



GB Electricity Market Summary

SECOND QUARTER 2018
APR TO JUN

Recorded Levels of GB Generation by Fuel (based upon Ofgem & NG Embedded Forecasts & FUELHH data):

GAS: 12.8GW (-14%)
COAL: 0.4GW (-89%)

RENEWABLES: 8.9GW (-11%)
IMPORTS: 2.3GW (-8%)

NUCLEAR: 7.1GW (-2%)

Contents

EXECUTIVE SUMMARY	1
FUEL ACTIVITY	3
RENEWABLES	6
DEMAND AND PRICES	9
NOTES ON THE REPORT	11
ABOUT ENAPPSYS	12

EXECUTIVE SUMMARY

The second quarter of 2018 – running from April to June – broadly saw a continuation of on-going market trends. These included very low levels of coal generation; increases in levels of renewable generation (in particular from wind), and increases in the general cost of electricity generation.

Levels of coal-fired generation remained low in the quarter and for the first time since the early days of the power market a full quarter saw levels of coal-fired generation drop below 1TWh.

This meant that coal plants (0.9TWh) only provided a low 1% of the generation in the quarter, with carbon prices remaining high enough for gas-fired plants (28.0TWh) to provide 41% of power, with nuclear plants providing an additional 23% (15.5TWh).

Around 7% of electricity generation was sourced via imports from other power markets (primarily from the continent), with 28% of power being sourced from renewable generators.

Levels of renewable generation (19.4TWh) continue to climb, but although solar output has frequently been peaking close to 10GW, solar farms continued to provide slightly over a quarter of the total renewable generation.

The achieved levels of renewable generation were not only a significant increase from the levels noted in Q2 2017 (an increase of 11%), but also marked a new high; with Q2 2017 having been the previous highest total for a second quarter.

Wind farms continued to provide almost half of the renewable generation throughout the quarter, with a large increase in wind output levels following the addition of a number of large offshore wind farms in recent quarters.

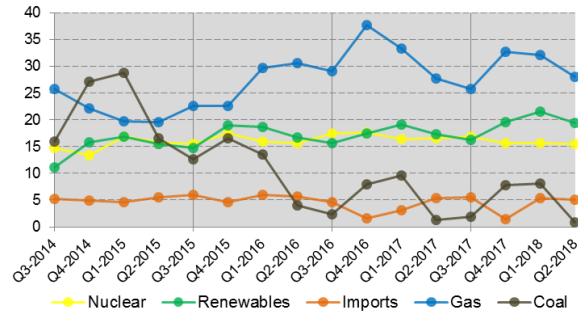
Overall solar farms provided almost 8% of the total generation in the quarter, but for this to match the peak ~20% levels of total generation that wind farms can achieve in winter, the combination of solar and storage in the market will be required. Otherwise it is likely that the growth in solar capacity would result in price cannibalisation during peak midday hours, limiting earnings at solar plants in the market.

By contrast, levels of wind capacity are already high enough to achieve a large share of total generation in the market and whilst these levels dropped back to 15% of total generation during the quarter, this is a seasonal reduction from around 19-20% in the winter months.

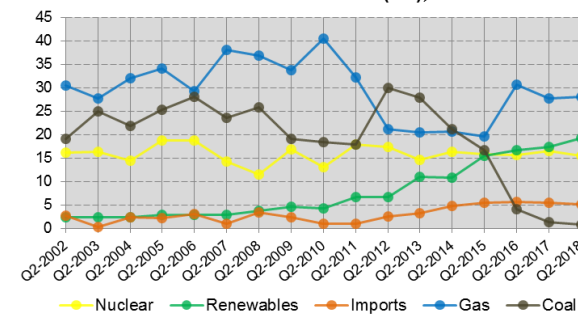
Overall 41% of power came from gas-fired plants, 28% from renewables, 23% from nuclear plants, 7% from imports and 1 from coal plants. Of the power that came from renewables, 49% came from wind farms, 27% from solar farms, 21% from biomass and 3% from hydro.

FUEL ACTIVITY

enappsys GENERATION BY FUEL (RECENT), TWh



enappsys GENERATION BY FUEL (Q2), TWh



The second quarter of 2018 - running from April to June – saw continued progress towards a power system increasingly powered by renewables and decreasingly powered by coal-fired power sources.

