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POWER, RENEWABLES & ENERGY TRANSITION (PRET)

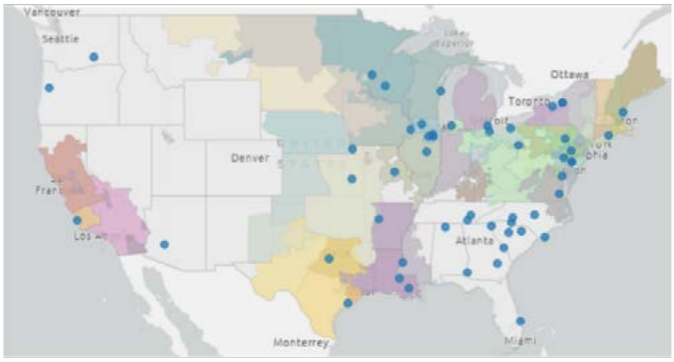
The Powerful Duo of Nuclear and Data Centers

Acute power shortages and mounting resource adequacy challenges have emerged as existential threats to the AI race. Hyperscale and colocation data centers — among the most energy-intensive digital infrastructures — depend on reliable, 24/7 electricity to sustain AI workloads and cloud computing. However, intermittent, non-dispatchable generation resources dominate the interconnection queues; power constraints stall data center deployment. Nuclear power, with its carbon-free, high-energy output, presents a compelling solution to alleviate the bottleneck. Large tech players and the nuclear industry have forged strategic alliances to move new nuclear projects forward. These partnerships represent a crucial down payment on building sustainable energy infrastructures capable of supporting AI growth. Experts at FTI Consulting have evaluated the collaboration models between these two sectors, including co-location strategies, which have gained momentum despite encountering pushbacks from market participants and regulatory bodies.

The Switch from Retirement to Restart

The U.S. leads the world in nuclear capacity, boasting approximately 102 gigawatts (GW) of installed capacity from 94 operational reactors across 28 states and different Regional Transmission Organizations (RTOs).[1] In recent years, the industry has undergone a remarkable turnaround, from a fight for survival to becoming a highly sought-after energy partner for data centers and other energy-intensive industries. This resurgence has reinvigorated a once-dwindling nuclear development pipeline. As of February 2025, FTI Consulting tracks more than 20 proposed nuclear projects, encompassing conventional nuclear restarts, next-generation small modular reactors (SMRs), advanced reactors, microreactors and pioneering fusion technologies.

Figure 1: Operating Nuclear Plants Across RTO Regions[2]



Between 2013 and 2022, the premature retirement of several nuclear reactors resulted in a loss of 9.6 GW capacity.[3] These closures were largely driven by economic pressures stemming from low natural gas prices, the declining cost of renewables, and flat electricity demand. Even with Zero-Emission Credit (ZEC) programs implemented in states like New York, Illinois, Connecticut, New Jersey and Ohio to compensate nuclear plants for their environmental and reliability attributes,[4] some facilities still faced financial challenges.

The U.S. nuclear industry is undergoing a historic revival marked by unprecedented efforts to restart shuttered reactors and significant investments aimed at bolstering clean energy capacity. Billions of dollars are being funneled into projects such as Michigan's 800-megawatt (MW) Palisades Nuclear Plant and Pennsylvania's 837-MW Three Mile Island Unit 1,[5] which are set to become the first retired reactors in the U.S. to resume operations.

The Palisades Nuclear Plant, which ceased operations in May 2022, could become the first restart by 2026 under the development of Holtec International and backed by billions in federal and state funding.[6] Similarly, Constellation Energy has committed a $1.6 billion investment to bring Three Mile Island Unit 1 back online by 2028, supported by a 20-year power purchase agreement (PPA) with Microsoft.[7] Meanwhile, NextEra Energy has filed a licensing change request with the Nuclear Regulatory Commission to recommission the Duane Arnold plant by late 2028.[8]

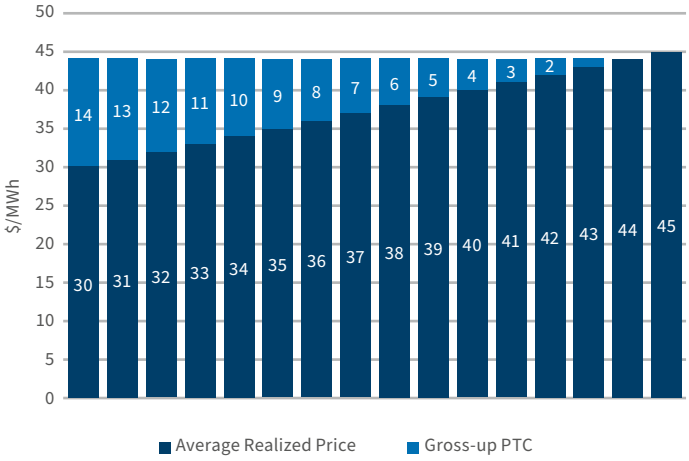
The Business Case for Merchant Nuclear Plants

In the U.S., approximately 61% of the operating nuclear capacity is under cost-of-serve regulation (COSR), a framework that allows utilities to recover costs and earn a regulated return on investment through approved rates. However, COSR capacity is unavailable to meet new demand from data centers, as it is already committed to serving regulated customers.

