GB Electricity Market Summary

THIRD QUARTER 2018

JUL TO SEP

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

GAS: 11.3GW (-9%)
IMPORTS: 2.2GW (-2%)
RENEWABLES: 8.3GW (-4%)
COAL: 0.8GW (+90%)
NUCLEAR: 7.2GW (+5%)

Contents

EXECUTIVE SUMMARY

The third quarter of 2018 – running from July to September – saw a record low share generation from fossil fuels, as this share dropped to 41% of total generation for the first time (a record low level).

This has come as part of a shift in how Great Britain produces electricity in recent years; with levels of fossil fueled generation having contributed 74% of the total back in Q3 2010 and 57% of the total as recently as Q3 2014.

This drop has been primarily driven by increased levels of renewable generation upon the system, but also by decreased levels of demand and by small increases in levels of nuclear-powered electricity generation.

Whilst levels of demand regularly drop during the summer months, reducing the levels of generation from non-fossil sources required to reach such a record, the changes from previous years remain significant.

Back in Q3 2010 renewables were only generating 5.5TWh of electricity (or 7% of the total), with this rising to 14.8TWh (or 21% of the total) by Q3 2015 and then up to 18.2TWh (or 28% of the total) by Q3 2018 (the most recent quarter).

At the same time, the type of fossil-fueled generation noted in Q3 has become increasingly clean over the years, with only 6% was sourced from dirtier coal-fired power plants in this recent three month period, significantly down from the 60% noted as recently as Q3 2013.

The net impact of this evolution towards a cleaner fuel mix is that gas remains the primary source of generation for Great Britain (as it has done for much of the past decade), but with only a nominal share of generation coming from coal-fired plants and with much of this generation being replaced by power generation from renewable projects.

These renewable projects now consistently provide the second largest share of electricity generation within the GB power market by primary fuel grouping, with these levels being marginally higher than the contribution from nuclear plants in the market.

Net electricity imports from the continent and from Ireland remain high, but with these levels being well below the contributions from the three primary fuel sources (gas, renewables and nuclear).

Otherwise prices in the quarter continued to rise as underlying carbon and fuel commodity prices remained high, with EU ETS carbon prices now sitting above €20/te CO2. This is a significant change from historic levels which were as low as €5/te CO2 in summer 2017.

These price increases have increased the cost of gas in the market, as carbon price rises have encouraged a level of switch from coal to gas, with gas prices increasing in response due to supply-demand economic effects.

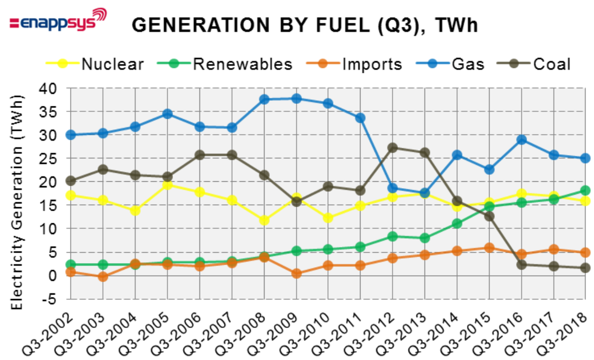
These price rises do not increase earnings at conventional coal or gas power stations in the market as their costs increase in line with their income, but these values are a significant boost to renewable projects which should all be seeing higher than expected levels of profitability.

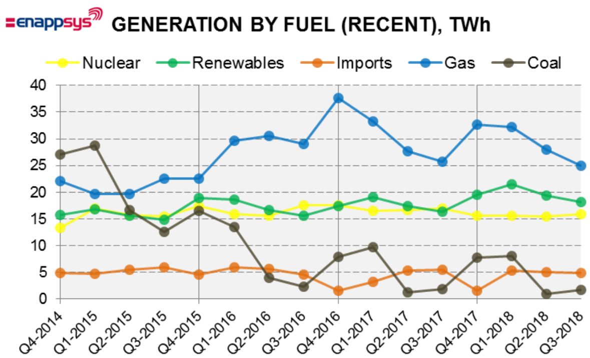
If commodity and carbon prices decline from these levels, then renewable projects will see declining returns, but further increases will only increase this effect.

