Powering AI: A Reckoning Is Coming

By Jerimiah Booream, CFA and Lance Marr, CFA

After decades of near-stagnant electricity growth in the United States, the emergence of artificial intelligence (AI) is helping to fuel a dramatic comeback for the power industry. Nearly every major AI player has pointed to electricity needs as a major gating factor to the AI buildout, and we estimate AI demand could account for half or more of the US power demand increase in coming years. By the end of this decade, the *additional electricity* demanded from data centers could eclipse the needs of 19 million US households *each year*. In the last five years, the price of electricity for residential customers increased over 26% on average.[1] Will the under-invested electric grid be able to support hyperscalers—the companies driving the digital transformation by investing hundreds of billions of dollars in large-scale, highly scalable data centers—or will physical limits overwhelm cash flow as the digital gold rush intensifies?

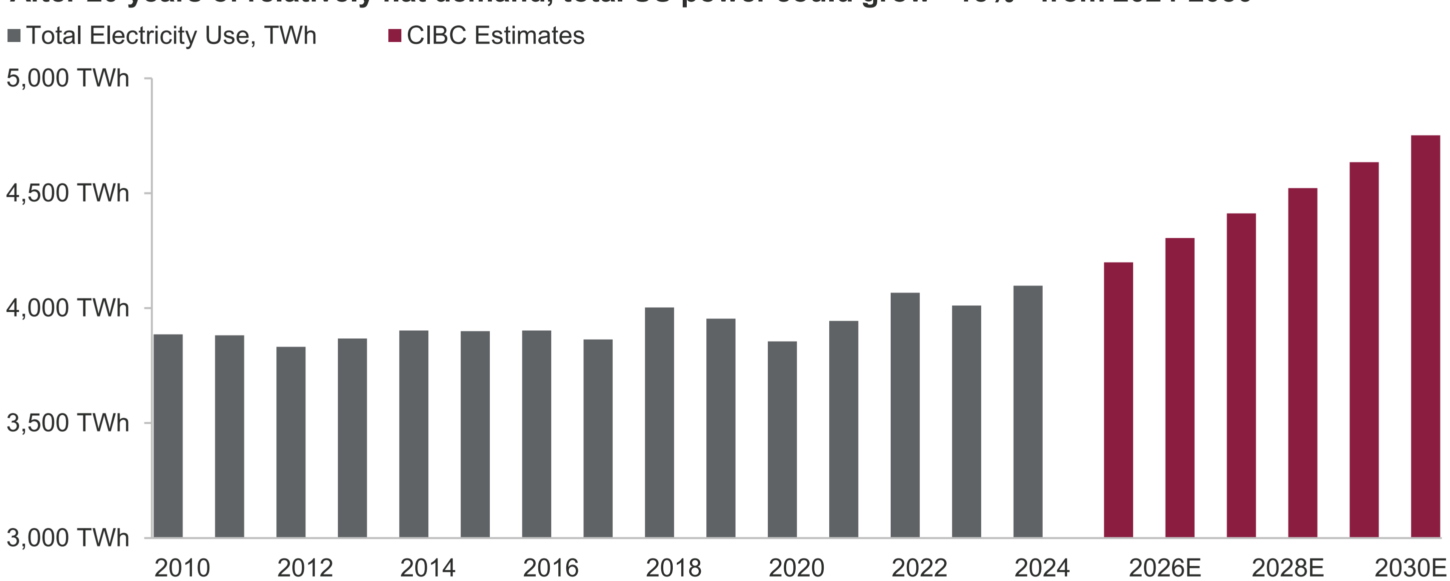
Structural power shift: The slumbering giant awakes

The North American power grid is one of the oldest and most complex machines in the world, but until recently, it was largely taken for granted. This power grid serves hundreds of millions of customers nearly 24/7/365 across millions of miles of power lines, linked by a varied web of physical infrastructure ranging from a simple home outlet to massive multibillion-dollar power plants underlying the largest economy in the world.

A look at the history of our infrastructure could help put today's power needs in context. Following World War II, the US power sector was the story of US industrial expansion. Between 1949 and 2000, total electricity use grew at a compound annualized growth rate of 4.6%, increasing from approximately 255 terawatt hours (TWh) in 1949 to approximately 3,600 TWh in 2000. (A terawatt is a unit of power equal to one trillion watts; a TWh is the equivalent of powering roughly 100 million homes for one hour.) Growth ground to a halt for the next 20 years as efficiency gains offset economic growth. In 2019, total US power use was approximately 3,900 TWh, an annual growth rate of less than 0.5% since 2000. In the intervening years, fewer power plants were built, the grid continued to get older, and commodity prices tied to power largely languished.

