

Unlocking the UK's data centre potential: an enquiry from the Data Centres All Party Parliamentary Group

About the IET

The IET is a trusted adviser of independent, impartial, evidence-based engineering and technology expertise. We are a registered charity and one of the world's leading professional societies for the engineering and technology community with over 156,000 members worldwide in 147 countries. Our strength is in working collaboratively with government, industry, and academia to engineer solutions for our greatest societal challenges. We believe that professional guidance, especially in highly technological areas, is critical to good policy making.

Recommendations

1. **Sustainability Rating:** The IET recommends a bronze, silver, gold standard for the approval of new data centres in the UK, based on a sustainability rating. The UK must become not only a global leader in innovation and technology, but a leader in sustainable innovation.
2. **Greener Infrastructure:** Current storage models (data centres) are unsustainable without greener infrastructure. Planning for new data centres should extend beyond data centre impacts to include initiatives that reduce data traffic and consequently lower the associated environmental impact.
3. **Systems approach:** A holistic view towards development of infrastructure, energy and workforce.

Background

Demand for data centres is increasing rapidly, driven by advances in artificial intelligence (AI), growing data volumes, and expanding digital services. In August 2025 the number of data centres in the UK was 477¹, as of the writing of this submission, that number has now reached 568². These trends are expected to continue, placing further pressure on infrastructure while also creating opportunities for the UK to lead in sustainable and efficient data centre development:

- Since 2010, the computational effort used in training notable machine learning models has increased by around 4.4 times per year³.
- Storage requirements are projected to increase substantially, partly due to AI uptake.
- Larger inputs, and more complex models with greater numbers of parameters, are driving higher compute requirements.

¹ *Data Centres to be expanded across UK as concerns Mount* (2025) BBC News. Available at:

<https://www.bbc.co.uk/news/articles/clyr9nx0jrzo>

² *United Kingdom Data Centres - 568 Facilities Data Centre Map*, Data Centres Map. Available at:

<https://www.datacentermap.com/united-kingdom/>

³ *Since 2010, the training computation of notable AI systems has doubled every six months* (2025), Our World in Data. Available at: <https://ourworldindata.org/data-insights/since-2010-the-training-computation-of-notable-ai-systems-has-doubled-every-six-months>

- In 2023, demand across Europe's 14 largest data centre markets reached 601MW, up from 546MW in 2022. This marked the second time in five years that demand exceeded supply, contributing to record-low vacancy rates of 10.6%⁴.

This presents an opportunity for the UK to position itself as a global leader in sustainable data centre development. Achieving this will require proportionate and effective regulation, clear guidance to monitor and reduce environmental impacts, and engagement in shaping international standards. Key areas for action include:

AI assurance technologies: Tools and frameworks that assess and mitigate AI related risks, including environmental impacts, can support more responsible deployment. Introducing requirements for environmental impact assessments and compliance audits could drive adoption.

Alternative models and hardware approaches: More efficient AI models and emerging chip architectures offer opportunities to reduce data storage, processing time, water consumption and energy consumption, while maintaining or improving performance. Targeted incentives could encourage greater uptake of environmentally conscious approaches across the AI value chain.

Smaller, task-specific models: Smaller models can often deliver comparable performance for specific tasks while requiring significantly less data and compute.

The drive for innovation and the expansion of data centres should not outweigh environmental considerations. A holistic approach is needed, one that not only addresses the impact of data centre operations but also prioritises measures to reduce traffic and minimise the broader environmental footprint of digital infrastructure.

