CFC ISSUE BRIEF

Powering the AI Boom:

What Data Center Growth Means for Electric Cooperatives

CFC
Cooperative Finance

Introduction

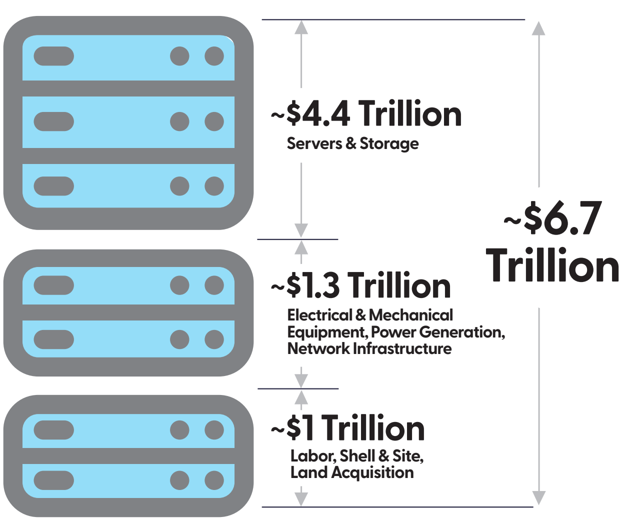
It's no secret that the U.S. data center industry is growing at a blistering pace due to surging demand for cloud computing and artificial intelligence (AI), which require massive amounts of data and compute[1] power. Such rapid growth, combined with the energy-intensive nature of data center facilities, poses both challenges and opportunities for the electric cooperatives that help power this industry.

Consider that U.S. gross domestic product (GDP) growth in the first half of 2025 was almost entirely driven by investment in data centers and information processing technology, according to an analysis by Harvard University economist Jason Furman. Without this tech infrastructure investment, U.S. GDP growth for the first half of this year would have been just 0.1% on an annualized basis, Furman wrote in a Sept. 27, 2025, post on X, suggesting near-stagnant economic growth outside the AI boom.

Globally, data center infrastructure is projected to require $6.7 trillion in capital expenditures by 2030 to keep pace with the demand for computing power, according to a report from McKinsey & Company. Breaking this down further, the consulting firm estimates $5.2 trillion will be required for data centers handling AI tasks, while $1.5 trillion will be needed for data centers performing traditional IT applications.

These staggering sums are on top of already-significant capital investments being made in the U.S., with hyperscalers leading the charge. According to Bloomberg, U.S. hyperscale annual capex reached $258 billion in 2024, driven in large part by investments from Amazon, Microsoft, Alphabet (Google) and Meta (Facebook). Hyperscale capex spending is estimated to reach $371 billion in 2025.

Capital Expenditure Needed To Support Data Center Demand Through 2030



Meanwhile, U.S. electric utilities are also spending at a record pace. According to an analysis from S&P Global Market Intelligence, annual capex from the 47 biggest investor-owned electric and gas utilities in the U.S. totaled $173 billion in 2024. Over the next five years (2025–2029), annual capex is expected to surpass $1 trillion cumulatively. Electric cooperatives are spending more on capex as well. CFC's Key Ratio Trend Analysis (KRTA) data for 2024 show that CFC members spent a total of $13.5 billion on utility plant additions in 2024, underscoring electric cooperatives' commitment to investing in essential infrastructure and reliability, despite challenges like high interest rates and inflation.

So far, the U.S. has a significant head start in the data center sector compared with other nations, and that dominance is expected to continue in the future. Morgan Stanley Research estimates that the U.S. had 37 GW in data center capacity by the end of 2024, accounting for more than 60% of total data center capacity worldwide. It also forecast that the U.S. will increase its footprint in the industry, accounting for 65% of global data center growth through 2030. China is currently the second-largest market and was estimated to have just over 20 GW of data center capacity by the end of 2024.

Data centers can create opportunities for electric cooperatives, including higher load factors and economic development for local communities, but they are also controversial. Data centers can consume as much electricity as entire towns, which can place enormous pressure on local power grids, tightening available power supply and requiring significant utility infrastructure upgrades. All of this can challenge system reliability and lead to rate increases. It is important for electric cooperatives to properly evaluate the impact a new data center may have on the grid in order to maintain financial security and protect the overall membership.

