July to September 2022

Electric Insights
Quarterly

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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

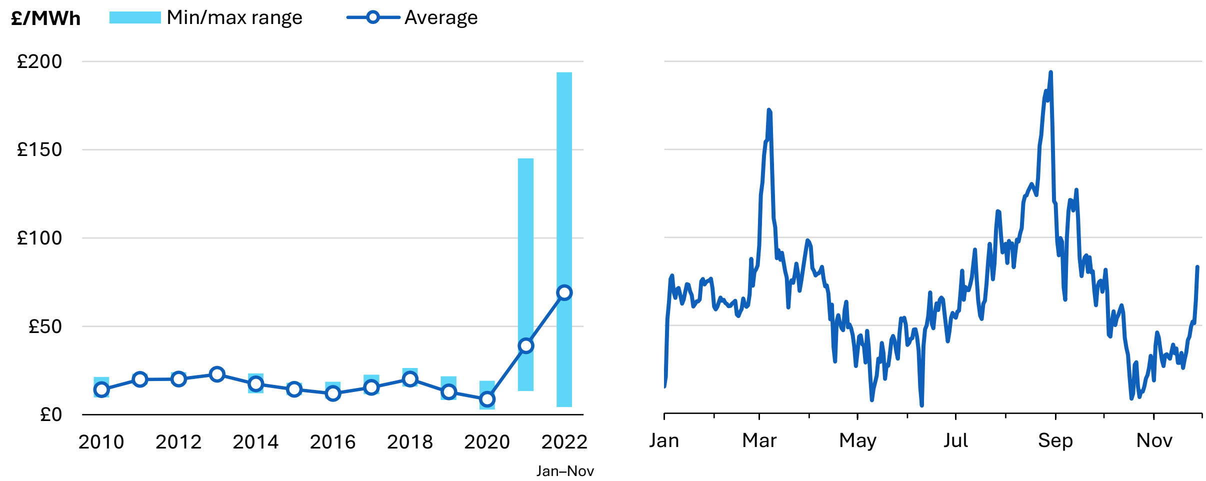
It has been all change for Britain's energy sector over the last quarter. Since the last issue there have been two new prime ministers, meaning two new Secretaries of State for BEIS, and two new sets of priorities for the regulations governing the power sector.

In September, Jacob Rees-Mogg took charge of energy within the Truss government. He supported lifting the ban for onshore wind and rapid expansion of the transmission network to help move renewable power around the country. However, Truss saw solar farms as 'one of the most depressing sights' in Britain's countryside, and looked to ban ground-mounted solar PV from more than half of all farmland. In October, Sunak took over as Prime Minister with Grant Shapps leading BEIS. The solar ban is gone, but Sunak wanted to keep the ban on onshore wind. Pressure from Conservative backbenchers has brought compromise, and the ban may be overturned after a consultation period.

The Truss government opposed a windfall tax on the energy sector to capture some of the enormous profits reaped from high gas and electricity prices. The Sunak government will instead raise the tax on oil and gas extraction to 35%, although a large caveat means this can be sidestepped by investing in new oil and gas infrastructure. BP and Shell report having paid zero windfall tax thanks to investment offsets. A new windfall tax of 45% on electricity generator profits will also be introduced, which will primarily hit older wind farms and nuclear power stations.

It has also been all change for energy prices. Our first article looks at how gas and electricity prices fell through Autumn to their lowest since early 2021. The way in which power prices are defined is up for consideration as the government looks at new rules for the electricity market. Our second article looks at 'locational pricing', how wholesale and retail prices can vary across the country according to local supply and demand.

Wholesale natural gas prices in the UK over the past decade (left) showing the minimum, maximum and average daily price in each year, and during 2022 (right) showing daily spot prices. The 2022 average of £69/MWh equates to 200 pence per therm.



Finally, the weather has abruptly changed as the mild start to Autumn has finally given way to winter cold. Across Europe, many countries have managed to cut their gas consumption by around 15%, but our third article shows there has been no such fall in the UK. Industry's gas demand has halved in response to high prices, but consumption by households has not fallen at all when we account for the weather. This does not bode well for how exposed we are to price volatility or even shortages of gas over winter.

Britain's homes could however be a major contributor to saving energy. Our final article explores how much gas British households could save in the short term. Changing boiler settings and turning the thermostat down by 1°C could together cut gas demand by up to a fifth, saving the average household around £300 per year. This is an instant win, so could help over the coming winter until the mass roll-out of insulation and retrofits can start to help.

