



Department for
Business, Energy
& Industrial Strategy

Energy Trends

UK, October to December 2021 and 2021

About this release

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

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Data tables

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

[Total energy](#)

[Coal and derived gases](#)

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[Renewables](#)

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

Percentage annual change from 2020, primary energy basis

(mtoe basis)	Production	Imports	Exports	Demand
Total energy	-14%	+7.7%	-13%	+3.2%
Coal	-36%	+1.8%	-14%	+2.3%
Primary oil	-17%	+4.4%	-15%	-0.9%
Petroleum products	+0.7%	+2.1%	-1.8%	+3.9%
Gas	-17%	+17%	-29%	+5.4%
Electricity	-11%	+28%	-7.0%	-11%

Energy consumption in 2021 remained low, up on last year but still down 8 per cent on 2019 as COVID-19 restrictions affected economic output, leisure, and travel. Consumption was low at the start of the year and increased from April as restrictions eased. Energy requirements for industrial use and services (e.g., shops, restaurants, offices) were up and returning to near pre-pandemic levels. Domestic demand remained higher than usual as people continued to spend more time at home.

Transport demand increased 7 per cent compared to last year but remains 23 per cent below 2019 levels. Whilst petrol and diesel consumption ended the year not far short of 2019 levels, **aviation fuel fell even further**, down 8 per cent on last year, and down 62 per cent on 2019 despite trending up in recent months.

Energy production was low, down 14 per cent compared to last year and the lowest level in over 50 years. Extensive maintenance in the North Sea, including the upgrade to the Forties Pipeline System, reduced oil and gas output by 17 per cent though output has increased since the summer lows. Nuclear output was also disrupted by maintenance, dropping output 9 per cent to the lowest level since 1982. Increasing energy demand with lower production meant that net import dependency increased to 37.9 per cent, the highest share since 2015.

Electricity output from renewable technologies dropped significantly because of less favourable weather conditions in 2021. Wind dropped 14 per cent, with further falls in both hydro and solar generation. **Renewables share of generation dropped from a record high of 43.1 to 39.3 per cent** despite a small increase in capacity. The share of low carbon generation fell more sharply, down to 54.1 per cent, due to drops in both renewables and nuclear.

Section 1: UK total energy

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Key headlines

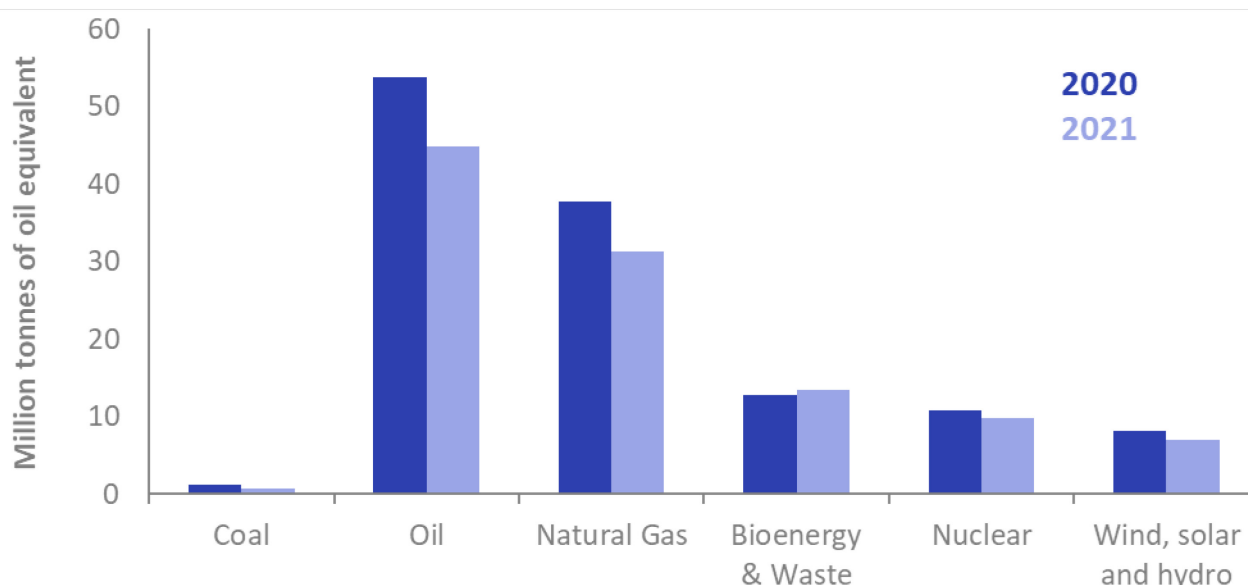
In 2021 total production was 106.9 million tonnes of oil equivalent, 14 per cent lower than in 2020, and **the lowest level in over 50 years**.

Total final energy consumption (excluding non-energy use) was 5.4 per cent higher than in 2020, with rises in all sectors following the easing of the Covid-19 pandemic restrictions. On a seasonally and temperature adjusted basis, final energy consumption rose by 3.2 per cent with only domestic demand falling, down 1.4 per cent on 2020.

In the fourth quarter of 2021 total production was 29.2 million tonnes of oil equivalent, 7.2 per cent lower than in the fourth quarter of 2020.

Final energy consumption (excluding non-energy use) rose by 2.4 per cent compared to the fourth quarter of 2020. Transport consumption rose by 18 per cent and industrial consumption rose by 1.4 per cent, but domestic consumption fell by 7.5 per cent. Consumption from other final users (mainly from the service sector) fell by 2.4 per cent. On a seasonally and temperature adjusted basis, final energy consumption rose by 4.7 per cent. Consumption levels have continued to recover as Covid-19 lockdown restrictions have been eased, but demand for aviation fuel has remained muted into the final quarter.

Chart 1.1 UK production



In 2021 total production was 106.9 million tonnes of oil equivalent, 14 per cent lower than in 2020, and the lowest level in over 50 years. Production levels for all fuels except bioenergy & waste are down on 2020, due to delayed oil & gas maintenance activities as a result of the Covid-19 pandemic, outages on the UK nuclear fleet and less favourable weather conditions for renewable technologies. The share of low carbon production has more than doubled since 2010, from 13.3 per cent to 28.2 per cent in 2021.

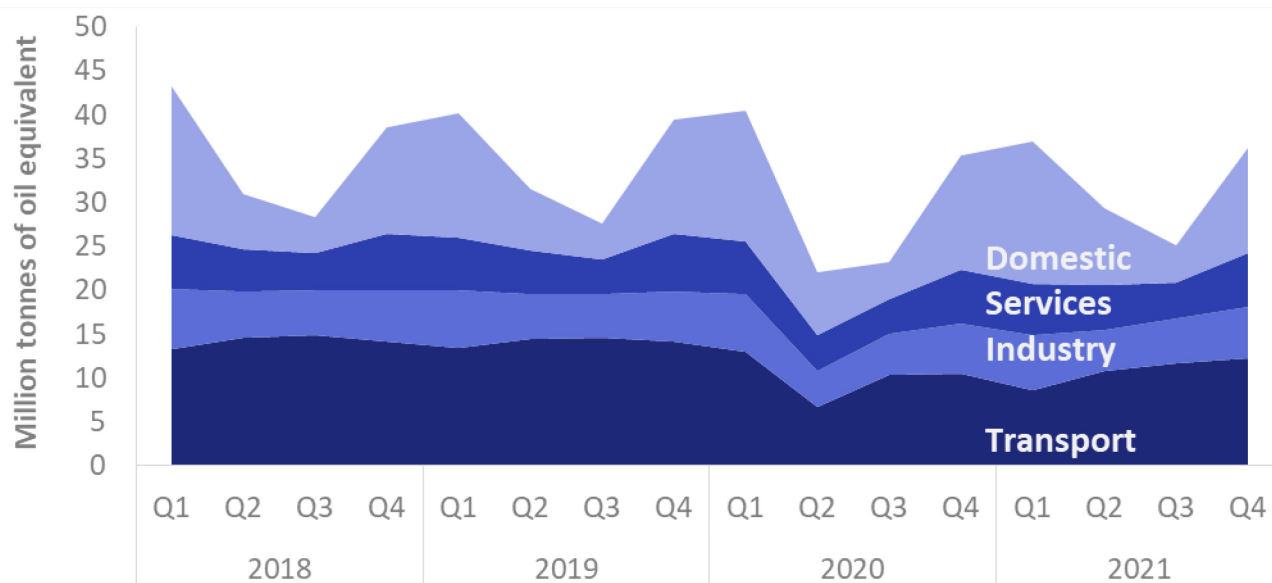
In the fourth quarter of 2021 total production was 29.2 million tonnes of oil equivalent, 7.2 per cent lower than in the fourth quarter of 2020. Production of all primary fuels fell except for bioenergy & waste, and wind and solar due to growth in capacity.

Chart 1.2 Total inland consumption (primary fuel input basis)



In 2021 total inland consumption (this includes not only fuel use by consumers, but fuel used for electricity generation and other transformation) was 170.6 million tonnes of oil equivalent, 2.2 per cent higher than in 2020, but down 8.5 per cent on pre-pandemic levels (on a seasonally adjusted and annualised rate that removes the impact of temperature on demand). **In the fourth quarter of 2021** consumption increased by 2.4 per cent on Q4 2020, but it remains below pre-pandemic levels, particularly for aviation fuel.

Chart 1.3 Final energy consumption by user



In 2021 total final energy consumption (excluding non-energy use) was 5.4 per cent higher than in 2020. Except for transport consumption, the energy requirements of most sectors are broadly in line with pre-pandemic averages. Transport consumption rose by 6.9 per cent, with road fuel demand approaching normal levels by the end of the year, but with demand for aviation fuel remaining low. Domestic consumption rose by 4.7 per cent, as people continued to work from home. Service sector consumption rose by 4.3 per cent as many schools, shops and workplaces were re-opened as lockdown restrictions were eased, whilst industrial sector energy consumption rose by 4.8 per cent. **In the fourth quarter of 2021** total final energy consumption was 2.4 per cent higher than in the fourth quarter of 2020.

Section 2: Coal and derived gases

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Key headlines

Total coal demand in 2021 rose to 7.3 million tonnes, 2.9 per cent higher than in 2020. The increase was driven by a 14 per cent rise in coal-fired electricity generation from a record low in 2020 following Covid-19 restrictions and high renewable electricity generation that year. The rise was a temporary deviation from the downward trend.

