

GB Electricity Market Summary

Q3-2022

July to September

Generation and Contribution by Fuel Type

Renewables:	24.9TWh (-6%)	Gas:	30.63TWh (+7%)	Nuclear:	10.17TWh (-16%)
Renewables excl. biomass:	18.42TWh (-14%)	Coal:	1.12TWh (+237%)	Net Imports:	-4.59TWh (26%)

% changes stated with respect to values in the previous quarter

Contents

1	Quarterly Review of GB Electricity Market Q3 2022	3
	Demand.....	5
	Generation.....	5
	Prices	6
	Interconnectors.....	7
2	Notes on the Report	11

1 Quarterly Review of GB Electricity Market Q3 2022

Although high gas prices dominated the energy landscape during Q3, feeding through into high electricity prices, GB produced its highest quarterly levels of gas-fired generation for many years in order to meet high demand for exports from GB to Europe through interconnectors with France, Norway, Belgium and the Netherlands. This was a consequence of poor availability in the French nuclear fleet, a Europe-wide drought and higher gas prices on the European mainland.

This quarter saw increased pressure in the GB electricity market as gas prices resumed their escalation, having fallen from Q1 2022 to Q2 2022 following the initial spike in prices at the outbreak of the war in Ukraine. The consequent increase in generation costs during Q3 led to a rise in wholesale power prices, with all-time high averages for day-ahead, within-day and system prices seen. Nevertheless, gas prices and electricity generation costs were generally more favourable in GB than in mainland Europe, so GB remained a net exporter this quarter. This was primarily due to GB's lower dependency on Russian gas imports than European countries. Much of GB's gas is produced in the North Sea, while imports come mainly from Norway and LNG imports from Qatar and the US. This means, that very little GB gas has historically come from Russia and so GB has been more shielded from the worst of the recent gas spikes than many of its European neighbours which do not have LNG import facilities.

Across Europe, uncertainty in gas supplies continued and prices increased materially through July and August, with GB gas prices peaking at £187.36/MWh in late August. Russia shut down the Nord Stream 1 pipeline's gas flows to Germany for maintenance in July for ten days and following the conclusion of the maintenance, gas flows through the pipeline were limited to just 20% of capacity throughout August. By September, flows were halted indefinitely. Towards the end of September, gas leaks were observed at both Nord Stream 1 and the as-yet unused Nord Stream 2, meaning that the pipelines are likely to remain out of use for an extended period. These events saw the prevailing GB gas price in this quarter climb from the £55.65/MWh seen at the close of last quarter to reach a peak of £187.36/MWh around the end of August. By the end of the quarter, however, gas prices declined to £61.45/MWh as European gas storages had been filled.

GB continued to be a net power exporter again this quarter (having become a net exporter rather than importer in the previous quarter). Total net power export from the GB interconnectors this quarter stood at 4.59TWh which was a 26% increase from the previous quarter due to a combination of events. As a consequence of reduced availability of the French nuclear fleet due to stress corrosion cracking problems, an issue that began earlier in the year, interconnectors exported heavily to

France during the quarter. This was compounded by periods of drought that resulted in limited river water cooling for reactors.

GB also became a net exporter to Norway which was affected by the drought, limiting their hydro output for the quarter.

As a consequence of the high levels of exports, GB's dispatchable generation fleet saw high levels of utilisation with a total CCGT output of 31TWh for Q3.

The key takeaways from the quarter are:

- Gas prices opened the quarter at £55.65/MWh and increased to a peak of £187.36/MWh, the second highest price of all-time after the peak directly following the Russian invasion of Ukraine in Q1 2022.
- The lowest gas price recorded in this quarter was £44.72/MWh and was observed between 2nd September and 4th September, shortly after Russia's indefinite shutdown of the Nord Stream 1 pipeline.
- Wholesale prices continued to increase, being almost double the prices seen in the previous quarter on average.
- The French nuclear fleet continued seeing low availability, resulting in the French interconnectors collectively being in a net export position for 94% of half-hours for the quarter.
- Interconnectors retained their exporting position, seeing an increase in net flow from 3.64TWh to 4.59TWh.
- Transmission system demand in this quarter (not including interconnector demand) was the lowest for any Q3 in recent years.
- Transmission system demand in this quarter (including interconnector demand) was the highest for any Q3 since 2018.
- Despite high gas prices, gas-fired generation continued to be highly utilised, with this quarter seeing the highest CCGT utilisation of any quarter since Q1 2019 in order to meet demand for exports to Europe.
- Wind generation in this quarter was higher than Q3 2021, though it was around 1.6% less than Q3 2020 and 15.3% less than Q2 2022.
- Coal generation saw an increase in utilisation from last quarter with only fourteen days in which no coal generation was seen. Generation was higher than Q3 2020 but less than Q3 2021 by 2.6%.

