# REPORT: AI Boom Strains US Power Network, Driving Data Centers Off Grid

***Natural gas emerges as near-term backbone for AI infrastructure amid interconnection bottlenecks and community resistance***

The rapid expansion of off-grid data centers across the U.S. is emerging as a decisive answer to the power constraints reshaping the AI-driven digital economy, according to a new report from law firm Troutman Pepper Locke.

As artificial intelligence accelerates demand for compute capacity, the firm's report — *Off-Grid Data Centers: A Potential Power Solution for AI* — finds that developers, hyperscalers, and energy companies are increasingly turning to behind-the-meter and 'island-moded' generation to secure reliable, scalable electricity while avoiding grid congestion and regulatory delays.

The report lands at a pivotal moment. According to projections cited in the analysis, global data center investment could reach $6.7 trillion by 2030, with approximately $2.7 trillion of that invested in the U.S. market. Nowhere is the transformation more visible than in Texas, where the Electric Reliability Council of Texas (ERCOT) forecasts that data center electricity demand could rise by 22GW between 2025 and 2031 — reaching 78GW, or roughly 36% of total statewide demand.

At the same time, AI-specialized server racks now require 50kW-100kW each, up from 5-10kW in traditional configurations just a few years ago. As microchips become more powerful and energy-intensive, the report concludes that power — not silicon — has become the primary constraint on AI expansion.

**Natural Gas as the Bridge to Scale**

One of the report's central findings is the decisive shift toward natural gas as the preferred near-term solution for off-grid facilities. Developers are prioritizing dispatchable generation that can deliver the "five nines" reliability — 99.999% uptime — demanded by hyperscale AI operations.

While renewables remain a central part of long-term decarbonization strategies, the analysis notes that wind and solar alone cannot yet provide consistent, 24/7 baseload power at the scale AI requires without substantial overbuild and storage. Battery capacity, though advancing, remains limited in duration for utility-scale deployments. Small modular nuclear reactors hold promise but are not yet commercially deployable at scale.

Natural gas generation, by contrast, can be deployed relatively quickly and offers dependable output — making it the dominant choice for early off-grid adopters, particularly in Texas, where fuel supply and land availability align.

However, the report cautions that turbine supply chains are tightening, and competition for equipment, skilled

labor, and transmission infrastructure is intensifying as AI-driven projects accelerate nationwide.

**Interconnection Bottlenecks Fuel Off-Grid Momentum**

Grid interconnection queues are increasingly congested, delaying projects in key markets. Developers are therefore pursuing behind-the-meter solutions as a bridge to eventual grid connection — or in some cases as a long-term strategy to maintain operational autonomy.

Texas' deregulated electricity market and advanced behind-the-meter framework make it a focal point for this shift. Yet regulatory oversight is also evolving. Senate Bill 6, passed with bipartisan support in 2025, introduced new obligations for large-load users, including requirements tied to backup generation and infrastructure cost allocation.

At the federal level, policymakers are responding to the AI "gold rush" with measures designed both to accelerate data center permitting and protect grid reliability. Proposed initiatives such as the Decentralized Access to Technology Alternatives (DATA) Act and large-load interconnection reforms could further clarify the treatment of private off-grid facilities and reduce compliance burdens.

The report suggests that regulatory clarity — rather than deregulation alone — will be essential to sustaining investment momentum while safeguarding broader system stability.

**Community Scrutiny and the $64 Billion Delay Factor**

Beyond infrastructure, the report highlights mounting community resistance. Research referenced in the analysis indicates that as of early 2025, approximately $64 billion in U.S. data center developments had faced delays due to bipartisan local opposition, often centered on energy costs, water use, and property impacts.

Off-grid systems can mitigate some of these concerns by reducing strain on public grids and shielding residential ratepayers from infrastructure cost allocation. Nevertheless, proactive community engagement and transparent economic value propositions remain critical.

The report also explores alternative models, including modular data centers co-located with renewable assets to absorb curtailed power — demonstrating that innovation in design and siting can complement traditional off-grid approaches.

**The Partner Imperative**

With gigawatt-scale campuses carrying price tags exceeding $1 billion per facility, counterparty strength and supply chain resilience are paramount. Developers and energy providers must conduct rigorous due diligence on turbine manufacturers, engineering teams, landholders, and off-takers.

In an off-grid environment, there is no utility fallback. Creditworthiness, long-term commitment, and technical capability become central risk determinants. The report underscores that competition is fierce and that some early entrants may struggle to scale without robust financial backing.

**Reliability First – and Always**

Ultimately, the report concludes that reliability eclipses all other considerations. Hyperscalers racing to lead the AI market prioritize guaranteed uptime over short-term cost arbitrage or energy trading opportunities. The business case for AI infrastructure depends on uninterrupted power, and developers are reshaping generation strategies accordingly.

Brandon Lobb, partner in Troutman Pepper Locke's Energy Transactional Practice Group, said: "AI has shifted the center of gravity in the energy market. Power availability — not just price — is now the defining variable in digital infrastructure strategy. Off-grid solutions are emerging as a pragmatic response to interconnection delays, reliability demands, and community pressures. Companies that align regulatory strategy, supply chain discipline, and creditworthy partnerships will be best positioned to lead in this next phase of AI growth."

As federal and state frameworks continue to evolve, off-grid data centers appear set to become a structural feature of the U.S. energy and technology landscape rather than a temporary workaround.

To read the full report, visit: *Off-Grid Data Centers: A Potential Power Solution for AI*.

As demand for power-intensive technologies continues to accelerate, the intersection of energy infrastructure and real estate development is becoming increasingly critical. Troutman Pepper Locke's nationally recognized Energy team and national Real Estate practice advise clients navigating these challenges, combining the experience of more than 220 energy attorneys with a real estate platform experienced in complex development and financing transactions across the U.S. The firm works with utilities, developers, financial institutions, private equity funds, and other market participants on large-scale infrastructure projects, including the development, financing, and siting of energy-intensive assets such as data centers.

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