

GB Electricity Market Summary

Full Year 2020

Generation and Contribution by Fuel Type

Gas:	10.9GW (-17%)	Coal:	0.8GW (+18%)	Imports:	2.0GW (-16%)
Nuclear:	5.7GW (-6%)	Renewables:	13.7GW (+14%)	Renew' no Biomass:	10.4 (+18%)

% changes stated with respect to values in the previous quarter

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1 Executive Summary

2020 saw a record year for renewable generation. Coupled with the impact of demand reductions resulting from the Covid lockdowns, this high renewable output resulted in the saw lowest levels of conventional thermal generation (gas and coal) for many years. Nuclear production was also down, in part reflecting contractual arrangements to take Sizewell offline during the May to September period to provide greater footroom to support system security.

The combination of low demand and high renewable output saw occasional requirements for actions by National Grid to increase system inertia by bringing on conventional spinning generation on occasions, most notably during the May Bank Holiday weekends at the height of the first lockdowns.

Market prices fell materially in response to the low demand conditions.

Generation

The renewable sectors of wind solar, hydro and biomass collectively contributed 42% of GB generation compared with gas (35%), nuclear (17%) and coal (2%). This is the largest share seen so far for the renewable fleet, on an annual basis, up 19% from the 35% share in 2019. It equates to 12TWh more renewable energy than generated last year.

Renewable capacity continues to increase and a consistently windy Q1 saw renewable output collectively become the largest contributor to the generation mix, overtaking gas-fired generation for the first time.

Relatively high wind generation continued into Q2 which saw the highest quarterly solar output of all time during a period of extended sunny weather.

Gas-fired generation became the dominant source during Q3 but increased wind levels during Q4 saw renewables become the greatest contributor again.

2020 was also notable for an extended period without coal-fired generation. Coal generation has been decreasing gradually year by year, but Q2 saw a record-breaking 67 days and 16 hours without coal generation as part of the fuel mix, which began on 9th April. This is the longest GB has been without coal in the fuel mix since coal was first used to generate electricity continuously in London by Thomas Edison in 1882.

Demand

The Covid lockdowns had a profound effect on demand patterns through the year, particularly through Q2 which, at the height of the first lockdown period, saw reductions of 20% compared with historic norms. The demand shape also changed, with the morning peak flattening out and the evening peak becoming spread out over a longer period.

There was some recovery during Q3 as lockdown measures eased, but Q4 saw further lockdown measures during November, with consequential reductions in demand.

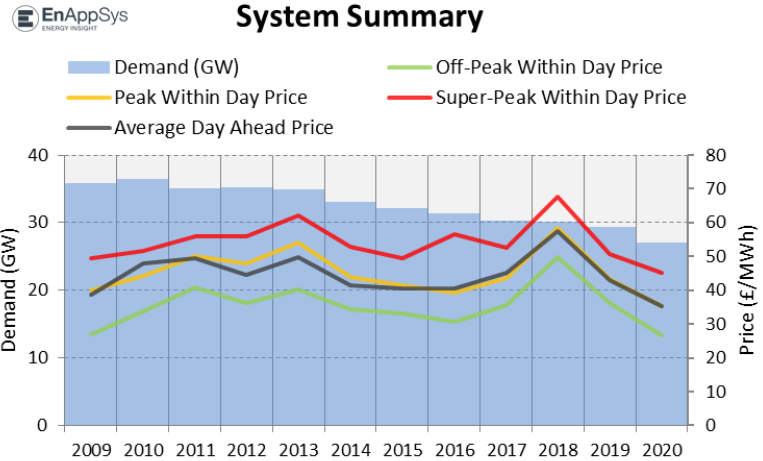
Prices

The combined effect of lower demand, high renewable output and low fuel prices resulted in a material reduction in market prices from the previous year with average day-ahead prices of £35/MWh representing an 18% drop for 2019.