Within this activity, fossil fuels continued to provide a large share of the total generation, with 42% of the total fuel mix; and with 65% of power continuing to come from nuclear or fossil fueled power stations.

Despite this, growth in levels of renewables has been an on-going trend for some years now and in particular levels of wind generation

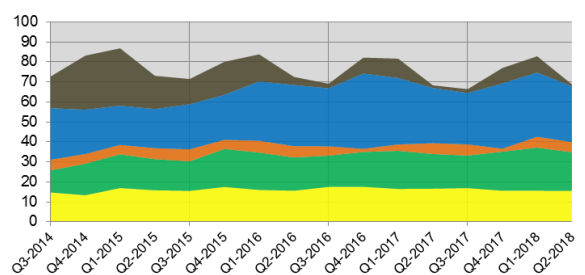
were very high in the quarter, with overall levels of solar output being limited by the reduced hours of contribution from this power source (i.e. daylight hours).

Whilst levels of onshore wind capacity have slowed in recent years, offshore wind capacity continues to come online and this has contributed to an increasingly reliable wind fleet.

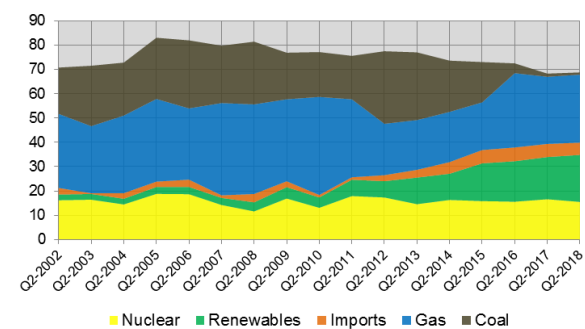
Generally commodity prices were high during the quarter, with gas prices holding high after particularly high peaks in Q1 2018, with coal prices continuing to climb from their 2016 lows and with carbon prices having risen considerably throughout 2018.

Carbon prices are now holding at around €15/te and combined with the UK Carbon Price Support (additional ~£18/te uplift on carbon costs), power

enappsys GENERATION BY FUEL (RECENT), TWh



enappsys GENERATION BY FUEL (Q2), TWh



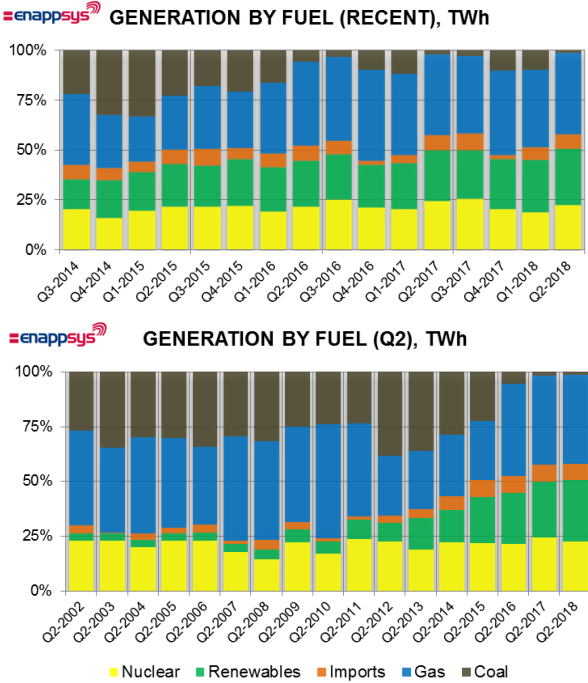
prices have been relatively high in the quarter. This UK-only component of carbon pricing also acted in the period to increase levels of flows from the continent (from a region of lower carbon pricing to a region of higher carbon pricing).

These prices will have had a favorable impact upon renewable sources which in general will be earning higher levels of income as a result, but has made it necessary for suppliers to increase their charged costs.

The greatest levels of generation came from gas-fired power stations in the quarter, which generated 28.0TWh of power (down from 32.2TWh in Q1 2018, but up slightly from 27.7TWh in Q2 2017).

These levels of gas-fired generation were in line with the previous two years and came

about as gas plants benefited from the very low levels of coal-fired generation seen in recent years / quarters. Overall 41% of power generation came from gas plants in the market.



The next highest levels of power output came from renewable generators, which have since 2015 provided the second largest share of power generation in a second quarter of the year.