The short-term beneficiary of increased carbon prices are speculative traders who bought carbon certificates in anticipation of a price rise, but longer term this benefit will be passed through to the tax beneficiaries (i.e. European governments, with less wealthy European states receiving a higher benefit – of which at least 50% must be used for climate and energy purposes).

These increases do, however, mean that households will pay higher prices for their electricity use and this effect will extend if EU ETS carbon prices continue to rise, but decease if prices start to fall.

FUEL ACTIVITY





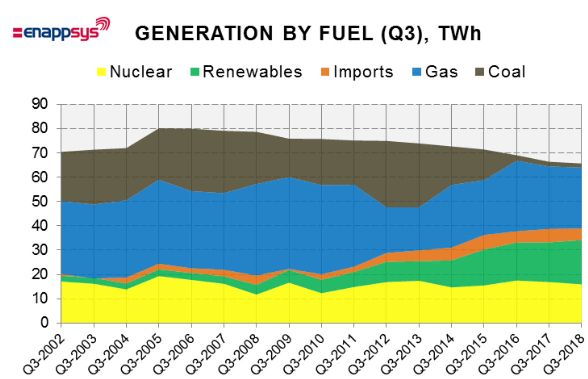
The third quarter of 2018 – running from July through September – saw levels of renewable generation decline from the previous quarter, but climb above the levels seen in Q3 2017.

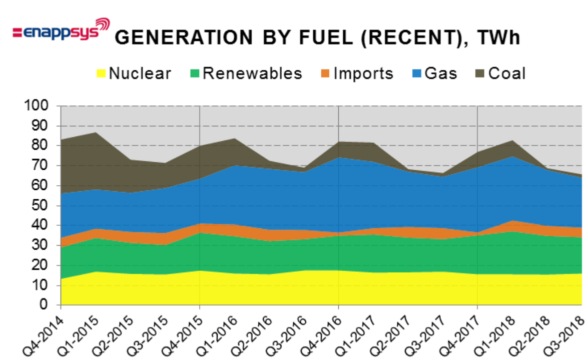
This shift came about as levels of solar generation fell between Q2 and Q3 2018, but with this being a typical drop for this time of year.

In comparison with levels of generation noted in Q3 2017, not only were solar output levels higher, but levels of wind and biomass generation also climbed between the two periods.

Elsewhere in the market fossil fuels continue to underpin the market, providing 41% of generation (versus 42% in Q3 2017 and again in Q2 2018). This share of generation from fossil fueled sources is the lowest share of fossil fueled generation recorded for a single quarter, with the market now close to seeing a quarter where less than 40% of power comes from fossil fuel sources.

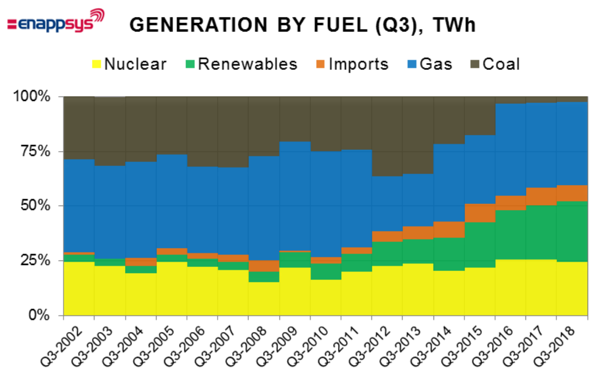
This about came as gas-fired power plants continued to provide the largest share of generation (as they have done for much of the past decade), with 25.0TWh of power coming from gas-fired power stations (or 38.1% of the total generation in the period). These levels were down 9% from the

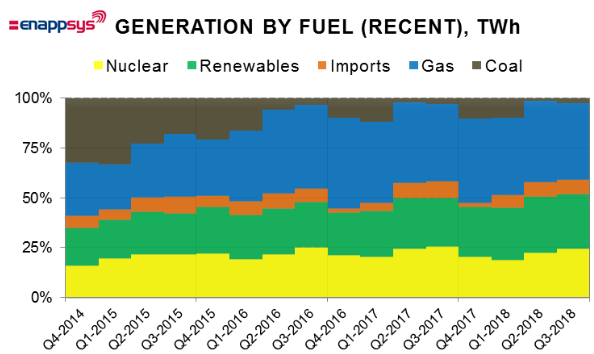




previous quarter and down 3% from Q3 2017.