Demand

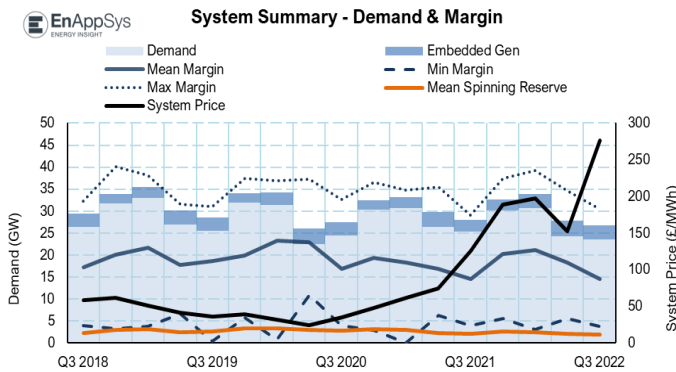


Figure 1: Total system summary – demand & margin across Q3 2018 - Q3 2022

This quarter saw the lowest underlying demand for any Q3 in recent years which strongly indicates that the overall trend of decreasing transmission level system demand is continuing, despite fairly consistent levels of demand between Q3 2020 and Q3 2021. The total transmission level system demand recorded this quarter was 52.0TWh (against 55.8TWh in Q3 2021 and 52.9TWh in Q2 2022). Upon inclusion of the embedded generation, this increases to 59.1TWh, which makes it the lowest overall demand since Q2 2020 (not including interconnector demand). However, when interconnector demand is included, this quarter saw the highest transmission system demand of any Q3 since 2018.

Generation

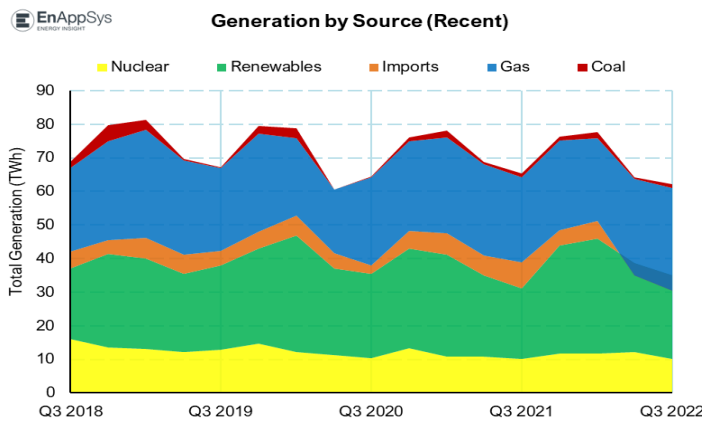


Figure 2: Stacked total quarterly generation by the main fuel groups

With a total generation of 30.6TWh, the gas-fired CCGT fleet retained its position as the largest single fuel type in the generation mix. This is the highest level of gas-fired generation since Q1 2019 despite solar generation in this quarter being the highest of any Q3 on record, in part due to the heatwave in July. The high presence of gas-fired generation in the fuel mix can be attributed to the high levels of exports arising from GB gas prices, and hence the cost of generation, being generally lower than in mainland Europe. Total renewable generation, including the dispatchable biomass fleet, stood at 24.9TWh, making this the second consecutive quarter in which gas generation was larger than total renewable generation. Wind was the largest of the renewable sources with generation at 13.5TWh followed by biomass at 6.5TWh, solar at 4.3TWh and lastly hydro which stood at 0.71TWh. Nuclear output saw less generation than the previous quarter, but was higher than Q3 2021 despite the closure of Hunterston at the end of 2021.

