Data Center Growth

Utilities are Developing New Approaches

BY AEIC VICE PRESIDENT FOR TECHNICAL STRATEGY ELIZABETH COOK

Data centers are the engine of the digital economy, but their growing demand for power is pushing utilities to rethink how they approach grid modernization. In January, AEIC's Center for Operational Excellence convened a forum with twenty-three utilities to explore the current gaps in streamlining data center interconnections.

This workshop served as an initial step toward a broader industry conversation on how best to address these evolving needs. The rapid expansion of data center facilities highlights a few fundamental challenges. Currently, the speed of data center infrastructure development is far outpacing the long-term planning cycles of the utility industry.

In addition, state mandates are evolving as the need grows for baseline, dispatchable generation required to support these larger interconnection requests. This creates pressure to balance resource adequacy with the surge in high-load customers.

To maintain a resilient, adaptable, and cost-effective grid, collaboration among utilities, developers, and policymakers is becoming increasingly important. Aligning planning horizons, establishing fair cost-sharing mechanisms, embracing dynamic flexible distribution grids, and standardizing interconnection processes can help ensure that growth does not come at the expense of system stability.

The misalignment between data center development timelines and utility infrastructure expansion is more than just an operational challenge. It is an issue that requires ongoing dialogue and careful coordination.

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Aligning Planning Horizons

Utilities operate within a multi-year planning cycle framework that accounts for regulatory approvals, environmental assessments, procurement constraints, and complex power system analyses.

Meanwhile, data centers often expect near-instantaneous access to power. Some utilities have attempted to accelerate feasibility studies and streamline interconnection processes, but these efforts only address symptoms of a deeper problem: current planning models are reactive when they need to be forward-looking.

A more comprehensive approach moving away from incremental forecasting to scenario-based forecasting can help anticipate large load clusters before they overwhelm the system. Advances in data warehousing, sensor technology, and engineering analytics are already enabling a more dynamic and predictive approach in utility operations.

Some utilities are already exploring structured cost-sharing models, such as milestone-based investment commitments and firm load agreements, to ensure that new infrastructure investments are made with clear demand signals.

However, these efforts are not solely a utility's responsibility – they involve multiple layers of oversight and engagement with external stakeholders in order to shift utility industry culture to be data-centric driven and provide the modeling enhancements and adoption to support the foundational work required to unlock the power of advanced analytics.

No single utility can solve this alone, especially when working to predict future interconnection requests in order to develop accurate load forecasting methods.

Establishing Fair Cost-Sharing Mechanisms

As interconnection requests increase, transparency and engagement from all

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parties will be key in preventing speculative applications from overwhelming the queue and delaying viable projects or creating financial strain on existing customers.

Developers play a critical role in working collaboratively with utilities to align expectations and investment strategies. Large-scale energy infrastructure is not something that can be procured instantly. It requires thoughtful coordination and shared responsibility.

Some utilities are already exploring structured cost-sharing models, such as milestone-based investment commitments and firm load agreements, to ensure that new infrastructure investments are made with clear demand signals.

Utilities often invest heavily in infrastructure upgrades without firm commitments from developers, leading to speculative interconnection applications that clog queues, delay viable projects, and strain grid capacity.

To mitigate this risk, structured cost-sharing models, such as milestone-based investment commitments and firm load guarantees are viable options. Another idea could be establishing a distinct asset class for data centers within the regulatory framework, which could also help de-risk utility investments and encourage long-term partnerships rather than one-off expansions.

Embracing Dynamic Flexible Distribution Grids

Another consideration that should remain a focus is the distribution grid. The distribution grid is becoming more automated and visible, providing new opportunities beyond traditional demand response programs.

Historically, large commercial and industrial customers have been the primary participants in response to demand, but emerging technologies are unlocking dispatchable, dynamic loads and distributed generation sources across a much broader customer base.

By better managing demand at the distribution level across a multitude of users, rather than just large individual customers, utilities may be able to unlock transmission capacity, reducing constraints on the bulk power system.

This evolution is made possible through enhanced sensing, measurement, and robust data warehousing and engineered data systems that provide insights never before available. These developments offer a significant opportunity to optimize grid operations in a way that benefits all stakeholders, and it will require collaboration of all parties to enable and incentivize utilities to culturally transform around digital assets and agreed upon value streams.

As utilities, developers, and regulators navigate this evolving landscape, the importance of collaboration, proactive planning, and innovative approaches to grid management will only grow.

Standardizing Interconnection Processes

The current system favors transactional interactions over collaborative grid development. This is an unsustainable model given the surging energy demands of data center-driven load growth. The broader conversation extends beyond utilities and developers.

While there are no quick solutions, the momentum is underway. Utilities have long played a critical role in ensuring safe and reliable service. Developers, in turn, are recognizing the importance of long-term planning and collaboration. That then leaves the awareness that regulatory bodies play a significant role in shaping policies that govern interconnection, cost-structures, digital transformation, and overall grid operations.

Some utilities have introduced new tariffs and dedicated interconnection pathways for developers committed to streamlined practices, but these approaches need to become the industry standard. The lack of standardization across utilities remains a significant barrier.

Interconnection requirements vary widely, leading to inefficiencies, delays, and uncertainty for developers. Interconnection agreements can incorporate load flexibility, demand response capabilities, and on-site generation to optimize grid reliability. Standardized review timelines and binding contractual commitments can also be implemented to prevent projects from being delayed indefinitely due to unforeseen obstacles.

The challenges and opportunities surrounding data center integration are only beginning to unfold. However, these types of transformational changes have occurred with other advanced grid technologies, such as integrating inverter-based resources or unlocking the grid capacity to support the integration of medium and large electrical fleets utilizing grid enhancing technologies.

There is no simple or immediate solution, but action is necessary. As utilities, developers, and regulators navigate this evolving landscape, the importance of collaboration, proactive planning, and innovative approaches to grid management will only grow. The discussion within the AEIC Center for Operational Excellence will continue, bringing together utility industry leaders to share lessons learned, analyze real-world interconnection experiences, and develop best practices that support both rapid load growth and long-term grid reliability. PUF