

GB Electricity Market Summary

Full Year 2021

Generation and Contribution by Fuel Type

Gas:	12.3GW (-13%)	Coal:	0.6GW (+14%)	Imports:	2.9GW (+36%)
Nuclear:	5.0GW (-8%)	Renewables:	12.0GW (-6%)	Renew' no Biomass:	8.8 (-9%)

% changes stated with respect to values in the previous year

Contents

1	Executive Summary	1
	Demand.....	2
	Generation.....	2
	Prices	3
2	Demand.....	4
3	Generation Mix Overview	6
	3.1 Gas-fired generation & Renewables.....	6
	3.2 Coal.....	7
	3.3 Nuclear	7
	Statistics	8
4	Renewables	9
	4.1 Wind.....	9
	4.2 Biomass	9
	4.3 Solar.....	10
	4.4 Hydro	10
	Statistics	11
5	Prices	12
	Statistics	14
6	Notes on the Report	15

1 Executive Summary

2021 was characterised by high commodity prices, which fed through into wholesale prices and then to consumers. A cold winter from December 2020 to February 2021 reduced gas reserves across Europe. These reserves were then further depleted over the summer months by extended periods of low wind generation requiring more gas and coal generation across Europe. The overall effect of these factors drove gas prices to extreme heights in Q3 and Q4. The cost of gas-fired generation rose, leading to increases in the price of power to record highs.

The key points from the year are:

- *Day-ahead and within-day system prices increased dramatically in 2021 in on-peak and off-peak settlement periods. Day-ahead and system prices saw record high averages, and system prices peaked at a record £4,037.80/MWh which was the highest imbalance price seen since the £5,003.33/MWh in June 2001, shortly after NETA Go-Live.*
- *The year saw increased demand from 2020 as COVID-19 lockdown restrictions were eased. Despite the 4% increase in demand from the low 238.2TWh in 2020 to 247.8TWh in 2021, this was still a 3% decrease from the 256.7TWh in 2019, which is the last previous 'normal' year and a so fairer comparison, so the overall trend of decreasing demand and/or increase in embedded generation in recent years continues.*
- *The main single generation type meeting this demand was the CCGT fleet, with gas-fired generation totalling 107.5TWh across the year. This was the same level as the combined renewable fleet (wind, solar, hydro and biomass). The gas fleet saw a 13% increase from its record low levels of generation in 2020 of 94.9TWh, under the demand reduced by lockdown, but the 2021 level was 6% lower than in 2019.*
- *The combined renewable total of 107.5TWh was lower than that in 2020, which had seen notably high levels of wind and solar generation, resulting in a record high 2020 total of 115.4TWh. 2021 saw a prolonged period of low wind and so low wind-powered generation in the summer, which led to a lower annual total, but this 107.5TWh total was still higher than the 103.7TWh in 2019, reflecting an increase in wind and solar installed capacity.*
- *2021 ended with Ofgem publishing an open letter noting its concerns regarding the extremely high balancing prices that had been submitted by some parties¹ in the Balancing Mechanism across Q4.*

¹ <https://www.ofgem.gov.uk/publications/open-letter-trends-balancing-costs-2021>

Demand

Lockdown restrictions as a result of the COVID-19 pandemic had reduced total demand in 2020 below normal levels to a total of 238.2TWh. In 2021, due to the easing of many of these restrictions, demand increased by 4% from the previous year to 247.8TWh. The seasonal pattern of the demand also looked more akin to the patterns seen before and during 2019, without the sharp dip around March that was seen in 2020 when the COVID-19 pandemic began.

However, demand was lower than 2019, the last complete year before the pandemic. In 2019 total demand was 256.7TWh, meaning demand decreased 3% from 2019 to 2021. Demand has been reducing, year-on-year, prior to the pandemic, partly from a combination of increased appliance efficiency and reduction in energy-intensive industry, so this decrease from 2019 levels holds with this trend.

Generation

Gas-fired CCGT generation was the greatest contributor to the system generation mix with a total output of 107.5TWh, surpassing the combined total of all renewable generation which was 105.5TWh. This output level equates to a 38% proportion of the generation mix for gas and 37% for renewables, (27% for renewables if the dispatchable biomass fleet is not included). **The overall proportions were 37% for gas, 22% for wind, 15% for nuclear, 10% for biomass, 9% for imports, 4% for solar and 2% for coal.**

The renewable output was reduced compared to 2020 which had a total level of 112.6TWh. This was primarily because of lower than usual windspeeds in Q1 to Q3, particularly in Q3, which kept wind powered generation low despite an underlying increase in capacity. Wind has been the largest component of renewable generation since 2007, so a reduction in wind generation has a notable impact on total renewable generation. Total wind output was 62.4TWh in 2021 against 68.3TWh in 2020. This decrease of 5.9TWh is the largest year on year decrease in wind generation in history for GB, with the only other decrease being a reduction of 1.7TWh from 2015 to 2016. Wind generation has historically seen an increase from one year to the next as generation capacity has increased over time. Despite this decrease, renewable levels were still higher than the 101.3TWh seen in 2019, indicating that the increase in wind generation capacity has to some degree offset the lack of wind.

