October to December 2022

Electric Insights

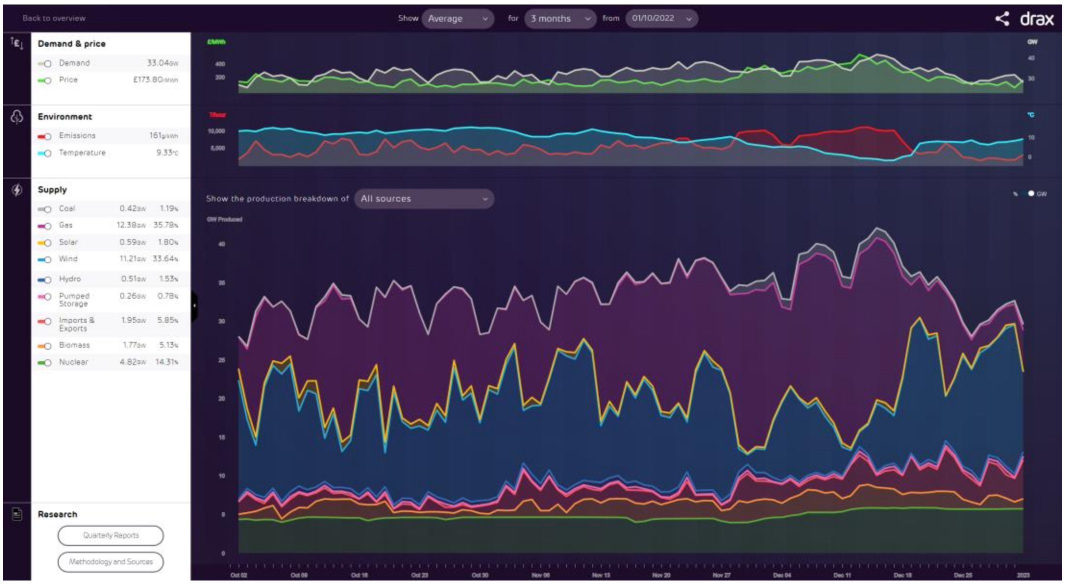
Quarterly

Authors:

Dr Iain Staffell, Professor Richard Green, Professor Tim Green, and Dr Daniel Mehlig
Imperial College London

Dr Malte Jansen
University of Sussex

Professor Rob Gross
UK Energy Research Centre



Contents

Electric Insights was established by Drax to help inform and enlighten the debate on Britain's electricity. Since 2016 it has been delivered independently by a team of academics at Imperial College London using data courtesy of Elexon, National Grid and Sheffield Solar.

1. Introduction

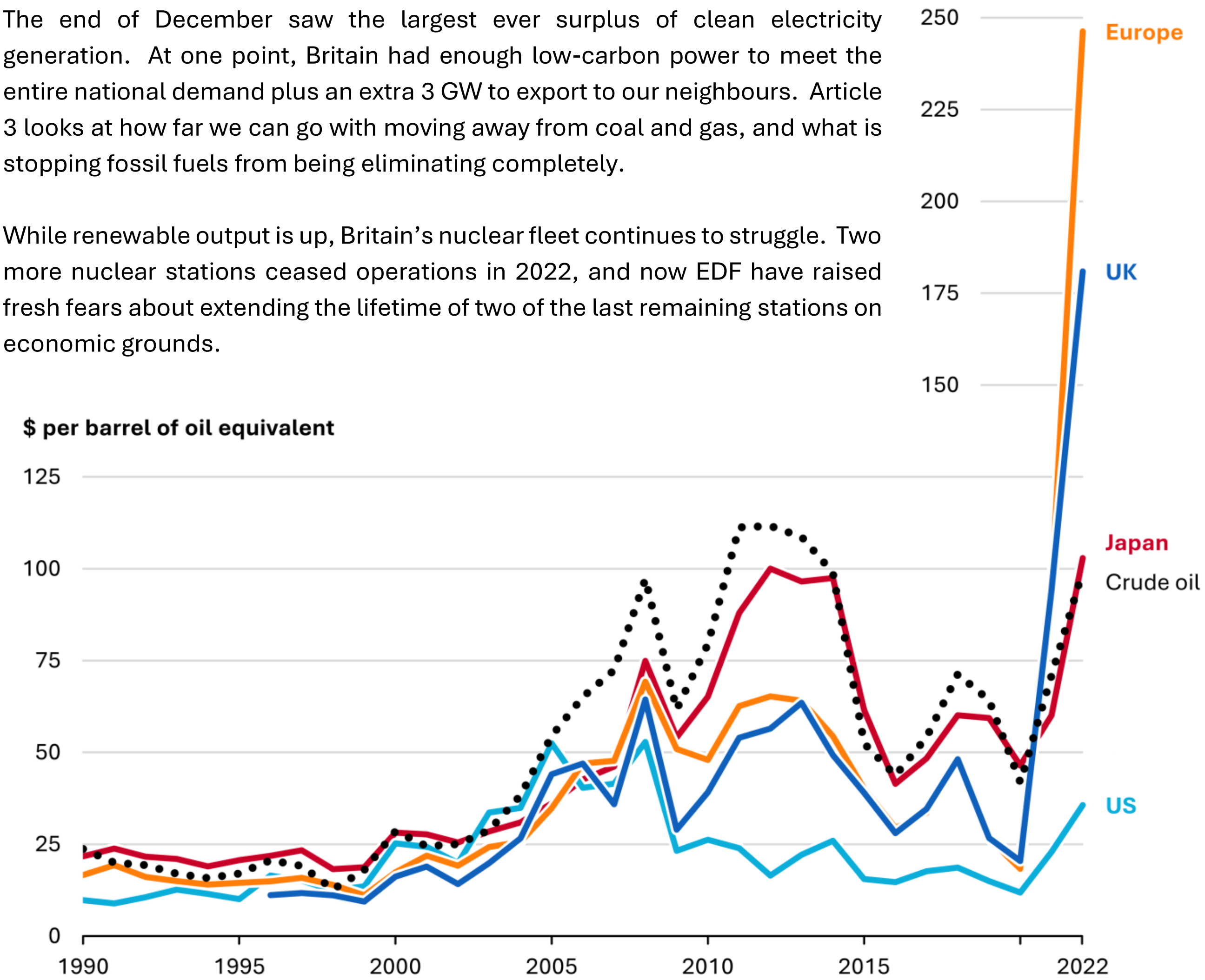
Without a doubt, 2022 was an exceptional and record-breaking year for the power system, for reasons both bad and good. On the one hand, electricity prices rose a further 75% from last year's record highs, leaving an estimated 8 million households in fuel poverty. On the other hand, renewables grew to their highest ever share of electricity production and carbon emissions started to fall again after rebounding in 2021. Our first article reviews the key trends over the last year and offers some thoughts on what 2023 might have in store.

