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AI accelerates electricity demand, prompting a new wave of grid adaptation and investment

- ***Nearly 80% of utilities expect more extreme and volatile demand patterns***
- ***Around one in five data center power requests may never materialize, distorting forecasts***
- ***At the same time, AI is expected by 60% of utilities to play a growing role in improving grid efficiency and unlocking operational gains, but only few have implemented advanced AI-driven approaches***

Paris, June 25, 2026 – The rapid expansion of AI-driven data centers is not only increasing electricity demand, but making it significantly harder to predict, challenging how power systems are planned and delivered. A large majority of electricity executives expect more extreme and less predictable demand spikes, while more than three quarters say they struggle to forecast future needs accurately, according to the Capgemini Research Institute's latest report, *AI meets the grid: shaping the data center power play*. The research, which surveyed over 600 senior electricity executives from organizations with annual revenue exceeding $500 million, highlights how power systems are entering a new phase as AI workloads become increasingly unpredictable. According to the report, forecasting has become significantly harder, but AI is also part of the solution with a majority of executives expecting AI to unlock significant efficiency and operational gains.

A new era of volatile and uncertain electricity demand

Beyond growth, the bigger challenge is uncertainty. Utilities are increasingly planning for demand that may never materialize. The report highlights a growing disconnect between projected and actual demand: a majority (67%) of electricity executives refer to "phantom" data-center load requests, with around two in ten (19%) of them never materializing, distorting forecasts and increasing the risk of both over- and under-investment.

This forecasting uncertainty creates a significant capital allocation dilemma. Utilities must decide not only how much capacity to invest in, but where and when to prioritize grid modernization investments to support future demand while avoiding stranded assets. For hyperscalers, the challenge is equally acute, requiring major infrastructure decisions to be made against a backdrop of uncertain demand forecasts, grid availability and connection timelines.

Furthermore, over three-quarters (77%) of utilities are forecasting difficulties predicting future demand accurately, as consumption patterns from AI become less stable and more difficult to model. As a result, they expect demand variability to emerge as a major system challenge, requiring new approaches to planning and operations.

In addition, 68% of electricity executives also anticipate shortages due to data-center demand growing faster than they can expand supply.

The challenge is compounded by the geographic concentration of data centers, which places significant strain on local grids: more than half of electricity executives identify load concentration as a major obstacle to reliable service, while large clusters of high-density facilities are creating localized bottlenecks that affect system stability and investment planning.

"AI is transforming electricity systems far beyond demand growth. It is exposing structural constraints in grid capacity, planning, and power availability, while making demand more dynamic and harder to predict," said Claire Gauthier, Global Head of Energy & Utilities at Capgemini. *"The challenge is no longer only how much power is needed, but whether it can be delivered reliably, where and when it is required. Utilities have a defining role to play as system orchestrators, leveraging AI-enabled insights to balance grid and customer-owned resources, accelerate deliverable capacity, and enable the next phase of data-center growth."*

AI's dual role: demand accelerator and a force multiplier for grid performance
According to the report, electricity consumption from AI training and inferencing is expected to rise significantly from 25% to 60% of total data center electricity demand in the next three to five years, largely displacing other IT workloads.

At the same time, electricity executives see AI as a force multiplier for grid planning and reliability: around six in ten expect advanced AI analytics to deliver over 10% improvements in failure reduction, operational productivity, and preventing and restoring outages.

Despite its benefits AI adoption remains limited
As per the report, less than half (45%) say they are currently using AI for grid optimization, and only 16% of electricity organizations have implemented more advanced AI-driven approaches to optimize power flows, enhance resilience, and improve real-time system performance to keep pace with booming demand.

According to the report, grid infrastructure construction timelines are also a critical constraint in accommodating rapid demand growth from AI data centers. This underscores the urgent need to accelerate grid modernization through AI itself and climate tech to deliver reliable, affordable and sustainable power.

On-site power as a structural shift toward hybrid and decentralized energy systems
Facing grid constraints and delays, data centers are increasingly shifting from backup-only approaches toward primary behind-the-meter[1] (BTM) and near-site solutions. Nearly three in ten say they already deploy on-site power solutions and 39% plan to add on-site/BTM within the next one to two years; more than seven in ten expect these solutions to significantly reduce reliance on the grid within five years.

The majority (86%) see the ability to operate independently from the grid as a competitive advantage. This evolution is reshaping the traditional relationship between utilities and large energy consumers, introducing both opportunities and coordination challenges.

A balanced, diversified energy mix at the core of reliable and sustainable data-center growth
A diversified energy mix is emerging as essential to ensure reliability and long-term resilience while renewable energy alone cannot yet provide continuous power at scale for large data centers and AI workloads - according to 78% of electricity executives and 73% of data-center executives. Both report on active investment in battery energy storage systems (BESS) to help bridge the gap.

They also agree that long-term solutions such as nuclear (Small Modular Reactors) will take time to deploy. As a result, more than two-thirds (68%) of electricity and data-center executives globally see natural gas as a near-term, transitional solution until renewable energy and storage technologies can scale, creating tensions with decarbonization goals.

Methodology of the report
The Capgemini Research Institute surveyed 612 senior electricity executives (director level and above) from organizations with annual revenue exceeding $500 million that are actively working with data centers. Capgemini also surveyed 175 senior executives at data-center-owning and operating organizations with revenue above $250 million. Respondents represented 21 countries across North America, Europe, APAC, and Latin America. The global survey took place in January 2026.

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[1] Behind-the-meter (BTM) power solutions include on-site generation, storage, or energy management systems that supply electricity directly to a customer's premises, without flowing through the utility grid.

capabilities across strategy, technology, design, engineering and business operations. The Group reported 2025 global revenues of €22.5 billion.

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