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Research and Policy at LSE

Submission to the UK government consultation 'Risks and opportunities to the sustainability of data centres in the UK'

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Consultation response

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About this consultation response

This submission responds to an Environmental Audit Committee inquiry into 'Risks and opportunities to the sustainability of data centres in the UK'. The authors have answered the questions most closely related to their areas of expertise. The response was submitted on **5 April 2026**. This version has been lightly edited prior to publication on the CETEx website.

The open consultation can be viewed here:

https://committees.parliament.uk/work/9651/risks-and-opportunities-to-the-sustainability-of-data-centres-in-the-uk/

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Summary of key points

Question 3: What impact are data centres having on climate change and the Government's net zero targets?

- The modelling carried out for this response suggests data centres could add approximately 12 million tonnes of carbon dioxide equivalent ($MtCO_2e$) per year to UK greenhouse gas emissions by 2035 – comparable to the amount produced by the shipping or waste sectors. In a high-demand and high-carbon-intensity scenario, data centre emissions could be as high as 37 $MtCO_2e$, or 8% of emissions in 2024. Short-term emissions are largely unavoidable, given the mismatch between data centres' need for continuous power and the intermittent nature of renewables. In the long term, data centres and AI tools have the potential to catalyse clean technology innovation, but could also exacerbate carbon lock-in and stranded asset risks by entrenching fossil-fuel generation.

Question 6: Has the Climate Change Committee [CCC] adequately taken account of the impact of data centres, especially in the Seventh Carbon Budget?

- The CCC's Seventh Carbon Budget contains no explicit reference to AI or data centres. This is a material omission. In a high-demand scenario, data centre emissions in 2035 alone could represent up to 35% of the 2040 Carbon Budget and, in our central case (see Table 1), could negate 70% of the cumulative emissions savings expected from industrial electrification up to 2035, based on modelling conducted for this submission.

Question 9: Are there beneficial or precautionary lessons to learn from the impact of data centres outside the UK?

- The experience in the United States is a cautionary tale for the UK. Data centre deployment in the US has already had serious consequences, including a 13% rise in coal generation in 2025, electricity price increases of over 200% near data centre clusters, and significant environmental harm from water stress and air pollution, as well as greenhouse gas emissions. Public opposition is growing: 57% of Americans expect data centres to become a campaign issue in their areas.[1]

Question 10: To what extent will data centre resource demands impact competition for resources and decarbonisation?

- Data centres will increase competition for land, labour and electricity. In a high-demand scenario, powering data centres entirely with renewable generation could require up to 610,000 hectares of land – an area around 2.5 times the size of Luxembourg. Data centres are also lengthening grid connection queues, potentially delaying electrification, while competing directly for the electricians, engineers and construction workers needed to build wind farms, solar installations and grid infrastructure.

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[1] See full responses below for citations.

Introduction

The scale and speed of data centre development will have important implications for energy demand, grid infrastructure and the UK's low-carbon transition. In this response, we provide evidence of the expected impacts of data centres on energy usage and greenhouse gas emissions, and the extent to which they can crowd out scarce resources, along with a summary of lessons learned from the rapid expansion of data centre infrastructure in the US.

We address four questions in the Environmental Audit Committee's call for evidence (Questions 3, 6, 9 and 10) and provide an Appendix detailing the process and assumptions used in our responses to Questions 3 and 10. Our analysis for this submission is based on stylised calculations that are intended to provide 'order of magnitude' estimates.

Response

Question 3. What impact are data centres having on climate change and the Government's net zero targets and how will this change in the short, medium and long term in the UK?

Data centres will have a significant impact on the UK Government's net zero targets, with our modelling suggesting that they could add about 12 million tonnes of carbon dioxide equivalent ($MtCO_2e$) per year in emissions in our central case, but potentially reaching 37 $MtCO_2e$, by 2035. Using the methodology outlined in the Appendix, we estimate data centre usage in various plausible demand scenarios. Assuming that data centre demand is in the middle of potential projections, and that there are moderate amounts of gas usage, data centres would increase the UK's emissions by about 3% relative to a 2024 baseline (Office for National Statistics, 2025). This figure is comparable to emissions from the shipping and waste sectors in 2024 (CCC, 2025). However, if data centres depend heavily on gas for behind-the-metre (BTM) generation and increase grid carbon intensity, as in our highest grid and BTM emissions intensity scenario, emissions could be 37 $MtCO_2e$ (8% of 2024 emissions) higher in 2035 than they would be without data centre energy demand. This figure is comparable to total emissions from the aviation sector in 2024 (CCC, 2025). Table 1 summarises the range of emissions impacts that could be possible, depending on the energy mix that data centres use.