Electrification is the next big step in decarbonising our energy use. Electric heat pumps offer the promise of low-carbon heating, and are becoming mainstream as major energy companies start to offer systems for as little as £3,000 in England & Wales (or just £500 in Scotland). Electric vehicle sales also hit a record high of 1 in 3 new cars sold in December. Current trends suggest EVs are set to overtake petrol and diesel sales in just two years. Our second article looks at what the next few years could hold, the barriers that must be overcome, and the impacts on electricity and oil demand.

The end of December saw the largest ever surplus of clean electricity generation. At one point, Britain had enough low-carbon power to meet the entire national demand plus an extra 3 GW to export to our neighbours. Article 3 looks at how far we can go with moving away from coal and gas, and what is stopping fossil fuels from being eliminating completely.

While renewable output is up, Britain's nuclear fleet continues to struggle. Two more nuclear stations ceased operations in 2022, and now EDF have raised fresh fears about extending the lifetime of two of the last remaining stations on economic grounds.

Natural gas prices around the world, in comparison to the global price of oil. Gas prices are converted to the measure used for oil (dollars per barrel) in terms of equivalent energy content.



2. 2022 in review

2022 was arguably the most challenging year for the energy sector since the oil crises of the 1970s. Fears of supplies running out and sky-high prices have dominated the news, but record renewable output and an exceptionally mild winter helped keep the electricity system running smoothly.

Electricity prices

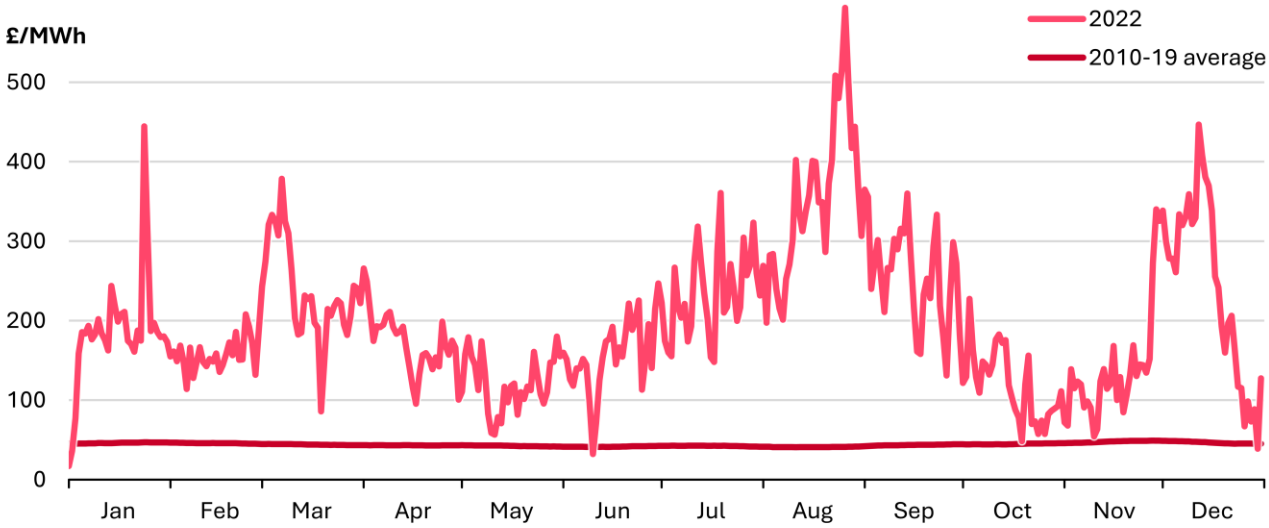
Fuel and electricity prices were already running at record highs at the start of the year. Demand was surging and supply chains struggled to keep up as the world emerged from COVID lockdowns. Then Russia's invasion of Ukraine in February sent gas and electricity prices spiralling upwards. The wholesale price of electricity centred on £200/MWh over the year – five times higher than the average during 2010-19.

If other goods suffered the same inflation rate as electricity over the last two years, a loaf of bread would now cost £6, a pint would set you back £21 (£27 in London), and a new iPhone would cost north of £6,000.

Gas prices eased off slightly going into winter, as a concerted effort to fill gas storage sites over summer paid off, and the mild weather helped to quell heating demand. But as a whole, there were only four days in the whole of 2022 where power prices were lower than the long-term average across the previous decade.

What happens to power prices in 2023 depends entirely on the state of Europe's gas market. Gas futures prices are continuing to fall, going below €60/MWh in February for the first time in 18 months. We unlikely to see prices fall back to their pre-COVID levels any time soon though, as cheap pipeline gas from Russia must be substituted with more expensive LNG imports. More price volatility can be expected as the UK and Europe start preparing for another winter without a major source of fuel for heating and electricity, and no guarantee of another mild winter or an end to the conflict in Ukraine.

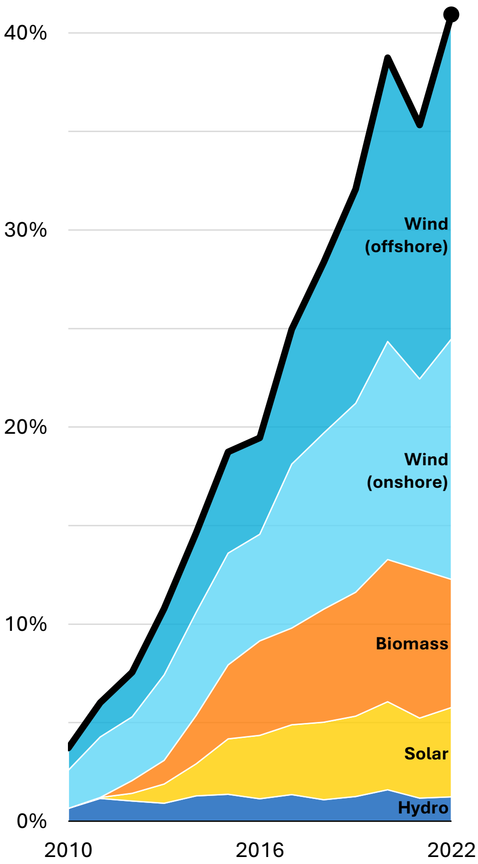
Daily average power prices in 2022 versus the average during the 2010s.