Coal production in 2021 fell to a record low of 1.1 million tonnes, down 37 per cent compared with 2020. Surface mining production fell to a record low of 960 thousand tonnes with mine closures and falling demand for coal for electricity generation. In the last ten years UK coal production has fallen by 94 per cent. (Chart 2.2)

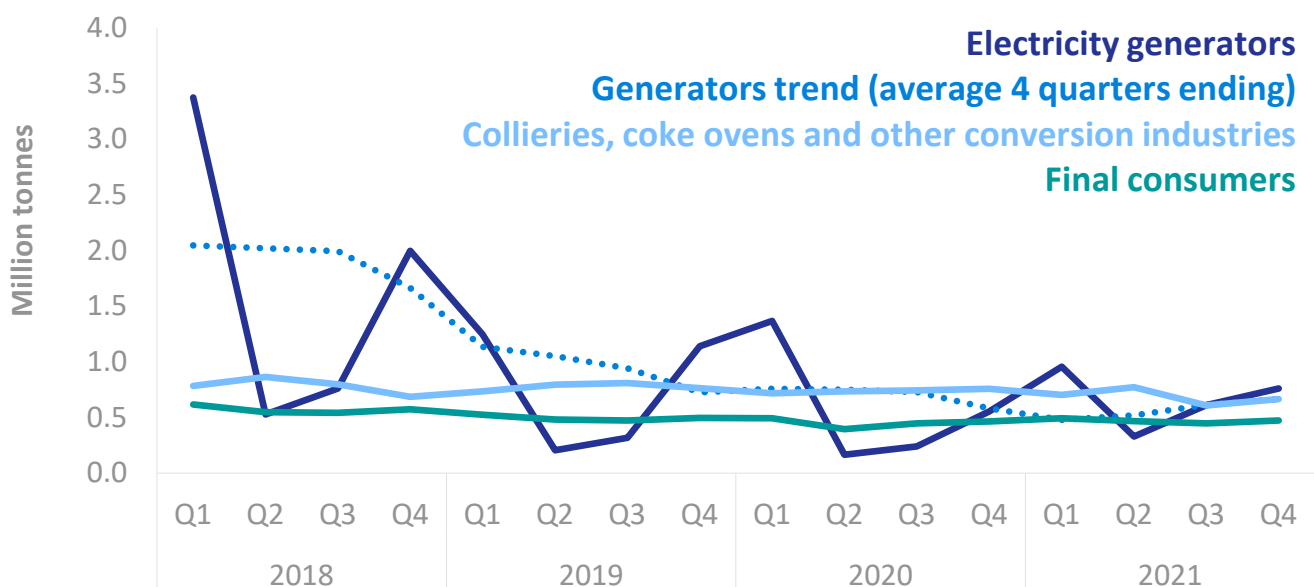
Coal imports rose to 4.6 million tonnes in 2021, 1.8 per cent up compared with 2020. Net imports accounted for 48 per cent of supply in 2021 (Chart 2.2) although volumes remained historically low. Russia (43 per cent), the USA (24 per cent) and Australia (11 per cent) accounted for 78 per cent of total coal imports. (Chart 2.3)

In the fourth quarter of 2021, demand for coal by electricity generators rose to 759 thousand tonnes, 37 per cent higher than in Q4 2020, although this was from a low baseline following record periods without coal generation in Great Britain in 2020. Lower generation from gas and nuclear sources contributed to higher coal generation (see Energy Trends 5.4) (Chart 2.1).

In Q4 2021, coal imports fell to 1.3 million tonnes, 19 per cent down on Q4 2020. Net imports accounted for 54 per cent of supply in Q4 2021 (Chart 2.2). Russia (50 per cent), the USA (26 per cent) and Venezuela (8 per cent) accounted for 84 per cent of total coal imports.

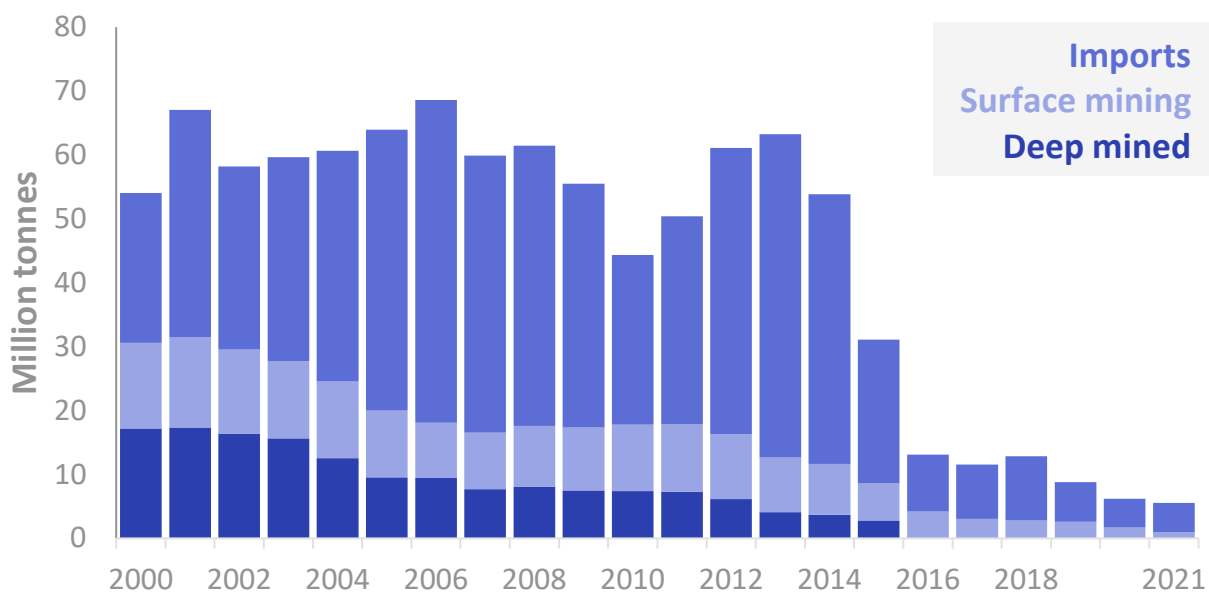
Total coal demand in 2021 rose to 7.3 million tonnes, 2.9 per cent higher than in 2020. Much of this increase was due to the 14 per cent rise in coal-fired generation to 2.7 million tonnes, although this was from a low baseline following record periods without coal generation in Great Britain in 2020. The fall in renewable electricity generation (due to less wind and rainfall) and the drop in nuclear generation due to outages also contributed to higher coal-fired generation. With the Drax coal units mothballed at the end of March 2021, just three coal plants remain operational in the UK. Coal use for electricity generation is expected to cease completely by October 2024.

Chart 2.1 Coal Consumption



In the most recent quarter, coal demand for coal-fired electricity generation rose from 554 thousand tonnes in Q4 2020 to 759 thousand tonnes in Q4 2021, an increase of 37 per cent. This was from a low baseline following record periods without coal generation in Great Britain in 2020. Lower generation from gas and nuclear sources contributed to higher coal generation in the quarter (see Energy Trends 5.4). Despite the fall in gas generation during the period, coal-fired generation continued to be less economically favourable. Demand for coal-fired generation is seasonal, peaking in winter when conditions are cold and dark; these peaks have declined as coal-fired generation became less competitive economically and is displaced by gas and renewable sources. (Chart 2.1)

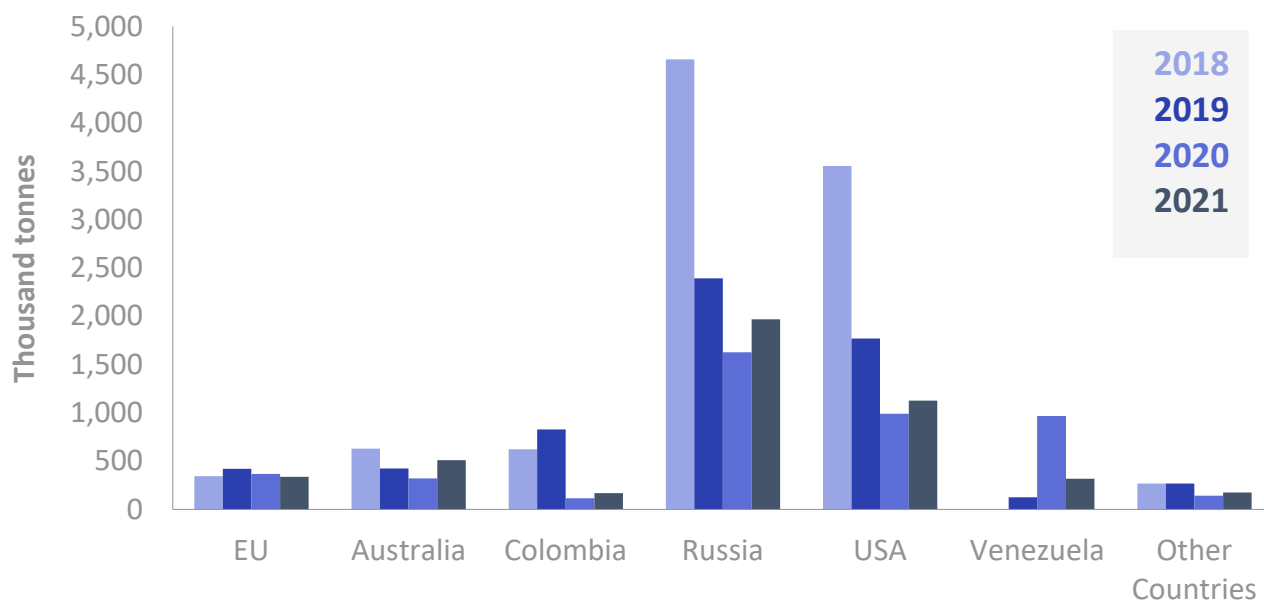
Chart 2.2 Coal Supply



Domestic coal production fell steadily because of coal mine closures and reduced demand. Imports filled the gap and increased 29 per cent from 4.5 million tonnes in 2020 to 5.8 million tonnes in 2021. This made up for supply lost due to lower domestic coal production.

In Q4 2021, UK coal production fell to a record low 182 thousand tonnes, a 36 per cent fall compared to Q4 2020. This was due to mine closures and flooding.

Chart 2.3 Coal Imports



Coal imports rose to 4.6 million tonnes in 2021, 1.8 per cent up compared with 2020. Net imports accounted for 48 per cent of supply although volumes remained historically low – imports had peaked at 50.6m tonnes in 2013 - due to the steep fall in UK demand for coal. In 2021 Russia remained the largest exporter of coal to the UK with a share of 43 per cent. This was followed by the USA with 24 per cent and Australia with 11 per cent.

In Q4 2021, coal imports fell to 1.3 million tonnes, 19 per cent down on Q4 2020. Net imports accounted for 54 per cent of supply in Q4 2021. Russia (50 per cent), the USA (26 per cent) and Venezuela (8 per cent) accounted for 84 per cent of total coal imports.

Section 3: Oil and oil products

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Key headlines

In 2021, indigenous production of primary oils reached the lowest level since 2014 at 41 million tonnes. This follows extensive maintenance both planned and delayed from 2020 as operators got to grips with restrictions in place to curb the Covid-19 pandemic.

In 2021, indigenous production of petroleum products reached a record low at just under 50 million tonnes. This was in response to low demand, a result of the Covid-19 pandemic, in addition to maintenance.