Table 1. Data centre emissions impacts across scenarios

Data centre energy demand scenario	GHG emissions in 2035 ($MtCO_2e$) / (% of 2024 emissions)						
	High gas use Behind the Meter (BTM) (95%)	Medium gas BTM (50%)	Low gas BTM (20%)	High grid carbon intensity	Medium grid carbon intensity	Low grid carbon intensity	High grid and BTM carbon intensity
High	33 / 7%	24 / 5%	18 / 4%	28 / 6%	24 / 5%	20 / 4%	37 / 8%
Medium	17 / 4%	**12 / 3%**	9 / 2%	14 / 3%	**12 / 3%**	10 / 2%	19 / 4%
Low	10 / 2%	8 / 2%	6 / 1%	9 / 2%	8 / 2%	6 / 1%	12 / 3%

Source: Authors' calculations (central cases bolded). For more details on these calculations, see the Appendix. These calculations are stylised and intended to provide 'order of magnitude' estimates of emissions impacts. The gas use percentages reflect the share of gas generation used to power BTM generation, which is assumed to be approximately 30% of total data centre capacity in the UK. The remainder is powered by the grid. In scenarios in which the gas share of BTM generation varies, grid carbon intensity is fixed at the central case; where grid carbon intensity varies, the gas share is fixed at 50%.

Short-term impacts

In the short term, emissions from data centres are largely unavoidable in the UK, due to a lack of assured low-carbon electricity supply. The International Energy Agency (IEA) projects that by 2030, only half the energy demand from data centres will be met by renewable energy sources, with the remainder powered by a mix of gas and coal (IEA, 2025). This is due to the demand profile of data centres, which require continuous, uninterrupted energy supply, making them a poor match for intermittent renewables, such as wind and solar generation. As such, there are two key determinants of the short-term emissions impacts of data centres: the level of demand data centres add, and the types of energy that they use.

The scale of data centres' expansion will materially contribute to emissions, given their high energy demand. There is considerable uncertainty as to how much of the pipeline of current data centre projects will be developed, due to the unpredictability associated with the AI industry – but the scale of demand introduced by even part of the current pipeline would be immense. Ofgem indicates that the total pipeline amounts to approximately 50 gigawatts (GW) of capacity, with about 20GW of this capacity at a mature stage of development, or at the final investment decision (FID) stage (Ofgem, 2026). In our central case, assuming half of the mature project pipeline (about 10GW) proceeds to operation, this would increase data centres' annual electricity demand by about 25%. In a high-demand scenario, where all 20GW of the mature pipeline goes ahead, this would double the impacts. A key determining factor of the associated emissions is the energy mix of new data centres, including whether they are connected to the grid or provide their own generation.

Although only a minority of data centres are expected to build on-site generation, their energy mix, especially gas dependency, matters for short-term emissions impacts (Gabbatiss, 2026; Wang, 2026). Following the IEA's projections, our central case assumes that approximately 50% of BTM data centre generation comes from renewables such as wind and solar (using battery storage). Given the regulatory environment in the UK, the remainder is assumed to come from gas generation. In our central case, this corresponds to annual emissions of 12 $MtCO_2e$ by 2035. But, if on-site generation relies heavily on gas, this could increase to 17 $MtCO_2e$ or, in a high-demand scenario, to 33 $MtCO_2e$ – approximately 7% of the UK's emissions in 2024.

Connecting to the grid potentially offers a less emissions-intensive energy mix, but would strain the network and could increase gas utilisation. Prospective analysis of data centre expansion in Malaysia, for example, finds that gas utilisation increases by 76% to accommodate increasing data centre demand, while coal utilisation also increases (Vu, 2026). This would increase the carbon intensity of the grid relative to current levels. In a scenario in which demand and grid carbon intensity are high, and BTM generation is highly dependent on gas, the emissions associated with data centre operations could approach 8% of the UK's emissions in 2024.