The remaining 41 GW of operating nuclear capacity consists of merchant plants operating in deregulated electricity markets. Unlike COSR facilities, these plants do not receive guaranteed cost recovery from state regulatory commissions. Instead, they rely on market-based revenues derived from energy sales, capacity payments (where applicable), and Emission-Free Energy Certificates (EFECs), which represent the zero-carbon attributes of the electricity. Major operators of merchant nuclear fleets, including Constellation Energy, Vistra Corp., NRG Energy and Public Service Enterprise Group Inc. (PSEG), manage most of this capacity in competitive markets.

Merchant nuclear plants benefit from greater operational flexibility compared to the plants under COSR. They can capitalize on price fluctuations by selling electricity directly into the spot market, with the federal Production Tax Credit (PTC) under Section 45U providing a financial backstop against market downturns through 2032. Figure 2 shows the inverse relationship of the 45U PTC and average realized energy prices, creating a de facto "revenue floor" for merchant nuclear during periods of low wholesale power prices. Additionally, these merchant plants can secure long-term PPAs as a financial hedge to mitigate market exposures. The federal 45Y PTC, a technology-neutral incentive, continues to provide vital support for new nuclear projects.

Figure 2: Relationship of 45U PTC and Wholesale Energy[9]



Merchant nuclear operators are now at the forefront of meeting the energy needs of the rapidly expanding data center sector while maximizing the value of their merchant nuclear fleet. As data centers compete to secure reliable, carbon-free power, hyperscalers have become recent preeminent off-takers for the limited uncontracted capacity from merchant nuclear plants. This uncontracted nuclear capacity has become the low-hanging fruit for targeted data center offtake deals, and the "race to contract" for the available nuclear MWs has become intense over the last 18 months. Further out, with a development and construction timetable of five to 10 years for any greenfield nuclear project, data center demand for baseload power in the intermediate term will most certainly turn to natural gas as the likely bridge solution.

The Demand Pull

The paradigm shifts in strategies for existing nuclear plants has coincided with a critical inflection point in power demand, driven by growth from AI and digital infrastructure, manufacturing onshoring, transportation electrification and the broader energy transition. This surge in demand has raised grid reliability concerns with projected shrinking reserve margins and a lack of dispatchable assets across several RTOs, including the Midcontinent Independent System Operator (MISO), Southwest Power Pool (SPP) and PJM. Similar challenges are evident in Independent System Operators (ISOs) such as the Electric Reliability Council of Texas (ERCOT) and the California Independent System Operator (CAISO).

FTI Consulting projects that with rapid adoption of GenAI, U.S. data centers could drive an incremental demand of 60–90 GW by 2030, recognizing that power constraints, GPU shortages and potential supply chain challenges (especially if recently introduced tariffs result in additional shortages of equipment needed to run data centers) could result in an extended timeframe for this projection. Regional electricity load forecasts have been significantly revised upward to reflect this growth, with ERCOT and PJM among the most affected markets. For example, ERCOT's 2024 forecast anticipates a 72% rise in peak load and an 87% increase in energy demand by 2030 compared to 2024, a sharp revision from its 2023 forecast. This surge is primarily attributed to data centers, alongside contributions from hydrogen production and industrial electrification.[10]

Figure 3: ERCOT Historical Load and Projected Growth[11]

PPAs and Co-location Strategies

As the grid faces resource adequacy risks, co-location strategies offer a promising pathway to expedite the interconnection of large loads, particularly in sectors where speed-to-market is a critical competitive advantage. By physically pairing large loads, such as data centers, with generation resources, co-location reduces reliance on lengthy and costly transmission upgrades and expedites project timelines. Meeting the unprecedented load growth requires a strategic and practical mix of grid-connected and direct-connected solutions.

Hyperscalers have utilized front-of-the-meter (FTM) and behind-the-meter (BTM) PPAs to secure power from nuclear facilities. FTM PPAs provide grid-connected power supply, ensuring broader access to electricity, while BTM PPAs facilitate direct power delivery to data center campuses physically connected to the generation source. This approach not only enhances efficiency (through interconnection queue avoidance) but also avoids costly and time-consuming transmission and/or distribution upgrades.

Microsoft's recently signed 20-year offtake agreement with Constellation Energy exemplifies an FTM PPA. Under the deal, Microsoft gains access to the output of the Crane Clean Energy Center to power its data centers in PJM. This agreement aligns with Microsoft's commitment to become carbon negative by 2030 and achieve 100% renewable energy matching by 2025.[12]

In contrast, Talen Energy's BTM PPA with Amazon Web Services (AWS) highlights both the benefits and challenges of co-location strategies. The agreement provides AWS with up to 960 MW of power directly connected to the Susquehanna Nuclear Plant in Pennsylvania.[13] Talen initially secured Federal Energy Regulatory Commission (FERC) approval for its existing 300 MW BTM PPA with AWS.[14] However, on November 1, 2024, FERC rejected an amended Interconnection Service Agreement (ISA)[15] that sought to expand the nuclear plant's co-located capacity from 300 MW to 480 MW. This decision halted the proposed expansion but left the original 300 MW co-location PPA agreement intact.