Prices

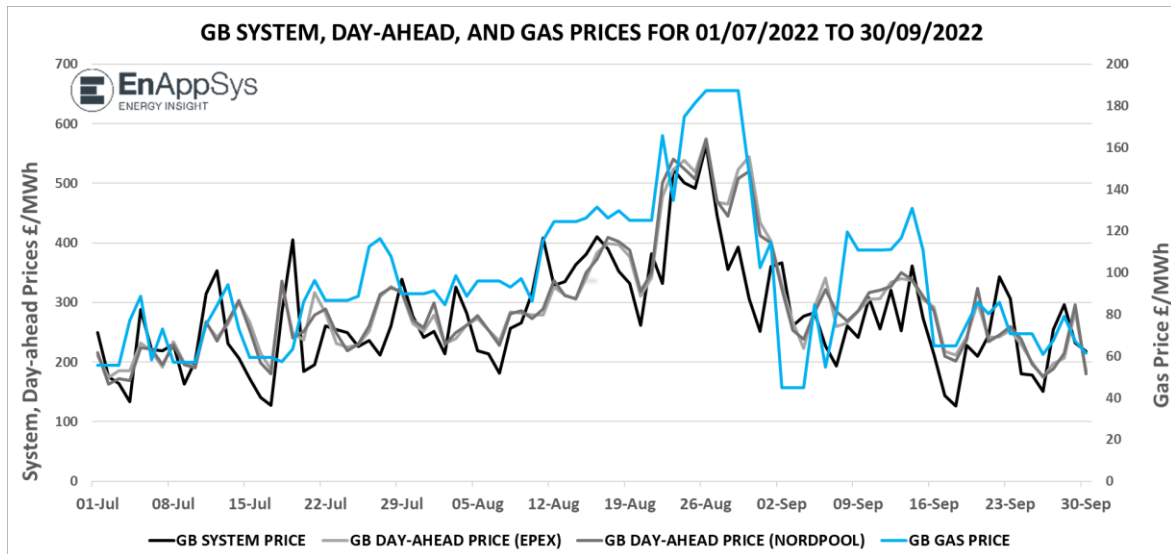


Figure 3: GB system, day-ahead and gas prices for Q3 2022.

High gas prices brought about high wholesale power prices in this quarter that reached almost double the price compared to Q2 2022 and was more than double compared to Q3 2021 (i.e. the quarter in which the increasing trend of prices began). Day-ahead electricity prices in the EPEX and Nordpool auctions averaged £294.75/MWh and £294.79/MWh, respectively.

From 2nd to 4th September, gas prices fell steeply to low values of £44.73/MWh, the lowest attained in the quarter. On 5th September, the halt in gas flows through the Nord Stream 1 pipeline triggered a steep reversal of the decline, with prices above £100/MWh being seen throughout the following week. However, by the end of the month prices fell again to be ~£60/MWh.

From Figure 4, it can be seen that the breakeven range for gas-fired units in this quarter rose significantly above that of coal units, reaching levels close to that seen shortly after the Ukraine war outbreak, having been below the range for coal units in the previous quarter.

Between August 26th and 29th, gas prices peaked at £187.36/MWh, not far beneath the £208.17/MWh seen on March 7th.

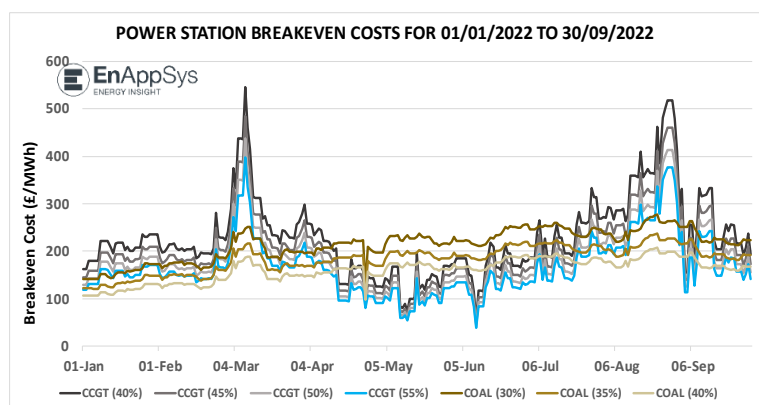


Figure 4: Breakeven costs for coal- and gas-fired units across Q1-Q3 2022.

The EPEX and Nordpool auctions saw their lowest day-ahead prices on different days with £63.4/MWh for EPEX at 03:00 on September 26th and £95.37/MWh for Nordpool at 15:30 on September 30th. Both lows were during periods of low demand and high levels of wind generation.

