	0.87	0.87	0
Bulgaria	0.01	0.20	0.21	39
Croatia	0.35	0.36	0.71	1,029
Cyprus	0.00	0.00	0.00	0
Czech Republic	0.02	0.01	0.04	209
Denmark	1.02	0.26	1.28	3,133
Estonia	0.00	0.00	0.00	0
Finland	0.00	0.08	0.08	0
France	0.00	0.73	0.73	16
Germany	0.07	0.83	0.90	6,612
Greece	0.00	0.61	0.62	9
Hungary	0.17	0.07	0.23	1,700
Ireland	0.48	0.00	0.48	2,647
Italy	0.06	0.54	0.61	4,800
Latvia	0.00	0.00	0.00	0
Lithuania	0.00	0.40	0.40	0
Luxembourg	0.00	0.61	0.61	0
Malta	0.00	0.20	0.20	0
Netherlands	0.75	0.61	1.36	33,704
Poland	0.26	0.57	0.83	5,669
Portugal	0.00	0.40	0.40	0
Romania	0.88	0.16	1.05	10,062
Slovakia	0.03	0.00	0.03	124
Slovenia	0.01	0.25	0.26	7
Spain	0.00	0.70	0.70	134
Sweden	0.00	0.31	0.31	0
UK	0.50	0.67	1.17	39,689
EU average	**0.17**	**0.34**	**0.51**	**3,947**

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

Countries included in 'Other' in Chart 5: EU 'Other' includes Trinidad and Tobago, Egypt, Peru, Angola. Equatorial Guinea, Netherlands, Cameroon, Latvia, France, Belgium, Saudi Arabia, Gibraltar and Lithuania (listed in order of volume imported)

Countries included in 'Other' in Chart 6: UK 'Other' includes Nigeria, Norway, Peru, Equatorial Guinea, Angola, Cameroon and the Netherlands. For a full breakdown see Energy Trends Table 4.4

Appendix 2: Methodology

Self-sufficiency

Data for natural gas was extracted from the IEA database. Self-sufficiency was determined from data on indigenous production and demand (indigenous production (mcm) ÷ demand (mcm)).

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:

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

Where x is the proportion of total natural gas supply represented by the i^{th} source country and n represents the final source country. A value below 1 signifies a country that is dependent on a small range of import sources, a value above 1 represents a country with a wider range of import sources. The minimum value of zero denotes a country that has one imported fuel source or relies entirely on indigenous production (or a country with no imports). The Shannon-Wiener was chosen here because it places weight on the diversity of contributions from smaller countries and reduces 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

Shannon-Wiener and political stability indices 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 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 natural gas, 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.

Other sources of gas

Sometimes, due to a variety of reasons, countries may report an import of natural gas from a “Non-Specified/ Other” source country. In 2019, for Austria, France, Germany, Hungary, Luxembourg, Romania and Sweden at least 5 per cent of imports were reported as Non-Specified/ Other. For Austria and Romania, all imports were reported in this way. To reallocate the imports of a non-specified origin we used Border Point Data, which is available at www.iea.org/gtf/. This data is collected by the IEA and shows monthly gas flows in Europe.

Calculation of Russian pipeline flows to the UK

In addition to LNG, the UK imports gas from Russia indirectly through the Netherlands and Belgium via pipeline. For transparency, the volume of these indirect imports is estimated. In 2019, the UK sourced 3.5 per cent of its natural gas imports through pipeline from the Netherlands and 0.8 per cent from Belgium. In turn Russian imports comprised 14 per cent of total supply to the Netherlands and 7.1 per cent to Belgium. The proportion of Netherlands' and Belgium's supply from Russia has been applied to UK pipeline imports from the Netherlands and Belgium to derive the UK share of indirect pipeline imports from Russia.

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Feed-in Tariff load factor analysis

Load factors are a measure of the efficiency of electricity generation and this article updates the load factors for Feed in Tariffs, the bulk of which are Solar PV.

Summary

- Load factors for both solar and wind were down marginally on last year, largely as a result of prevailing weather conditions. Solar PV decreased from 10.5 to 10.3 and wind from 20.4 to 19.1. These are within the usual variation shown in the data.

- As in previous years, regional variations in load factors exist, reflecting again different weather conditions in the UK. For Solar we see values ranging from Scotland at 9.1 per cent and South West England at 10.7 per cent. In contrast, Scotland had the highest load factor for wind at 26 per cent, more than double the load factor in the East of England at 12 per cent.

Introduction

This article updates the Feed-in Tariff (FIT) load factor analysis presented in the December 2020 edition of Energy Trends[1] with data for FIT year ten (financial year 2019/20). We also present regional analysis of solar PV for the nine years that data has been published (FIT years two to ten) and wind for years five to ten. All the data in this article is also available in Excel format at the following link, including quarterly load factors for solar PV: http://www.gov.uk/government/statistics/quarterly-and-annual-load-factors

Background

Load factors are a measure of the efficiency of electricity generation. A load factor is defined as the ratio of how much electricity was generated over a certain time period as a proportion of the total generating capacity.

The Feed-in Tariff scheme was launched in April 2010. It is a financial support scheme for eligible low-carbon electricity technologies, aimed at small-scale installations. The following technologies are supported:

- Solar photovoltaic (PV; Up to 5 MW capacity)
- Anaerobic digestion (AD; Up to 5 MW capacity)
- Hydro (Up to 5 MW capacity)
- Wind (Up to 5 MW capacity)
- Micro combined heat and power (MicroCHP; Up to 2 kW capacity).

[1] The article published in December 2019 can be found at the following link: https://www.gov.uk/government/publications/energy-trends-december-2019-special-feature-article-feed-in-tariff-load-factor-analysis

William Spry 0207 215 5394 fitstatistics@beis.gov.uk

Installers receive support through generation and export tariffs, paid directly from electricity suppliers. The generation tariff is based on the number of kilowatt hours (kWh) generated whereas the export tariff is based on electricity that is generated on site, not used and exported back to the grid. The FIT scheme closed to new entrants at the end of March 2019.

Data cleansing

Table 1 shows how many installations were registered on the Central Feed-in Tariff Register at the start of FIT year ten and how many installations had meter readings in both March 2019 and 2020. In order to be included in the analysis a meter reading is required in both of these months to cover the whole financial year and remove seasonal effects which would bias the results.

Of the 867,762 schemes registered for FiTs when the scheme closed to new entrants on 31st March 2019[2], 16 per cent were found to have meter readings in both March 2019 and March 2020. Extreme load factor values were further excluded (as in previous years' analysis), accounting for around 1,796 (0.2%) of installations. The column 'Valid load factor' in Table 1 indicates how many installations were included in the final analysis for each technology for the annual generation data. Micro CHP data is included in the main results, but this data must be treated with caution as the number of installations is relatively low.

Table 1: Installations included in analysis by technology – FIT Year 10

Technology	Commissioned by 31st March 2019	Generation Data Reported*	Valid load factor	% remaining in analysis
Anaerobic digestion	421	123	116	28%
Hydro	1,191	211	207	17%
Micro CHP	596	32	27	5%
Solar PV	857,857	140,069	138,312	16%
Wind	7,697	1,813	1,790	23%
All Technologies	**867,762**	**142,248**	**140,452**	**16%**

* Meter reading in March 2019 and March 2020.

Results

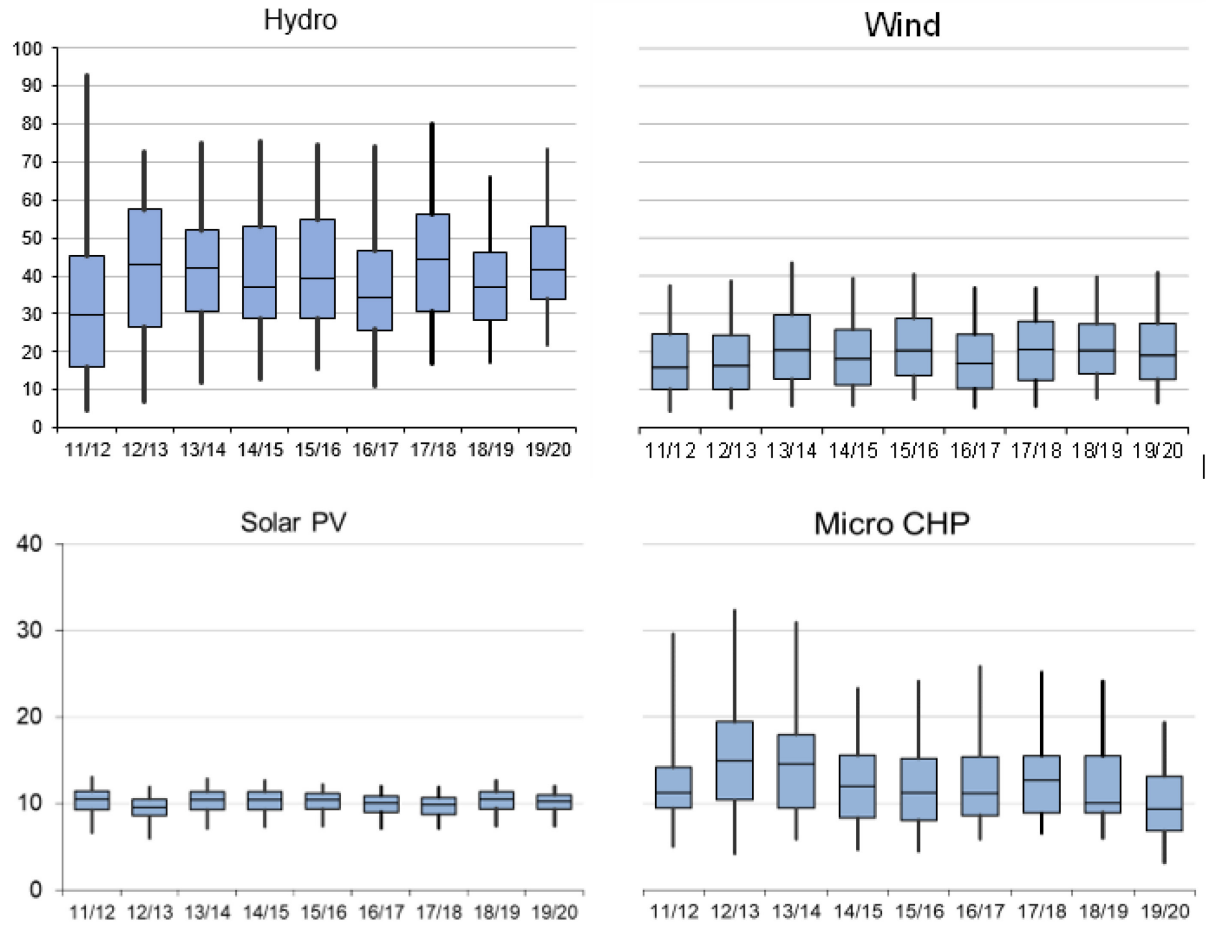
Table 2 gives the weighted mean and median load factors as well as associated percentiles for each technology. Chart 1 presents this data across all available years (FITs years two to ten), highlighting the large range present for Hydro compared to other technologies, whilst solar installations have the smallest range of load factors.