Total nuclear output also decreased in 2021 from 47.2TWh in 2020² to 43.4TWh. This reduction is in part a consequence of Hunterston B7 going offline this in November, plus Sizewell B1 and B2 seeing extended outages from May to August for repairs and Hartlepool 1 seeing an extended outage from September into 2022. This decrease had the effect of further increasing dependency on fossil fuel generation.

Prices

The combined effect of increased demand, decreased renewable generation and increased gas-fired generation, meant that fuel and emissions allowance prices climbed to all-time highs in 2021. **In 2020 the average day-ahead price had been £35.26/MWh. In 2021 this rose by 235% to £118.29/MWh (averaged³ between both EPEX and Nordpool auctions).** Similarly, the previous all-time high day-ahead price before 2021 was £350.00/MWh but this was surpassed in 2021 by a new record high of £2500.01/MWh, an increase of 614%. System prices also increased significantly, with 2021 seeing a high of £4,037.80/MWh which was the highest imbalance price seen since the £5,003.33/MWh in June 2001, shortly after NETA Go-Live, surpassing the next highest for 2021 that had been set on the 8th of January 2021 at £4,000.00/MWh at 19:00 and 19:30.

² Nuclear output had been low in 2020 partly as a consequence of the contractual arrangements to take Sizewell offline during the May to September period to provide greater foot-room to support system security during the low demand experienced at that time.

³ Simple arithmetic average basis (not volume-weighted)

2 Demand

2021 saw the end of many of the COVID-19 lockdown restrictions introduced in 2020. As a result, demand (at the transmission system level) increased from 238.2TWh in 2020 to 247.8TWh in 2021, an increase of 4%.

The average demand per half hour settlement period was 28.3GW. This is the first time that demand has increased from one year to the next since 2010. However, as 2020 saw periods of lockdown, it is not the best comparison for demand and 2019 is fairer, being the most recent 'normal' demand year.

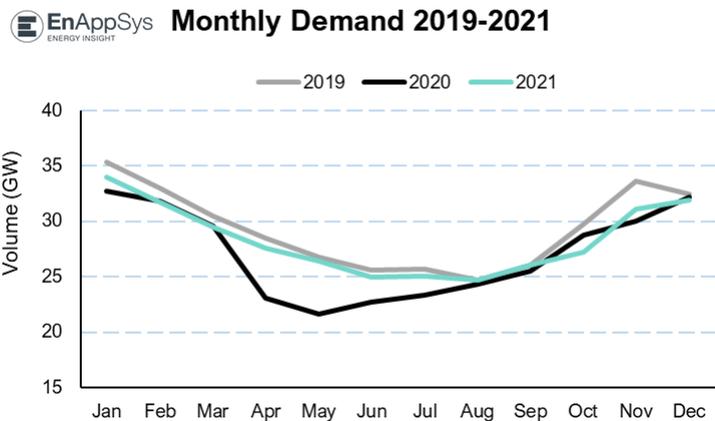


Figure 1: Monthly Demand 2019-2021

Total transmission level demand

in 2021 was still lower than the 256.7TWh seen in 2019. Transmission system demand includes the impact of embedded generation (which offsets some demand at the embedded level thereby reducing offtake required from the transmission network). We have visibility of generation by the embedded renewable fleets, but none of the embedded gas- and diesel-fired fleets, so some apparent demand reduction is likely to be from an increase in embedded assets and their activity over time, combined with appliance efficiency gains. In our data tables, we report both transmission system demand and estimated full demand. This estimated full demand has renewable embedded generation subtracted, but the gas- and diesel-fired embedded generation will still impact this value.

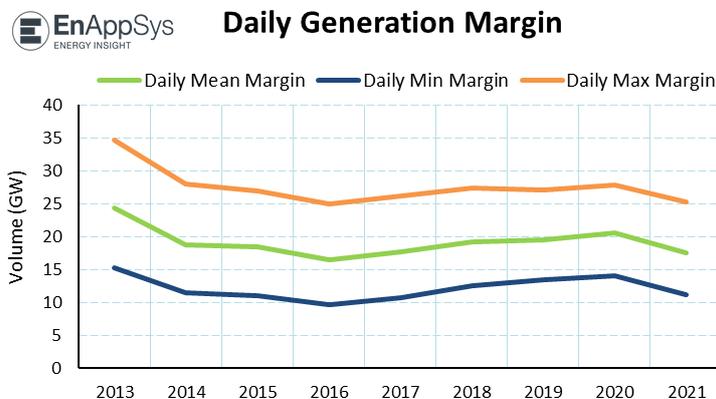


Figure 2: Daily Generation Margin

Although there were still many restrictions in place throughout 2021, the effects of these restrictions were not felt as keenly on the demand shape as they were in 2020. Figure 1 (right) shows how the demand shape of 2021 is more in line with 2019 than 2020, as it does not exhibit the large decrease in demand

around March, the time of the first lockdown in 2020.

The mean daily margin of available generation capacity in excess of demand decreased from 20.6GW to 17.5GW, a decrease of 15%. The last time that the mean daily generation margin decreased compared to the previous year was in 2016 when it decreased by 10% from 2015. The winter of 2016/17 saw several coal and CCGT units held in the Supplemental Balancing Reserve, designed to keep them outside wholesale and balancing markets but available in case they were needed for reserve power.

