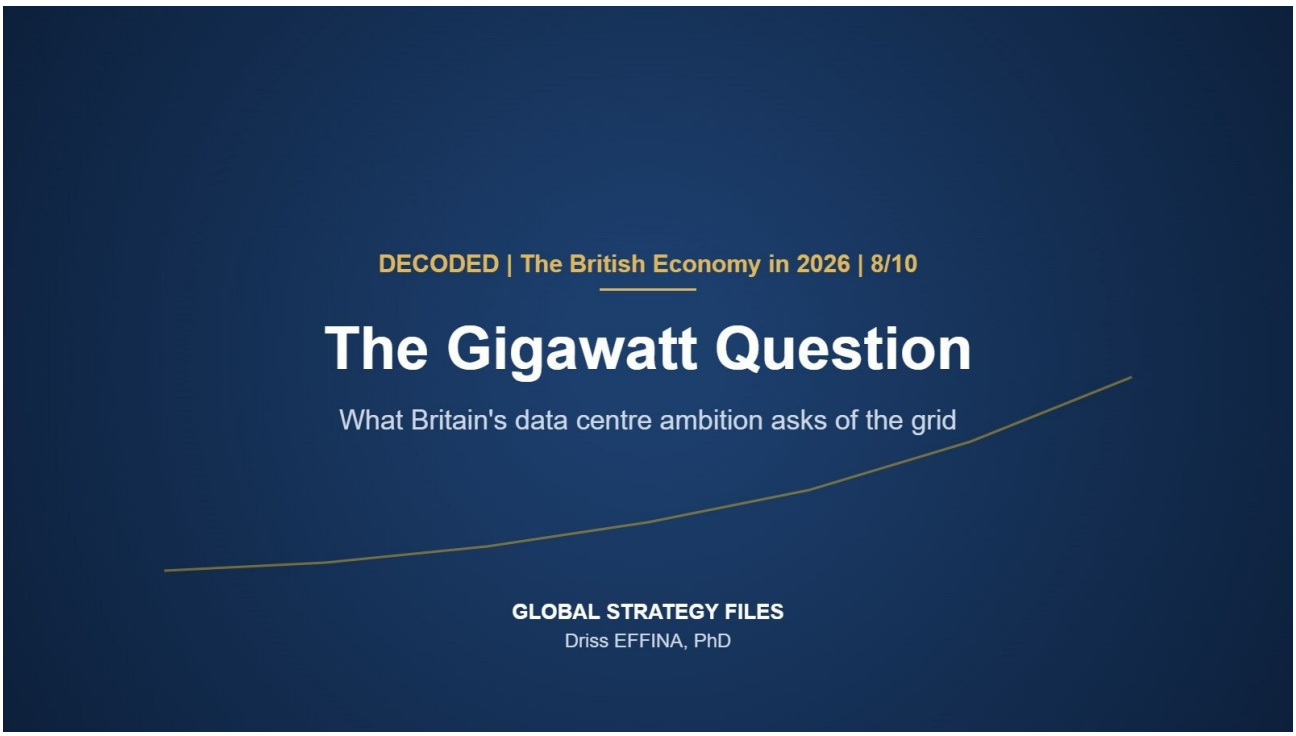


The Gigawatt Question: What Britain's Data Centre Ambition Really Asks of the Grid

The British Economy in 2026 | Analytical Series, Paper 8

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Executive Summary

Data centres have become the most uncertain element of Britain's electricity planning. The government's ambition to make the country a leader in artificial intelligence, AI growth zones and faster grid connections have produced a wave of requests to connect data centres to the network. Whether those projects materialise will decide whether electricity demand grows modestly or sharply over the next decade, and how much new generation and network capacity consumers will have to finance. This paper quantifies that uncertainty with the official figures available.