In Q2 2018, this share saw the largest gap from the second largest fuel source (renewables) to the third largest (nuclear), but nuclear sources remained close behind.

Renewables generated 19.4TWh in the quarter (down from 21.5TWh in Q1 2018, but notably up from 17.4TWh in Q2 2017). This amounted to 28% of power generation in the quarter.

Nuclear plants generated 15.5TWh (down from 15.6TWh in Q1 2018 and down from 16.6TWh in Q2 2017), with 23% of generation coming from nuclear plants.

Levels of imports from the continent have been consistently high in recent years, but were limited by levels of import capacity. In future years as the levels of import capacity increase with the construction of new interconnectors this could rise. Imports amounted to 5.1TWh (down from 5.4TWh in Q1 2018 and in Q2 2017) and to 7% of total electricity requirements.

Coal plants continue to see low activity and generated less than 1TWh in the quarter, despite the gas price rises, as carbon costs remain high. This came as 1% of power was sourced from coal-fired plants, with generation of 0.9TWh (down from 8.1TWh in Q1 2018 and from 1.3TWh in Q2 2017).

In the quarter, 40.7% of generation came from gas-fired plants, 28.1% from renewables, 22.5% from nuclear plants, 7.4% from imports and 1.3% from coal-fired plants.

Statistics

The following tables contain some of the key statistics relating to the quarter:

*GB Only (Excludes Northern Ireland)	Q2-2016	Q3-2016	Q4-2016	Q1-2017	Q2-2017	Q3-2017	Q4-2017	Q1-2018	Q2-2018
TOTAL GENERATION BY FUEL (TWh)									
Coal	4.05	2.28	7.97	9.67	1.30	1.91	7.73	8.13	0.92
Gas	30.58	29.02	37.70	33.27	27.65	25.73	32.63	32.15	28.00
Imports	5.67	4.65	1.57	3.18	5.41	5.56	1.53	5.42	5.06
Nuclear	15.57	17.51	17.52	16.46	16.59	16.91	15.59	15.60	15.48
Renewables	16.67	15.64	17.44	19.08	17.37	16.30	19.51	21.54	19.35
FOSSIL FUELS	34.63	31.31	45.67	42.95	28.95	27.64	40.36	40.28	28.91
TOTAL	72.54	69.11	82.20	81.67	68.32	66.39	77.00	82.84	68.81
Fossil Fuel Percentage	48%	45%	56%	53%	42%	42%	52%	49%	42%
Clean Percentage	44%	48%	43%	44%	50%	50%	46%	45%	51%
Renewable Share of Clean Power	52%	47%	50%	54%	51%	49%	56%	58%	56%
SHARE OF GENERATION (%)									
Coal	5.6%	3.3%	9.7%	11.8%	1.9%	2.9%	10.0%	9.8%	1.3%
Gas	42.2%	42.0%	45.9%	40.7%	40.5%	38.8%	42.4%	38.8%	40.7%
Imports	7.8%	6.7%	1.9%	3.9%	7.9%	8.4%	2.0%	6.5%	7.4%
Nuclear	21.5%	25.3%	21.3%	20.2%	24.3%	25.5%	20.2%	18.8%	22.5%
Renewables	23.0%	22.6%	21.2%	23.4%	25.4%	24.5%	25.3%	26.0%	28.1%