Medium- to long-term impacts

The medium- to long-term emissions of data centres remain uncertain, and their quantity will heavily depend on AI's potential to catalyse clean technology innovation. While AI holds genuine decarbonisation potential, data centre infrastructure could create path dependencies that entrench rather than reduce energy-related emissions. The extent to which these effects offset each other is an area of ongoing research, but some key themes are summarised below.

The scale and nature of data centre demand could alter the least-cost transition pathway for the grid, entrenching reliance on fossil-fuel-based generation. This could require the construction of gas-powered generation in the short term to service the demand profile of data centres. However, new gas generation has an asset life of approximately 25 years (Alster, 2021), which means that new gas generators constructed today could remain in operation past 2050. The same logic of carbon lock-in applies to BTM generation – although hybrid energy mixes with on-site peaking units and reliance on the grid during off-peak times could reduce emissions intensity, while minimising renewable energy curtailment.

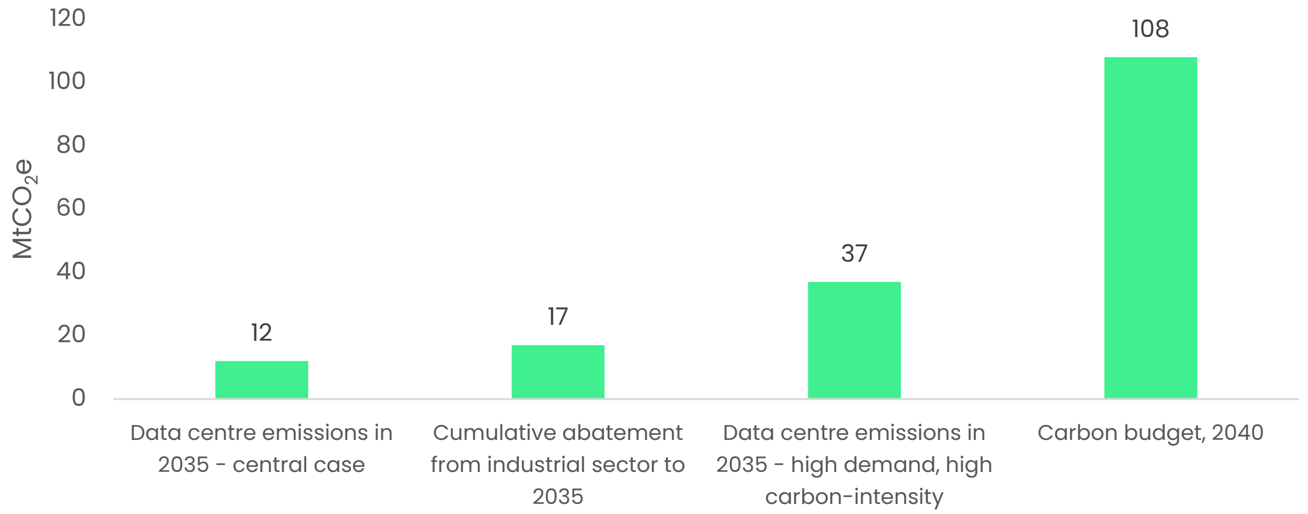
The scale and nature of data centres' energy demand could also catalyse clean technology innovation by enabling the widespread adoption of AI tools, as well as by providing much-needed offtake for emerging clean technologies. Examples of the latter, where data centres provide an initial customer base for emerging clean technologies, include the growing number of offtake agreements signed by data centres for energy from technologies such as small modular reactors and integrated battery storage and renewables (CTVC, 2026; Gerke, 2024). This could have learning-by-doing benefits, driving innovation in firm clean energy sources to bring down costs faster. Moreover, the AI tools enabled by data centres drive innovation across clean industries – with the evidence suggesting that clean sectors benefit more from these advances than dirty technologies do (Andres et al., 2022). This can provide opportunities to overcome path dependencies in technological innovation, although the benefits remain largely hypothetical at this stage.

Question 6. Has the Climate Change Committee [CCC] adequately taken account of the impact of data centres, especially in its advice on the Seventh Carbon Budget?