1. The queue is enormous. Data centre connection requests exceed 70 gigawatts, almost thirty times the 2.4 gigawatts connected in 2025, according to the National Energy System Operator (NESO).
2. Data centres use far less than their connected capacity. Existing data centres consumed about 7.6 terawatt hours in 2025, implying average utilisation of about 36 per cent. NESO's forecast for 2030, 5.2 gigawatts and just over 20 terawatt hours, implies 45 per cent.
3. The full queue is not credible. At 45 per cent utilisation, 70 gigawatts would consume about 276 terawatt hours a year, more than total electricity demand in Great Britain in 2025 (269 terawatt hours).
4. The official forecast embeds a strong attrition assumption. NESO's central view of about 33 terawatt hours by 2035 is consistent with only about 8.5 per cent of requested capacity being built, roughly one gigawatt in twelve.
5. Uncertainty is wide and skewed upward. A Monte Carlo simulation over completion and utilisation gives a median of 55 terawatt hours in 2035 (90 per cent range 20 to 127), equal to about 15 per cent of projected national demand, with a 79 per cent probability of exceeding the official view.
6. The supply implications are large. The median outcome would require about 14 gigawatts of new

offshore wind, 49 gigawatts of solar or 9 gigawatts of gas-fired generation, on top of what is needed for the electrification of heat and transport.

7. Digital growth has not required domestic power. Since 2010 the output of information service activities, which includes data processing and hosting, has risen by about 160 per cent, while the output of the electricity supply industry has fallen by a third.

The policy conclusion is that Britain should treat the data centre queue as an option, not a forecast. Connections should be allocated with strong locational and financial signals, data centres should bear the network costs they create, and the case for each large site should rest on its local value, not on the general argument that AI requires domestic computing capacity.

1. The Data Centre Bargain

Britain is one of Europe's largest data centre markets, with a cluster around London and the M4 corridor serving finance, cloud computing and telecommunications. Data centres consumed about 7.6 terawatt hours of electricity in 2025, around 3 per cent of national demand, from about 2.4 gigawatts of connected capacity. Most of that capacity serves traditional activities such as banking and cloud storage, not the training of AI models.

The AI boom has changed the scale of ambition. Developers now seek sites of hundreds of megawatts, often connected directly to the transmission network. NESO told Parliament in 2026 that connection requests had passed 70 gigawatts, with a clear shift toward very large sites, and that its forecast pointed to around 5.2 gigawatts connected and just over 20 terawatt hours of demand by 2030. Its Future Energy Scenarios published in 2025 put data centre demand at about 33 terawatt hours by 2035 and between 30 and 71 terawatt hours by 2050. Its 2026 ten-year outlook projected total electricity demand rising from 269 terawatt hours in 2025 to 368 terawatt hours in 2036, with lower data centre demand than a year earlier because of project attrition and lower utilisation.

Table 1. Official figures used in this paper

Indicator	Value	Source
Connected data centre capacity, 2025	2.4 GW	NESO, Future Energy Scenarios 2025
Data centre electricity demand, 2025	7.6 TWh	NESO, Future Energy Scenarios 2025
Forecast capacity and demand, 2030	5.2 GW, just over 20 TWh	NESO evidence to Parliament, 2026
Data centre connection requests	over 70 GW	NESO evidence to Parliament, 2026
Data centre demand, 2035 (central view)	about 33 TWh	NESO, Future Energy Scenarios 2025
Great Britain electricity demand, 2025 and 2036	269 and 368 TWh	NESO, ten-year outlook 2026
Output of information service activities; electricity supply	Monthly indices to August 2026	ONS, index of services (S2LG) and index of production (K249)

Note: the paper combines published NESO aggregates with ONS output data; it does not use project-level data.