Demand for petroleum products increased 4.1 per cent in 2021 compared to 2020 although remains down by a fifth compared to 2019. Much of this growth in demand was driven by increasing demand for road fuels which were up by just over 10 per cent.

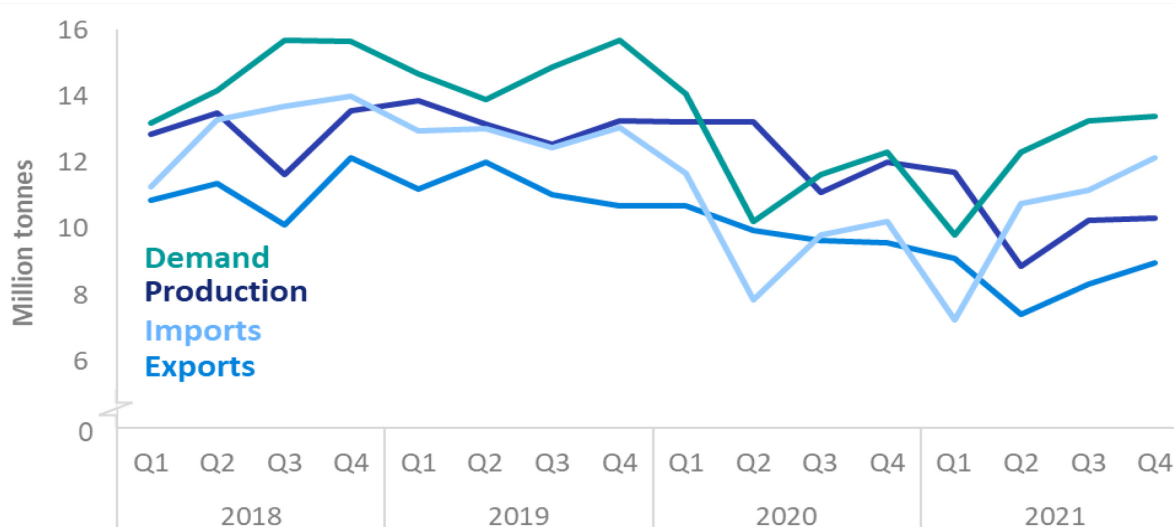
In 2021, the UK left the European Union (EU) resulting in a change to stockholding obligations. This has resulted in a reduction in stocks of 32 per cent in December 2021 compared to December 2020.

In Quarter 4 2021, indigenous production of primary oils was down 14 per cent compared to the same period in 2020. Recovery following extensive summer maintenance was slow as delays to maintenance in 2020 on the back of several years of low investment in North Sea infrastructure took hold.

Demand for petroleum products was up 12 per cent in Quarter 4 2021 compared to the same period in the previous year but remains down compared to pre pandemic levels. Imports were used to bolster supply amid low production, up 23 per cent in the same period.

In Quarter 4 2021 demand for key transport fuels grew substantially. Jet fuel demand was 80 per cent higher than that in Quarter 4 2020 as international travel restrictions were eased across the world.

Chart 3.1 Production and trade of crude oil and NGLs



Indigenous production of primary oils fell to a 7 year low in 2021, down 17 per cent compared to 2020. This was largely the result of an extensive summer maintenance schedule which included the shutdown of the Forties Pipeline System (FPS) for a maintenance upgrade. The FPS accounts for a significant proportion of UK oil and gas production. Furthermore, delays to maintenance in 2020, the result of extensive restrictions in

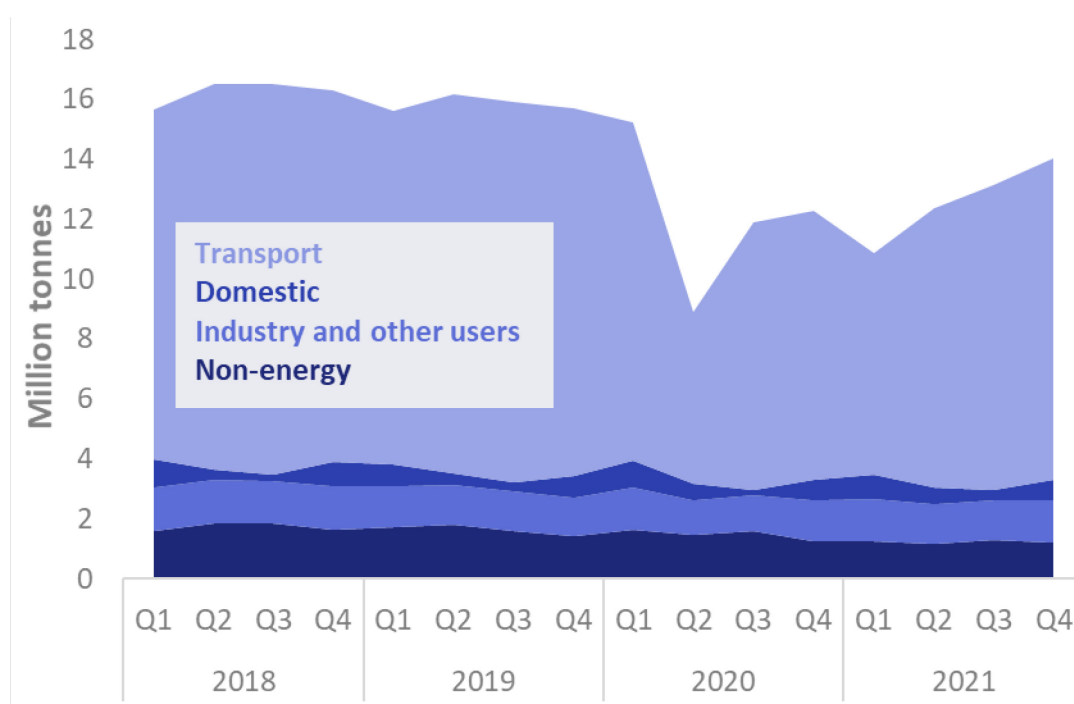
place to curb the spread of Covid-19, as well as reduced investment in North Sea infrastructure in recent years resulted in low production throughout the remainder of 2021.

Demand for primary oils was stable in 2021 compared to 2020 up just 1.1 per cent. With demand stable and production down, supply was balanced by a drop in exports, which were down 15 per cent to a six-year low. Imports were up 4.4 per cent, the increase softened by record lows in 2020. The UK returned to being a net importer of primary oils by 7.5 million tonnes. Both imports and exports remain down compared to pre pandemic levels.

Monthly data on the origin and destination countries of oil traded have been published for the first time. For more information see tables 3.14 and 3.15.

A similar story continued into the end of the year with production down 14 per cent in Quarter 4 2021 compared to Quarter 4 2020. Production has recovered following summer maintenance but remains down overall. Imports were used to bolster low production, up 19 per cent in the same period supporting growing demand which was up 8.9 per cent. Despite this demand remains lower than pre pandemic levels, down 15 per cent in Quarter 4 2021 compared to Quarter 4 2019.

Chart 3.2 UK demand for petroleum products



In 2021, indigenous production of petroleum products was down 1.2 per cent compared to 2020, the second consecutive record low. This was largely the result of reduced demand throughout the Covid-19 pandemic in addition to maintenance activity earlier in the year.

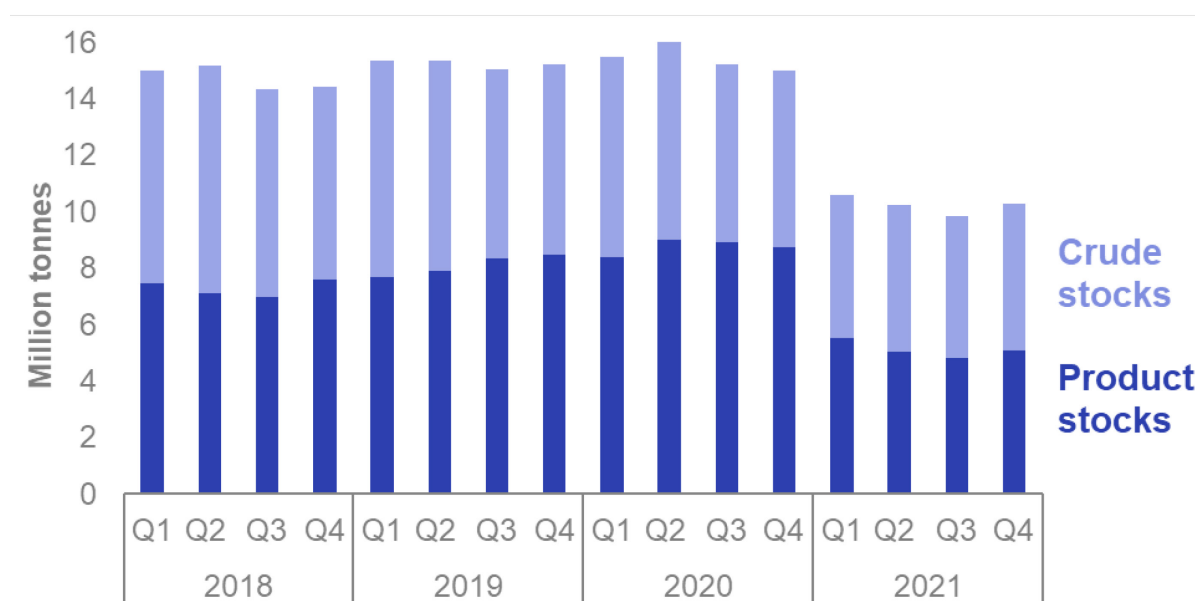
Demand for petroleum products was up by 4.1 per cent in 2021 compared to 2020 although remains down by a fifth compared to 2019. Much of the growth in demand was attributable to an increase in road fuels sales with demand for petrol and diesel increasing by just over 10 per cent. As international travel restrictions remained in place for much of the year, jet fuel remained the most significantly impacted by the pandemic, with demand in 2021 down 7.7 per cent compared to 2020 and more than 60 per cent compared to 2019. This muted growth in demand for transport fuels was reflected in refinery output with production of diesel and jet fuel reaching new record lows in 2021. Petrol saw the greatest recovery up 9.1 per cent in 2021 compared to 2020 but remained down 13 per cent compared to 2019.

Demand for petroleum products was up 12 per cent in Quarter 4 2021 compared to Quarter 4 2020.

Chart 3.2 shows the steady increase in demand throughout the year in line with reducing restrictions in place to curb the Covid-19 pandemic. Again this was largely the result of increasing demand for transport fuels, particularly road fuels. Demand for petrol and diesel increased 18 and 9.4 per cent respectively when compared to Quarter 4 2020. The most significant increase was in jet fuel with demand up 80 per cent compared to Quarter 4 2020. This was the result of substantially fewer international travel restrictions both in the UK and across the globe. Demand for jet fuel remains down compared to pre pandemic levels, by 39 per cent in Quarter 4 2021 compared to the same period in 2019.