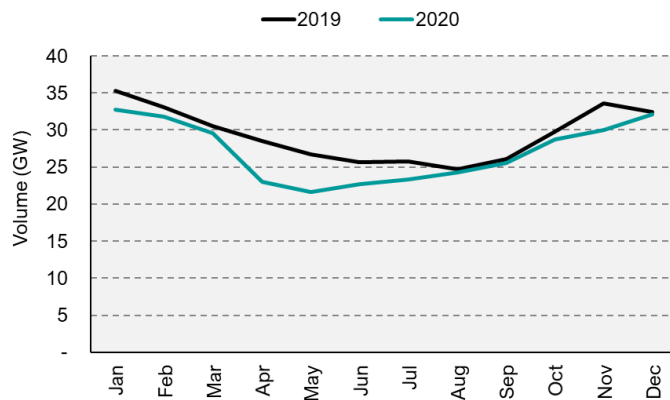
2020 was also notable for periods of negative prices with some very low prices occurring, notably £-70.49/MWh on 22/05/2020 at 05:30 and £-65.94/MWh on 28/06/2020 at 08:00, with prices remaining negative for hours at a time on a number of occasions during Q2. These occurred during periods of low demand, when large volumes of wind had to be bid down or off.

2 Demand and Prices

With 2020 seeing lockdown measures across several months, total demand was 7% lower than in 2019. This is the largest year-on-year decrease seen in any year since 2011. Total demand was 238.2TWh, which averages out at 27.1GW per half hour settlement period.



EnAppSys Monthly Demand 2020 v 2019

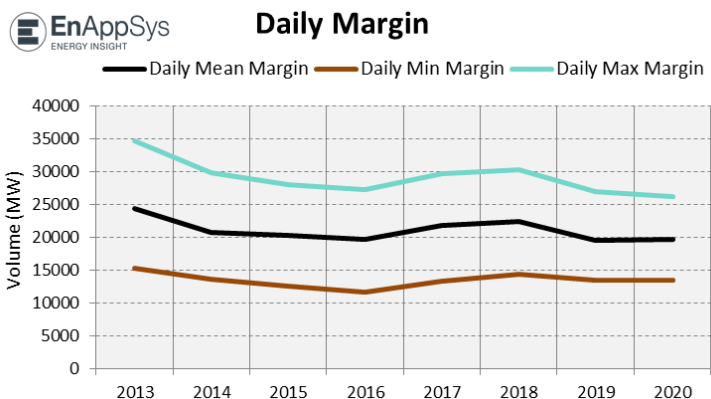


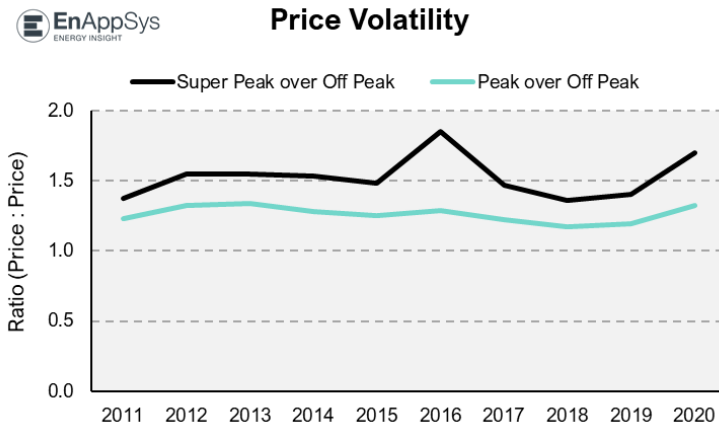
The seasonality of this demand difference is shown in the chart to the left, with the drops in demand relating to the national Covid-19 lockdowns clearly apparent.

Early in the year, before the lockdowns were in place, 2020 was already seeing slightly lower demand than in January and February 2019, with this mainly related to these

months being warmer in 2020 than 2019.

Although demand was down and renewable output up, average, minimum and maximum daily margin across 2020 was close to that in 2019, with the average being 19.6GW (versus 19.5GW) reflecting closure and unavailability of conventional plant. Four CCGT units operated by Calon energy left the market in 2020 (Baglan Bay, Severn Power 10 and 20, plus Sutton Bridge). The three Aberthaw B coal units went offline at the end of 2019 and the three Fiddlers Ferry units that had generated in 2019 went offline in March this year.





