

ACEC Market Intelligence Brief

Data Centers

Special Issue Fall 2025

Introduction & Market Scope

In this *Market Intelligence Brief Special Issue*, we take a deeper look into the five key trends shaping the data center market. AI workloads are driving unprecedented power demand, projected to reach 123 GW by 2035; latency and scalability needs are accelerating adoption of new building designs; co-location with nuclear power, especially small modular reactors, is emerging to ensure grid reliability; public misconceptions about water use are being addressed through advanced cooling technologies and adaptive reuse of underutilized real estate is offering scalable, cost-effective pathways for development. Federal policy updates and permitting reforms are accelerating data center deployment, with new legislation streamlining environmental reviews, and siting on federal lands. Meanwhile, successful site selection hinges on incentives, infrastructure, community engagement, and environmental risk, factors increasingly evaluated using AI-driven planning tools.

Top Clients

Here is a list of the top ten data center-providing companies based on the number of centers they have in the United States.

Rank	Company	Headquarters	# Data Centers
1.	Digital Realty Trust Inc.	Austin, TX	115
2.	Equinix Inc.	Redwood City, CA	64
3.	Flexential	Charlotte, NC	40
4.	QTS Data Centers	Overland Park, KS	40
5.	Cologix	Denver, CO	29
6.	CyrusOne	Dallas, TX	25
7.	Iron Mountain	Boston, MA	25
8.	Vantage Data Centers	Denver, CO	25
9.	Databank	Dallas, TX	23
10.	365 Data Centers	Norwalk, CT	20

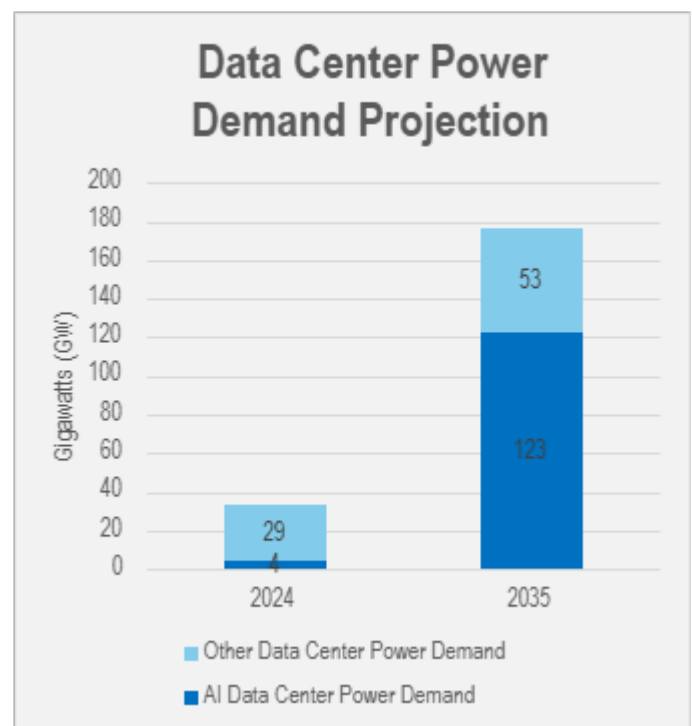
Sources: Blackridge Research & Consulting U.S. Data Center Market Report 2025

5 Current Market Trends

1. AI Leading Data Center Power Demand: The launch of ChatGPT in 2022 marked a turning point in AI's influence on the AEC industry, expanding capabilities from voice assistants like Siri and Alexa to advanced language learning models (LLMs) that include functions for deep research, image generation, and design automation.

This surge in AI adoption brought significant energy implications: standard queries use roughly 0.012 kilowatt-hours (kWh), and generation of a single high-quality image uses 2.0 kWh—roughly 20 times the daily consumption of a 10-watt LED lightbulb. Weekly active users of ChatGPT grew from 100 million to 700 million between November 2023 and August 2025 (*Axios, Reuters*). As a result, AI-driven data center power demand, which stood at 4 GW in 2024, is projected to reach 123 GW by 2035. Therefore, it is forecasted that 70% of data center power demand will be driven by AI (see chart below).