Generally, production and trade increased in line with increasing demand with a similar pattern seen across products. Production of petrol increased by 10 per cent in Quarter 4 2021 compared to Quarter 4 2020, while jet fuel production more than doubled. Conversely diesel production was down 6.3 per cent in the same period with demand being met by reducing exports and increasing imports.

Chart 3.3 UK Oil stocks



UK oil stocks were down 32 per cent in December 2021 compared with December 2020. As of the end of December 2020 the UK left the European Union (EU) resulting in a change to international stockholding requirements. Until December 2020, the UK was obligated to hold stocks as a member state of the EU and the International Energy Agency (IEA). On leaving the EU the UK was only required to hold stocks as a member of the IEA. As the IEA obligation has historically been lower than that of the EU, companies were directed to hold less stock.

Following the change to the obligation, companies opted to hold less stock abroad, using surplus domestic stocks to meet their required stock levels. This resulted in a reduction of 81 per cent of stocks held abroad in 2021 compared to 2020. Overall, total primary oil stocks fell 17 per cent, and total product stocks 42 per cent when compared to the previous year. This sharper drop in product stocks was the result of recovering demand for transport fuels which had been heavily impacted by Covid-19 restrictions in place.

At the end of December 2021, the UK held the equivalent of 905 days of net imports in stock. This is substantially higher than the minimum stockholding requirement of 90 days of net imports set by the IEA.

For further information on stocks please see Energy Trends tables 3.6 and 3.11.

Section 4: Gas

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Key headlines

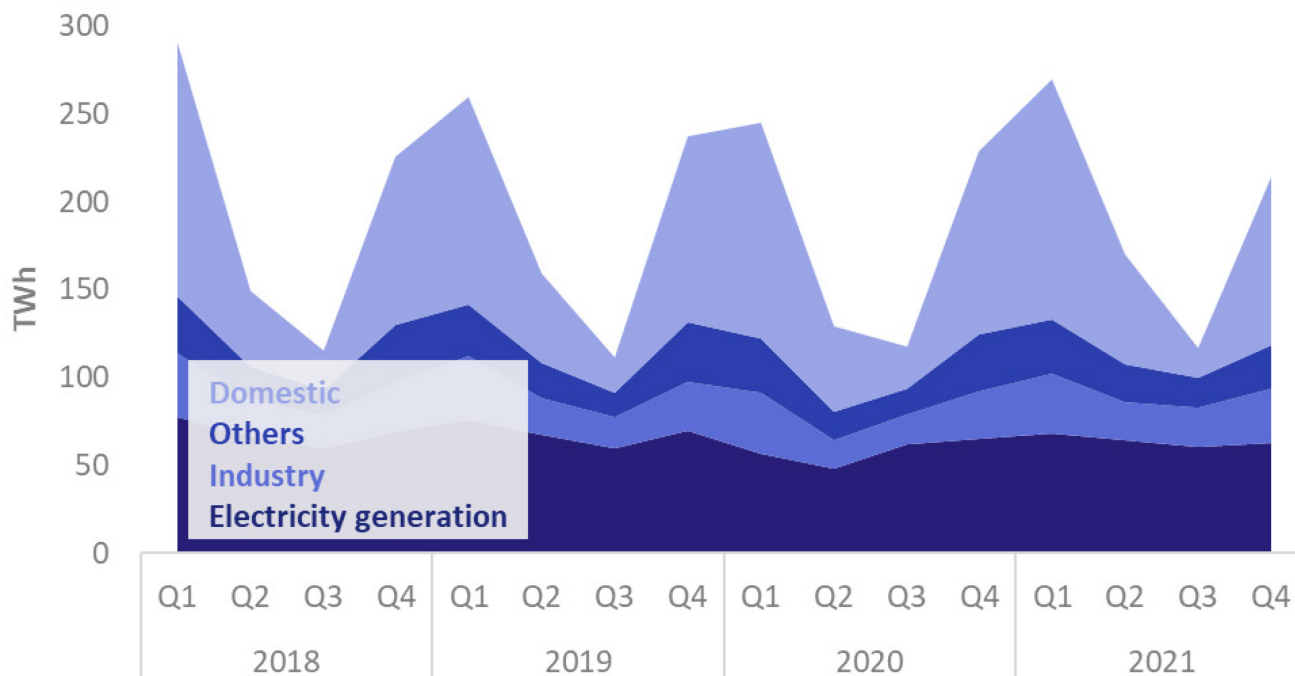
In 2021, UK gas demand rose by 5.4 per cent in comparison with 2020, reaching 854 TWh. This increase reflected an easing of lockdown restrictions from spring until the end of the year, and reduced generation from renewables and nuclear increasing demand for electricity generation. The easing of restrictions predominantly increased demand across the industrial, commercial and public sectors (included under 'Others', Chart 4.1).

Gas production reached a record low in 2021 at 363 TWh, 47 TWh below the previous record low in 2013. This was a 17 per cent fall in comparison with 2020 and was largely the result of scheduled maintenance including a shutdown of the Forties Pipeline System (FPS) which serves a significant proportion of UK oil and gas production. To meet demand, imports of natural gas increased by 17 per cent, and exports fell by 29 per cent to the lowest level since 1998. This resulted in a 30 per cent increase to net imports. The rise in imports was driven by increased pipeline imports, up 44 per cent; imports of Liquefied Natural Gas (LNG) fell by 22 per cent.

Quarter 4 2021 saw a 6.3 per cent fall in demand for natural gas, in comparison with Quarter 4 2020.

This was due to reduced demand for electricity generation, as well as warmer quarterly temperatures reducing domestic demand. Production continued to increase from the summer lows but was down 1.7 per cent on the same period in the previous year. Net imports fell 17 per cent in Quarter 4 2021, primarily due to significant exports in October. Imports of LNG remained substantial but were down 5.5 per cent when compared with Quarter 4 2020.

Chart 4.1 UK demand for natural gas

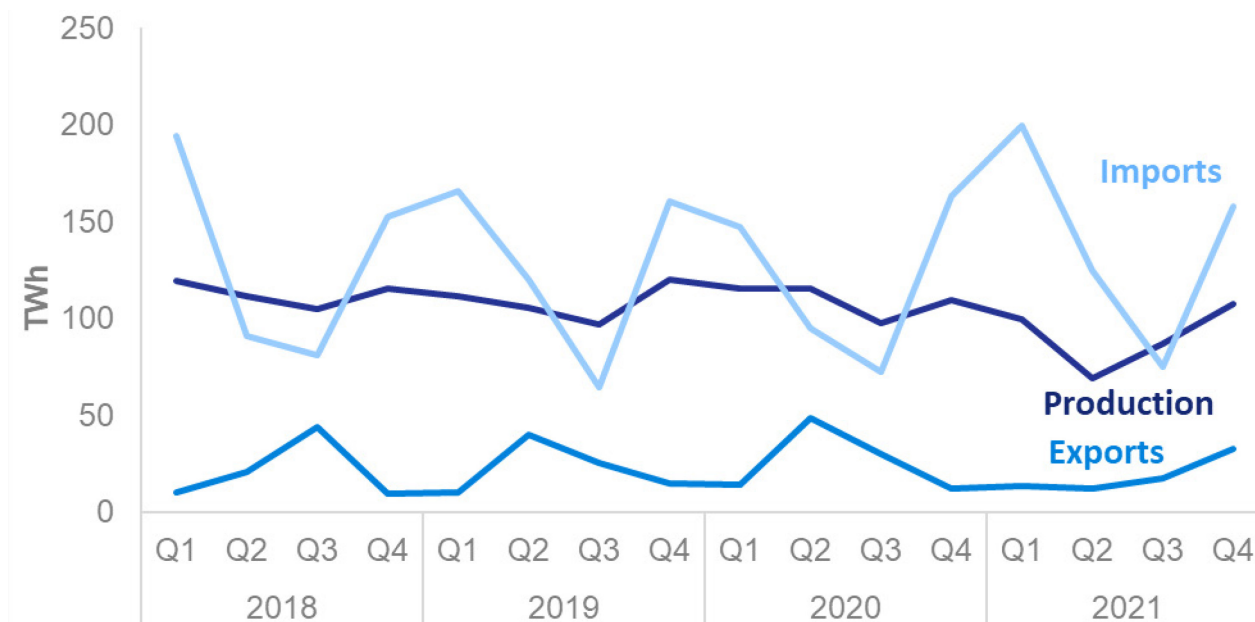


Domestic demand increased in 2021, up by 6.2 per cent in comparison with the previous year. This was due to colder average temperatures in the first half of the year, coinciding with lockdown restrictions which led households to spend more time at home. Demand for gas used for electricity generation was up by 10 per cent in 2021, the result of reduced renewable and nuclear output.

In Quarter 4 2021, demand for natural gas fell by 6.3 per cent in comparison with Quarter 4 2020. This was driven by warm temperatures, leading to an 8.7 per cent fall in domestic demand. Gas demand for

electricity generation also fell, down 3.9 per cent when compared with Quarter 4 2020, due to increased output from renewable sources.

Chart 4.2 Production and trade of natural gas

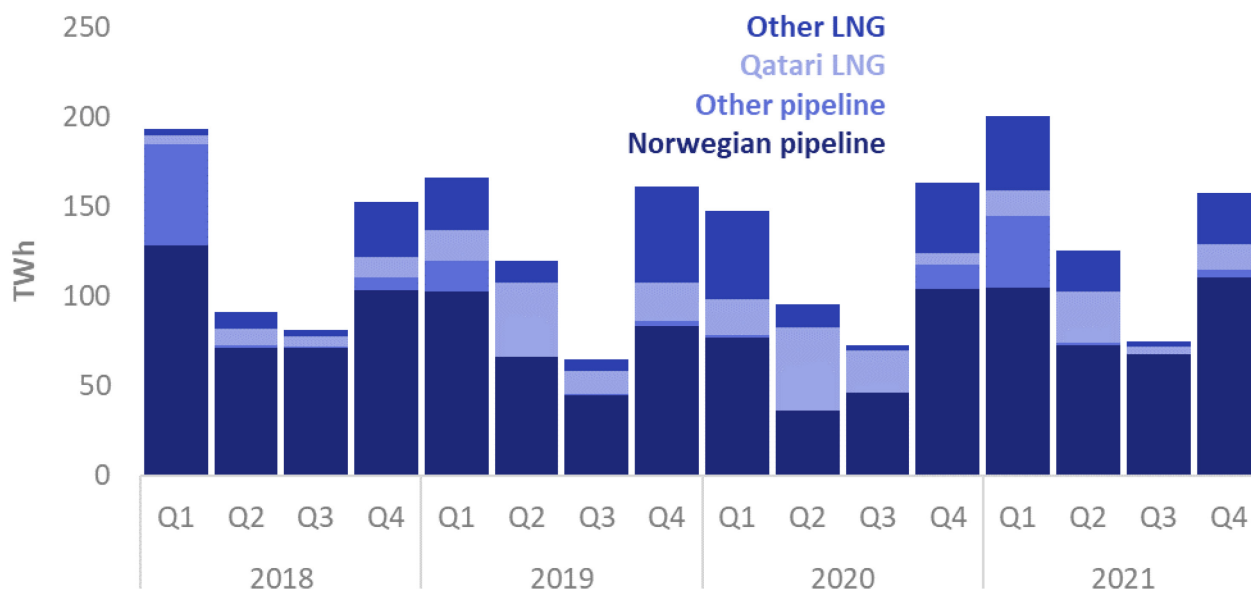


In 2021, gas production hit a record low of 363 TWh, 47 TWh below the previous record low in 2013. This was a 17 per cent fall in comparison with 2020, and equivalent to 30 per cent of the peak in 2000. Low production was the result of an extensive summer maintenance schedule which saw shutdowns at several major terminals, as well as the Forties Pipeline System (FPS) which serves around a significant proportion of UK oil and gas production.