Renewable generation

Britain's renewables also helped to stem the impact of high gas prices. Together – wind, solar, biomass and hydropower generated 40% of the country's electricity over the year. Increased renewable generation helped to restart the trend of annual reductions in carbon emissions from the power sector. Emissions fell by 3% from last year to 51 million tonnes of CO_2.

The share of Britain's electricity generation from renewables. The dip in 2021 was due to below-average wind speeds that year.

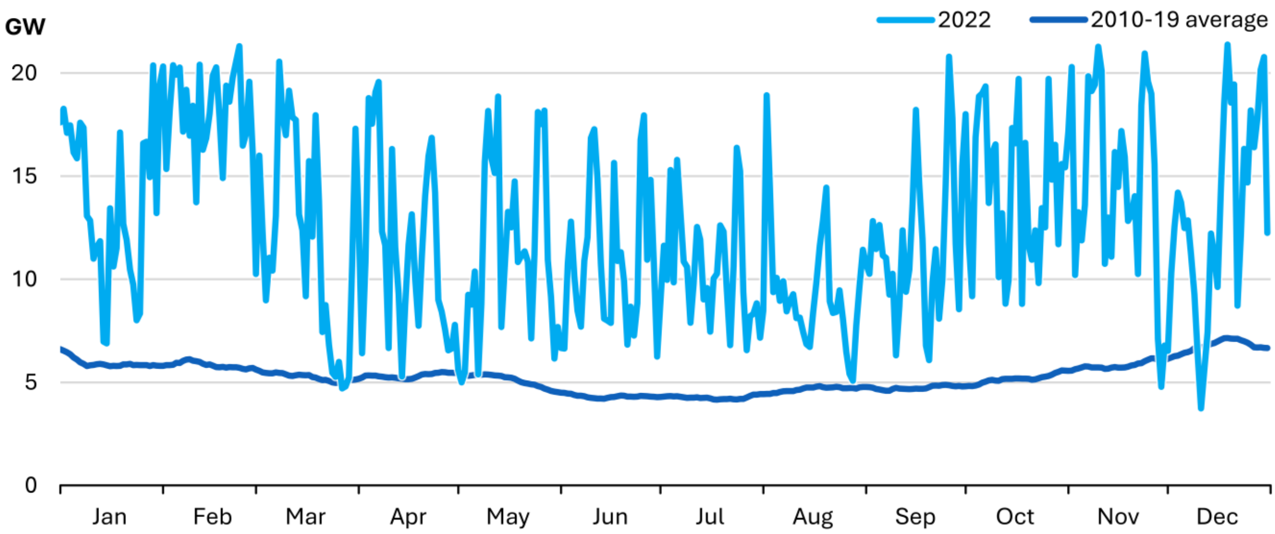


Offshore wind has been the major driver of this growth, with production more than doubling over the last five years. Offshore wind capacity should continue rising strongly. Two major farms, Seagreen and Neart na Gaoithe are expected to come online in 2023, adding 1.5 GW of capacity. Dogger Bank (the world's largest offshore farm) is also set to achieve first power in 2023, and could bring around 1 GW of capacity online by the end of the year.

Solar PV could also rebound strongly from its recent slump, potentially adding 2-4 GW of new capacity in 2023. This would bring it back to the levels of growth not seen since the peak installations of 2015.

The cost of building new renewables is likely to rise in the coming year though. Financing costs are increasing as the Bank of England hiked interest rates for the tenth time to 4%. Borrowing costs for renewable developers have approximately quadrupled since 2019. Most of the cost of wind and solar farms is upfront capital – so, just like with a home mortgage, the borrowing rate has a defining impact on the lifetime cost of renewables.

Daily average output from renewable power sources in 2022 versus the average during the 2010s.



Electricity exports

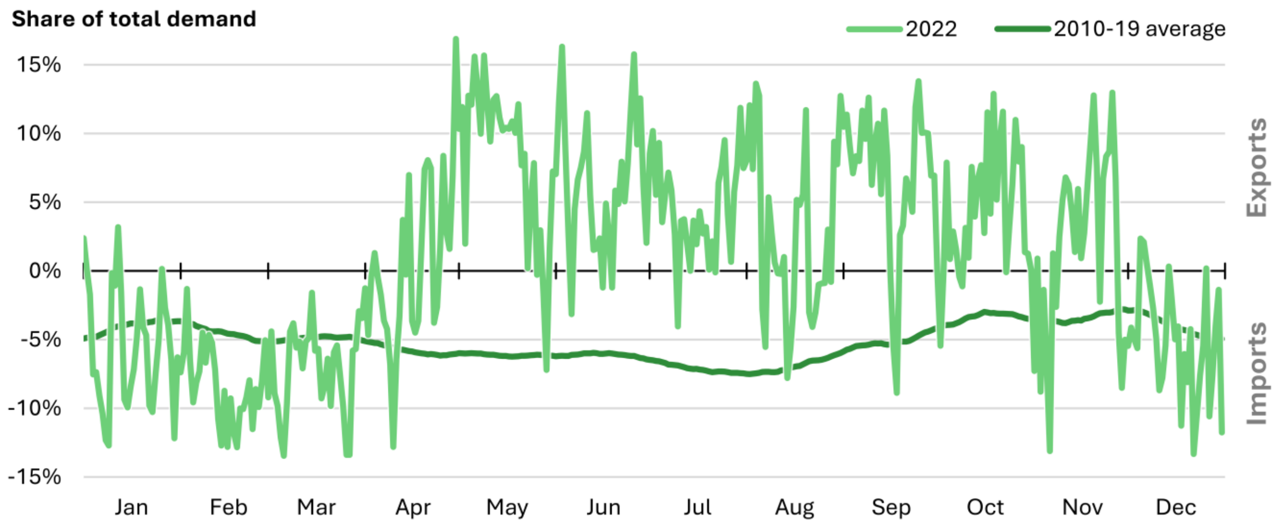
2022 marked a huge change in our electricity trade, with Britain becoming a net exporter for the first time on record. Imports fell by one-third and exports quadrupled from last year to hit 17 TWh (6% of demand). The lines between England and France saw a dramatic 21 TWh swing in power traded, with GB exporting 7 TWh to France in 2022, compared to importing 14 TWh in 2021.

Electricity is the only energy vector where Britain can domestically produce all that it consumes (albeit partly using imported fuels). Britain produced 101% of its electricity consumption over the course of the year, compared to just [90% of the oil, 43% of the gas, and just 24% of the coal consumed] in 2021.