Interconnectors

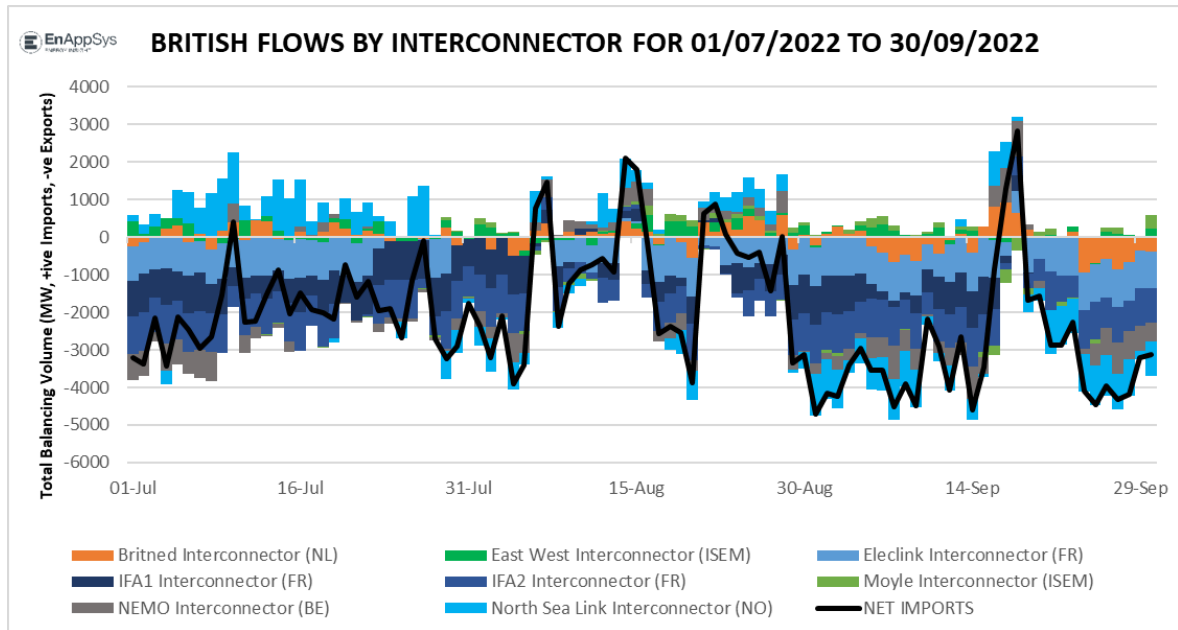


Figure 5: GB physical flows by country for Q3 2022. Orange=NL, Dark Blue=FR, Grey=BE, Green=ISEM, Light Blue=NO

GB continued to be in a net export position this quarter with a total of 4.59TWh of power leaving the Island, a 26.1% increase from last quarter. France maintained its position as the country with the largest import volume from GB, owing to stress corrosion cracking and a drought affecting its nuclear fleet. A net volume of 4.41TWh was exported from GB to France, compared to 3.37TWh in the previous quarter, with all three of the GB-FR interconnectors (IFA1, IFA2, and Eleclink) seeing very high utilisation. Belgium and Norway received net volume exports from GB of 0.46TWh and 0.07TWh respectively. North Sea Link was mostly in an export from GB position for the second half of the quarter due to a low reservoir levels resulting in low hydro output in Norway.

The longer term context becomes apparent when seen against the trend over the last 7 years as shown in Figure 6.¹ It has historically been highly unusual to see the level of exports that we have seen in the previous two quarters.