Table 2: FIT Year 9 (2019/2020) load factors by technology

Technology	Count	Weighted mean	Percentile				
			5th	25th	50th (median)	75th	95th
Anaerobic digestion	116	75.3	20.0	61.3	84.0	94.6	97.5
Hydro	207	40.9	22.0	34.0	41.8	53.2	73.2
Micro CHP	27	10.1	3.2	6.8	9.3	13.1	19.2
Photovoltaic	138,312	10.2	7.5	9.4	10.3	11.0	12.0
Wind	1,790	29.7	6.5	12.7	19.1	27.5	40.8

[2] Subject to further revision

Chart 1: Load factor range by technology and year



Lines indicate range from 5th to 95th percentile. Boxes indicate range from lower to upper quartile (25th to 75th percentile) with median indicated.

The median load factor for Solar PV in 2019/20 was lower than 2018/19 by 0.2 percentage points. However, in 2019/20 average sunlight hours were 4.4, down from 4.9 in 2018/19 which had been the sunniest year in this time series. The median load factor was at a similar level to that seen in the years 2013/14 – 2015/16 when average daily sun hours were at a similar level. See Table 3:

Table 3: Solar PV load factors and average sun index

Year	Median load factor	Average daily sun hours
2011/12	10.5	4.5
2012/13	9.6	3.7
2013/14	10.4	4.5
2014/15	10.4	4.5
2015/16	10.4	4.3
2016/17	10.1	4.2
2017/18	9.8	4.1
2018/19	10.5	4.9
2019/20	10.3	4.4

As in previous years, the weighted mean load factor for wind installations is higher than the mean (see Table 2), and this difference has generally increased over the time-series, possibly reflecting the increase in the number of higher performing larger wind schemes in the analysis. The relationship between average daily wind speed[3] and load factor for wind installations is weaker than that observed between sun hours and solar load factors (see Table 4). In 2019/20 the median load factor decreased from 20.4% to 19.1%, despite an increase in average wind speeds. However, the weighted mean of the load factors increased from 26.0% to 29.7%, the highest in this series. The mean and median load factors are broadly similar to those seen in 2017/18 when the average wind speed across the year was also 8.8 knots.

There is a relationship between wind speed and wind load factors but load factors for wind vary much more than those for solar PV. Chart 1 (above) shows the wider spread between the lower and upper quartiles for wind but these ranges overlap from year to year. This may be because the wind farms that are on FITs are on average much smaller than major power producers and they may not be located in the optimum position for wind generation. Furthermore, wind speeds are measured at ground level which may differ from the wind speed at the level of the wind turbine. The average wind speed quoted here is for the whole of the UK but wind speed can vary significantly by location.

Table 4: Wind load factors and average wind speed

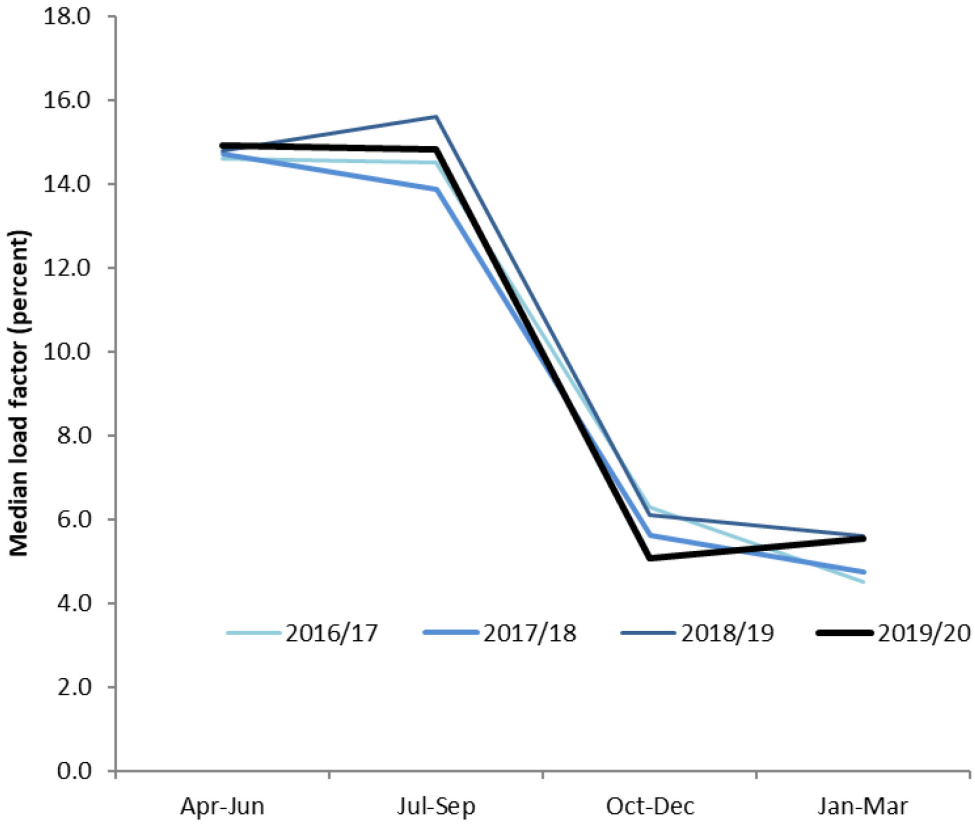
Year	Median load factor	Weighted mean load factor	Average wind speed (knots)
2011/12	15.9	18.3	9.2
2012/13	16.3	22.3	8.0
2013/14	20.5	27.2	9.3
2014/15	18.1	25.3	8.6
2015/16	20.3	28.7	9.2
2016/17	17.0	24.6	8.2
2017/18	20.5	28.4	8.8
2018/19	20.4	26.0	8.5
2019/20	19.1	29.7	8.8

Quarterly Solar PV load factors

Quarterly load factors for Solar PV installations are available in the accompanying excel workbook and the last four years are presented graphically in Chart 2. These show an expected association between load factor and daily hours of sunshine, where the quarters mainly covering Autumn and Winter have the lowest load factors. This chart shows that the load factors seen in FIT year ten (2019/20) for Solar PV were relatively low in October to December and high in January to March. This is in line with typical seasonal trends.

[3] Average wind speed taken from Energy Trends section 7: weather, table 7.2 " Average wind speed and deviations from the long-term mean (ET 7.2)" www.gov.uk/government/statistics/energy-trends-section-7-weather. Note that data for 2019/20 are provisional and subject to revision.

Chart 2: Quarterly Solar PV load factors by FIT year



Regional Solar PV load factors

Solar PV Factors for each region have been published for FIT years two to ten in the accompanying excel file and are presented for years five to ten in Table 5. Chart 3 highlights that the lowest load factors are seen in Scotland, while the highest are seen in the South West. In year ten (2019/20), the median load factor was down in every region except North East England, although they were at a very similar level in Wales and the other regions in the North of England. This reflects average sunlight hours being down on FIT year nine but there are regional variations in sunlight hours. In every year London has had a lower load factor than the South East and this year it had the lowest outside of Scotland. This may be due to pollution or particles settling on the panels or because more panels are shaded by tall buildings nearby.