The second largest provider of generation in the market continues to be renewable projects, with these contributing 18.2TWh in Q3 2018. These levels amount to 27.7% of total generation.





Levels of renewable generation declined from the previous quarter (with a drop of 4% noted), but remained up 12% against the levels recorded in Q3 2018, indicating that levels are continuing to rise when adjusting for the time of year.

Nuclear plants continued to provide a lower share of generation than that from renewable sources (as has been the case for the past 4 quarters), with total levels of generation amounting to 16.0TWh. These levels were up 5% from the previous quarter, but remained 6% down on Q3 2017.

After these three primary fuel groupings, coal and interconnector projects provided much lower levels of generation, with interconnectors importing 4.8TWh and with coal-fired plants generating 1.7TWh. These levels amount to 7.4% and 2.6% of the total respectively (or a combined 10% of the overall power market).

This leaves the market with 90% of power coming from either gas, renewable or nuclear power sources.

Interconnector import levels were down 2% from the last quarter and 13% down from Q3 2017, with coal-fired generation levels climbing 90% from the last quarter and down 11% from Q3 2017.

In the quarter, 38.1% of generation came from gas-fired plants, 27.7% from renewables, 24.3% from nuclear plants, 7.4% from imports and 2.6% from coal-fired plants.

Statistics

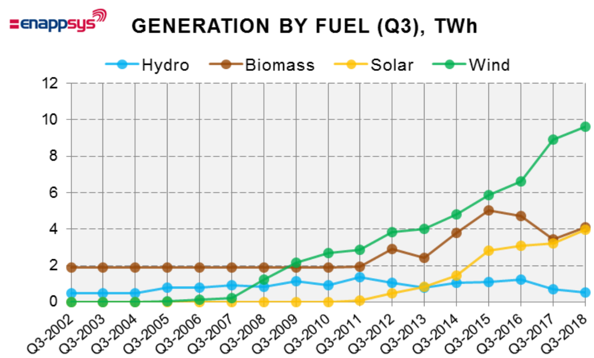
The following tables contain some of the key statistics relating to the quarter:

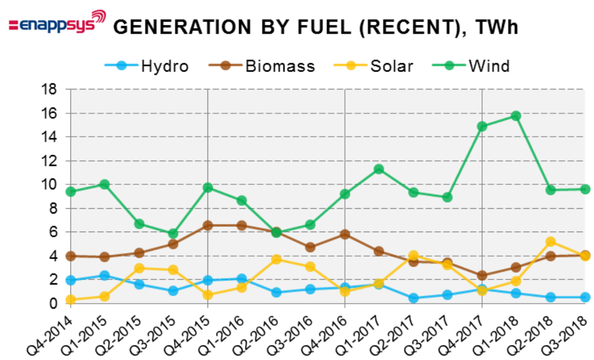
FUEL ACTIVITY

*GB Only (Excludes Northern Ireland)	Q3-2016	Q4-2016	Q1-2017	Q2-2017	Q3-2017	Q4-2017	Q1-2018	Q2-2018	Q3-2018
TOTAL GENERATION BY FUEL (TWh)									
Coal	2.28	7.97	9.67	1.30	1.91	7.73	8.13	0.92	1.70
Gas	29.02	37.70	33.27	27.65	25.73	32.63	32.15	28.00	25.01
Imports	4.65	1.57	3.18	5.41	5.56	1.53	5.42	5.06	4.84
Nuclear	17.51	17.52	16.46	16.59	16.91	15.59	15.60	15.48	15.95
Renewables	15.64	17.44	19.08	17.37	16.30	19.51	21.54	19.35	18.22
FOSSIL FUELS	31.31	45.67	42.95	28.95	27.64	40.36	40.28	28.91	26.71
TOTAL	**69.11**	**82.20**	**81.67**	**68.32**	**66.39**	**77.00**	**82.84**	**68.81**	**65.71**
Fossil Fuel Percentage	45%	56%	53%	42%	42%	52%	49%	42%	41%
Clean Percentage	48%	43%	44%	50%	50%	46%	45%	51%	52%
Renewable Share of Clean Power	47%	50%	54%	51%	49%	56%	58%	56%	53%
SHARE OF GENERATION (%)									
Coal	3.3%	9.7%	11.8%	1.9%	2.9%	10.0%	9.8%	1.3%	2.6%
Gas	42.0%	45.9%	40.7%	40.5%	38.8%	42.4%	38.8%	40.7%	38.1%
Imports	6.7%	1.9%	3.9%	7.9%	8.4%	2.0%	6.5%	7.4%	7.4%
Nuclear	25.3%	21.3%	20.2%	24.3%	25.5%	20.2%	18.8%	22.5%	24.3%
Renewables	22.6%	21.2%	23.4%	25.4%	24.5%	25.3%	26.0%	28.1%	27.7%
				59.7%					6.4%