2. Power prices ease going into winter

After unrelenting bad news about energy prices spiralling upwards, they have been in freefall since hitting a peak in August. Wholesale electricity prices fell by 70% between August and November on the back of much lower natural gas prices. This fall is saving the country £7 billion per month – or £10 million every single hour – in terms of natural gas and electricity consumption.[1]

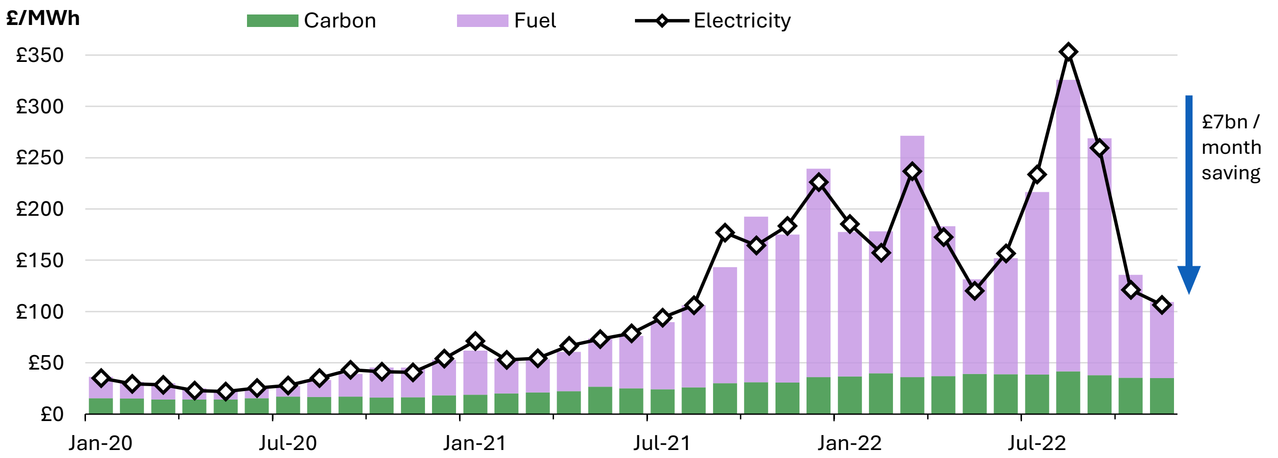
Pressure on the European gas market has temporarily eased thanks to an exceptionally mild Autumn and concerted efforts to stockpile gas over the summer. Imports of liquified natural gas (LNG) reached an all-time high, with several LNG tankers idling off the coast waiting to unload when gas demand, and thus prices, are higher again. Wholesale gas prices collapsed from a peak of £194/MWh in August to a low of just £8/MWh in October.

This translates into a sizable fall in the cost of generating electricity from gas. The figure below estimates this cost for an average gas-fired station in Britain, based on the fuel it burns and the carbon emissions it produces. Although the cost of carbon emissions has quadrupled since 2020 to a peak of £87 per tonne in August 2022, this is only having a minor impact on generation costs compared to the wild volatility in fuel prices.

The recent fall in power prices is welcome news as it will translate into a lower price cap from Ofgem in the coming months. This will give a much-needed respite for consumers or less pressure on the public purse, depending on where that price cap sits relative to the level of the 'price freeze' set by government. Either way, the sums of money involved are staggering. In October and November, British homes and businesses consumed 70 TWh of natural gas and 47 TWh of electricity. The national bill for this energy was £4 billion per month, compared to £11 billion in the two previous months.

This is only just the start of winter though, and gas prices started heading back upwards at the end of November. Where prices end up through the winter months will have a significant impact on household and national finances alike.

Monthly-average wholesale cost of electricity at day-ahead prices, with the underlying cost of the fuel burnt and the carbon emissions produced in generating electricity from natural gas.



[1] Note that many generators and retailers hedge their prices in advance, so this fall will not be reflected until their contracts are renewed

3. Locational pricing for Britain's electricity?

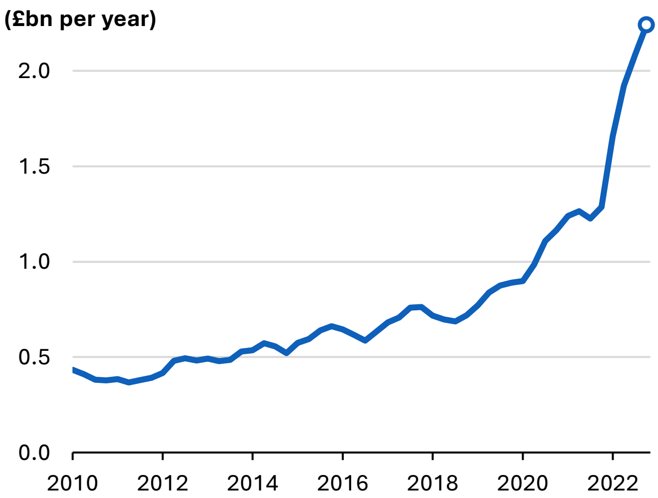
The government is looking at whether to let wholesale electricity prices vary across the country. This is one part of the Review of Electricity Market Arrangements (REMA) that was discussed in last quarter's Electric Insights. At present there is a single price for electricity across the country in each half-hour trading period, regardless of where it comes from or where it is consumed. Changing this could make the system more efficient, but it would create winners and losers.

