What's Fueling the Artificial Intelligence Boom?

Tortoise

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Artificial Intelligence (AI) is rapidly transforming industries, and as this trend accelerates, power-hungry data centers will play a crucial role in its advancement. This paper explores AI's increasing electricity demands and how the energy infrastructure sector, particularly natural gas, is equipped to meet this challenge.

Data Centers: The Backbone of AI

Data centers are the computational workhorses of AI, providing critical resources for complex algorithms and machine learning models. Their power consumption is driven by:

- **Increasing Number and Size:** More and larger data centers are being built, consuming more electricity.
- **Advanced Hardware:** The rapid adoption of AI is driven by increasingly powerful chips, as central processing units (CPUs) now incorporate graphics processing units (GPUs). This advancement significantly increases electricity demands per server; and consequently, the combination of larger data centers and more advanced chip technology is expected to drive unprecedented electricity demand growth in certain regions of the U.S..

Surging Electricity Demand from AI

The expansion and increasing power needs of data centers are driving significant growth in electricity demand:

- **Projected Growth:** McKinsey estimates a 9% annual increase in data center electricity consumption, reaching 35 gigawatts by 2030 (see above).
- **AI's Rising Share:** AI-related electricity consumption is expected to reach 7.5% of the U.S. total by 2030, up from 2.5% today.

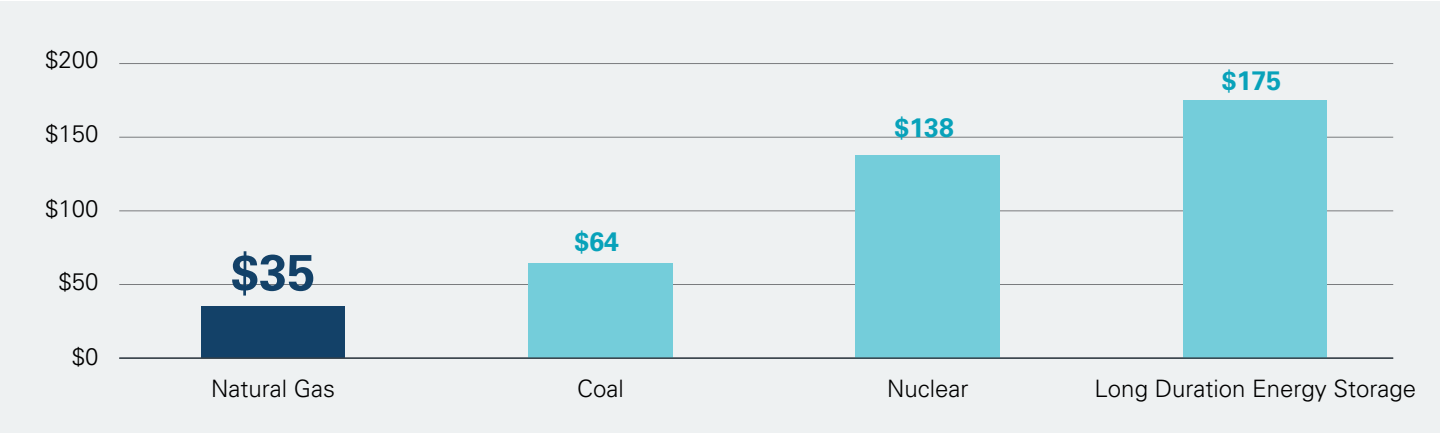
Energy Infrastructures: Bridging the Gap

The U.S. electric grid must adapt to meet these growing electricity demands. Key drivers of growth include:

- **Hyperscale Data Centers:** These massive facilities, which represent the pinnacle of AI's infrastructure needs, will be the top electricity consumers, necessitating reliable and secure power sources.
- **Tech Giants' Initiatives:** Companies like Amazon and Meta are securing reliable energy sources to support their evolving business needs in expanding AI operations.

Natural Gas: A Strategic Advantage for AI

Natural gas is a reliable and cost-effective fuel for data centers, offering key benefits:



Source: McKinsey & Company, September 2023 and Lazard LCOE study, April 2023

- **Reliability:** Unlike solar and wind, natural gas plants provide consistent electricity, essential for uninterrupted data center operations.
- **Cost-Effectiveness:** Natural gas offers lower fuel costs compared to other sources, reducing data center operational expenses (see above).

