



EnAppSys
ENERGY INSIGHT

GB Electricity Market Summary

Third Quarter 2019

July to September

Gas: 24.7TWh (-14%)
Imports: 4.3TWh (-24%)

Renewables: 24.4TWh (+5%)
Coal: 0.4TWh (+12%)

Nuclear: 12.8TWh (+3%)

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Executive Summary

The third quarter of 2019 – running from the start of July through to the end of September – was very nearly a landmark quarter for renewable generation, with power generation from fossil fuel sources only being slightly higher than that from renewable sources.

In the quarter, fossil fuels generated a combined 25.1TWh, of which 24.7TWh came from gas-fired power stations and 0.4TWh from coal-fired power stations. Against these figures, renewables generated 24.4TWh, coming close to exceeding fossil fuel output for the first time in recorded history.

These renewable generation levels were not the highest on record, with the record high for renewable generation in a quarter being the 28.2TWh produced in the fourth quarter of 2018. However, while renewable generation levels dip in the summer months due to reduced wind speeds, the quarter still saw higher levels of renewable production than that achieved in the fourth quarter of 2017, signalling the on-going growth in output.

A major factor in this growth has been the on-going commissioning of new wind projects, with offshore wind farms continuing to come online, with further increase set to be boosted by the award of CfD contracts to new offshore wind projects.

In the quarter levels of nuclear generation dropped 20% from the levels achieved in Q3 2018 and this 3.3TWh drop in power output was a key factor in higher than might otherwise be expected gas-fired generation levels.

Without this drop in nuclear output, renewable projects would have been expected to generate more power than fossil fuel power stations over the course of a quarter for the first time in recorded history. It now looks only a matter of time before renewables start overtaking fossil fuels in Great Britain.

Coal generations continue to be very low (less than 1% of total production) with numerous plants set to be closed by this time in 2020.

Power prices in the quarter were low, with this being driven by a greater than 50% drop in gas prices since the same period in 2018. Peak prices within the market were also low

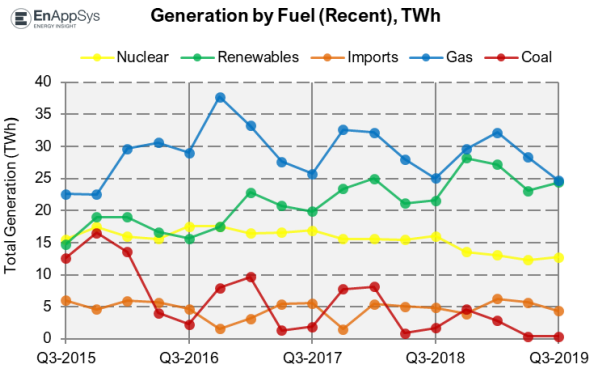
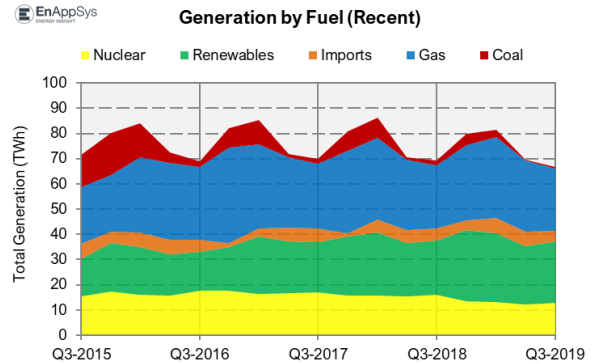
as the market continues to be well supplied, although the coal closures occurring in the market might increase peak prices around tightly supplied events in future years.

In the quarter 37.0% of power came from gas-fired plants and 36.7% from renewables. The remaining power came from nuclear (19.2%), imports (6.5%) and coal plants (0.6%).

Fuel Activity Overview

The third quarter of 2019, saw the largest share of generation come from gas-fired power stations, which have been ever-present as Great Britain's primary source of power generation since the decline in coal generation, back in 2014.