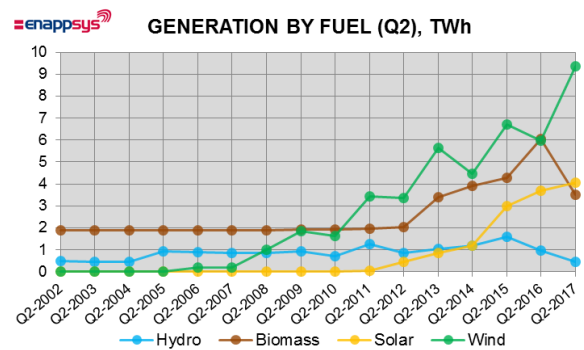
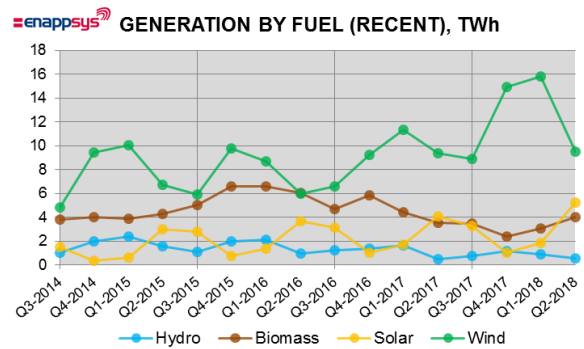
*GB Only (Excludes Northern Ireland)	Q2-2010	Q2-2011	Q2-2012	Q2-2013	Q2-2014	Q2-2015	Q2-2016	Q2-2017	Q2-2018
TOTAL GENERATION BY FUEL (TWh)									
Coal	18.47	17.90	29.89	27.88	21.11	16.60	4.05	1.30	0.92
Gas	40.39	32.12	21.14	20.49	20.67	19.63	30.58	27.65	28.00
Imports	1.01	1.02	2.50	3.20	4.79	5.48	5.67	5.41	5.06
Nuclear	13.06	17.90	17.31	14.55	16.30	15.81	15.57	16.59	15.48
Renewables	4.26	6.70	6.70	10.95	10.79	15.55	16.67	17.37	19.35
FOSSIL FUELS	58.85	50.01	51.02	48.38	41.78	36.22	34.63	28.95	28.91
TOTAL	77.18	75.64	77.53	77.07	73.66	73.07	72.54	68.32	68.81
Fossil Fuel Percentage	76%	66%	66%	63%	57%	50%	48%	42%	42%
Clean Percentage	24%	36%	29%	31%	40%	47%	42%	41%	51%
Renewable Share of Clean Power	25%	27%	28%	43%	40%	50%	52%	51%	56%
SHARE OF GENERATION (%)									
Coal	25.5%	25.9%	36.4%	34.1%	30.9%	25.0%	5.3%	1.6%	1.3%
Gas	55.7%	46.5%	25.7%	25.1%	30.3%	29.6%	39.7%	33.4%	40.7%
Imports	1.4%	1.5%	3.0%	3.9%	7.0%	8.3%	7.4%	6.5%	7.4%
Nuclear	18.0%	25.9%	21.1%	17.8%	23.9%	23.8%	20.2%	20.0%	22.5%
Renewables	5.9%	9.7%	8.1%	13.4%	15.8%	23.4%	21.6%	21.0%	28.1%

RENEWABLES

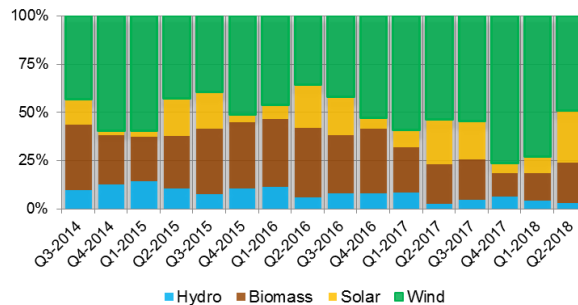
In Q2 2018 levels of renewable generation decreased from 21.5TWh (Q1 2018) to 19.4TWh (Q2 2018), although this did represent a significant increase from the 17.4TWh achieved in Q2 2017. Those levels in 2017 had been the highest ever levels of renewable generation for the second quarter of the year and so this increase is particularly notable.

Despite wind speeds being generally lower over the summer months, wind farms continued to provide the largest share of renewable generation at 49% (14% of total generation), amounting to 9.5TWh across the quarter.

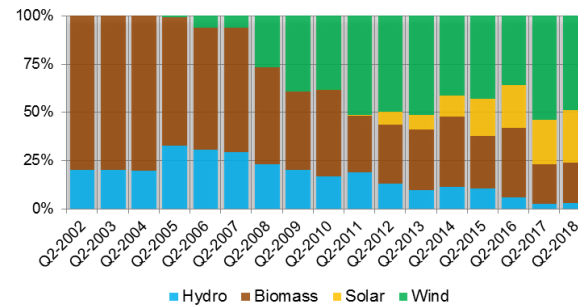
Over the past 18 months a number of new large offshore wind farms (including Burbo Bank Extension, Dudgeon, Galloper, Race Bank, Rampion and Walney Extension) added significant levels of new wind capacity.