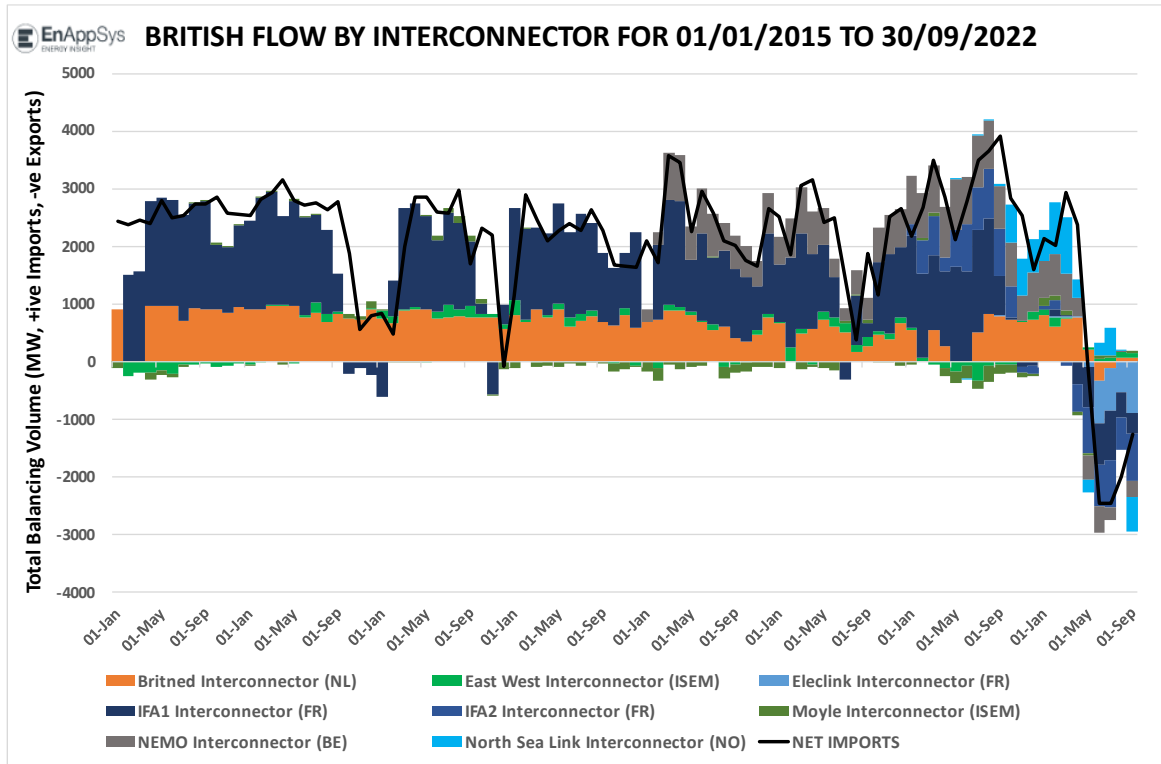


Figure 6: GB physical flows by country for 2015-2022. Orange=NL, Dark Blue=FR, Grey=BE, Green=ISEM, Light Blue=NO

North Sea Link highlights the magnitude of the change in interconnector flows seen in recent months. Running between GB and Norway, it commenced operation in October 2021 and had primarily been used to import energy into the GB market up until early Q2 2022. From that point on, it began to see exports from the GB market into Norway, despite Norway historically seeing lower wholesale power prices due to the large component hydro generation comprises in the Norwegian generation mix.

¹ Charts from EnAppSys platform:

<https://app.enappsys.com/#gb/elec/inter/bycountry/chart&start=202207010000&end=202210010100>

Appendix: Supporting Tables

The tables below shows key statistics on generation in the quarter and all previous quarters over the last two years. Biomass and hydro values for the reporting quarter contain estimates for the embedded portion of the fleet, based on the same quarter last year as this data is published at a lag of ~3 months by BEIS². Note that all percentages are given as a percentage of total generation including imports.

Table 1: Quarterly generation summary Q3 2022 (TWh)