Exhibit 1: Powering up—US electricity growth poised to inflect

After 20 years of relatively flat demand, total US power could grow ~15%+ from 2024-2030



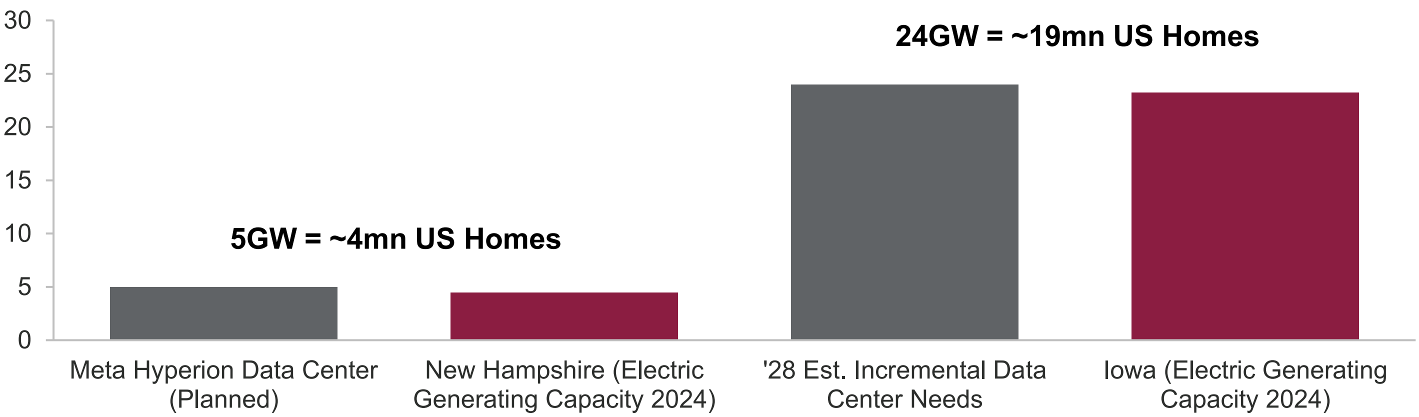
Source: EIA, CIBC estimates. TWh = Terawatt-hour.

Artificial Intelligence: Electric behemoths

All that changed in late 2022 with the release of OpenAI's ChatGPT. Even as electric vehicles, electrification of industry, demographics and reindustrialization were starting to breathe life into the electric sector, it was the proliferation of AI that supercharged growth. While news of massive demand for advanced semiconductors and AI products dominates the news cycle, it is the lowly electron that will increasingly steer the new industrial age of AI. Without electricity, there is no AI, and decades of under-investment in the power sector has created a brewing storm.

Nonetheless, electricity is such a core lifeblood of AI that some of the largest companies in the world—hyperscalers like Microsoft, Amazon, Meta and Alphabet—are already committing billions of dollars to lock up power supply for decades at a time. Data centers must have access to 24/7 power at city-scale, and power needs are now the primary measure of data center size. Consider that a 1 gigawatt (GW) power plant (think of a nuclear or large natural gas plant) can power approximately 800,000 US homes, but single data center announcements are routinely eclipsing this: Meta's Hyperion data center complex alone is targeting an eventual 5 GW need, and analysts expect annual needs for incremental US data center power could soon eclipse 20 GW-plus per year in the US alone by the end of the decade. Absent immense efficiency improvements or a collapse in funding, this number is only expected to grow.