Theme 1 - Energy infrastructure and international competitiveness

In the UK, while data centres currently represent a relatively modest proportion of total electricity demand (1.6GW in 2024)⁵, this is expected to grow rapidly. Analysis by the House of Commons Library suggests that electricity consumption from data centres and AI could increase significantly over the next decade, placing additional pressure on generation capacity and network infrastructure⁶. At a global level, AI-related energy use is already estimated to account for around 2-3% of total greenhouse gas emissions, and this share is likely to increase as adoption accelerates⁷. It is important to also note that in the event of power failure, data centres often rely on backup generators, which are largely diesel powered. We must ensure that going forward there is a greater reliance on DC (direct current) architecture in UK data centres to minimise power losses and waste heat

⁴ *Demand for European Data Centres Outstripped Supply Last Year Despite Rising Rental Rates* (2024) CBRE. Available at: <https://www.cbre.co.uk/press-releases/demand-for-european-data-centres-outstripped-supply-last-year-despite-rising-rental-rates>

⁵ *Estimate of Data Centre Capacity: Great Britain 2024* (2025), GOV.UK. Available at: <https://www.gov.uk/government/publications/estimate-of-data-centre-capacity-great-britain-2024/estimate-of-data-centre-capacity-great-britain-2024>

⁶ *Data centres: planning policy, sustainability, and resilience* (2026) House of Commons Library. Available at: <https://commonslibrary.parliament.uk/research-briefings/cbp-10315/>

⁷ *AI and energy: Will AI help reduce emissions or increase power demand? Here's what to know*, World Economic Forum, (2024). Available at: [AI and energy: Will AI reduce emissions or increase power demand? | World Economic Forum](https://www.weforum.org/articles/ai-and-energy-will-ai-help-reduce-emissions-or-increase-power-demand/?_lang=en)

generation, which would consume less energy overall. The DC model can have numerous benefits such as lower current requirements, a reduction in distribution losses and improved scalability and fault isolation⁸.

In the short term, rising demand for data centre services is likely to increase overall electricity consumption, particularly where new capacity is not fully matched by low-carbon energy supply. This risks slowing progress towards decarbonisation targets, especially if grid constraints delay the deployment of renewable generation or require continued reliance on higher-carbon sources during peak demand periods in the absence of proper long duration storage solutions.

In the medium term, the scale of demand growth driven by AI training and, increasingly, inference may require substantial expansion of clean energy generation, grid infrastructure, and energy storage. Without coordinated planning, there is a risk that data centre growth could outpace the UK's ability to deliver sufficient low-carbon electricity, thereby increasing system costs and complicating progress towards Net Zero. At the same time, there are opportunities for data centres to support the transition, for example by providing flexible demand, co-locating with renewable generation, or utilising waste heat. It is possible, for example, to utilise waste heat to support greenhouses and grow crops in the UK or heat public swimming pools to improve sustainability.

Medium-term policy arrangements for the growth of AI will also have to be stringent. Whilst a package of reforms and investment to accelerate AI-driven growth will provide many benefits to the UK, this must be underpinned by strong data foundations, clear competencies, and full transparency. Informed rules on what data can and cannot be used to train AI systems are essential to ensure products are developed safely. This will also help build public trust. Robust legal and regulatory frameworks are needed to support the safe development and use of AI without stifling innovation.

In the long term, the overall impact will depend on the extent to which efficiency improvements, regulatory frameworks, and technological innovation can offset rising demand. Advances such as more efficient AI models, improved cooling systems, and lower-impact hardware could help to reduce emissions intensity. However, if total demand continues to scale rapidly, absolute environmental impacts may still increase.

Beyond carbon emissions, data centres also contribute to wider environmental pressures. Their operation can lead to air and water pollution, thermal pollution, and the generation of electronic waste⁹. These impacts can affect both environmental and human health, and may exacerbate existing inequalities, as the environmental costs of digital infrastructure are often unevenly distributed geographically and socially.

⁸ *How 800 VDC powers next-gen AI data centres* (2026), McKinsey. Available at: [How 800 VDC powers next-gen AI data centers | McKinsey](#)

⁹ *AI Data Centre Health Impacts* (2026), Environmental Health Science. Available at: <https://ehsciences.org/ai-data-center-health-impacts/>

Energy

UK data centre energy consumption could increase up to sixfold over the next decade¹⁰. This rising demand adds to the system-wide challenge of decarbonising the electricity grid. Data centres can also stress grid stability due to varying levels of ongoing compute demand. It can also be difficult to assess the realistic demand for energy when designing and building data centres as requests for power can take place without a financial commitment. Furthermore, grid connections for data centres can only be secured at high voltage level, which may be benefited by clustering of facilities.