One of the key measures for price volatility within the British power market is the ratio between the price during the super-peak periods (4-7pm) against the overnight price (the super-peak price divided by the off-peak price). The historical super-peak:off-peak ratio across the years 2011 to 2019 is 1.51, with the

previous peak being 1.85 in 2016. 2020 saw this ratio increase back up to 1.70, indicating higher volatility in the market than in the three previous years. This implies higher prices around peak periods and more opportunities for electricity generators focused around generating on these peak periods.

Statistics

The following tables set out some key statistics relating to prices and demand during the quarter. The wholesale and within-day prices shown are averages across the quarter, 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)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
WHOLESALE PRICES (£/MWh)										
Average Day Ahead Price	49.61	44.54	49.69	41.55	40.51	40.47	45.27	57.44	42.86	35.27
Average Within Day Price (MIDP)	47.83	45.21	50.58	42.10	39.94	39.01	44.73	56.84	41.94	33.88
WITHIN DAY PRICE BREAKDOWN (£/MWh)										
Average in Off-Peak Hours	40.69	36.23	40.21	34.46	33.24	30.62	35.67	49.81	36.11	26.61
Average in Peak Hours (excl Superpeak)	50.17	47.95	53.96	44.03	41.58	39.43	43.64	58.42	43.18	35.30
Average in Superpeak Hours	56.00	55.96	62.18	52.74	49.40	56.58	52.44	67.73	50.58	45.17
AVERAGE HH DEMAND (GW)										
AVERAGE HH DEMAND (GW)	35.08	35.22	34.86	33.12	32.17	31.32	30.31	30.19	29.31	27.12
AVERAGE HH AVAILABILITY (GW)										
AVERAGE HH AVAILABILITY (GW)				53.85	53.17	50.87	51.22	53.77	55.65	53.55
AVERAGE HH MARGIN (GW)										
AVERAGE HH MARGIN (GW)				13.58	12.52	11.62	13.21	14.29	13.42	13.44
TOTAL DEMAND (TWh)										
TOTAL DEMAND (TWh)	307.3	309.4	305.3	290.1	281.8	275.1	265.5	264.4	256.7	238.2
TOTAL AVAILABILITY (TWh)										
TOTAL AVAILABILITY (TWh)				471.7	465.8	446.8	448.7	471.0	487.5	470.4
TOTAL MARGIN (TWh)										
TOTAL MARGIN (TWh)				119.0	109.7	102.1	115.7	125.2	117.5	118.0
WHOLESALE PRICE RELATIVE TO 2020										
Day Ahead Price	-29%	-21%	-29%	-15%	-13%	-13%	-22%	-39%	-18%	
Within Day Price (MIDP)	-29%	-25%	-33%	-20%	-15%	-13%	-24%	-40%	-19%	
DIFFERENCE RELATIVE TO 2020										
Off-Peak Hours	53%	36%	51%	30%	25%	15%	34%	87%	36%	
Peak Hours (excl Superpeak)	42%	36%	53%	25%	18%	12%	24%	66%	22%	
Superpeak Hours	24%	24%	38%	17%	9%	25%	16%	50%	12%	
DEMAND RELATIVE TO 2020										
DEMAND RELATIVE TO 2020	29%	30%	29%	22%	19%	16%	12%	11%	8%	

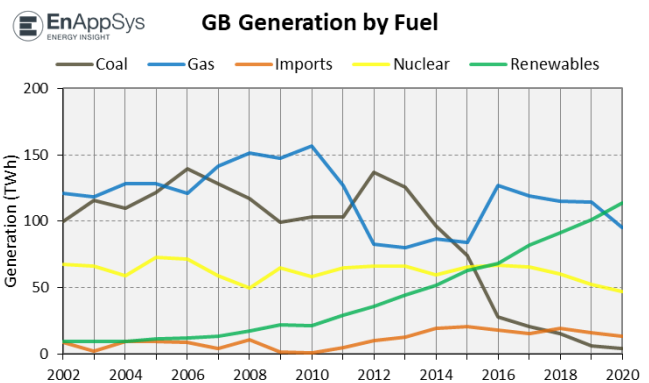
3 Fuel Activity Overview

2020 was notable as the first year in which the majority of generation in GB came from renewable (wind, solar, hydro and biomass) sources. Combined renewable generation totalled 113.5TWh across the year, a 42% contribution to the overall generation total of 273.9TWh. This equates to an average level of 13.0GW.