GENERATION BY FUEL (RECENT), TWh



GENERATION BY FUEL (Q2), TWh

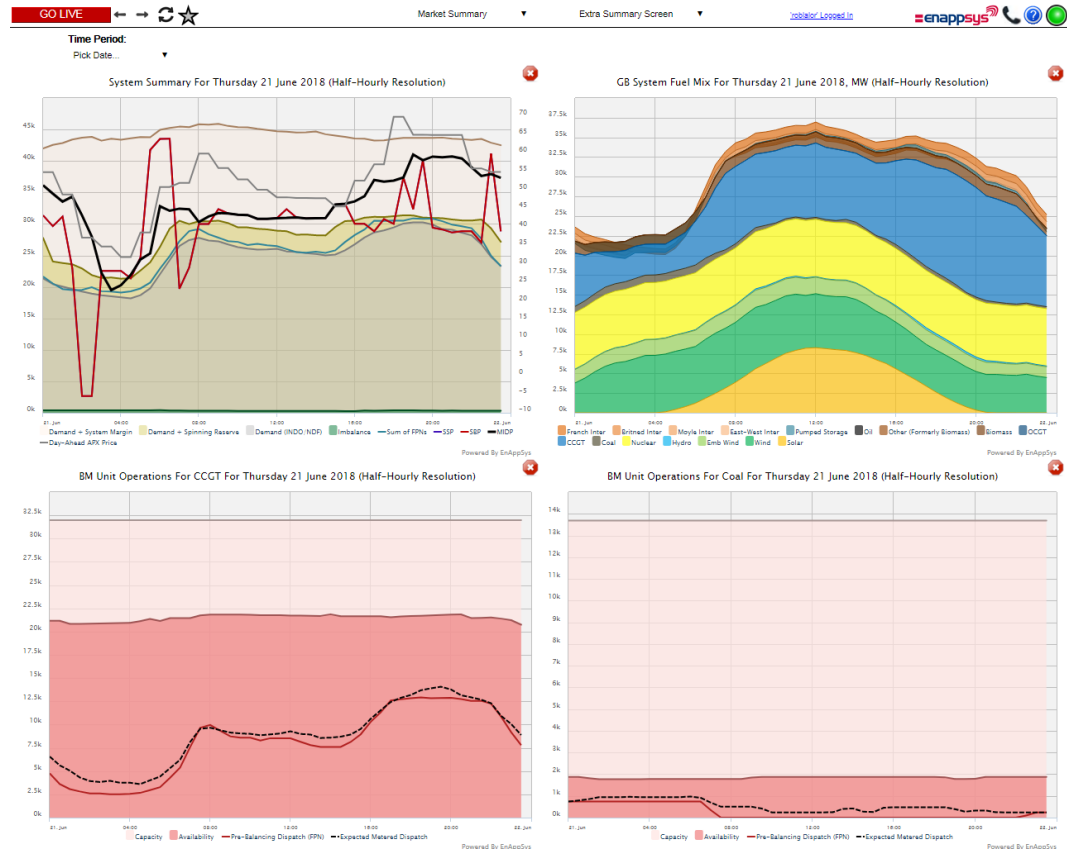


These increases have not only increased the share of wind capacity sourced from offshore farms, but have also provided momentum for a continued rise in wind generation levels following the slow-down in construction of onshore wind farms.

The next highest share of renewable generation in the market came from solar farms, with this amounting to 5.2TWh. The summer months are particularly favorable to solar projects due to the long daylight hours and reduced cloud cover.