Chart 3: Regional Solar PV load factors for FITs years 2-10

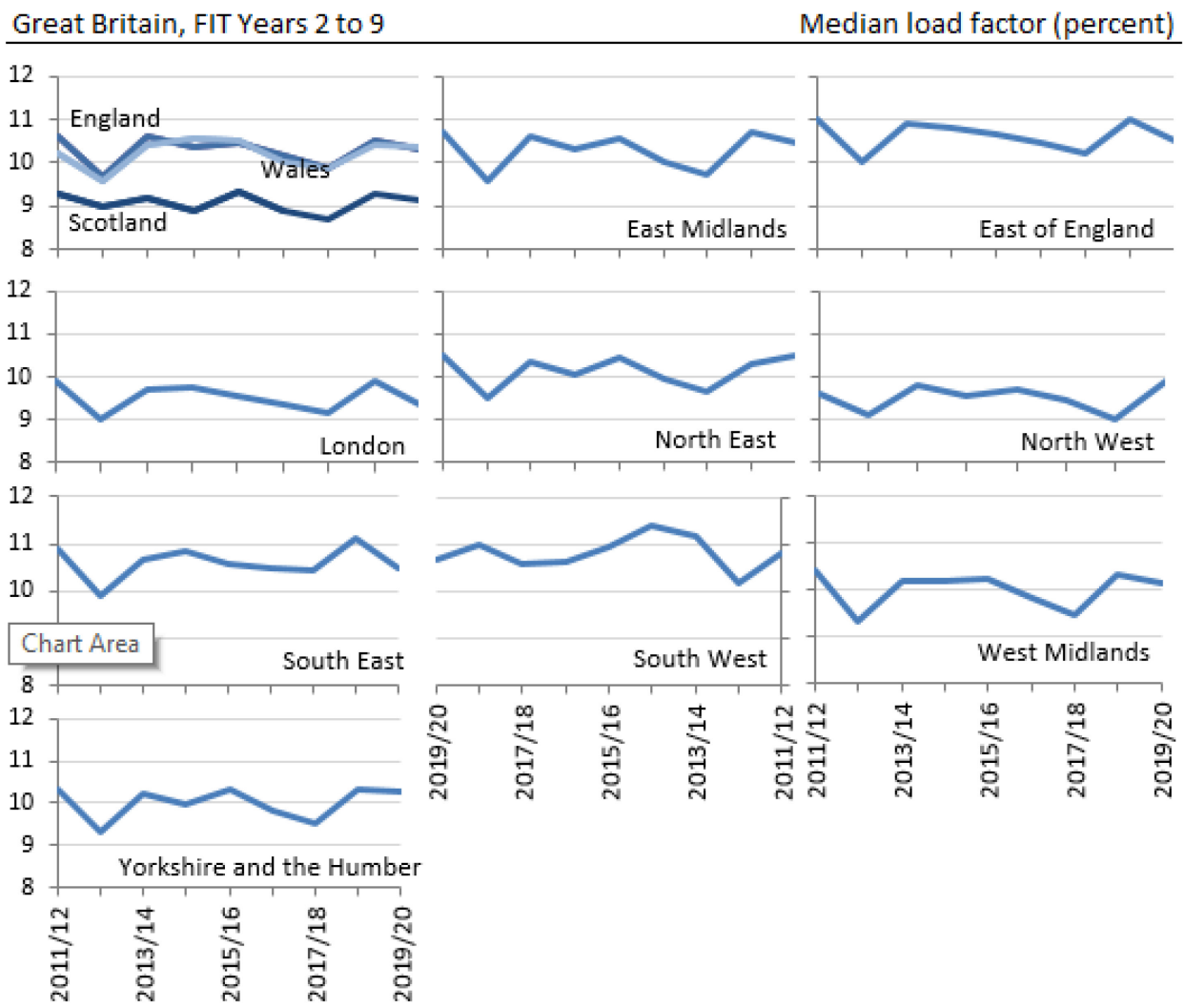


Table 5: Regional Solar PV load factors for FITs years 5-10

Region	FIT Year 5 (2014/15)		FIT Year 6 (2015/16)		FIT Year 7 (2016/17)		FIT Year 8 (2017/18)		FIT Year 9 (2018/19)		FIT Year 10 (2019/20)	
	Count	Median	Count	Median	Count	Median	Count	Median	Count	Median	Count	Median
North East	8,023	10.1	6,444	10.4	5,595	9.9	9,625	9.7	8,086	10.3	9,337	10.5
North West	17,360	9.5	13,689	9.7	11,546	9.5	19,736	9	21,398	9.9	14,117	9.9
Yorkshire and the Humber	18,507	9.9	15,058	10.3	12,826	9.8	19,339	9.5	15,866	10.3	21,813	10.3
East Midlands	18,735	10.3	13,489	10.5	11,548	10	19,023	9.7	16,041	10.7	18,880	10.5
West Midlands	15,312	10.2	12,013	10.2	10,219	9.8	13,946	9.5	11,843	10.3	16,080	10.1
East of England	21,247	10.8	16,917	10.6	14,308	10.5	22,240	10.2	26,783	11	14,211	10.5
London	4,996	9.8	3,813	9.6	3,240	9.4	4,852	9.2	4,027	9.9	2,456	9.4
South East	25,994	10.9	18,955	10.6	15,632	10.5	24,933	10.4	21,379	11.1	12,817	10.5
South West	36,938	11.4	29,331	11	25,715	10.6	36,357	10.6	32,044	11	17,412	10.7
England	**167,112**	**10.4**	**129,709**	**10.5**	**110,629**	**10.2**	**170,137**	**9.9**	**157,467**	**10.5**	**127,123**	**10.3**
Scotland	**11,363**	**8.9**	**6,802**	**9.3**	**5,731**	**8.9**	**11,036**	**8.7**	**11,681**	**9.5**	**4,861**	**9.1**
Wales	**15,100**	**10.5**	**11,614**	**10.5**	**9,946**	**10.0**	**14,598**	**9.9**	**12,545**	**10.4**	**6,328**	**10.4**

Regional Wind load factors

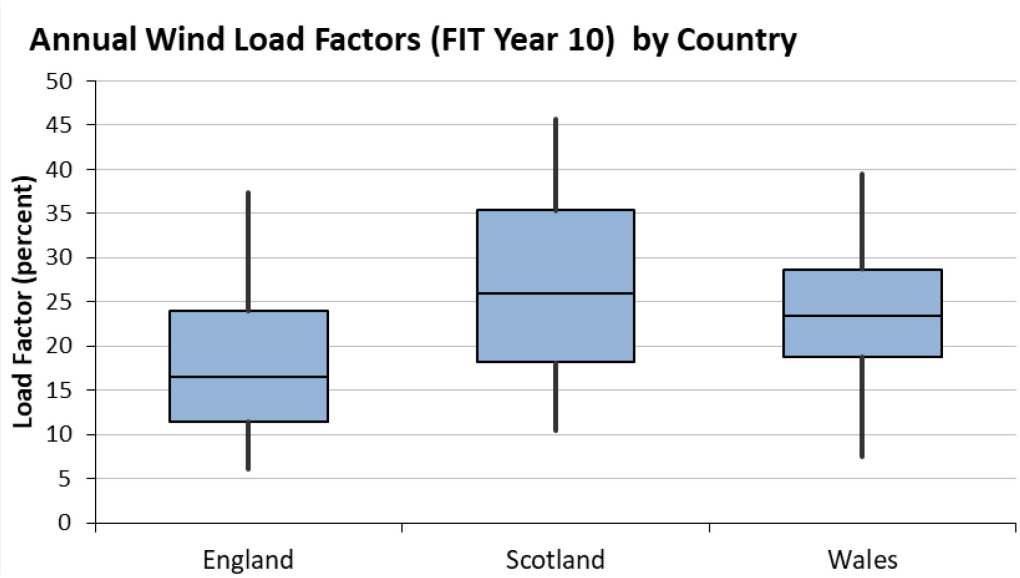
Regional load factors for Wind schemes for FIT years five to ten are available in the accompanying excel file. The median load factors for years seven to ten are presented in Table 6. Data from London and the South East have been aggregated as there are a low number of installations within these regions with a valid load factor. The table shows that in the latest year the highest Wind load factors are found in Scotland, followed by Wales then South West England. Chart 4 summarises this data for England, Scotland and Wales.

Table 6: Regional Wind load factors for FITs years 7 to 10

Region	FIT Year 7 (2016/17)		FIT Year 8 (2017/18)		FIT Year 9 (2018/19)		FIT Year 10 (2019/20)	
	Count	Median	Count	Median	Count	Median	Count	Median
North East	67	14.2	63	18.5	60	17.8	53	17.2
North West	129	18.9	90	18.8	133	20.6	119	20.4
Yorkshire & the Humber	321	17	161	19.7	313	17.9	277	18.5
East Midlands	134	13.6	60	18.9	132	17	117	19.1
West Midlands	63	13.6	38	11.1	56	12.2	58	15.4
East of England	361	8.6	74	16	73	17.8	353	11.5
London & South East	18	10.2	16	8	9	14	16	13.7
South West	276	20.6	166	20.2	284	20.2	234	23.2
England	**1,369**	**14.6**	**668**	**18.3**	**1,060**	**17.2**	**1,227**	**16.5**
Scotland	**436**	**24.0**	**360**	**23.5**	**546**	**24.4**	**404**	**26.0**
Wales	**192**	**20.4**	**85**	**20.6**	**206**	**21.6**	**159**	**23.4**

Chart 4: Wind regional load factors for FITs year 9 by country

Lines indicate range from 5th to 95th percentile. Boxes indicate range from lower to upper quartile (25th to 75th percentile) with median indicated.



Methodology

From 2013, BEIS obtained meter readings for registered installations from Energy Suppliers and used this to produce quarterly and annual load factors for FIT years two to ten (data from year one is not available as the number of installations running for the full year was very small).

The methodology used for the load factor analysis was described in detail in an Energy Trends article from September 2014[4]. One additional quality assurance (QA) step has been added since 2015, to remove any installations from the analysis where more than one generation meter is attached. This step has only been applied to FIT year five to ten data; previously produced statistics have not been revised. Whilst all efforts have been made to quality assure the data in this publication, the results are based on a sample.

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

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

[4] The article published in September 2014 can be found at the following link: www.gov.uk/government/statistics/energy-trends-september-2014-special-feature-article-analysis-of-feed-in-tariff-generation-data

Electricity generation and supply in Scotland, Wales, Northern Ireland and England, 2016 to 2019

Introduction

This article examines the variation of electricity generation and consumption in the four nations of the United Kingdom. It updates and extends the previous version, published in December 2019. The UK data in this article are taken from chapters 5 and 6 of the Digest of United Kingdom Energy Statistics (DUKES) 2020; the definitions are thus identical to those in DUKES. Tables 1 and 2 are included at the end of the main text and cover the latest four years (2016 to 2019 inclusive), with a revised timeseries for 2004 to 2019 in the accompanying Excel spreadsheet.