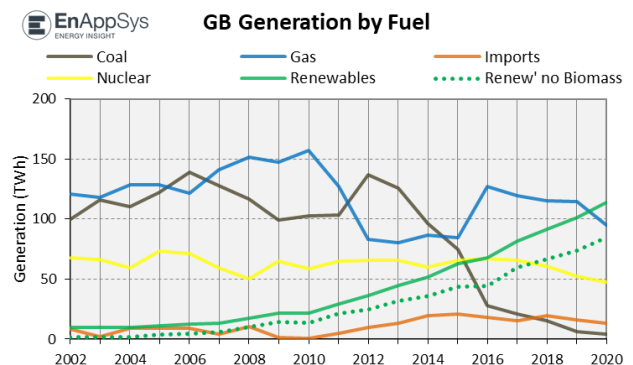
This renewables total was 12% higher than last year, mainly resulting from a 17% increase in the wind generation component, to total 69TWh. An increase in wind capacity, mainly from offshore wind deployment, has contributed to the fairly steady and continued increase in combined renewable generation over recent years.

A prolonged sunny period and record levels of output for Q2, resulted in total solar output of 12.0TWh for the year, up 2% from last year's total of 11.8TWh.

The large and increasing contribution of the wind component of the combined renewables fleet means that if biomass is not included, and renewables are taken as wind, solar and hydro only, the total is now closing in on that of the gas-fired fleets, at 84.9TWh for renewables versus 95.7TWh for gas-fired.



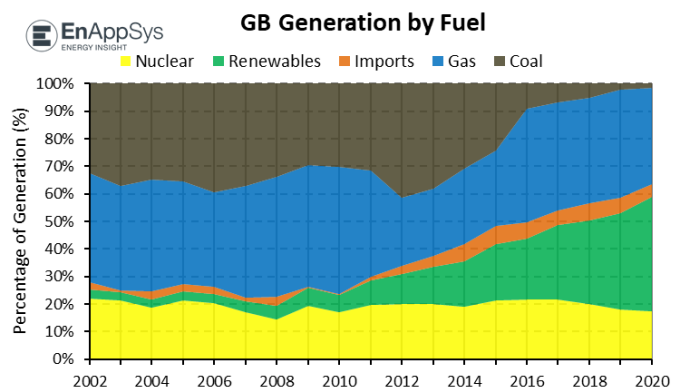
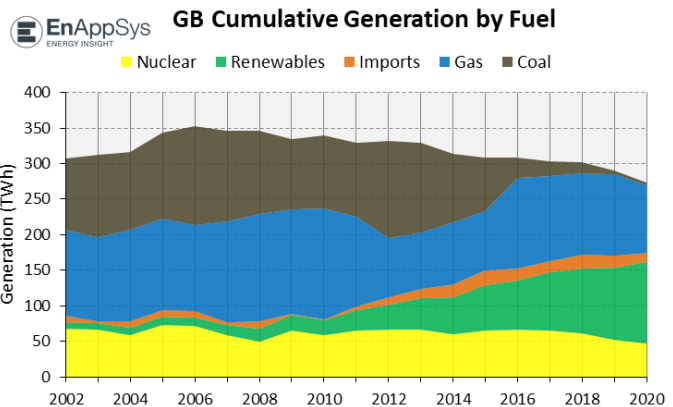
The gas-fired fleet (CCGT + OCGT), which has been the greatest contributor for the past five years, fell to second place, with an annual total of 95.1TWh. This was a 35% contribution, equating to an average generation level of 10.8GW. The gas-fired fleet's total generation fell 17% from last year's levels. Even if it had remained the same as last year, at 114.5TWh, this would only have been 1TWh higher than this year's combined renewable total.



Both the gas- and coal-fired fleets have seen difficult conditions for running across a notable portion of 2020, as the reduced demand under covid-19 lockdown conditions meant that they often fell down the merit order under low demand conditions.