Several European countries have separate prices in different regions, and the power markets in the United States calculate hourly prices for the thousands of nodes on their transmission networks. The benefit of these locational marginal prices (LMPs) is that it gives generators incentives to operate in ways that do not overload the transmission system. For example, if more local generation is needed to overcome a constraint on how much power can flow into an area, prices can rise in that area to encourage more generators online. Similarly, areas with surplus generation would see lower prices, encouraging some stations to turn down their output.

With the nationwide wholesale prices we have in Britain, generators don't have these incentives and National Grid must pay them separately to change their behaviour to keep the transmission system operating within safe limits. This increases the overall cost of the system: balancing actions now add £7.50/MWh to the wholesale cost of electricity, in excess of £2 billion per year (see figure below). As Britain progresses towards net-zero electricity, more renewable generation located far from demand will increase flows on the transmission system, and hence the risk of these costly constraints.

National Grid charges generators for using the transmission system, and varies this cost around the country to reflect how much they would have to spend to upgrade the network in each area. These charges do not capture day-to-day changes in constraints and their impact on costs, so while they might help guide investment to the right places, they don't help to make operations more efficient.

The cost of balancing the national grid, showing the rolling sum of the previous 12-months.



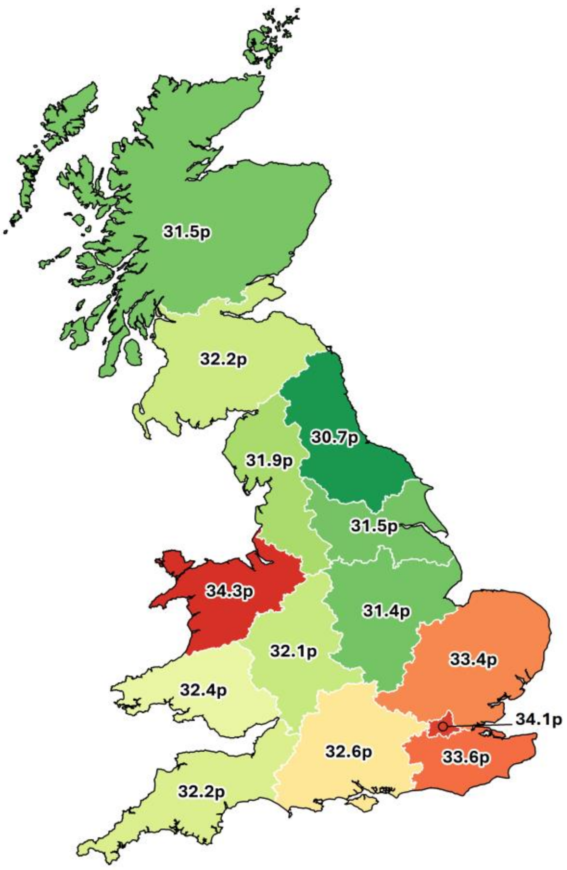
Locational prices can reduce the cost of dealing with constraints, but will increase the financial risks faced by generators. Building a new wind farm would have a minimal effect on national power prices, as it is small compared to country-wide demand. But if it is built near an existing wind farm, it may noticeably reduce that farm's LMPs, as it is big compared to local demand and transmission capacity.

Generators could reduce this risk using 'financial transmission rights': contracts that offset price differences between two points on the network and can reduce generators' day-to-day risks without blocking the price signals. However, the risk reduction only lasts for the life of the contract; next year's contract will cost an amount that reflects expectations of the price differences it is going to hedge, so unless someone offers very long-term transmission rights, generators could be left facing the risk of newly-built power stations undermining their revenue.

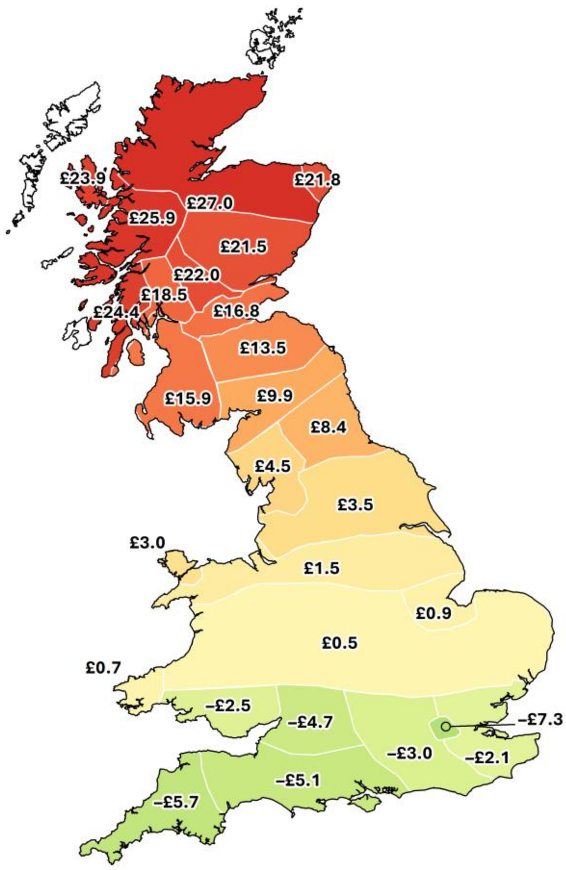
Prices don't only vary for generators, consumers are also charged based on where they live. Electricity retail prices in Britain are a mix of the 'postcode lottery' and 'postage stamp' pricing. The 'postcode lottery' refers to variations in outcomes based on where you live; a term often used to criticise uneven delivery of public services. 'Postage

Regional variation in the amount that households pay for electricity (left), and the amount that generators are charged for providing it.

