WORKING TOGETHER TO SOLVE NORTH AMERICA'S POWER CHALLENGES

As technology evolves, so too must our approach to power infrastructure.

By Dana Adams, President of North America, Vantage Data Centers

Power is the biggest challenge facing the data center industry today, in North America and across the globe. The data center industry's incredible growth is being fueled by the rapid expansion of Internet usage, increased accessibility to the Internet, and the ongoing evolution of online technologies. This trend, coupled with the proliferation of both traditional and generative artificial intelligence (AI) and the continued growth of cloud computing, has increased the existing strain on the power grid in a growing number of markets due to its immense scale and concentration in certain areas.

To provide a startling example, the computing infrastructure required to support machine learning and AI applications can reach up to 100kW+ per rack—10+ times what is needed for traditional applications. All of this upscaling is happening in tandem with a level of factory building in the US not seen since the '90s, driven in part by the increased onshore production of the chips needed to power AI. Moreover, the surge in demand for electrification and other types of factories being built in the US reflects a broader trend towards reshoring manufacturing and strengthening domestic supply chains, particularly in critical sectors like automotive, electronics, and renewable energy.

Altogether, the amount of power that utilities are projecting for the years ahead continues to rise, leading consulting firm Grid Strategies to declare that "the era of flat power demand is over." That same report notes that grid planners have nearly doubled the five-year load growth forecast.

To be clear, the advancements in AI and cloud computing are exciting. They enable the expansion of next-generation applications that enhance efficiency, accessibility, and sustainability across various sectors. Beyond revolutionizing industries with modernizations like self-driving cars to even more powerful online banking and telehealth, these technologies also play a pivotal role in promoting environmental sustainability. Data center providers and other stakeholders have an incredible opportunity to bring creative, future-looking solutions to the power constraints we are facing so we can deliver innovation at scale.

The first step is for all stakeholders—data center developers, utilities, governments, customers and other industry players—to embrace our shared accountability in order to create and bring to market efficient, sustainable solutions to the power challenges we currently face together.

TYPES OF POWER CHALLENGES

As industries and governments work to reduce carbon footprints globally, the dramatic uptick in power consumption from data centers, manufacturing, and

Vantage Data Centers' 50-acre campus in Goodyear, Arizona, will include 176MW across more than one million square feet once fully developed.

A data module at Vantage Data Centers' flagship Northern Virginia campus.

ABOUT THE AUTHOR

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other industries has unfortunately been used as pretext to delay the planned closure of some North American coal plants and to build new gas power plants. As we work toward long-term sustainable solutions and address our aging infrastructure, we must avoid taking steps backward on carbon reduction.

The power challenges we currently face can be divided into three broad categories:

1. Generation: North America is far behind in our transition to clean energy. As a major consumer of power, the data center industry must be proactive in aiding a transition to renewable energy and contributing to the generation of sustainable power from a variety of sources, such as solar, wind, and hydrogen.

2. Transmission and Distribution: The ability to generate renewable power is only part of the equation. The ability to transmit it is just as crucial, yet poses another challenge—one that requires significant upgrades to existing, aging infrastructure. Such upgrades are multi-year endeavors that require buy-in from a range of stakeholders and regulators across multiple governments. Expanding the transmission infrastructure in the

US would greatly benefit the industry by enabling the smooth transfer of renewable energy from its sources to the locations of data centers and other customers, which would enhance accessibility and sustainability.

3. Storage: Given that renewables only generate power at certain times, there's the potential for waste unless proper storage is in place. Energy storage technologies, including thermal, battery, and pumped hydro, each bring unique benefits in capturing renewable energy and saving it for off-peak use. Data centers can store energy onsite and repurpose their waste heat as an energy source for other spaces in the facility, such as breakrooms and offices, as well as an export for the local community to use in homes and neighboring buildings.

