

US INVESTS IN NUCLEAR REVIVAL

AS DEMAND AND POLICY UNITE



INTRODUCTION

The U.S. nuclear industry is rebounding thanks to surging demand for power from data centers and electrification of transport and industry, alongside favorable policies from a Trump administration seeking to boost domestic energy generation and deregulate infrastructure investments.

The U.S. is the world's largest producer of nuclear power and its 94 online reactors accounted for nearly 19% of total national power output in 2023, making nuclear the largest source of low-carbon energy. The Three Mile Island nuclear accident in 1979 triggered a near halt in new construction for several decades but following strong demand for clean energy from AI and computing, the U.S. is set for a wave of new small modular reactors (SMRs) as well as larger conventional nuclear power plants.

At an energy summit with President Trump in July, Westinghouse announced a plan to deploy 10 new AP1000 reactors with construction to begin by 2030.

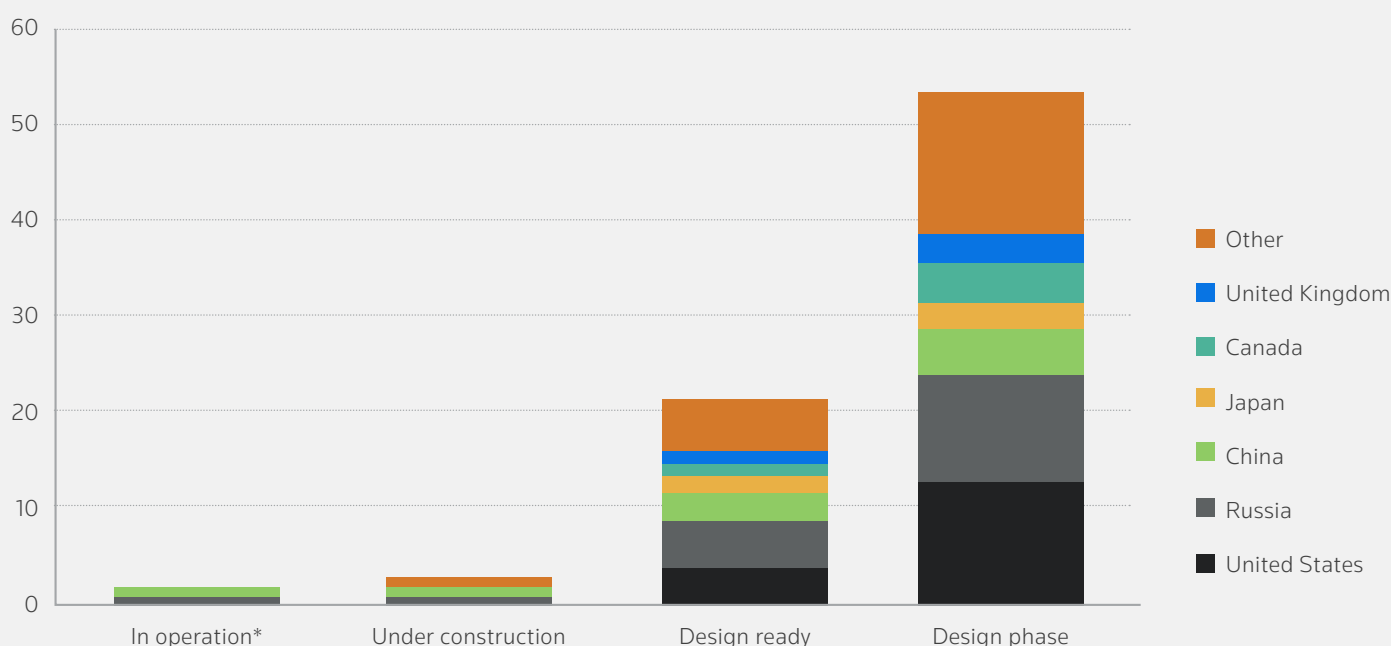
The Vogtle 3 and 4 AP1000 nuclear reactors in Georgia were brought online in 2023 and 2024. Construction was completed seven years behind schedule and costs more than doubled from the initial projection of \$14 billion, but their completion left behind a supply chain that could pave the way for new large reactors.

Westinghouse will also partner with Google Cloud to "accelerate the construction" of Westinghouse small modular reactors (SMRs) and "improve operations in our current nuclear fleet," it said.