3 Generation Mix Overview

Overall, the pattern of the fuel generation in 2021 was that fossil fuel generation increased over the previous year for the first time since 2010 and this came about for a number of reasons. **Demand increased from 2020 levels as a result of many lockdown restrictions coming to an end and a declining presence of the nuclear fleet as well as extended periods of low wind generation ensured that more fossil fuel generation was required in order to meet this increased demand.**

3.1 Gas-fired generation & Renewables

In 2020, the total output of renewable generation (including biomass) had increased above that of the gas-fired fleet, with 112.6TWh of renewable generation and only 94.9TWh of gas generation. In 2021, however, despite the increasing wind capacity, total renewable output decreased beneath total gas-fired output, with 105.5TWh of renewable generation (-6% vs 2020) against 107.5TWh of gas-fired generation (+13% vs 2020). The renewable output excluding biomass fleet was 76.9TWh of generation in 2021 against 84.7TWh in 2020, a reduction of 9%.

The GB system saw prolonged periods of low wind in 2021 which contributed to these reduced renewable figures. Previously, the largest decrease in renewable output from one year to the next was in 2010 when a reduction of 0.3TWh was observed compared to 2009. 2021 saw a reduction of 7.1TWh compared to 2020, emphasising the effect of extended periods of low wind generation on renewable

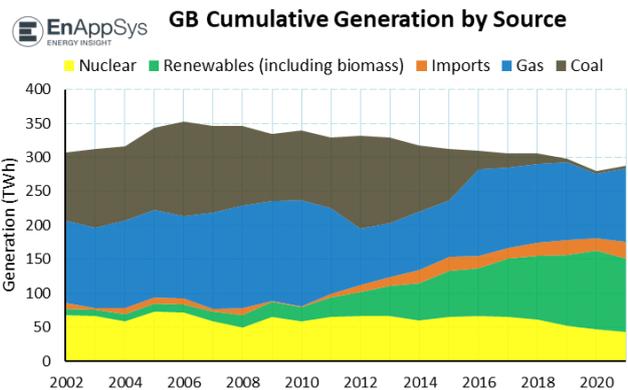


Figure 4: GB cumulative generation by source

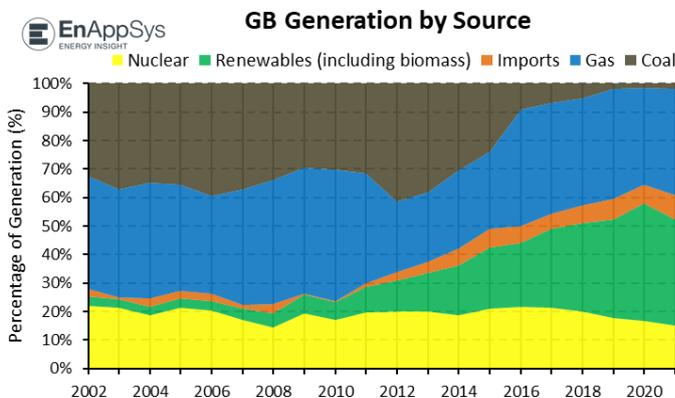


Figure 3: GB generation by source

output. In 2021, renewables made up 37% of the generation mix and 27% if the dispatchable biomass fleet is not included. These values are both decreases from their respective values in 2020 of 41% and 31%. Gas, meanwhile, made up 37% of the generation mix, an increase on 34% in 2020. Consequently, the gas fleet again became the biggest contributor to the generation mix after being the second largest in 2020, beneath

the renewable fleet. In terms of single largest generation types (i.e. not aggregated into renewables or fossil fuel), gas has been the greatest contributor every year since 2015 when a number of coal-fired plants exited the market following the expiry of the Large Combustion Plant Directive grace period.

3.2 Coal

The coal fleet saw an increase in generation, going from 4.4TWh in 2020 to 5.0TWh in 2021, an increase of 14%. Given the small proportion of coal-fired plant in the overall generation mix, this represented a change from 1.6% to 1.7% of the overall generation mix from 2020 to 2021.

Most of coal-fired operation was on a two-shifting basis but, as both demand and the merit of coal generation increased during Q4, some plants saw an increase in extended runs over more than one day.

3.3 Nuclear

2021 saw the closure of the Hunterston B7 nuclear unit, plus extended outages at Hartlepool 1 and Sizewell B1 and B2. These events contributed to a declining presence of the nuclear fleet in the generation mix. In 2020 the nuclear fleet had a total output of 47.3TWh which represented 17% of the generation mix. In 2021, those values fell to 43.4TWh (-8%) and 15% of the generation mix. The output of the nuclear fleet has been decreasing each year since 2016 by an average of 8%, so 2021 falls in line with historical precedent.