HOW TO ADDRESS THESE CHALLENGES

Solving these tough power challenges is going to require creativity and collaboration from a wide range of stakeholders. As an industry, we have an opportunity to take a leading role in addressing these challenges with proactive engagement and savvy

investments. The most immediate ways to do this include:

● **Engaging with utilities:** To start, the data center industry must work with utilities early in the planning and development phase to understand local power challenges better and be able to plan and prepare for expected and unexpected peak load situations along with future capacity needs. Engaging in these relationships is crucial in part because of how much power challenges vary across localities. For some markets, it's an issue with generation; for others, it's an issue with transmission and distribution. By understanding a market's unique challenges, we can offer thoughtful, tailored solutions. For example, in Arizona, Vantage is partnering with a local utility to innovate a flexible and dispatchable load scenario that will provide the utility with relief in peak situations. In California, we have open lines of communication with the local utility, and we have agreed to go off-grid when needed (such as during hot weather conditions, wildfires, or extreme load situations). During those periods, we run our data centers off our generators, which are fueled primarily

with hydrotreated vegetable oil (HVO), a much cleaner product for the environment compared to traditional diesel fuel.

● **Investing in renewable energy:** Data centers can be particularly creative in offsetting usage through investment in the creation and adoption of new renewable energy sources. At Vantage, these investments have the added benefit of helping us reach our goal of net zero carbon operational emissions by 2030 while also helping our customers meet their own environmental goals. In South Africa, for instance, we have a 20-year power purchase agreement (PPA) with SolarAfrica, a pioneer in the country's solar energy financing. Through this program, we are investing in the production of 87MW of renewable energy to supplement the local grid that powers our Johannesburg campus and the surrounding community. We are exploring similar investments across North America and advocating for policies enabling swift, affordable, and abundant clean energy access for all, including data centers.

● **Deploying onsite generation:** As the industry is exploring a number of solutions to solve for power constraints, onsite generation is one option that has risen to the top as a viable supplemental, alternative—or at a minimum, an interim bridge solution. For example, in markets where there are capacity constraints or peak demand challenges,

an onsite solution—whether connected to the grid or operated in island mode—can help utilities balance their systems. While these solutions come with their own set of challenges, from regulatory to space constraints, they can be a reliable option given their availability, emissions benefits, competitive cost, and (depending on the market) being a cleaner solution than grid power.

● **Improving data center design:** Power demands from AI, especially generative AI, are higher than previously expected and are poised to represent up to four percent of global power demand by 2030. At the same time, AI has the potential to revolutionize how data centers operate and deliver services, making them more efficient, scalable, and responsive to changing demands. To ensure we can continue to reap the benefits of AI, the data center industry must continue to establish scalable design efficiencies to drive improved power usage effectiveness (PUE) and other energy reductions.

● **Spreading out demand needs:** Training AI applications requires a tremendous amount of power compared to traditional computing. Fortunately, these training models are less latency-critical, so they can be placed in second and third tier markets where power is potentially cleaner and more readily available. Moving to these markets also stands to benefit the communities by

bringing jobs and tax revenues to the area. We can also spread out demand needs by prioritizing markets where renewables are already available and there is a commitment to expand.

● **Engaging in national dialogue:** The data center industry needs to ensure it has a voice in broader discussions about power as well. The industry is dedicated to partnering with utilities, grid operators, developers, and policymakers to address challenges in deploying clean energy, such as long interconnection queues, local siting issues, and inadequate transmission infrastructure. It's critical that the industry remain engaged with stakeholders to inform load forecasts and support initiatives ensuring reliable, affordable, and clean energy access. From the creation of data center coalitions to the introduction of national conversations related to power grid issues, we need space to engage with one another and face these challenges head-on. Renewable energy providers, chip manufacturers, customers, and the community should all be part of the conversation, too. With any complex issue, there is no simple answer—and power challenges are as complex as they come.

The bottom line is that exciting, world-changing technology is evolving quickly, and power demand is growing with it—here and around the world. The current moment demands we bring our creativity and problem-solving capacity to the table to ensure we can reap the benefits of new technologies through proactive and transparent planning to meet the power challenges of today. Addressing these challenges is going to take all of us: the data center industry, manufacturers, end users, utilities, and the government. From future-proofing data center design to having strategic discussions with stakeholders, the time to act is now. By working together, we can address these power challenges and continue advancing technology around the globe in clean, responsible ways. ●