



Why nuclear power could be the answer to the big data question

Nuclear energy is poised to be a key answer to the power needs of data centers, offering clean, reliable, and scalable electricity to support the growth of the digital economy.

Key takeaways:

- Regulation, though relatively stable, has been criticized for not matching the pace of deployment for nuclear power
- There's white space for insurance to evolve: professional liability insurance at the design stage of nuclear projects; surety solutions for decommissioning at pre-licensing phase; and downstream risks associated with construction

- By engaging with insurance markets at early design stages, investing in risk engineering, and building insurance obligations into decision-making from the outset, nuclear projects can move forward with clarity

[In a recent article](#), Willis specialists examined the exponential growth of data centers, reporting that electricity consumption by data centers is set to double by 2030. Energy required for AI chip production soared by more than 350% worldwide between 2023 and 2024, and this trajectory is showing no sign of slowing.

Powerful AI supercomputers need powerful data centers, and a powerful solution for energy.

Nuclear power is on the table for big tech

Nuclear energy presents a highly reliable, low-carbon, and scalable power source to meet the rapidly increasing and continuous electricity demands of data centers. While it cannot be the sole solution — renewables, natural gas, and battery storage also play roles — nuclear is a critical component of a diversified energy strategy to sustainably power the future of data centers and AI infrastructure.

U.S. technology giants such as Microsoft, Google, and Amazon are big consumers of energy and are looking for ways to generate their own power. Investing in nuclear energy to power data centers is a gateway to securing clean, reliable electricity without intermittency issues associated with other clean technologies such as wind or solar.

Microsoft has signed power purchase agreements with nuclear plants such as [Three Mile Island Unit 1](#), and Amazon Web Services has contracted power from [Susquehanna nuclear plant](#).

For smaller technology companies at start-up or scale-up phases of development, securing capital is imperative for growth. While small/medium-sized companies may not have access to capital to invest in stable nuclear power,

large technology companies with robust balance sheets are willing to pay a premium for clean energy and expand portfolios to acquire new technologies – creating a dual incentive to invest in new technology companies. For privately owned nuclear companies dependent on private investment, the supply and demand dynamics of the digital economy is a prime opportunity for growth.

But there are barriers.

Barriers to nuclear project deployment

Regulation, though relatively stable, has been criticized for not matching the pace of deployment for nuclear power. [The State of Texas and a technology developer had filed a case against the federal government](#), claiming the regulatory body is moving too slowly and is inhibiting growth.

Inconsistency in regulation is another major barrier. At the moment, any country for deployment needs to have domestic licensing structures, but countries such as Poland do not currently have a regulatory body or liability regime for nuclear. The question of how to establish and build this expertise is looming over project development. While there are talks about reciprocal technology licensing agreements among various countries to help expedite deployment, reliability concerns are an issue.

Deploying a multi-billion and potentially risky project is a major decision for country officials, and maintaining control over the safety standards and checks is the priority. The challenges of reciprocal licensing agreements mean there's no feasible solution yet and countries remain challenged to establish their own nuclear regulatory bodies.

The way forward: Regulation as an enabler

While Canada hopes to have an operational [small modular reactor by 2026](#), the potential for cost overruns and project delays that have plagued the industry could push this date into the future. [Swathes of executive orders signed by the Trump administration](#) are overhauling regulatory body that license and oversee nuclear power plants – removing barriers for nuclear projects in the U.S., which is targeting deployments before the end of the decade.

The main driver? The race to become the global AI giant.

Meanwhile, [the Philippines and Vietnam](#) are starting to engage in due diligence to [explore nuclear](#). And in Eastern Europe where the Russia-Ukraine war has amplified issues associated with energy security, companies in countries such as Bulgaria and Poland are actively pursuing [gigawatt-scale nuclear projects](#) as a stable and reliable source of

power. These projects use known and proven gigawatt-scale technologies, which alleviate some of the burdens of new and prototypical projects.