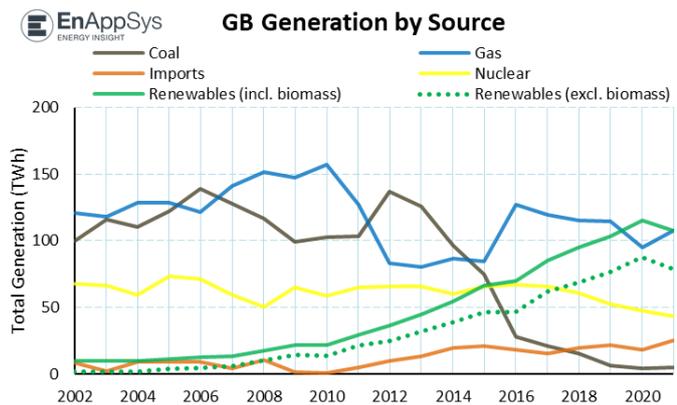


Figure 5: GB generation by source

Statistics

The following tables contain sets out key statistics relating to generation in the year:

*GB Only (Excludes Northern Ireland)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
TOTAL GENERATION BY FUEL (TWh)										
Coal	137.22	125.74	96.63	74.45	27.99	20.61	15.38	5.93	4.37	4.97
Gas	83.09	80.23	86.70	84.35	127.26	119.27	115.30	114.39	94.86	107.45
Imports	9.91	13.02	19.48	20.75	17.86	15.67	19.26	21.69	18.30	24.96
Nuclear	65.99	65.93	59.72	65.68	66.75	65.54	60.61	52.71	47.25	43.40
Renewables (including biomass)	36.18	44.51	54.43	66.63	70.12	84.97	94.68	103.72	115.37	107.45
TOTAL	332.39	329.43	316.97	311.86	309.97	306.07	305.22	298.45	280.15	288.23
*GB Only (Excludes Northern Ireland)										
AVERAGE GENERATION BY FUEL (GW)										
Coal	15.62	14.35	11.03	8.50	3.19	2.35	1.76	0.68	0.50	0.57
Gas	9.46	9.16	9.90	9.63	14.49	13.61	13.16	13.06	10.83	12.27
Imports	1.13	1.49	2.22	2.37	2.03	1.79	2.20	2.48	2.09	2.85
Nuclear	7.51	7.53	6.82	7.50	7.60	7.48	6.92	6.02	5.39	4.95
Renewables (including biomass)	4.12	5.08	6.21	7.61	7.98	9.70	10.81	11.84	13.17	12.27
TOTAL	37.84	37.61	36.18	35.60	35.29	34.94	34.84	34.07	31.98	32.90
SHARE OF GENERATION (%)										
Coal	41.3%	38.2%	30.5%	23.9%	9.0%	6.7%	5.0%	2.0%	1.6%	1.7%
Gas	25.0%	24.4%	27.4%	27.0%	41.1%	39.0%	37.8%	38.3%	33.9%	37.3%
Imports	3.0%	4.0%	6.1%	6.7%	5.8%	5.1%	6.3%	7.3%	6.5%	8.7%
Nuclear	19.9%	20.0%	18.8%	21.1%	21.5%	21.4%	19.9%	17.7%	16.9%	15.1%
Renewables (including biomass)	10.9%	13.5%	17.2%	21.4%	22.6%	27.8%	31.0%	34.8%	41.2%	37.3%
PERCENTAGE DIFFERENCE OF PREVIOUS YEARS VERSUS 2021 LEVELS										
Coal	-96%	-96%	-95%	-93%	-82%	-76%	-68%	-16%	14%	
Gas	29%	34%	24%	27%	-16%	-10%	-7%	-6%	13%	
Imports	152%	92%	28%	20%	40%	59%	30%	15%	36%	
Nuclear	-34%	-34%	-27%	-34%	-35%	-34%	-28%	-18%	-8%	
Renewables (including biomass)	197%	141%	97%	61%	53%	26%	13%	4%	-7%	
Fossil Fuels		205.97	183.34	158.80	155.25	139.88	130.68	120.33	99.23	112.42
Fossil Fuel Share		62.5%	57.8%	50.9%	50.1%	45.7%	42.8%	40.3%	35.4%	39.0%
Renewable Share		13.5%	17.2%	21.4%	22.6%	27.8%	31.0%	34.8%	41.2%	37.3%

4 Renewables

4.1 Wind

Total renewable output level in 2021 was 105.5TWh (including embedded estimates)⁴, a notable reduction from the 112.6TWh seen in 2020. Despite reduced wind levels across the middle of the year, wind farms continued to be the biggest source of renewable generation in the GB system. Total wind output in 2021 was 62.4TWh and although this is a 9% reduction in output from 2020 which saw 68.3TWh from the wind fleet, it still comprised 59% of the overall renewable generation (81% if the dispatchable biomass fleet is not included), more than any other single technology.