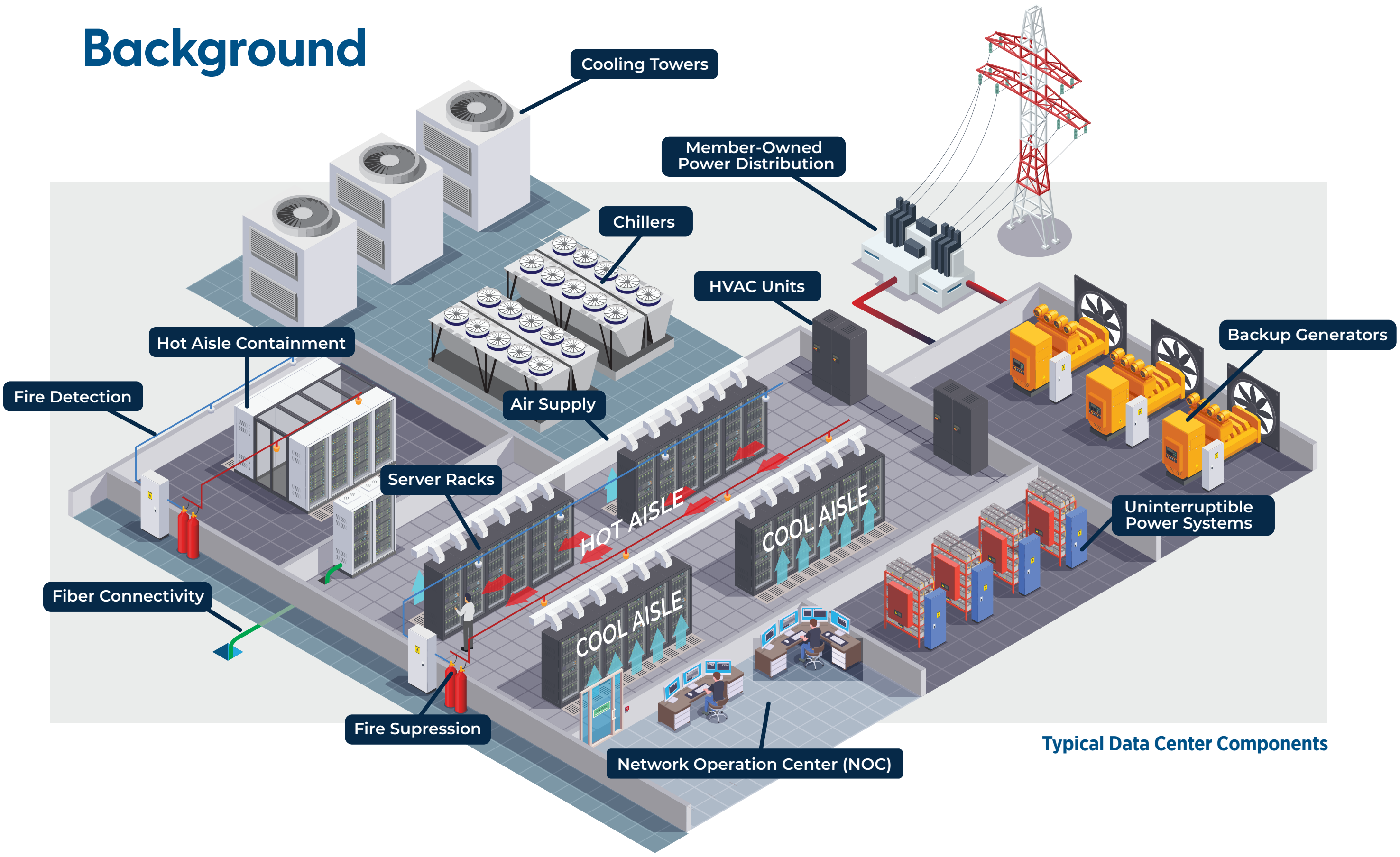
This issue brief serves as a road map to help educate electric cooperatives about the expanding data center industry and to help prepare them for serving these large loads. You can look for:

- Information about data center characteristics.
- Current and future trends impacting the industry.
- Constraints that could hinder data center growth in the future.
- Different methods electric cooperatives have used to protect their membership and help mitigate the risks associated with these facilities.

This brief also includes three case studies that highlight real-world examples of how electric cooperatives are successfully serving data center loads.

1. Compute power is the general term referring to hardware, processors, memory, storage and energy to run a data center.

Background



Typical Data Center Components

What Is a Data Center?

A data center is a facility that houses computing infrastructure—such as servers, storage systems and network equipment—used to store, process and manage digital data and information. Data centers are critical pieces of infrastructure needed to support all types of digital applications, services, business operations, cloud computing and AI.

Types of Data Centers

There are three main types of data centers: enterprise, leased and hyperscale. The amount of grid infrastructure and power demand needed at a data center can vary depending on the type of facility and the functions being performed.