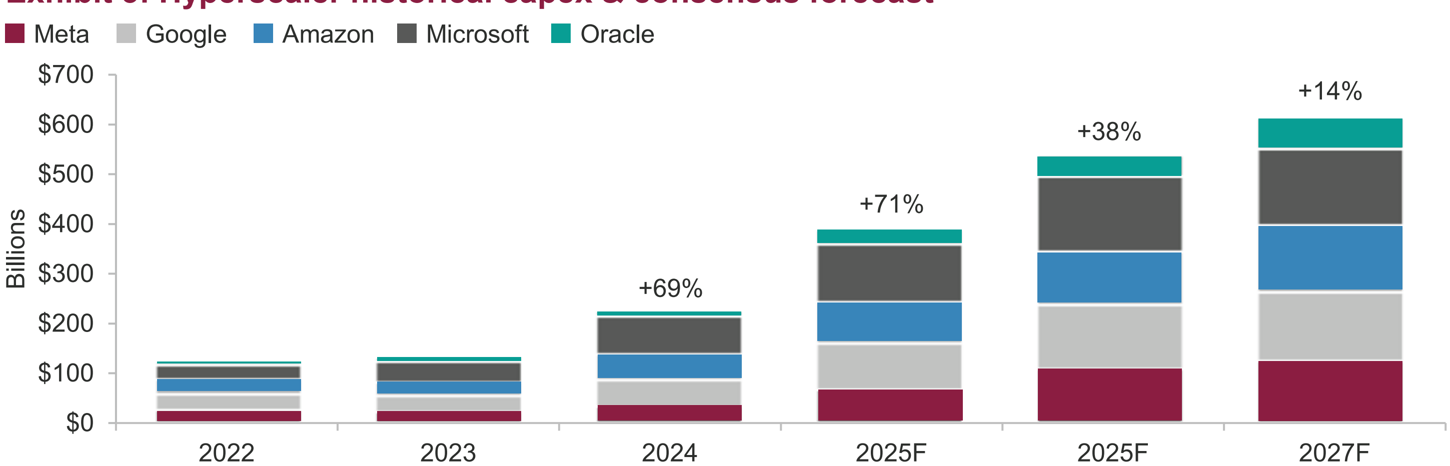
Exhibit 2: Data Center needs could power millions of US homes



Source: EIA, META, Morgan Stanley ('28 data center needs estimate.), CIBC (households estimates).

Hyperscalers continue to raise their capital expenditure (capex) expectations, driven largely by spending on AI data centers. All-in capital costs for power only represent around 10%-15% of the total build cost for a large data center.[2] Given the level of spending by hyperscalers on data centers and the importance of securing reliable power, they are relatively insensitive to price in order to maximize speed to market.

Exhibit 3: Hyperscaler historical capex & consensus forecast



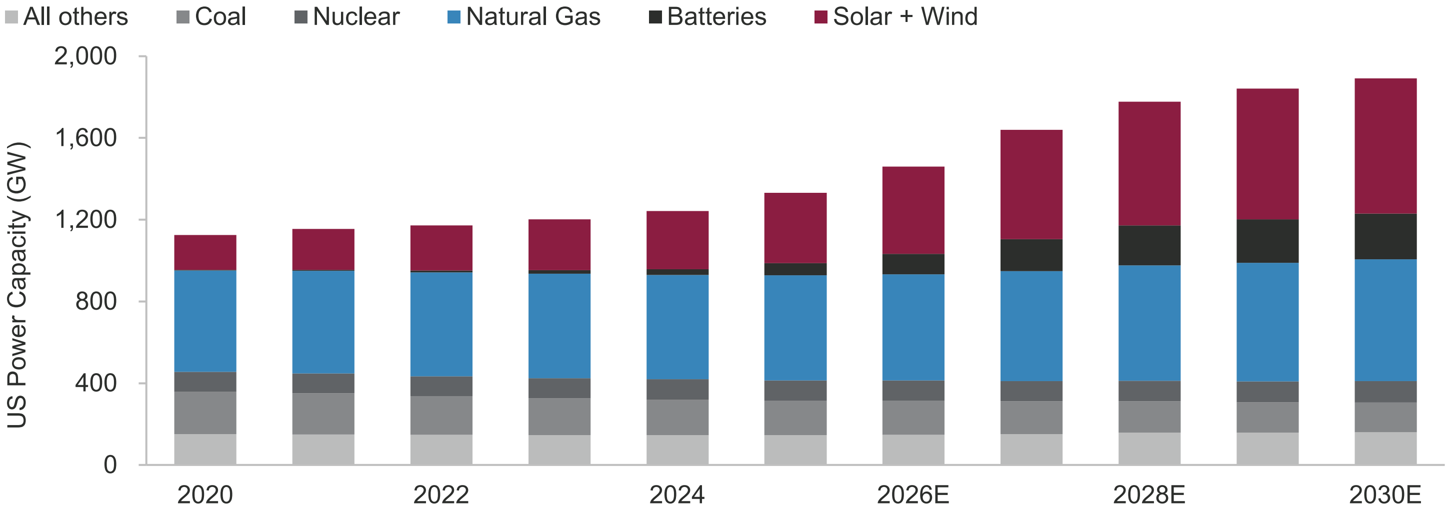
Source: Barclays, as of November 2025.