To meet demand amid low production, there was a 17 per cent increase in imports of natural gas and a substantial slowing of exports. Exports in 2021 reached their lowest level since 1998, down 29 per cent on 2020. Overall this resulted in net imports increasing by 30 per cent in 2021 compared to 2020.

In Quarter 4 2021, gross gas production fell 1.7 per cent on Quarter 4 2020. Production has recovered following substantial maintenance in the summer but remains lower than pre pandemic levels. This is the result of delays to maintenance in 2020, following restrictions in place to curb the Covid-19 pandemic, on the back of several years of low investment in North Sea infrastructure. Net imports fell 17 per cent in comparison with Quarter 4 2020, due to exports more than doubling when compared to Quarter 4 2020. This rise in exports was driven by a substantial increase in exports to Belgium and the Netherlands while UK demand was low.

Chart 4.3 Imports by origin



In 2021, Norway remained the largest import source of natural gas. Imports from Norway accounted for 39 per cent of supply (production + imports) and 64 per cent of total imports. Historically, the UK imports a large amount of gas from Norway, however, in 2021 Norwegian imports increased 35 per cent in comparison with 2020 when LNG took centre stage. Increases were also seen in imports from the Netherlands and Belgium, which more than doubled in comparison with 2020. This reflects the rise in imports to meet demand amid low indigenous production.

LNG imports decreased by 22 per cent in 2021, though volumes imported remained substantial. LNG accounted for 17 per cent of supply (production + imports) and 28 per cent of total gas imports. Qatar remained the largest source of LNG, contributing 40 per cent of LNG imports in 2021. However, this represents a fall in its share in comparison with 2020, as well as being the lowest share of LNG from Qatar since 2008. The USA remained the second largest source of LNG despite decreasing just over a quarter compared to 2020. Imports of LNG from Russia were up 37 per cent in 2021 compared to 2020, accounting for 3.7 per cent of supply (production + imports) and 6.1 per cent of imports.

In Quarter 4 2021, LNG imports fell 5.5 per cent in comparison with Quarter 4 2020. Qatar was the largest supplier of LNG to the UK, comprising 34 per cent of total LNG imports. This was more than double that recorded in Quarter 4 2020. Following zero imports to the UK for 2 years, Peru was the second largest supplier of LNG in Quarter 4 2021, comprising 21 per cent of total LNG imports. This reflects gas market conditions towards the end of 2021, which saw European countries secure LNG cargoes from further afield. Imports from the USA increased by close to a third in the same period, conversely imports from Russia decreased by close to a third accounting for 3.6 per cent of supply (production + imports) and 5.8 per cent of imports.

Section 5: Electricity

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Key headlines

Electricity demand increased slightly in 2021 with the lifting of Covid restrictions, though offset by warmer temperatures. Final consumption of electricity was 285 TWh in 2021, an increase of 1.8 per cent on 2020. Industrial use of electricity increased by 4.0 per cent and consumption by other final users increased by 0.9 per cent. Domestic consumption increased by 0.9 per cent.

Total electricity generated in 2021 was 310 TWh, 0.7 per cent lower than in 2020 and the lowest value on the published data series. The difference between demand and generation was accounted for by record net imports of 25 TWh, up by 37 per cent and the highest value on the published data series. Generation from renewable sources decreased to 122 TWh as a result of less favourable weather conditions, while generation from fossil fuels increased to 132 TWh. Generation from nuclear was the lowest value on the published data series at 46 TWh as plant outages continued to restrict generation.

Quarter 4 of 2021 saw lower electricity demand and generation than Quarter 4 2020. Demand was down by 1.6 per cent while total generation decreased by 1.0 per cent. Electricity consumed by the industrial sector rose by 1.9 per cent while consumption by other final users increased by 3.6 per cent. Domestic electricity consumption decreased by 6.9 per cent. This reflects the lack of Covid-19 restrictions in Quarter 4 2021, and by warmer average temperatures.

Renewable electricity generation was 35.8 TWh in Quarter 4 2021, an increase of 4.0 per cent compared to the same period in 2020. Nuclear generation fell by 14 per cent in Quarter 4 2021 to 12 TWh as outages continued at many of the UK's nuclear plants. Generation from fossil fuel totalled 33 TWh, below renewables generation and a decrease of 1.9 per cent compared to Quarter 4 2020.

Final consumption of electricity increased slightly in 2021, up by 1.8 per cent compared to 2020. Final consumption totalled 285 TWh. Although consumption was less affected by Covid-19 restrictions, differences in temperature offset some of the increased consumption that resulted from increased non-domestic activities. The first half of the year had cooler average temperatures than 2020, but this was at a time when Covid-19 restrictions were in place, whereas the second half of the year had few restrictions across the UK as a whole, but demand was reduced by warmer average temperatures.

Domestic electricity consumption increased by 0.9 per cent in 2021. This was driven by cooler average temperatures in the first half of the year, which increased heating demand at a time when Covid-19 restrictions meant that people were still spending substantial amounts of time at home, including working from home.

Non-domestic consumption increased in 2021, with the lifting of restrictions. Industrial use of electricity, including iron and steel, was up 4.0 per cent between the same periods, in line with higher industrial output as measured by the Index of Production. Consumption by other final users, including commercial use, increased by 0.9 per cent. This modest rise reflects some restrictions on commercial activity in the first half of the year as well as reduced heating demand in the second half of the year once restrictions had been lifted.

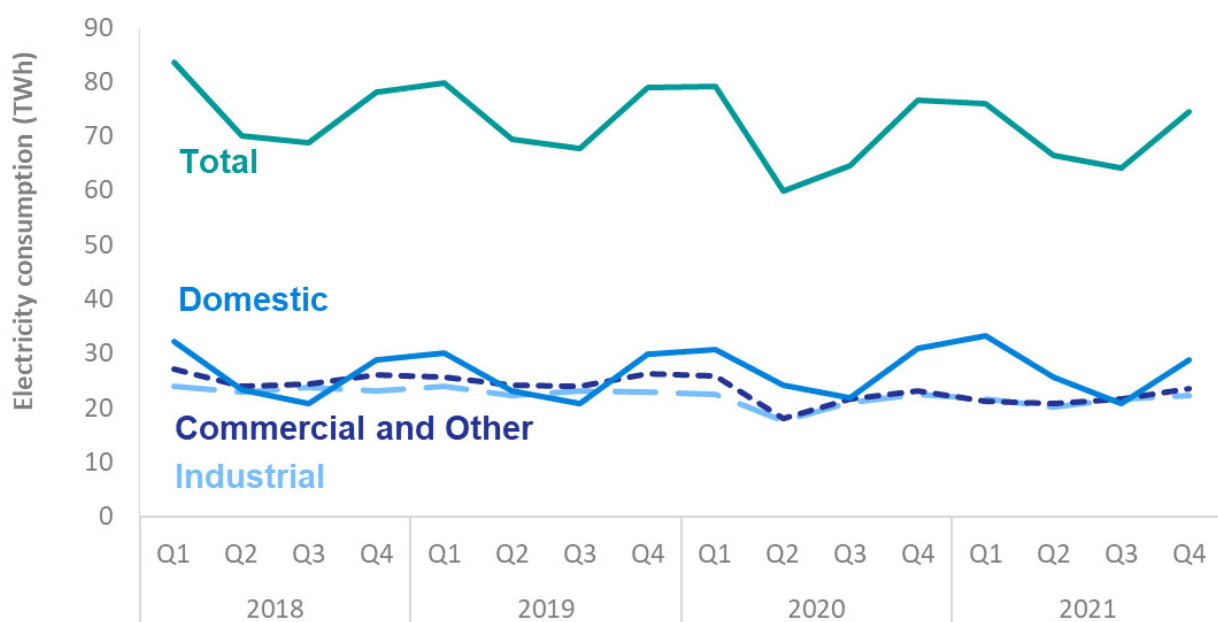
Quarter 4 2021 had lower consumption of electricity compared to the same period in 2020. Final electricity consumption by end-users fell 1.2 per cent to 76 TWh. This reflects warmer average temperatures during the quarter which decreased electricity demand for heating, offsetting the increased demand resulting from the lifting of Covid-19 restrictions. There were few restrictions during Quarter 4 of 2021 whereas Quarter

4 2020 saw varying degrees of restrictions across the quarter, including a national lockdown for England for most of November and regional lockdown tiers in December.

Domestic electricity consumption decreased by 6.9 per cent in Quarter 4 2021. This reflected reduced electricity demand from heating as well as the lack of Covid-19 restrictions meaning that people could spend more time outside the home.