Household tariffs (p/kWh):



Generator tariff (£m per GW):



Shetland and Northern Ireland are not shown as they are not connected to National Grid's transmission network. The Western Isles and Orkney are blank as they do not have any generators subject to national tariffs.

stamp' pricing reflects the fact it costs the same amount to deliver a letter in the UK regardless of whether it travels a short distance within the same city, or from Land's End to John O'Groats. The former costs much less to deliver, but having a uniform national price could be viewed as part of a 'social contract' that guarantees everyone a similar service, wherever they live.

Each distribution network operator (DNO) has a common tariff for all domestic customers in its area, so that a household in Bristol would pay the same amount, per kWh and per day, as one in a small village on the coast of Cornwall at the end of much longer lines – that's the postage stamp. The level of that tariff varies between DNOs – that's the lottery (see figure, below left). The cost of serving a customer in reasonably flat and densely populated areas like the Midlands is much lower than the cost in North Wales, which is mountainous and sparsely populated.

While the DNOs are required to have tariffs that don't discriminate between urban and rural customers, National Grid is obliged to make its charges cost reflective. It estimates how much extra investment would be needed to connect a new generator in each part of the country. With electricity usually flowing from the North of Scotland to the South of England, new power stations in the north would require expensive investment, while those in the south would save money (see figure, below right). The Torness nuclear station near Edinburgh pays about £20/kW per year to use the system, while Sizewell B in Suffolk pays only about £2/kW. On the current tariff, Hinkley Point C in Somerset would be *paid* about £5/kW, although its arrival on the system is likely to affect the calculations.

The reverse is true for electricity consumers. More demand in the north of Scotland would reduce National Grid's costs, just as extra demand in London would increase them. Taking transmission and distribution charges together, the average household pays around £200 per year for getting electricity from the generators to their plug sockets, about 5% of current bills. There are plenty of options available for making electricity prices better reflect the different costs faced around the country. There are pros and cons to having more or less variation, but with bills being so high, any reforms which could change how much people pay will be the subject of intense debate.

4. No sign of Britain's gas demand falling

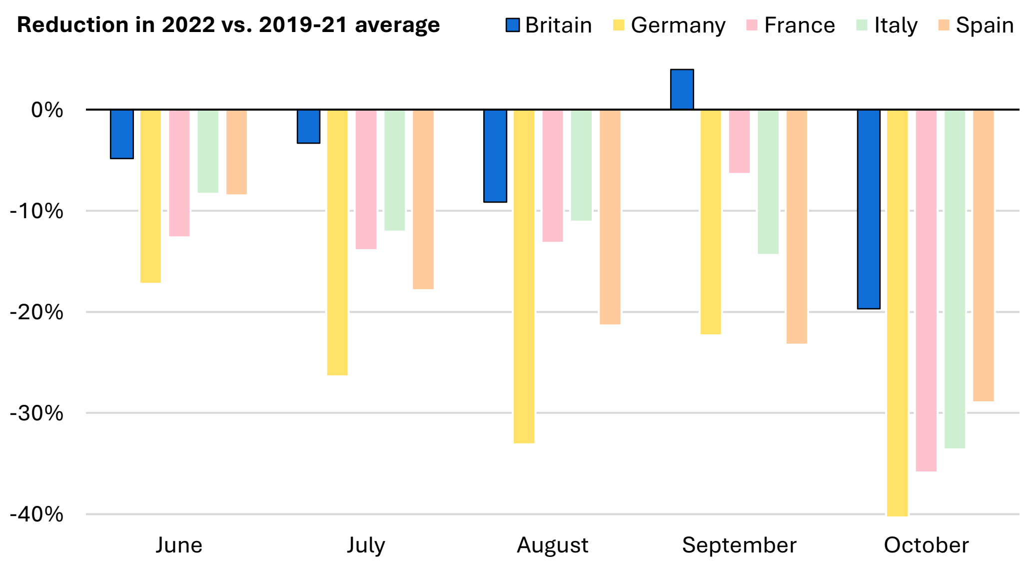
Is Britain sleepwalking into an energy crisis this winter? Gas and electricity bills have more than doubled, and the government is footing a bill of tens of billions of pounds to keep prices from rising further. Worse still, fears of blackouts loom large, with National Grid running wargame scenarios on how to cope with gas shortages this winter.