2. Digital Output Without Domestic Power

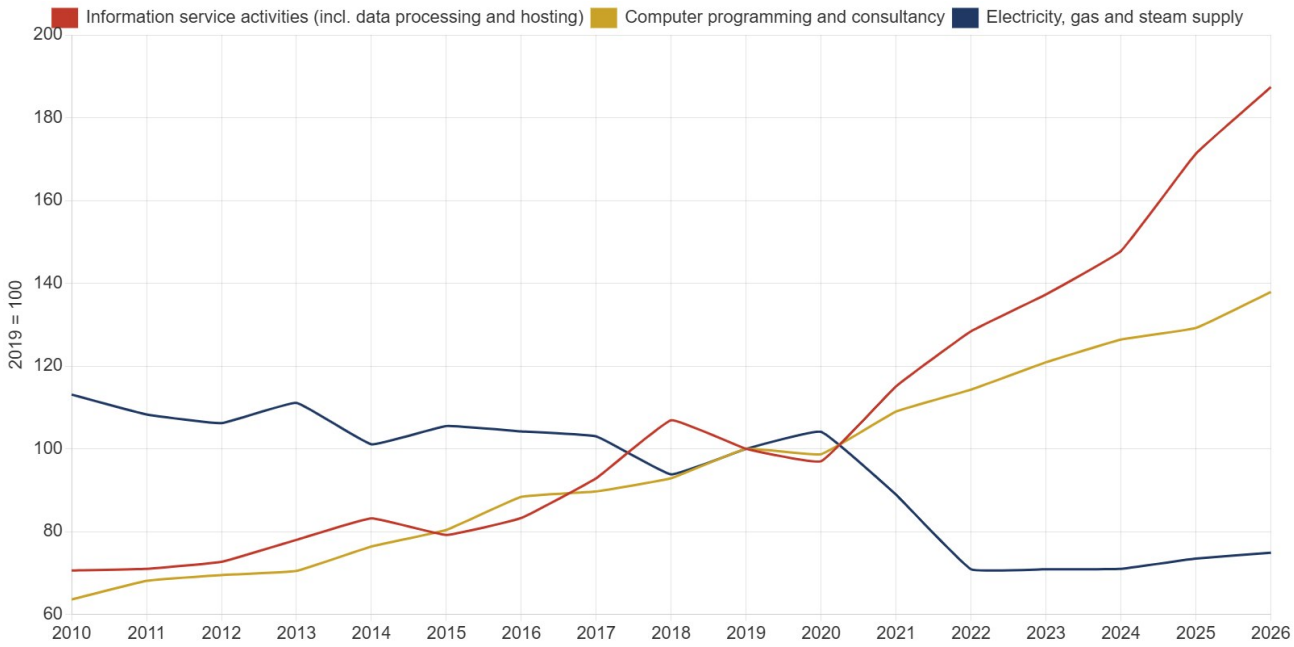


Figure 1. Digital output has decoupled from electricity supply, 2010 to 2026. Source: ONS, index of services (information service activities, S2LG; computer programming and consultancy, S2LF) and index of production (electricity, gas and steam supply, K249). Annual averages, 2026 to August, rebased to 2019 = 100.

A common argument for domestic data centres is that the digital economy cannot grow without them. British data do not support that claim. Since 2010 the output of information service activities, the ONS industry that includes data processing and hosting, has risen by about 160 per cent, and it has grown by 87 per cent since 2019 alone. Output of computer programming and consultancy has risen strongly too. Over the same period, the output of the electricity supply industry fell by about a third, as efficiency improved and heavy industry declined.

Part of Britain's digital activity is already served by computing located elsewhere, in Ireland, the Netherlands, the Nordic countries and the United States. Computing services can be imported like other services. Data centres located in Britain bring benefits, including latency for some applications, data sovereignty and construction activity, but the growth of the digital economy does not depend one for one on domestic electricity use.

