

Perspective from
Franklin Equity Group

The nuclear option: How nuclear power helps solve the AI/energy gap

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As technology giants increasingly turn to nuclear energy to power the energy-intensive data centers essential for training and running today's advanced artificial intelligence (AI) models, the potential for expanded nuclear capacity is becoming more apparent. This shift could significantly transform the energy landscape, not only for the tech industry, but also for US businesses and manufacturing. Franklin Equity Group delves into the implications, challenges and opportunities of a potential nuclear renaissance in the United States.

Key takeaways:

- The AI revolution, with its potential to generate US\$2.6 trillion to US\$4.4 trillion in economic value annually, is driving a renewed interest in nuclear energy production.¹
- Tech companies are turning to nuclear power for its reliability and scalability, ensuring a stable energy supply to support AI technologies.
- While tech giants are leading the charge, increased investment in nuclear technology could have positive ripple effects across the broader industrial landscape.
- Recent DeepSeek news and the efficiency gains of the R1 model will likely further accelerate adoption of AI.

DeepSeek: Do compute efficiency gains revise energy demands?

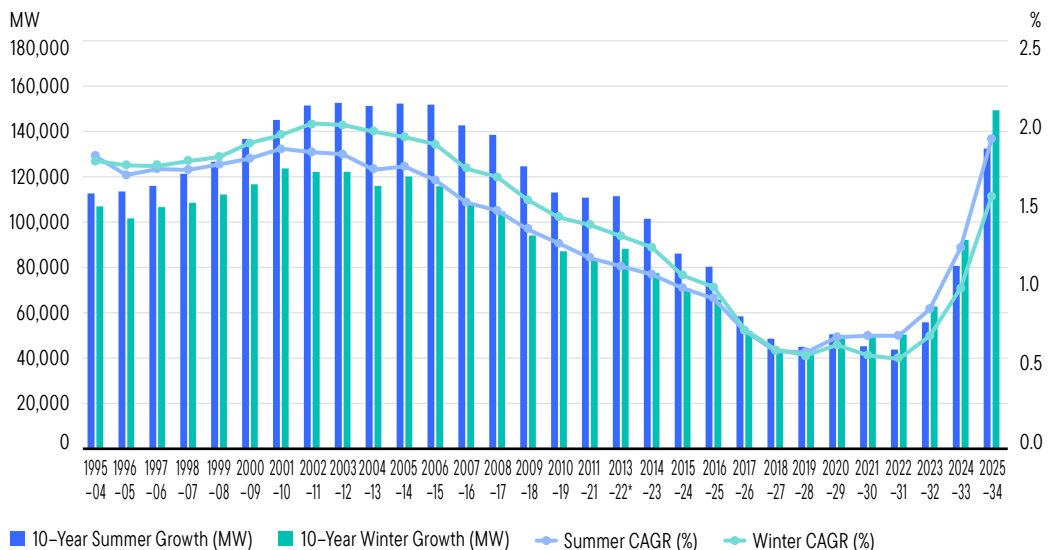
Recent announcements from China's DeepSeek lab touted substantial gains in compute efficiency in its R1 large language model (LLM). Although some initially questioned if these efficiency advances would rewrite the AI/energy equation, technology leaders remain committed to data center investments, appearing to leave the looming energy supply/demand gap unchanged. We believe Jevon's paradox will apply, and that the lower cost of compute will increase adoption demand for AI, which in turn, will ultimately drive energy needs even higher.

Further, we believe that the open-source nature of DeepSeek, along with its willingness to share architecture, weights and training data, will enable key techniques to be widely adopted across all AI models, leading to even greater breakthroughs in the future. Additionally, we think DeepSeek could serve as a wake-up call for our administration, highlighting that other countries are not lagging in AI development. This could accelerate regulatory changes and reduce the red tape that has historically made investing in nuclear energy challenging. Of course, we are constantly monitoring technological advancements in training and inference design, as well as in energy and storage, which could alter the energy usage dynamics of data centers.

The AI/energy equation

AI-driven energy demand, coupled with reshoring of US manufacturing and trends toward electric vehicles and homes, leads experts to estimate the average growth rate of energy consumption could jump to 1.5%-3.5% annually—a huge increase from its 20-year average of just 0.3% annual growth.²

Exhibit 1: Electricity Consumption Has Spiked due to Demand from AI Data Centers, Electrification Trends and Reshoring of US Manufacturing



* Prior to the 2011LTRA, the initial year of the 10-year assessment period is the report year (e.g., the 10-year assessment period for the 1990LTRA was 1990–1999). The 2011LTRA and subsequent LTRAs examine the initial year of the assessment period as one year out (e.g., the 10-year assessment period for the 2011LTRA is 2012–2023).

Source: NERC (North American Electric Reliability Corporation) 2024 Long Term Reliability Assessment. December 2024. There is no assurance that any estimate, forecast or projection will be realized.