An obvious response to both problems would be to use less gas and electricity. Conserve what we have so that supplies last longer, and the bill for getting through winter is not quite so sharp. Energy conservation has been a central part of Europe's response to this crisis. The EU has asked member states to cut gas consumption by 15%, and this appears to be working. The seven largest countries cut gas consumption by 14% in the year to September, and detailed studies in Germany and the Netherlands confirm these savings are persisting after the weather turns cold.

Early evidence suggested that British consumers were similarly tightening their belts. E.On announced that gas consumption was 10–15% lower in the UK compared to seasonal averages. However, this was only half the saving made by consumers in Europe in that same month. Through October, the four biggest nations in Europe consumed 30-40% less gas than in previous years, compared to only a 20% fall in Britain.

Over the summer, Britain's demand for gas was only 5–10% lower than average, and in September it was actually higher than in previous years (by 4%). In contrast, German gas demand was 17–33% lower, and there is a similar story across France, Italy and Spain: all the largest economies in Europe have reduced the amount of gas they consume much further than Britain. Once the mild weather of October came, the savings in all countries increased by a similar amount, leaving Britain still behind its neighbours.

The change in natural gas consumption this year versus the previous three years in Britain and the larger European countries. The bars compare gas consumption across all sectors excluding power generation, and consider actual measured demand (without correcting for weather differences).



Data from National Grid and Bruegel.

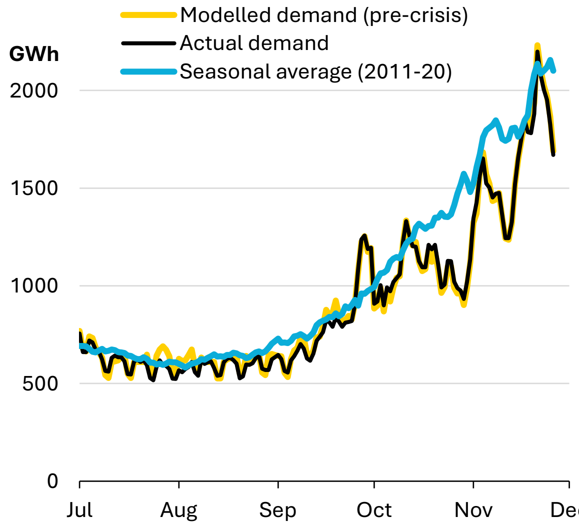
Britain's smaller share of industrial consumers may play a role. Around 20% of Britain's natural gas is consumed by industry, but this figure is 30–40% in Europe. Factories have reduced output and shifted from gas to other energy sources; options to reduce gas consumption that are not viable for households who rely on it for heating.

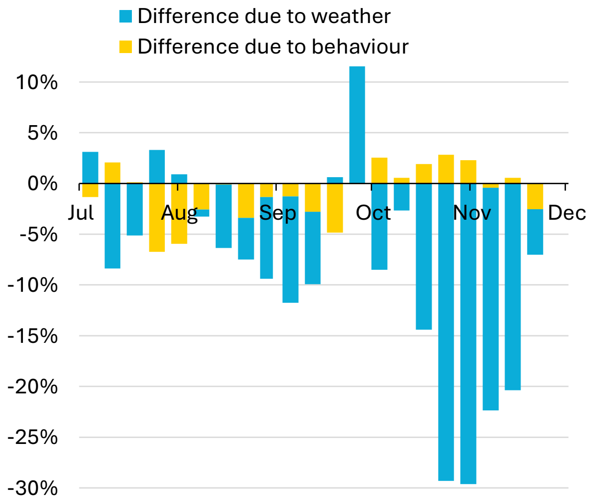
Not only are Britain's gas savings smaller than those in neighbouring countries, the savings seen in October and November are also not the result of conscious changes in behaviour, but simply good luck with the weather. Europe experienced an unseasonably warm start to Autumn. October saw much of the UK 3°C warmer than average, and a record-breaking 30°C was recorded in Gravesend. The first three weeks of November were similar, with only one day in 21 being colder than the average for the time of year.

Correcting for this weather anomaly, Britain's natural gas consumption has simply not changed since pre-crisis times. Before the crisis started, the country demanded 600 GWh of gas per day, plus an extra 160 GWh for every degree it falls below 15°C. With this simple relationship, Britain's gas consumption can be accurately predicted based on the prevailing weather. Even though actual consumption through much of Autumn was well below the seasonal average (compare the black and blue lines below), it was almost no different to this pre-crisis estimate (compare the black and yellow lines).

From September through to end of November, Britain's gas demand was 12% lower than in an average year, lining up with E.On's findings. However, demand was just 0.3% lower than what would have been expected given the mild weather – implying that relatively few people and businesses have changed their behaviour in light of the gas crisis.