There’s a need for insurance markets to innovate

Multi-year and multi-billion nuclear projects historically have gone overbudget and over deadlines. Currently, there’s not a suitable insurance mechanism to backstop this for investors and funders.

Gaps and exposures are emerging across the full project lifecycle.

Design stage:

Construction stage: Construction markets largely have appetite for nuclear projects, but 10-15 year projects don’t always align with insurer appetite or models. Cost overruns and project delays remain core risks, and there’s a growing trend of project owners taking control of the insurance program and using [Risk & Analytics](#). “Analyzing each and every insurance program for both insurable and uninsurable risks in a portfolio produces an optimal balance of risk transfer and risk. This can help companies build financial resilience against atypical and changing risks in the energy transition.” Aurelia Le Fosse, Associate



At the outset, we’re starting to see gaps emerging in professional liability for reactor design, which is not available in the market at all yet. A fault at the design stage can delay entire projects, creating long-tail financial stress. Alongside professional liability issues, individual projects now need their own decommissioning trust fund upfront, as mandated by regulators. In particular, start-up companies are unlikely to have the disposable capital to put up or the balance sheet strength or to secure a bond. It’s not an efficient use of capital, and a surety solution for decommissioning is a gap in the market for entities that don’t have robust balance sheets or existing revenue.



Kate Fowler, Global Head of Nuclear, Willis Natural Resources

Director, Strategic Risk Consulting, WTW Italy. Although construction markets are relatively open to nuclear projects, there’s still white space for innovation to cover downstream damages of faulty workmanship or parts.

When fuel is added to the reactor, construction policies exclude fire, lightning, explosion, aircraft impact and earthquake for the hot zone. This is a point when risks start to belong to nuclear specific markets rather than the traditional construction insurance panel.

Operational phase: Once fuel is added to the reactor and testing is complete – which can take upward of 9-12 months, depending on technology – the world has a handful of markets to cover nuclear risks. The U.S. has two – one for nuclear property and one for nuclear liability, the U.K. has a nuclear liability pool that covers property and liability, and one MGA, as well as two European nuclear mutuals, one each for property and liability. The big question is whether insurers will be able to match the pace and scale of change for operational nuclear when the switch is flipped to connect it to the grid.

Three key steps for nuclear projects

- Invest in risk engineering. Technologies such as AP1000 are known, but although AP300 uses similar principles, there are parts of it that will differ. Known technologies and known fuels may be used in a new configuration. There's a balance of technology aspects that are new and known, and risk engineering can apply rigor and data to delineate these risks and articulate clear risk information to underwriters.
- Engage with markets and bring insurers along on the journey. The worst-case scenario would be for a project to be designed and approved by regulators, only to be rejected or require modifications for risk mitigation by insurance markets due to decisions such as location, fire

protection designs, or other risk details. Bringing an advisor in early enables nuclear project owners to make informed decisions from the outset, knowing the limitations and support insurance markets can offer.

- Pay attention to nuclear insurance requirements. "It's not just like any other risk. In the U.S., it doesn't matter how big or small the reactor is, it's mandatory to buy \$1.06 billion in property insurance. In the U.K., £1.2 billion in nuclear liability cover is mandatory, again, agnostic of the size or scale of the project. Looking beyond the technology, to understand the legal insurance requirements is absolutely critical to build in these obligations into financial and operational planning."