Nuclear generation saw less difference to 2019 levels, remaining in third place with a total of 47.4TWh and a 17.3% contribution to the overall total. This equates to an average level of 5.7GW and is the lowest for a decade. In part this reflects the arrangements under which National Grid contracted for Sizewell to be taken off-line in order to maintain system stability during the summer period of low demand.

Total generation has been declining, in line with declining demand, over recent years, as shown in the chart to the right. The reduced demand over the lockdown periods has continued this trend, with a slightly greater reduction (6%) from 2019 levels, than was seen from 2018 to 2019 (2%). As demand has declined and renewable generation has increased, this has progressively squeezed the periods in which the fossil fuel-fired units can find generation in merit. Whilst there is still a need for spinning thermal generation to provide inertia for system stability reasons, there will be a requirement for some additional thermal generation to be dispatched displacing renewable output in periods of high renewable output.



A period without coal generation commenced 10 April and ended 16 June setting a new record of 67 days and 16 hours without coal contributing to GB generation.

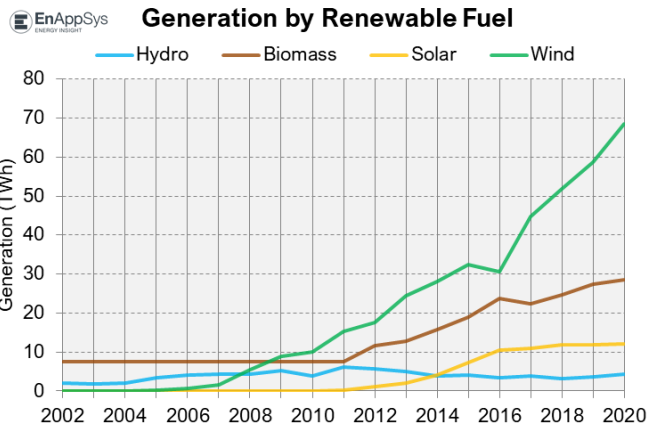
Statistics

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

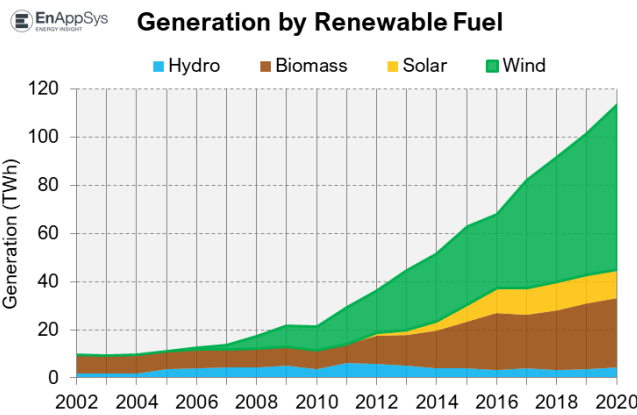
*GB Only (Excludes Northern Ireland)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TOTAL GENERATION BY FUEL (TWh)										
Coal	103.48	137.22	125.74	96.63	74.45	27.99	20.61	15.38	5.93	4.38
Gas	127.01	83.09	80.23	86.70	84.35	127.26	119.27	115.30	114.39	95.12
Imports	4.77	9.91	13.02	19.48	20.75	17.86	15.67	19.26	16.05	13.46
Nuclear	64.75	65.99	65.93	59.72	65.68	66.75	65.54	60.61	52.71	47.38
Renewables	29.24	36.18	44.51	51.60	62.77	68.03	82.00	91.52	101.30	113.53
TOTAL	329.24	332.39	329.43	314.14	308.00	307.89	303.09	302.06	290.38	273.87
AVERAGE GENERATION BY FUEL (GW)										
Coal	11.81	15.62	14.35	11.03	8.50	3.19	2.35	1.76	0.68	0.50
Gas	14.50	9.46	9.16	9.90	9.63	14.49	13.61	13.16	13.06	10.83
Imports	0.54	1.13	1.49	2.22	2.37	2.03	1.79	2.20	1.83	1.53
Nuclear	7.39	7.51	7.53	6.82	7.50	7.60	7.48	6.92	6.02	5.39
Renewables	3.34	4.12	5.08	5.89	7.17	7.74	9.36	10.45	11.56	12.92
TOTAL	37.58	37.84	37.61	35.86	35.16	35.05	34.60	34.48	33.15	31.18
SHARE OF GENERATION (%)										
Coal	31.4%	41.3%	38.2%	30.8%	24.2%	9.1%	6.8%	5.1%	2.0%	1.6%
Gas	38.6%	25.0%	24.4%	27.6%	27.4%	41.3%	39.4%	38.2%	39.4%	34.7%
Imports	1.4%	3.0%	4.0%	6.2%	6.7%	5.8%	5.2%	6.4%	5.5%	4.9%
Nuclear	19.7%	19.9%	20.0%	19.0%	21.3%	21.7%	21.6%	20.1%	18.2%	17.3%
Renewables	8.9%	10.9%	13.5%	16.4%	20.4%	22.1%	27.1%	30.3%	34.9%	41.5%
DIFFERENCE RELATIVE TO 2020										
Coal	-96%	-97%	-97%	-95%	-94%	-84%	-79%	-72%	-26%	
Gas	-25%	14%	19%	10%	13%	-25%	-20%	-18%	-17%	
Imports	183%	36%	3%	-31%	-35%	-25%	-14%	-30%	-16%	
Nuclear	-27%	-28%	-28%	-21%	-28%	-29%	-28%	-22%	-10%	
Renewables	288%	214%	155%	120%	81%	67%	38%	24%	12%	
Fossil Fuels		220.31	205.97	183.34	158.80	155.25	139.88	130.68	120.33	99.50
Fossil Fuel Share		66.3%	62.5%	58.4%	51.6%	50.4%	46.2%	43.3%	41.4%	36.3%
Renewable Share		10.9%	13.5%	16.4%	20.4%	22.1%	27.1%	30.3%	34.9%	41.5%

