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2026 Case Competition

Data Center Power Strategy

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Kellogg Energy & Sustainability

2026 Case Competition

Case Context & Prompt

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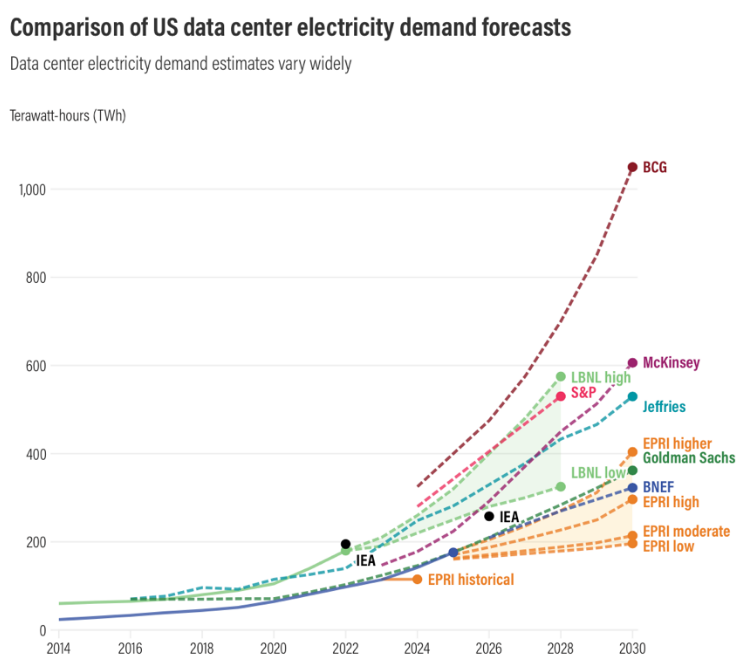
1.0 Why AI and Data Centers Are Driving Power Demand and Straining the Grid

The rapid expansion of artificial intelligence (AI), cloud computing, and digital services is fundamentally reshaping electricity demand in the United States. At the center of this transformation are hyperscale data centers, large, energy-intensive facilities operated by cloud providers and leading AI companies that support compute-heavy workloads such as machine learning training, inference, and large-scale data storage. Unlike traditional commercial loads, these facilities require massive, continuous, and highly reliable electricity supply, often at the scale of hundreds of megawatts per site.

U.S. data center electricity consumption has accelerated sharply over the past decade and is expected to grow significantly faster over the next ten years. Estimates from the U.S. Department of Energy and industry analysts suggest that data centers accounted for roughly 2-3% of total U.S. electricity consumption in the early 2020s, but this share could rise to 6-9% by the end of the decade as AI adoption scales.[1] A single hyperscale AI data center can consume as much electricity as a mid-sized city, and clusters of new facilities are increasingly concentrated in various U.S. regions such as Northern Virginia, Texas, Arizona, and the Midwest. These regions are popular due to their grid characteristics and renewable generation potential.

Several characteristics make AI-driven data center load uniquely challenging for the electric grid. First, these facilities operate with extremely high load factors, running near full capacity around the clock. This creates sustained base-load demand rather than the peak or flexible consumption patterns utilities have traditionally managed. Second, AI workloads are growing faster than expected and are difficult to forecast accurately, increasing uncertainty for utilities planning generation and transmission



Source: Adapted from Bloomberg NEF, US Data Center Outlook: The Age of AI. Data from Bloomberg NEF; Lawrence Berkeley National Lab (LBNL); International Energy Agency (IEA); Boston Consulting Group (BCG); Electric Power Research Institute (EPRI); Jefferies; Goldman Sachs; McKinsey; S&P.

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

investments. Third, hyperscalers require very high reliability, with outages measured in milliseconds potentially resulting in significant financial and reputational damage.[2]

The speed at which hyperscalers seek to bring new capacity online further strains existing grid planning processes. Traditional generation and transmission investments often require a decade or more to permit and construct, while data centers may be planned and built in just a few years. In many regions, this mismatch has resulted in interconnection backlogs, capacity constraints, and concerns about grid reliability for existing customers. Utilities and regulators are increasingly focused on how to accommodate large new loads without driving up costs for residential and small commercial ratepayers.

At the same time, hyperscalers face strong internal and external pressure to decarbonize. Many have committed to 100% clean or carbon-free energy targets on aggressive timelines, often exceeding regulatory requirements. This creates a tension between rapid load growth and sustainability goals, particularly in regions where clean generation and transmission capacity is limited. While renewable energy costs have fallen dramatically, integrating large volumes of variable generation introduces additional system complexity and often requires complementary investments in storage, firm clean power, or grid upgrades.