3. Reading the Queue

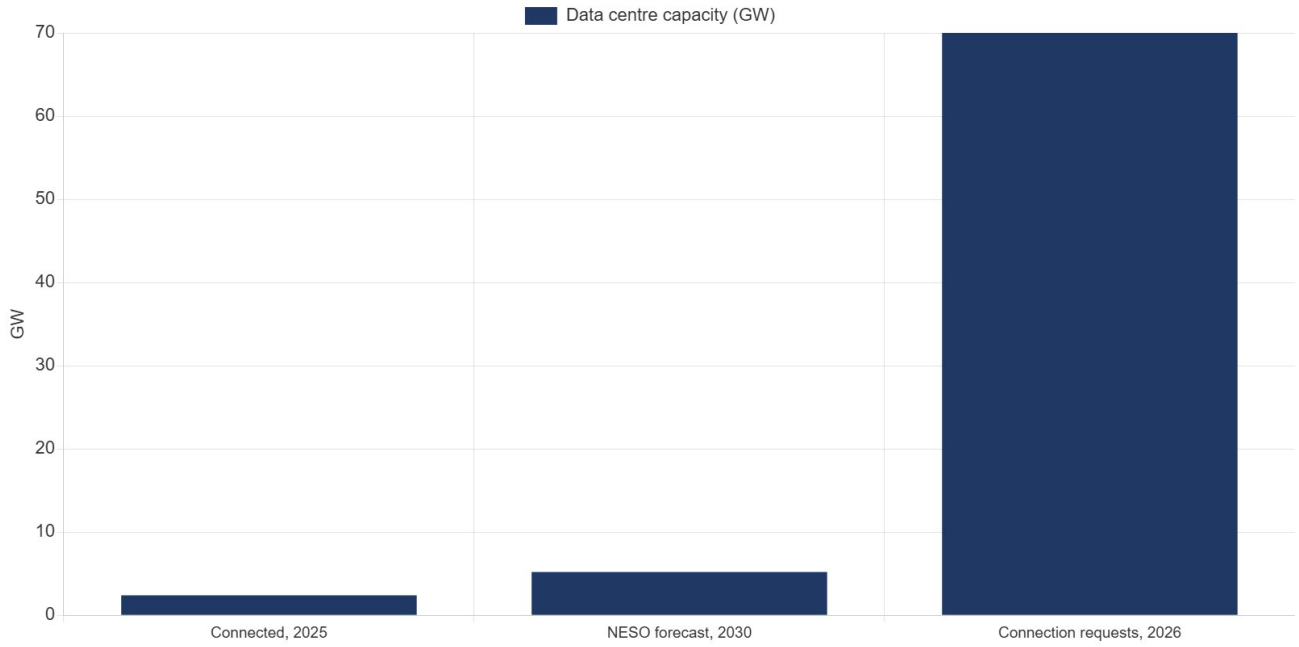


Figure 2. Data centre capacity: connected, forecast and requested. Source: NESO.

The first step in assessing the queue is to convert capacity into energy. Connected capacity measures the maximum power a site may draw; actual consumption depends on how much of that capacity is used and how quickly sites ramp up. The official figures imply average utilisation of about 36 per cent in 2025 (7.6 terawatt hours from 2.4 gigawatts) and 45 per cent in NESO's 2030 forecast. AI training sites can run at higher utilisation than traditional data centres, but most sites take several years to fill.