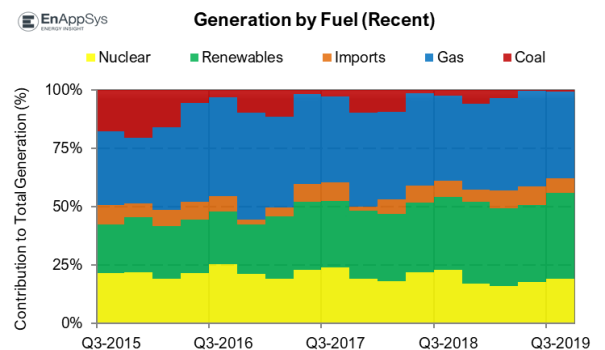
Overall this amounted to 24.7TWh of power production, with this being down 14% from the previous quarter, but only down 2% from the same quarter in 2018.



Only very slightly behind gas power stations in terms of overall electricity production were renewable projects (biomass, hydro, solar & wind), which produced a combined 24.4TWh of power in the quarter.

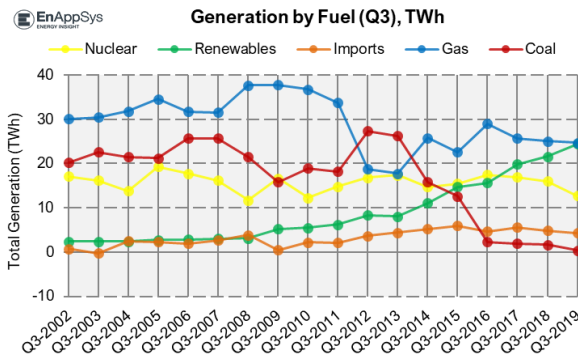
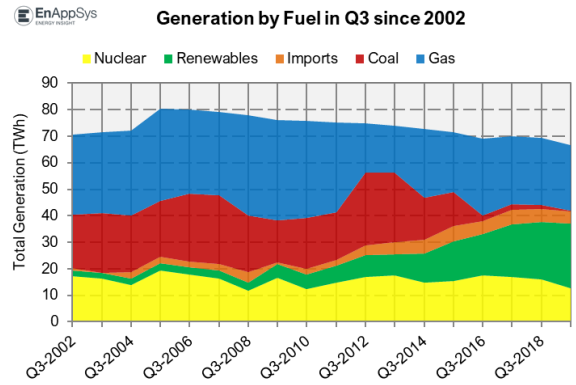
These levels were only 1% less than the power output from gas power stations, with the quarter nearly being the first in recorded history where renewable plants as a combined entity produced more power than any other power source.

These levels came as renewable output climbed 5% from the previous quarter, with a significant 13% climb in



generation levels from the same period in the previous year. This increase is detailed further in the renewables section of this report, but was driven by significantly increased levels of wind generation and despite a drop in levels of solar output year-to-year.

One of the main factors preventing renewables from overtaking fossil fuels as the primary source of electricity supply in the quarter was a 20% drop in levels of nuclear generation from Q3 2018.



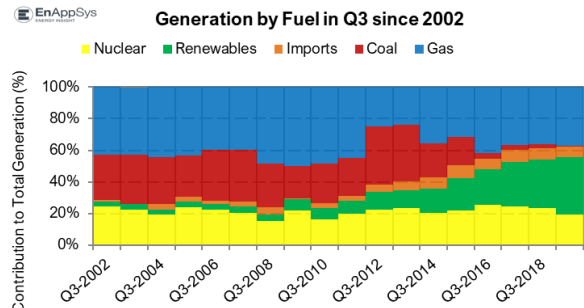
This saw nuclear output levels fall from 16.0TWh in Q3 2018 to 12.8TWh in Q3 2019, with this resulting from the prolonged outages at Dungeness B and Hunterston power stations.

Without these reductions renewable projects within Great Britain would have generated more power than fossil fuel power stations for the first time in recorded history.

fossil fuel power stations for the first time in recorded history.

Of the five summarized fuel types considered, only renewables saw increased levels of generation year-to-year from Q3 2018 and included in the reductions was an 11% drop in levels of power imports from Ireland and the continent.

This drop has resulted from a reduced flow of power from France to Great Britain and with periods of reversal in the quarter stemming from more similar pricing in France and Great Britain than has



traditionally been the case. This has resulted from significant reductions in British prices since Q3 2018.