AI Boom is a Catalyst for Natural Gas

The power requirements of the AI boom present new growth opportunities for the natural gas industry:

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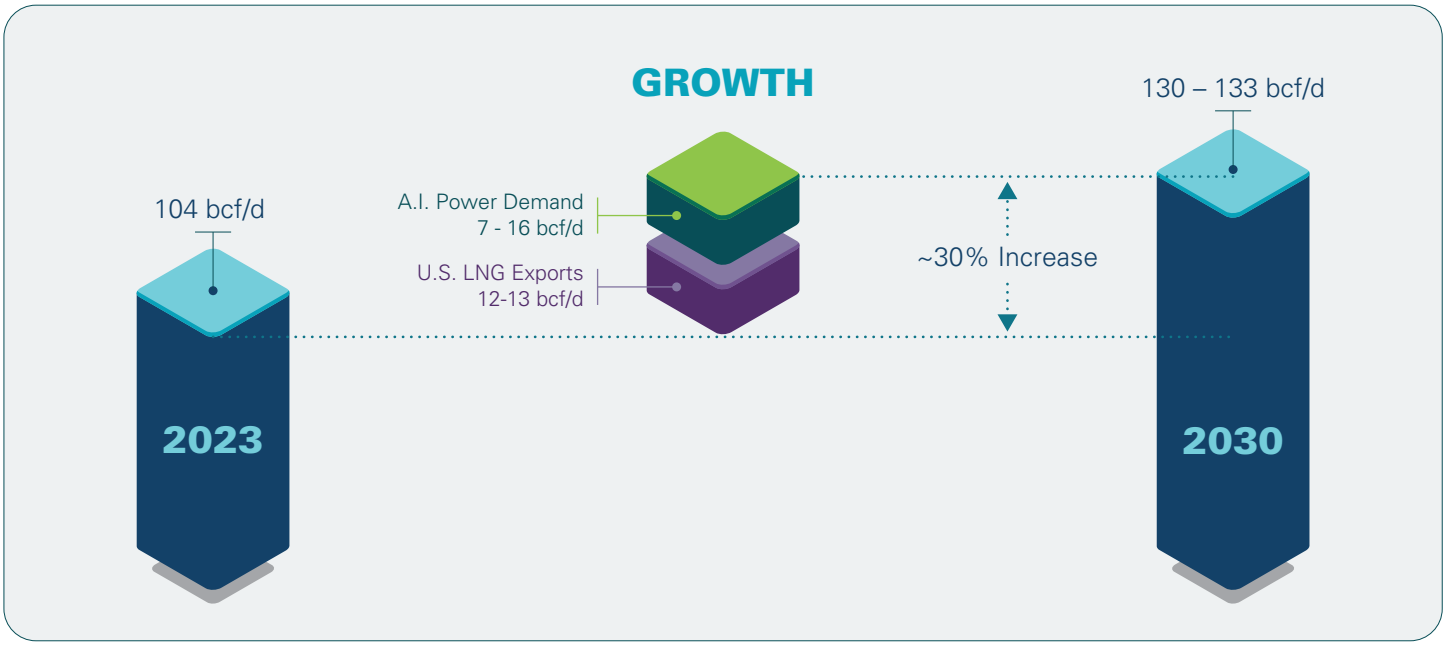

Source: EIA and Tortoise estimates. Projections on this page are shown for informational purposes only and no guarantee of future outcomes.

- **Production Increase:** U.S. natural gas production could rise by up to 30% by 2030 to meet AI-driven electricity demands.
- **Infrastructure Expansion:** Expanding pipelines and storage capacities is essential for the safe and cost-effective distribution of natural gas.

Bottom Line

The convergence of AI and energy infrastructure offers a unique opportunity. Natural gas, with its reliability and affordability, emerges as a strategic fuel source for powering AI advancements.

Full Paper Access

For a deeper dive into how the rise of AI is creating powerful tailwinds for natural gas, access the full research paper **here**.

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