THE INTERNATIONAL ECONOMY
THE MAGAZINE OF INTERNATIONAL ECONOMIC POLICY
220 I Street, N.E., Suite 200
Washington, D.C. 20002
www.international-economy.com
editor@international-economy.com

AI's Energy Problem

BY PHILIP K. VERLEGER, JR.

The Big Bad Beautiful Bill's phase-out of renewable energy subsidies isn't helping matters.

The rapidly expanding investment in artificial intelligence data centers may distort U.S. electricity markets and hinder the MAGA goal of reshoring industries that require abundant, low-cost energy. It could take years to provide adequate power supplies. The elimination of certain renewable energy system tax credits could further prolong the delay.

Electricity markets are complicated. The variance in demand, and hence the required supply, by day, week, month, or year, is likely larger than that for any other market. Another difference from other markets is that, with deregulation, electricity prices can be negative at times and impossibly high at others. These characteristics make analyzing and projecting electricity supply, demand, and prices the most complicated process among all commodity markets and perhaps all economic markets. Furthermore, the economic consequences of an electrical system failure or an off-base forecast can be catastrophic, as Portugal and Spain learned in April 2025, Southern California in 2001, and the U.S. Northeast in 1965.

The avoidance of power outages requires constant long-term planning and investment to expand, upgrade, and manage generating and distribution capacity. In the United States, the "grid" operators hold "capacity auctions" in which companies that own or propose to build generating facilities submit bids that offer generating capacity at specific prices. Some auctions take place long before the expected demand materializes, which gives firms building new facilities the time needed to complete them.

Utilities can require five or more years to plan, obtain necessary approvals, and order generating equipment. Bobby Noble, senior program manager

Philip K. Verleger, Jr., is a senior fellow at the Niskanen Center.

CHAD DAVIS

Google's data center in Council Bluffs, Iowa, was constructed in 2007 and Google continues to expand operations at the site. Other companies with data centers in the "Silicon Prairie" include Microsoft, Meta, and Apple. The Des Moines Register *reports, "Data centers are increasingly springing up in Iowa as the state lures tech companies with its abundance of inexpensive, environmentally friendly wind energy, access to high-speed fiber optic connections, and tax incentives."*

for gas turbine research and development at the Electric Power Research Institute, told S&P Global Platts in May 2025 that original equipment manufacturers now quote lead times of five to seven years for gas-fired turbines.

These efforts to ensure the continuous availability of electricity for all consumers are threatened today by the rapid expansion of AI data centers. PJM Interconnection, the largest power grid in the United States, warned on July 9 of a possible "supply demand crunch" caused by premature closings of fossil fuel-fired power plants and the breakneck growth of data centers in Virginia and other mid-Atlantic states.

A PJM spokesperson identified three primary causes of the potential crunch: the loss of existing capacity, delays in constructing new facilities, and the rapid expansion of data centers. According to this individual, almost six gigawatts of capacity were lost in the last decade, and the addition of 46 gigawatts has been delayed due to local opposition or financing issues. "Meanwhile, data center demand is surging. By 2030, PJM expects 32 gigawatts of increased demand on its system, with all but two of those gigawatts coming from data centers."

The surge in data centers has "turbocharged" the projected rise in electricity demand over the next ten years, according to research firm Wood Mackenzie. The consultants there noted that the upsurge in demand puts technology firms with a "move fast and break things ethos" in competition with the power sector, which operates on a timeframe of five to ten years. This conflict, they pointed out, may limit U.S. economic growth.

The *Financial Times* also believes that the AI-driven upswing in electricity demand will limit expansion opportunities for other sectors, particularly metals processing. The United States and European Union are offering billions in subsidies to producers and processors as they try to break China's near-monopoly on many metals markets. Their attempts to "reshore" production are being frustrated, though, because of data center operators. One executive from the aluminum processor Norsk Hydro told the *Financial Times* that "in the United States, smelters were vying for electricity contracts with technology groups, which were willing to pay much higher sums in order to develop the data centers that underpin the artificial intelligence revolution."

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Another commentator suggested that the battle did not pit U.S. mining companies against Chinese firms, but rather Alcoa, a U.S. aluminum firm, against Google. In a report prepared for the Aluminum Association, the authors explained,

> *A single new aluminum smelter uses ~11 TWh [terawatt-hours]—a similar amount of electricity every year as a major U.S. city like Boston*

or Nashville. Furthermore, to be economically competitive, a smelter requires a 10–20 year contract with electricity costs ~$40/MWh [megawatt-hours]. Technology companies are currently committing upward of $115/MWh for power at AI data centers.

In December 2024, economists at the Lawrence Berkeley National Laboratory published a detailed, bottom-up estimate of U.S. data center power requirements, concluding that demand could range between 325 and 580 terawatt-hours in 2028, which would represent between 6.7 percent and 12 percent of U.S. electricity consumption. The review noted that data center demand accounted for 1.9 percent of U.S. consumption in 2018 and 3.3 percent in 2023. The projected increase could be between 200 and 400 terawatt-hours.

Researchers at ICF, an international consulting firm that follows electricity, wrote in May that U.S. generating capacity would need to expand at a rate of 3.3 percent per year over the next quarter-century to meet the demand surge. The 3.3 percent would be almost double the 1.8 percent growth rate seen over the last twenty-five years.

The ICF authors added that, when they wrote in May 2025, "new solar, wind, and energy storage capacity is forecast to be installed more than other generation sources—showcasing the important role of these energy resources in meeting future electricity demand."

Those projects could now be in jeopardy due to the One Big Beautiful Bill Act signed by President Trump on July 4, 2025. The OBBB speeds up the phase-out of the generous tax credits for renewables provided by the Inflation Reduction Act of 2022. According to the law firm Latham & Watkins, under the OBBB, solar and wind projects must be completed by the end of 2027 or begin construction in July 2026 in order to receive credits.

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Latham & Watkins also warns that clean energy products "must now meet strict new foreign ownership and sourcing requirements to be eligible for any tax credits." Under the law, which denies credits to firms that use components made in countries designated as "Foreign Entities of Concern," firms will need to decrease the share of renewable project components they receive from China in order to maintain eligibility. For many, this will cut off their tax credits because of China's domination of the solar and wind component industry.

Jennifer Dlouhy, writing for Bloomberg, noted that the FEOC provisions "could make it harder for the United States to build its own, independent solar supply chain and to satisfy climbing power demand from artificial intelligence, according to analysts."

Given the burgeoning AI data center demand, the prospects for maintaining an adequate power supply across the United States were already at risk before the OBBB passed. The legislation's restrictions on access to tax credits for solar, wind, and battery projects boost the probability of shortages while making exorbitant price increases likely. Among other impacts, the coming problems with electricity reliability and cost will slow or block the reshoring of U.S. manufacturing on which President Trump campaigned so vigorously. ◆

Another Electric Power Crypto Complication

Another growing source of U.S. electricity demand is cryptocurrency mining. A recent report from the Edison Electric Institute estimates that crypto mining operations could account for as much as 2.3 percent of U.S. energy consumption.

However, it can be difficult to assess electricity use in crypto mining. Generating cryptographic hashes can be done on equipment ranging from individual workstations to large data centers. Also, crypto mining operators have a propensity to relocate in search of low-cost power, and operators are able to shift operations to times of day when power is cheaper.

Price fluctuations in cryptocurrency also play a role. Lawrence Berkeley National Laboratory estimates that for every $1,000 increase in the price of Bitcoin, U.S. crypto mining energy consumption increases by approximately 0.058 terawatt-hours per month.

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