Two factors drove the increase: Britain having lower gas prices than mainland Europe (hence it was cheaper to generate electricity here), and the widespread outages in France's nuclear fleet which left Europe short on capacity. Overall, Britain's gross electricity exports were worth over £3 billion at day-ahead prices, helping to reduce the country's trade deficit. With France's nuclear fleet slowly coming back online, capacity shortages may ease on the continent, bringing a return to the long-term trend of imports.

Whether the UK continues to be a net exporter depends heavily on the weather, both here and on the continent. Temperature affects demand; wind speeds and sunshine determine generation from renewables; and the amount of rain and snow affects the potential hydro generation over the following months. How many French reactors will return to service, or British ones will retire? Could the cross-channel pattern of gas prices reverse? What the future may hold for us is inherently unpredictable.

Daily average share of electricity imported and exported in 2022 versus the average during the 2010s.

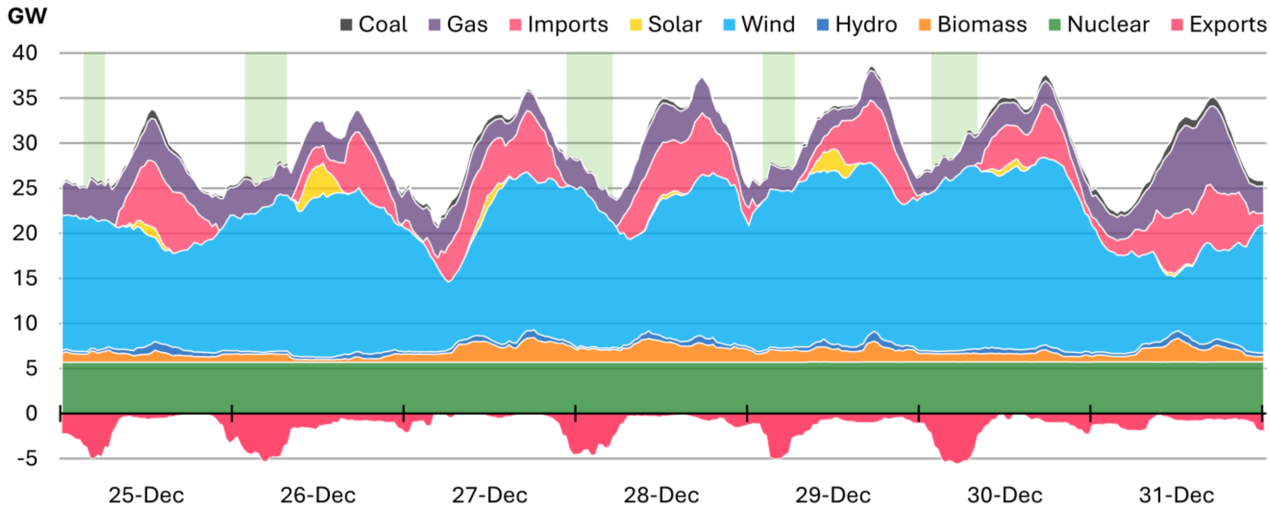


3. 100% low carbon

For 50 hours over the last quarter, Britain had enough clean electricity to meet the entire country's demand, plus export low-carbon power to our neighbours. We now have 45 GW of renewable capacity installed (wind, solar, biomass and hydro), plus 7 GW of nuclear power, which compares to demand that ranged from 18 to 48 GW over the last year. So when the right kind of weather combined with low demand (e.g. mild windy nights), clean output can easily exceed demand.

This became commonplace between Christmas and New Year, with 5 AM on 30 December seeing a record of 3 GW of surplus clean power produced. Clean sources produced over 26.4 GW while demand was only 23.4 GW. However, this surplus of clean power did not mean that coal and gas stations were all switched off. Coal and gas were still producing over 2 GW during these hours, but this was less than exports of 5.5 GW.

The electricity supply mix during the week of Christmas to New Year's Eve.
Periods when total supply from clean sources exceeded demand are highlighted in pale green.



Fossil fuelled generators are still required to run continuously, as they provide the [flexibility and inertia that keeps the power system stable](). All thermal and hydro power stations have turbines which spin at the same frequency: 50 times a second (or 50 Hz). If a generator or interconnector develops a sudden fault, the shortage of generation relative to demand means the frequency will fall. The inertia from their rotating mass continuing to turn means that it does not fall too fast (just as a ten-pin bowling ball continues running on after hitting the skittles. This gives time for other generators to start to replace the lost output. But the generators must be flexible enough to increase output quickly (which typically rules out nuclear stations) and must already be running part-loaded (so they can increase demand). Wind and solar power generation do not naturally provide inertia, as they connect to the grid through power electronics. With their share of generation increasing, National Grid ESO is now having to specifically procure inertia services from new and existing power stations, rather than it being an ever-present feature of the grid mix.

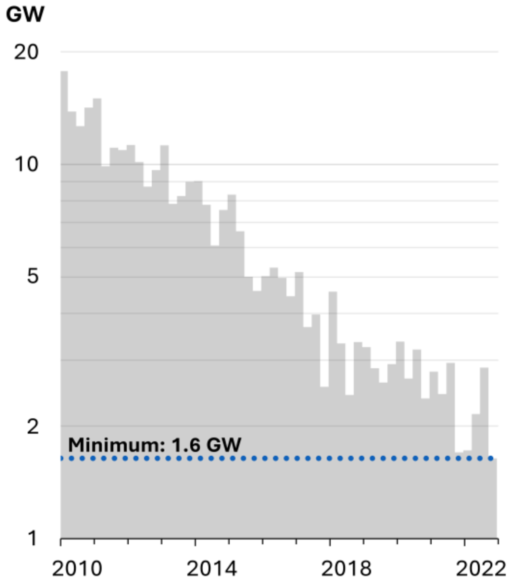
The minimum safe amount of fossil fuels we need is continuously falling though. On 29 December this minimum fell to its lowest ever minimum of 1.6 GW. Up until a year ago, this had never fallen below 2.4 GW.

National Grid is inching closer to its 2025 goal of running the entire power system with zero fossil fuels at times when there is enough renewables output.

Four things are needed to make this goal a reality:

- More low carbon sources of flexible generation, such as biomass, or in future hydrogen burnt in gas turbines
- More energy storage, such as pumped hydro and lithium-ion batteries
- More flexible demand, such as National Grid ESO's new Demand Flexibility Service, and customers being paid to delay their electricity use
- More interconnection with neighbouring countries.

