



On-site Power for Data Centers Series: Commercial Considerations and Infrastructure Costs

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The rapid growth of AI, data storage, and cloud computing has placed stress on U.S. power grids, forcing data center operators to pivot toward on-site, also referred to as “behind-the-meter” (BTM), power solutions to provide energy resilience and mitigate exposure to power market price volatility. On-site generation typically uses natural gas, solar energy, battery storage, fuel cells, or a mixed platform offering local operators control over electricity supply and price. Data centers are currently transitioning from relying on on-site generation solutions as a redundant power source (with grid power as the primary) to on-site generation as the primary energy source.

However, on-site generation systems require major capital investments and may necessitate contracting long-term fuel supply arrangements. Costs are determined by the construction and operation of generation facilities and storage systems, and controls that allow for a seamless transition between grid and self-generated energy. Investors face critical commercial considerations when evaluating whether to invest in on-site generation, including how to balance upfront costs with long-term savings, ensuring uninterrupted energy flow (including, if applicable, fuel supply), and aligning with federal and state regulations and emissions standards.

Reliability & Resilience

Data centers are forecasted to account for 6.7% to 12% of total electricity demand by 2028, and they are expected to double in size, with some centers requiring over a gigawatt of energy.¹ Data centers are both a cause and effect of the grid strains all over the country. The soaring demand for computational power, particularly for AI workloads and cloud technology, has created an intense “load jitter” where power draw can spike or dip rapidly, making it difficult for utilities to forecast and allocate capacity. The average power density per rack in a data center is expected to rise from 36 kW to 50 kW by 2027, putting more strain on cooling systems and the already burdened utility grid.²

Grid connection delays continue to be a challenge for data centers due to rapid demand growth on the electric grid and overburdened utility company operations. As a result, developers and operators are turning to on-site generation to alleviate demand concerns, to provide development timeline certainty and to lower long-term costs. To the extent that a developer prioritizes speed to market, on-site generation could be a necessity to achieve project goals.

Avoiding construction delays and interruptions during operation is often of paramount importance due to the high costs associated with server downtime. Redundancy, through on-site power sources such as an uninterruptible power supply or a backup generator, is key to avoiding unexpected outages and ensuring data center operations are able to function for a full day every day. Although these systems can carry a high initial cost, on-site generation facilities provide data centers with operational continuity and mitigate concern over a strained electric grid with potential power shortages.

Regulatory Shifts

While there are uniform federal standards governing the level of pollutants, different regulations and environmental standards across states pose both opportunities and challenges for data centers. At the federal level, the White House issued an Executive Order “Accelerating Federal Permitting of Data Center Infrastructure” in July 2025 to expedite federal environmental reviews and streamline permitting processes involving multiple agencies.³ The purpose of the Executive Order is to launch an initiative to provide financial support for Qualifying Projects, which could include loans and loan guarantees, grants, tax incentives, and offtake agreements. Subject to certain requirements, “Qualifying Projects” under the Executive Order include data center projects that require greater than 100 megawatts (MW) of new load dedicated to AI inference, training, simulation, or synthetic data generation.⁴

¹ <https://www.energy.gov/articles/doe-releases-new-report-evaluating-increase-electricity-demand-data-centers>.

² <https://www.deloitte.com/us/en/insights/industry/technology/technology-media-and-telecom-predictions/2025/genai-power-consumption-creates-need-for-more-sustainable-data-centers.html>.

³ <https://www.whitehouse.gov/presidential-actions/2025/07/accelerating-federal-permitting-of-data-center-infrastructure/>.

⁴ Id.

States are increasingly addressing data centers’ rising energy demands. For example, in Texas, Senate Bill 6, “[r]elating to the planning for, interconnection and operation of, and costs related to providing service for certain electrical loads and to the generation of electric power by a water supply or sewer service corporation” (“SB 6”), in effect since September 1, 2025, aims to address interconnection and operation of new or expanded load requests that exceed 75 MW which directly impacts data centers that are considering new developments in Texas.⁵ The Texas Public Utilities Commission is tasked with finalizing rules for assigning costs before December 31, 2026.⁶ SB 6 requires large-load applicants to disclose to their interconnecting utility whether they have on-site backup generation that cannot export to the grid and is capable of serving at least half of their on-site demand.⁷ During emergencies, ERCOT can rely on this disclosed capability to order those customers, with reasonable notice, to deploy backup generation or curtail load.⁸

At the local level, microgrids consisting of on-site power generators can also be connected to the main grid or operate in island mode during an outage, providing a backup power source that ensures that critical operations can continue when the main grid is down. Data centers with on-site generation are able to participate in “demand response” programs, which are available in many states and are designed to compensate businesses that lower their energy use when the local grid is strained. A data center can take advantage of these programs, transferring load at strategic times throughout the day without disrupting operations. By using on-site generation instead of grid-supplied power, a data center can receive payments for lowering its energy consumption without any disruption to its day-to-day operations.

Generation Asset Costs

Acquiring or developing the proper power source is another cost that varies depending on location and local regulations, which may reward a lower carbon footprint. The table below provides a high-level analysis of the cost breakdowns for the most common technologies used for on-site generation.⁹ We note that due to the need for a continuous energy supply to a data center, nuclear power may eventually be the optimal power source solution. Nuclear power generation remains costly compared to other sources and is therefore not expected to be a viable behind-the-meter solution this decade.

⁵ <https://legiscan.com/TX/text/SB6/id/3248460/Texas-2025-SB6-Enrolled.html>.

⁶ Id.

⁷ Id.

⁸ Id.

⁹ The high-level analysis provided in the table is based on data from recent years as documented at the following:

- <https://www.eia.gov/electricity/generatorcosts/>.
- <https://www.eia.gov/todayinenergy/detail.php?id=63485>.
- <https://docs.nrel.gov/docs/fy19osti/72509.pdf>.

Technology	Upfront Capital Cost	Operational Dependability	Lifetime Maintenance Costs	Speed to Market	Long-Term ROI	Carbon Footprint
Utility Grid + Diesel Engine-generator for Backup	Low	Low	High	Varies, depends on grid	Lowest ROI	Highest
Natural Gas (Reciprocating Engines or Turbines)	Medium	Medium	Medium	Fast	Moderate to High ROI	Medium
Solar + Battery Energy Storage System (BESS)	Medium to High	High	Low	Medium	High ROI	Lowest
Fuel Cells with Natural Gas	High	Very High	Very Low	Very Fast	High ROI	Lower

Conclusion

On-site generation as a primary source of power is rapidly becoming a strategic imperative for data center developers and operators, offering a path to near-term reliability, cost certainty, and operational flexibility amid mounting grid constraints and evolving regulatory requirements. Thoughtful evaluation of capital outlays, interconnection design, technology selection, and revenue-enhancing opportunities such as demand response can unlock resilient solutions that align with long-term growth and emissions objectives. Willkie’s team stands ready to guide stakeholders through commercial structuring, regulatory strategy, and project execution to de-risk investments and capture the full value of on-site power solutions.

If you have any questions regarding this client alert, please contact the following attorneys or the Willkie attorney with whom you regularly work.

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