Tech turns to nuclear to power AI

The immense energy required to train and run AI models far exceeds the current capacity of the US electrical grid. To ensure they meet AI business objectives, many tech leaders are turning to nuclear power.

Nuclear can offer several advantages compared to other energy sources:

- Nuclear is zero carbon emitting.
- Nuclear energy provides a more consistent and stable supply than other renewable sources like solar or wind, which is crucial for data centers training AI models.
- In some cases, small modular reactors (SMR) or other production facilities can be built in proximity and may not need to be connected to the grid, reducing transmission issues.

Hyperscalers embrace nuclear³

The following are just a few examples of major tech companies securing long-term deals for nuclear energy:

Microsoft

- Microsoft signed a signed a 20-year contract with Constellation to restart the Three Mile Island plant in Pennsylvania, which was closed in 2019.
- This project aims to bring 835 megawatts online by around 2028 (put in context, this is enough energy to power around 750,000 homes for a year).
- The recommissioning costs are approximately US\$1.6 billion, while the 20-year deal is valued at US\$16 billion.
- Analysts estimate a contract price over US\$100/megawatt-hour, representing a significant premium over market rates.

Amazon

- Amazon has agreements with Energy Northwest for a total capacity of 320 megawatts from four SMRs and with Dominion Energy to explore SMR development near an existing nuclear power plant in Virginia.
- Amazon acquired Talen's data center campus next to the Susquehanna Nuclear Plant for US\$650 million. (Although the Federal Energy Regulatory Commission [FERC] initially rejected a 180-megawatt electric service agreement to Amazon's data center due to grid stability concerns and the need for fair grid costs, the companies plan to submit a revised proposal.)

Google

- Google has agreed to purchase up to 500 megawatts of energy from Kairos SMRs starting in 2030.

Does this signal a nuclear renaissance?

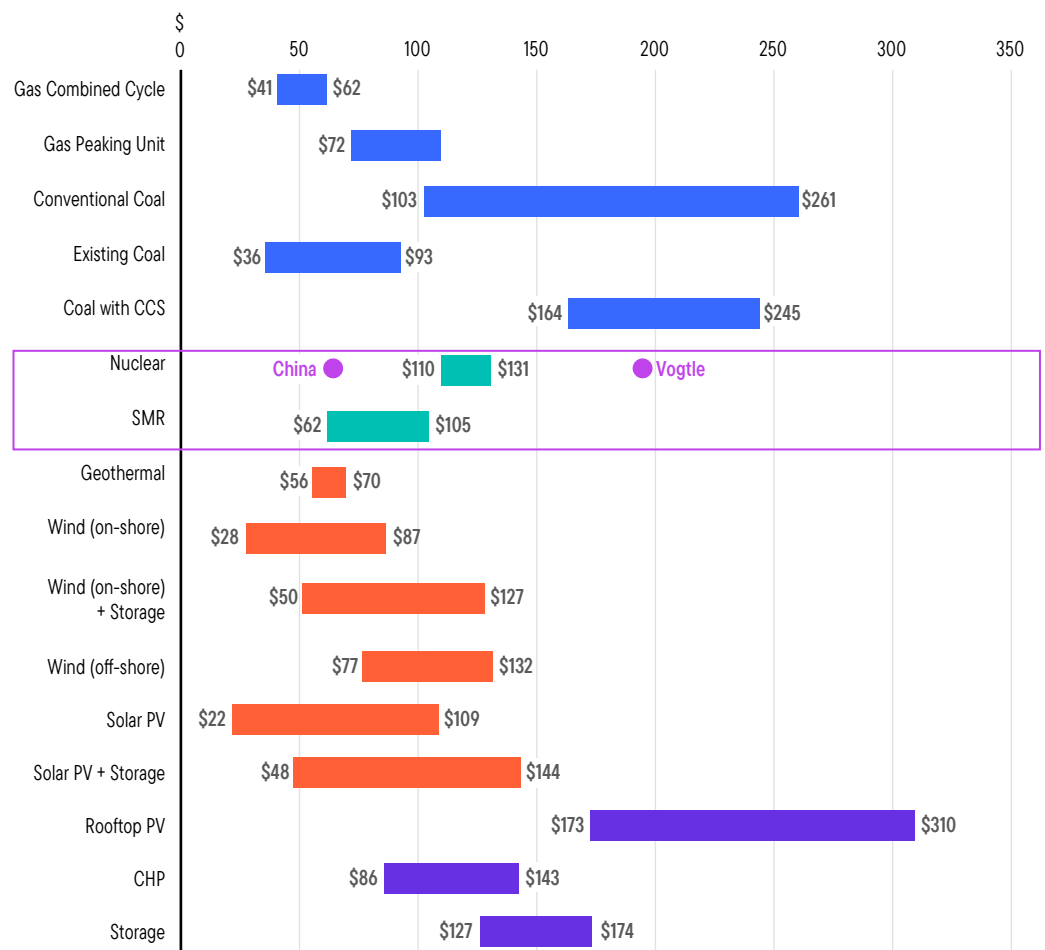
We believe the answer may be “yes.” While historical delays and cost overruns, such as the Vogtle nuclear power plant in Georgia (which cost double the initial estimate and took 14 years to complete), give critics reason to be skeptical, we see several compelling reasons for optimism that this shift can and will be achieved.⁴