The minimum instantaneous power generation from fossil fuels in each quarter since 2010 (in GW). Shown on a logarithmic axis to reflect the increasing difficulty of further reductions.



Being able to run the system for an hour with zero CO_2 produced will be a major achievement, but is still only one step towards a fully net-zero electricity system. In January, Chris Skidmore launched the Net Zero Review, which called for a 'war effort' to "rapidly accelerate the transition away from fossil fuels and bolster its energy security". The February cabinet reshuffle has created a new Department for Energy Security and Net Zero, which puts the commitment to Net Zero in the very title, and among its priority outcomes.

4. Electric vehicles hit the mainstream

Electric cars had their best ever year, making up 1 in 6 new cars sold in 2022. During the fourth quarter, their share rose to a quarter of all car sales. Just under 370,000 EVs were bought in 2022, with 270,000 pure battery and 100,000 plug-in hybrids.

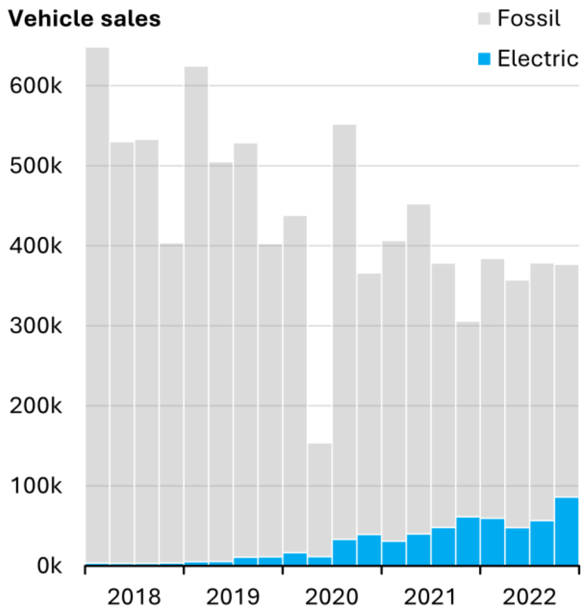
UK electric vehicle sales are growing fast: 20 times more EVs are sold now than just four years ago. This is part of a global trend, worldwide some 10% of cars sold are now electric. Other sectors are moving even faster, with 40% of scooters and 50% of buses sold now electric.

If sales growth continues along its current trend, the next few years will see a massive shift in the UK's car markets, with petrol and diesel sales falling off a cliff. The chart below plots the historical share of electric sales with a simple logistic curve projection.

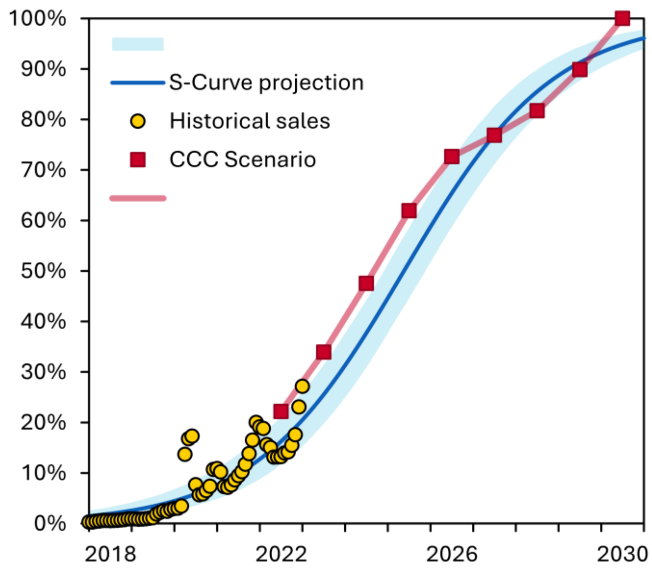
This type of curve describes technology transitions for things ranging from refrigerators to solar panels to smartphones. Once a new technology comes along that offers something new or better, early adoption is at first agonisingly slow, as high prices or niche status mean only a few enthusiasts want to be early adopters. Then comes exponential growth, as more models are released, prices come down, and people become more comfortable with the technology.

This S-Curve fit, as shown by Carbon Tracker, suggests that 1 in 3 cars sold should be fully electric by the end of next year, and EV sales will overtake petrol and diesel as soon as 2025.

New car sales in the UK by quarter, split between electric (battery and plug-in hybrid) and fossil (petrol, diesel and hybrid).



The share of electric vehicles in new car sales, showing historical sales data alongside two with scenarios to 2030: a simple S-curve projection based on historical sales data, and the Climate Change Committee's pathway to meeting the 2030 ban on new combustion engine vehicle sales.



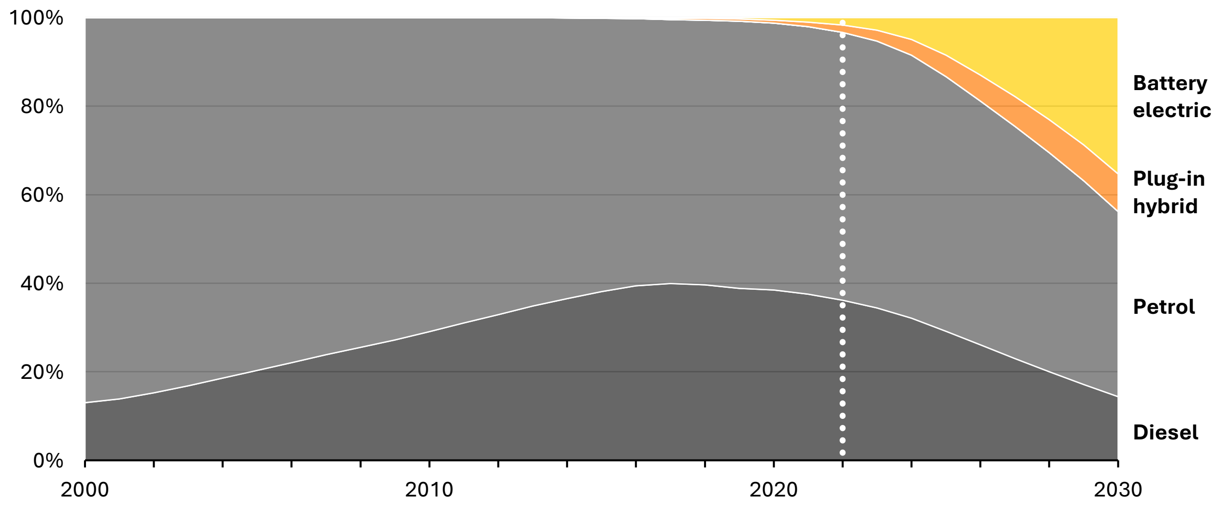
Quadrupling the share of EVs sold in just four years is going to require an enormous amount of work and support from across the whole supply chain. Not just in battery and vehicle production, but also in charging infrastructure. For this growth to proceed smoothly, there need to be sufficient working charging points for all the legions of new EV owners to use.

