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AI and the energy transition

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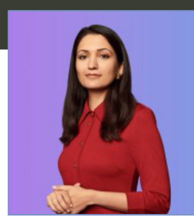
Parliament

Wera Hobhouse MP



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Introduction

AI is increasingly presented as a solution to the UK's productivity gap and a central pillar of the government's growth strategy at precisely the moment when the transition to net zero is being challenged, amid rising geopolitical concerns. The UK faces a "perfect storm": Energy-intensive AI – demand is projected to rise from 1.5% of global emissions to 8% by 2040 – is on a collision course with ambitious clean energy targets.

The roundtable coincided with the government's announcement that 10 million people will receive training on how to use various AI-powered platforms. Improved user capability should enable more judicious deployment of AI, helping to reduce energy consumption and associated emissions. Until a national strategy integrating digital infrastructure planning is coordinated with the Clean Power 2030 Action Plan, the aim of securing the "dual promise" of AI grid optimisation, helping to lower emissions represents "magical thinking".

Moreover, high UK electricity prices risk "tagging our growth to the American stack," with AI infrastructure and investment gravitating towards jurisdictions where power is cheaper, and where carbon intensity is often treated as a secondary concern. This underlines the case for an integrated national strategy.

Key takeaways

Energy intensity and geopolitical reality

- AI compute – the hardware and software used to develop and run AI models – is fundamentally determined by electricity price, availability and carbon intensity. The location of demand is secondary. AI compute increasingly "goes to the power".
- The UK's high power prices are a structural disadvantage when competing for large-scale AI investment, particularly for energy-intensive training workloads.
- The opportunity cost: "Every megawatt allocated to data centres is a megawatt that's not available for housing, manufacturing or other growth priorities".
- Without coordination between AI policy, grid investment and clean energy, the UK risks losing competitiveness while increasing system strain.

Water versus energy trade-offs

- Low water use does not automatically equate to a more sustainable data centre. For instance, "closed loop" or "dry" cooling systems that do not consume water are widespread, but require significantly more electricity, creating trade-offs that must be assessed holistically.
- In the UK context, where electricity is expensive relative to water, commercial incentives often favour water-intensive evaporative cooling because it is more energy-efficient. "Whether a data centre uses water or not is entirely a design choice, and none of those choices are impact-free."
- Focusing on single metrics, such as water consumption alone, risks distorting investment decisions and undermining overall sustainability outcomes.
- Policymakers need better visibility of these trade-offs to avoid unintended consequences in planning and regulation.

Training, efficiency and transparency – "not just a skills issue, it's an energy issue"

- Training people to use AI efficiently, including when not to use it, should be treated as a vital means for conserving energy.
- The government's ambition to train millions of people is a potentially powerful means for reducing avoidable energy demand, if aligned with sustainability goals.
- Self-reported emissions from tech giants like Google and Microsoft show massive increases, 48% and 30% respectively, despite their stated carbon commitments.
- Without transparency around energy consumption, water use and performance, users cannot distinguish efficient applications from wasteful or unnecessary deployment.

Small language models (SLMs) vs. Large language models (LLMs)

- There's a structural bias towards large, opaque, highly energy-intensive models, driven by investment incentives rather than use-case suitability.
- 95% of current capital flows are directed toward LLMs, which are far more compute-intensive than smaller alternatives.
- SLMs can offer greater privacy for the user, reduced bias, more transparency and significantly lower energy consumption for specific tasks.
- The lack of disclosure around the energy and resource use of mainstream models is a major barrier to effective ESG assessment and capital allocation.
- Investors and policymakers are unable to assess the real social or environmental value of AI deployment. "We are making decisions about infrastructure, investment and emissions without even being able to see what the models are actually costing us."

Humans, trust and liability

- Human decision-making must remain central in AI deployment, particularly in high-stakes contexts such as energy optimisation – including ESG – where automated outputs can have material real-world consequences.
- Opaque AI systems create governance and liability risks, making it difficult to interrogate decisions, assign responsibility or demonstrate compliance.
- This applies directly to ESG disclosures. AI tools could significantly reduce reporting burdens, particularly for SMEs, but only where accuracy and data provenance are properly governed.
- Without clear guardrails, AI risks scaling inaccuracies rather than improving data quality, undermining the credibility of sustainability information, potentially breaching regulations and contractual agreements. Someone always needs to "stand behind" the data. "Am I going to sue ChatGPT? No, you can't".
- Poorly governed or biased inputs can produce misleading outputs, reinforcing the case for transparent, task-specific models that support effective audit, oversight and accountability.

Issues raised

The upside – energy optimisation

AI delivers its clearest environmental benefits when applied to specific optimisation – e.g. renewable forecasting and demand response, grid balancing. These applications can reduce emissions across the wider system, rather than simply shifting energy demand. However, an open question remains as to how policy and investment frameworks can actively steer AI deployment towards these high-value use cases, rather than prioritising unconstrained scaling of general-purpose models whose energy demands may outpace grid decarbonisation.

Regulation without stifling innovation
Proportionate, targeted regulation is necessary to improve transparency and accountability without stifling innovation. The EU is developing data centre-specific minimum standards and ESG ratings. The UK could benefit from a "second-mover advantage" by designing clearer and more focused standards and reporting requirements. Voluntary reporting was widely seen as insufficient, given evidence that self-reported emissions and resource use may significantly understate real impacts. At the same time, blunt or poorly designed regulation risks discouraging innovation and growth.

The need for a joined-up strategy
There is a disconnect between government messaging on AI ambition and the reality of the UK's clean energy targets. Pursuing rapid AI expansion without an integrated plan across energy, planning and digital policy is unsustainable. A joined-up strategy would ensure that AI infrastructure growth is coordinated with grid upgrades and low-carbon power sources from the outset, rather than attempting to retrofit sustainability once data centres are already built. This includes considering the role of baseload generation, such as nuclear, alongside renewables to support constant AI demand while maintaining system stability. By aligning these goals, investment can more easily flow into "optimisation" use cases, such as renewable forecasting and grid balancing.

Communication and realism
There is a critical barrier in the complexity surrounding AI, which often obscures its technical and environmental realities for both policymakers and the public. Inaccessible terminology can leave policymakers "in the dark," making them vulnerable to over-hyped expectations or unfounded fears. To support an informed transition strategy, there needs to better "myth-busting" and educational materials that translates technical concepts into real societal impacts. Without improved technical literacy, democratic oversight is weakened, as stakeholders struggle to weigh AI expansion against other priorities such as housing or local resource security.

Recommendations

- Require companies to disclose energy, water, and emission data specifically for AI, disaggregated from general operations.
- Empower Ofgem to require AI operators to demonstrate efficiency and renewable procurement for fast-track grid access.
- The Climate Change Committee should integrate digital infrastructure into carbon budgeting with AI-specific targets.
- Establish transparent, democratic processes for AI growth and data centre development, rather than circumventing planning and environmental assessments.
- Position the UK as a leader on international AI sustainability standards by advancing coordinated frameworks through COP processes, the International Energy Agency and targeted bilateral partnerships, leveraging this position to secure a competitive advantage in the global AI market.

Links

- David Mytton, Data centre water consumption
- World Economic Forum, Why circular water solutions are key to sustainable data centres
- KPMG, AI's dual promise – enabling positive climate outcomes and powering the energy transition.
- Minderoo Centre for Technology and Democracy, Big Tech's climate performance and policy implications for the UK
- Wera Hobhouse, Responsible AI usage can help us combat climate change – but it must be powered sustainably

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