Enterprise: Demand typically ranges from 1 MW to over 50 MW. These data centers are owned and operated by enterprises to manage their own corporate data management needs. The size of these facilities depends on the size and scope of the organization. Enterprise data centers are typically deployed in or alongside corporate offices.

Leased: Demand typically ranges from 5 MW to over 200 MW. Leased data centers are owned and operated by colocation companies. These companies sell floor space in their data centers to customers that need a place to host IT hardware. The colocation company owns and manages the physical data center, and the tenants pay a fee to house their IT infrastructure in the data center.

Leased data centers can be divided into two segments, retail and wholesale. Retail facilities are more focused on enterprise tenants as customers, while wholesale facilities are much larger and are primarily focused on hyperscale customers.

Leased data centers tend to be deployed near major metropolitan areas, especially for retail facilities. On the other hand, wholesale facilities tend to be located further outside metropolitan areas where land is cheaper, scale can be achieved and time-to-market is shorter.

Hyperscale: Demand can range from 20 MW to more than 1 GW. Hypercale data centers typically serve functions related to AI and cloud computing. U.S. hyperscale companies (Amazon, Google, Microsoft, etc.) often build and operate their own data centers, while also leasing out space from colocation companies. The self-built facilities are generally deployed in a campus style, housing several data centers in the same complex.

Hyperscale data centers tend to be located outside metropolitan areas where land is cheaper, scale can be achieved and time-to-market is shorter. Recently, hyperscale data centers have started popping up wherever power capacity can be found at scale, even in more rural parts of the country.

Data Center Operational Needs

Data centers need robust, scalable and resilient power to support around-the-clock operations at a high load factor. Electricity accounts for a very large percentage of a data center's total operational expenditure, and that is not expected to change anytime soon. Power rack densities are quickly rising, now approaching upwards of 50 kW–120 kW per rack, depending on the computer chips and servers being used, according to McKinsey & Company. Reliable, uninterrupted power is essential. With this in mind, data centers are often equipped with backup generators and behind-the-meter generation, allowing them to diversify while also maintaining operations during on-grid emergencies.

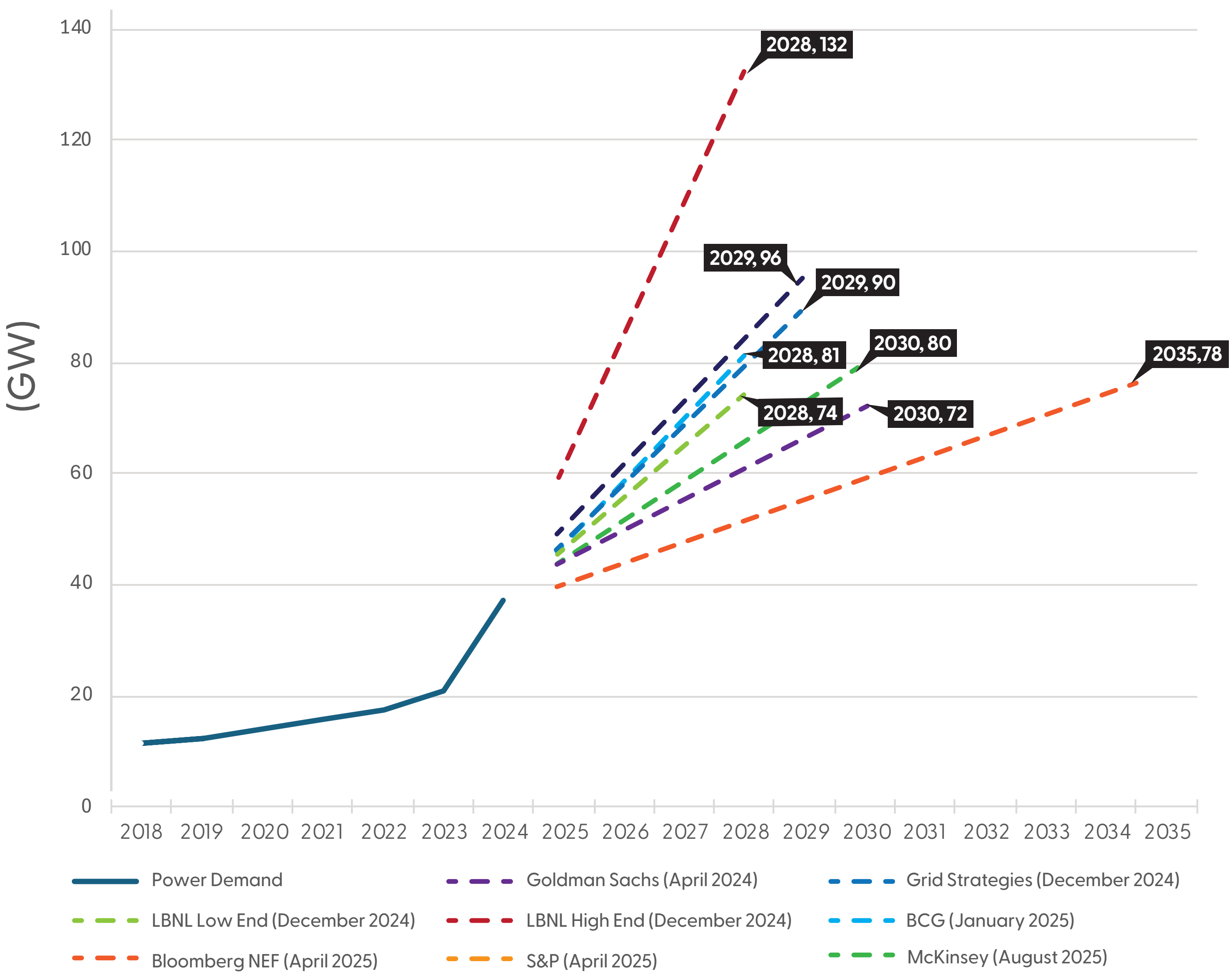
Cooling systems also require a significant amount of power and are vital to prevent servers from overheating. According to the National Renewable Energy Laboratory, as much as 40% of a data center's total energy consumption is related to cooling systems. Liquid cooling systems are becoming more common and have proven to be more energy efficient compared with traditional HVAC; however, they require access to large amounts of water.