Charging infrastructure is needed in all parts of the country. Home charging is ideal for people with driveways and garages, but everyone else is entirely reliant on on-street chargers. Nationwide coverage is also essential for longer journeys and in rural areas. In shopping centres and major attractions, too many people are put off by the worry of long queues to get a charging point. Pictures of electric vehicles in long queues at shopping centres waiting to charge up could greatly discourage sales.

There is an important distinction to make between sales and total stock – i.e. the number of electric vehicles on the roads. The average car stays on Britain's roads for around 14 years, before being scrapped or exported to overseas markets. If half of all new cars sold become electric, it would take over 14 years for half of the cars on the roads to become electric.

Fleet turnover models estimate how projections for new car sales will influence the overall stock of vehicles on the roads. The current sales trajectory suggests that 20% of cars on the road will be electric in just four years, and by 2030 that will jump to 40%. By the end of the decade, electric vehicles could save the country from importing 75 million barrels of oil a year (~£5 billion worth), and instead would consume around 30 TWh of electricity, or about 10% of Britain's total.

Historical and projected share of vehicles on the roads in Britain



5. Fresh fears for Britain's nuclear power

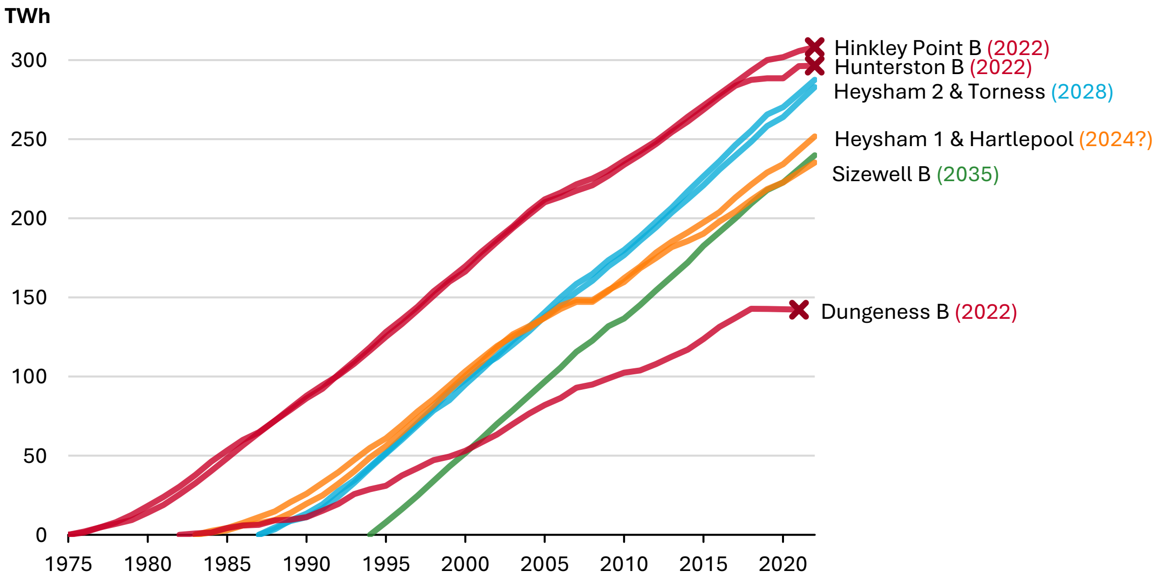
At a time when we want anything but gas, both technical and economic problems are diminishing Britain's nuclear fleet. EDF is contemplating shutting down its Heysham 1 and Hartlepool nuclear stations early, ahead of their March 2024 decommissioning date. They cite the Chancellor's 'low carbon windfall tax', which adds 45% tax to profits coming from the exceptionally high wholesale power prices.

Heysham 1 and Hartlepool are Britain's oldest nuclear power stations still in operation. They were built around the 1970s and came online in 1983, but got off to a slow start, not achieving commercial operations until 1987. The 1.1 and 1.2 GW reactors produce around 5% of Britain's electricity demand. Both stations use the UK's Advanced Gas Reactor (AGR) design, which was superseded by the Pressurised Water Reactor (PWR) design favoured by Sizewell B and the under-construction Hinkley Point C.

The last two years have seen three of Britain's AGR stations close down, with a combined capacity of 3.1 GW. First came Britain's least productive station: Dungeness B in 2021; and then its two most productive ones: Hunterston B and Hinkley Point B in 2022. Bringing forward the closure of two more stations could not come at a worse time.

Back in 2019, EDF planned to keep both Heysham 1 and Hartlepool running until March 2024, giving an expected lifetime of 41 years. Both stations appeared to be in good condition, with no evidence of the cracking that condemned Dungeness B to an early retirement. The company invested £25 million into maintenance on Hartlepool 1 in 2021, suggesting it had confidence in the stations' economic viability. At that time, wholesale power prices had averaged £45/MWh over the past decade, with little to suggest that power prices were about to soar.

Cumulative lifetime electricity generation from each of the UK's operating and recently-retired nuclear stations. The UK also had a fleet of 11 smaller Magnox stations which closed between 1989 and 2015. Data from EDF Energy.