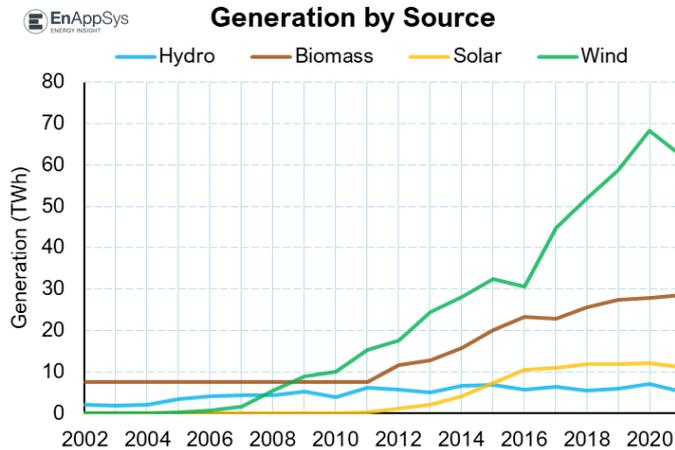


Figure 6: Generation by renewable source

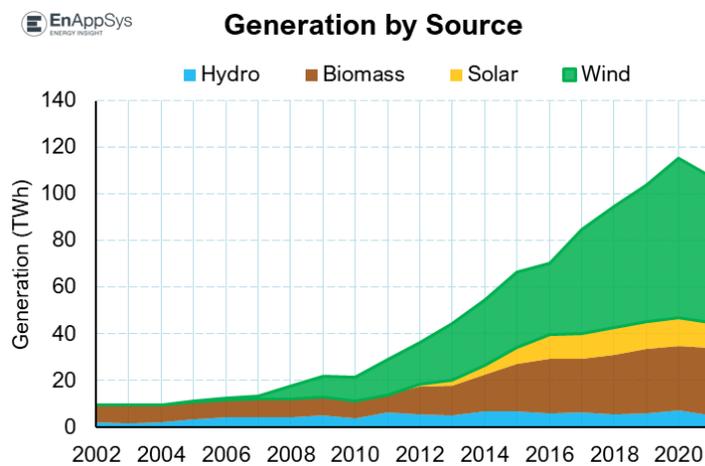


Figure 7: Generation by renewable source (stacked)

Although wind output in 2021 was lower compared to that of 2020, it is still an increase of 6% compared the 58.6TWh seen in 2019, indicating that the overall trend of increasing wind generation in the GB system is continuing as wind farms continue to be built.

4.2 Biomass

For the 12th consecutive year, the biomass fleet was the second biggest component of renewable generation after wind, comprising 27% of the renewable generation

⁴ Biomass and hydro values for the Q4 2021 contain estimates based on Q4 2020 as this data is published at a lag of ~3 months by BEIS at [https://www.gov.uk/government/statistics/energy-trends-section-6-renewables/Renewables_obligation_certificates_and_generation_\(monthly_-_Excel\)](https://www.gov.uk/government/statistics/energy-trends-section-6-renewables/Renewables_obligation_certificates_and_generation_(monthly_-_Excel))

mix. With a total output of 28.6TWh, it increased by 3% compared to the 27.9TWh seen last year. Although annual biomass generation has increased almost every year this decade, the overall increase is relatively small compared to wind. In 2015 the total biomass output was 20.1TWh, meaning that it has increased by 42% since then as a third Drax coal unit was recommissioned as biomass-fired in 2016 and the three Lynemouth units recommissioned as biomass-fired in 2018. Conversely, in the same period, wind generation increased from 32.4TWh to 62.4TWh, an increase of 93%.

4.3 Solar

The total solar output in 2021 was 11.2TWh, a reduction of 7% from the 12.0TWh seen in 2020. These outputs equate to average power levels of 1.3GW in 2021 and 1.4GW in 2020. This is the lowest total annual solar output since 2017 when the output was 10.9TWh. Despite this, the solar fleet comprised 11% of renewable generation in both 2020 and 2021 though in both cases this rises to 15% if the biomass fleet is counted separately as a dispatchable fleet.

Installed capacity for the solar fleet is available from BEIS⁵ on a quarterly basis up to Q3 2021. In this most recent data, it is 13.7GW, just a 2% increase from the 13.5GW at the end of 2020. Whilst a small increase, solar capacity has still increased, year-on-year, so this decline in output from the 2020 total indicates a reduction in solar irradiance in 2021.

4.4 Hydro

Hydro again represented the smallest proportion of the renewable generation mix with 5.2TWh giving a proportion of 5%, (7% if the dispatchable biomass fleet is not included). This was a decrease of 27% from 7.1TWh in 2020.

Overall, although renewable generation was reduced in 2021

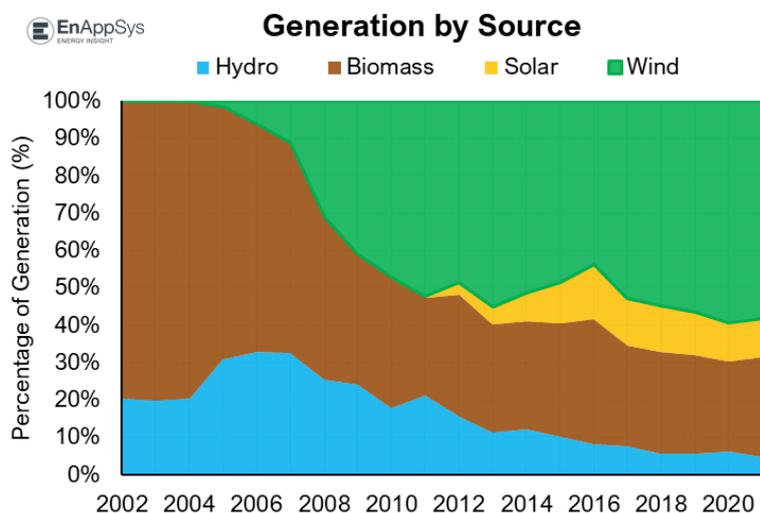


Figure 8: Generation by renewable source (percentage of total renewables)

⁵ <https://www.gov.uk/government/statistics/energy-trends-section-6-renewables>, Renewable electricity capacity and generation (ET 6.1 - quarterly)

compared to 2020, it was higher than 2019 levels. This indicates that the increased renewable capacity has to some degree offset the extended periods of low wind output.