Coal-fired power stations continue to deliver on a minor share of British power generation (less than 1% of the total), with a number of closures set to be completed by Q3 2020. At this point coal has largely exited the Great British power market.

In the quarter 37.0% of power generation came from gas-fired power stations, 36.7% from renewable projects, 19.2% from nuclear plants, 6.5% from power imports and 0.6% from coal plants.

Statistics

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

*GB Only (Excludes Northern Ireland)	Q3-2017	Q4-2017	Q1-2018	Q2-2018	Q3-2018	Q4-2018	Q1-2019	Q2-2019	Q3-2019
TOTAL GENERATION BY FUEL (TWh)									
Coal	1.91	7.73	8.13	0.92	1.71	4.63	2.85	0.36	0.41
Gas	25.73	32.63	32.15	27.99	25.08	29.60	32.21	28.31	24.67
Imports	5.56	1.53	5.42	5.06	4.86	3.93	6.24	5.67	4.33
Nuclear	16.91	15.59	15.60	15.48	16.02	13.59	13.06	12.28	12.78
Renewables (Biomass, Wind, Solar & Hydro)	19.89	23.42	25.01	21.16	21.56	28.19	27.22	23.06	24.41
FOSSIL FUELS	27.64	40.36	40.28	28.91	26.79	34.24	35.05	28.67	25.08
TOTAL	69.99	80.91	86.30	70.60	69.23	79.94	81.58	69.67	66.60

Fossil Fuel Percentage	39%	50%	47%	41%	39%	43%	43%	41%	38%
Clean Percentage (Renewable & Nuclear)	53%	48%	47%	52%	54%	52%	49%	51%	56%
Renewable Share of Clean Power	54%	60%	62%	58%	57%	67%	68%	65%	66%

SHARE OF GENERATION (%)									
Coal	2.7%	9.6%	9.4%	1.3%	2.5%	5.8%	3.5%	0.5%	0.6%
Gas	36.8%	40.3%	37.3%	39.6%	36.2%	37.0%	39.5%	40.6%	37.0%
Imports	7.9%	1.9%	6.3%	7.2%	7.0%	4.9%	7.6%	8.1%	6.5%
Nuclear	24.2%	19.3%	18.1%	21.9%	23.1%	17.0%	16.0%	17.6%	19.2%
Renewables (Biomass, Wind, Solar & Hydro)	28.4%	29.0%	29.0%	30.0%	31.1%	35.3%	33.4%	33.1%	36.7%

*GB Only (Excludes Northern Ireland)	Q3-2017	Q4-2017	Q1-2018	Q2-2018	Q3-2018	Q4-2018	Q1-2019	Q2-2019	Q3-2019
AVERAGE GENERATION BY FUEL (GW)									
Coal	1.91	7.73	8.13	0.92	1.71	4.63	2.85	0.36	0.41
Gas	25.73	32.63	32.15	27.99	25.08	29.60	32.21	28.31	24.67
Imports	5.56	1.53	5.42	5.06	4.86	3.93	6.24	5.67	4.33
Nuclear	16.91	15.59	15.60	15.48	16.02	13.59	13.06	12.28	12.78
Renewables (Biomass, Wind, Solar & Hydro)	19.89	23.42	25.01	21.16	21.56	28.19	27.22	23.06	24.41
FOSSIL FUELS	27.64	40.36	40.28	28.91	26.79	34.24	35.05	28.67	25.08
TOTAL	69.99	80.91	86.30	70.60	69.23	79.94	81.58	69.67	66.60