*GB Only (Excludes Northern Ireland)	Q3-2010	Q3-2011	Q3-2012	Q3-2013	Q3-2014	Q3-2015	Q3-2016	Q3-2017	Q3-2018
TOTAL GENERATION BY FUEL (TWh)									
Coal	18.98	18.22	27.37	26.29	15.87	12.63	2.28	1.91	1.70
Gas	36.74	33.75	18.76	17.73	25.81	22.57	29.02	25.73	25.01
Imports	2.24	2.16	3.68	4.45	5.27	5.98	4.65	5.56	4.84
Nuclear	12.31	14.84	16.87	17.41	14.70	15.51	17.51	16.91	15.95
Renewables	5.53	6.20	8.31	8.07	11.10	14.78	15.64	16.30	18.22
FOSSIL FUELS	55.72	51.97	46.13	44.02	41.68	35.20	31.31	27.64	26.71
TOTAL	**75.79**	**75.17**	**75.00**	**73.96**	**72.75**	**71.48**	**69.11**	**66.39**	**65.71**
Fossil Fuel Percentage	74%	69%	62%	60%	57%	49%	45%	42%	41%
Clean Percentage	24%	28%	34%	34%	35%	42%	48%	50%	52%
Renewable Share of Clean Power	31%	29%	33%	32%	43%	49%	47%	49%	53%
SHARE OF GENERATION (%)									
Coal	25.0%	24.2%	36.5%	35.5%	21.8%	17.7%	3.3%	2.9%	2.6%
Gas	48.5%	44.9%	25.0%	24.0%	35.5%	31.6%	42.0%	38.8%	38.1%
Imports	3.0%	2.9%	4.9%	6.0%	7.2%	8.4%	6.7%	8.4%	7.4%
Nuclear	16.2%	19.7%	22.5%	23.5%	20.2%	21.7%	25.3%	25.5%	24.3%
Renewables	7.3%	8.3%	11.1%	10.9%	15.3%	20.7%	22.6%	24.5%	27.7%

RENEWABLES





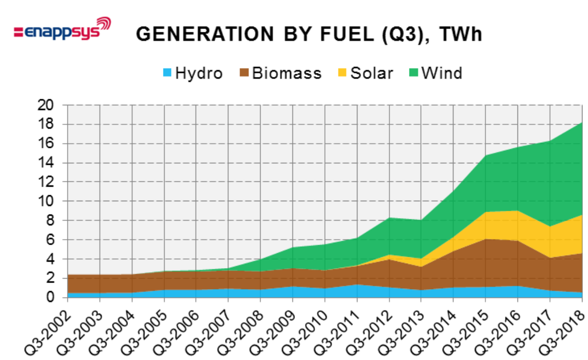
Levels of solar generation have historically peaked in the second quarter of the year and this trend continued in 2018, with levels of solar generation falling 24% from the previous quarter, but climbing up 23% from the levels in the previous year.

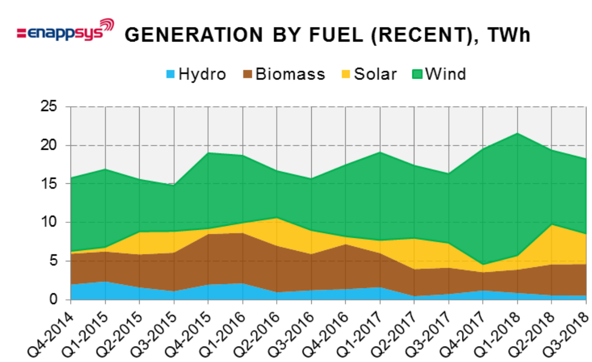
This was offset by a small gain in levels of wind generation (increasing by 1% from the previous quarter as increased levels of installed capacity continue to have an effect, with levels of biomass climbing and levels of hydro falling.