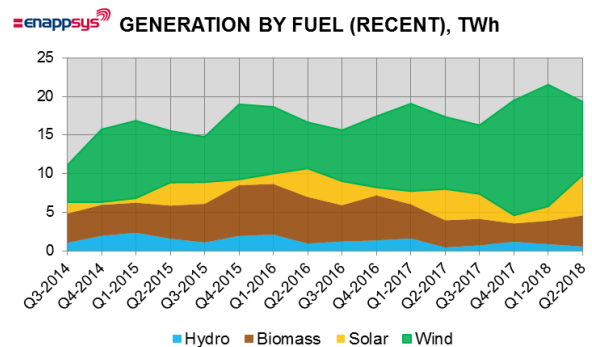
This generation has come about as

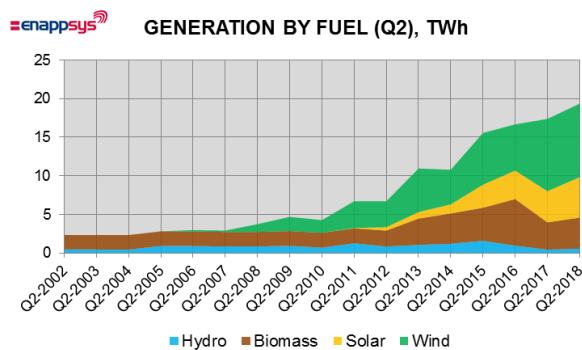
solar output has been peaking around 10GW and when levels of wind and solar generation have been strong, the activity at gas-fired plants has been significantly reduced in order to accommodate these other fuel types:



Generally the impact of this on prices within the market has been modest due to the fact that generators in the market have been able to adjust their activity and provide additional services in order to help National Grid manage this activity.

Beyond these two main sources, biomass continued to provide a large share of renewable generation (helped by the commissioning of Lynemouth as a biomass plant). This biomass generation amounted to 4.0TWh, 21% of all renewable generation and 6% of total generation in the market.





Hydro plants are generally less active during the summer months due to reduced levels of rainfall but have continued to generate 0.6TWh or 3% of the renewable generation noted.

Additional renewable generation did occur at other renewable sources such as tidal projects, but these levels were much lower and so are not included here.

Of all the renewable generation achieved in the market, 49% came from wind farms, 27% from solar farms, 21% from biomass plants and 3% from hydro plants.

Statistics

The following tables contain some of the key statistics relating to the quarter:

*GB Only (Excludes Northern Ireland)	Q2-2016	Q3-2016	Q4-2016	Q1-2017	Q2-2017	Q3-2017	Q4-2017	Q1-2018	Q2-2018
TOTAL GENERATION BY FUEL (TWh)									
Biomass	6.04	4.71	5.85	4.43	3.52	3.43	2.38	3.04	4.02
Hydro	0.95	1.21	1.36	1.62	0.45	0.72	1.18	0.87	0.56
Solar	3.69	3.11	1.02	1.70	4.05	3.23	1.05	1.86	5.24
Wind	5.98	6.61	9.22	11.34	9.35	8.91	14.90	15.78	9.52
TOTAL RENEWABLES	16.67	15.64	17.44	19.08	17.37	16.30	19.51	21.54	19.35

SHARE OF RENEWABLE GENERATION (%)									
Biomass	36.2%	30.1%	33.5%	23.2%	20.3%	21.1%	12.2%	14.1%	20.8%
Hydro	5.7%	7.8%	7.8%	8.5%	2.6%	4.4%	6.1%	4.0%	2.9%
Solar	22.2%	19.9%	5.8%	8.9%	23.3%	19.9%	5.4%	8.6%	27.1%
Wind	35.9%	42.3%	52.9%	59.4%	53.8%	54.7%	76.4%	73.3%	49.2%

SHARE OF TOTAL GENERATION (%)									
Biomass	8.3%	6.8%	7.1%	5.4%	5.2%	5.2%	3.1%	3.7%	5.8%
Hydro	1.3%	1.8%	1.7%	2.0%	0.7%	1.1%	1.5%	1.0%	0.8%
Solar	5.1%	4.5%	1.2%	2.1%	5.9%	4.9%	1.4%	2.2%	7.6%
Wind	8.2%	9.6%	11.2%	13.9%	13.7%	13.4%	19.4%	19.1%	13.8%

LARGEST RENEWABLE SOURCE	BIOMASS	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND
--------------------------	---------	------	------	------	------	------	------	------	------

*GB Only (Excludes Northern Ireland)	Q2-2010	Q2-2011	Q2-2012	Q2-2013	Q2-2014	Q2-2015	Q2-2016	Q2-2017	Q2-2018
TOTAL GENERATION BY FUEL (TWh)									
Biomass	1.92	1.95	2.05	3.41	3.92	4.28	6.04	3.52	4.02
Hydro	0.71	1.26	0.85	1.05	1.21	1.58	0.95	0.45	0.56
Solar	0.00	0.05	0.45	0.85	1.18	2.99	3.69	4.05	5.24
Wind	1.63	3.45	3.35	5.64	4.48	6.70	5.98	9.35	9.52
TOTAL RENEWABLES	4.26	6.70	6.70	10.95	10.79	15.55	16.67	17.37	19.35