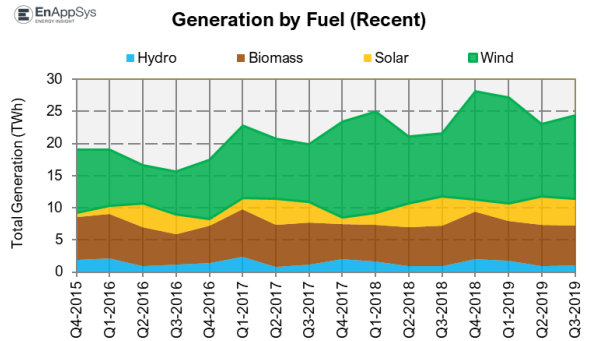
*GB Only (Excludes Northern Ireland)	Q3-2011	Q3-2012	Q3-2013	Q3-2014	Q3-2015	Q3-2016	Q3-2017	Q3-2018	Q3-2019
TOTAL GENERATION BY FUEL (TWh)									
Coal	18.22	27.37	26.29	15.87	12.63	2.28	1.91	1.71	0.41
Gas	33.75	18.76	17.73	25.81	22.57	29.02	25.73	25.08	24.67
Imports	2.16	3.68	4.45	5.27	5.98	4.65	5.56	4.86	4.33
Nuclear	14.84	16.87	17.41	14.70	15.51	17.51	16.91	16.02	12.78
Renewables (Biomass, Wind, Solar & Hydro)	6.20	8.31	8.07	11.10	14.78	15.66	19.89	21.56	24.41
FOSSIL FUELS	51.97	46.13	44.02	41.68	35.20	31.31	27.64	26.79	25.08
TOTAL	75.17	75.00	73.95	72.75	71.48	69.12	69.99	69.23	66.60

Fossil Fuel Percentage	69%	62%	60%	57%	49%	45%	39%	39%	38%
Clean Percentage	28%	34%	34%	35%	42%	48%	53%	54%	56%
Renewable Share of Clean Power	8%	11%	11%	15%	21%	23%	28%	31%	37%

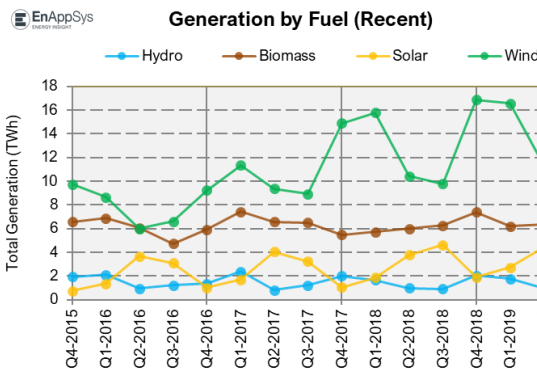
SHARE OF GENERATION (%)									
Coal	24.2%	36.5%	35.5%	21.8%	17.7%	3.3%	2.7%	2.5%	0.6%
Gas	44.9%	25.0%	24.0%	35.5%	31.6%	42.0%	36.8%	36.2%	37.0%
Imports	2.9%	4.9%	6.0%	7.3%	8.4%	6.7%	7.9%	7.0%	6.5%
Nuclear	19.7%	22.5%	23.5%	20.2%	21.7%	25.3%	24.2%	23.1%	19.2%
Renewables (Biomass, Wind, Solar & Hydro)	8.3%	11.1%	10.9%	15.3%	20.7%	22.7%	28.4%	31.1%	36.7%

Renewables

Overall levels of renewable generation climbed significantly, up by 13%, from Q3 2018, although only wind farms saw a significant increase in generation over this period, with biomass and solar projects seeing decreased output year-on-year.



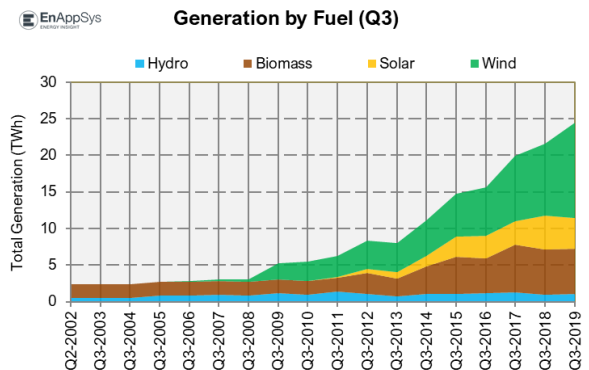
Of the overall 24.4TWh of power produced from renewables, 13.0TWh were from wind farms, 6.2TWh from biomass plants, 4.2TWh from solar projects and 1.1TWh from hydro plants.



