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How Data Centers are Remaking the U.S. Electricity Sector

# Part Three: Lasting Implications

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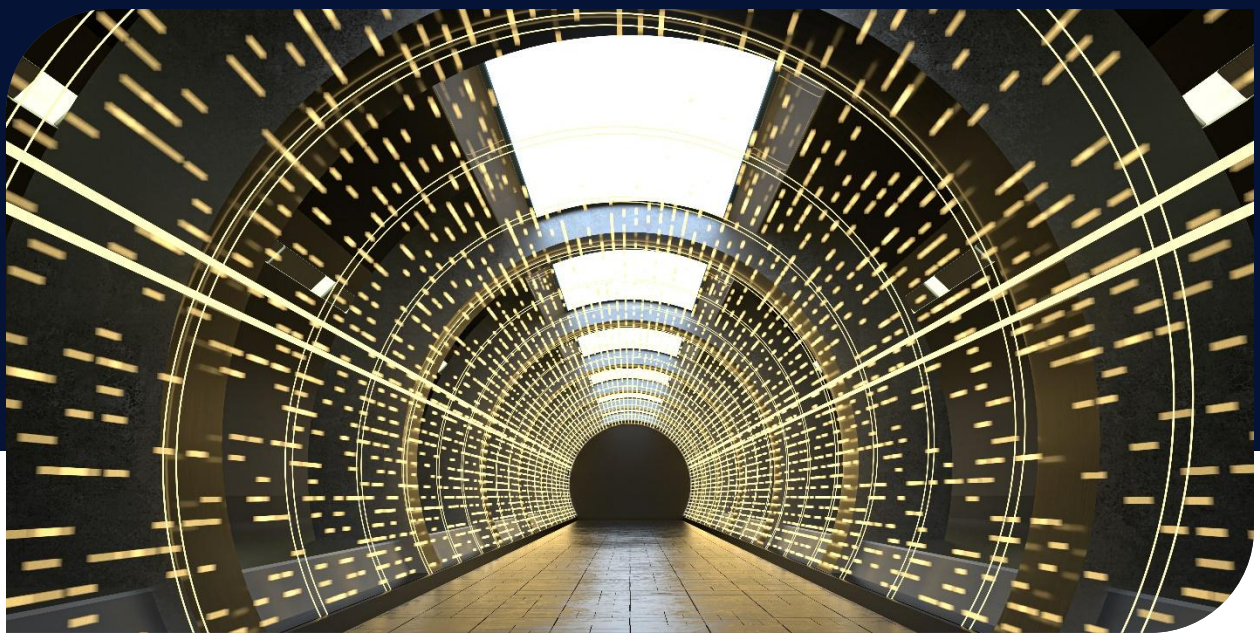

**The developments surveyed in the second article, in our three-part series exploring how data centers are remaking the U.S. electricity sector, will have lasting implications for the design, operation and regulation of the U.S. energy sector – implications that are likely to transcend the current data center mania.**

In our third and final article, we summarize the rush to power data centers—with its associated pressure on prices across the value chain—is accelerating the development of technologies and processes that should improve the affordability and efficiency of the sector.

They are also placing increasing strain on the current regulatory structures governing the electricity sector in the most populous parts of the country. Regardless of the eventual magnitude of the data center boom, it will leave a lasting impact on how the system is designed and operated, how power generation prices are formed and where capital gets deployed across the sector.

## Costs and Prices

Many of the demand- and supply-side innovations noted above share a common objective: increasing the flexibility of the electricity system to accommodate faster, denser and larger load interconnections. While myriad demand response techniques and technologies have been available for decades, the high profile and value of the load—and its impact on electricity prices (e.g., the last PJM capacity auction)—are increasing their relevance. Similarly, in pursuit of faster interconnections, customers are choosing contractual mechanisms that allow them to trade off reliability for interconnection time, breaking with the traditional, one-size-fits-all approach to grid reliability and placing an explicit price on speed and reliability.

Taken together, these measures are likely to increase the overall capital efficiency of the grid and partially mitigate the affordability impacts of rapid demand growth. They also create opportunities for DER/DR technology, project and service providers to play a larger role in the electricity market going forward, as they become more trusted, routine solutions. However, this longer-term outlook is unlikely to spare the sector from supply side-induced price volatility and the boom-bust pattern typical of most capital-intensive industries. For the next few years, rigidities in expanding supply across the energy value chain—from building combined cycle gas turbines, high-voltage switchgear and new gas pipeline capacity to training engineering and construction talent—will likely result in significant price increases, exacerbated by the current tariff environment and the deep pockets of data center customers. Adding to the volatility, the increase in generation and grid capacity, as well as significantly increased flexibility of load (i.e., demand elasticity), will likely lead to lower long-term electricity prices. Investors who expect a long, profitable life for their investments in on-site or grid generation: beware.

## Market Design

The implications of the current rush for interconnections will have complex ramifications for the future of power sector regulation. The streamlining of permitting and more granular, sophisticated approaches to measuring and mandating reliability, are very likely to provide long-term benefits to market participants.[1] Price signals for adding generation and grid capacity will become more reliable and precise. But the implications for market design are less clear. Both vertically integrated utilities in the South and West, as well as the relatively lightly regulated ERCOT market, appear better able to accommodate faster load interconnection than the more elaborately designed RTOs. These apparent differences reflect broader regional attitudes toward state regulation but also underline long-criticized limitations in the ability of capacity markets to incentivize new generation capacity without yielding windfall profits to incumbent generators and raising prices for all consumers.

As noted above, these concerns are leading regional policymakers in states that went through the unbundling/liberalization of electric utilities in the 1990s to question the value of RTOs and even the unbundling of vertically integrated utilities (i.e., allowing transmission and distribution utilities to own their own generation). Others are pointing to the development of a "Strategic Electricity Reserve" program as a back-stop - or alterative to the various mechanisms employed by RTOs today to ensure appropriate levels of system reliability. Time will tell if RTOs can respond to the pressures of rapid demand growth, or if the data center boom will trigger a reversal of the market liberalization of the early 2000s—with potentially worrisome results for affordability and reliability. At the other extreme, a dramatic bust in the AI build-out

[1] Examples of emerging, more refined approaches to measuring and paying for generation's contribution to grid reliability include California's "Slice of Day" Resource Adequacy and PJM's shift to "Marginal Effective Load Carrying Capacity"

could lead to significant financial distress for the utilities and IPPs that have invested most aggressively, increasing the potential for a return to vertically integrated utilities or even public takeovers of power generation and grid businesses should things go wrong. Ironically, one potential outcome of the advent of AI could be a return of the U.S. electricity sector to the industry structure of the last century.

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### How Data Centers are Remaking the U.S. Electricity Sector

This is the third and final article in a three-part thought leadership series from Teneo's Energy and Infrastructure team, exploring how the rapid expansion of data centers is transforming the U.S. electricity sector. Drawing on real-world developments, the series brings together perspectives on technology, regulation and market design. Teneo's Energy and Infrastructure practice has significant experience advising on these challenges, with a deep understanding of the technical, regulatory and market dynamics reshaping the sector. Should you wish to discuss any of these matters, please do not hesitate to reach out.

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