Westinghouse's AP300 Small Modular Reactor (SMR) is a 300 MW modular version of the much larger AP1000.

Investors including Big Tech groups are pouring billions of dollars into developing SMRs, driven by surging demand for power and a need for dispatchable sources of energy. The modular build and deployment of small reactors promises lower upfront capital costs than conventional large reactors, as well as shorter construction times and greater flexibility in deployment.

SMALL MODULAR REACTOR PROJECTS BY COUNTRY



Source: International Energy Agency report 'Electricity 2024: Analysis and Forecast to 2026.'

In May 2025, President Trump issued several executive orders to usher in a “nuclear renaissance,” including a mandate that the Nuclear Regulatory Commission expedites (NRC) licensing for the construction of new nuclear reactors. Trump also mandated the Department of Energy (DOE) to develop at least three advanced nuclear reactors and devise a plan to boost domestic production of nuclear fuels. The government aims to expand U.S. nuclear energy capacity from around 100 GW today to 400 GW by 2050.

Historically, the nuclear industry has suffered from long timelines and cost overruns, but project partners say strong demand

for clean power from Big Tech companies such as Google, Amazon and Microsoft has increased appetite for nuclear construction and helped to derisk projects.

Power consumption by data centers is on track to account for almost half of the growth in U.S. electricity demand by 2030, the International Energy Agency (IEA) said in a special report in April 2025.

“The U.S. economy is set to consume more electricity in 2030 for processing data than for manufacturing all energy-intensive goods combined, including aluminum, steel, cement and chemicals,” it noted.



Image: REUTERS/Megan Varner

SMALL REACTORS ON THE WAY

SMR developers are looking to build their first full size reactors in the coming years and their deployment plans have been boosted by Big Tech companies seeking to secure steady supplies of clean energy for their sprawling data center infrastructure as well as efforts by the Trump administration to streamline permitting.

SMR developers say that modular reactor units can be deployed in line with data center expansions, making them a good fit for Big Tech as AI demand grows. A range of designs are being developed, from reactors based on existing light water reactor (LWR) technology to more advanced designs such as molten salt reactors (MSRs) and high temperature gas-cooled reactors (HTGRs).

In May, the NRC approved NuScale Power's 77 MWe SMR design, which increases the power output of the company's previously approved 50 MWe design. NuScale's design is based on LWR technology and was the first SMR to gain approval from the

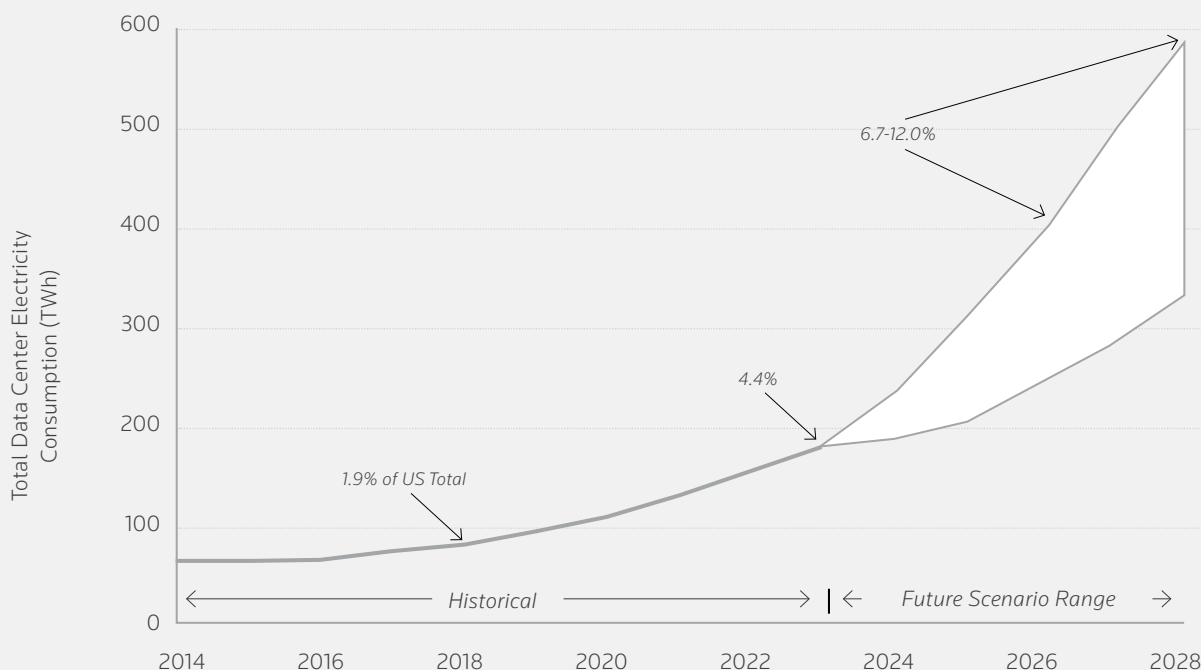
Nuclear Regulatory Commission (NRC).