Statistics

The following tables sets out key statistics relating to renewable electricity output during the year. Biomass and hydro values Q4 2021 contain estimates based on Q4 2020 as this data is published at a lag of ~3 months by BEIS⁶:

*GB Only (Excludes Northern Ireland)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
TOTAL GENERATION BY FUEL (TWh)										
Biomass	11.72	12.84	15.85	20.11	23.39	22.91	25.61	27.37	27.90	28.59
Hydro	5.69	5.06	6.57	6.88	5.75	6.39	5.48	5.99	7.12	5.22
Solar	1.22	2.12	3.99	7.29	10.40	10.92	11.79	11.77	12.01	11.22
Wind	17.55	24.49	28.01	32.36	30.58	44.75	51.80	58.58	68.35	62.42
TOTAL RENEWABLES	36.18	44.51	54.43	66.63	70.12	84.97	94.68	103.72	115.37	107.45
TOTAL GENERATION BY FUEL (GW)										
Biomass	1.33	1.47	1.81	2.30	2.66	2.62	2.92	3.12	3.18	3.26
Hydro	0.65	0.58	0.75	0.79	0.65	0.73	0.63	0.68	0.81	0.60
Solar	0.14	0.24	0.46	0.83	1.18	1.25	1.35	1.34	1.37	1.28
Wind	2.00	2.80	3.20	3.69	3.48	5.11	5.91	6.69	7.80	7.13
TOTAL RENEWABLES	4.12	5.08	6.21	7.61	7.98	9.70	10.81	11.84	13.17	12.27
SHARE OF RENEWABLE GENERATION (%)										
Biomass	32.4%	28.9%	29.1%	30.2%	33.4%	27.0%	27.0%	26.4%	24.2%	26.6%
Hydro	15.7%	11.4%	12.1%	10.3%	8.2%	7.5%	5.8%	5.8%	6.2%	4.9%
Solar	3.4%	4.8%	7.3%	10.9%	14.8%	12.8%	12.5%	11.4%	10.4%	10.4%
Wind	48.5%	55.0%	51.5%	48.6%	43.6%	52.7%	54.7%	56.5%	59.2%	58.1%
LARGEST RENEWABLE SOURCE	WIND	WIND	WIND							
PERCENTAGE DIFFERENCE OF PREVIOUS YEARS VERSUS 2021 LEVELS										
Biomass	143.8%	122.6%	80.3%	42.2%	22.2%	24.8%	11.6%	4.5%	2.5%	0.0%
Hydro	-8.3%	3.2%	-20.5%	-24.1%	-9.2%	-18.3%	-4.8%	-12.9%	-26.7%	0.0%
Solar	822.3%	429.5%	181.0%	53.9%	7.9%	2.8%	-4.8%	-4.7%	-6.6%	0.0%
Wind	255.6%	154.9%	122.9%	92.9%	104.1%	39.5%	20.5%	6.6%	-8.7%	0.0%
Total	2.19	1.59	1.12	0.73	0.65	0.36	0.22	0.11	0.00	0.07
DIFFERENCE RELATIVE TO PREVIOUS YEAR										
Biomass		9.8%	23.5%	26.8%	16.0%	-1.8%	11.8%	6.9%	1.9%	2.5%
Hydro		-10.9%	29.9%	4.7%	-16.6%	11.5%	-14.2%	9.4%	18.7%	-26.7%
Solar		74.6%	88.4%	82.5%	42.3%	5.3%	8.0%	-0.2%	2.0%	-6.6%
Wind		39.9%	14.4%	15.5%	-5.8%	46.8%	15.7%	13.1%	16.7%	-8.7%
Total		23.4%	22.3%	22.4%	4.9%	21.5%	11.4%	9.5%	11.2%	-6.9%

⁶ [https://www.gov.uk/government/statistics/energy-trends-section-6-renewables/Renewables-obligation:certificatesandgeneration\(monthly-Excel\)](https://www.gov.uk/government/statistics/energy-trends-section-6-renewables/Renewables-obligation:certificatesandgeneration(monthly-Excel))

5 Prices

The last quarter of 2021 saw the most noteworthy events of the year as prices increased significantly above normal rates. Driven by a cold winter from December 2020 to February 2021, as well as lower wind generation from 2020 to 2021, underlying prices of gas, coal and emissions allowances rose dramatically in 2021 (a year-on-year reduction in wind generation has not been seen since 2016). This gave rise to all-time high day-ahead, within-day and system prices.

Although commodity prices in general were subject to sharp increases in 2021, gas prices in particular rose significantly, peaking at £155.29/MWh on 22nd December. Before 2021, the peak gas price was £71.65/MWh and the average was £14.24/MWh. Coal, on the other hand, increased from a pre-2021 average of £7.13/MWh to a peak of £29.30/MWh. Because gas increased by a much greater proportion, there were extended periods in 2021, particularly in Q4, when the breakeven ranges for coal and gas units completely diverged and did not overlap at all. This meant that the breakeven cost for the least efficient coal units (30% efficient) became cheaper than the breakeven costs for the most efficient gas units (55% efficient CCGT).

