Data Centers Are Hungry For Power. Chart Industries Is Fueling The Future With Cooling And Energy Solutions

Unsplash/Geoffrey Moffett

Data centers are demanding more power, and they're demanding it at record-shattering numbers.

By 2030, data center power demand is estimated to increase by 165% — a number that could "upend power grids." There are 5,400 data centers nationally, more than double the figure from just five years ago, and dozens more are in the pipeline across the U.S.

It is an industry expanding faster than any other commercial real estate sector. Its biggest barrier to success? Energy and cooling challenges.

“The single biggest energy challenge is power availability,” said Jeff MacPhee, director of business development, data centers at Chart Industries, a global leader in engineered process equipment and manufacturing, with a $9B market capitalization. “Grid interconnections can take five to seven years, while operators need capacity online in 18 to 24 months. There’s a delta that everyone is trying to solve for, and that’s where on-site power generation comes into play.”

Data Center Energy Demand Is Skyrocketing

MacPhee said it is getting harder to find parcels of land that are ready for the large amounts of power that data centers need. These facilities typically require anywhere from 50 to 200 megawatts, and in some places even more than 1 gigawatt. This need is evolving rapidly — and the power grid can't keep up.

The difference between what can be generated and what is needed makes reliable on-site generation — such as natural gas-based energy systems — a top priority, MacPhee said.

“When you rely on the electrical grid, the electricity passes through several stages and long distances. There are numerous points of failure that can cause outages,” he said. “Having on-site power removes these risks.”

It’s all about speed to market, MacPhee said. Most operators are looking at how they can self-generate, whether that means a permanent or bridging solution.

On-site power generation options include reciprocating engines, turbines, fuel cells, wind and solar, large-scale nuclear and the emergence of small modular reactors, expected by late 2026 into 2027. According to MacPhee, natural gas-based assets remain the preferred choice.

Bridging The Gap With Natural Gas Solutions

Liquefied natural gas, or LNG, is a powerful resource for several reasons, MacPhee said. It combines high efficiency, reliability, flexibility and cleaner emissions with an abundant supply and strong infrastructure. It is ideal for primary or backup power in regions with grid instability or limited renewable resource coverage.

Renewable energy sources can also be intermittent and weather-dependent, requiring storage or backup to ensure uptime. This only accentuates the need for a reliable power source in case something goes wrong.

As data centers seek reliable power solutions, liquefied natural gas is quickly emerging as a smart, efficient choice for primary and backup energy needs.

“LNG is simply natural gas cooled into liquid form — about 600 times denser than its gaseous state, allowing far greater storage capacity in a smaller footprint,” he said.

For data centers, LNG offers two key use cases, MacPhee said. First, it is a prime fuel source for added resilience alongside pipeline gas. Second, it is a reliable backup fuel that can eliminate the need for diesel and the high capital costs of reciprocating engines, ensuring continuity during pipeline interruptions.

Chart provides cryogenic technology solutions for various molecules, offering technologies across the value chain, including liquefaction, storage, transportation and regasification.

“Our scalable LNG storage tanks, with capacities from 10,000 to 450,000 gallons, are designed to support campuses of any size,” he said. “We provide flexible redundancy options, offering fuel for 48 hours to five days — or tailored to the operational needs of our customer.”

Chart’s cryogenic storage solutions can be deployed in as little as 12 months, supporting campuses of any size. Its operational cost to run is 30% to 50% cheaper than diesel fuel

and emits 30% less greenhouse gases, MacPhee said. When looking at Title V air permits, this can make a huge difference.

"Natural gas is a proven, clean and reliable source for power generation and will remain an important part of the energy mix for years to come," he said.

Cooling Challenges Posed By Increased Demand

On the other hand, with server rack size growing exponentially, the cooling side of the equation becomes equally as important — and challenging — to address effectively, MacPhee said.

Cooling already accounts for 30% to 40% of facility energy use, and AI workloads are pushing rack densities from 50 kilowatts to 100 kW per rack, with talks of 600 kW and even 1 MW. At those densities, water-cooled systems, sometimes using hundreds of thousands of gallons per day, are increasingly unsustainable, especially in water-stressed regions, MacPhee said.

The challenge of making cooling strategies scalable and sustainable has yet to be solved. Chart Industries, however, has several strategies to make this critical infrastructure operate seamlessly and more sustainably.

Chart's Sustainable Cooling Solutions

One way Chart approaches data center cooling is with large-scale, closed-loop air-cooled heat exchangers, or ACHX, that can reject hundreds of megawatts of thermal energy with 90% to 95% less water than evaporative systems, MacPhee said. This technology pairs seamlessly with advanced cooling methods, such as direct-to-chip, making them ideal for regions facing water scarcity or regulatory limits, he added.

How does it work? An air-cooled heat exchanger, or dry cooler, works like a giant radiator, MacPhee said. The warm process fluid from the information technology load flows through finned tubes, and large fans blow outside air across them to remove the

heat before the cooled fluid returns inside, and the cycle repeats in a closed loop. An adiabatic system can be paired with the ACHX to boost cooling performance during hotter conditions, typically needed only 200 to 400 hours per year, depending on region, he added.

The benefits? An ACHX provides direct heat rejection without refrigerant or compression, resulting in lower costs, simpler maintenance and greater sustainability than traditional chillers or cooling towers. It also reduces energy use and improves power usage effectiveness.

"These air-cooled heat exchangers have consistently delivered 90%-plus water savings compared to traditional evaporative cooling while maintaining high reliability across varied environmental conditions," MacPhee said.

Chart's Tuf-Lite composite fan blades are a major differentiator, he said. Compared to conventional aluminum fans, they deliver 15% to 40% more airflow, driving efficiency and improving thermal duty at scale while providing lower noise, all while offering four to five times the operational life.

More than 300,000 units of this product are in use today, MacPhee said, everywhere from hot, humid to arid, high-altitude climates.

Chart manufactures ACHX and fan blades at its facilities in Tulsa, Oklahoma, and Beasley, Texas. In-house production allows the company to reduce supply chain risk and decrease lead times.

"That's a huge advantage in a market where timelines are everything," he said.

The Future Of Data Center Energy

The future won't be defined by a single silver bullet but by combining clean, dispatchable generation with smarter, more efficient cooling to achieve the right balance of speed, scale and sustainability, MacPhee said.

“The computational power packed inside the racks has exploded, driven by advances in chip technology and AI workloads,” he said. “This shift is accelerating the adoption of advanced technologies across the data center landscape. Chart’s proprietary cryogenic solutions are well-positioned to support this evolution, and our closed-loop cryogenic cooling systems, currently in development, have already drawn interest from leading chip manufacturers.”

He said that on the power front, Chart will continue to see innovation, with steady growth in on-site generation using natural gas and emerging interest in hydrogen. Chart is also collaborating with nuclear developers and looks forward to sharing more details soon.

“Our first-of-its-kind cryogenic carbon capture technology is gaining attention as a promising solution for reducing emissions,” MacPhee said. “Really, it's just an exciting time for the data center industry.”

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