Key headlines

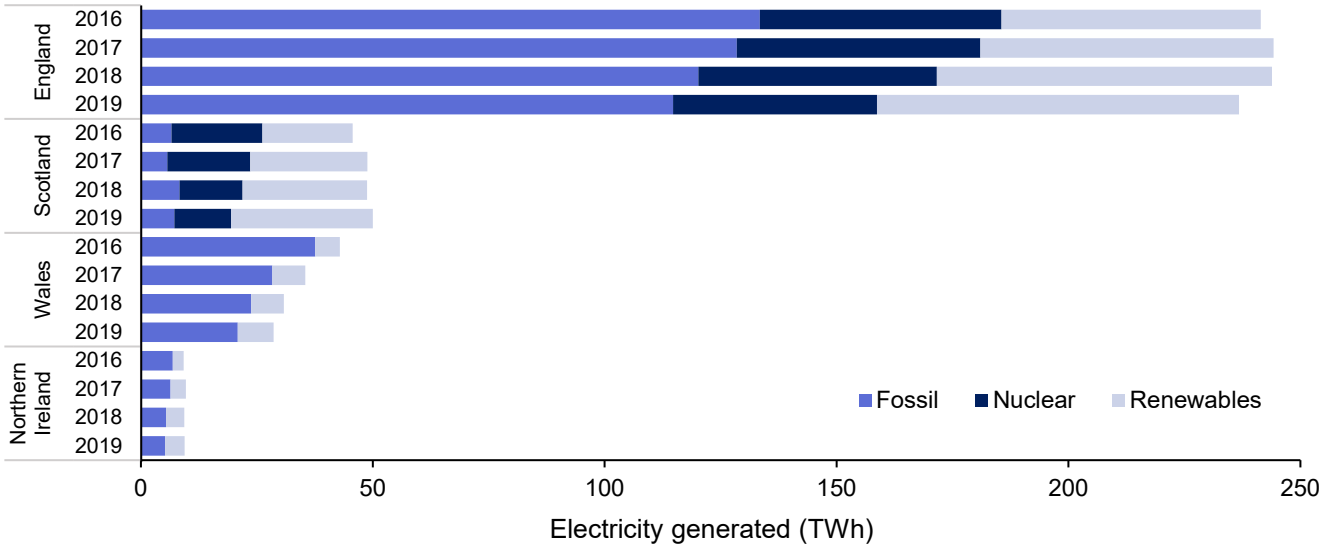
- UK total electricity generation in 2019 was 2.4 per cent lower than the previous year, at 325 TWh, which is the lowest value in the published time series. This was predominantly driven by a 2.9 per cent reduction in electricity generation in England in 2019, as coal fired generation fell by 65 per cent in 2019 compared to the previous year.
- The decreased generation was partially offset by a 1.3 per cent fall in demand. Net imports increased to 21.2 TWh, with England receiving a net 21.8 TWh from France, Belgium and the Netherlands, and Wales receiving 0.2 TWh from the Republic of Ireland. The interconnector from Northern Ireland to Ireland remained the UK's only net exporting interconnector, with total net exports amounting to 0.8 TWh.
- Fossil fuel generation fell in all four nations to record low levels in England, Wales and Northern Ireland, with the sharpest falls in Scotland (16 per cent) and Wales (11 per cent). In Scotland, fossil fuels accounted for just 12.7 per cent of electricity generated in 2019, a 2.7 pp decrease on the previous year. Coal-fired power in particular continued to play an increasingly minor role in the UK's generation mix, with UK-wide generation falling by 59 per cent to a record low share of just 2.1 per cent.
- Renewable generation rose to a record 121 TWh in 2019 with the renewable share of UK generation rising by 4.0 pp to 37.1 per cent, surpassing 2018's record. Scotland continued to have the highest share, rising to 61.1 per cent, up 6.0 pp on 2018. Each UK nation saw record generation and record shares of generation, with shares of 44.6 per cent in Northern Ireland (up 2.4 pp), 33.0 per cent in England (up 3.4 pp) and 26.9 per cent in Wales (up 4.1 pp).
- The increase in renewable generation was driven by capacity, which increased by 6.5 per cent in 2019. Generation increased despite less favourable conditions for renewables compared to 2018, with both wind and solar generators restricted by low wind speeds and fewer daily sun hours. Hydro generators were supported by increased rainfall, which saw an increase in generation despite unchanged capacity.
- Low carbon generation reached a record high share of 54.4 per cent in 2019 (up 1.8 pp). This was despite a UK-wide 14 per cent fall in nuclear generation due to outages. Nuclear's share of generation in England fell to 18.6 per cent and 24.5 per cent in Scotland, which was the lowest value in the published timeseries.

George Creasey **0300 068 5226** George.Creasey@beis.gov.uk

Generation, consumption and trade

Electricity generation within the UK decreased to 325 TWh in 2019, down 2.4 per cent on 2018 and the lowest level on the published time series. This follows a four-year period from 2014 to 2017 wherein generation remained broadly stable at an average of 339 TWh, before falling by 1.6 per cent in 2018. Chart 1 shows total electricity generation by UK country, between 2016 and 2019, with generation divided by fossil fuel, nuclear and renewable technologies.

Chart 1: Total electricity generation by country (all generating companies), 2016 to 2019.



Shares of electricity supplied by nation remained stable compared to the previous year with generation in England in 2019 accounting for 72.7 per cent of the UK's total, down 0.3 pp on 2018. Electricity generated in England and Wales fell by 2.7 per cent and 7.1 per cent respectively, as fossil fuel generation fell in all four nations. This was seen most notably in Scotland (-16 per cent) and Wales (-11 per cent). In England and Northern Ireland coal fired electricity generation fell by 65 per cent and 32 per cent respectively, as coal use continued to decline in 2019. In Scotland, fossil fuels accounted for just 12.7 per cent of electricity generated in 2019, a 2.7 pp decrease on 2018.

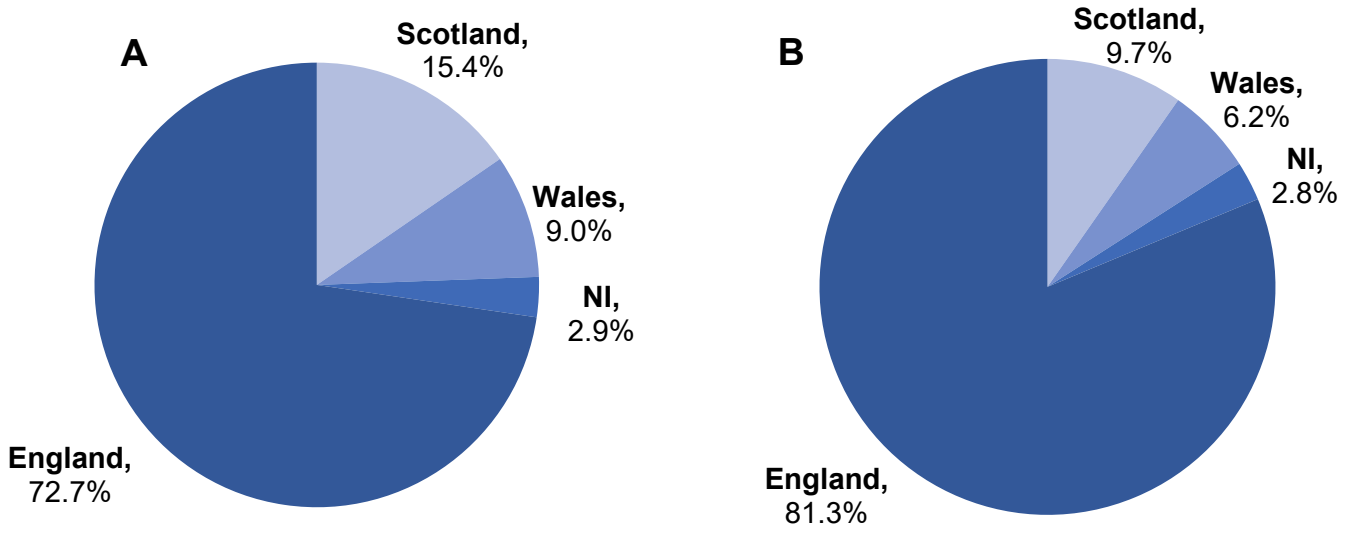
UK-wide nuclear generation fell to its lowest level since 2008, accounting for less than a quarter of generation in Scotland for the first time in the published time series, and falling to 18.6 per cent in England. Since the closure of Wylfa in Wales in December 2015, there has been no nuclear generation in Wales or Northern Ireland.

While fossil fuel and nuclear generation fell, renewable generation rose to record levels in all four nations in 2019. Scotland has a target to reach 100 per cent renewable electricity generation as a proportion of gross electricity consumption (defined as generation plus transfers into Scotland less transfers out of Scotland). In 2019, Scotland reached a record 89.5 per cent of the renewable target, up 13 pp on 2017 and up 30 pp on the 2015 value.

Shares of annual electricity consumption of the respective UK nations did not significantly differ from 2018, with the overwhelming majority of demand coming from England (81.3 per cent), 9.7 per cent from Scotland, 6.6 per cent from Wales and 2.8 per cent from Northern Ireland. This reflected little difference to the 2016-18 period where consumption shares were 81.3 per cent, 9.9 per cent, 6.1 per cent and 2.7 per cent respectively. Chart 2 shows shares of electricity supply and demand in the UK by country in 2019.

The difference between England's electricity generation and demand is met through net positive transfers from Scotland and Wales, as well as net imports from continental Europe (via the France, Netherlands and Belgium interconnectors). These sources provided 18.0 per cent of total electricity consumed in England in 2019, up 1.2 pp on 2018.

Chart 2: Shares of electricity supply (A) and demand (B) in the UK by country in 2019.



In 2019, Scotland exported a record 31.7 per cent of its generation in net transfers to England and Northern Ireland totalling 15.9 TWh. Scotland's renewable capacity has expanded dramatically in recent years, offsetting the fall in fossil fuel generation to result in an increase in total generation of 9.4 per cent from 2016 to 2019. In this period, Scotland's electricity demand fell by 5.0 per cent, resulting in an increase in electricity available for exports. Meanwhile, Wales exported 26.2 per cent of its total generation to England in 2019, the lowest proportion since 2007. Total generation has fallen by a third in Wales since 2016, predominantly driven by the reduction of coal and gas-fired generation in the period. A flow chart illustrating electricity generation, consumption and trade in the UK nations is provided in Appendix A.

Electricity generation by fuel

In recent years, the closure of coal and gas fired power stations and an increase in the number of renewable generators shifted the UK's generation mix from fossil fuels towards renewables. As the fossil fuel share of generation fell across the UK, the renewable share rose from 24.5 per cent in 2016 to a record 37.1 per cent in 2019. This was driven by decreases in fossil fuel shares of generation in all UK nations since 2016. Notably, fossil fuel generation dropped by 45 per cent in Wales since 2016, with the winding down of operations at major Welsh coal plants, including Aberthaw B and Uksmouth resulting in coal generation falling 91 per cent from 2019 to 2016. Falls in fossil fuel generation were offset by a 45 per cent increase in UK renewable generation in the same period.