The average day-ahead price (arithmetic mean of⁷ both EPEX and Nordpool auctions) increased from £35.26/MWh in 2020 to £118.29/MWh (+235%) in 2021 and in Q4 the average EPEX and Nordpool day-ahead prices were £205.27/MWh and £203.17/MWh, respectively. Between 2014 and December 31st 2020, day-ahead prices in GB had been market coupled with those in the EU, however, following Brexit, the GB prices were decoupled. This meant that from January 1st 2021, GB prices were more directly influenced by the GB market, including the GB Carbon Price Support which increases the cost of carbon-producing plant in GB compared to the EU and also reflected the explicit

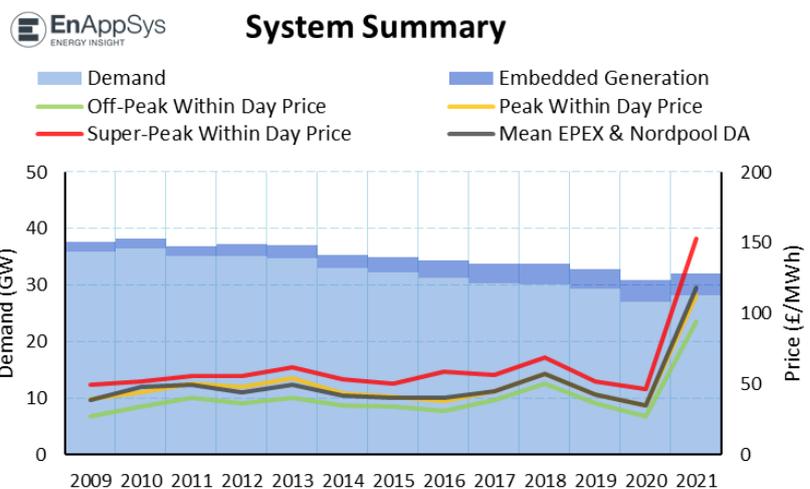


Figure 9: System Summary (GB)

⁷ Simple arithmetic average basis (not volume-weighted)

value of interconnector capacity. Since the North Sea Link commenced operation on the 1st October 2021, GB has been coupled with the Norwegian market zone NO2 in Nordpool exchange trading.

The highest day-ahead price seen in either auction in 2021 was £2,500.01/MWh which was in the Nordpool auction on 15th September. The highest day-ahead price seen before 2021 had been £350.00/MWh which was seen on 6th December 2020. The 2021 peak was therefore a 614% increase on the previous all-time high. There were 272 half-hourly settlement periods in 2021 in which both the EPEX and Nordpool auctions exceeded the previous all-time high day-ahead price, indicating that prices were not only high, but they were consistently so.

Within-day prices and system prices in 2021 were also notably higher than any previous year on record, with system prices averaging £113.74/MWh and peaking at £4,037.80/MWh, whilst market index data price (MIDP) averaged £112.47/MWh and peaked at £1,983.66/MWh. The previous single system price average for 2016-2020 was £43.60/MWh meaning that the average has increased by 221%. The peak of £4,037.80/MWh on the 9th of September was the highest imbalance price seen since the £5,003.33/MWh in June 2001, shortly after NETA Go-Live.

The lowest system price seen in 2021 was -£70.97/MWh which was seen on the 12th December and the average negative system price was -£32.00/MWh. Generally, these periods of negative system prices occurred in periods of high wind generation and low demand. The average demand in settlement periods with negative system prices was 21.3GW and the average wind generation in these same periods was 13.8GW.

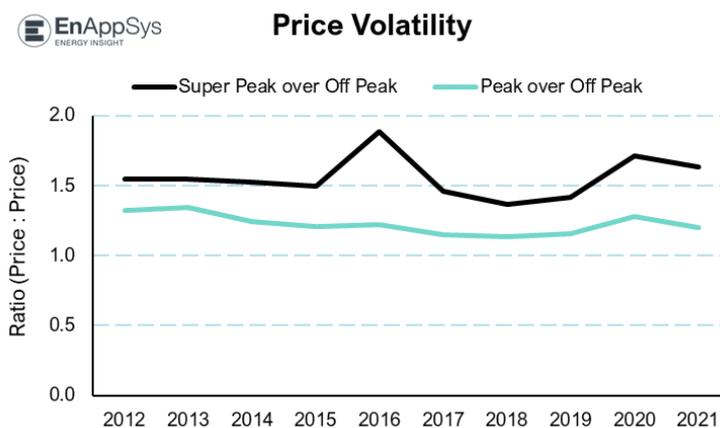


Figure 10: History of peak (green) and super peak (black) prices to off-peak prices

A measure of price volatility within the British power market is the ratio between the within-day price during the super-peak periods (4-7pm) against the overnight price (off-peak price). These ratios can be seen in Figure 10 (left).

From 2012-2020, the average ratio of super-peak prices to off-peak prices was 1.55, and for 2021 it was 1.63. Though this is a decrease from last year's ratio of

1.71, it is above the average for the last decade. The decrease in volatility compared to 2020 is a result of off-peak prices also increasing significantly and by a proportionately greater level than the

increase in peak prices which brought the ratio down. The average off-peak within-day price from 2014-2020 was £36.18/MWh but in 2021 it rose to £93.98, thereby bringing down the ratio of super off-peak to off-peak prices.