- **AI as a catalyst:** The vast potential of AI could drive industry and government to align their efforts and provide motivation to overcome bottlenecks. Tech companies have both the will and financial resources to exert influence on the energy market.
- **The role of SMRs:** SMRs are poised to play a crucial role in future power supply. They offer greater flexibility and scalability compared to large-scale reactors, with lower costs, shorter construction times and advanced safety features.⁵ The cost to build a single SMR is estimated at US\$2 billion-\$3 billion versus US\$14 billion-\$30 billion for a large-scale nuclear reactor.⁶

- **Global competition:** With nuclear power costs in China and several other countries now below US levels, there is a strong incentive for the US government to act to remain competitive in the global energy market.
- **Trump administration support:** President Trump's newly appointed Energy Secretary Chris Wright has stated, "The long-awaited American nuclear renaissance must launch during the President Trump's administration. As global energy demand continues to grow, America must lead the commercialization of affordable and abundant nuclear energy. As such, the Department will work diligently and creatively to enable the rapid deployment and export of next- generation nuclear technology."⁷

While costs of nuclear in the US remain high relative to other energy sources, China has built cost-effective nuclear capacity. Identifying cost-effective nuclear solutions may be critical for the United States to remain competitive in the global energy market.

Exhibit 2: US Levelized Cost of Energy Analysis (US dollars/megawatt-hour)



Sources: Analysis by Franklin Templeton, Guggenheim, OurworldinData.

Potential signals of nuclear acceleration

Certainly, challenges remain to adding significant US nuclear capacity. However, we see five key changes that could signal nuclear power generation is poised to accelerate:

- 1. Changes in government regulations.** Current complex federal and state regulations make nuclear energy production challenging, costly and time-consuming. To expand capacity, we are watching for moves by the government to address and streamline commercial regulatory hurdles. We view the early comments from the Trump administration as encouraging signs of support for nuclear energy, which could help accelerate its adoption.
- 2. Development of nuclear waste solutions.** Expanding nuclear capacity will require a federal solution for nuclear waste storage. (States like California, Massachusetts and New Jersey have moratoriums on new nuclear construction until a federal solution is established.) We believe the US government can explore nuclear waste recycling, as practiced in the United Kingdom, France, Russia, Japan and China, as a potential solution.⁹
- 3. Continued corporate commitment to renewable energy.** We will be watching to see if tech companies remain committed to their sustainability goals (Microsoft aims to be carbon negative by 2030, Apple carbon neutral and Amazon net zero by 2040.¹⁰) and willing to pay a premium for renewable resources.
- 4. A shift in safety perceptions.** Although some experts now consider nuclear power among the safest sources of energy, comparable to solar and wind, public perception has not fully aligned with this view. We believe the breakdown of NIMBY (not in my backyard) attitudes and less resistance to new power supply construction is likely to coincide with more nuclear power being brought online.
- 5. Regulators efforts to balance consumer needs and data center demands.** Regulators must ensure sufficient power for both consumers and data centers, while managing the strains caused by data center and AI growth.

Conclusion

We believe nuclear energy will be crucial in meeting the rising domestic demand for electricity driven by AI and data center growth, reshoring, and a resurgence in US manufacturing and electrification across various industries. Although it is still early and challenges persist, we are confident that nuclear power will play a significant role in energy transformation over the next decade.

Endnotes

1. Source: "The economic potential of generative AI: the next productivity frontier." McKinsey Global Institute. June 14, 2023.
2. Source: "The era of flat power is over." Grid Strategies. December 2023. US Energy Information Administration.
3. Source: "Up 'n atom-Big tech spurring a nuclear investment cycle." TD Cowen. October 18, 2024.
4. Source: "Georgia nuclear rebirth arrives 7 years late, \$17B over cost." Associated Press. May 25, 2023.
5. Source: "Benefits of Small Modular Reactors (SMRs)." US Department of Energy.
6. Sources: "Amazon doubles down on nuclear energy deal with small reactors." The Washington Post. October 16, 2024. "Cost to Build a Nuclear Power Plant: 2023 Prices and Rates." The Cost Guys.
7. Source: National Review. "Chris Wright Makes Unleashing Nuclear Power Priority for American Energy Abundance." February 7, 2025.
8. Source: "What is a nuclear moratorium?" US Department of Energy. September 20, 2024.
9. Source: World Nuclear Waste Report and International Atomic Energy Agency.
10. Sources: Microsoft 2024 Environmental Sustainability Report. March 15, 2024. "Microsoft's carbon negative goals could push other tech companies to catch up." The Real Deal.

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