The growing trend of co-locating large loads at generation facilities has sparked significant debate. These arrangements offer hyperscalers and other energy-intensive industries the potential for accelerated and direct access to clean, reliable power. However, opponents raise concerns about grid reliability and cost equity, particularly regarding potential cost-shifting to other ratepayers. FERC's rejection of Talen's proposed expansion underscores the need for a

clear regulatory framework to balance direct energy delivery with grid management and cost distribution. As large loads increasingly pursue co-location strategies, resolving these regulatory hurdles is essential to ensuring grid reliability and affordability for all stakeholders.

The Strategic Imperative

Along with other large loads, the data center industry is driving a nuclear energy revival, tapping into conventional, SMR and advanced technologies to meet the skyrocketing demand while advancing decarbonization progress. These investments signal the tech sector's strong conviction in nuclear energy as a premium product and a cornerstone of its long-term, 24/7 carbon-free energy strategies. Much of its success will depend on moving technology costs from a First of a Kind (FOAK) to an Nth of a Kind (NOAK) as quickly and efficiently as possible – a paradigm which requires multiple commercial deployments of a new technology in order to achieve targeted long-term costs efficiencies.

Amazon has committed to deploying 5 GW of SMR capacity by 2039, with initial projects in Washington and Virginia. Its $500 million investment in X-energy supports reactor design, licensing and fuel production.[16] Similarly, Google has partnered with Kairos Power to develop up to seven SMRs, delivering 500 MW of carbon-free power by 2035.[17] Meanwhile, Oklo Inc., an advanced nuclear technology company, and Switch, a leader in AI and cloud data centers, have announced plans to deploy 12 GW of nuclear capacity by 2044.[18] These and many other commitments from the data center industry represent a crucial down payment to secure sustainable energy supply for the growing AI workloads.

The surge in private funding and long-term offtake agreements marks a transformative opportunity for early-stage nuclear projects. With robust private sector participation and much-needed federal/state policy support, these investments provide a blueprint for de-risking, financing and scaling game-changing clean energy solutions. The wave of collaboration between the tech and the energy sectors positions nuclear energy as both a strategic imperative and a competitive advantage for the data center industry in the AI race.

How We Can Help:

FTI Consulting's Power, Renewables & Energy Transition Practice ("PRET") offers a team of highly experienced economists, industry specialists, former utility executives, regulators and accountants to serve the regulatory and strategic needs of our power and utility clients. For data centers, investor-owned utilities, municipalities, cooperatives, developers or regulators, the PRET team provides our clients with holistic and actionable strategies, pertinent analysis, and approaches to compete across the energy value chain.

FTI Consulting's Data Center Practice is an industry leader offering an expansive suite of services to investors across the globe, including due diligence, financial advisory, capital raising, market assessments, strategy, merger integration and carve-out support, performance improvement, business transformation, and turnaround & restructuring. Our data center team has worked on dozens of recent North American M&A transactions, providing commercial, operational, technical, ESG and sustainability, Workplace Health Safety and Environmental (WHSE), financial, tax and cyber due diligence services with expertise across the colocation spectrum (retail, wholesale, hyperscale, edge, crypto mining, GPU cloud and carrier hotel segments).

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- Capital Markets Services
- Regulated and Unregulated Asset M&A
- Power Market Price Forecasts
- Safety and Reliability Compliance
- Financial and Operational Compliance
- Dispute and Expert Witness

LEAD AUTHOR

FENGRONG LI, CFA, CIRA
Managing Director
Power, Renewables & Energy Transition (PRET)
FTI Consulting
fengrong.li@fticonsulting.com

CONTRIBUTING AUTHORS

CHRIS POST
Senior Managing Director
Power, Renewables & Energy Transition (PRET)
FTI Consulting
chris.post@fticonsulting.com

LUKE BRALY
Managing Director
Telecom, Media & Technology
FTI Consulting
luke.braly@fticonsulting.com

LARRY STONE
Managing Director
Power, Renewables & Energy Transition (PRET)
FTI Consulting
larry.stone@fticonsulting.com

OTHER KEY CONTACTS

CHRISTOPHER R. LEWAND
Global Practice Leader
Power, Renewables & Energy Transition (PRET)
FTI Consulting
chris.lewand@fticonsulting.com

JUSTIN PUGH
Senior Managing Director
Power, Renewables & Energy Transition (PRET)
FTI Consulting
justin.pugh@fticonsulting.com

JOHN COCHRANE
Senior Managing Director
Power, Renewables & Energy Transition (PRET)
FTI Consulting
john.cochrane@fticonsulting.com

RJ ARSENAULT
Senior Managing Director
Power, Renewables & Energy Transition (PRET)
FTI Consulting
rj.arsenault@fticonsulting.com

BERTRAND TROIANO
Senior Managing Director
Power, Renewables & Energy Transition (PRET)
FTI Consulting
bertrand.troiano@fticonsulting.com

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