4 Renewables

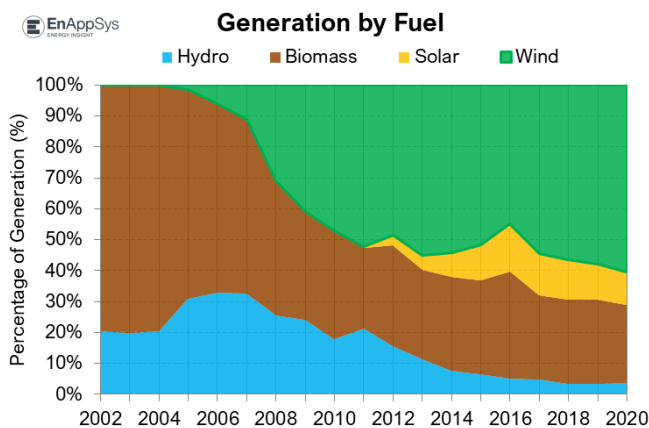
Wind farms continue to be the primary source of renewable generation in the GB power market. Total wind generation was 68.5TWh across the year, averaging 7.8GW per half-hour. This equates to a 60.4% share of total renewable generation, more than twice that of biomass (25.2%) the second largest component. All forms of renewable generation saw an increase in output from 2019 levels, with wind seeing the largest increase.



Since 2016, total wind generation has increased steeply, with a 17% (~10TWh) increase from 2019 levels to 2020.



This high volume of wind on the system means that there is a continuing need for balancing actions to be taken for stability, bringing on additional spinning thermal units to provide inertia and/or voltage control during periods of high wind generation. When the Stability Pathfinder units become operational, these will provide an alternative source of inertia.



The biomass fleet retained its position as the second largest contributor to overall renewable generation, with a total of 28.6TWh across the year, giving an average of 3.3GW per half hour. Biomass generation has also seen an overall increase since 2011 as more coal units are converted to biomass. 2020 saw the most consistent output from the three

Lynemouth units that were first recommissioned following conversion in 2018.

Solar generation was the third largest component in 2020, at 12.0TWh (1.4GW per half hour), contributing 10.6% of total renewable output.