"Large-load customers like hyperscale data centers need power solutions that are robust, reliable, and clean. The 77 MWe module is ideally suited for that profile. It allows customers to get more capacity from fewer modules, which improves both capital efficiency and operational simplicity," John Hopkins, President and CEO of NuScale Power, told Reuters Events.

In October 2023, NuScale announced an agreement with data center infrastructure developer Standard Power for 24 units of 77 MWe modules that would together provide 1.8 GW for two data centers in Ohio and Pennsylvania.

"In collaboration with our exclusive commercialization partner, ENTRAI Energy, we are in various stages of discussions with potential customers both here in the U.S. and abroad," Hopkins said.

FORECAST US DATA CENTER ELECTRICITY DEMAND



Source: Berkeley Lab's 2024 United States Data Center Energy Usage Report, December 2024.

Data centers are the greatest driver of demand for nuclear power, although sectors including transportation, domestic manufacturing and heavy industry are also seeking more clean energy, Hopkins said. Electricity demand from U.S. data centers is forecast to triple from 25 GW in 2024 to over 80 GW by 2030, requiring an investment of over \$500 billion in new power generation, according to McKinsey.

Because solar and wind are intermittent sources of energy, they cannot supply the needs of data centers, which require vast amounts of energy around the clock.

"While renewables are undoubtedly important to our clean energy future, nuclear, and specifically SMRs, are uniquely positioned to take the lead in powering these massive data centers," Hopkins said.

As a result, many SMR developers have secured funding or signed long-term power purchase agreements (PPAs) with Big Tech firms.

Google in October 2024 announced a PPA to secure 500 MW of carbon-free electricity by 2035 from SMR developer Kairos Power and in May 2025 said it will provide early-stage financing to developer Elementl Power to advance the development of three projects with a capacity of 600 MW each. Amazon has

signed a strategic partnership with Kairos and is an investor in the firm. Oracle in October 2024 said it was planning to build a GW-scale data center powered with a trio of SMRs but did not name its potential partners.

The strong synergy between Big Tech needs and SMR sizes is boosting investor interest in this technology.

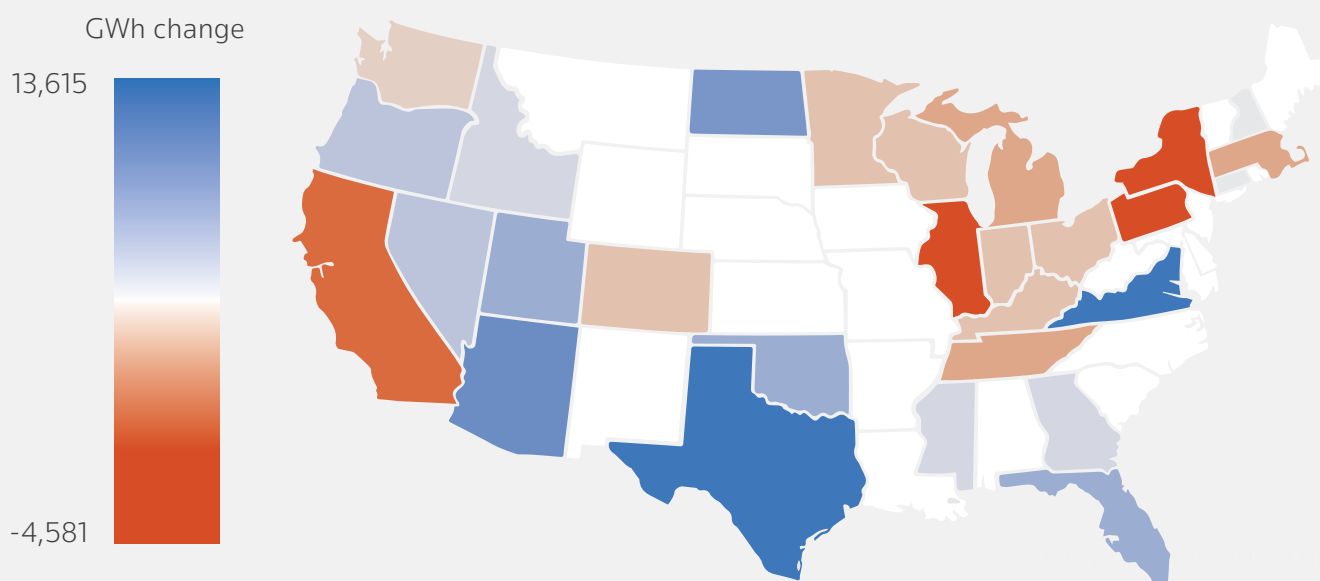
SMR developer TerraPower in June announced a \$650 million funding round with investments from NVentures, the venture capital arm of NVIDIA, and current investors, including TerraPower-founder Bill Gates and HD Hyundai.