(Continued on next page)



Sources: DC Byte, S&P Global, Wood Mackenzie, LBNL, CSIS and Wells Fargo

▶ **2. Cooling Technologies Reveal Water Use Nuance:** Water consumption in data centers varies considerably based on the cooling technologies employed. Systems such as air cooling, liquid cooling, and evaporative cooling offer a range of water use profiles, while newer methods like adiabatic and free air cooling minimize water use (*Microsoft*). Amazon Web Services (AWS), Microsoft (Azure), Google Cloud Platform (GCP), and Meta—the "big four" are the largest hyperscale operators; all four have committed to becoming water-positive (replenishing more water than they consume) by 2030. The following outlines cooling technologies by relative water use.

Cooling Method	Description	Water Use
Free Air	uses outdoor air to cool equipment	None to very low
Closed-Loop	Recirculates coolant; minimal water loss	Low ~reduces freshwater use by 70%
Liquid Immersion	Submerges components in dielectric fluid	Low ~uses synthetic fluids
Direct-to-Chip	Targets and dissipates heat directly	Low
Indirect Evaporative	Closed system, no potable water required	Low
Direct Evaporative	Adiabatic cooling	Low ~90% less than traditional systems
Mechanical/Dry	No direct water but higher energy use and noise	Moderate to high

Sources: *Environmental and Energy Study Institute (EESI) and Microsoft*

“Most data centers utilize closed loop cooling systems requiring no makeup water and minimal maintenance.”

- Thom Jackson, Mechanical Engineer, and Partner at Dunham Engineering

▶ **3. Design Shifts Driven by Latency and Scalability:** Data centers have traditionally required specialized infrastructure, such as high floor-to-ceiling ratios and robust HVAC systems to support dense server environments and cooling demands. As demand grows for reduced latency, greater access to power, and closer proximity to end users, the design and deployment of data centers have diversified. This shift has accelerated the rise of edge, hyperscale, colocation, and modular models. Each offers distinct advantages: edge centers reduce latency by locating closer to users, hyperscale facilities support massive cloud and AI workloads, colocation

enables scalable shared environments for enterprises, and modular designs offer rapid deployment and cost efficiency. These trends, reflected in the chart below, illustrate a broader move toward flexible, distributed, and purpose-built data center solutions.

Type	Key Features	Operator / Provider	Best For
Edge/Micro	Small, local, low latency	EdgeConneX, Vapor IO	IoT, 5G real-time applications
Hyperscale	100k+ servers, massive scale	Big Tech (AWS, Microsoft, Google)	Cloud services, AI, global apps
Colocation	Shared space, scalable	Third Party (Equinix, Digital Realty)	SMEs and enterprises
Modular	Prefabricated w/power and cooling	AWS, Google, Cloud, Microsoft, Azure	Cost and time savings

Sources: *Dgtl Infra, Reboot Monkey, and EdgeUno*

▶ **4. Data Centers Co-locate with Nuclear Power:** As data centers continue to drive U.S. electricity demand, nuclear energy is emerging as a potential solution for reliable, uninterrupted power. Co-location of assets including data centers and power sources is also gaining traction as a strategic approach to enhance grid reliability, optimize energy use, and support the operational demands of digital infrastructure . The Department of Energy (DOE) has selected four federal sites to host AI data centers and clean energy generation projects, including small modular reactors (SMRs) through public-private partnerships (P3s): the Idaho National Laboratory, Oak Ridge Reservation (TN), Paducah Gaseous Diffusion Plant (KY), and Savannah River Site (SC). The Nuclear Regulatory Commission (NRC) also anticipates at least 25 SMR license applications by 2029 underscoring the future demand of nuclear and co-location.

▶ **5. Conversion Opportunities in Underutilized Real Estate:** As office real estate continues to underperform relative to pre-pandemic levels due to the rise of teleworking, developers are increasingly exploring adaptive reuse of underutilized assets for data center development. Brownfield sites, historical buildings, and former office spaces offer existing utility infrastructure that can reduce construction time and costs, making them attractive alternatives. Despite some design constraints of existing infrastructure, adaptive reuse is gaining traction as a scalable solution. Design and construction spending for the data center market reached \$38 billion in Q3 2025 and is expected to reach \$62 billion by 2029 (FMI) signaling sustained investment in the market for at least the next five years.

