Hamm Institute for American Energy
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POWERING AI WITH AMERICAN ENERGY: NATURAL GAS

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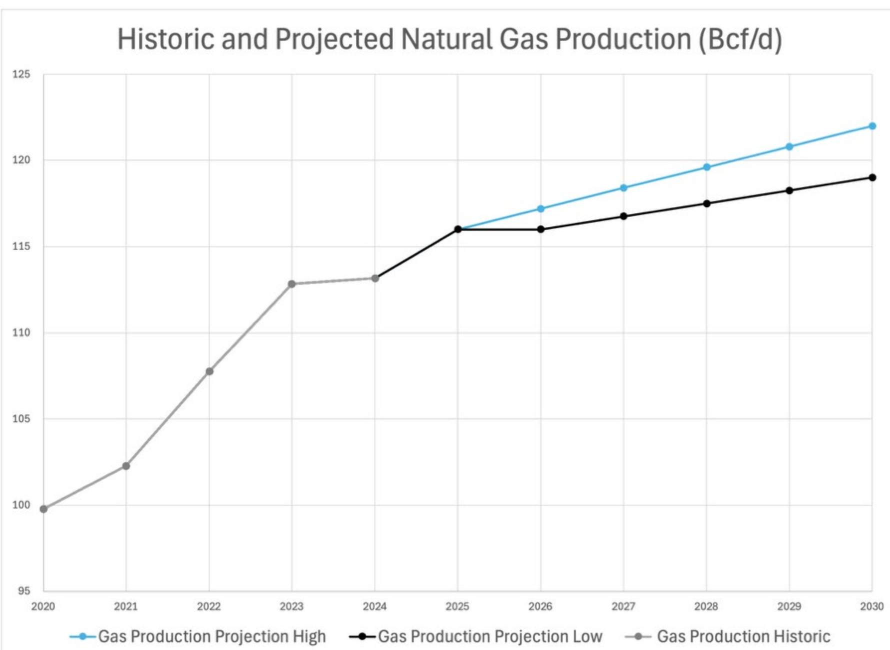
The rapid expansion of artificial intelligence, cloud computing, and digital infrastructure is driving an unprecedented increase in power demand from U.S. data centers. As renewable energy deployment struggles to keep pace, natural gas has emerged as the most reliable baseload energy source to meet this demand. Forecasts suggest that natural gas consumption will rise by 3 to 6.1 billion cubic feet per day (Bcf/d) by 2030, accounting for up to a 6% increase in national production and a 15% rise in power-sector usage. However, bringing new natural gas plants online faces significant challenges, including pipeline constraints, interconnection bottlenecks, and supply chain disruptions. Understanding these trends is essential for policymakers, utilities, and energy developers navigating the expansion of power generation to secure American energy and AI innovation.

U.S. Electricity Production

U.S. power consumption will hit record highs in 2025 and 2026, the U.S. Energy Information Administration (EIA) stated in its short-term energy outlook on Tuesday July 8, 2025. The EIA projected power demand will rise to 4,189 billion kilowatt hours (kWh) in 2025 and 4,278 billion kWh in 2026, up from a record 4,097 billion kWh in 2024. The energy mix in the United States varies greatly by region, but overall, 42% natural gas was the single largest fuel source.[1] Other major sources: Coal (~16%), Nuclear (~19%), Renewables (wind, solar, hydro) (~21%). The EIA forecasts continued reliance on natural gas through 2030.



U.S. Natural Gas Production

Marketed natural gas production averaged 116.8 billion cubic feet per day (Bcf/d) in 2Q25, a 4.7 Bcf/d increase compared with the same period in 2024. The EIA expects production to remain near this level through 2026, averaging around 116 Bcf/d in both 2025 and 2026.

[1] https://www.eia.gov/outlooks/steo/

U.S. Data Center Demand

The total data center electricity usage climbed from 58 terawatt-hours (TWh) in 2014 to 176 TWh in 2023 and is estimated to increase between 325 to 580 TWh by 2028.[2] In 2022, U.S. data centers consumed approximately 200 TWh of electricity—roughly 4–5% of the total U.S. electricity use.[3] By 2030, that number could rise to 400–500 TWh annually, driven by rapid AI adoption, cloud services, and digital infrastructure expansion.[4] This level of energy use would exceed the electricity consumption of entire industrial sectors or small-to-mid-sized nations, putting substantial pressure on existing power generation and grid infrastructure. This alone could require dozens of new gas-fired plants, equivalent to powering 20–30 million additional homes.