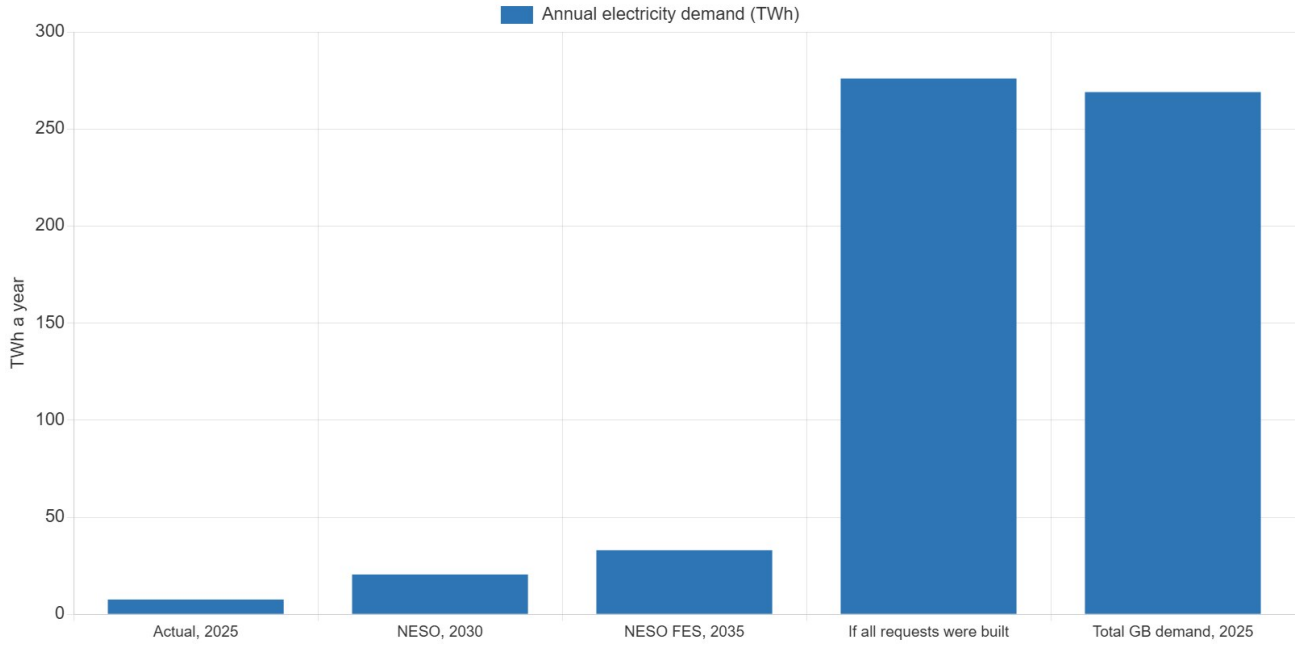


Figure 3. What the queue would mean: annual electricity demand. Source: NESO; author's calculations. The bar for the full queue applies 45 per cent utilisation to 70 GW.

At 45 per cent utilisation, the 70 gigawatts in the queue would consume about 276 terawatt hours a year, slightly more than the whole of Great Britain's electricity demand in 2025. That is not a plausible outcome; it shows that the queue is largely speculative, with many projects applying in several places for the same customers. It also shows how much the official forecast depends on an assumption about attrition. NESO's central view of about 33 terawatt hours in 2035 is consistent, at 45 per cent utilisation, with about 8.4 gigawatts connected, so with only about 8.5 per cent of requested capacity being built.

4. A Probabilistic View of 2035

To quantify the uncertainty, the paper simulates 20,000 outcomes for 2035. Connected capacity equals the existing 2.4 gigawatts plus a share of the 70 gigawatt queue, with the completion share drawn from a beta distribution with a mean of about 17 per cent and a long right tail. Average utilisation is drawn uniformly between 35 and 65 per cent. The assumptions are deliberately simple and are reported so that readers can substitute their own.

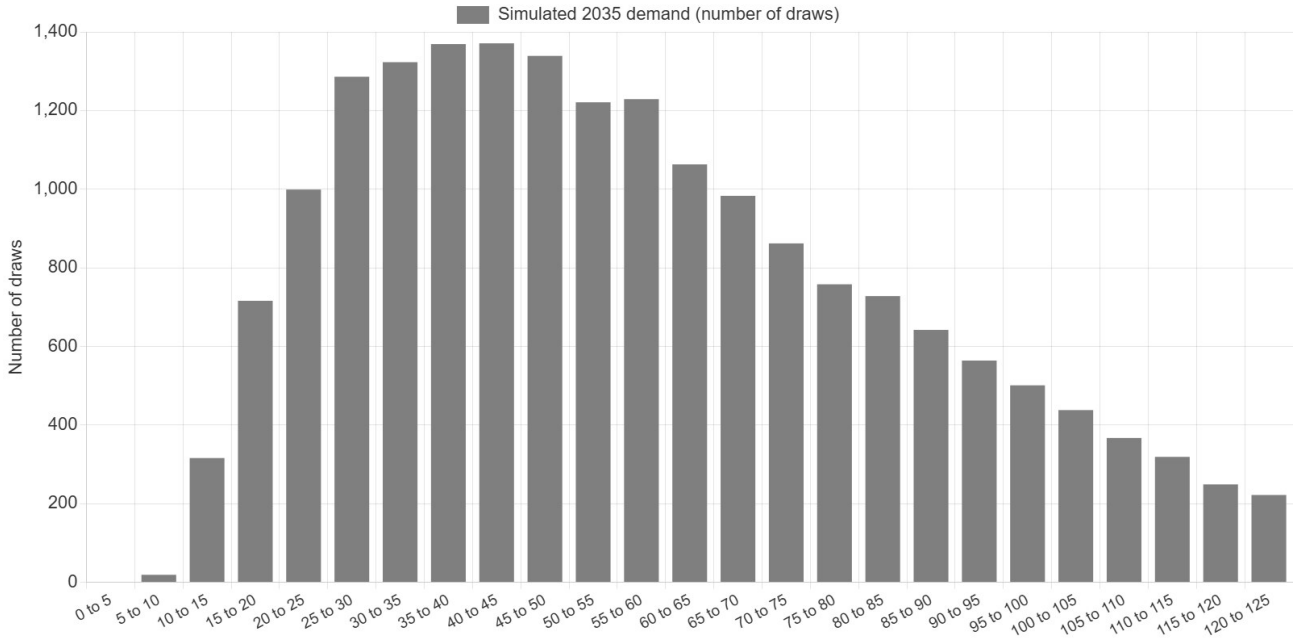


Figure 4. Data centre electricity demand in 2035: Monte Carlo distribution. Source: author's simulation.