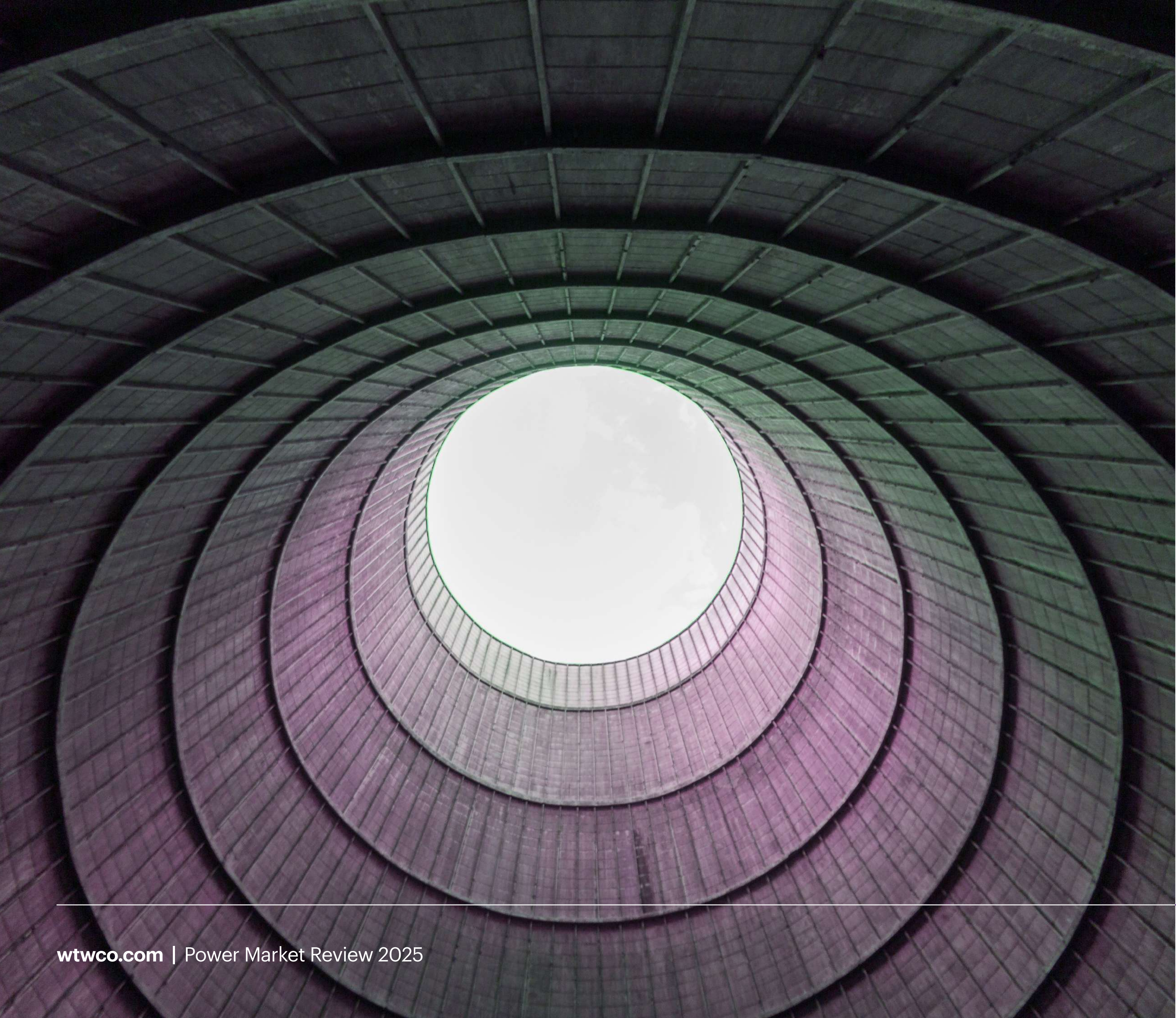
In looking ahead, there's potential for Jevons paradox to become a reality. When technological advancements make a resource more efficient to use, driving pricing down, the more popular it will become. For data centers, nuclear power could be this answer. But as demand for data continues to increase, the demand for power will continue to increase in parallel. "If data centers get more efficient, that doesn't mean we'll build less, it means we have an accelerated opportunity to build more" Kate Fowler.



Insurers are accustomed to a very modest number of new operational units each year given growth in the sector has been limited. With technology developers and power off takers communicating a desire to deploy potentially hundreds of technologies in the coming decade, volume of projects could become a challenge for the limited number of insurers in the market today. While it's not the elephant in front of them yet, it's coming.



Kate Fowler, Global Head of Nuclear, Willis Natural Resources



To find out how nuclear could answer the big data question, contact:



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