Government Affairs Action

ACEC advances policy and legislation to promote member firm interests related to clean energy, sustainability, and resilience, and to improve the efficiency of the permitting process. Below are the current policies that ACEC is tracking:

- **New Source Review (NSR)** — The goal of NSR is to ensure air quality standards are met under the Clean Air Act (CAA). Because data centers rely on back-up generators and cooling systems that can impact air quality, air permits are needed to ensure facilities comply with standards before constructing or operating equipment that emits pollutants. The recently revised NSR could allow data center construction to begin before permits are issued, thereby accelerating development.
- **Accelerating Federal Permitting of Data Center Infrastructure** — Executive Order 14318 directs federal agencies to streamline environmental reviews and permitting for new data centers and related infrastructure by using new and existing categorical exclusions, identifying Brownfields sites, superfund sites, and federal lands for data center development, and updating environmental regulations under the Clean Water Act, Clean Air Act, Toxic Substances Control Act, and CERCLA. Certain data center projects will also be eligible for inclusion in FAST-41 and the federal permitting dashboard.
- **Federal Energy Regulatory Commission (FERC) Update** – Energy Secretary Wright’s directive to accelerate data center grid connections has raised concerns among Republicans about federal overreach into state energy planning. While some support the initiative, others warn it may undermine states’ regulatory authority and increase electricity costs.
- **ACEC’s New Data Center Task Force** – The Energy Committee formed a task force to advocate for reliable energy and streamlined processes to support rapid data center deployment. It urges policies that balance speed, affordability, and national security. To get involved, contact ACEC SVP Nando Gomez at NGomez@acec.org.
- **FY26 National Defense Authorization Act (NDAA)** –The Department of Defense/War calls for a Congressional briefing on using thermal technology to cool and reduce energy consumption of DoD data centers to be built or expanded on a military installation.

Business Development Insight

Site Selection Barriers, Key Considerations & AI Tools

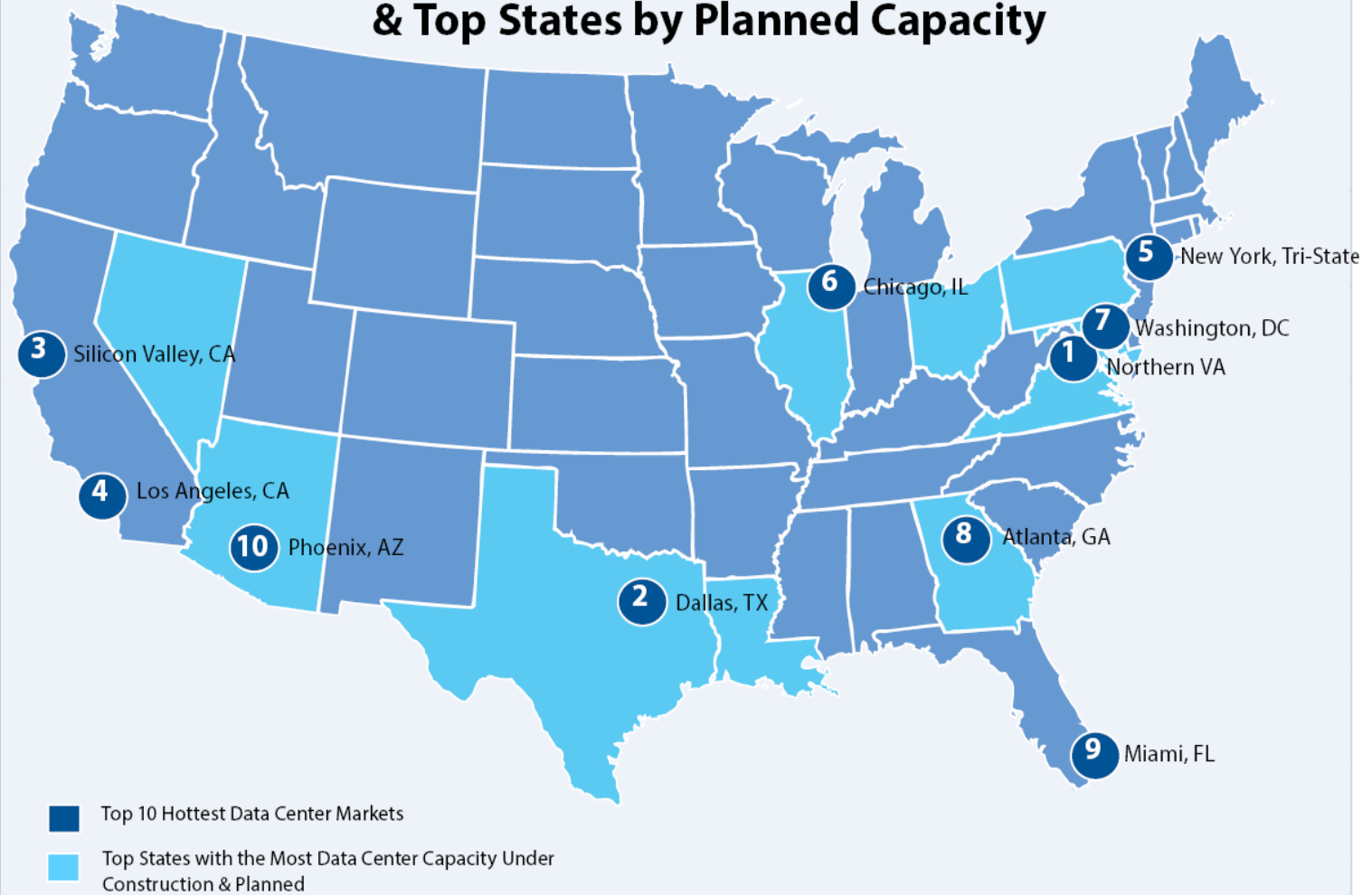
Data center development begins with the identification of a viable site. The following outlines potential barriers to entry and key considerations from initial screening to final selection as well as AI tools that may assist with the process.