The CCC's Seventh Carbon Budget[2] does not appear to account for the additional energy demand and associated greenhouse gas emissions that will come from data centres. There are no explicit references to AI or data centres in the Carbon Budget, and it is challenging to identify the sector in which data centres would sit. The sectors in the Carbon Budget include energy supply, industry, waste and F-Gases, buildings, surface transport, aviation and shipping, agriculture and land use, engineered removals, and 'other'. Data centres could sit within industry – but this is not definitively indicated anywhere in the report. Therefore, it is likely that emissions from data centres would be additional to the emissions and emissions reduction accounted for in the Seventh Carbon Budget, which would increase the challenges associated with meeting emissions reduction targets.

Data centres could increase the UK's annual emissions by 3% in the central case, and by up to 8% in a scenario involving high demand and high grid carbon intensity. Additional emissions reduction must, therefore, be found within the budget. To place these figures in context, data centre-related emissions in 2035 alone could be as much as 11% of the 2040 carbon budget in the central case, and up to 35% in a high-demand, high carbon-intensity scenario. One year of data centre-related emissions in the central case could also negate 70% of the cumulative abatement delivered by electrification of the industrial sector up to 2035 (CCC, 2025).

Figure 1. Data centre emissions compared with Seventh Carbon Budget milestones



Source: Authors, and CCC Seventh Carbon Budget (CCC, 2025)

[2] The Seventh Carbon Budget runs from 2038 to 2042.

Question 9. Are there beneficial or precautionary lessons to learn from the impact of data centres outside the UK?

The US is at the forefront of data centre expansion, and the associated social and environmental impacts are already resulting in public and political pushback. Although the US and the UK differ in the way their energy markets are structured, the groundswell of pushback against data centre expansion provides a cautionary tale for the UK on advancing the rollout of data centres without appropriate safeguards in place.

The electricity demand from data centres in the US is significantly increasing emissions from fossil-fuel-based electricity generation, among other environmental impacts. Although tech companies bought record amounts of clean energy in 2024 and 2025, they are increasingly reliant on fossil fuels, particularly natural gas (Webber, 2026). Due in large part to increased demand from data centres and other large-load customers, 2025 saw a 13% increase in coal generation in the US relative to 2024, with overall emissions increasing by 2.4% after two years of decreases (Gaffney and King, 2026). This trend is only set to continue, with the US planning to triple its gas-fired power plant capacity (Milman and Witherspoon, 2026). Data centres are also increasing the stress on local water supplies, negatively impacting air quality where the associated power is provided through gas-fired generation and back-up diesel generators, and reducing available productive land for agricultural purposes (Walker and Goldsmith, 2026).

The increased electricity demand from data centres is also having a significant effect on household energy prices. In the US, electricity prices near data centre clusters have soared by as much as 267% in the last five years (Saul et al., 2025). The independent market monitor for the PJM grid – the largest electricity grid in the US, and home to the nation's highest concentration of data centres – notes that supply crunches contribute to price increases, observing that these constraints are almost entirely due to large-load additions from data centres (Monitoring Analytics, 2025). The impact on household energy bills could be exacerbated by some US-specific factors, including large industrial companies' ability to directly negotiate for better rates (Martin and Peskoe, 2025). For example, utility company Georgia Power has offered tax incentives to large-load customers and negotiated bespoke rate tariffs that are not disclosed to the public (Georgia Power, 2025). Legislation is being introduced to phase out these tax incentives, but it may not go far enough to address concerns about a lack of transparency on rate-setting (Rocha, 2026).

Unrealistic demand projections for new data centres could create stranded assets in the future. These projections could be inflated due to speculative interconnection requests and uncertainty about actual future demand (Goldsmith and Byrum, 2025). The IEA notes that there is a seven-fold difference between the highest and lowest estimates of data centre energy demand (IEA, 2025). The concern is that the costs associated with this overbuild will ultimately be borne by utility companies and passed on to other ratepayers, resulting in stranded assets, higher bills and carbon lock-in related to fossil-fuel-based infrastructure (Muir, 2026).

The US is at the forefront of experiencing the challenges associated with data centre buildout, but it is also experimenting with possible solutions. For example, regulators in Ohio have created a new rate class specifically for large data centres, in recognition of the demands they are placing on the grid and the potential cost implications for households (Public Utilities Commission of Ohio, 2025). On the more extreme end, some jurisdictions are contemplating bans on new permits for data centre construction, either at the local or the national level, and giving local communities more rights to limit construction (Ropek, 2026). Public pushback has been strong enough that large tech companies have promised to cover the costs of data centre buildout, so that it does not raise household power costs (Reuters, 2026). However, this is a pledge without an enforcement mechanism.