"The increased interest in supporting advanced nuclear is great for the industry as a whole. It shows that investors recognize the important role advanced nuclear will play in addressing energy demand," said Chris Levesque, TerraPower President and CEO.

TerraPower's Natrium system stands out because its 345 MW reactor features an integrated 500 MW molten salt energy storage system.

"That flexibility allows for both in front of, and behind, the meter applications, and is a game-changer for utilities managing variable renewables and for data centers that need constant, reliable power," Levesque told Reuters Events.

U.S. STATES CHANGE IN COMMERCIAL SECTOR ELECTRICITY CONSUMPTION (2019-2023) *change in annual sales of electricity to commercial customers, gigawatthours (GWh)*



Source: U.S. Energy Information Administration, June 2024

SMR development is seeing strong policy tailwinds under Trump. In April 2025, the Department of Energy (DOE) designated 16 federal sites as potential locations for data center–energy hubs, which allows for expedited permitting and access to existing infrastructure.

“That kind of forward-looking action is helping nuclear gain momentum,” Hopkins noted.

In March, the Trump administration reissued a DOE tender for \$900 million in federal funding to help de-risk deployment of light water reactor SMR technology (Gen III+) and removed a previous requirement for community engagement, underlining their support for new nuclear.

The tender includes \$100 million to support the development chain for Gen III+ SMRs such as Westinghouse’s AP300, NuScale’s 77 MWe SMR and Holtec’s SMR-300. Through the DOE’s Advanced Reactor Demonstration Program (ARDP), the federal government has also signed public-private partnerships with X-energy and TerraPower to support first-of-a-kind (FOAK) nuclear technologies like SMRs.

“Cooperation between governments and the private sector help free-world companies overcome first-of-a-kind costs and compete against state-sponsored nuclear programs to demonstrate new technologies,” Levesque said, referring to efforts by China and Russia, which are channeling state funding to develop advanced nuclear reactor designs.