As a result, AI-driven power demand is not simply a question of scale, but of system design, investment coordination, and risk allocation. Addressing this challenge requires new approaches to utility partnerships, financing, regulatory engagement, and long-term planning, making it a rich and timely problem for strategic and financial analysis.

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[2] https://www.wri.org/insights/us-data-centers-electricity-demand

2.0 Regulatory Considerations for Large-Load Users and Power Generation in the U.S.

The rapid growth of data centers is colliding with a U.S. electricity regulatory framework that was largely designed for incremental load growth and traditional utility-customer relationships. In most states, vertically integrated utilities or regulated transmission and distribution providers operate under cost-of-service regulation, with investments reviewed and approved by public utility commissions (PUCs). This framework creates both constraints and opportunities when accommodating very large new customers.

A central regulatory issue is cost allocation. New generation, transmission, and distribution infrastructure required to serve hyperscalers can involve billions of dollars in capital expenditures. Regulators must determine how these costs are shared between the hyperscaler, the utility, and existing ratepayers. Complicating this dynamic, regulated utilities operate under a rate-based incentive structure in which authorized returns are earned on invested capital, creating a natural preference for large, utility-owned infrastructure investments that expand the rate base. This structure can weaken incentives to pursue alternatives such as energy efficiency, demand flexibility, or non-wires solutions that may lower system costs or emissions but do not generate comparable returns under traditional regulation. Many PUCs are increasingly wary of allowing large-load-driven investments to be broadly socialized, particularly if there is uncertainty around long-term data center demand. As a result, utilities are exploring "large load tariffs," special contracts, or upfront contribution mechanisms to ensure that hyperscalers bear an appropriate share of costs.

Interconnection and permitting represent another major bottleneck. Large generation and storage projects, particularly renewables, must navigate complex federal, state, and local approval processes. At the federal level, the Federal Energy Regulatory Commission (FERC) oversees wholesale markets and transmission planning in much of the country. Interconnection queues in regional transmission organizations (RTOs) such as PJM, ERCOT, and MISO have grown dramatically, delaying clean energy projects that hyperscalers often rely on to meet sustainability commitments. These delays increase both cost and risk for companies attempting to align rapid load growth with decarbonization goals.

Large-load users also raise questions about resource adequacy and reliability. Regulators must ensure that utilities maintain sufficient capacity to meet peak demand while preserving system resilience. The addition of large, relatively inflexible loads can increase reserve requirements and complicate planning, especially in regions already experiencing extreme weather events. Some regulators are therefore scrutinizing whether hyperscalers should participate more directly in demand response programs, capacity markets, or reliability-related investments. As large data center loads scale rapidly, the North American Electric Reliability Corporation (NERC) has raised concerns that concentrated, inflexible demand could strain regional resource adequacy and transmission systems if generation and grid upgrades do not keep pace. NERC has emphasized the need for improved load forecasting, coordination between utilities and large customers, and proactive planning to ensure that rapid data center growth does not undermine grid reliability during peak demand or extreme weather events.

Siting and environmental review add another layer of complexity. New generation and transmission projects often face local opposition, environmental justice concerns, and land-use conflicts. Hyperscalers and utilities must engage with regulators, communities, and stakeholders to demonstrate that proposed investments support broader public interest goals such as economic development, emissions reduction, and grid modernization.

Finally, decarbonization policy is reshaping regulatory expectations. Federal incentives under the Inflation Reduction Act (IRA), state renewable portfolio standards, and clean energy mandates are accelerating clean generation deployment while also increasing regulatory scrutiny of emissions outcomes. Hyperscalers that align their power procurement strategies with these policy goals may find greater regulatory support and flexibility.

Overall, the regulatory environment requires hyperscalers to move beyond a traditional “customer” role and engage as active system partners, sharing risks, co-investing in infrastructure, and helping regulators balance affordability, reliability, and sustainability.

3.0 Emerging Trends in Power Demand and Supply

In response to accelerating data center load growth, utilities, hyperscalers, and policymakers are experimenting with new models for procuring power, financing infrastructure, and managing risk. Several emerging trends are shaping how large power users engage with the grid.

One major trend is the evolution of **power purchase agreements (PPAs).** While long-term virtual PPAs have been a common tool for meeting renewable energy targets, hyperscalers are increasingly exploring more integrated structures. These include utility-facilitated PPAs, “sleeved” agreements that deliver power directly to specific load zones, and hybrid contracts that bundle renewables with storage or firm clean generation. These structures aim to better align clean energy procurement with real-time load and local grid needs.

Innovative partnerships between hyperscalers and utilities are also becoming more common. In some cases, hyperscalers are co-investing in generation, transmission, or storage assets to accelerate deployment and reduce regulatory risk. Others are negotiating customized tariffs that provide price certainty while supporting utility capital recovery. These partnerships blur the traditional boundary between customer and supplier, requiring sophisticated financial and stakeholder analysis.