Some of the policy proposals under discussion in the US could help reduce costs for consumers, but they will not address the emissions and other environmental impacts without targeted policies. For example, bespoke tariffs for large energy users are a useful starting point, but more could be done to incentivise clean energy (Perez et al., 2026). Modelling suggests that clean energy could meet much of the increased electricity demand from US data centres if appropriate policy incentives were put in place, such as clean energy tax credits, binding emissions reduction targets, carbon-free electricity standards, and environmental and health standards around the development of data centres (Clemmer et al., 2026). Implementing these proposals would likely require significant political will at both the federal and state levels.

Overall, the US example suggests a need for caution in moving forward with data centre expansion, particularly in creating appropriate environmental and social guardrails, and in securing public support. The benefits of further data centre rollout are hypothetical and diffused across society, while the costs are immediate and highly concentrated in some areas. This is not just a social and environmental issue, but also an electoral problem for politicians. Recent opinion polling in the US shows that Americans have a mostly negative view of data centres' local impact on the environment, home energy costs and people's quality of life (Gramlich et al., 2026), with 57% believing they will be a campaign issue in their area (Bordelon and Miller, 2026).

Question 10. To what extent will the resource demands of data centres impact other sectors with regard to competition for resources and decarbonisation?

The resource demands of data centres are significant, and can contribute to growing competition for scarce energy, land and skills. The consequences of this could include increased prices for these scarce resources or delays in the development of low-carbon projects across the UK.

The land requirements for data centres themselves are not necessarily a constraint – but the land needed to supply them with clean energy could be. Our analysis suggests that, in the central case, meeting data centre energy demand exclusively with an expansion of renewable energy supply, such as that from onshore wind, would require as much as 300,000 hectares of land. This is comparable to the total area of good-quality wind and solar resources available in England (Friends of the Earth, 2025). In a high-demand scenario, land-use requirements for data centres powered by onshore wind could be as much as 610,000 hectares – an area roughly 2.5 times the size of Luxembourg. Dedicating this quantity of new renewable energy generation to data centre energy demand would hinder the UK's efforts to achieve its net zero objectives, which rely increasingly on electrifying existing energy demand across industry and households (CCC, 2025).

Data centre energy demand could also push up electricity prices and lengthen grid connection queues – adversely impacting energy affordability and decarbonisation efforts. Our central demand scenario suggests data centres could increase electricity demand by about 25% from a 2024 baseline. This could place upward pressure on prices if energy supply failed to keep up, as may well be the case in the short term (European Commission, 2025). Electricity prices in the US have seen significant increases due to similar dynamics, with some areas reporting rises of over 200% (Saul et al., 2025), at least partly due to data centre demand. Competition for demand-side connections to the electricity grid can also crowd out other low-carbon infrastructure, including electric vehicle charging and projects for electrifying industrial facilities. Data centres' combination of high power density, large and rapid shifts in demand, and geographic concentration also poses unique engineering challenges for the grid, and could exacerbate network-level costs and transmission constraints (Chen et al., 2025).

The current data centre investment supercycle, comprising US$700 billion in 2026 alone (Bloomberg, 2026), is increasingly exposed to skills shortages that could also impact related industries including renewable energy. The data centre boom has increased demand for HVAC engineers – who install and maintain data centre cooling systems – as well as workers in traditional skilled trades, including construction workers, welders and electricians (Gentle, 2026). Workers in other skilled roles, such as electrical engineers, are also increasingly in high demand due to data centre development (Mok, 2025). These roles are also among the core professions required to build and connect wind farms, solar installations, grid infrastructure and heat pump systems. The extent to which data centres and low-carbon projects are drawing on the same labour pool is underexplored but, given the scale and speed of data centre expansion, it is plausible that competition for these roles could exacerbate the skills and labour shortages already constraining the delivery of renewable-energy and low-carbon projects.

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Appendix: approaches to calculating data centre emissions, demand and land use

This Appendix outlines the assumptions behind and process we used to calculate data centre energy demand, emissions and land-use needs, informing our responses to Questions 3 and 10.