The introduction of the Carbon Price Floor (CPF) in April 2013 resulted in the swift decline of coal generation, which accounted for 39.2 per cent of the UK generation mix in 2012, compared to a record-low share of just 2.1 per cent in 2019. Unfavourable economics, as well as the impact of EU regulations saw the closure of almost all the UK's coal plants. 2019 saw the closure of Cottam, and the final full year of generation at Fiddlers Ferry and Aberthaw B, both of which closed in March 2020. In England and Northern Ireland, coal generation decreased by 65 per cent and 32 per cent respectively on the previous year, with coal power accounting for less than 10 per cent of Northern Ireland's share of generation for the first time in the published time series. In Wales, generation rose slightly, although from a low baseline, as remaining coal stocks were used before the closure of Aberthaw B, the last coal plant in Wales. Since the closure of Longannet in 2016 there has been no coal generation in Scotland.

The UK's four remaining coal plants will be phased out by October 2024 as the UK works towards net zero carbon emissions by 2050. Drax will close its remaining coal units in 2021, whilst Kilroot plans to convert to gas by winter 2023. Plans for the closure of Ratcliffe and West Burton are yet to be finalised.

A map showing the locations of MPP sites in each UK nation is provided in Appendix B.

Overall, the share of UK gas generation rose slightly to 40.6 per cent in 2019, up 1.1 pp on 2018. Gas displaced the bulk of coal in the generation mix in 2016 and its share of generation has fluctuated around the 40 per cent mark since. As coal use continued to fall back in 2019, there was a 3.9 per cent increase in gas generation in England. Gas generation fell by 17 per cent in Scotland, whilst rising 5.1 per cent in Northern Ireland. In Wales, fossil fuel generation accounted for less than two thirds of the total for the first time since 2011 as gas generation fell by 12 per cent. Despite this, Wales remains more reliant on gas than the other nations, with it accounting for 63.1 per cent share of total generation in 2019.

As the UK's nuclear power stations continue to age, nuclear generation fell for the third consecutive year due to maintenance outages. Generation was suppressed by 14.6 per cent and 10.2 per cent on 2018 at nuclear plants in England and Scotland respectively. Since the closure of Wylfa in 2015, there has been no nuclear generation in Wales. With the closures of Hinkley Point B and Hunterston B by 2022, 3.2 GW of capacity is to be replaced by Hinkley Point C, which is expected to commence operations in 2023. Combined with high renewables generation, shares of low carbon electricity generation in 2019 were 85.5 per cent in Scotland and 51.5 per cent in England.

Renewable generators saw record levels of generation in 2019, accounting for 37.1 per cent of the UK's total (up 4.0 pp on 2018) as the UK expanded wind and bioenergy capacity, with generation up 13 per cent and 6.8 per cent respectively. In Scotland, 61.1 per cent of electricity was generated by renewable fuels in 2019, accounting for one quarter of the UK's renewable electricity. While Scotland remains the UK leader for renewable generation, all four nations saw record shares with renewable electricity accounting for 44.6 per cent, 33.0 per cent and 26.9 per cent of generation in Wales, England and Northern Ireland respectively. Chart 3 shows the renewable share of total electricity generation in each UK country from 2016 to 2019, in comparison to the UK average.

Chart 3: Renewable share of electricity generation by country, 2005 to 2019.

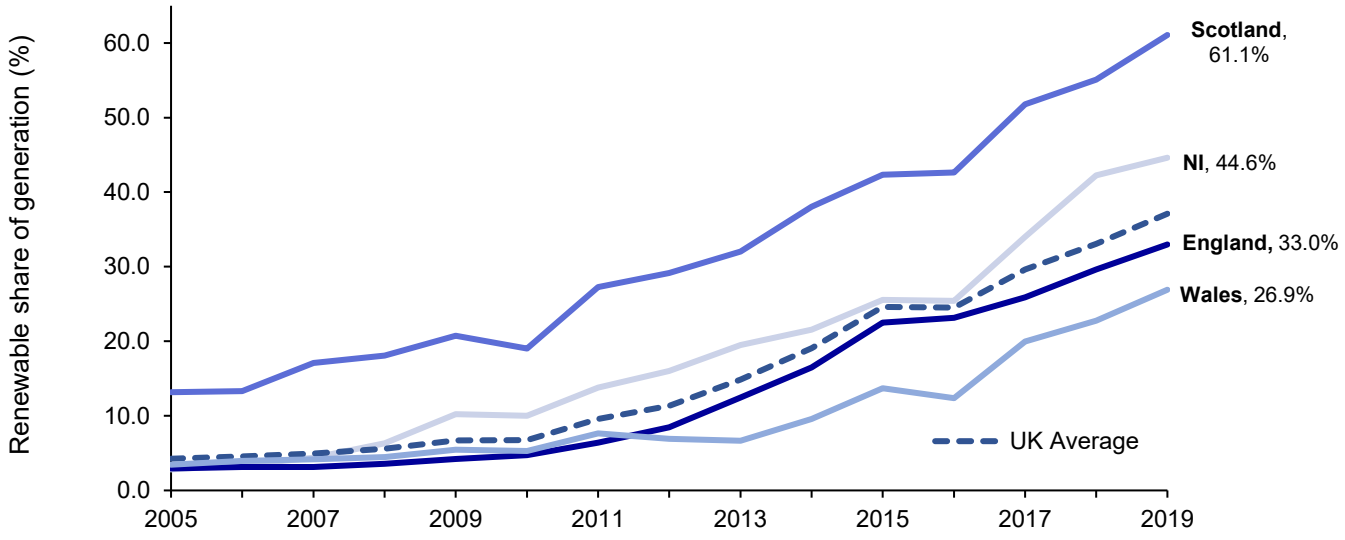
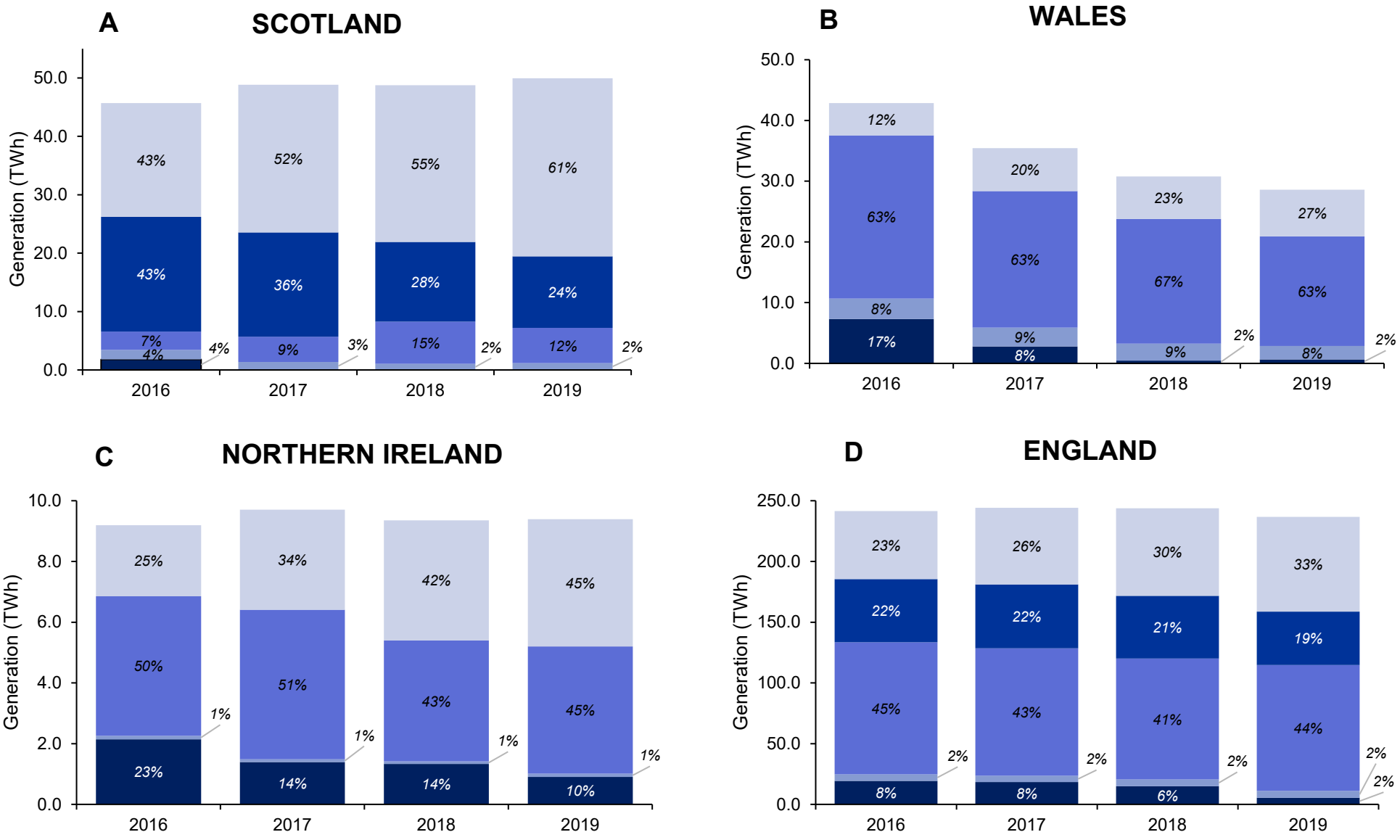


Chart 4 below shows electricity generation by fuel (in all generating companies) in each UK country for the period 2016 to 2019. To illustrate the generation mix in each country, shares of electricity generated by fuel are shown as data labels.