Statistics

The following tables set out some key statistics relating to prices and demand during the reporting year. The wholesale and within-day prices shown are averages across the year, whilst the system prices are minimum, average and maximum values. MW demand values are averages, whilst TWh demand values are totals across the year:

*GB Only (Excludes Northern Ireland)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
WHOLESALE PRICES (£/MWh)										
Arithmetic Average Nordpool and EPEX Day Ahead Price	44.54	49.69	42.02	40.43	40.38	45.32	57.44	42.85	35.26	118.29
Average Within Day Price (MIDP)	45.21	50.58	42.10	39.92	38.99	44.70	56.75	41.78	33.84	112.47
WITHIN DAY PRICE BREAKDOWN (£/MWh)										
Average in Off-Peak Hours	36.23	40.21	34.99	33.83	31.29	38.99	50.50	36.55	27.11	93.98
Average in Peak Hours (excl Superpeak)	47.95	53.96	43.48	40.85	38.26	44.93	57.34	42.28	34.62	112.90
Average in Superpeak Hours	55.96	62.18	53.45	50.51	59.07	56.89	69.00	51.90	46.48	153.19
SINGLE SYSTEM PRICE BREAKDOWN (£/MWh)										
Average Single System Price					39.38	44.27	57.35	42.00	35.06	113.74
Maximum Single System Price					1528.72	1509.80	990.00	375.00	2242.31	4037.80
Minimum Single System Price					-153.89	-73.15	-150.00	-88.00	-70.49	-70.97
AVERAGE HH TRANSMISSION SYSTEM DEMAND (GW)										
AVERAGE HH FULL DEMAND ESTIMATE (GW)	35.22	34.86	33.12	32.17	31.32	30.31	30.18	29.31	27.12	28.29
AVERAGE HH AVAILABILITY (GW)	37.33	37.08	35.38	35.01	34.35	32.82	34.37	32.01	30.05	32.01
AVERAGE HH MARGIN (GW)				11.06	9.61	10.74	12.49	13.40	14.07	11.10
TOTAL TRANSMISSION SYSTEM DEMAND (TWh)										
TOTAL FULL DEMAND ESTIMATE (TWh)	309.4	305.3	290.1	281.8	275.1	265.5	264.4	256.7	238.2	247.8
TOTAL AVAILABILITY (TWh)	327.9	324.8	309.9	306.7	301.7	287.5	301.1	280.4	263.9	280.4
TOTAL MARGIN (TWh)				96.9	84.4	94.1	109.4	117.4	123.5	97.3
WHOLESALE PRICE RELATIVE TO 2021										
Day Ahead Price	166%	138%	181%	193%	193%	161%	106%	176%	235%	
Within Day Price (MIDP)	149%	122%	167%	182%	188%	152%	98%	169%	232%	
Single System Price					189%	157%	98%	171%	224%	
PERCENTAGE DIFFERENCE OF PREVIOUS YEARS VERSUS 2021 LEVELS										
Off-Peak Hours	-61%	-57%	-63%	-64%	-67%	-59%	-46%	-61%	-71%	
Peak Hours (excl Superpeak)	-58%	-52%	-61%	-64%	-66%	-60%	-49%	-63%	-69%	
Superpeak Hours	-63%	-59%	-65%	-67%	-61%	-63%	-55%	-66%	-70%	
DEMAND RELATIVE TO 2021										
	25%	23%	17%	14%	11%	7%	7%	4%	-4%	

8

⁸ Peak is 08:00 – 16:00 and 19:30 – 00:00; Super Peak is 16:00 – 19:30; Off-Peak is 00:00 – 08:00.

6 Notes on the Report

The figures used in the report refer to GB only, against BEIS figures that refer to GB and Northern Ireland. This selection has been made since Northern Ireland is separate from GB and is more closely linked to the electricity grid of the Republic of Ireland.

Generation levels by fuel from 2009 are based upon National Grid FUELHH data, which give the operationally metered totals by fuel, down to a 5-minute resolution.

Prior to 2009, individual plant data has been aggregated from our databased matching of National Grid fuel-type relationships.

To account for embedded wind and solar, the National Grid forecasts for these generators have been used as if they were output figures. Embedded hydro and biomass have been accounted for using analysis of Ofgem data on certificate awards. This embedded hydro and biomass data is published at a lag of approximately three months, so the reporting quarter will not have actual data for this section of these two fleets, instead values are estimated from the respective quarter the previous year.

Within this report, levels of offshore wind have not been separated from the wind total. This is because this can only be reliably done using metered volumes at a generating unit level. This is not a publicly available data stream and figures can only be estimated and not distributed. Final Physical Notifications (FPNs) at wind farms do not correlate well with metered volumes and so cannot be used reliably.

Price and demand data primarily come from Elexon (as does the FUELHH data), with the exception of the EPEX day-ahead prices.

Availability levels are calculated by totalling levels of recorded availability at all plants in the market.

Next to providing a pan-European energy data platform, flexible configurable screens and automated data feeds, EnAppSys offers consultancy services and incredibly detailed market insights for companies in the energy industry.

To find out more about EnAppSys contact us via info@enappsys.com or visit our website at www.enappsys.com



EnAppSys Ltd.

Blenheim House, 1 Falcon Court, Stockton On-Tees, TS18 3TS, U.K.
Company Registration No.:04685938

EnAppSys B.V.

Oostelijk Bolwerk 9, 1st Floor, 4531 GP, Terneuzen, The Netherlands
Company Registration No.: 67992358