New energy technologies are another key trend. Grid-scale battery storage is increasingly paired with renewables to improve reliability and flexibility. Emerging firm clean power options, such as advanced nuclear, enhanced geothermal, and long-duration storage, are attracting interest from hyperscalers seeking 24/7 carbon-free energy. While many of these technologies are not yet cost-competitive at scale, hyperscalers’ willingness to sign long-term contracts or provide early capital can help move them down the cost curve.

Demand-side innovation is also gaining attention. Flexible computing, load shifting, and participation in demand response programs offer potential ways for hyperscalers to reduce grid stress during peak periods. While AI workloads are often considered inflexible, advances in workload scheduling and geographic load balancing may create new opportunities to align power consumption with grid conditions.

Finally, there is a growing emphasis on **transparency and stakeholder communication**. Utilities, regulators, and communities are increasingly focused on how large data center developments affect local electricity prices, emissions, and land use. Hyperscalers that can clearly articulate the economic and environmental benefits of their power strategies, such as enabling new clean energy, improving grid resilience, or supporting local jobs, are better positioned to secure regulatory and public support.

Together, these trends point toward a future in which meeting hyperscale power demand requires integrated solutions that combine finance, technology, regulation, and strategy rather than relying on any single lever.

4.0 Research Support

The following sources provide high-quality data and analysis to support research on rising power demand, grid constraints, and decarbonization challenges:

- **U.S. Department of Energy (DOE)** – Reports on data center energy use, grid modernization, and load growth projections. *Example: Clean Energy Resources to Meet Data Center Electricity Demand*
- **Electric Power Research Institute (EPRI)** – Analysis of data center demand growth, grid reliability, and utility planning implications. *Example: Powering Intelligence: Analyzing Artificial Intelligence and Data Center Energy Consumption*
- **National Laboratory of the Rockies (NLR)** – U.S. Department of Energy's primary national laboratory for energy systems *Example: Data Center Demand Capacity by County*
- **CBRE –** Information around trends for data centers *Example: North America Data Center Trends H1 2025*
- **International Energy Agency (IEA)** – Global and U.S. perspectives on data centers, AI, and electricity demand growth. *Example: Energy Demand from AI*
- **Federal Energy Regulatory Commission (FERC)** – Materials on interconnection queues, transmission planning, and wholesale market regulation. *Example: FERC Orders Action on Co-Location Issues Related to Data Centers Running AI*
- **North American Electric Reliability Corporation (NERC) -** provides standards, assessments, and data focused on ensuring the reliability, resilience, and security of the North American bulk power system, including guidance on planning, operations, and emerging grid risks. Example: NERC Large Loads Action Plan
- **Lawrence Berkeley National Laboratory (LBNL)** – Research on data center efficiency, power consumption trends, and clean energy integration. *Example: How Data Centers Can Set the Stage for Larger Loads to Come*
- **Grid Strategies / Brattle Group** – Industry analyses on large load growth, transmission needs, and cost allocation challenges.
- **RMI (Rocky Mountain Institute)** – Perspectives on clean power procurement, 24/7 carbon-free energy, and innovative utility partnerships.

5.0 Competition Deliverables

Hypercompute is a hypothetical, leading global technology company that provides cloud infrastructure, AI platforms, and consumer-facing digital services used by billions of people worldwide. Historically, the company built its competitive advantage through software innovation and large-scale distributed computing to support search, social platforms, advertising, and enterprise cloud services, but the rapid rise of artificial intelligence is now driving unprecedented growth in compute-intensive workloads. As AI becomes central to its business model, Hypercompute faces a challenge of securing massive amounts of reliable, affordable, and increasingly clean power at speed and scale, forcing the company to rethink how it partners with utilities, invests in energy infrastructure, and manages risk across the electric grid.

In Round 1, participants are asked to create an archetype framework that can guide Hypercompute's power strategy in the United States as it seeks to support rapid AI-driven data center expansion while maintaining reliability, affordability, and decarbonization commitments. This framework should address power needs across the electricity value chain, from generation and transmission, to procurement structures and stakeholder engagement. In round 2, teams will outline an end-to-end roadmap for implementation, assessing risks and proposing mitigation strategies to ensure that Hypercompute can meet its growing power demand without undermining grid reliability, regulatory relationships, or sustainability goals.