Actual natural gas consumption in Britain versus expectation. (left) shows daily demand over the last five months. The blue line shows the seasonal average consumption for all end users excluding power stations, averaged over the ten years to 2020. The yellow line adjusts this demand for the actual weather experienced in 2022, showing what demand would be with pre-crisis behaviour from consumers. The black line shows actual consumption. (right) shows the weekly-average difference between actual consumption and the seasonal average, separating out the effect of weather anomalies versus change in behaviour.



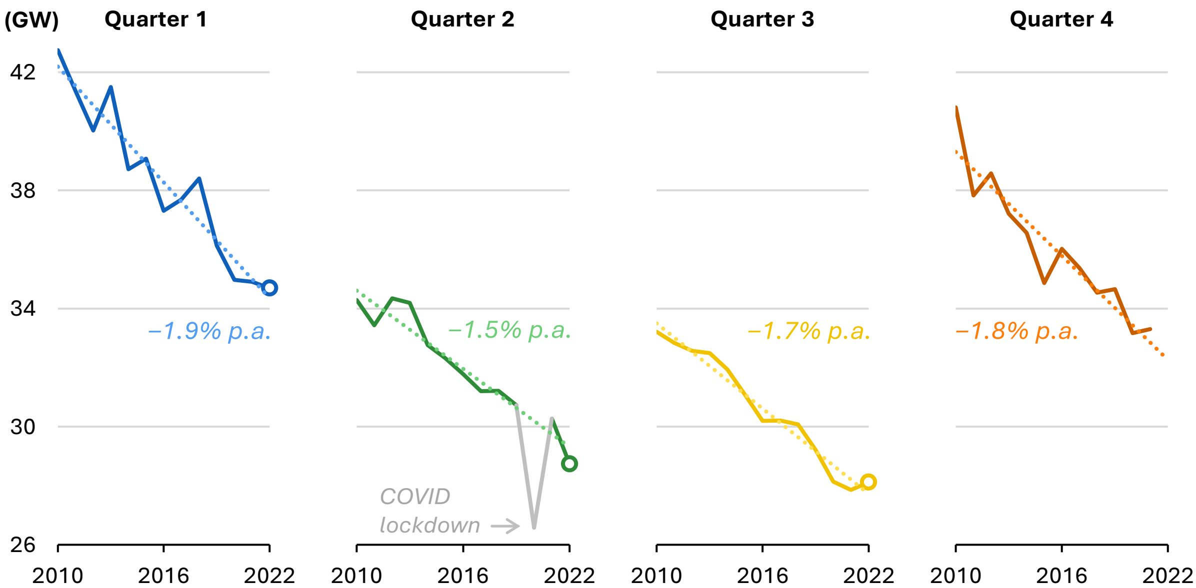


Similarly, Britain's electricity consumption was reported as being 6% lower in 2022 than during the previous five years. Despite sounding like a strong response to the cost-of-living crisis, this actually does not suggest that households and businesses are behaving differently than in previous years. Electricity demand has fallen steadily by 1.5–1.9% per year since the start of the last decade, and this year is no different (see below).

So, Britain is an outlier on the world stage. Despite the cost of gas and electricity soaring, there has been no major contraction in demand. For months, the British government did not want to commit to an energy saving target or provide households with advice on how to save energy, leaving thinktanks and television personalities to publicise energy saving measures. The incoming government has changed course, with ministers speaking to the media about what households can do to save energy, funding a public education campaign, and importantly providing £1 billion (over several years) to improve the houses most in need.

With inflation at its highest in decades and a deep recession looming, it makes sense to try and cut the amount we spend on importing incredibly expensive gas. Households and businesses using fuel more efficiently, or cutting back on their heating could have a major impact on both the cost of weathering the energy crisis, and potentially even the ability to get through winter without energy rationing and blackouts. Clear advice on how best to achieve this cannot come soon enough.

Average electricity demand across the four quarters of each year since 2010. Dotted lines show the linear trend in demand over the whole period. Quarter 2 of 2020 is excluded from the trendline as demand was supressed by the first (and most severe) COVID-19 lockdown. Demand in Quarter 1 and 4 are higher due to electric heating.



5. The power of turning down the thermostat

Britain's homes, shops and offices are currently consuming as much energy as ever. But they could be a potent force in reducing the country's reliance on imported gas and exposure to volatile fuel prices. Homes consume about three-fifths of the country's gas, with commercial buildings and industry consuming about one fifth each. By far the largest use is heating, as around five in six British homes are kept warm by a gas boiler. So how much can we realistically cut gas demand in the short term?

Improving insulation and other home retrofits must be the starting point in any conversation. Uptake of insulation measures plummeted a decade ago after government slashed support for green measures. The installer industry then scaled back, and is now stretched to the limit with households wanting to improve their insulation before winter. While insulating our homes will undoubtedly help in future years, it is not going to make a large dent on consumption in the coming three months.