40%

Percentage of Data Center Energy Consumption Used for Cooling Systems

Fiber connectivity is another critical resource. High-speed fiber networks ensure low-latency data transmission, with fiber capacity often determining site selection and operational efficiency.

US Data Center Power Demand Forecast



Industry Outlook

As digital demand accelerates, utility infrastructure will need to expand to meet the size and speed of data center deployment. Data center power demand in the U.S. grew by upwards of 76% in 2024, or 16 GW, equivalent to powering roughly 12 million new homes, according to Morgan Stanley. This growth is expected to continue through the next decade. However, it is uncertain just how much will actually materialize given the significant constraints already present in the industry.

Growth projections for the data center industry have begun to diverge over the last two years as grid operators, utilities and supply chains struggle to keep pace with the influx of new data center project announcements and capital investments. By 2028, data center power demand could reach as high as 132 GW, according to a Lawrence Berkeley National Lab (LBNL) forecast. Bloomberg New Energy Finance, on the other hand, forecasts much slower growth, with data center power demand expected to reach 78 GW by 2035. Outside of these two extreme cases, several other research institutions have forecasted that demand in this industry will reach somewhere between a range of 72 GW to 96 GW by 2030.

According to the International Energy Agency (IEA), data center power demand in the U.S. is currently met with a generation mix consisting of around 40% natural gas, 24% renewables, 20% nuclear and 15% coal. The incremental capacity needed to power data center demand growth through 2030 is expected to be served by 60% natural gas and 40% renewables, according to Goldman Sachs.

Large amounts of natural gas and renewable generation projects are already in the pipeline. According to data from S&P Global Market Intelligence, there is currently 74 GW of new natural gas generation projects expected to be in service from 2025 through 2030. Additionally, LBNL reported there was more than 2,100 GW of renewable and storage capacity in interconnection queues by the end of 2024.

Looking past 2030, nuclear energy is expected to play a much bigger role in serving U.S. data center power demand as small modular reactors (SMRs) begin to break ground. According to the IEA, technology companies currently have plans to finance over 20 GW of SMRs. Successful development of these technologies could open up even larger data center opportunities.