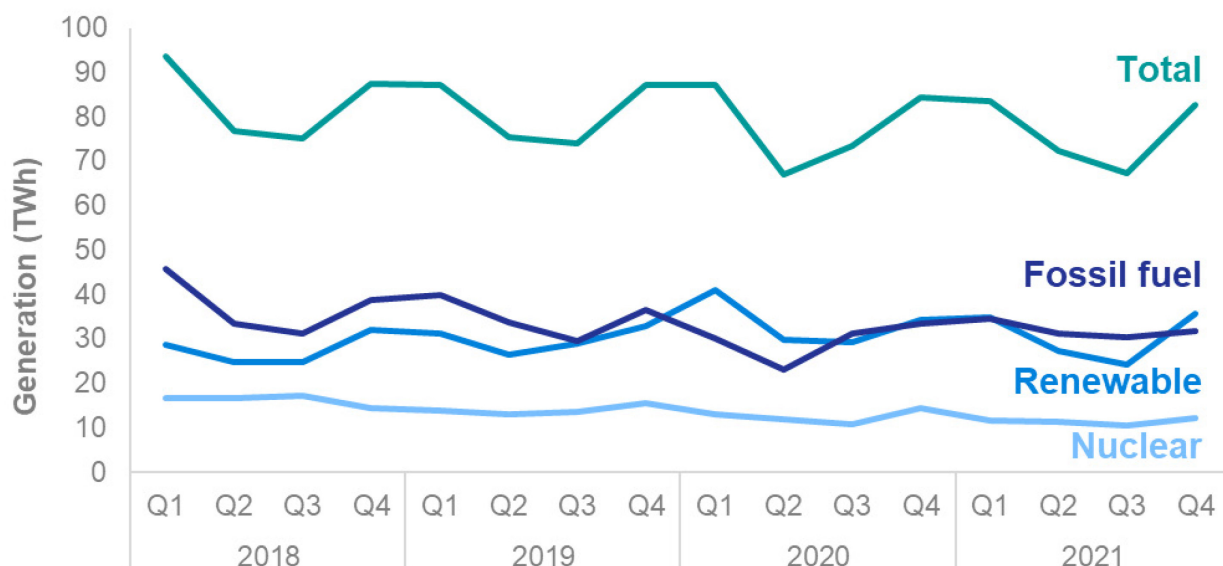
Industrial consumption increased 1.9 per cent in Quarter 4 2021 while consumption by other users increased by 3.6 per cent. Industrial consumption in line with a rise in industrial output, while consumption by other users, primarily the commercial sector, rose. This increase reflected the lack of Covid-19 restrictions meaning that shops, offices and leisure venues could operate as normal, offset by warmer average temperatures reducing the demand for electricity for heating.

Chart 5.1 Electricity consumption by sector



In 2021, total electricity generation decreased by 0.7 per cent compared to 2020, to 310 TWh. This was the lowest value on the published data series. The low generation was despite a slight increase in demand for electricity, which was up 1.4 per cent as Covid restrictions were eased and consumption patterns returned to more normal levels. The difference between generation and demand was met by high net imports, which increased by 37 per cent to 25 TWh, the highest value in the published data series and representing 7 per cent of electricity supply.

Chart 5.2 Electricity generated, by fuel



Renewable generation decreased in 2021, down by 9.5 per cent to 121.9 TWh. This was linked to less favourable weather conditions in 2021 compared to 2020, particularly that wind speeds were below average in every month except February in 2021. This led to a 14 per cent decrease in wind generation across 2021. The only renewable technology with an increase in 2021 was bioenergy, which increased by 1.8 per cent to 40.0 TWh. Nuclear generation continued to be restricted by outages and the defuelling of Dungeness B which began in June 2021 after a prolonged outage. Nuclear generation was 45.9 TWh in 2021, a decrease of 8.8 per cent compared to 2020 and the lowest nuclear generation since 1982. The decrease in renewable and nuclear generation meant that low carbon sources represented 54.1 per cent of generation in 2021, 5.1 percentage points lower than in 2020.

Generation from fossil fuels increased in 2021 to 132.2 TWh, a 12 per cent increase compared to 2020.

This was in line with the reduced generation from low carbon sources, but also reflects the unusually low demand in 2020 which reduced the need for generation from fossil fuels. Generation from gas was 124.2 TWh in 2021, an 11 per cent increase compared to 2020. Generation from coal also increased by 18 per cent to 6.5 TWh. While this was a large increase in percentage terms, it was from a very low baseline in 2020.

In Quarter 4 of 2021, total electricity generation was 83.6 TWh, which was 1.0 per cent down on Quarter 4 2020. This was in line with the 1.6 per cent decrease in demand over the same time period. While most of 2021 saw high net imports, these decreased in Quarter 4 2021, down by 15 per cent compared to the same period in 2020. This was because of a doubling in exports as a result of generation outages in France.

Renewable generation increased by 4.0 per cent in Quarter 4 2021 compared to the same period in 2020. Wind generation increased by 3.3 per cent, despite slightly lower average wind speeds, as capacity for wind generation rose compared to the same period in 2020. Higher average sun hours and increased solar capacity saw solar generation rise 24 per cent in Quarter 4 2021, but hydro generation was down by 16 per cent in line with lower average rainfall. There was also a 7.1 per cent increase in generation from bioenergy, up to 10.7 TWh in Quarter 4 2021. Nuclear generation fell to 12.3 TWh in Quarter 4 2021, which was the highest quarterly value in 2021 but 14 per cent lower than Quarter 4 2020. Low carbon electricity generation represented 57.6 per cent of total electricity generation, down 0.2 percentage points on Quarter 4 2020.

Fossil fuel generation was 32.7 TWh in Quarter 4 2021, a 1.9 per cent decrease compared to the same period in 2020. This was driven by a 4.4 decrease in generation from gas, down to 30.4 TWh. At the same time, generation from coal increased by 44 per cent to 1.9 TWh. While this is a large increase in percentage terms, it is from a very low baseline in 2020. Fossil fuel represented 39.1 per cent of the total generation in Quarter 4 2021, 0.4 percentage points lower than in the same period in 2020.

Section 6: Renewables

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Key headlines

Following a record high in 2020, renewable generation fell by 9.5 per cent to 121.9 TWh, though this is still the second highest on record. The decrease is mostly a result of less favourable weather conditions across the board (wind, sun hours, and rainfall). Overall, renewables accounted for 39.3 per cent of total generation, down from 43.1 per cent in 2020.

Although growth in generating capacity remains modest with 1.6 GW installed in 2021 (a 3.4 per cent increase), it is higher than the 1.0 GW installed during 2020 with some projects being delayed due to Covid-19 restrictions (see chart 6.2).

In the latest quarter, renewable electricity generation was 35.8 TWh, a 4.0 per cent increase on 2020 Q4 with almost half the increase being in onshore wind. Average wind speeds fell but generation in 2020 Q4 had been depressed by outages. Solar PV generation rose by 24 per cent due to new capacity and a marginally sunnier quarter than 2020 Q4. Hydro generation fell by 16 per cent in Q4 2021 due to lower rainfall.

Renewables' share of total generation was 42.8 per cent in 2021 Q4, up by 2.1 percentage points on 2020 Q4. This is the third highest percentage share on record, after Q1 and Q2 2020 (47.2 and 44.5 per cent respectively).

Chart 6.1 Change in renewable generation and capacity between Q4 2020 and Q4 2021

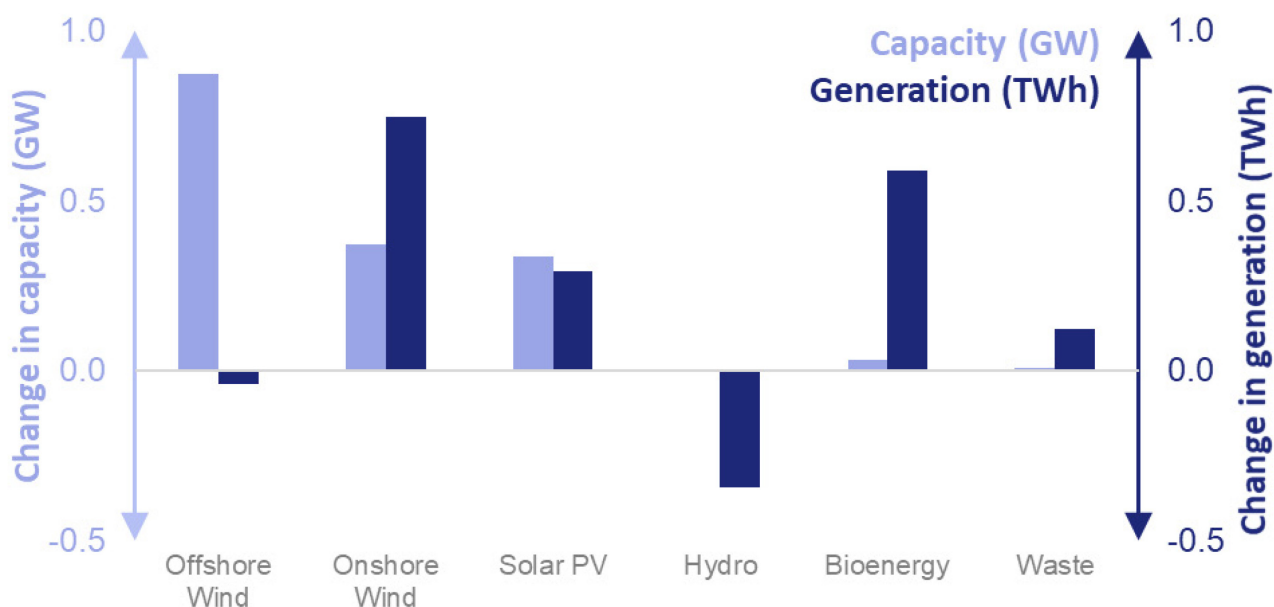
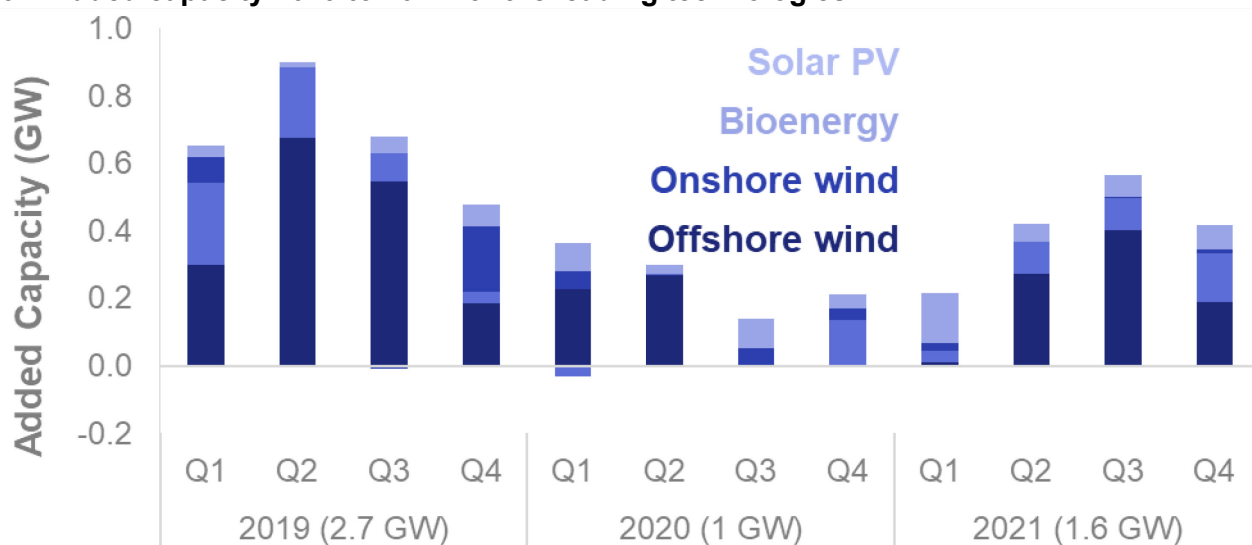


Chart 6.1 shows increases in capacity by technology compared to changes in generation between 2020 Q4 and 2021 Q4. Capacity grew 3.4 per cent, and generation by 4.0 per cent. The chart shows the increase in capacity for both onshore and offshore wind, but it is notable that only onshore wind saw a corresponding increase in generation. Whilst all wind generation was subjected to lower wind speeds, onshore generation was artificially low in 2020 Q4 due to disruptions caused by Storm Aiden. An additional 337 MW of solar PV capacity, mostly microgeneration schemes of less than 50kW, combined with longer average sun hours

boosted generation by 24 per cent compared to 2020 Q4. Hydro generation fell by 16 per cent, mirroring a 15 per cent decrease in average rainfall¹.