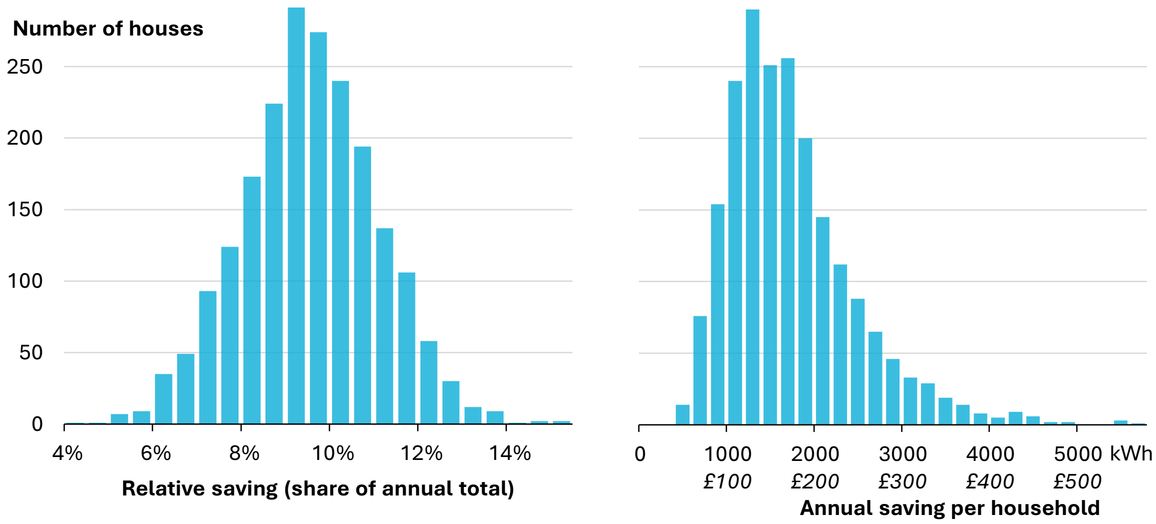
There are several 'quick fixes' that people can try to reduce their gas consumption. Martin Lewis and others have become household names for spreading the word about low-cost measures to reduce energy bills. Draught excluders and temporary second glazing can quickly cut the amount of heat lost through gaps and single-glazed windows. One change that costs nothing and can be made immediately is to turn down the flow temperature on gas boilers, lowering the temperature of the water entering your radiators. Often this is set high by the installer and never touched again, but it doesn't allow modern boilers to make the most of their energy-saving features. Getting flow temperatures below 50°C allows them to operate in 'condensing mode' and achieve their full efficiency when burning gas. This will cut gas consumption by 8–10% with no change in comfort, and now that most boilers in the UK are condensing models, this could have a major impact at the national scale. If your radiators are more than pleasantly warm to touch, it's worth looking into.

A third option is to look at how warm we keep our homes. This is naturally a sensitive topic, as nobody wants to endure lower living standards, and many simply cannot as they are already unable to afford enough warmth. Already one third of households are suffering fuel poverty, with many families only heating a single room to save money, or avoiding using their heating altogether. At the other end of the spectrum, many homes are kept at summer temperatures throughout the depths of winter. The average UK house is kept at over 20°C, living up to the stereotype of people walking around in a t-shirt through winter.

Lowering room temperatures by just 1 degree (e.g. from 20 to 19°C) will reduce a typical household's gas consumption by 8–11%, saving in the region of £150–200 per year on gas bills (depending on the size of house). This puts in sharp contrast the value of some energy-saving tips: turning the TV off standby mode or unplugging mobile phone chargers has next to no impact on bills. With everyone looking to cut back on energy costs this winter, it is worth noting that running the Christmas tree lights will cost around ½ to 1p per hour. In contrast, turning the heating down by 1°C will save an average home around £1 per day through winter.

If everyone in Britain lowered their household temperature by 1°C, the country would save 50 TWh of natural gas over the winter months, comparable to the savings seen in Germany. This would be good news for the environment, saving around 10 million tonnes of CO_2 per year, or 3% of Britain's total emissions. It would also be good news for the economy. Households would save around £5 billion collectively, and the government would save an extra £3 billion on funding the Energy Price Guarantee in the new year, which would lessen the need for tax rises and spending cuts.

The modelled saving in gas consumption from lowering room temperatures by 1°C, measured across a population of 2,000 British households.



Data from Staffell, Pfenninger & Johnson.

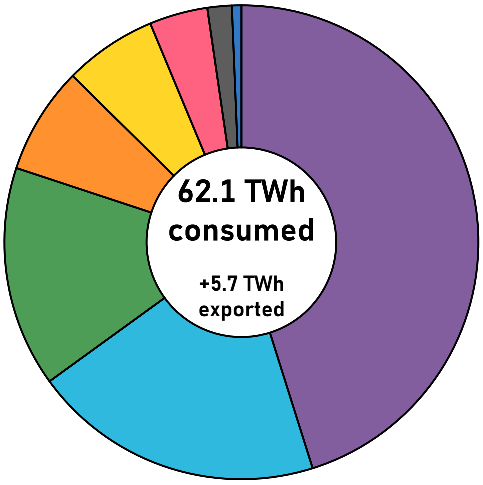
6. Capacity and production statistics

Britain's most productive nuclear reactor, [Hinkley Point B, retired in August](). It operated for 46 years, generating 311 TWh over its lifetime (enough to power the whole of Britain for a year). This closure cuts the country's nuclear generation capacity by 10% to just 7.4 GW, as now only five reactors remain. Two of these are scheduled to cease operating in 2024.