Image: REUTERS/Nathan Howard

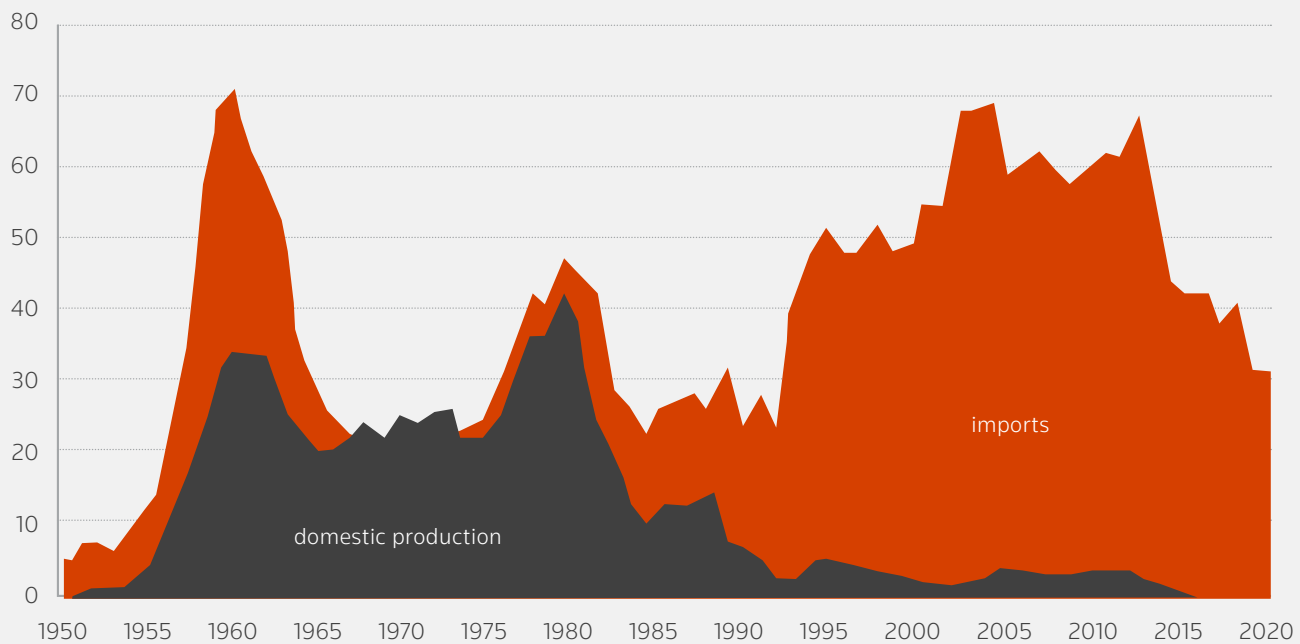
FUEL CHALLENGE

Most developers racing to deploy fleets of SMRs by the 2030s plan to use high-assay low-enriched uranium (HALEU), which is in short supply in the U.S. due to low domestic production capacity and a ban on imports from Russia, the world's largest supplier.

U.S. demand for HALEU could reach 50 metric tons per year by 2035, with additional amounts required each year, according to the DOE. Centrus Energy is currently the only U.S. maker of the fuel and has the capacity to produce 900 kilograms per year.

U.S. URANIUM SUPPLY TO COMMERCIAL NUCLEAR REACTORS (1950-2023)

million pounds U₃O₈



Source: U.S. Energy Information Administration (January 2025)

The DOE has committed to supply HALEU to five SMR developers – Westinghouse, Kairos Power, TerraPower, Radiant Industries and TRISO-X – to carry out their demonstrations projects but long-term supply will largely depend on federal efforts to expand production of nuclear fuels and will require hefty investments from the private sector.

The DOE in October 2024 awarded ten contracts with companies to provide enrichment services that will help

establish and build out a domestic supply of HALEU and low-enriched uranium (LEU), and for deconversion services.

“We feel confident that with our current arrangements with fuel suppliers, plus the domestic enrichment capabilities of DOE’s HALEU Availability Program that TerraPower is prioritized for, we will be able to fuel our Natrium reactor in Kemmerer, Wyoming and all future Natrium plants,” said Levesque.