16GW

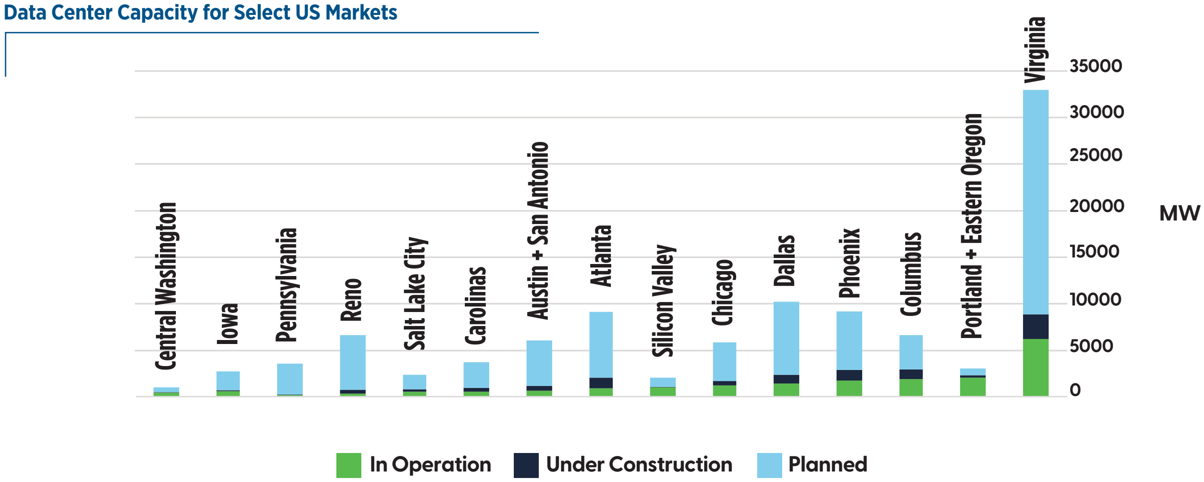
Data Center Power Growth Over 2024

The largest data center market in the world is Virginia, with over 6.2 GW of data centers currently in operation. The state is also expected to remain the largest market going into the future, with over 24 GW of data centers planned for construction. Despite the immense amount of data center activity in Virginia, data center growth in the future is expected to be more spread out in the U.S. as the state continues to get increasingly congested with new projects. Outside of Virginia, there are at least 10 U.S. markets that have between 2 GW and 8 GW of planned data center projects. Of those, the surrounding Dallas and Atlanta markets have the most planned data centers, at 7.8 GW and 7 GW, respectively.

Time-to-market is a very important characteristic for location siting. Data centers often prefer to begin operation as quickly as possible. As such, data centers are starting to flock to less congested parts of the country where the necessary market studies can be conducted quicker, construction lead times are shorter and there is available transmission and generation capacity.

Many state and local governments see the data center industry as a good way to spur economic development in their communities by creating new jobs, supporting local businesses and contractors, and generating significant amounts of state and local tax revenue. According to the Commercial Real Estate Development Association, there are at least 36 states that have legislation authorizing subsidies and tax incentives to help incentivize new data center development. This has also helped attract data centers to less traditional U.S. markets.

Data Center Capacity for Select US Markets



Constraints Impacting Data Center Growth

It remains to be seen how many new data center projects become operational in the next decade as headwinds threaten to slow data center deployment. According to Bloomberg New Energy Finance, data centers, on average, can take more than seven years before becoming fully operational, 4.8 years for pre-construction and 2.4 years for construction.

Transmission Infrastructure

The most significant factor impacting data center growth is the extended timelines for building new transmission and grid interconnection, which has not been able to keep pace with data center demand. Building transmission infrastructure is a time-intensive process. In many U.S. markets, it can take more than four years to have high-capacity transmission lines extended to new development sites, according to real estate services company JLL. These delays are largely due to persistent permitting and regulatory challenges.

Due to an influx of new renewable energy projects seeking grid interconnection in recent years, interconnection queues are swelling across the country, which is putting additional pressure on existing transmission infrastructure and the impact study process. This has largely exacerbated wait times for building new transmission and connecting new generation sources to the grid. According to LBNL, new power projects took an average of five years to get from initial interconnection request to commercial operation.

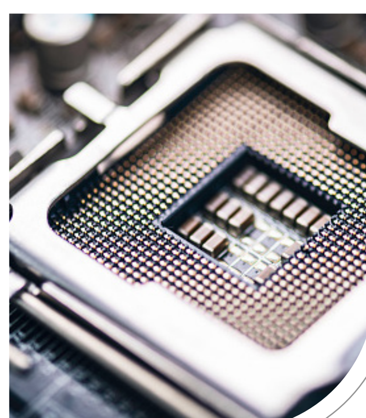
These constraints have prompted a change in how data center sites are selected. There is now a much greater emphasis on evaluating land based on available power capacity and proximity to transmission infrastructure.

Utility Equipment—Transformers

Utility equipment supply chains are also under enormous pressure, creating additional cost increases and project delays. As U.S. power demand increases, so too does demand for transformers. Transformers are crucial pieces of utility equipment needed to serve new loads and connect new generation sources. Expanding production capacity for this technology can take years. In addition, supply chains for transformers are mostly concentrated overseas, making them very sensitive to tariffs and geopolitical tensions. In total, 80% of U.S. demand for transformers is met through imports.