Wind, solar and biomass all increased their generation over the last year, together producing 20% more electricity during Q3 than the same quarter last year. Despite this, gas-fired power generation was also up by 20%, and coal generation remained the same. Gas continued to supply more than twice as much electricity as any other source In Q3.

Demand for electricity was slightly lower than in previous years, mirroring the long-term downwards trend, but the shift from imports to exports meant an additional 10 TWh of electricity was generated in Britain over the quarter. As a result, output from British power stations rose to its highest since 2014.

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



Share of the mix	
Gas	45.1%
Wind	19.9%
Nuclear	15.1%
Biomass	7.3%
Solar	6.3%
Imports	4.0%
Coal	1.7%
Hydro	0.6%

Installed capacity and electricity produced by each technology [2] [3]

	Installed Capacity (GW)		Energy Output (TWh)		Utilisation / Capacity Factor	
	2022 Q3	Annual change	2022 Q3	Annual change	Average	Maximum
Nuclear	7.4	−1.0 (−12%)	10.2	+0.1 (+1%)	57%	74%
Biomass	3.8	~	5.0	+0.4 (+9%)	59%	100%
Hydro	1.2	~	0.4	+0.1 (+22%)	17%	66%
Wind	26.2	+1.6 (+7%)	13.5	+3.1 (+30%)	24%	74%
..of which Onshore	13.6	~	6.6	+2.6 (+64%)	22%	70%
..of which Offshore	12.5	+1.6 (+15%)	6.9	+0.5 (+8%)	26%	81%
Solar	13.4	+0.1 (+1%)	4.3	+0.5 (+14%)	15%	68%
Gas	27.6	~	30.6	+5.2 (+21%)	51%	78%
Coal	3.8	~	1.1	−0.0 (−3%)	14%	39%
Imports	7.4	+0.7 (+10%)	2.5	−6.0 (−70%)	16%	74%
Exports			5.6	+4.6 (+507%)	34%	72%
Storage discharge	3.1	~	0.4	−0.1 (−13%)	6%	56%
Storage recharge			0.4	−0.0 (−9%)	6%	35%

[2] 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.
[3] 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.

7. Power system records

Quarter 3 saw very few records broken: just three out of the 200+ records we track. Most notably, August was by far the most expensive month ever for generating electricity. The average wholesale price reached over £350/MWh, smashing the previous record of £230/MWh set back in March.

Exports of electricity once again reached record highs through July, peaking at the end of the month with more than one-fifth of the electricity generated here sent abroad. On the 1st of July, more than 10% of Britain's electricity generation was sent to France alone.

Finally, on the 27th of July high winds combined with low demand to mean that less than 5 GW of electricity generation came from 'conventional' sources (i.e. not wind or solar) for the first time ever. National Grid is preparing to be ready to run a zero-carbon power system (with no fossil generation at all for individual hours) by 2025.

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.[4] Cells highlighted in blue are records that were broken in the first half 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	20002	64.8%
Daily average	17672	53.4%
Month average	14525	40.4%
Year average	7817	24.9%

	Solar – Maximum	
	Output (MW)	**Share (%)**
Instantaneous	9680	33.1%
Daily average	3386	13.6%
Month average	2651	10.0%
Year average	1372	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	21301	66.3%
Month average	18334	51.0%
Year average	11896	37.9%

[4] The annual records relate to full calendar years, so cover the period of 2009 to 2021.

	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	4745
Daily average	48823	8385
Month average	43767	18017
Year average	36579	21520

	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	112.66	33.88

	Carbon intensity	
	Maximum (g/kWh)	Minimum (g/kWh)
Instantaneous	704	18
Daily average	633	55
Month average	591	135
Year average	508	172

	All low carbon – Maximum	
	Output (MW)	Share (%)
Instantaneous	35104	92.1%
Daily average	27282	82.5%
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	1700	5.3%
Daily average	3476	11.7%
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	12.9%
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	499	1.6%

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	1556	4.7%
Daily average	3071	9.5%
Month average	6775	19.9%
Year average	9159	24.6%

Imports – Maximum	Output (MW)	Share (%)
Instantaneous	5906	22.5%
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	-1.9%

Pumped storage – Maximum[5]	Output (MW)	Share (%)
Instantaneous	2660	7.9%
Daily average	409	1.2%

Pumped storage – Minimum[5]	Output (MW)	Share (%)
Instantaneous	-2782	-10.8%
Daily average	-622	-1.7%

[5] 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.

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