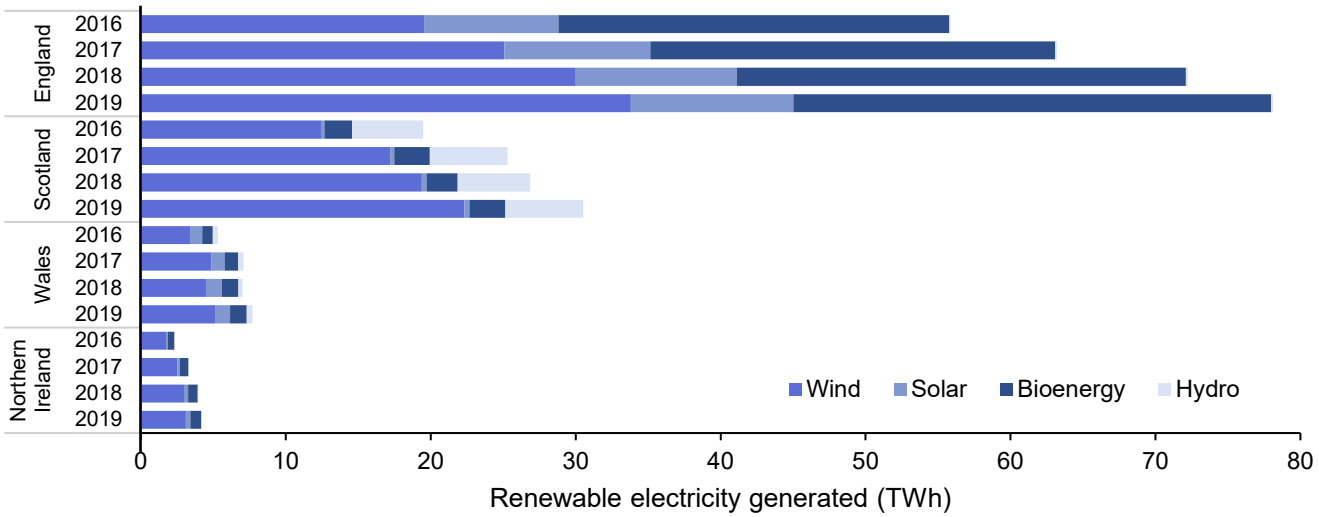
Chart 4: Electricity generation by fuel (with shares of electricity generated) in all generating companies, in Scotland (A), Wales (B), Northern Ireland (C) and England (D), 2016 to 2019.



Renewable electricity

Renewable electricity generation and capacity has increased dramatically in recent years as the UK strives towards a cleaner future, working towards its goal to achieve net zero carbon emissions by 2050. In 2019, the UK became the first global economy to enshrine this commitment in law. Chart 5 shows electricity generation by renewable technology in each UK nation between 2016 and 2019.

Chart 5: Renewable electricity generation by technology, in each UK nation between 2016 and 2019.



The upsurge in renewable generation in recent years has been driven by the dramatically increasing capacity for renewable generators, with UK capacity rising by 6.5 per cent in 2019 to reach 47,163 MW. Wind generation has been particularly prominent, with a 73 per cent increase in UK wind generation between 2016 and 2019. Wind power accounted for close to half of Scotland's total generation in 2019 (over double the UK average of 19.7 per cent), following an 80 per cent increase in generation since 2016. The UK recently announced its intent to increase its installed capacity for offshore wind generation to 40 GW by 2030, increasing overall wind capacity to over 50 GW, in line with its commitment to achieve net zero carbon emissions by 2050.

Bioenergy now represents a sixth of UK generation capacity, with an 11.5 per cent share of generation in 2019 following the first full year since Lynemouth converted its 420 MW coal unit to biomass in 2018. Since the conversion of four Drax coal units to biomass, the majority of biomass generation capacity by major producers now takes place at these two sites which are both in England.

Solar generators produced 1.4 per cent more electricity in 2019 than in the previous year, despite average daily sun hours being down by 0.2 hours, as de-rated capacity increased by 2.1 per cent. Most UK solar farms are in England, where generation increased by 1.1 per cent. In Scotland, Northern Ireland and Wales, solar generation rose by 9.1 per cent, 5.7 per cent and 1.2 per cent respectively.

The vast majority of the UK's hydro generation assets are in Scotland, where generation increased 7.4 per cent on the previous year. This was in line with a 5.5 per cent increase in UK rainfall, weighted by location of UK hydro resource, as hydro capacity remained unchanged.

For further, detailed renewable statistics on a sub-national and regional basis, please refer to the special feature article published in the September 2020 issue of Energy Trends. For weather data, weighted by location of renewable resources, refer to Energy Trends section 7: weather.

Note that previous versions of this article included reference to renewable generation under the Renewables Obligation (RO). This is no longer included since the RO closed to new generating capacity in March 2017, with a grace period ending in 2018. Since this date, the expansion of renewable capacity renders renewable generation under the RO less significant.

For more information, please contact

George Creasey
Electricity Statistics
Tel: 0300 068 5226
E-mail: George.Creasey@beis.gov.uk

Vanessa Martin
Electricity Statistics
Tel: 020 7215 2995
E-mail: Vanessa.Martin@beis.gov.uk

Or email the electricity statistics team shared mailbox: electricitystatistics@beis.gov.uk

Revisions

Previous versions of the data in this article remain available online for comparison at:

www.gov.uk/government/collections/energy-trends-articles

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Energy Trends: weather

http://www.gov.uk/government/statistics/energy-trends-section-7-weather

Table 1a: Generation and supply of electricity in Scotland, Wales, Northern Ireland and England, 2016 and 2017

GENERATION AND SUPPLY OF ELECTRICITY (*GWh*)	2016					2017				
	UK Total	**Scotland**	**Wales**	**Northern Ireland**	**England**	**UK Total**	**Scotland**	**Wales**	**Northern Ireland**	**England**
Electricity generated by Major Power Producers (MPPs)	*292,943*	38,138	39,302	7,358	208,146	*287,744*	39,885	31,343	7,182	209,334
Electricity generated by other generators	*46,221*	7,541	3,561	1,836	33,283	*50,453*	8,956	4,087	2,525	34,885
TOTAL ELECTRICITY GENERATED	***339,164***	**45,679**	**42,863**	**9,193**	**241,429**	***338,197***	**48,841**	**35,429**	**9,707**	**244,219**
Own use by other generators	*2,921*	341	190	88	2,302	*3,758*	475	275	129	2,880
Net electricity supplied by other generators	*43,300*	7,200	3,371	1,748	30,981	*46,695*	8,481	3,812	2,397	32,005
Used in pumping at pumped storage and other own use by MPPs	*16,361*	2,701	1,173	354	12,133	*15,571*	2,494	859	353	11,865
Net electricity supplied by MPPs	*276,582*	35,437	38,129	7,004	196,013	*272,173*	37,391	30,483	6,829	197,469
Electricity transferred to England (net of receipts)	*0*	9,639	21,591	0	-31,230	*0*	13,013	14,333	0	-27,346
Electricity transferred to Northern Ireland (net of receipts)	*0*	-252	0	252	0	*0*	-145	0	145	0
Electricity transferred to Europe (net of receipts)	*-17,745*	0	-313	-399	-17,034	*-14,760*	0	-831	110	-14,039
Transfers from other generators to public supply	*20,400*	3,392	1,588	823	14,596	*21,544*	3,913	1,759	1,106	14,767
Transmission losses	*6,233*	552	357	151	5,173	*6,497*	555	385	149	5,409
Distribution losses and theft	*19,855*	1,775	1,169	504	16,407	*20,021*	1,770	1,221	525	16,505
Consumption from public supply [A]	*288,639*	27,115	16,912	7,319	237,292	*281,959*	26,111	17,135	7,006	231,708
Consumption by autogenerators	*22,900*	3,808	1,783	924	16,385	*25,151*	4,568	2,053	1,291	17,239
TOTAL ELECTRICITY CONSUMED	***311,539***	**30,924**	**18,695**	**8,243**	**253,678**	***307,110***	**30,679**	**19,188**	**8,297**	**248,946**
Electricity sales (public supply) [B]	*288,331*	25,771	16,982	7,312	238,266	*281,641*	24,899	17,170	7,389	232,183
Statistical difference between calculated consumption [A] and sales [B]	*308*	1,345	-69	6	-974	*318*	1,212	-35	-383	-476

Table 1b: Generation and supply of electricity in Scotland, Wales, Northern Ireland and England, 2018 and 2019

GENERATION AND SUPPLY OF ELECTRICITY (*GWh*)	2018					2019				
	UK Total	**Scotland**	**Wales**	**Northern Ireland**	**England**	**UK Total**	**Scotland**	**Wales**	**Northern Ireland**	**England**
Electricity generated by Major Power Producers (MPPs)	*281,330*	39,588	26,829	6,279	208,634	*269,192*	40,585	24,663	6,222	197,723
Electricity generated by other generators	*51,446*	9,182	3,959	3,076	35,228	*55,569*	9,385	3,945	3,168	39,071
TOTAL ELECTRICITY GENERATED	***332,776***	**48,770**	**30,788**	**9,355**	**243,862**	***324,761***	**49,969**	**28,608**	**9,389**	**236,794**
Own use by other generators	*4,323*	664	346	158	3,155	*4,985*	847	376	185	3,577
Net electricity supplied by other generators	*47,122*	8,518	3,613	2,918	32,073	*50,584*	8,538	3,569	2,983	35,494
Used in pumping at pumped storage and other own use by MPPs	*14,481*	2,050	646	342	11,443	*12,209*	1,722	527	257	9,704
Net electricity supplied by MPPs	*266,849*	37,538	26,183	5,937	197,191	*256,983*	38,863	24,136	5,965	188,019
Electricity transferred to England (net of receipts)	*0*	12,810	10,013	0	-22,823	*0*	14,873	7,502	0	-22,375
Electricity transferred to Northern Ireland (net of receipts)	*0*	707	0	-707	0	*0*	981	0	-981	0
Electricity transferred to Europe (net of receipts)	*-19,108*	0	-504	471	-19,075	*-21,170*	0	-180	825	-21,815
Transfers from other generators to public supply	*22,245*	4,021	1,705	1,378	15,141	*25,300*	4,270	1,785	1,492	17,752
Transmission losses	*6,497*	546	379	140	5,432	*7,627*	631	461	168	6,368
Distribution losses and theft	*19,355*	1,619	1,160	548	16,028	*18,785*	1,535	1,160	505	15,585
Consumption from public supply [A]	*282,349*	25,877	16,841	6,862	232,769	*277,041*	25,113	16,977	6,941	228,010
Consumption by autogenerators	*24,878*	4,497	1,907	1,541	16,933	*25,284*	4,268	1,784	1,491	17,741
TOTAL ELECTRICITY CONSUMED	***307,227***	**30,374**	**18,748**	**8,402**	**249,702**	***302,325***	**29,381**	**18,761**	**8,431**	**245,751**
Electricity sales (public supply) [B]	*282,402*	23,625	16,920	8,000	233,857	*276,827*	22,624	17,101	7,435	229,668
Statistical difference between calculated consumption [A] and sales [B]	*-53*	2,252	-79	-1,138	-1,088	*214*	2,490	-123	-494	-1,658