It's worth noting that lead times for large capacity and generation step-up transformers have quadrupled since before the COVID pandemic, going from a delivery window of 30 to 60 weeks prior to 2020 to 120 to 130 weeks today. Costs for transformers have also risen significantly over the same period by 60%–80%, depending on the size and application of the transformer.

Semiconductor Chip Production



In order for the U.S. data center industry to keep pace with such aggressive power demand forecasts, the industry will need the supply of semiconductor chips to rapidly expand. According to a recent report from London Economics International, however, the projections surrounding U.S. data center power demand growth could be significantly overstated due to constraints in chip manufacturing.

According to the report, if data center power demand were to grow by 57 GW through the end of the decade, it would require at least 90% of the world's new production capacity for semiconductor chips through 2030. Given that demand for data center infrastructure is growing worldwide, not just domestically, owning such a large share of future chip supply is unrealistic. If chip production is unable to significantly grow over the next five years, domestic data center power demand growth will be limited going forward.

CFC CASE STUDIES

CORE
ELECTRIC COOPERATIVE

Colorado Co-op Adopts 'Scale-Based' Approach To Serving Data Centers

CORE Electric Cooperative is headquartered approximately 20 miles south of Denver in Sedalia, Colorado. The distribution system serves more than 163,000 members in a nearly 5,000-square-mile area along Colorado's Front Range, including rapidly growing areas surrounding Denver. CORE buys power from a variety of sources, including new solar and wind projects, existing natural gas and federal hydroelectric power.

The cooperative's membership is primarily residential, but it has been actively working to bring new commercial and industrial members to its service area—and has seen some interest from data center developers. According to CORE Power Supply Director Christopher Hildred and CORE Engineering Director Brian Richter, the cooperative's approach is shaped by the need to balance growth opportunities with prudent risk management.

CORE's line workers respond to outages and perform system improvements.

Managing Risk in a High-Growth Environment

CORE's service territory has attracted both mid-sized and large data center prospects against a backdrop of high demand growth in the region. The cooperative's risk-management strategy is highly dependent on the scale of the proposed load:

Large Data Centers: For data center projects with loads from 50 MW up to 1 GW, commercial members are required to underwrite the generation risk by committing to financial obligations that cover the cost of new generation resources the cooperative would have to procure.

Mid-Sized Data Centers: For data centers that don't take up a large share of the cooperative's overall load, these commercial members have often located their projects near existing substations with available transmission capacity, reducing the need for major infrastructure investments. These mid-sized data centers contribute capital for transmission and distribution (T&D) upgrades and pose less risk to CORE's existing membership. If a mid-sized data center were to leave after a few years, CORE believes regional economic growth would help absorb the excess capacity over time.

Hildred noted that these mid-sized data centers help CORE. "They're helping us better utilize the assets that are there and/or build out new assets." He added that they are also "contributing a significant chunk of the capital for the T&D assets needed to serve them."

CORE is also looking to implement minimum financial obligations and ramp up schedules in their service agreements to ensure cost recovery and mitigate additional risks.

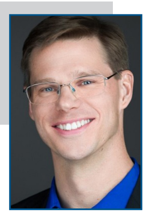
Regulatory Environment

Colorado's stringent carbon reduction mandates and regulatory uncertainty are significant challenges for large data centers. The state's evolving requirements for renewable energy and emissions reductions make it difficult for electric utilities to guarantee long-term, low-carbon power at the scale and speed demanded by hyperscale data centers. As a result, many large prospects have opted for locations with more favorable regulatory conditions.

Power Procurement Strategy

"On the generation side, it's an ongoing planning process for us to acquire the capacity resources and renewables needed to meet the state's carbon constraints while also meeting their load requirements," Hildred explained.

Historically, CORE relied on a partial requirements contract with Xcel Energy, with additional supply from the Western Area Power Administration, several large solar facilities and a minority stake in a coal plant. However, CORE is transitioning to a self-supply model and is engaging with power marketer ACES for real-time and day-ahead market management. This shift will allow CORE to better align procurement with the timing and scale of new data center loads, ensuring that new members do not outpace available resources.



Christopher Hildred
CORE Power Supply Director

CFC Case Studies

Umatilla Electric Cooperative Draws on Extensive Experience To Serve New Data Center Loads

Umatilla Electric Cooperative (UEC) serves an area in eastern Oregon that spans approximately 2,000 square miles across three counties, including much of Umatilla County surrounding the cities of Hermiston and Pendleton and into the Blue Mountains. The distribution cooperative gets its power from a diverse mix of sources, with a large portion coming from federal hydropower supplied by the Bonneville Power Administration (BPA). In 2023, UEC tripled its purchase from hydro resources, reflecting a trend in the region to increase the use of renewable energy.