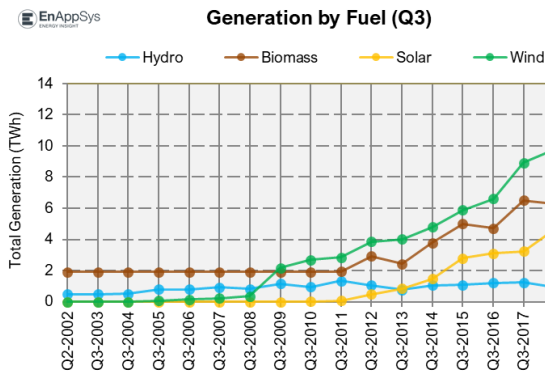
This meant that wind farms continue to be the largest source of renewable power within Great Britain, with over half the renewable power coming from wind farms in

the quarter despite the fact that wind speeds drop and solar radiation levels climb during the summer months.

This growth has been driven by the increased levels of capacity available across Britain as new offshore wind farms continue to come online. New CfD contract awards are set to see very significant growth in future offshore wind capacity over the coming years.



The next largest share of renewable power came from biomass projects, which had a dip in output in the quarter, but which still continue to provide a large share of renewable power.



With growth in solar capacity levels plateauing, solar plants produced 4.2TWh, down from 4.6TWh in Q3 2018, with further growth set to be limited without a major upheaval in support for these projects. Further solar can be built subsidy free, but this is reliant on being able to move

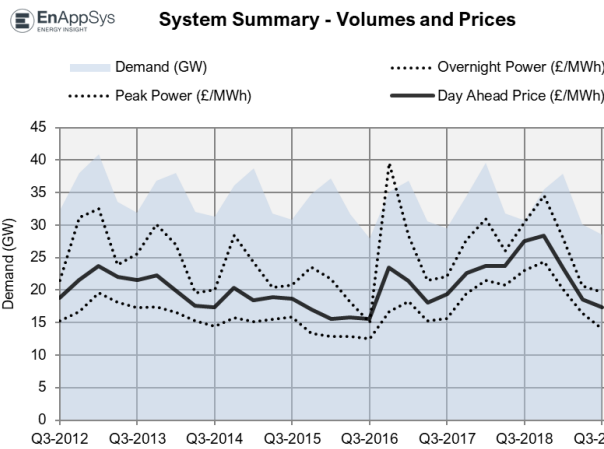
power into adjacent – higher demand – periods to avoid cannibalization of revenues.

Hydro plants produced 1.1TWh which represented an increase of 19% from the previous year, with the limited number of new projects preventing any significant growth from these production levels.

In the quarter wind farms generated 53.1% of all renewable generation, biomass 25.2%, solar farms 17.2% and hydro 4.5%. As a percentage of total generation wind farms produced 19.5%, biomass 9.2%, solar 6.3% and hydro 1.6%.

Demand and Prices

Although the Q3 period of 2019 saw an extreme event in which power cuts occurred across the country, this did not translate into major pricing activity as this was a frequency event (a brief under supply caused by a failure) rather than a supply event



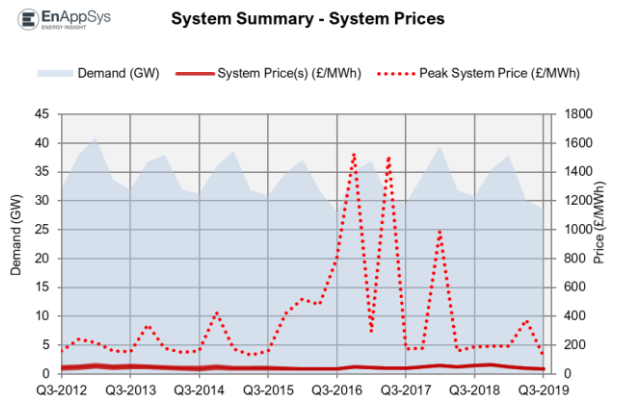
(a shortage of additional supply).

Overall prices in the market fell in Q3 2019, driven by a combination of falling gas prices and strong levels of renewable generation.

Compared against activity in Q3 2018, gas prices are down

by over 50% and this has reduced the overall cost of power in the market as gas in the marginal fuel that sets the price within Great Britain.

With plants often being slightly delayed in returning from outages, September can be a month of the year that sees high “system” prices.



These system (or imbalance, or cashout) prices are the prices that must be paid by generators that have a shortfall of power against

the levels they have promised to deliver. So far these levels have continued to remain low throughout 2019, although the closure of coal plants could see these levels increase in future years.