Table 2. Simulated data centre electricity demand in 2035

Statistic	Value
5th percentile	20 TWh
25th percentile	36 TWh
Median	55 TWh
75th percentile	81 TWh
95th percentile	127 TWh
Probability of exceeding NESO's 33 TWh	79 per cent
Median connected capacity (5th to 95th percentile)	12.8 GW (4.7 to 27.9)
Median share of projected 2035 national demand (359 TWh)	15 per cent (5.5 to 35.5)

Note: completion share drawn from Beta(2,10); utilisation uniform 35 to 65 per cent; 20,000 draws. National demand in 2035 interpolated from NESO's 2026 ten-year outlook.

The median outcome, 55 terawatt hours, is two thirds higher than NESO's central view, and the distribution is skewed: the official figure lies near the 21st percentile. In the median case, data centres would account for about 15 per cent of national electricity demand in 2035 and for about half of the growth in demand between 2025 and 2035. Even NESO's own central view implies that data centres account for about 28 per cent of the growth in demand over the decade, more than any other single source except, possibly, the electrification of transport.

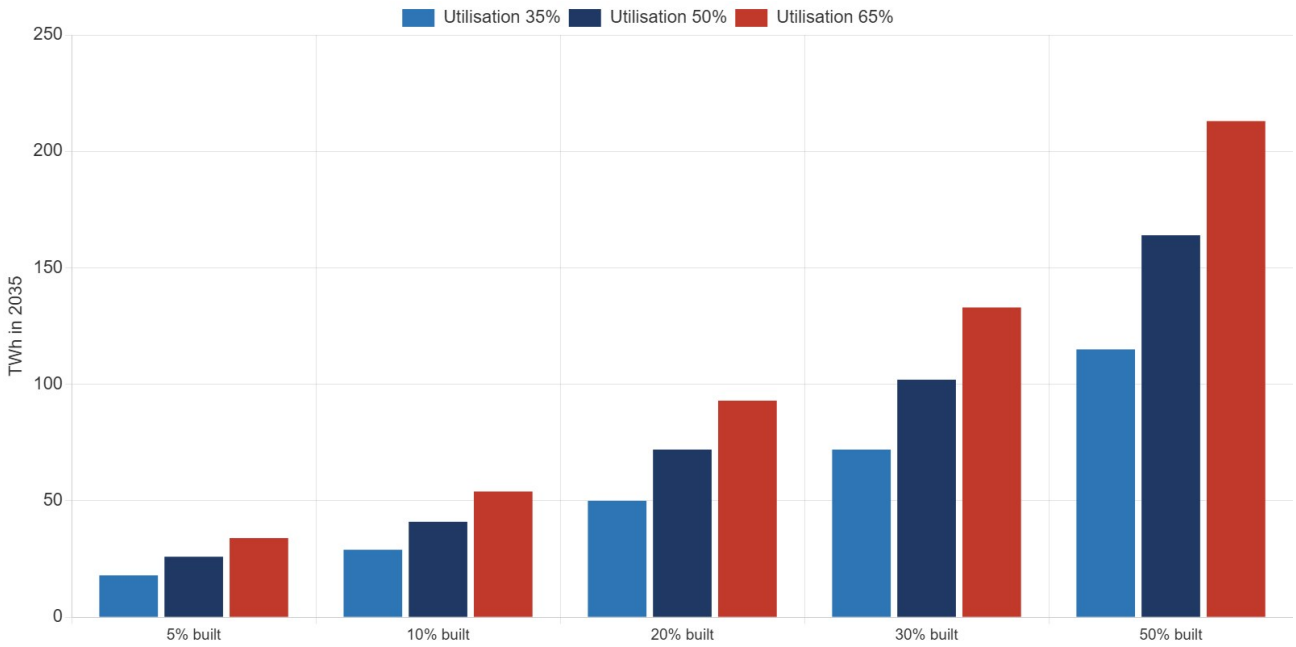


Figure 5. Sensitivity of 2035 demand to completion and utilisation. Source: author's calculations.