Power Additions: Renewables dominate…for now

While hyperscalers continue to spend hundreds of billions of dollars per year on data centers, we expect the physical limits of power to increasingly clash with the unprecedented desire to build data centers. Building power plants has many practical limitations: the complex regulatory and permitting environment, the availability of labor and equipment, and the construction timeline (typically several years). Despite political rhetoric to the contrary, renewables and storage are the fastest to market. We therefore estimate over 80% of planned future power additions on the US grid over the remainder of this decade will be intermittent renewables and batteries. In 2024, corporate power purchase agreements totaled 26.4 GW for renewables, and approximately 70% of those were from hyperscalers.[3] While current announced plants still heavily favor renewables and batteries, we expect natural gas to play an increasingly important role in future power capacity growth over the intermediate term.

Exhibit 4: Historic / future planned power capacity additions

Mostly renewables, but gas is coming

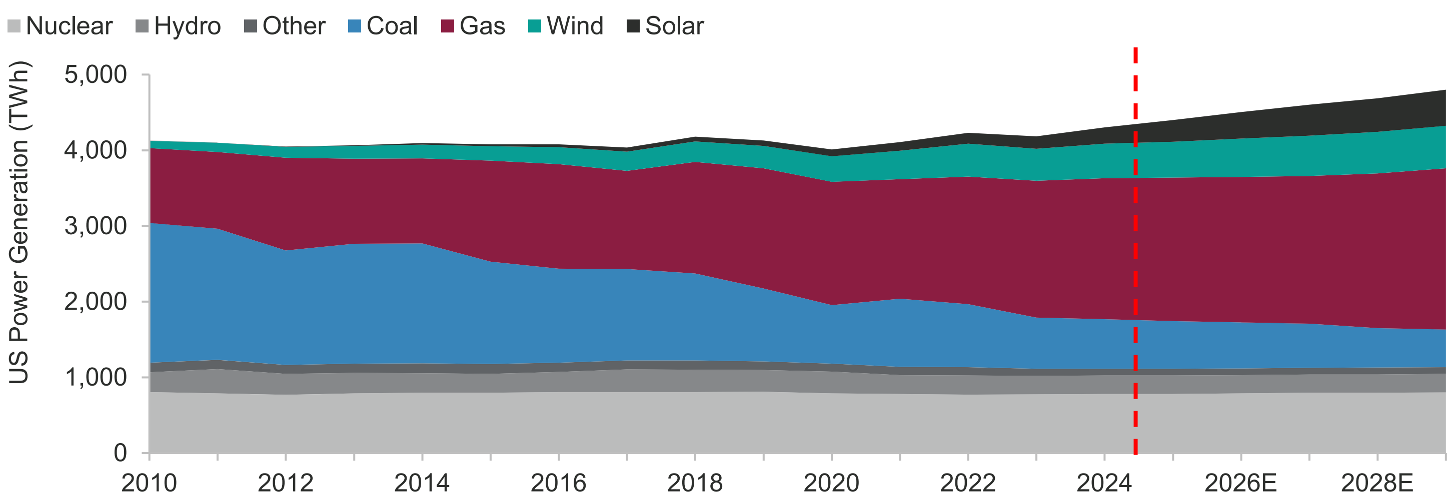


Source: S&P Capital IQ, as of July 2025

Given varying net capacity additions and utilization rates by technology type, the actual amount of electricity generated significantly shifted over the past decade as natural gas and renewables have displaced coal. That shift is expected to continue into the visible future as more renewables and natural gas generation capacity get added to the grid. Looking beyond the decade, nuclear could start to contribute more meaningfully as regulatory support and technology progress.