Delivering the UK's target of at least 95% clean power by 2030 will already require a substantial expansion of renewable generation. Continued growth in data centre demand will increase the scale and urgency of this transition. Future projections also highlight the scale of potential demand. The National Energy System Operator (NESO) Future Energy Scenarios suggest that data centre capacity could reach between 9.9 GW and 14.6 GW by 2050. However, more recent evidence from grid connection queues indicates significantly higher potential demand, with around 50 GW of projects reportedly seeking connection and approximately 20 GW already having submitted formal applications¹¹. This points to a substantial pipeline of anticipated growth, far exceeding earlier scenario assumptions. As a result, government should consider mandating the placement of data centres closer to energy sources to reduce line losses¹² for high energy consumers.

Water

Pressures on water resources is a concern, with suggestions that global data centre water consumption could nearly triple by 2030 as computing capacity expands¹³. As facilities typically draw water from local sources, areas with high concentrations of data centres may face heightened risks of water stress. This is particularly relevant in England, where public water supply deficits are projected to reach 4,860 million litres per day by 2050¹⁴. By 2030, seven regions are expected to be severely water stressed¹⁵, including London, which hosts the majority of the UK's data centre capacity. There may be capacity constraints if data centres continue using water at the current rate therefore alternative data centre cooling technologies need to be mandated by government and evaporative cooling should be discontinued, given water shortages. It may be beneficial for the APPG to explore the potential of other ways of cooling, whilst remaining within the context of the UK's emissions targets.

¹⁰ *Data centre power use 'to surge six-fold in 10 years'*, BBC News, (2024). Available at: [Data centre power use 'to surge six-fold in 10 years' - BBC News](#)

¹¹ *Future Energy Scenarios: Pathways to Net Zero*, (2025) National Energy System Operator (NESO). Available at: <https://www.neso.energy/document/364541/download>

¹² Line losses refer to the electrical energy that is lost as heat and dissipation when electricity travels through transmission and distribution power lines from power plants to consumers

¹³ *Data centre water consumption could nearly triple by 2030*, Digital Watch Observatory (2026). Available at: [Data centre water consumption could nearly triple by 2030 | Digital Watch Observatory](#)

¹⁴ *A summary of England's revised draft regional and Water Resources Management Plans* (2026) GOV.UK. Available at: [A summary of England's revised draft regional and water resources management plans - GOV.UK](#)

¹⁵ *Seven regions in England will face severe water stress by 2030 as Brits significantly underestimate their daily water usage*, Kingfisher plc. Available at: [Seven regions in England will face severe water stress by 2030 as Brits significantly underestimate their daily water usage – Kingfisher plc](#)

Water impacts extend beyond operation. Significant volumes are also required in the manufacturing of computer hardware. A single semiconductor fabrication facility can use over 37 million litres of ultrapure water per day¹⁶, while the global semiconductor industry consumes an estimated 1.2 trillion litres annually¹⁷. Water is also used extensively in electricity generation, particularly for cooling in thermal and nuclear plants and through evaporation in hydropower systems, therefore, the whole system cost must be considered.

Theme 2 - Investment, planning and regional growth

Investment

Continued investment in data centres is important for the UK's ambitions in AI, digital services, innovation and economic growth. However, the UK needs to be cautious that its investment decisions should not be assessed purely on financial returns, but also environmental costs, climate impacts and long-term resilience¹⁸.

Due to the pace of change, it can be challenging to achieve desirable outcomes and aims for stakeholders such as government, network operators, utilities and developers. We must be cautious that stakeholders are not working in silo and become uncoordinated, nationally.

Planning and regional growth

Data centre planning should be more strategic. The planning stages of data centres should include considerations in data centre location, climate resilience risks, access to renewable energy, local water availability and the integration of energy, water and digital infrastructure.

Data centre deployment should be directed towards locations where infrastructure constraints are lower and where clean energy resources are available. This greatly balances geographical distribution of digital infrastructure as opposed to further concentration in already constrained areas. Furthermore, any future data centre growth must be aligned with local energy networks, water resources and infrastructure capacity before development proceeds at scale¹⁹.