*GB Only (Excludes Northern Ireland)	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022
TOTAL GENERATION BY FUEL (TWh)									
Coal	0.27	1.06	2.05	0.55	1.15	1.23	1.88	0.33	1.12
Gas	26.18	26.67	28.42	27.10	25.36	26.57	24.63	28.70	30.63
Imports	2.51	5.40	6.44	6.09	7.74	4.62	5.23	-3.64	-4.59
Nuclear	10.43	13.43	10.85	10.79	10.09	11.66	11.74	12.14	10.17
Biomass	6.35	7.12	7.65	7.05	6.32	7.71	7.00	5.15	6.48
Wind	13.68	19.01	19.25	11.48	10.41	21.29	23.27	15.91	13.46
Solar	3.86	1.16	1.69	4.53	3.75	1.25	1.98	4.46	4.25
Hydro	1.21	2.24	1.71	1.09	0.63	2.05	1.92	1.06	0.71
RENEWABLES (Biomass, Wind, Solar & Hydro)	25.09	29.53	30.29	24.16	21.11	32.30	34.18	26.58	24.90
NON-DISPATCHABLE RENEWABLES (Wind, Solar & Hydro)	18.75	22.40	22.65	17.11	14.79	24.59	27.18	21.43	18.42
FOSSIL FUELS (Gas & Coal)	26.44	27.72	30.46	27.65	26.51	27.80	26.51	29.04	31.76
TOTAL GB GENERATION (excl. Imports)	61.96	70.67	71.61	62.60	57.72	71.76	72.43	67.76	66.82
TOTAL GB CONSUMPTION (incl. Imports)	64.47	76.07	78.05	68.70	65.45	76.37	77.67	64.11	62.23
Fossil Fuel Percentage	41%	36%	39%	40%	41%	36%	34%	45%	51%
Clean Percentage (Renewable & Nuclear)	55%	56%	53%	51%	48%	58%	59%	60%	56%
Renewable Share of Clean Power	71%	69%	74%	69%	68%	73%	74%	69%	71%
SHARE OF GENERATION (%)									
Coal	0.4%	1.4%	2.6%	0.8%	1.8%	1.6%	2.4%	0.5%	1.8%
Gas	40.6%	35.1%	36.4%	39.5%	38.7%	34.8%	31.7%	44.8%	49.2%
Imports	3.9%	7.1%	8.2%	8.9%	11.8%	6.0%	6.7%	-5.7%	-7.4%
Nuclear	16.2%	17.6%	13.9%	15.7%	15.4%	15.3%	15.1%	18.9%	16.3%
Renewables (Biomass, Wind, Solar & Hydro)	38.9%	38.8%	38.8%	35.2%	32.3%	42.3%	44.0%	41.5%	40.0%

Table 2: Year-on-year comparison of Q3 generation output (TWh and %)

*GB Only (Excludes Northern Ireland)	Q3 2014	Q3 2015	Q3 2016	Q3 2017	Q3 2018	Q3 2019	Q3 2020	Q3 2021	Q3 2022
TOTAL GENERATION BY FUEL (TWh)									
Coal	15.86	12.63	2.28	1.91	1.71	0.41	0.27	1.15	1.12
Gas	25.79	22.57	29.03	25.73	25.07	24.66	26.18	25.36	30.63
Imports	5.27	5.98	4.65	5.56	4.86	4.33	2.51	7.68	-4.59
Nuclear	14.69	15.51	17.51	16.91	16.02	12.77	10.43	10.09	10.17
RENEWABLES (Biomass, Wind, Solar & Hydro)	9.16	11.72	13.75	16.93	21.09	25.11	25.09	21.11	24.90
FOSSIL FUELS	41.65	35.20	31.31	27.64	26.78	25.07	26.44	26.51	31.76
TOTAL GB GENERATION (excl. Imports)	65.50	62.43	62.57	61.48	63.90	62.94	61.96	57.72	66.82
TOTAL GB CONSUMPTION (incl. Imports)	70.77	68.42	67.22	67.04	68.76	67.28	64.47	65.40	62.23
Fossil Fuel Percentage	59%	51%	47%	41%	39%	37%	41%	41%	51%
Clean Percentage	34%	40%	47%	50%	54%	56%	55%	48%	56%
Renewable Share of Clean Power	13%	17%	20%	25%	31%	37%	39%	32%	40%
SHARE OF GENERATION (%)									
Coal	22.4%	18.5%	3.4%	2.8%	2.5%	0.6%	0.4%	1.8%	1.8%
Gas	36.4%	33.0%	43.2%	38.4%	36.5%	36.7%	40.6%	38.8%	49.2%
Imports	7.4%	8.7%	6.9%	8.3%	7.1%	6.4%	3.9%	11.7%	-7.4%
Nuclear	20.8%	22.7%	26.1%	25.2%	23.3%	19.0%	16.2%	15.4%	16.3%
RENEWABLES (Biomass, Wind, Solar & Hydro)	12.9%	17.1%	20.5%	25.3%	30.7%	37.3%	38.9%	32.3%	40.0%

² [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))

Table 3 below shows key statistics on generation in the quarter and all previous quarters over the last two years. The wholesale and within-day prices shown are averages across the quarter in Table 4, whilst the system prices are given with minimum, average and maximum values³.