Table 3. Data centre demand in 2035 (TWh) by completion and utilisation

Share of requests built	Utilisation 35%	Utilisation 50%	Utilisation 65%
5%	18	26	34
10%	29	41	54
20%	50	72	93
30%	72	102	133
50%	115	164	213

Note: connected capacity = 2.4 GW + share built x 70 GW.

Table 3 shows that completion matters more than utilisation. Each additional ten points of the queue built adds 20 to 40 terawatt hours, as much as a large nuclear station produces in a year. Planning for 33 terawatt hours, as the system operator does, is reasonable only if at most one requested project in ten goes ahead.

5. What It Would Take to Supply

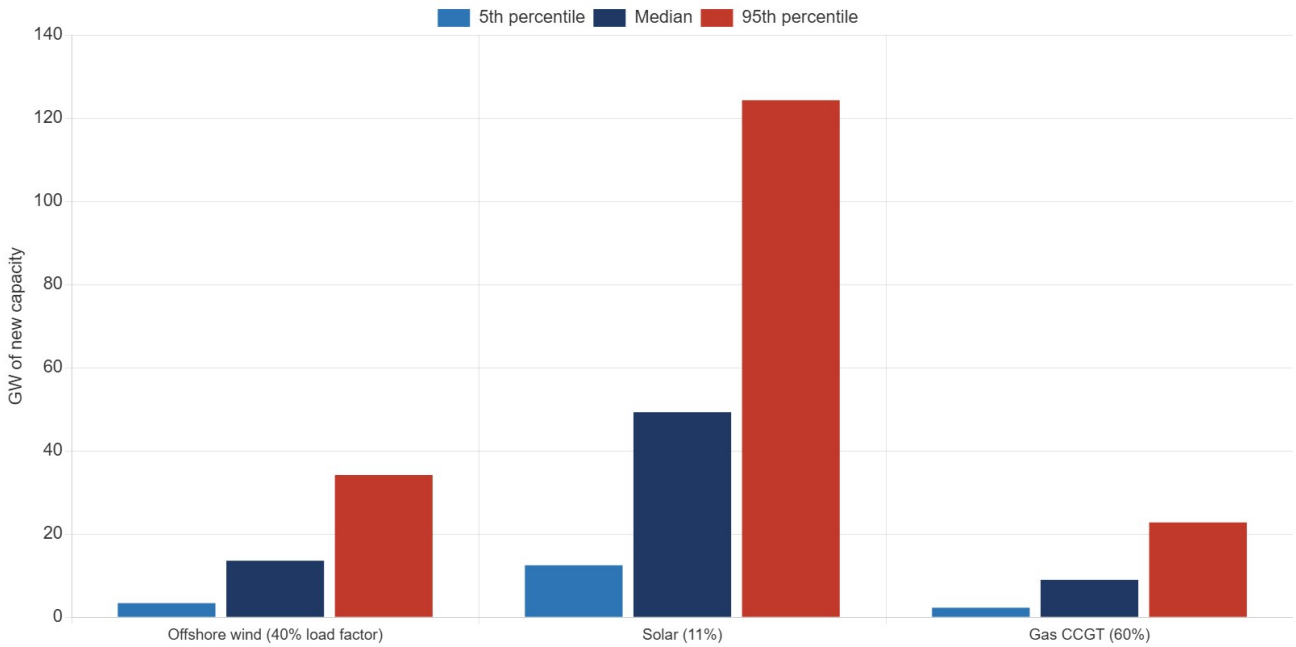


Figure 6. New generation needed to supply data centres by 2035. Source: author's calculations. Extra demand relative to 2025 divided by annual output per GW at the stated load factors.

Every terawatt hour consumed by data centres must be generated. Supplying the extra demand in the median simulated outcome, about 47 terawatt hours above 2025, would require about 14 gigawatts of new offshore wind at a 40 per cent load factor, about 49 gigawatts of solar at 11 per cent, or about 9 gigawatts of gas-fired plant running 60 per cent of the time. In the 95th percentile case, the requirements roughly treble. These are additions to the large build-out already needed to electrify heating and transport and to replace retiring plant.