Against this backdrop, UEC has emerged as a leader in serving large data center loads, with the cooperative experiencing rapid growth since first connecting a data center in 2012. UEC's experience offers valuable lessons for other cooperatives that are navigating the complexities of these high-demand commercial members.

UEC's main office is located in Hermiston, Oregon

Data Center Locations—Why Umatilla?

The Portland–Eastern Oregon data center market is currently the third largest in the world, behind Virginia and Beijing, according to commercial real estate firm Cushman & Wakefield. UEC plays a significant role in that ranking by serving a large portion of the data centers in the eastern part of the state.

According to UEC Assistant General Manager Josh Lankford and UEC Vice President of Power Supply and Transmission Blake Weathers, data centers are attracted to the cooperative's service territory due to a combination of localized factors, including local incentives offered to data centers, land availability, power supply and transmission availability, and strong fiber infrastructure. Lankford and Weathers also point to UEC's reputation as a trusted service provider.

"Data centers recognize our track record in building the infrastructure needed to support their growth, coordinating transmission service with the BPA and ensuring reliable power supply," Weathers said.

Lankford added, "We've consistently met their needs, and that reliability continues to be important to them."

Power Procurement Strategies

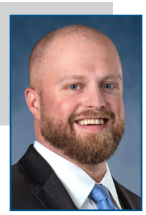
Federal regulations stipulate that loads over 10 MW are ineligible for BPA generation. As a result, UEC procures power for data centers from non-federal wholesale power suppliers, while traditional members with loads less than 10 MW retain access to UEC's federal power allocation from BPA. This separation is crucial for protecting traditional members and maintaining the integrity of the cooperative's federal power supply.

UEC is also preparing for future changes in the power market with plans to participate in the Southwest Power Pool (SPP) Markets+ initiative, a new stakeholder-driven wholesale electricity market for the western United States that is expected to go live in October 2027. Through this SPP-created initiative, UEC is aiming to optimize power procurement for large loads and become less reliant on bilateral power supply transactions.

Blake Weathers
UEC Vice President of Power Supply and Transmission

Organizational Adaptation

UEC's growth has necessitated substantial organizational changes. The cooperative has grown its power supply team and expanded its engineering and support staff. UEC also relies on consultants and contractors for specialized services, such as real-time power trading. This flexible approach allows UEC to scale up its engineering and support staff as demand grows while maintaining high standards of reliability and service.



Josh Lankford
UEC Assistant General Manager

Community Impact and Engagement

Community engagement is a cornerstone of UEC's strategy. UEC encourages its data center members to engage with the community to build trust and transparency, create a positive reputation and ensure the long-term viability of their operations. Community engagement through public outreach, charitable giving and active community participation is critical to building acceptance and support while demonstrating the data center's commitment to being a good neighbor.

UEC's experience underscores the importance of proactive communication with traditional members, ensuring they understand how data center growth will not adversely affect their rates or service.

CFC Case Studies

Cass County Electric Cooperative/Minnkota Power Cooperative Protect Member Interests

Minnkota Power Cooperative is a generation and transmission (G&T) cooperative supplying wholesale power to 11 distribution cooperatives in eastern North Dakota and northwestern Minnesota. Minnkota's infrastructure includes over 3,400 miles of transmission lines and 265 substations, and its power generation comes from a mix of sources including coal, wind and hydropower. In addition, Minnkota participates in the Midcontinent Independent System Operator (MISO) wholesale energy market to buy and sell surplus power.

Minnkota's previous experience in dealing with large load requests for cryptocurrency mining helped introduce the G&T to the complexities and risks associated with serving computational workloads. While these initial commercial members mined various cryptocurrencies, more recent inquiries have shifted toward AI workloads.

CCEC relies on service trucks for a multitude of different tasks.

Cass County Electric Cooperative (CCEC), one of Minnkota's distribution cooperative members, serves approximately 60,000 members across nearly 6,000 miles of line in 10 southeast North Dakota counties. CCEC's mission extends beyond providing electricity to supporting local economic and rural development in southeast North Dakota.

Against this backdrop, data center developer Applied Digital began construction of a 280 MW facility near Harwood, North Dakota, in September 2025. The facility will be served by CCEC with G&T services provided by Minnkota. As electric cooperatives across the country face increasing inquiries from data center developers, the steps taken by Minnkota and CCEC offer a compelling model for balancing how to serve a large data center commercial member while also mitigating any adverse impacts on their membership.

