Nuclear energy rises again in the race for energy independence

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Key Takeaways

- Big tech companies including Microsoft, Google, and Amazon are investing in nuclear.
- Small modular reactors are revolutionising nuclear energy promising scalability.
- Nations are reigniting their nuclear ambitions as well, given rising energy needs.

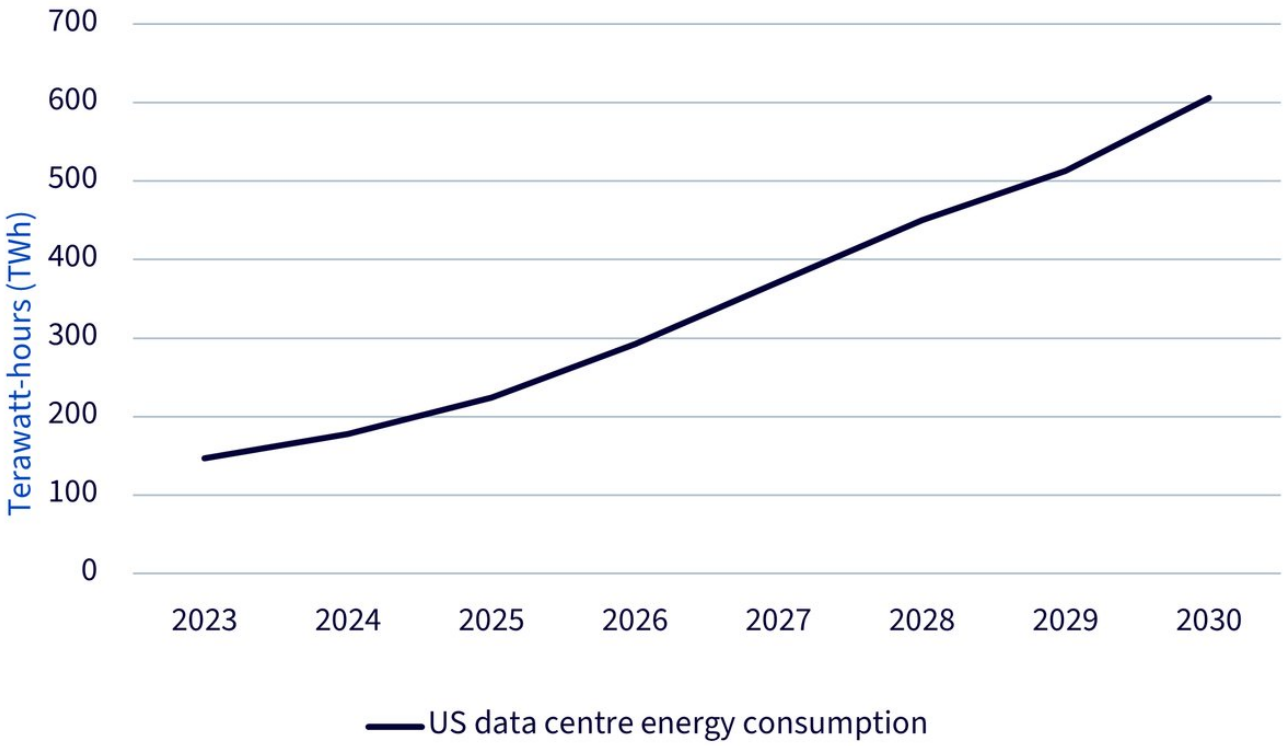
“The decision here is the most powerful symbol of the rebirth of nuclear power as a clean and reliable energy resource,” – Constellation Energy CEO Joe Dominguez, September 2024.

The decision in the quote above refers to the deal Microsoft has struck with Constellation Energy, the operator of the Three Mile Island nuclear plant, to restart operations and power the tech giant’s data centres. Constellation plans to bring back online its Unit 1 reactor, which ceased operations in 2019 when nuclear energy struggled to compete with natural gas and renewables. This so-called rebirth, expected to see the reactor operational by 2028, is significant not only because it reflects renewed confidence in nuclear energy’s economics but also a positive shift in sentiment and political will to restart a site associated with a past incident in a different reactor. The confidence in nuclear energy’s improved safety through technological progress, its economic viability, and its environmental credentials is growing as the world pursues energy independence to power energy-intensive technologies like artificial intelligence.

The world’s energy needs are rising rapidly

If a single ChatGPT query requires ten times as much energy as a Google search[1], and with the increasing number of devices making such artificial intelligence (AI) queries, global energy demand is poised to rise significantly. Data centres, which underpin technologies like AI, are power-hungry and are expected to see their energy needs increase swiftly. How the world meets these energy needs will be one of the most compelling themes for the rest of this decade and beyond.