When considering the impacts of multi-level data centre developments in the same area, government must appropriately consider the benefits and the risks of clustering. Clustering can be beneficial to manage infrastructure and capacity, particularly for voltage, but it can equally cause concentration risk. In the Southeast for example, there are local development and energy challenges due to clustering. A definition of 'technology zones' at regional or county level would enhance broader benefits. There is scope for clearer, prescriptive

¹⁶ *Fraunhofer IPMS: Collaboration with AlixLabs and NSS Water revolutionizes sustainable ultrapure water management in semiconductor manufacturing* (2025), Silicon Saxony. Available at: <https://silicon-saxony.de/en/fraunhofer-ipms-collaboration-with-alixlabs-and-nss-water-revolutionizes-sustainable-ultrapure-water-management-in-semiconductor-manufacturing/>

¹⁷ *The hidden cost of AI: Energy, water, and the sustainability challenge* (2025), Beyond Emerging Europe. Available at: <https://emerging-europe.com/the-hidden-cost-of-ai-energy-water-and-the-sustainability-challenge/>

¹⁸ *IET responds to plans for 100 New Data Centres across UK*, The Institution of Engineering and Technology (IET). Available at: [IET responds to plans for 100 new data centres across UK](#)

¹⁹ *'Expert insight: AI, data centres and the UK's twin crunch – energy and water'* The Institution of Engineering and Technology (IET). (2025), Available at: [19 August 2025: Expert insight: AI, data centres and the UK's twin crunch – energy and water](#)

guidance on site selection, habitat protection, and net biodiversity gain specific to data centre projects.

Theme 3 - Innovation and sustainability

A core principle of data centre development should be long term sustainability, for example consideration of heat re-use by operators, thus forming local heat networks and providing a social benefit to the community. This example is already implicit in EU developments and should be expanded from a mandatory design development in the UK. Another such example of sustainable design development is using a 'Closed Loop' systems this reduces the burden on local water supplies and should form an equal mandatory design development²⁰.

The IET proposes a 'bronze, silver, gold' standard for data centres: bronze for excessive energy consumption which is harmful to the environment, silver for less harmful, and gold for environmentally sustainable operations. This would emphasise the moral responsibility surrounding data centre energy consumption. Government should subsequently encourage the removal of "bronze" data centres (those not using green energy) in the UK. Similar to the country's shift away from coal energy, this could support the push for sustainable technological progress. It would also be appropriate to tangibly recognise instances where developers have acted sustainably by adapting an existing product, for example an LLM, rather than retraining or starting from the beginning, which has led to a lower carbon footprint.

The UK has the potential to lead and be innovative in the way AI systems are developed and deployed. Rather than repeatedly training new large-scale models, government should recognise and encourage developers who adapt and reuse existing AI models, thereby reducing unnecessary computational and energy demands.

Critical Materials

Data centres rely on hardware containing a range of critical materials, including antimony, gallium, indium, silicon and tellurium. The extraction and processing of these materials can have significant environmental impacts, including land degradation, biodiversity loss, pollution, and pressure on water resources. Demand for these materials is increasing, particularly due to the growth of specialised AI hardware²¹. This creates both environmental and strategic risks, as supply chains are highly globalised and complex, with semiconductor production involving resources crossing around 70 international borders²². Disruptions to these supply chains can lead to shortages and wider economic impacts. Improving recycling and reuse offers a pathway to mitigate both environmental harm and supply chain vulnerability. However, the UK currently performs poorly in this area, generating one of the

²⁰ *How Closed-Loop Cooling Is Reshaping Data Centre Design*, Data Centre Magazine (2026). Available at: [How Closed-Loop Cooling Is Reshaping Data Centre Design | Data Centre Magazine](#)

²¹ *Metals at scale for AI at scale: securing the data centre materials backbone* (2025), World Economic Forum. Available at: <https://www.weforum.org/stories/manufacturing-and-value-chains/securing-data-centre-materials/>

²² *Mapping the Semiconductor Supply Chain: The Critical Role of the Indo-Pacific Region* (2023), Centre for Strategic & International Studies. Available at: [Mapping the Semiconductor Supply Chain: The Critical Role of the Indo-Pacific Region](#)

highest levels of e-waste per capita globally²³. Addressing this will be essential to improving long-term resilience.