The smallest share of renewable generation in the year again came from hydro plants which had a total output of 4.3TWh (0.5GW per hh), a 3.8% share of the renewable total. This was, however, a 21% increase on the 2019 total of 3.6TWh.

Total renewable generation has risen steadily since 2011, as a result of increases in installed capacity of all four components..

On an aggregated basis, 60.4% of total renewable generation came from wind farms, 25.2% from biomass plants, 10.6% from solar farms and 3.8% from hydro plants.

Statistics

The following tables sets out key statistics relating to renewable electricity output during the year:

*GB Only (Excludes Northern Ireland)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TOTAL GENERATION BY FUEL (TWh)										
Biomass	7.62	11.72	12.84	15.67	19.03	23.67	22.36	24.72	27.37	28.64
Hydro	6.21	5.69	5.06	3.92	4.09	3.38	3.96	3.20	3.57	4.31
Solar	0.16	1.22	2.12	3.99	7.29	10.40	10.92	11.79	11.77	12.04
Wind	15.26	17.55	24.49	28.01	32.36	30.58	44.75	51.80	58.58	68.54
TOTAL RENEWABLES	29.24	36.18	44.51	51.60	62.77	68.03	82.00	91.52	101.30	113.53

*GB Only (Excludes Northern Ireland)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TOTAL GENERATION BY FUEL (GW)										
Biomass	0.87	1.33	1.47	1.79	2.17	2.70	2.55	2.82	3.12	3.26
Hydro	0.71	0.65	0.58	0.45	0.47	0.38	0.45	0.37	0.41	0.49
Solar	0.02	0.14	0.24	0.46	0.83	1.18	1.25	1.35	1.34	1.37
Wind	1.74	2.00	2.80	3.20	3.69	3.48	5.11	5.91	6.69	7.80
TOTAL RENEWABLES	3.34	4.12	5.08	5.89	7.17	7.74	9.36	10.45	11.56	12.92

SHARE OF RENEWABLE GENERATION (%)										
Biomass	26.1%	32.4%	28.9%	30.4%	30.3%	34.8%	27.3%	27.0%	27.0%	25.2%
Hydro	21.2%	15.7%	11.4%	7.6%	6.5%	5.0%	4.8%	3.5%	3.5%	3.8%
Solar	0.5%	3.4%	4.8%	7.7%	11.6%	15.3%	13.3%	12.9%	11.6%	10.6%
Wind	52.2%	48.5%	55.0%	54.3%	51.6%	44.9%	54.6%	56.6%	57.8%	60.4%

LARGEST RENEWABLE SOURCE	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND
DIFFERENCE RELATIVE TO 2020										
Biomass	259.2%	133.5%	113.1%	74.7%	43.9%	15.6%	22.4%	10.7%	0.0%	-4.4%
Hydro	-42.4%	-37.2%	-29.4%	-9.0%	-12.7%	5.7%	-9.8%	11.5%	0.0%	-17.1%
Solar	7429.9%	867.7%	455.6%	194.8%	61.5%	13.2%	7.8%	-0.2%	0.0%	-2.2%
Wind	283.9%	233.7%	139.2%	109.1%	81.0%	91.6%	30.9%	13.1%	0.0%	-14.5%
Total	2.46	1.80	1.28	0.96	0.61	0.49	0.24	0.11	0.00	-0.11

DIFFERENCE RELATIVE TO PREVIOUS YEAR										
Biomass		53.4%	9.8%	22.0%	21.4%	24.1%	-5.3%	10.5%	10.7%	4.4%
Hydro		-8.6%	-10.9%	-22.4%	4.3%	-17.7%	17.5%	-19.1%	11.5%	20.3%
Solar		676.0%	74.6%	88.4%	82.5%	42.3%	5.3%	8.0%	-0.2%	2.0%
Wind		14.7%	39.9%	14.4%	15.5%	-5.8%	46.8%	15.7%	13.1%	16.7%
Total		23.4%	23.4%	15.9%	21.7%	8.1%	20.9%	11.6%	10.7%	11.8%

5 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.

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 APX day-ahead prices.

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

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