In aggregate, levels of renewable generation dropped 4% from the previous quarter (but rose 12% against Q3 2017) and generated 18.2TWh in the quarter. This amounted to 27.7% of the overall fuel mix in the quarter.

As has been the case since Q2 2016, wind farms provided the largest share of renewable generation – and just over half of the overall total – generating 9.6TWh of power. These levels were up 1% from the previous quarter and up 8% from Q3 2017.

The next largest share of renewable generation came from biomass plants in the market which generated 4.1TWh of power, up 2% from the previous quarter. These levels were also up 19% from the levels recorded in Q3 2017.





The largest fall in levels of renewable power generation came from solar projects which generated 24% less power in Q3 2018 than in Q2 2018. Despite these drops solar generation levels continued to improve from Q3 2017, climbing 23%. These solar projects generated 4.0TWh in the quarter.

The lowest share of renewable generation recorded in this report came from hydro projects, which generated 0.5TWh of power. These levels were down 5% from the previous quarter and down 26% from Q3 2017.

Of all the renewable power sources noted in this report, only hydro generated less power than coal-fired power stations.

Of all the renewable generation achieved in the market, 53% came from wind farms, 23% from biomass plants, 22% from solar farms and 3% from hydro plants.

Statistics

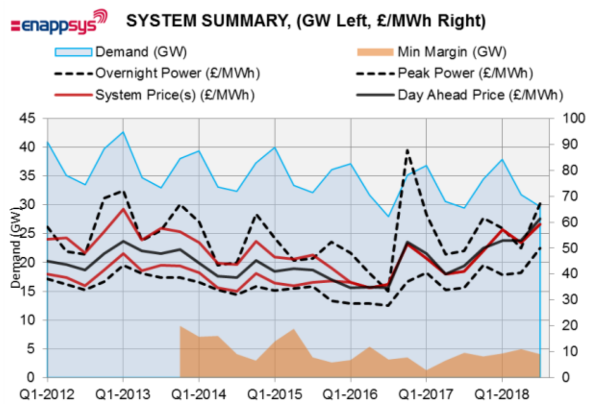
The following tables contain some of the key statistics relating to the quarter:

*GB Only (Excludes Northern Ireland)	Q3-2016	Q4-2016	Q1-2017	Q2-2017	Q3-2017	Q4-2017	Q1-2018	Q2-2018	Q3-2018
TOTAL GENERATION BY FUEL (TWh)									
Biomass	4.71	5.85	4.43	3.52	3.43	2.38	3.04	4.02	4.09
Hydro	1.21	1.36	1.62	0.45	0.72	1.18	0.87	0.56	0.53
Solar	3.11	1.02	1.70	4.05	3.23	1.05	1.86	5.24	3.97
Wind	6.61	9.22	11.34	9.35	8.91	14.90	15.78	9.52	9.63
TOTAL RENEWABLES	**15.64**	**17.44**	**19.08**	**17.37**	**16.30**	**19.51**	**21.54**	**19.35**	**18.22**
SHARE OF RENEWABLE GENERATION (%)									
Biomass	30.1%	33.5%	23.2%	20.3%	21.1%	12.2%	14.1%	20.8%	22.4%
Hydro	7.8%	7.8%	8.5%	2.6%	4.4%	6.1%	4.0%	2.9%	2.9%
Solar	19.9%	5.8%	8.9%	23.3%	19.9%	5.4%	8.6%	27.1%	21.8%
Wind	42.3%	52.9%	59.4%	53.8%	54.7%	76.4%	73.3%	49.2%	52.8%
SHARE OF TOTAL GENERATION (%)									
Biomass	6.8%	7.1%	5.4%	5.2%	5.2%	3.1%	3.7%	5.8%	6.2%
Hydro	1.8%	1.7%	2.0%	0.7%	1.1%	1.5%	1.0%	0.8%	0.8%
Solar	4.5%	1.2%	2.1%	5.9%	4.9%	1.4%	2.2%	7.6%	6.0%
Wind	9.6%	11.2%	13.9%	13.7%	13.4%	19.4%	19.1%	13.8%	14.7%
LARGEST RENEWABLE SOURCE	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND