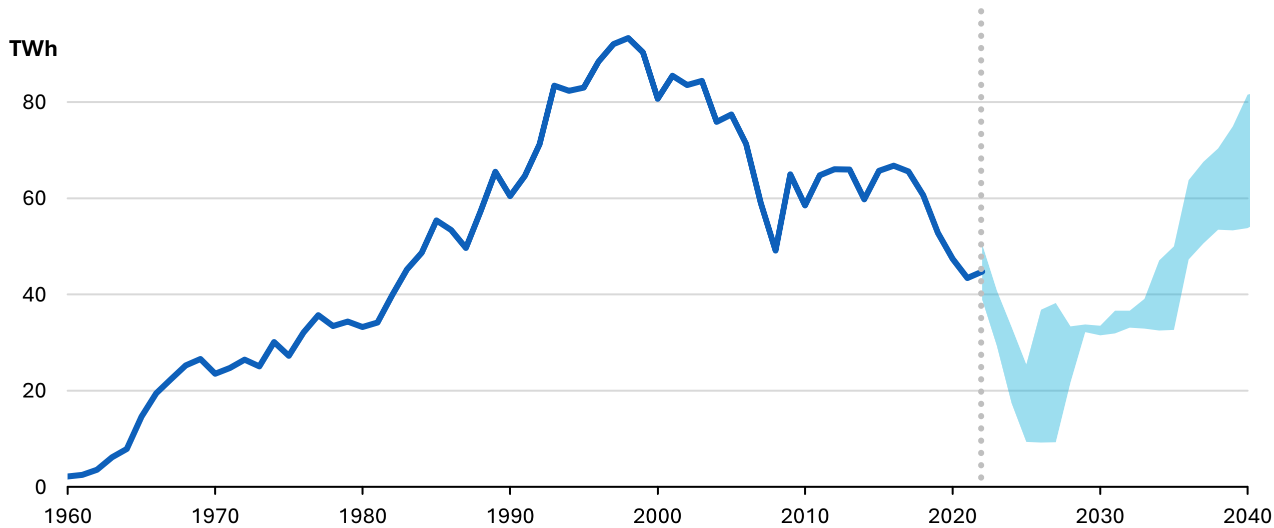
This raises the question of why the stations are now facing a financial risk from the windfall tax. Nuclear power stations do not burn expensive gas, and the tax only affects unforeseen profits from 'excessively high wholesale prices', rather than the business-as-usual revenues that were expected in 2019.

EDF is facing severe financial difficulties in its home country of France. They lost €32 billion in revenues last year from reduced nuclear production, higher than had been expected. Stress corrosion was discovered in many of their reactors in 2021, which combined with other technical problems and the exceptional drought of summer 2022 to leave 32 of their 56 reactors offline in September. So, a loss of their windfall profits from the UK arm of the business could not come at a worse time.

The construction of Hinkley Point C was originally due to be completed this year. Its strike price of £117/MWh (in today's money) seemed expensive at the time (double the average wholesale price of power), but it would now seem like a bargain compared to sky-high natural gas prices. Construction of the 3.2 GW power station has been beset on all sides by delays, and is currently scheduled for completion by 2027.

Early closure of Hartlepool and Heysham 1 would pose challenges to both the country's energy security and hitting net zero. It is likely that their lost generation would be replaced entirely by gas-fired generation – as this can scale up to meet demand as necessary. This would add around 6 million tonnes of CO_2 to the country's annual power sector emissions. Given the current worries around Britain's energy security, the early loss of these nuclear stations would further exacerbate worries about keeping the lights on over winter, just as electricity demand starts rising with more electric vehicles on our roads and more electric heat pumps heating our homes.

Annual electricity production from nuclear power in Britain, with the range seen across future scenarios from National Grid ESO.



6. Correction: *Britain's gas demand is falling*

In last quarter's Electric Insights, we commented on the surprising lack of a reduction in gas demand in response to high gas prices. This was based on downloading the *"Gas Demand – Actual"* statistics from National Grid. We incautiously assumed that this was a time series of the actual demand for gas, but on further investigation we found it is instead a series of estimated demand levels, based on a model that assumes demand responds to the weather, but not to price. British utilities have form in this area: the Electricity Pool in the 1990s used demand forecasts that explicitly prohibited any consideration of demand responding to the level of power prices. Other time series of gas quantities are available from National Grid, and these do show a noticeable response to the high prices of 2022, more in line with the experience in other European countries.

We must apologise for this oversight, and thank the reader who pointed this out.

7. Capacity and production statistics

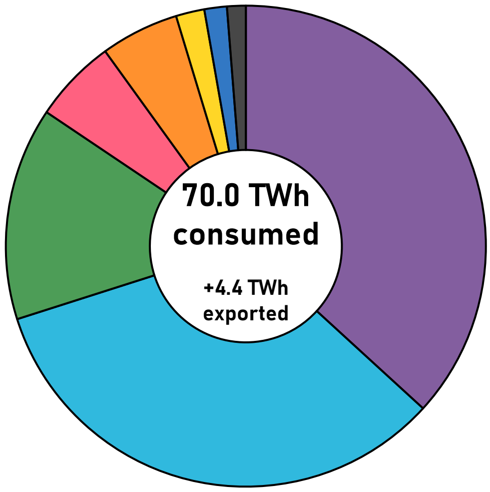
Coal once again became the smallest component of Britain's electricity generation mix, producing less than hydropower or solar PV during its off-season (October to December).

The share of gas in the generation mix fell to its lowest since the start of the year. Gas-fired electricity output was down 10% from last quarter, despite demand being up by 13%. This meant wind came close to being the largest source over the quarter, and generation from renewables as a whole overtook fossil fuels (42% vs. 38%).

Offshore wind capacity grew by over 2 GW in the last year, as Triton Knoll, Moray East and Hornsea Two all came online. Britain's offshore wind capacity now stands level with onshore wind, both at 13.4 GW. By pure coincidence, 13.4 GW of solar panels are also installed.

The downside to this story is that onshore wind has completely stalled. No new capacity was added in the past year, due to the de-facto ban on new wind farm development.

Britain's electricity supply mix in the fourth quarter of 2022



Share of the mix	
Gas	36.8%
Wind	33.3%
Nuclear	14.3%
Imports	5.6%
Biomass	5.3%
Solar	1.9%
Hydro	1.5%
Coal	1.3%

Installed capacity and electricity produced by each technology [1] [2]

	Installed Capacity (GW)		Energy Output (TWh)		Utilisation / Capacity Factor	
	2022 Q4	Annual change	2022 Q4	Annual change	Average	Maximum
Nuclear	7.4	−1.0 (−12%)	10.6	−1.0 (−9%)	66%	79%
Biomass	3.8	~	3.9	−1.7 (−31%)	47%	100%
Hydro	1.2	~	1.1	−0.1 (−9%)	45%	97%
Wind	26.8	+2.1 (+9%)	24.8	+3.5 (+16%)	43%	79%
..of which Onshore	*13.4*	~	*9.6*	*+0.4 (+4%)*	*33%*	*69%*
..of which Offshore	*13.4*	*+2.1 (+19%)*	*15.2*	*+3.1 (+26%)*	*52%*	*96%*
Solar	13.4	+0.1 (+1%)	1.4	+0.2 (+14%)	5%	54%
Gas	27.7	~	27.4	+0.8 (+3%)	45%	91%
Coal	3.8	~	0.9	−0.3 (−24%)	11%	41%
Imports	7.4	+0.7 (+10%)	4.0	−2.3 (−37%)	25%	77%
Exports			4.3	+2.5 (+147%)	26%	72%
Storage discharge	3.1	~	0.5	−0.0 (−5%)	8%	71%
Storage recharge			0.6	−0.0 (−2%)	9%	45%

[1] Other sources give different values because of the types of plant they consider. For example, BEIS Energy Trends records an additional 0.7 GW of hydro, 0.6 GW of biomass and 3 GW of waste-to-energy plants. These plants and their output are not visible to the electricity transmission system and so cannot be reported on here.
[2] We include an estimate of the installed capacity of smaller storage devices which are not monitored by the electricity market operator. Britain's storage capacity is made up of 2.9 GW of pumped hydro storage, 0.6 GW of lithium-ion batteries, 0.4 GW of flywheels and 0.3 GW of compressed air.