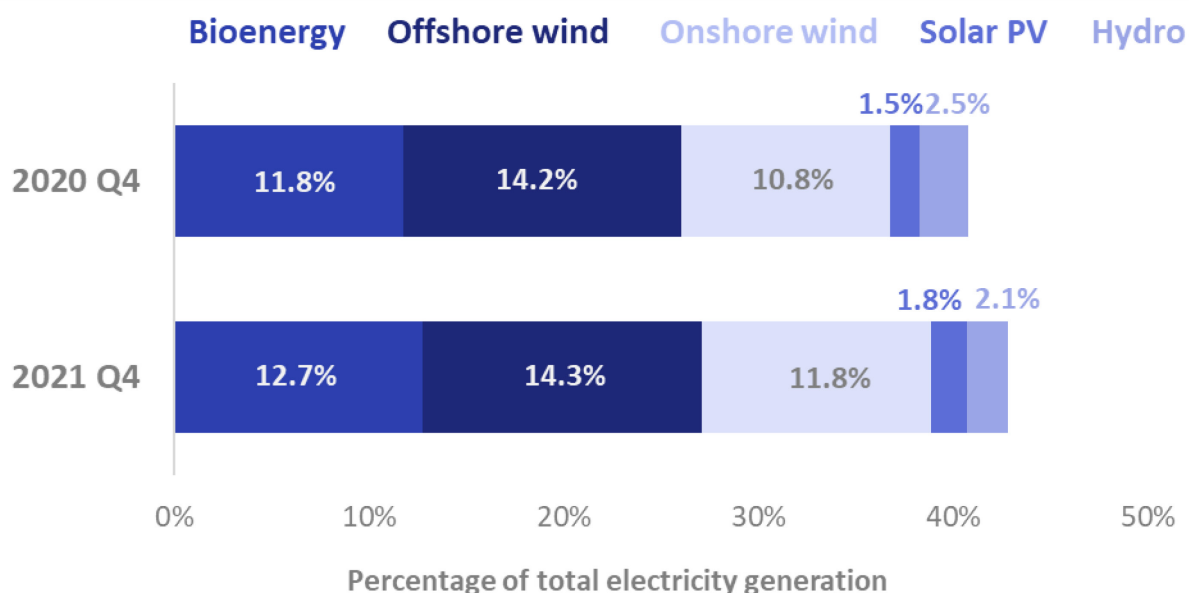
Chart 6.2 Added capacity 2019 to 2021 for the leading technologies



In 2021, 1.6 GW of new renewable capacity was installed compared to just 1.0 GW in 2020. Although some projects were likely delayed during 2020 due to Covid-19 restrictions, new capacity had already begun slowing from 2019 and the growth rate in the most recent quarter is the highest since the third quarter of 2020.

Of the 5.3 GW new capacity added between the start of 2019 and the end of 2021, 3.1 GW (58 per cent) was in offshore wind and 1.0 GW (20 per cent) in onshore. Solar PV has also increased capacity during this period with 0.7 GW installed. The remaining technologies have not seen significant increases in capacity.

Chart 6.3 Renewables' share of electricity generation – Q4 2020 and Q4 2021



In 2021 Q4, renewable's share of generation was 42.8 per cent, 2.1 percentage points higher than in Q4 2020, this is due to a combination of increased renewable generation and lower total electricity generation. Offshore wind's share of generation increased marginally from 14.2 per cent in 2020 Q4 to 14.3 per cent in 2021 Q4 whilst hydro's share fell from 2.5 per cent to 2.1 per cent. The share of generation from bioenergy increased to 12.7 per cent from 11.8 per cent.

¹ See data tables and special articles page for links to weather data.

In 2021, electricity generated from renewable sources was 121.9 TWh, 9.5 per cent lower than in 2020 reflecting less favourable weather conditions, particularly for wind generation. In 2020, Q1 saw two major storms (Ciara and Dennis) resulting in record wind generation which drove the high generation for that year. Consequently, wind generation fell by 11 TWh (14 per cent), the largest fall in absolute terms for renewable technologies, which in turn pushed down wind's share of renewable generation in by 3.1 percentage points to 53 per cent (29 per cent for offshore and 24 per cent onshore). Offshore wind generation now outstrips that of onshore wind despite lower total capacity (11.3 GW for offshore wind and 14.5 GW for onshore) due to the higher load factors offered by stronger, off-coast winds. Furthermore, offshore wind plants tend to be newer and larger than most onshore wind plants, and as a result they are often more efficient.

Hydro also suffered from less favourable rainfall in 2021 with generation falling by 26 per cent when compared to 2020, the highest fall in percentage terms by technology. With capacity stable and no notable outages, the key driver was the lower average rainfall in 2021.

Despite an increase in capacity, Solar PV generation decreased by 5.9 per cent in 2021, mostly because of lower average daily sun hours.

Generation from Anaerobic Digestion (AD) saw a 14 per cent increase on the previous year though generation in 2020 had been affected by plant outages which explains the artificially high annual increase in 2021. There were also increases in municipal solid waste and plant biomass in 2021, offset to an extent by lower landfill and sewage gas resulting in an overall increase in bioenergy of just 1.8 per cent. Despite this modest increase in generation, bioenergy's share of renewable generation increased by 3.6 percentage points to 33 per cent, reflecting the lower share of generation from the weather dependent technologies.

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:

Review of solar PV capacity publications

Long-term mean temperatures 1991-2020

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:

<http://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>

Tables showing foreign trade flows of energy:

<https://www.gov.uk/government/statistics/dukes-foreign-trade-statistics>

Weather tables produced by BEIS using Met Office data:

<https://www.gov.uk/government/collections/weather-statistics>

Information on Energy Prices:

<http://www.gov.uk/government/collections/quarterly-energy-prices>

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

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e-mail: kevin.harris@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](#).

Related publications

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

National statistics

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

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

Pre-release

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

User engagement

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



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Review of solar PV capacity publications

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Introduction

This paper sets out the current methodology for producing solar photovoltaic (PV) deployment statistics. It highlights suspected data gaps in the current approach, (e.g. some unsubsidised commercial scale installations between 50 kW and 1 MW capacity). It also discusses our plans to make the statistics more accurate and complete as new data sources become available.

BEIS statisticians are conducting this work in conjunction with Sheffield Solar (a research group at The University of Sheffield who currently provide capacity and generation estimates to National Grid ESO) and Solar Energy UK, the main trade association for the solar industry in the UK. These discussions are ongoing.

We are seeking further feedback from industry and users of the data. To comment on any of the issues discussed in this article please email: renewablesstatistics@beis.gov.uk

Background

The use of solar PV to generate electricity in the UK has grown rapidly since 2010, increasing capacity from 95 MW to 13,800 MW at the end of 2021. There are now over one million solar PV installations in the UK. In 2021¹ solar PV contributed more than 10 per cent of renewable generation and more than 4 per cent of total electricity generation in the UK.

BEIS solar PV capacity and generation statistics are compiled from a range of sources as no single dataset currently covers all installations. These sources include administrative datasets used to monitor subsidy schemes, surveys, and commissioned research such as:

Ofgem's Renewables Obligation (RO)² dataset and **Central FiTs Register (CFR)** which records sites registered with the Feed in Tariff (FiTs)³ scheme. Ofgem grants access to BEIS statisticians under data sharing agreements. However, as the RO closed to new applicants in March 2017 and FiTs closed to new applicants in March 2019, so these are largely historic datasets.

BEIS' **Major Power Producers (MPP)** survey is a monthly survey covering electricity generated by UK major power producers. These are defined as companies with a generation portfolio over 100 MW or 50 MW for wind and solar PV.

The **Microgeneration Certification Scheme (MCS)** covers installations that are 50 kW or less. Solar PV installers are encouraged to register with the MCS to assure customers of equipment and performance standards⁴. Registering with the MCS was a mandatory prerequisite for FiTs; owners couldn't receive financial support without doing so. MCS registration is also a prerequisite for Smart Export Guarantee (SEG), the government's current financial incentive for embedded generation⁵. However, registering with the MCS is not compulsory and our statistics may omit some unregistered small-scale installations.

¹ Provisional data for 2021 is published in ET 6.1 [here \(opens in new window\)](#)

² Information on the RO can be found on the Ofgem website [here \(opens in new window\)](#)

³ Information on the closure of FiTs can be found on the Ofgem website [here \(opens in new window\)](#)

⁴ From MCS website [here \(opens in new window\)](#)

⁵ For more details of SEG see [here \(opens in new window\)](#)

These data are supplemented with data from other sources, discussed in more detail in the Methodology section. Even with this wide range of data we are not guaranteed to have full coverage. For instance, a suspected partial data gap is with installations smaller than 5 MW since the closure of FiTs in March 2019. This particularly affects sites with capacity between 50 kW and 1 MW. Larger sites are more likely to be covered in our other data sources (discussed further in the methodology section) whilst many installations with capacity below 50kW are recorded in the MCS data.

Conversely, there are reasons why the statistics may overstate the total capacity. Information on whether installations have been decommissioned or when they are offline is not available in all of our data sources. We will continue to monitor this issue.

Methodology

We currently have two methodologies for calculating solar PV capacity. These are used in different BEIS Energy Statistics publications to meet differing timeliness and coverage needs:

	Publication	Frequency and Timeliness	Purpose
i)	Solar Deployment tables	Monthly One month in arrears	Developed in 2010 when the Feed-in-Tariff sparked rapid solar PV deployment, this publication was designed to give an early, up-to-date estimate of solar installations and capacity. Uses provisional administrative datasets where necessary.
ii)	Energy Trends	Quarterly Three months in arrears	National Statistics. Provides a quarterly update on UK energy including solar PV capacity and generation. Based on more comprehensive surveys and administrative datasets that are available in a longer timeframe.
iii)	Digest of UK Energy Statistics (DUKES)	Annual Six months in arrears	National Statistics. Presents annual UK energy statistics with consistent time series, including solar PV capacity and generation. Based on more comprehensive surveys and administrative datasets that are available in a longer timeframe.

The figures for Energy Trends and DUKES are based on the same method and are aligned, but there are some minor methodological differences between the monthly Solar Deployment tables and the Energy Trends and DUKES figures. The total capacity shown in the Solar Deployment tables and the National Statistics tables differ by less than 1 per cent.