- ✓ **State-Level Incentives** – Given the high upfront costs of data center development, clients pursue sales and use tax exemptions to ease capital burdens. Tract SVP of Land Development Kevin Arrow says “almost all hyperscalers require” such exemptions. These policies encourage equipment purchases without state-level tax penalties. Per Husch Blackwell’s 50-state survey, 36 states offer tax incentives for new data centers. See the [Tax Incentives for Data Centers 50 State Survey](#).
- ✓ **Connectivity** – Existing power and fiber infrastructure are critical to site selection. Power supports operations and cooling, while fiber ensures connectivity and reliability. When both are in place, developers benefit from reduced capital investment, faster time-to-market, and enhanced performance.
- ✓ **Community Engagement** – Early, intentional outreach to local communities can speed up zoning and permitting. Kimley-Horn VP Trisha Sieh advocates a “community input first” approach. This model drives economic development through job creation and boosts school funding via property tax contributions.
- ✓ **Risk Assessment** – Assessing physical constraints is key to evaluating land suitability for data centers. Environmental factors that are immovable like wetlands, endangered species, and protected areas are critical. Air permitting and site planning—such as duct banks and underground utilities—also impact viability. See Government Affairs Action for air permitting details.
- ✓ **AI Tools:** see chart for AI tools being used by urban planners, policy makers, and developers for site research and selection.

AI Tools	Capabilities
UrbanFootprint	Evaluates site suitability via land use, infrastructure and demographic data.
Descartes Labs	Uses satellite imagery and AI to assess terrain, land cover, and construction risk.
ESRI ArcGIS	Utilizes smart mapping and predictive modeling via GIS.
Doxel & AirWorks	Site scanning, virtual analysis and construction feasibility.
Custom ML	Proprietary machine learning AI engines for internal use.

Source: [Datacenter.com](#)

Top 10 Hottest Data Center Markets & Top States by Planned Capacity



(Sources: CoreSite & Deloitte)

Data Center Market Briefing



ACEC's Data Center Market Briefings provided a three-part online series hosted by the Market Intel Committee, offering a deep dive into the booming data center market. The series included:

- **Data Centers 101** - covering market dynamics, infrastructure trends, and foundational engineering solutions.
- **Engineering Sustainability** - explores power and water resource management, energy strategies, and regulatory impacts.
- **Land Use & Development** - focuses on strategic planning, zoning, and environmental considerations for site selection and growth.

Register for the full series and receive a 10% discount. [Register and watch the recording here.](#)

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