*GB Only (Excludes Northern Ireland)	Q3-2010	Q3-2011	Q3-2012	Q3-2013	Q3-2014	Q3-2015	Q3-2016	Q3-2017	Q3-2018
TOTAL GENERATION BY FUEL (TWh)									
Biomass	1.90	1.93	2.91	2.44	3.79	5.01	4.71	3.43	4.09
Hydro	0.94	1.35	1.06	0.77	1.05	1.09	1.21	0.72	0.53
Solar	0.00	0.06	0.48	0.85	1.46	2.80	3.11	3.23	3.97
Wind	2.69	2.85	3.86	4.02	4.80	5.88	6.61	8.91	9.63
TOTAL RENEWABLES	**5.53**	**6.20**	**8.31**	**8.07**	**11.10**	**14.78**	**15.64**	**16.30**	**18.22**
SHARE OF RENEWABLE GENERATION (%)									
Biomass	34.3%	31.1%	35.1%	30.2%	34.1%	33.9%	30.1%	21.1%	22.4%
Hydro	17.0%	21.8%	12.8%	9.5%	9.5%	7.4%	7.8%	4.4%	2.9%
Solar	0.1%	1.0%	5.8%	10.5%	13.2%	19.0%	19.9%	19.9%	21.8%
Wind	48.6%	46.0%	46.4%	49.8%	43.2%	39.8%	42.3%	54.7%	52.8%
SHARE OF TOTAL GENERATION (%)									
Biomass	2.5%	2.6%	3.9%	3.3%	5.2%	7.0%	6.8%	5.2%	6.2%
Hydro	1.2%	1.8%	1.4%	1.0%	1.4%	1.5%	1.8%	1.1%	0.8%
Solar	0.0%	0.1%	0.6%	1.1%	2.0%	3.9%	4.5%	4.9%	6.0%
Wind	3.5%	3.8%	5.1%	5.4%	6.6%	8.2%	9.6%	13.4%	14.7%
LARGEST RENEWABLE SOURCE	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND	WIND

DEMAND AND PRICES

In the quarter, prices continued to rise off the back of underlying increase in the cost of both carbon and fuel commodities. This has led to increase costs associated with generating power.



These price rises do not increase earnings at conventional coal or gas power stations in the market as their costs increase in line with their income, but these values are a significant boost to renewable projects which should all be seeing higher than expected levels of profitability.

Late in the quarter EU ETS carbon prices (applied alongside the UK-only Carbon Price Support of ~£18/te CO_2) climbed above €20/te CO_2 and these imply high carbon costs, with the levels having been as low as €5/te CO_2 in the summer of 2017.

There is the potential for these carbon costs to keep climbing with a figure of €30/te CO_2 being quoted by some market forecasters, but other market analysts see prices dropping back from these levels.

With coal already out of merit within the GB power market these changing levels do not have much impact upon fossil fuel projects except to push the cost of generation up. For these plants the increases in market prices do not correlate to increased profits due to these cost increases.

However, other projects in the market with low (fixed) fuel costs such as renewables and nuclear will be earning levels of income above the levels that would otherwise have been expected. These projects should see a significant boost that will either continue to grow or which will then fall back in future years.

The consequence for power consumers is a greater raw cost of any electricity consumed and this should translate into higher household bills.

Otherwise the market heading into winter 2018/19 looks set to see no major scarcity price effects with levels of margin looking far healthier than back in 2016/17.

Once reserve services used in 2015/16 and 2016/17 are excluded (these could not be used commercially), margins for these two winter periods amounted to a de-rated capacity margin of 1.1% and 2.2% respectively, down from 5.0% in winter 2013/14 and 4.1% in winter 2014/15.

Winter 2017/18 saw de-rated capacity margins of 10.3% and the coming winter is likely to see similar levels once National Grid publishes its Winter Outlook report for this period (not published at time of writing).

With peak prices only rising above the norm during periods of tight system margin, this should see activity in winter 2018/19 closely replicate that of winter 2017/18, excepting for any specific market events that act to drive prices up beyond the mean expectation.