Table 3 Quarterly price summary Q3 2020 to Q3 2022

*GB Only (Excludes Northern Ireland)	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022
WHOLESALE PRICES (£/MWh)									
EPEX Day-Ahead Price	36.42	47.51	63.67	72.20	128.59	205.27	200.80	155.32	294.75
Nordpool Day-Ahead price	36.42	47.51	63.67	72.20	128.59	203.17	199.63	153.40	294.79
Within Day Price (MIDP)	35.33	45.42	59.62	71.80	125.19	191.25	194.30	149.28	282.00
WITHIN DAY PRICE BREAKDOWN (£/MWh)									
Off-Peak Hours	28.82	33.49	46.19	62.71	100.21	156.55	165.99	136.51	249.17
Peak Hours (excl Superpeak)	36.77	47.55	58.89	75.06	129.48	195.78	196.87	152.53	286.26
Superpeak Hours	45.11	65.25	93.27	81.01	166.34	254.87	249.86	166.86	334.87
SYSTEM PRICE (£/MWh)									
Maximum	540.22	849.82	4000.00	1971.59	4037.80	3916.28	4035.98	494.23	890.00
Average	35.54	47.49	62.04	74.85	126.14	188.62	197.64	152.31	276.40
Minimum	-60.00	-63.93	-61.00	-59.95	-66.73	-70.97	-90.32	-69.49	-68.53
Transmission System Demand (MW average)	24,380	30,303	30,593	26,323	25,258	30,075	30,738	24,224	23,572
Demand Incl. Embedded Gen. (MW average)	27,443	32,515	33,148	29,719	28,023	32,630	33,968	27,866	26,782
Transmission System Demand (TWh total)	53.8	66.9	66.1	57.5	55.8	66.4	66.4	52.9	52.0
Demand Incl. Embedded Gen. (TWh total)	60.6	71.8	71.6	64.9	61.9	72.0	73.4	60.9	59.1

Table 4: Year-on-year comparison of Q3 prices

*GB Only (Excludes Northern Ireland)	Q3 2014	Q3 2015	Q3 2016	Q3 2017	Q3 2018	Q3 2019	Q3 2020	Q3 2021	Q3 2022
WHOLESALE PRICES (£/MWh)									
EPEX Day-Ahead Price	38.69	41.40	39.51	43.05	61.25	38.49	36.42	128.59	294.75
Nordpool Day-Ahead price	38.69	41.40	39.51	43.05	61.25	38.49	36.42	128.59	294.79
Within Day Price (MIDP)	38.77	41.15	37.22	41.97	59.64	37.24	35.33	125.19	282.00
WITHIN DAY PRICE BREAKDOWN (£/MWh)									
Off-Peak Hours	32.06	35.16	27.95	34.70	51.12	31.22	28.82	100.21	249.17
Peak Hours (excl Superpeak)	41.48	43.61	39.67	44.64	62.83	39.27	36.77	129.48	286.26
Superpeak Hours	44.46	46.06	49.69	49.07	67.73	43.69	45.11	166.34	334.87
SYSTEM PRICE (£/MWh)									
Maximum	160.93	161.80	801.77	176.69	189.26	120.00	540.22	4037.80	890.00
Average	43.70	47.22	34.95	40.94	59.13	36.45	35.54	126.14	276.40
Minimum	0.00	17.54	-114.99	-25.00	-71.45	-65.93	-60.00	-66.73	-68.53
Transmission System Demand (MW average)	29,968	28,838	27,302	26,755	26,493	25,494	24,380	25,258	23,572
Demand Incl. Embedded Gen. (MW average)	31,208	30,749	29,972	29,674	29,500	28,584	27,443	28,023	26,782
Transmission System Demand (TWh total)	66.2	63.7	60.3	59.1	58.5	56.3	53.8	55.8	52.0
Demand Incl. Embedded Gen. (TWh total)	68.9	67.9	66.2	65.5	65.1	63.1	60.6	61.9	59.1

³ 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.

2 Notes on the Report

The figures used in the report refer to GB only, unlike those reported by BEIS that refer to GB and Northern Ireland. This selection has been made since the Northern Ireland electricity market is separate from the GB electricity market and is part of the Ireland all-island I-SEM market.

Generation levels by fuel from 2009 onwards 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 database matching the 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. 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.

EnAppSys offers incredibly detailed market insights and consultancy services for companies in the energy industry.

*This report has been created using our pan-European **market data platform**, which has flexible configurable screens and automated data feeds. If you would like to gain more detailed information and insight, please contact us to arrange trial access to the platform via: sales@enappsys.com*

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