8. Power system records

Wind and solar power both recorded their highest ever annual output in 2022, with wind producing 13% more than its previous record from 2020. Wind power had an excellent quarter, also beating its instantaneous and daily production records in November and December.

The end of December stands out with two exceptional days for the power system. On the 29th, gas and fossil fuels had their minimum instantaneous and daily output, falling to a combined low of 1.64 GW in the early afternoon. On the 30th, two-thirds of the country's electricity came from wind power alone, giving rise to the lowest carbon emissions seen to date: the first ever day when electricity averaged under 50 g/kWh.

2022 also saw records broken for coal, which fell to its lowest ever generation over the year, and power prices which hit an all-time high of £200/MWh averaged over the year. Exports tripled from their 2010 record of 1.9% of generation to 5.8% of generation this year.

The tables below look over the past decade (2009 to 2022) and report the record output and share of electricity generation, plus sustained averages over a day, a month and a calendar year. Cells highlighted in blue are records that were broken in the fourth quarter of 2022. Each number links to the date it occurred on the Electric Insights website, so these records can be explored visually.

	Wind – Maximum	
	Output (MW)	Share (%)
Instantaneous	21018	66.7%
Daily average	19270	60.1%
Month average	14525	40.4%
Year average	8825	26.8%

	Solar – Maximum	
	Output (MW)	Share (%)
Instantaneous	9680	33.1%
Daily average	3386	13.6%
Month average	2651	10.0%
Year average	1397	4.4%

	Biomass – Maximum	
	Output (MW)	Share (%)
Instantaneous	3831	16.8%
Daily average	3316	12.9%
Month average	2849	8.8%
Year average	2216	7.1%

	All Renewables – Maximum	
	Output (MW)	Share (%)
Instantaneous	27852	72.8%
Daily average	21377	66.3%
Month average	18334	51.0%
Year average	12603	38.3%

	Gross demand	
	Maximum (MW)	Minimum (MW)
Instantaneous	60070	16934
Daily average	49203	23297
Month average	45003	26081
Year average	37736	30709

	Demand (net of wind and solar)	
	Maximum (MW)	Minimum (MW)
Instantaneous	59563	4032
Daily average	48823	8385
Month average	43767	16663
Year average	36579	20572

	Day ahead wholesale price	
	Maximum (£/MWh)	Minimum (£/MWh)
Instantaneous	1983.66	-72.84
Daily average	666.90	-11.35
Month average	353.36	22.03
Year average	198.16	33.88

	Carbon intensity	
	Maximum (g/kWh)	Minimum (g/kWh)
Instantaneous	704	18
Daily average	633	49
Month average	591	135
Year average	508	172

	All low carbon – Maximum	
	Output (MW)	Share (%)
Instantaneous	35104	92.1%
Daily average	27551	85.0%
Month average	23754	66.1%
Year average	18287	58.3%

	All low carbon – Minimum	
	Output (MW)	Share (%)
Instantaneous	3395	8.3%
Daily average	5007	10.8%
Month average	6885	16.7%
Year average	8412	21.6%

	All fossil fuels – Maximum	
	Output (MW)	Share (%)
Instantaneous	49307	88.0%
Daily average	43085	86.4%
Month average	36466	81.2%
Year average	29709	76.3%

	All fossil fuels – Minimum	
	Output (MW)	Share (%)
Instantaneous	1640	4.8%
Daily average	2740	8.7%
Month average	7382	24.3%
Year average	11336	36.1%

	Nuclear – Maximum	
	Output (MW)	Share (%)
Instantaneous	9342	42.8%
Daily average	9320	32.0%
Month average	8649	26.5%
Year average	7604	22.0%

	Nuclear – Minimum	
	Output (MW)	Share (%)
Instantaneous	2488	8.1%
Daily average	2665	10.3%
Month average	4232	12.8%
Year average	4956	15.4%

	Coal – Maximum	
	Output (MW)	Share (%)
Instantaneous	26044	61.4%
Daily average	24589	52.0%
Month average	20746	48.0%
Year average	15628	42.0%

	Coal – Minimum	
	Output (MW)	Share (%)
Instantaneous	0	0.0%
Daily average	0	0.0%
Month average	0	0.0%
Year average	488	1.5%

	Gas – Maximum	
	Output (MW)	Share (%)
Instantaneous	27131	72.6%
Daily average	24210	62.2%
Month average	20828	54.8%
Year average	17930	46.0%

	Gas – Minimum	
	Output (MW)	Share (%)
Instantaneous	1403	4.1%
Daily average	2444	7.7%
Month average	6775	19.9%
Year average	9159	24.6%

	Imports – Maximum	
	Output (MW)	Share (%)
Instantaneous	5906	23.7%
Daily average	5047	17.6%
Month average	4276	15.3%
Year average	3333	10.3%

	Exports – Maximum	
	Output (MW)	Share (%)
Instantaneous	-5662	-20.9%
Daily average	-4763	-14.1%
Month average	-3098	-9.8%
Year average	-731	-5.8%

	Pumped storage – Maximum[3]	
	Output (MW)	Share (%)
Instantaneous	2660	7.9%
Daily average	409	1.2%

	Pumped storage – Minimum[3]	
	Output (MW)	Share (%)
Instantaneous	-2782	-10.8%
Daily average	-622	-1.7%

[3] Note that Britain has no inter-seasonal electricity storage, so we only report on half-hourly and daily records. Elexon and National Grid only report the output of large pumped hydro storage plants. The operation of battery, flywheel and other storage sites is not publicly available.

Drax Group plc
Drax Power Station, Selby, North Yorkshire, YO8 8PH
www.drax.com
@DraxGroup

Imperial Consultants
58 Prince's Gate, Exhibition Road, London, SW7 2PG
www.imperial-consultants.co.uk
@ConsultImperial