Exhibit 5: Historic / future planned power generation

Renewables + Gas Growth

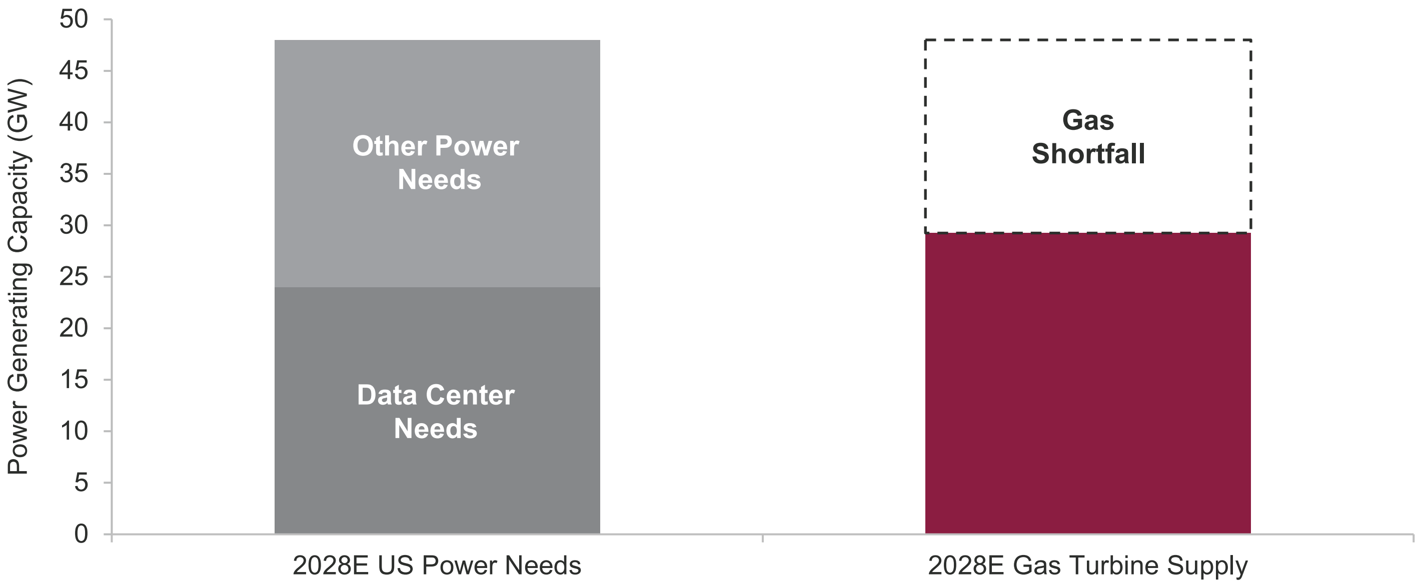


Source: EIA (historical data), Wolfe Research and CIBC estimates.

High tension: The limits of gas (and nuclear)

While hyperscalers generally claim to maintain their environmental targets and are by far the heaviest corporate purchasers of renewables, there is a tension between power intermittency and the large weighting of renewables in recent and future power capacity build. Data centers need 24/7 power that can most efficiently be served long term by connecting to the power grid, which will require significant investments in natural gas power plants, and in the future, nuclear. While renewables and batteries can be built sooner to help address power needs, hyperscalers and utilities are rapidly attempting to add baseload power—largely gas plants—as fast as possible. However, acquiring a gas turbine today can easily be a three-year wait, and there simply aren't enough gas turbines in production to meet this rapid increase in demand.

Exhibit 6: Gas turbines alone cannot meet demand



Source: Morgan Stanley and CIBC estimates

As shown above, estimates of future gas turbine supply in the US will be unlikely to keep up with demand. Renewables, batteries and on-site generation (e.g. diesel generators, mobile gas units, fuel cells) will fill some of that gap, but the need for 24/7 power will likely keep demand for gas turbines elevated.

One other area of emerging focus is nuclear. However, given the very long development timelines and enormous costs, the US has only completed construction of one nuclear plant since 2016. The 2.2GW Vogtle plant in Georgia came online recently after over a decade of construction at a cost of over $35 billion dollars.[4] While the next reactors could see some cost efficiencies, the most optimistic timelines for new large nuclear reactors would place power coming online in six to eight years (the typical timeline for China, which is building many). Similarly, the small modular reactors (SMRs) that get a lot of attention are likely at least five years away from any large-scale deployment and will be slow to proliferate and reduce costs in our view. In the near-to-medium term, we expect gas, solar and batteries to dominate power plant additions in the US—the timelines for anything else impactful are well into the 2030s.

We will continue to monitor and keep you apprised of the evolving impact of artificial intelligence on US power demand. If you have any questions, please contact a member of your CIBC Private Wealth team.

1. https://www.eia.gov/electricity/sales_revenue_price/
2. Bernstein AI Value Chain.
3. BNEF 1H'25 Corporate Energy Outlook, figure 13.
4. https://en.wikipedia.org/wiki/Vogtle_Electric_Generating_Plant