Table 2a: Generation of electricity by fuel in Scotland, Wales, Northern Ireland and England, 2016 and 2017

ELECTRICITY GENERATED *(GWh)*		2016					2017				
		UK total	**Scotland**	**Wales**	**Northern Ireland**	**England**	**UK total**	**Scotland**	**Wales**	**Northern Ireland**	**England**
Major power producers (MPPs):	Coal	*30,613*	1,806	7,316	2,107	19,384	*22,481*	0	2,780	1,361	18,339
	Oil	*606*	156	180	68	201	*390*	120	54	59	156
	Gas	*131,972*	1,523	26,092	4,489	99,868	*124,512*	2,547	21,707	4,815	95,445
	Nuclear	*71,726*	19,630	0	0	52,096	*70,336*	17,827	0	0	52,509
	Hydro natural flow	*3,951*	3,692	235	0	25	*4,179*	3,890	276	0	12
	Wind	*30,712*	10,081	2,776	690	17,165	*40,954*	14,038	3,920	879	22,117
	Solar	*2,035*	8	196	3	1,828	*2,978*	10	287	68	2,613
	Bioenergy	*17,400*	756	33	0	16,611	*17,766*	880	19	0	16,866
	Other fuels	*968*	0	0	0	968	*1,276*	0	0	0	1,276
	Hydro pumped storage	*2,959*	486	2,474	0	0	*2,872*	573	2,299	0	0
	TOTAL MPPs	***292,943***	**38,138**	**39,302**	**7,358**	**208,146**	***287,744***	**39,885**	**31,343**	**7,182**	**209,334**
Other generators	Coal	*56*	0	0	36	20	*49*	0	0	28	21
	Oil	*1,285*	263	16	37	969	*1,225*	278	18	36	893
	Gas	*11,384*	1,618	804	108	8,854	*12,233*	1,814	775	105	9,540
	Hydro natural flow	*1,419*	1,224	104	24	67	*1,703*	1,466	95	30	113
	Wind	*6,447*	2,335	653	1,043	2,416	*8,687*	3,163	931	1,626	2,967
	Solar	*8,360*	238	610	108	7,404	*8,479*	280	627	117	7,455
	Shoreline wave and tidal	*0*	0	0	0	0	*4*	4	0	0	0
	Bioenergy	*12,665*	1,142	696	469	10,359	*14,128*	1,570	919	580	11,059
	Other fuels	*4,605*	722	678	11	3,194	*3,944*	380	723	3	2,838
	TOTAL OTHER GENERATORS	***46,221***	**7,541**	**3,561**	**1,836**	**33,283**	***50,453***	**8,956**	**4,087**	**2,525**	**34,885**

Table 2b: Generation of electricity by fuel in Scotland, Wales, Northern Ireland and England, 2016 and 2017

ELECTRICITY GENERATED *(GWh)*		2016					2017				
		UK total	**Scotland**	**Wales**	**Northern Ireland**	**England**	**UK total**	**Scotland**	**Wales**	**Northern Ireland**	**England**
All generating companies	**Fossil fuels**	*175,915*	5,365	34,408	6,844	129,297	*160,891*	4,760	25,334	6,404	124,393
within which	Coal	*30,669*	1,806	7,316	2,143	19,405	*22,530*	0	2,780	1,390	18,360
	Oil	*1,890*	419	196	105	1,171	*1,614*	399	72	95	1,049
	Gas	*143,356*	3,141	26,897	4,597	108,722	*136,746*	4,361	22,481	4,920	104,984
	Nuclear	*71,726*	19,630	0	0	52,096	*70,336*	17,827	0	0	52,509
	Renewables	*82,990*	19,476	5,303	2,338	55,874	*98,879*	25,301	7,074	3,301	63,203
within which	Hydro natural flow	*5,370*	4,916	339	24	92	*5,882*	5,356	371	30	125
	Wind	*37,159*	12,416	3,430	1,734	19,581	*49,641*	17,201	4,851	2,505	25,084
	Solar	*10,395*	247	806	111	9,232	*11,457*	290	914	185	10,068
	Shoreline wave and tidal	*0*	0	0	0	0	*4*	4	0	0	0
	Bioenergy	*30,066*	1,898	729	469	26,970	*31,894*	2,450	938	580	27,926
	Other fuels	*5,573*	722	678	11	4,162	*5,219*	380	723	3	4,114
	Pumped storage	*2,959*	486	2,474	0	0	*2,872*	573	2,299	0	0
	TOTAL ALL GENERATING COMPANIES	***339,164***	**45,679**	**42,863**	**9,193**	**241,429**	***338,197***	**48,841**	**35,429**	**9,707**	**244,219**
Shares of total generation (%)	**Fossil fuels**	*51.9*	11.7	80.3	74.4	53.6	*47.6*	9.7	71.5	66.0	50.9
within which	Coal	*9.0*	4.0	17.1	23.3	8.0	*6.7*	0.0	7.8	14.3	7.5
	Oil	*0.6*	0.9	0.5	1.1	0.5	*0.5*	0.8	0.2	1.0	0.4
	Gas	*42.3*	6.9	62.8	50.0	45.0	*40.4*	8.9	63.5	50.7	43.0
	Nuclear	*21.1*	43.0	0.0	0.0	21.6	*20.8*	36.5	0.0	0.0	21.5
	Renewables	*24.5*	42.6	12.4	25.4	23.1	*29.2*	51.8	20.0	34.0	25.9
within which	Hydro natural flow	*1.6*	10.8	0.8	0.3	0.0	*1.7*	11.0	1.0	0.3	0.1
	Wind	*11.0*	27.2	8.0	18.9	8.1	*14.7*	35.2	13.7	25.8	10.3
	Solar	*3.1*	0.5	1.9	1.2	3.8	*3.4*	0.6	2.6	1.9	4.1
	Bioenergy	*8.9*	4.2	1.7	5.1	11.2	*9.4*	5.0	2.6	6.0	11.4
	Other fuels	*1.6*	1.6	1.6	0.1	1.7	*1.5*	0.8	2.0	0.0	1.7
	Pumped storage	*0.9*	1.1	5.8	0.0	0.0	*0.8*	1.2	6.5	0.0	0.0
	Low carbon	*45.6*	85.6	12.4	25.4	44.7	*50.0*	88.3	20.0	34.0	47.4

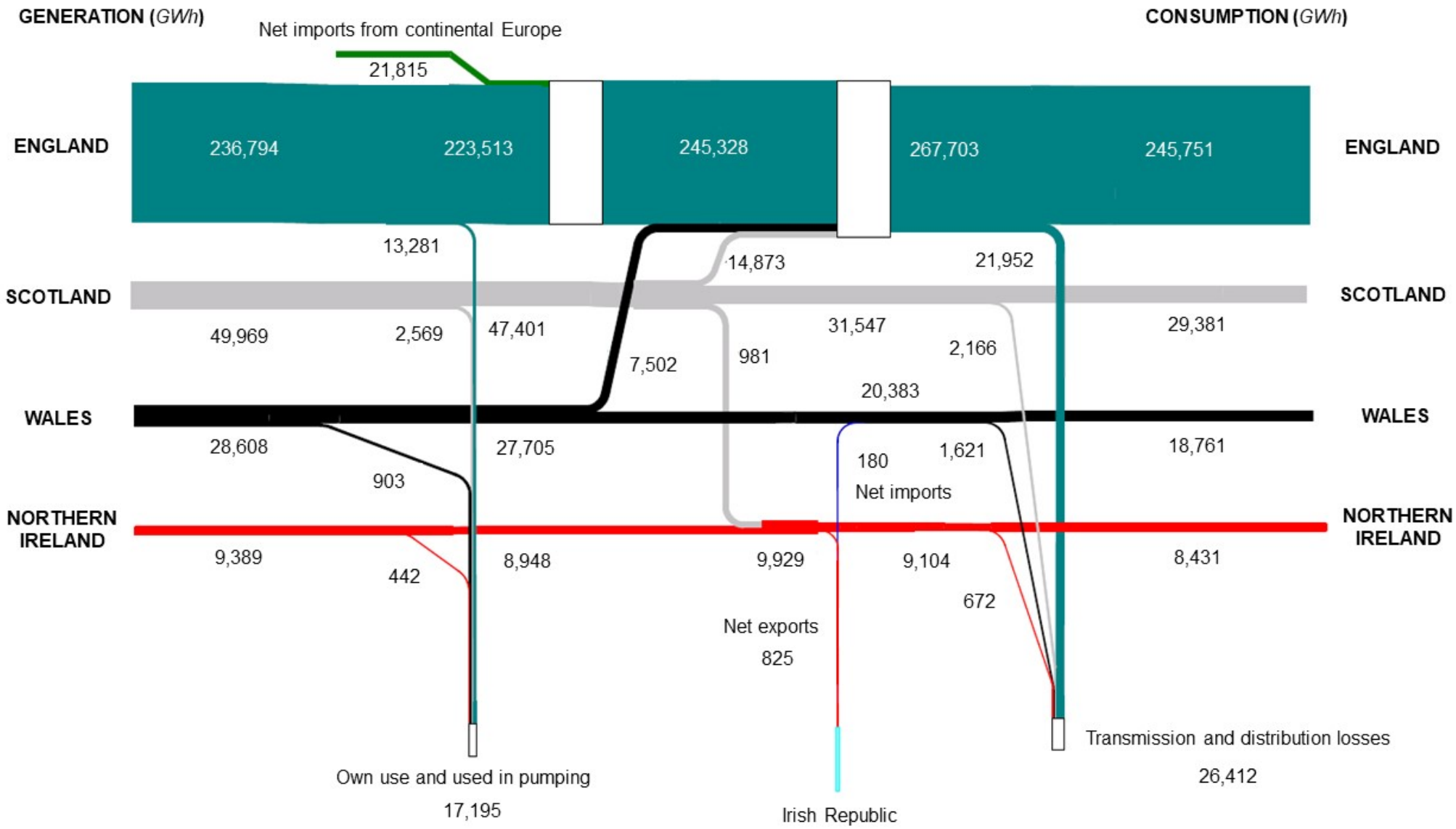
Table 2c: Generation and supply of electricity by fuel in Scotland, Wales, Northern Ireland and England, 2018 and 2019