Theme 4 - Cross cutting questions

The success of a data centre depends not only on its infrastructure and technology, but also on the skills of the people who design, operate, and maintain it. While the continued growth of data centres supports wider innovation and economic objectives, skills shortages risk constraining both innovation and operational efficiency. The expertise and professional standards required across the sector are comparable to those found in other mission-critical industries, such as aviation, where reliability, resilience, and safety are paramount. Although technical proficiency remains fundamental, modern data centres require a broad and increasingly multidisciplinary workforce. These highly resilient environments demand specialist knowledge across the full infrastructure stack, including structural and civil engineering, mechanical and electrical systems, technology integration, cyber security, and operational management.

It is vital to ensure that demand for these skills does not outpace supply. According to The IET's Skills Survey, the most critical skills for future growth are automation (38%), cyber security (38%), data engineering (34%), and software engineering (33%)²⁴. At the same time, employers report significant difficulties recruiting for many of these areas, with data engineering, software engineering, and cyber security cited as the hardest skills to source (all 17%). This highlights the need for sustained investment in skills development to ensure the workforce can support the sector's continued growth and increasing complexity.

While data centres are often presented as significant generators of employment, this can be misleading. Although the construction phase can create substantial short-term employment opportunities, operational data centres typically require relatively small, if highly skilled, workforces once established²⁵. As such, the direct long-term employment benefits associated with data centre development are often limited.

It is therefore essential that government strategy recognises data centres not solely as sources of direct job creation, but as enabling infrastructure that can support wider economic growth. The real value of internationally competitive data centre capacity lies in its potential to attract and underpin investment from data-intensive industries, thereby stimulating broader employment opportunities, innovation, and long-term increases in regional gross value added (GVA).

From a regional development perspective, there is a risk that initiatives such as AI Growth Zones located in areas such as Wales could generate disproportionate economic benefits elsewhere in the UK. Rather than being sourced from local talent, high-value jobs and associated economic activity may be transplanted temporarily from established technology clusters such as King's Cross. To address this, government should consider implementing targeted incentive frameworks that encourage global technology firms, data centre-

²³ *Global Ewaste Statistics* (2025), Lumenloop. Available at: <https://lumenloop.co.uk/global-ewaste-statistics/>

²⁴ *2025 UK Engineering and Technology skills survey*, The Institution of Engineering and Technology (IET). (2025), Available at: [2025 UK Engineering and Technology skills survey](#)

²⁵ *Data Centres: The productivity case we're not making (yet)* (2026) Frontier Economics. Available at: [Data centres: the productivity case we're not making \(yet\) | Frontier Economics](#)

dependent businesses, and related high-value sectors to co-locate alongside the underlying infrastructure and pivot from reactive hiring models to proactive, long-term talent development strategies²⁶. Such an approach would help ensure that the economic benefits arising from devolved infrastructure investments are retained within the regions hosting them, supporting local employment, skills development, and sustainable economic growth.

Conclusion

The continued growth of data centres will be essential to supporting the UK's ambitions in AI, digital services and economic growth, but this expansion must be delivered in a way that is environmentally sustainable and resilient. Increasing demand for computing power, data storage and AI services is placing growing pressure on energy systems, water resources and critical material supply chains, creating challenges that cannot be addressed through infrastructure expansion alone. The UK therefore has an opportunity to position itself as a global leader not only in digital innovation, but in sustainable digital infrastructure. This will require a strategic approach that aligns data centre development with clean energy, climate resilience and resource availability, while also encouraging more efficient AI models, reuse of existing systems and responsible data practices. By embedding sustainability into planning, investment and regulation, the UK can ensure that the benefits of AI and data centres are realised without compromising environmental protection, public trust or long-term Net Zero objectives.

²⁶ *The data centre boom needs a resilient workforce – here's how to build one*, World Economic Forum (2025). Available at: [Building a long-term pipeline for more data centre talent | World Economic Forum](#)