Statistics

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

*GB Only (Excludes Northern Ireland)	Q3-2017	Q4-2017	Q1-2018	Q2-2018	Q3-2018	Q4-2018	Q1-2019	Q2-2019	Q3-2019
WHOLESALE PRICES (£/MWh)									
Day Ahead Price	43.05	50.24	52.72	52.66	61.25	62.98	51.82	41.18	38.50
Within Day Price (MIDP)	42.01	49.62	54.62	51.65	59.73	61.67	50.83	40.99	37.25
WITHIN DAY PRICE BREAKDOWN (£/MWh)									
Off-Peak Hours	34.79	43.34	47.64	46.26	51.32	54.03	44.70	36.52	31.22
Peak Hours (excl Superpeak)	44.67	50.30	55.00	53.39	62.89	62.39	51.22	42.32	39.27
Superpeak Hours	49.03	61.47	68.81	57.77	67.71	76.64	62.29	45.97	43.69
SYSTEM PRICE (£/MWh)									
Maximum	176.69	178.00	990.00	158.00	189.26	191.37	195.00	375.00	120.00
Average	41.10	49.46	57.50	50.64	59.38	62.42	50.81	41.27	36.56
Minimum	-25.00	-69.17	-150.00	-92.38	-71.45	-68.40	-70.24	-71.26	-65.93
Demand (MW)	29,459	34,448	39,527	31,840	30,719	35,472	37,905	30,142	28,574
Availability (MW)	45,186	55,505	59,823	49,443	49,530	56,442	59,955	59,956	59,957
Demand (TWh)	65.0	76.1	85.4	69.5	67.8	78.3	81.9	65.8	63.1
Availability (TWh)	99.8	122.6	129.2	108.0	109.4	124.6	129.5	130.9	132.4

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 come from Elexon (as does the FUELHH data), with the exception of the APX day-ahead prices.

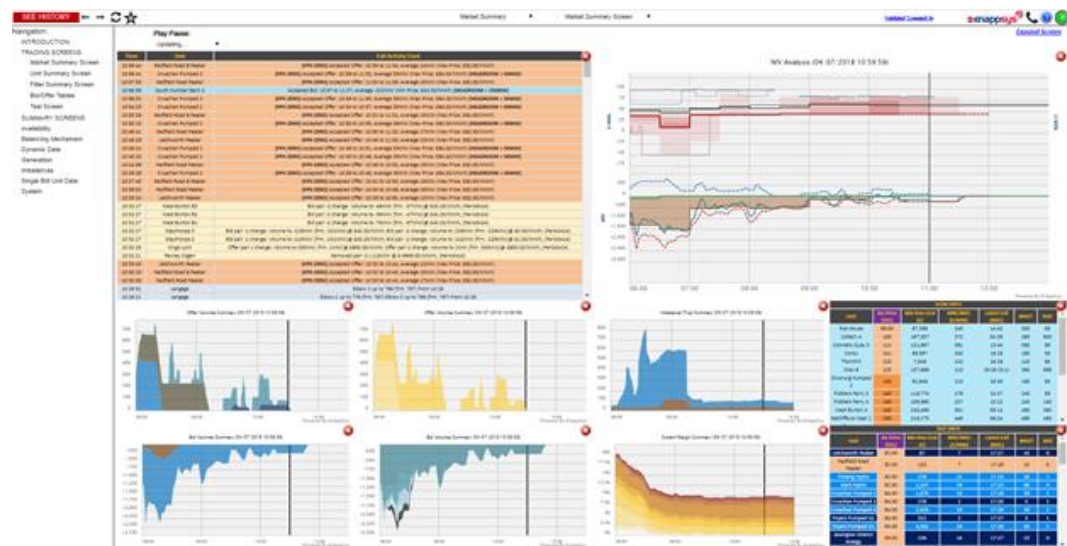
Availability levels are calculated by totaling levels of recorded availability at all plants in the market.

About EnAppSys

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

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.

The company has a European platform which covers underlying activity across all European markets with more detailed information available across Ireland, Belgium and the Netherlands with additional content in other regions being continuously built out.



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