Statistics

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

*GB Only (Excludes Northern Ireland)	Q3-2016	Q4-2016	Q1-2017	Q2-2017	Q3-2017	Q4-2017	Q1-2018	Q2-2018	Q3-2018
WHOLESALE PRICES (£/MWh)									
Day Ahead Price	34.59	52.25	48.00	40.00	43.00	50.00	53.00	53.00	61.25
Within Day Price (MIDP)	33.36	50.45	47.00	40.00	42.00	50.00	55.00	52.00	59.64
WITHIN DAY PRICE BREAKDOWN (£/MWh)									
Off-Peak Hours	27.75	37.13	40.53	33.87	34.79	43.34	39.62	40.51	49.86
Peak Hours (excl Superpeak)	36.95	48.29	47.15	41.81	44.67	50.30	46.50	46.79	62.94
Superpeak Hours	33.36	87.81	62.85	47.66	49.03	61.47	57.72	50.11	67.06
SYSTEM BUY PRICE (£/MWh)									
Maximum	801.77	1528.72	292.55	1509.80	176.69	178.00	990.00	1528.72	189.26
Average	35.91	51.45	46.00	40.00	41.00	49.00	57.00	52.00	59.13
Minimum	-114.99	-153.89	-14.00	-73.15	-25.00	-69.17	-150.00	-153.89	-71.45
SYSTEM SELL PRICE (£/MWh)									
Maximum	801.77	1528.72	292.55	1509.80	176.69	178.00	990.00	1528.72	59.00
Average	35.91	51.45	46.00	40.00	41.00	49.00	57.00	52.00	59.13
Minimum	-114.99	-153.89	-14.00	-73.15	-25.00	-69.17	-150.00	-153.89	59.00
DEMAND (MW)	27,981	35,186	36,835	30,600	29,459	34,448	37,910	31,775	29,704
AVAILABILITY (MW)	46,133	50,859	55,672	47,496	44,155	54,618	59,411	49,746	43,719
MARGIN (MW)	21,597	17,303	21,062	20,031	17,401	22,138	24,100	21,620	17,226
MIN MARGIN (MW)	3,154	3,516	1,287	2,959	4,318	3,682	4,197	4,953	4,076
DEMAND (TWh)	61.8	77.7	79.6	66.8	65.0	76.1	81.9	69.4	65.6
AVAILABILITY (TWh)	101.9	112.3	120.3	103.7	97.5	120.6	128.3	108.6	96.5
MARGIN (TWh)	47.7	38.2	45.5	43.7	38.4	48.9	52.1	47.2	38.0
MIN MARGIN (TWh)	7.0	7.8	2.8	6.5	9.5	8.1	9.1	10.8	9.0

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.

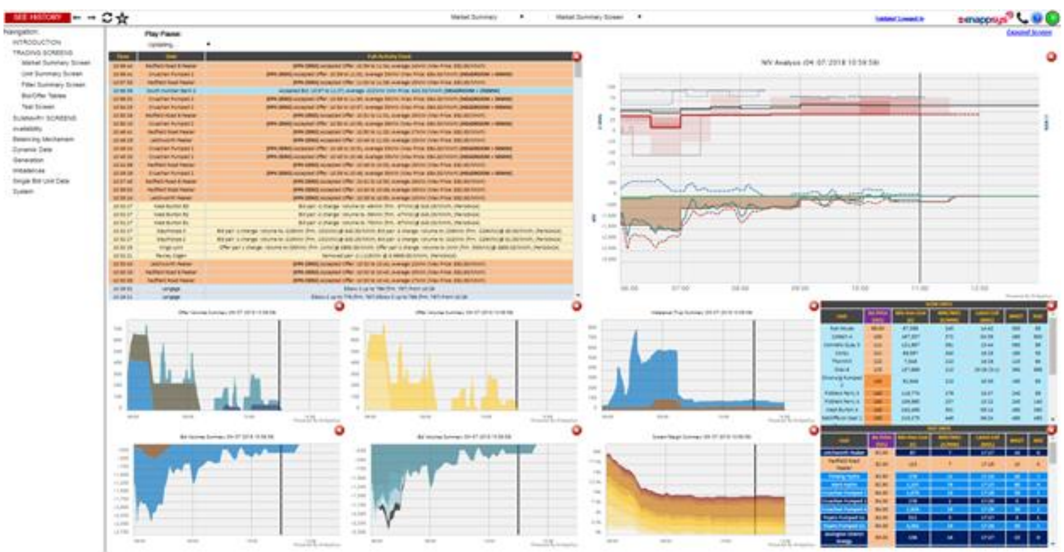
ABOUT ENAPPSYS

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.