Drivers for Natural Gas

Natural gas remains the preferred baseload energy source due to its reliability, relatively low emissions (vs. coal), and ease of dispatch compared to intermittent renewables. The U.S. power grid, especially in data center hotspots like Northern Virginia and Texas, is struggling to meet demand using renewables alone.[5] The U.S. natural gas delivery system is supported by an extensive pipeline network that spans more than 400,000 miles of gathering, interstate, and intrastate transmission lines. These pipelines serve as the critical link between supply basins and end-users, including power plants, industrial facilities, and residential consumers.[6]

According to the EIA, natural gas as a fuel for electricity generation has one of the lowest levelized costs of electricity (LCOE) for new dispatchable resources entering service in 2030.[7]

Consumption Projection

East Daley Analytics (EDA) forecasts an additional 4.2–6.1 billion cubic feet per day (Bcf/d) of gas demand by 2030, tied to approximately 81 gigawatts (GW) of new gas-fired power capacity for data centers.[8] Analysts from S&P Global project demand is as high as 3 Bcf/d, with upside to 6 Bcf/d depending on buildout success and policy alignment.

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[2] https://doi.org/10.71468/P1WC7Q
[3] https://www.eia.gov/todayinenergy/detail.php?id=65564
[4] https://www.iea.org/reports/energy-and-ai
[5] https://www.iea.org/reports/energy-and-ai
[6] https://www.phmsa.dot.gov/data-and-statistics/pipeline/annual-report-mileage-natural-gas-transmission-gathering-systems
[7] https://www.eia.gov/outlooks/aeo/
[8] https://eastdaley.com/the-burner-tip/data-centers-could-add-6-bcf-d-to-gas-demand-eda-forecast

Relative Impact of Data Center Demand:

An increase of 3–6.1 Bcf/d in natural gas demand would represent:

- 2.5%–5% increase in total U.S. gas production
- 7%–15% increase in power-sector natural gas consumption

Supply Challenges

Pipeline Constraints: In regions like the Northeast U.S., even approved plants face gas delivery issues due to infrastructure bottlenecks. In regions where large clusters of data centers are being built, this gas infrastructure is already under strain and building new pipelines could be a serious challenge.

Grid Interconnection Bottlenecks: Even when natural gas plants are fully permitted and ready to build, they often run into long delays trying to connect to the electrical grid. Before any new power plant can feed electricity into the system, it must go through an interconnection study, a detailed engineering analysis conducted by regional grid operators to ensure safety and reliability. Historically, the Pennsylvania-New Jersey-Maryland Interconnection (PJM), the largest grid operator in the U.S., has been a slow actor, often taking between 3 to 5 years or more to complete such studies. The backlog has been so large that many projects recently entering the queue are unlikely to be connected before the end of the decade. These kinds of delays make it much harder to bring on the new generation capacity needed to meet growing electricity demand from data centers and other sources.[9] There have been recent efforts by policy makers to address these issues and streamline the process to pave the way for speed to power.

Supply Chain Constraints: GE Vernova says it has a 29 GW backlog of turbine orders and 21 GW of earlier-stage "slot reservation" agreements. Of those 21 GW, only about one-third are "aligned" with data centers, the company has said. It's booking turbine orders for 2028 and 2029, with 2026 and 2027 largely sold out.[10] “Transformer lead times have been increasing for the last 2 years - from around 50 weeks in 2021, to 120 weeks on average in 2024. Large transformers, both substation power and generator step-up (GSU) transformers, have lead times ranging from 80 to 210 weeks, and some manufacturers have already announced plans to expand capacity to meet growing demand.”[11]

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[9] https://www.pjm.com/pjmfiles/pub/planning/project-queues/impact_studies/AD2189_imp.pdf
[10] https://www.axios.com/2025/05/23/ge-vernova-ai-gas-turbine-demand
[11] https://www.woodmac.com/news/opinion/supply-shortages-and-an-inflexible-market-give-rise-to-high-power-transformer-lead-times/