Data centre energy demand

Given the uncertainty associated with AI demand and, therefore, the share of energy-intensive accelerated servers within data centres, it is challenging to arrive at top-down or demand-driven conclusions about future data centre energy demand in the UK.

However, the project pipeline for data centres in the UK, recently disclosed by Ofgem, provides an alternative approach to gauge the size of this demand. Ofgem indicates that the total pipeline of data centre projects amounts to approximately 50 gigawatts (GW) of capacity, with about 20GW of this capacity at a mature stage of development, or at the FID stage (Ofgem, 2026).

On this basis, we estimate a high, medium, and low case for data centre energy demand – with the high case corresponding to the mature group of projects (i.e. 20GW), the medium case at half this capacity (10GW) and the low case corresponding to government estimates of installed capacity in the absence of any supportive policies (6.3GW; Clark et al., 2026). The medium case is treated as the central scenario – in line with the Department for Science, Innovation and Technology's main scenario that total compute demand will grow to 9.6GW by 2035 (DSIT, 2025).

We convert this into total yearly demand using the following calculation:

Installed capacity × data centre utilisation rate × hours in a year

The key assumptions are listed in Table 2.

Table 2. Data centre demand assumptions

	High	Med	Low	Source(s)
Demand	20GW	10GW	6.3GW	(Clark et al., 2026; DSIT, 2025; Ofgem, 2026)
Utilisation rate		90%		(Mazzoni et al., 2026)

Data centre energy mix

Data centres are assumed to be powered either through direct connection to the grid or on-site generation. As this analysis is stylised, hybrid options are not considered. Analysis of the project pipeline suggests that 32% of planned data centres intend to develop at least some on-site generation (Wang, 2026). The remainder are assumed to connect to the grid.

In the UK, on-site generation is assumed to have some dependence on gas, at least in the short term. This is in line with analysis by the International Energy Agency, which suggests that about 50% of data centre energy demand will likely be met with renewables by 2030 (IEA, 2025). As such, 50% gas generation is adopted as a central case for BTM generation, with the high case at 95%, following Gabbatiss (2026), and the low case at 20%.

Grid-connected data centres are assumed to adopt the emissions intensity of the grid, with high, medium and low intensities obtained from NESO data (NESO, 2026).

Calculating data centre emissions

Data centre emissions are calculated using the above assumptions about data centres' energy demand and energy mix, and the carbon intensity of generation technologies, obtained from Staffell (2017), which assumes renewable generation has an emissions intensity of zero.

For grid-connected data centres, the emissions intensity scenarios reflect the maximum, mean and minimum carbon intensity of the grid between January 2025 and January 2026. This enables some consideration of a scenario where significant data centre demand either increases or reduces the average carbon intensity of the UK grid.

Emissions from data centre energy use with BTM generation is calculated as follows:

$$\textit{Annual data centre energy demand in GW} \times \textit{gas share} \times \textit{BTM share} \times \textit{gas emissions intensity per GW}$$

Emissions from data centre energy from grid generation are calculated as follows:

$$\textit{Annual data centre energy demand in GW} \times \textit{grid share} \times \textit{grid carbon intensity per GW}$$

The sum of these two figures provides total emissions from data centre energy usage.

Calculating land use requirement for data centre energy supply

The land-use requirement for data centre energy is calculated specifically for onshore wind usage, assuming that all new data centre capacity is met using onshore wind power. This is done for all three demand scenarios, and is intended to be an illustrative estimate, rather than a projection of how data centre energy demand will be met.

The calculation process for this is as follows:

$$\frac{\textit{Data centre installed capacity (GW)}}{\textit{Onshore wind capacity factor (\%)}} \times \textit{Space requirement per GW onshore wind (ha)}$$

The capacity factor for onshore wind is obtained from Spry (2024) and is the average UK-wide figure, which is approximately 26%.

The space requirement per GW of onshore wind capacity is calculated using the Renewable Energy Planning Database, which provides installed capacity as well as site area for 645 operational onshore wind projects. The mean land use per installed unit of capacity, in this case GW, was applied. This methodology is roughly the same as that applied by Spry (2024) to calculate the space requirements per MW of installed solar capacity.