Data centres also add to peak demand, because their consumption is largely flat through the day and the year. Unless they can shift load or provide their own back-up, each gigawatt of data centre demand requires firm capacity at times of low wind, which in Britain still means gas. The third paper in this series showed how strongly gas prices pass through to British households; a large data centre load that keeps gas plants at the margin for more hours would raise that exposure.

6. Who Pays and Where

Three cost channels matter for households and other businesses. The first is network reinforcement: large transmission connections require new substations and lines, whose costs are partly socialised through network charges. The second is wholesale prices: additional demand raises the price whenever the marginal plant is gas-fired. The third is local resources: water for cooling and land near grid nodes. None of these costs is captured in the private return of a data centre project.

Location therefore matters. NESO has said that, with sufficiently strong locational signals, up to 20 per cent of future data centre demand could be located in Scotland, where wind generation is abundant and network constraints often force wind farms to switch off. Siting data centres near surplus renewable generation would reduce both network costs and the hours in which gas sets the price; siting them around London would increase both.

7. Recommendations

1. Treat the queue as an option. Plan networks and generation around a probabilistic range, not a single figure, and publish the completion and utilisation assumptions behind official forecasts.
2. Price connections properly. Large data centres should bear the reinforcement costs they cause, with

financial commitments that discourage speculative applications.

3. Use location as a lever. Strong locational signals in network charges and connection rules should steer new data centres toward areas of surplus renewable generation.
4. Require flexibility. New large sites should be able to reduce demand at times of system stress or provide their own firm capacity.
5. Judge each site on its local value. The aggregate evidence shows that Britain's digital economy can grow without domestic computing on the scale requested; public support should depend on measurable local benefits.

8. Conclusions

The data centre queue is a measure of interest, not of future demand. Taken literally, it would double Britain's electricity consumption. The official forecast assumes that more than nine requested gigawatts in ten will not be built; a simple probabilistic analysis suggests that demand could nonetheless be well above the official view, with a median of about 55 terawatt hours in 2035. Whether that outcome is a burden or an opportunity depends on where data centres are built, who pays for their connections and whether they bring value that could not be obtained by importing computing services. Britain's own data show that the digital economy can grow strongly without proportional growth in domestic power use.

Methodological Appendix

A1. Utilisation

Average utilisation u = annual demand (TWh) / (capacity (GW) x 8.76). 2025: 7.6 / (2.4 x 8.76) = 0.36. 2030 forecast: 20.5 / (5.2 x 8.76) = 0.45. The capacity consistent with 33 TWh in 2035 at u = 0.45 is 8.4 GW, implying a completion share of (8.4 - 2.4) / 70 = 8.5 per cent.

A2. Monte Carlo

For each of 20,000 draws: completion c from Beta(2,10); utilisation u from Uniform(0.35, 0.65); capacity K = 2.4 + 70c; demand D = 8.76 K u. National demand in 2035 is 359 TWh, interpolated linearly between NESO's 269 TWh in 2025 and 368 TWh in 2036. Generation requirements equal (D - 7.6) / (8.76 x load factor), with load factors of 0.40 for offshore wind, 0.11 for solar and 0.60 for gas-fired plant.

A3. Limitations

The paper uses aggregate official figures, not project-level data, and its distributions are illustrative. The ONS information services industry covers more than data centres, and its output is measured in value terms rather than computing capacity. The analysis does not estimate the employment, tax or productivity benefits of individual data centres, which vary widely, nor the wholesale price effect of additional demand, which requires a full dispatch model.

References

National Energy System Operator (2025), Future Energy Scenarios 2025: Pathways to Net Zero.

National Energy System Operator (2026), Written evidence to Parliament on data centres (DCU0081).

National Energy System Operator (2026), Ten Year Outlook: electricity demand.

Office for National Statistics (2026), Index of services and index of production, August 2026.

About this series. This paper belongs to a ten-part series on the British economy in 2026 published by Global Strategy Files. Each study takes one current economic question and answers it with original time-series analysis and modelling on the latest official data.

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