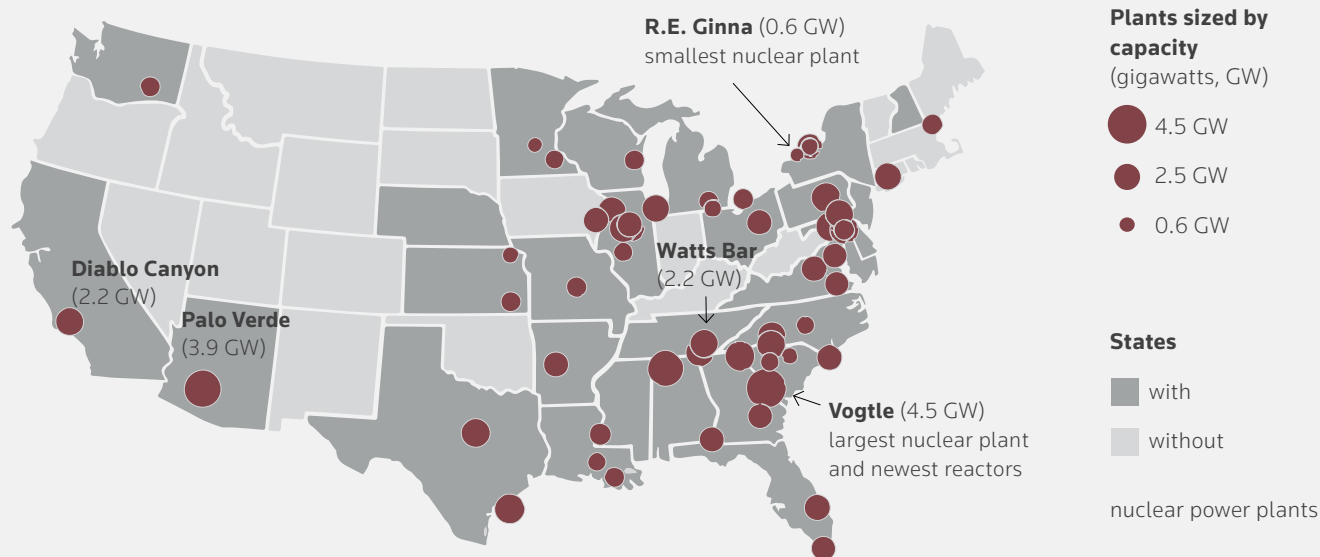
SECOND LIFE FOR REACTORS

As rising power demand improves the economics of nuclear, operators are also restarting shuttered plants and upgrading existing units to seize more revenue.

Restarting a mothballed nuclear power plant offers a faster

timeline and lower upfront costs than building a new one from scratch but is still an arduous process that would require several years for planning, licensing, inspections, equipment purchases, refurbishment, workforce training and fuel management actions.

US NUCLEAR POWER PLANTS IN OPERATION



Source: U.S. Energy Information Administration, February 2025.

Holtec International is on track to restart the 800 MW Palisades Nuclear Plant in Michigan this year, a project announced in the summer of 2022. Holtec is also seeking to install two SMR-300 reactors in a partnership with Hyundai Engineering & Construction at Palisades, as part of a plan to build a 10 GW fleet of SMRs in North America through the 2030s.

Holtec has seen a faster timeline in its dealings with the NRC since Trump issued his executive orders in May, Patrick O'Brien, Director, Government Affairs and Communications at Holtec International, told Reuters Events.

A faster licensing timeline leads to shorter construction times, which in turn helps nuclear developers raise funds because

venture capital and private equity investors are more keen on projects that offer a fast turnaround, as well as long-term PPAs, he said.

Holtec in 2023 signed a multi-decade PPA to sell power from Palisades to Wolverine Power Cooperative, a not-for-profit energy provider to rural communities across Michigan.

O'Brien said the deal was "the key piece" that allowed the company to move forward with the reopening plans because long-term certainty helps "put shovels in the ground and get some of these projects done."

Strong power demand from data centers bodes well for the nuclear industry because Big Tech companies are eager to sign

long-term deals and are sometimes willing to pay a premium for clean power, he said.

As well as securing financing and a PPA, Holtec had to complete a lengthy regulatory approval process with the NRC to restart Palisades, to bring the facility from “decommissioning” status to “operational.” Re-staffing the plant was another challenge.

Palisades had around 200 workers while it was inactive and by July the company was close to reaching a fully-staffed level of around 600 people.

Extensive training is necessary to “build a culture of safety” among nuclear workers, O’Brien noted.

Securing community support is also essential but is less challenging than in the past, he noted, pointing to a June 2025 poll by independent non-partisan group Pew Research that showed that about six-in-ten (59%) Americans now back more nuclear power plants to generate electricity.

Two other decommissioned nuclear facilities could be brought back online in the U.S. in the coming years. Constellation Energy aims to reopen the Three Mile Island Unit 1 in Pennsylvania in 2027 and Florida-based NextEra is considering restarting the Duane Arnold plant in Iowa, which shut down in 2020.

Constellation in September 2024 signed a 20-year PPA to supply nuclear power from the Three Mile Island Unit 1, which has been renamed Crane Clean Energy Center, to Microsoft data centers.

But these three nuclear restarts are unlikely to set a trend since “most shuttered reactors are too far into their decommissioning process to be restarted cost-effectively,” Katy Huff, an Associate Professor in the Department of Nuclear, Plasma, and Radiological Engineering at the University of Illinois at Urbana-Champaign, said.

Meanwhile, South Carolina’s state-owned Santee Cooper told Reuters Events in June that it is studying “fewer than five” proposals from companies seeking to finish building and operating the VC Summer 2 and 3 reactors.

“We expect to complete this process by the end of 2025. Santee Cooper does not intend to own or operate the units, but rather to enable interested entities to pursue completion and operation of the units for the benefit of all South Carolina,” a Santee Cooper spokesperson said.