Figure 1: Data centre power demand is expected to rise significantly in the US



Source: Global Energy Perspective 2023, McKinsey, October 18, 2023, McKinsey analysis. **Forecasts are not an indicator of future performance and any investments are subject to risks and uncertainties.**

Big tech is striking big deals

Microsoft is not alone. Other tech giants are also turning to nuclear. In October last year, Google announced a deal with Kairos Power to source multiple small modular reactors (SMRs), expected to be deployed between 2030 and 2035. According to Google, “this deal will enable up to 500 MW of new 24/7 carbon-free power to US electricity grids and help more communities benefit from clean and affordable nuclear power.”[2]

SMRs, with their modular design, offer several advantages: they are smaller, safer, and faster to deploy than traditional reactors, making nuclear energy more accessible and scalable.

Amazon, also in October last year, announced three agreements to source new SMRs, highlighting their commitment to achieving net-zero carbon despite growing energy needs. Amazon struck deals with Energy Northwest to develop four advanced SMRs in Washington, led a $500 million funding round for X-energy to scale SMR technology, and partnered with Dominion Energy to explore SMR projects in Virginia, all aimed at advancing carbon-free energy solutions for its data centres.[3]

Given that power outages in data centres would mean major disruptions to global tech services, the importance of uninterrupted power is increasingly critical. With SMRs deployable close to demand sources, nuclear energy is positioning itself not only as a carbon-free solution but also as a key enabler of energy independence, much like wind and solar.

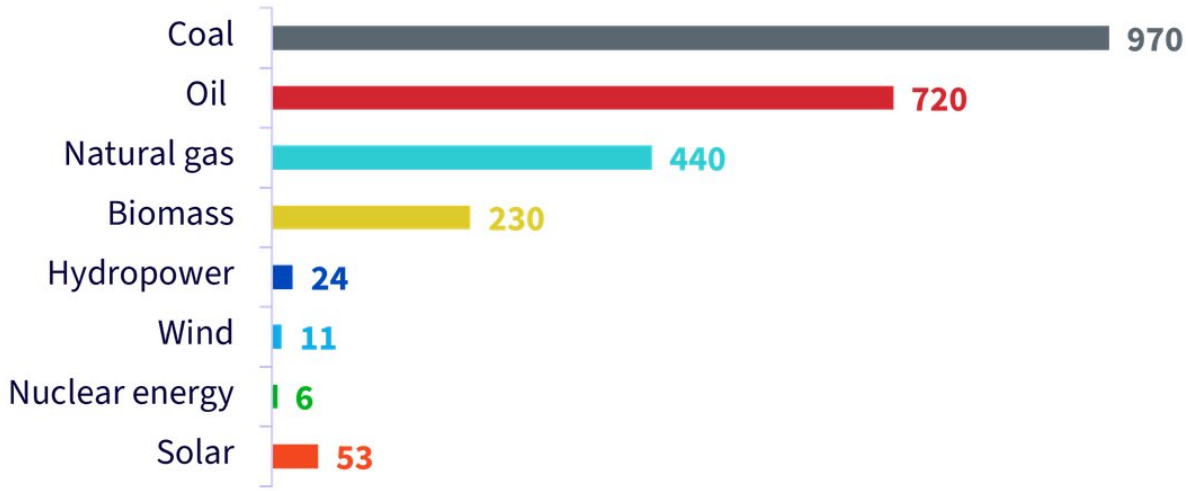
Countries are advancing their nuclear plans too

Europe learned valuable lessons from the 2022 gas price crunch when it scrambled to reduce its reliance on Russian gas. In February 2022, President Emmanuel Macron announced plans to construct six new nuclear reactors and consider building an additional eight over the next 30 years, aiming to bolster France's energy independence and reduce carbon emissions.[4]

In the United Kingdom, the proposed Sizewell C nuclear power station is set to generate low-carbon electricity for approximately six million homes, supporting the nation's transition to net-zero emissions. The project is also expected to support 70,000 jobs across the UK and engage over 2,000 UK-based suppliers.[5]

Nuclear energy's strong credentials in terms of low emissions and reliability are clearly encouraging both companies and countries to advance their plans.

Figure 2: Greenhouse gas emissions (in tonnes of CO2 equivalents per gigawatt-hour)



Source: Ourworldindata, Nuclear Energy, April 2024.

Conclusion

There is a clear upswing in sentiment towards nuclear power. The rapidly rising energy needs of pow-er-hungry technologies like AI and data centres seem to be the catalyst. Both companies and countries

are turning to sustainable and independent energy sources, and nuclear has firmly joined the ranks. As technologies like small modular reactors advance, we can expect more big headlines from big tech and beyond. Nuclear energy has arrived—and it's here to stay.

[1] International Energy Agency, 2024.
[2] Google, October 2024.
[3] Amazon, October 2024.
[4] World Nuclear Association, Jan 2025.
[5] Sizewell C, Jan 2025.

Important Risks Related to this Article

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