SHARE OF RENEWABLE GENERATION (%)									
Biomass	11.5%	12.5%	11.8%	17.9%	22.5%	26.3%	30.9%	14.1%	20.8%
Hydro	4.2%	8.1%	4.9%	5.5%	6.9%	9.7%	4.9%	4.0%	2.9%
Solar	0.0%	0.3%	2.6%	4.4%	6.8%	18.4%	18.9%	8.6%	27.1%
Wind	9.8%	22.1%	19.2%	29.5%	25.8%	41.1%	30.7%	73.3%	49.2%

SHARE OF TOTAL GENERATION (%)									
Biomass	2.5%	2.6%	2.6%	4.4%	5.3%	5.9%	8.3%	5.2%	5.8%
Hydro	0.9%	1.7%	1.1%	1.4%	1.6%	2.2%	1.3%	0.7%	0.8%
Solar	0.0%	0.1%	0.6%	1.1%	1.6%	4.1%	5.1%	5.9%	7.6%
Wind	2.1%	4.6%	4.3%	7.3%	6.1%	9.2%	8.2%	13.7%	13.8%

LARGEST RENEWABLE SOURCE	BIOMASS	WIND	WIND	WIND	WIND	WIND	BIOMASS	WIND	WIND
--------------------------	---------	------	------	------	------	------	---------	------	------

DEMAND AND PRICES

Commodity prices remained high in the quarter, with gas prices generally holding close to the typical values seen during Q1 2018 (when gas prices peaked around supply shortages). At the same time coal prices continued to climb up from their 2016 lows and carbon prices have seen a considerable gain through 2018 that was maintained in Q2.

The key factor at the moment are the carbon prices which are high enough to ensure that gas remains more dominant than coal in the market. EU ETS carbon prices remain at around €15/te, up from lows of below €5/te in early 2017, with this combined with ~£18/te uplift on carbon from the UK Carbon Price Support.

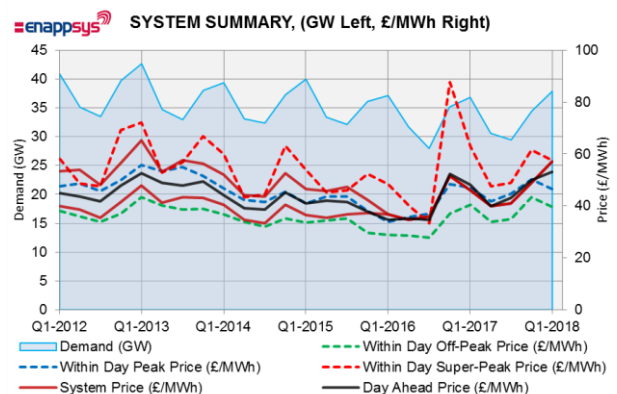
This UK-only component of carbon pricing also acted in the period to increase levels of flows from the continent (from a region of lower carbon pricing to a region of higher carbon pricing).

The very high UK carbon costs are reducing coal generation in the UK more than is the case on the continent, but it is worth noting that the interconnectors then in turn encourage more import of power from more polluting, but lower charged continental-based power stations.

All of this has ensured that prices remain high in the market, but without much activity seen with respect to volatility or price peaks. This has occurred partly due to the impact of competitive pressures in ancillary service markets, and partly due to a system that has had lots of options to call upon from inactive plants.

Competition in ancillary service markets has pushed down utilisation prices - with these prices commonly driving many of the price peaks around morning and evening demand peaks, this has reduced the frequency of prices in excess of £100/MWh.

For instance in the morning it is typically the case that pumped storage providing fast-responding services to the market would set the price. Formerly this price would be around £140/MWh, but due to increased competition this price has reduced to sub-£100/MWh in many cases.



These lower values then set the price in the market and reduce the incentive for plants to balance the market through their own actions due to the lower levels of profits available.

As levels of competition remain high this is likely to continue in the market, although with new changes such as the proper commissioning of the Western HVDC Link connecting Scotland and England (to move more wind power into England) volatility will increase.