The tables below outline the two different approaches we take for

- i) the monthly Solar Deployment tables and
- ii) Energy Trends.

In the following explanations, datasets are listed in order of decreasing priority for each method with duplicate installations removed at each stage. The tables show the solar PV installation capacity added from each source dataset.

i) **Solar Deployment tables – December 2021 figure as published in January 2022**

Source dataset	Capacity from each source (MW)	Capacity covered	Notes
Microgeneration Certification Scheme (MCS) <i>Of which:</i> <i>Unmatched at closure of FITs Installed since April 2019</i> <i>FITs (on Ofgem's Central FITs Register, CFR)</i>	4,053 313 430 3,311	<50 kW	The unmatched figure refers to old MCS registered installations that do not appear in the Central FITs Register (CFR). This relies on historic MCS data and may be slightly inaccurate. The MCS data here uses Declared Net Capacity (DNC) but the CFR uses Total Installed Capacity (TIC) (see below)
ROOFIT	1,684	50kW – 5MW	Schemes that are accredited with FITs but larger than the 50 kW MCS threshold
Transferred to FIT from RO	9	< 50 kW	Schemes that were on RO before FITs existed but moved over to FiTs in 2010
RO (Renewables Obligation)	6,988	>50kW	Taken from Ofgem's public report. Still being updated routinely but RO now closed to new entrants
CfD (Contracts for Difference)	23	>10 MW	Two operational sites from LCCC's online CfD register. Netley Landfill Solar is excluded as it does not have a start date in the CfD register
REPD (Renewable Energy Planning Database)	530	>150 kW	The REPD aims to capture all schemes greater than 150 kW. Until recently the threshold was 1 MW. This is based on planning application data and may not have complete coverage. There are known differences between the REPD and other data sets
Great Britain total	13,286	-	
Northern Ireland MCS	126	<50 kW	MCS since 2010 + RO under 50kW
Northern Ireland RO	200	Any	FiTs was not available in Northern Ireland but unlike the rest of the UK, RO was available to small scale schemes. Small installations are excluded to avoid double counting with above
Northern Ireland REPD	66	>150 kW	See REPD line above
Northern Ireland total	393	-	
Pre 2010 estimate	15	Any	To account for the small number of installations in place before any of the other data sources existed
UK total	13,693		

ii) **Energy Trends table 6.1 – provisional 2021 - published March 31st (also used for DUKES)**

Source	Capacity (MW)	Notes
MPP (Major Power Producer survey)	4,615	BEIS' major power producer survey, data is received directly from electricity generators and is given preference over other sources
ROCs	3,234	Does not include sites believed to already be in MPP
CFR (Central FiTs register)	4,551	5,108 MW total minus 557 MW for installations already in MPP
ROOFIT residual	27	Installations in ROOFIT data not appearing in CFR
Microgeneration Certification Scheme (MCS) residual	754	A combination of MCS installations that could not be matched with CFR and new installations since closure of FiTs. Excluding Northern Ireland capacity included in NI RO line below.
Pre 2010 estimate	15	As in solar deployment tables
Northern Ireland RO	115	sub-50 kW sites in NI from RO data, unlike the rest of UK, RO was available to microgeneration in NI but FiTs was not. A lot of these are also registered with the MCS so the MCS figure in this table is lower than in table i) to avoid double counting.
REPD (Renewable Energy Planning Database)	488	Given lower priority than in Solar Deployment tables method as some already captured in MPP. Includes CfD sites
UK total	13,799	

The main differences between the two methods are that:

- Energy Trends / DUKES uses data from BEIS' Major Power Producers (MPP) survey which is published monthly, two months in arrears, whereas the Solar Deployment tables do not.
- The Solar Deployment tables prioritise the MCS data as it is updated faster and then add the remaining installations from the CFR. Energy Trends / DUKES takes the CFR data and then adds on the remaining installations from the MCS. This is a subtle difference but results in a discrepancy. This is because declared net capacity (DNC) is used for the MCS installations rather than total installed capacity (TIC)⁶ and some installations are listed with different capacities in the two sources. The implied FiTs total (including ROOFIT) from the Solar Deployment tables is **4,998 MW**, while in Energy Trends this is **5,108 MW**.

The reason for this is that the MCS data didn't always include the total installed capacity (TIC) in earlier years so the more frequently completed declared net capacity (DNC) was used to keep the time series

⁶ Definitions of Declared Net Capacity and Installed Capacity are given on p9 of the renewables methodology note [here \(opens in new window\)](#)

consistent. More generally, the quality of MCS data is not as good for the early years of FiTs (2010 – 2014).

The total installed capacity is the total amount that the solar panels can generate in DC (direct current). The declared net capacity (DNC) measures capacity after the current has been inverted to AC (alternating current) so that the electricity can be consumed by the user or exported to the grid. BEIS solar PV capacity statistics are based on the total installed capacity (TIC) where possible, with DNC used where TIC is not recorded. TIC will generally be the same as or higher than DNC; however, recent research suggests that commercial solar farms may increasingly install extra capacity (TIC) in excess of the inverter capacity (DNC) to maximise generation at times when the panels are not operating at peak potential. This will widen the gap between TIC and DNC and increase the importance of recording both capacity metrics.

- Lastly, the data for Energy Trends and DUKES are reviewed by an external renewables statistics contractor, employed by BEIS to improve data quality. This can lead to more installations being identified (for instance in the REPD). Likewise, it can lead to capacity being removed if double counting between datasets is identified. The contractor does not review data for the monthly Solar Deployment tables due to time constraints.

Going forward, **we will align the two methods so that the Solar Deployment tables will match the BEIS Energy Trends and DUKES National Statistics publications.** This is now possible as the historic subsidy datasets (the Renewables Obligation database and the Central FiTs Register) have stabilised and we have made improvements to our internal data processing and matching procedures. The monthly solar deployment tables will still be provisional for the latest months and subject to revision.

Planned improvements

We are considering options for improving the coverage of solar PV statistics. These have included purchasing additional data from additional sources. However, no current data source is believed to measure total solar capacity perfectly. Furthermore, we will investigate the possibility of making a capacity register freely available to the public, using commercial data may raise barriers to that.

We plan to include data from the recently released Embedded Capacity Register (ECR). This is compiled by the Distribution Network Operators (DNOs) and currently includes a complete register of generators over 1MW capacity connected to the distribution network (as opposed to the transmission network). This is effectively all solar PV generators in the UK over 1 MW as there is currently no solar generation on the transmission network. The data should help identify installations not already included in the Major Power Producers (MPP) survey and other data sets. Links to the ECRs from the different distribution network operators are available via the Energy Networks Association here: <https://www.energynetworks.org/industry-hub/databases>

From April 2022 the ECR will cover systems with capacity greater than 50 kW. While the ECR is not yet at its planned capability, and it will take months for the ECR data collection processes to become mature it is expected that ECR's coverage will increase and we will incorporate it into our statistics when suitable. We plan to place the dataset second in the methodology priority behind the BEIS MPP survey. This work won't be complete in time for DUKES 2022, published in July this year, but we hope to include the data in DUKES and Energy Trends in 2023. At that point we will revise solar capacity and generation accordingly.

We will investigate the feasibility of publishing a regional solar PV capacity dataset, potentially at MSOA or LSOA level although this will depend on GDPR and the level at which data becomes disclosive.

We welcome further feedback from industry and users of the data. To comment on any of the issues discussed in this article please email: renewablesstatistics@beis.gov.uk



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Long-term mean temperatures 1991-2020

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Key headlines

BEIS are planning to change the 30-year long-term mean period used to calculate temperature data comparisons from 1981-2010 to 1991-2020 with effect from the publication of the June 2022 edition of Energy Trends on 30 June 2022.

Background

Long-term mean averages are normally updated at the end of each decade, with thirty years selected as a period long enough to eliminate any year-to-year variations.

At present average mean air temperatures are calculated from the maximum and minimum daily temperature as recorded at 17 meteorological stations, selected as representative of fuel consumption in Great Britain, 2 in Scotland, 2 in Wales and 13 in England, 4 of which are double weighted. Data on temperatures recorded are provided by the Met Office. Temperature comparisons with previous months and the long-term mean are then published every month in the Energy Trends table 7.1 at: <https://www.gov.uk/government/statistics/energy-trends-section-7-weather>

Temperature data are then used in the compilation of Energy Trends tables 1.2, inland energy consumption: primary fuel input basis, seasonally adjusted and temperature corrected series, and table 1.3c seasonally adjusted and temperature corrected final energy consumption data by fuel and sector, at: <https://www.gov.uk/government/statistics/total-energy-section-1-energy-trends>

Impact

A summary of the average monthly and annual temperatures and the differences between the two 30-year periods are shown in Table 1. All months show an increase in average temperature, whilst annually there has been an increase of 0.37 degrees Celsius. This is higher than the increase noted between 1971-2000 and 1981-2010 (0.23 degrees Celsius). The BEIS numbers differ to those published on the Met Office website, due to the different number of weather stations and weightings used.

Table 1: Comparison of long-term mean temperatures

	Degrees Celsius												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1981-2010	4.6	4.6	6.5	8.4	11.4	14.1	16.4	16.2	14.0	10.6	7.3	4.7	9.9
1991-2020	4.9	5.2	6.8	9.0	11.8	14.6	16.7	16.5	14.2	10.9	7.6	5.2	10.3
Difference	+0.3	+0.5	+0.3	+0.6	+0.4	+0.5	+0.2	+0.2	+0.3	+0.3	+0.3	+0.4	+0.4

Heating Degree Days

In BEIS's temperature and seasonal adjustment, the adjustments for temperature are based on heating degree days. These have also been re-estimated for the period 1991-2020. As we do not have detailed daily temperature data for each of the 17 stations for the full period, some estimation was required. A base temperature of 15.5 degrees Celsius is used when calculating the number of heating degree days in each calendar month; if the average daily temperature is below the base temperature, then that is considered a heating degree day.

The period 1991-2020 was warmer than the period 1981-2010 as previously mentioned. In the period 1981-2010, we estimated that on average there were 2,176 heating degree days. For the period 1991-2020 we estimate that there were on average 2,061 heating degree days, a fall of 5.3 per cent.

In general, the change in the base period is unlikely to have a significant effect on the messages being derived from the adjusted data, as the main inferences from the data are year on year changes as shown in Energy Trends table 1.2, where base data effects will cancel each other out. New regression factors will though be estimated, so some minor changes in growth rates published in June/July each year may occur.

Timing

BEIS plan to change Energy Trends tables 1.2, 1.3 and 7.1 on 30 June 2022 consistent with the new 30-year long-term mean period of 1991-2020. The annual DUKES weather tables 1.1.7 to 1.1.9, available at: <https://www.gov.uk/government/statistics/weather-digest-of-united-kingdom-energy-statistics-dukes>, will be similarly changed on publication of the 2022 edition of the Digest of United Kingdom Energy Statistics on 28 July 2022.



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