Round 1: Three-Page Memo

Teams will submit a three-page memo, structured as follows:

1. **Market and Location Analysis**
    a. Objective: Assess U.S. market conditions impacting hyperscaler power procurement and grid integration, focusing on electricity demand growth, grid capacity constraints, regulatory oversight, and clean energy availability.
2. **Hypercompute's Power + Development Strategy**
    a. Objective: Develop a preliminary reliable, cost-effective, and scalable power strategy for Hypercompute's data center by prioritizing generation and procurement options that ensure high availability while measurably advancing the company's long-term decarbonization goals. Also consider how Hypercompute develops this data center.
3. **Key Risks and Mitigation Strategies**
    a. Objective: Identify the most material risks to Hypercompute's 360 MW data center power strategy across reliability, cost, decarbonization, and execution, and define mitigation approaches that leverage proactive utility engagement, market participation, and flexible procurement structures.
4. **Initial Recommendations**
    a. Objective: Present high-level recommendations for what your advisory team initially assesses to be the most optimal power procurement strategies and locations for Hypercompute to meet near- and medium-term power needs while positioning itself for long-term growth.

Formatting Requirements:

- Font: 11-point, 1.5 line spacing, 1-inch margins.
- Appendix: This section is optional for supporting exhibits (including figures and charts) and notes/citations. Content in the appendix does not count toward the page limit. Should you choose to use this section, please limit to no more than 4-5 exhibits.

Round 2: Presentation (Slide Deck)

In Round 2, finalist teams will give a 15-minute virtual presentation that builds upon their initial analysis from Round 1 to develop a more comprehensive strategy focused on **implementing Hypercompute's power strategy**. The emphasis will shift from ideation to execution, where teams will be expected to translate their strategic framework into actionable, financeable, and regulator-ready plans.

Key focus areas will include:

1. **Refined Power Strategy Framework:** Teams will enhance their initial hyperscaler power strategy framework, incorporating feedback from Round 1 to create a robust, data-backed approach tailored to Hypercompute's U.S. data center operations and projected load growth.
2. **Implementation Roadmap:** A strategic plan outlining the key steps, partnerships, timelines, and resources required to operationalize the proposed power strategy. This may include utility engagement, power procurement structures, infrastructure development, regulatory approvals, and sequencing of investments.
3. **Risk Assessment & Mitigation:** Identification of critical risks associated with implementation (e.g., regulatory delays, cost overruns, grid constraints, technology uncertainty, stakeholder opposition), along with high-level strategies to mitigate these risks and manage downside exposure.
4. **Projected Impact:** Estimation of the financial, operational, and sustainability impacts of the proposed strategy, focusing on key metrics such as power costs, reliability outcomes, emissions implications, capital requirements, and scalability over time.

Detailed list of deliverables will be provided to finalist teams after round 1 results.

6.0 Evaluation Criteria

Round 1: Three-Page Memo

1. **Market & Location Analysis:** Assess the team's understanding of U.S. electricity market conditions affecting hyperscale data center growth, evaluating how these factors are linked to Hypercompute's site selection and power procurement challenges.
2. **Compute Strategy Framework:** Evaluate the quality of the proposed archetype framework guiding Hypercompute's compute (data center + power) strategy. The framework should balance cost, capital requirements, reliability, timeliness, scalability, and decarbonization.
3. **Risk assessment & preliminary mitigation**: Evaluate the team's identification of key risks (e.g., regulatory delays, cost allocation disputes, grid constraints, clean energy supply risks, community opposition) and the plausibility and completeness of proposed mitigation strategies.
4. **Initial recommendations & strategic fit:** Assess the clarity, feasibility, and strategic relevance of the team's initial recommendations for meeting near- and medium-term power needs. Recommendations should align with Hypercompute's rapid AI-driven load growth, regulatory realities, grid reliability requirements, and sustainability commitments.

Round 1 Evaluation criteria Topic	**Not included** *Did not cover topic*	**Weak analysis** *Limited coverages / contains flaws*	**Average analysis** *Moderate coverage but lacking in depth*	**Strong analysis** *Strong, relevant, and feasible analysis*
Market analysis				
Grid capacity and reliability analysis	0	1	2	3
Interconnection and regulatory environment	0	1	2	3
Clean energy availability and market access	0	1	2	3
Risks & constrains by location	0	1	2	3
Power supply strategy				
Identification of power procurement strategies	0	1	2	3
Alignment with data center requirements	0	1	2	3
Tradeoff analysis	0	1	2	3
Risk & mitigation strategies				
Three relevant risks identified and evaluated	0	1	2	3
Quality of mitigation strategies	0	1	2	3
Initial recommendations				
Strategic analysis of data center development path	0	1	2	3
Cost & risk sharing approaches	0	1	2	3

Round 2: Presentation (Slide Deck)

Detailed deliverables, formatting guidelines, and judging criteria will be provided to the finalist teams after Round 1 to ensure clarity for participants at that stage.

Please treat the information in this memorandum as confidential and proprietary to this competition.