This is because wind farms will no longer be turned off for locational reasons and so could start to be turned off for genuine energy reasons. The impact of this is that they would no longer be excluded from any system pricing within the market, creating more extreme prices in the process.

All these effects stem from the impact that the system price calculation has upon the market and this is a very specific, but very important calculation.

Statistics

The following table contains some of the key statistics relating to the quarter:

*GB Only (Excludes Northern Ireland)	Q2-2016	Q3-2016	Q4-2016	Q1-2017	Q2-2017	Q3-2017	Q4-2017	Q1-2018	Q2-2018
WHOLESALE PRICES (£/MWh)									
Day Ahead Price	35.07	34.59	52.25	48.00	40.00	43.00	50.00	53.00	53.00
Within Day Price (MIDP)	34.06	33.36	50.45	47.00	40.00	42.00	50.00	55.00	52.00
WITHIN DAY PRICE BREAKDOWN (£/MWh)									
Off-Peak Hours	28.65	27.75	37.13	40.53	33.87	34.79	43.34	39.62	40.51
Peak Hours (excl Superpeak)	35.78	36.95	48.29	47.15	41.81	44.67	50.30	46.50	46.79
Superpeak Hours	40.28	33.36	87.81	62.85	47.66	49.03	61.47	57.72	50.11
SYSTEM BUY PRICE (£/MWh)									
Maximum	480.38	801.77	1528.72	292.55	1509.80	176.69	178.00	990.00	1528.72
Average	34.62	35.91	51.45	46.00	40.00	41.00	49.00	57.00	52.00
Minimum	-100.00	-114.99	-153.89	-14.00	-73.15	-25.00	-69.17	-150.00	-153.89
SYSTEM SELL PRICE (£/MWh)									
Maximum	480.38	801.77	1528.72	292.55	1509.80	176.69	178.00	990.00	1528.72
Average	34.62	35.91	51.45	46.00	40.00	41.00	49.00	57.00	52.00
Minimum	-100.00	-114.99	-153.89	-14.00	-73.15	-25.00	-69.17	-150.00	-153.89
DEMAND (MW)									
DEMAND (MW)	31,716	27,981	35,186	36,835	30,600	29,459	34,448	37,910	31,775
AVAILABILITY (MW)									
AVAILABILITY (MW)	46,968	46,133	50,859	55,672	47,496	44,155	54,618	59,411	49,746
MARGIN (MW)									
MARGIN (MW)	17,851	21,597	17,303	21,062	20,031	17,401	22,138	24,100	21,620
MIN MARGIN (MW)									
MIN MARGIN (MW)	6,259	4,439	1,213	1,287	1,867	4,090	0	0	1,213
DEMAND (TWh)									
DEMAND (TWh)	69.3	61.8	77.7	79.6	66.8	65.0	76.1	81.9	69.4
AVAILABILITY (TWh)									
AVAILABILITY (TWh)	102.6	101.9	112.3	120.3	103.7	97.5	120.6	128.3	108.6
MARGIN (TWh)									
MARGIN (TWh)	39.0	47.7	38.2	45.5	43.7	38.4	48.9	52.1	47.2
MIN MARGIN (TWh)									
MIN MARGIN (TWh)	13.7	9.8	2.7	2.8	4.1	9.0	0.0	0.0	2.6

NOTES ON THE REPORT

The figures used in the report refer to GB only, against DECC 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. FPNs at wind farms do not correlate well with metered volumes and so cannot be used reliably.

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

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

ABOUT ENAPPSYS

EnAppSys provides services to companies in the energy and power markets, specifically by providing data, information and consultancy services.

The company has a GB power market database stretching back to 2002 and an online platform that provides readily available information ranging from forwards market prices to historic generator operations.

EnAppSys is focused on providing information and analytical services covering the energy sector and is actively growing the business to provide products with enhanced analysis and forecasting capabilities and extending the geographic and sector coverage beyond the UK and the electricity market.

The company serves customers across Europe and has market monitoring platforms used by a significant number of market parties in both Britain and the Netherlands and is increasing coverage continuously.



The company's business objective is to make available timely, optimal and insightful information, analysis and systems to the energy sector to ensure all sizes of company have the best available tools and information to make informed decisions and to optimise their business strategy.

To find out more about EnAppSys contact the company at about@enappsys.com or visit the company's website at www.enappsys.com.