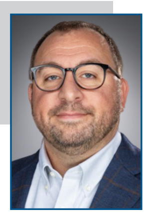
Rigorous Application Process

In order to properly manage risk, ensure equitable treatment of legacy cooperative members and efficiently separate serious prospects from a vast number of speculative inquiries, Minnkota established a rigorous application process for large load interconnection requests for any project seeking 20 MW or more. This process, detailed on the Minnkota website, requires significant financial commitments, including an upfront application fee and a subsequent fee per megawatt for those wishing to proceed. Additionally, a prospective data center is also charged a significant retainer for all feasibility studies conducted by the cooperative.

These commitments serve as an initial filter, deterring what CCEC CEO Paul Matthys describes as "tire kickers," speculative developers who lack a committed tenant or the financial capacity to move forward, while also helping the cooperative allocate resources efficiently and protect its membership from undue risk.

Paul Matthys
CEO, Cass County Electric Cooperative

Collaboration is central to Minnkota's approach, noted Minnkota Communications Manager Ben Fladhammer. As a G&T cooperative, Minnkota coordinates closely with its member distribution cooperatives to ensure both retail and transmission needs are met. Then going forward, Minnkota's power delivery and economic development teams lead location assessments and power delivery studies, while consultants are engaged as needed for specialized expertise.



Ben Fladhammer
Minnkota Communications Manager

Risk Management: Impact on the Membership

The cooperative employs several risk-mitigation strategies to help isolate the membership from any unnecessary risks brought on by large load projects. Minnkota will require a data center to pay 100% of the construction costs upfront for any necessary infrastructure improvements and will also require a data center to make upfront deposits on their electricity bills. If future expansions require new resources, Minnkota and CCEC plan to structure costs so that only the data center bears the financial burden, not the rest of the membership.

The not-for-profit business model of electric cooperatives prioritizes the interests of its traditional members. Matthys noted that every step in serving large loads like data centers was designed to avoid negative impacts on existing members. CCEC plans to leverage data center margins to offset costs, build a resource transition fund and absorb wholesale rate increases, thereby stabilizing rates for legacy members. Revenue from data centers will also be used to self-fund work plans, reduce borrowing and increase capital credits for members.

Key Considerations for Serving Data Center Loads

CFC recommends that electric cooperatives consider the following when entering into a service agreement with a data center:

Ensure close coordination between distribution cooperatives and wholesale power suppliers.

Data centers have high power demands and require continuous, reliable electric service. It is critical that retail service providers and power suppliers coordinate closely to ensure the necessary capacity, infrastructure and supplies are in place to meet data center "mission-critical" standards without exposing existing members to unnecessary risk. Serving a large data center often requires significant new infrastructure development and/or upgrades to existing substations and transmission lines. Close coordination ensures that these projects are aligned across the distribution and transmission levels and that costs are allocated appropriately.

Prioritize risk management and cost recovery.

Before serving a data center, cooperatives should have a clear understanding of how they will manage risk and recover costs. Data center developers often survey across several different utilities at one time, looking for preferable conditions, before selecting the final location. Cooperatives should consider implementing upfront financial commitments and safeguards, allowing them to filter out speculative projects early and recover costs associated with feasibility studies. Once a data center has satisfied these concerns, electric cooperatives should then consider additional protections to mitigate the risks of deploying new resources and providing service for operations going forward. This could include having the data center contribute capital upfront to cover the costs of building new transmission and distribution infrastructure, new generation capacity and any other system upgrades or improvements. Additionally, through the electric service agreement, cooperatives could also explore implementing ramp up schedules and having the data center pay upfront deposits on their electricity bills. All this can be used to help allocate costs so the data center bears the financial burden, not the membership.

Plan for uncertainty.

As the data center industry continues to grow, electric cooperatives need to be flexible to successfully navigate market constraints and increased uncertainty. In the planning phase, cooperatives need to evaluate how their ability to source equipment and build infrastructure could be impacted by increased lead times and costs, and how these trends could impact their ability to provide service and manage risk. Similarly, the cooperative should also be mindful of what factors could slow the data center down from becoming fully operational, allowing the cooperative to properly assess the data center's overall risk and manage the project's timeline accordingly.

Be proactive about engaging with members and local communities.

It is critically important for distribution cooperatives to be proactive about engaging with their members and local communities when serving a data center. Members need to know how data center growth will affect their rates and service reliability. In addition, distribution cooperatives should encourage data centers to participate in community activities to build trust, address concerns, align projects with community expectations and demonstrate their commitment to being good neighbors.

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