Another way to secure nuclear power is extending the life of existing facilities. Some 24 of the 94 operational U.S. nuclear reactors have licenses that are set to expire prior to 2035, the Department of Energy said in 2023, and utilities are increasingly eager to extend those licenses.

To meet the growing energy needs of its customer base, Duke Energy is investing in maintenance and upgrades to secure license renewals for its six nuclear facilities – three in North Carolina and another three in South Carolina – said Steven Capps, senior vice president New Nuclear Generation and Operations Support for Duke Energy. These investments will allow the 11 reactors in these plants to continue operating until mid-century, he said.

A good example is Oconee Nuclear Station, whose license renewal application was approved by the NRC in March. Over the last 20 years, the company has replaced equipment such as reactor vessel heads, steam generators, turbines, transformers, pumps, valves and other equipment to support longevity at the station. A power uprate completed in 2024 added 45 MW of capacity to Oconee.

“The vast majority of the growth we’re seeing in the Carolinas is from always-on industries that require 24/7 power supply. As our most reliable energy source, nuclear is an ideal resource to help meet that demand,” Capps told Reuters Events.

In June, Constellation signed a 20-year PPA with Meta to provide clean power from its 1.1 GW Clinton nuclear facility in Illinois. Constellation’s president and CEO Joe Dominguez said the partnership shows “the relicensing and expansion of existing plants is just as impactful as finding new sources of energy.”

Constellation is pursuing license renewals across its fleet of 21 nuclear reactors, the largest in the United States. Clinton’s operating license is set to expire in 2027 but Constellation last year applied for a 20-year extension and as of July this year the NRC was still reviewing the application.

FUSION AT THE DOOR

The U.S. is also a hotbed of private fusion energy development, with numerous startups pursuing different approaches to build a commercially viable tokamak.

A tokamak is a doughnut-shaped device that uses powerful magnetic fields to confine superheated plasma for controlled nuclear fusion research and energy production. Unlike fission reactors, tokamaks do not inherently pose meltdown risks, produce far less long-life radioactive waste, and are fueled by abundant resources like water and lithium.

The sector has been boosted by the Department of Energy's Milestone-Based Fusion Development Program, which has awarded \$46 million in federal funding to eight fusion startups that have raised a further \$350 million of new funding from the private sector.

These eight companies (Commonwealth Fusion Systems (CFS), Focused Energy, Thea Energy, Realta Fusion, Tokamak Energy, Type One Energy Group, Xcimer Energy and Zap Energy) are working towards presenting pre-conceptual designs and technology roadmaps of their fusion power plants by late 2025.

Fusion developers seeking investors are also enjoying Big Tech's AI boom.

Helion, a fusion energy developer based in Washington state, in January announced a \$425 million investment round, with participation from existing investors, including OpenAI founder Sam Altman, bringing their total raised to over \$1 billion.

In 2023, Helion signed a PPA to supply power to Microsoft from its first commercial plant, a 50 MW device that is slated to start producing energy in 2028. The company has also signed a PPA with U.S. steelmaker Nucor for a 500 MW plant that is expected to come on line in the 2030s.

CFS in June announced a strategic partnership with Google that includes a 200 MW PPA for CFS' future ARC facility in Virginia, which is expected to start producing power in the early 2030s, and an investment that gives the tech Giant a stake in the fusion startup. Financial terms were not disclosed.

"As part of the deal, [Google] also have an option to buy power from the next several ARC plants. It's a great partnership because the hyperscalers, and Google in particular, all have a need for more power for their infrastructure and they need firm and clean power and that's something that fusion plants can provide," CFS Chief Commercial Officer Rick Needham told Reuters Events.

Construction of the company's SPARC device – a compact tokamak designed to demonstrate net fusion energy using powerful, new high-temperature magnets – is 60% complete, Needham told Reuters Events. Located in Massachusetts, the facility is on schedule to demonstrate net energy gain across the plasma by 2027.

CFS is dealing with approximately a thousand vendors across 30 different countries not only to build SPARC but also to develop a "supply chain that we can then reach out to and tap into as we build our power plants," he said.

The company is now working toward securing construction permits and grid connection agreement for the ARC facility and hopes to benefit from a less stringent regulatory regime than fission technologies because fusion devices are inherently safer.

Obtaining regulatory licensing to deploy advanced fission reactors takes several years and can cost hundreds of millions of dollars, but that's something fusion developers "can do in like 18 months and for less than \$10 million," Needham said.

– Eduardo Garcia