ELECTRICITY GENERATED *(GWh)*		2018					2019				
		UK total	**Scotland**	**Wales**	**Northern Ireland**	**England**	**UK total**	**Scotland**	**Wales**	**Northern Ireland**	**England**
Major power producers (MPPs):	Coal	*16,778*	0	473	1,303	15,003	*6,841*	0	665	877	5,298
	Oil	*625*	121	34	43	426	*695*	124	40	50	480
	Gas	*119,632*	5,234	19,724	3,868	90,806	*118,593*	4,322	17,491	4,073	92,708
	Nuclear	*65,064*	13,611	0	0	51,453	*56,184*	12,226	0	0	43,958
	Hydro natural flow	*3,800*	3,572	208	0	21	*4,190*	3,902	265	0	22
	Wind	*48,182*	15,877	3,952	940	27,414	*55,074*	18,695	4,443	1,097	30,839
	Solar	*3,653*	28	393	125	3,108	*3,860*	38	418	124	3,280
	Bioenergy	*19,965*	691	1	0	19,273	*20,836*	859	2	0	19,976
	Other fuels	*1,132*	0	0	0	1,132	*1,162*	0	0	0	1,162
	Hydro pumped storage	*2,498*	454	2,045	0	0	*1,756*	418	1,339	0	0
	TOTAL MPPs	***281,330***	**39,588**	**26,829**	**6,279**	**208,634**	***269,192***	**40,585**	**24,663**	**6,222**	**197,723**
Other generators	Coal	*53*	0	0	32	21	*50*	0	0	29	21
	Oil	*947*	162	18	36	731	*1,022*	183	21	36	782
	Gas	*11,857*	2,007	818	116	8,917	*13,338*	1,723	567	117	10,932
	Hydro natural flow	*1,644*	1,423	84	30	107	*1,745*	1,460	143	35	107
	Wind	*8,724*	3,506	590	2,039	2,588	*9,261*	3,631	664	2,013	2,952
	Solar	*9,082*	290	646	152	7,995	*9,058*	309	633	168	7,948
	Shoreline wave and tidal	*9*	9	0	0	0	*14*	14	0	0	0
	Bioenergy	*14,989*	1,469	1,136	668	11,716	*16,477*	1,614	1,131	752	12,981
	Other fuels	*4,140*	316	667	3	3,153	*4,604*	451	786	18	3,348
	TOTAL OTHER GENERATORS	***51,446***	**9,182**	**3,959**	**3,076**	**35,228**	***55,569***	**9,385**	**3,945**	**3,168**	**39,071**

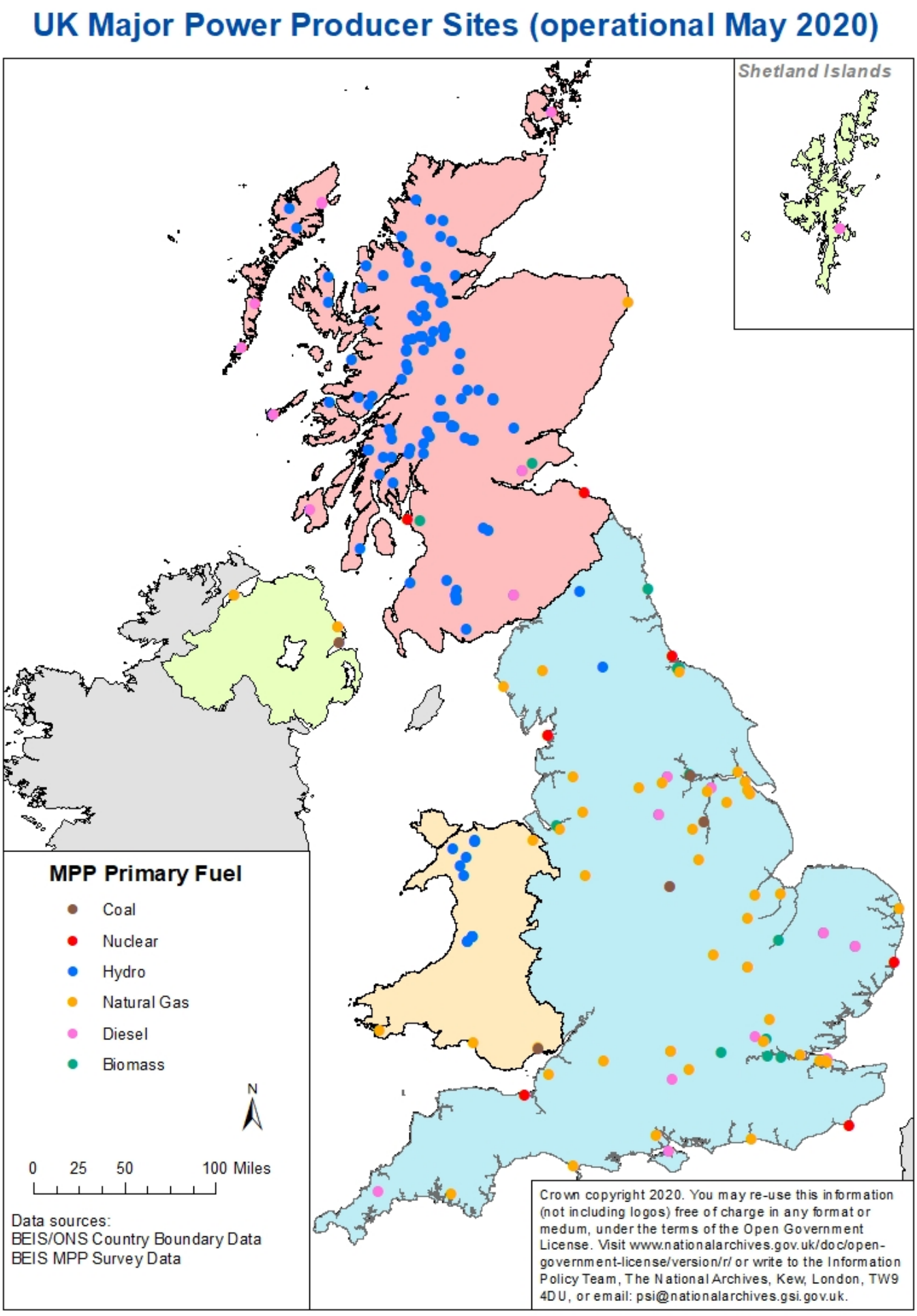
Table 2d: Generation of electricity by fuel in Scotland, Wales, Northern Ireland and England, 2018 and 2019

ELECTRICITY GENERATED *(GWh)*		2018					2019				
		UK total	**Scotland**	**Wales**	**Northern Ireland**	**England**	**UK total**	**Scotland**	**Wales**	**Northern Ireland**	**England**
All generating companies	**Fossil fuels**	*149,893*	7,525	21,067	5,398	115,904	*140,539*	6,353	18,784	5,182	110,221
within which	Coal	*16,831*	0	473	1,334	15,024	*6,891*	0	665	907	5,319
	Oil	*1,572*	284	52	79	1,157	*1,717*	307	62	86	1,262
	Gas	*131,490*	7,241	20,542	3,985	99,722	*131,931*	6,045	18,057	4,189	103,640
	Nuclear	*65,064*	13,611	0	0	51,453	*56,184*	12,226	0	0	43,958
	Renewables	*110,049*	26,865	7,010	3,954	72,221	*120,515*	30,521	7,700	4,189	78,105
within which	Hydro natural flow	*5,444*	4,995	292	30	127	*5,935*	5,362	408	35	129
	Wind	*56,906*	19,383	4,542	2,979	30,002	*64,335*	22,326	5,108	3,110	33,791
	Solar	*12,736*	318	1,039	276	11,102	*12,918*	347	1,051	292	11,228
	Shoreline wave and tidal	*9*	9	0	0	0	*14*	14	0	0	0
	Bioenergy	*34,954*	2,160	1,137	668	30,989	*37,314*	2,472	1,133	752	32,957
	Other fuels	*5,272*	316	667	3	4,285	*5,766*	451	786	18	4,511
	Pumped storage	*2,498*	454	2,045	0	0	*1,756*	418	1,339	0	0
	TOTAL ALL GENERATING COMPANIES	***332,776***	**48,770**	**30,788**	**9,355**	**243,862**	***324,761***	**49,969**	**28,608**	**9,389**	**236,794**
SHARES OF TOTAL GENERATION (%)	**Fossil fuels**	*45.0*	15.4	68.4	57.7	47.5	*43.3*	12.7	65.7	55.2	46.5
within which	Coal	*5.1*	0.0	1.5	14.3	6.2	*2.1*	0.0	2.3	9.7	2.2
	Oil	*0.5*	0.6	0.2	0.8	0.5	*0.5*	0.6	0.2	0.9	0.5
	Gas	*39.5*	14.8	66.7	42.6	40.9	*40.6*	12.1	63.1	44.6	43.8
	Nuclear	*19.6*	27.9	0.0	0.0	21.1	*17.3*	24.5	0.0	0.0	18.6
	Renewables	*33.1*	55.1	22.8	42.3	29.6	*37.1*	61.1	26.9	44.6	33.0
within which	Hydro natural flow	*1.6*	10.2	0.9	0.3	0.1	*1.8*	10.7	1.4	0.4	0.1
	Wind	*17.1*	39.7	14.8	31.8	12.3	*19.8*	44.7	17.9	33.1	14.3
	Solar	*3.8*	0.7	3.4	3.0	4.6	*4.0*	0.7	3.7	3.1	4.7
	Bioenergy	*10.5*	4.4	3.7	7.1	12.7	*11.5*	4.9	4.0	8.0	13.9
	Other fuels	*1.6*	0.6	2.2	0.0	1.8	*1.8*	0.9	2.7	0.2	1.9
	Pumped storage	*0.8*	0.9	6.6	0.0	0.0	*0.5*	0.8	4.7	0.0	0.0
	Low carbon	*52.6*	83.0	22.8	42.3	50.7	*54.4*	85.5	26.9	44.6	51.5

Appendix A: Electricity generation and consumption in Scotland, Wales, Northern Ireland and England



Appendix B: Map of Major Power Producer sites in Scotland, Wales, Northern Ireland and England



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