GLOBAL X INSIGHTS

Uranium Insights: U.S. Nuclear Ambitions Greenlight the Industry's Revival

Kenny Zhu, CFA
kzhu@globalxetfs.com

Date: September 30, 2025
Topic: Commodities

Executive orders aimed at revitalizing the U.S. nuclear energy complex kicked off a surprise rally in the nuclear sector in Q2, led by nuclear reactor manufacturers, as these actions targeted the regulatory burdens that have weighed on grid expansions for decades. We believe these policy actions could set the stage for sustained growth in the U.S. nuclear industry, potentially accelerating development in the West, which has lagged overseas rivals like Russia and China. We think the momentum is just beginning, and the recent entrance of financial backers into the sector only underscores our bullish outlook. Although we acknowledge the road ahead is winding, we believe this sector carries much potential in the decades to come.

Key Takeaways

- Despite having the world's largest fleet of operational nuclear plants, the United States has fallen woefully behind foreign rivals in reactor constructions, with China and Russia dominating construction pipelines.
- Recent policy actions aiming to quadruple U.S. nuclear power capacity by 2050 may represent the most consequential nuclear legislation of our time, potentially leading to a sea-change for the U.S. nuclear complex[1].
- We believe momentum will continue, as policy support, private sector investment, and popular opinion align in favor of nuclear power as a preferred tool for combating global energy insecurity.

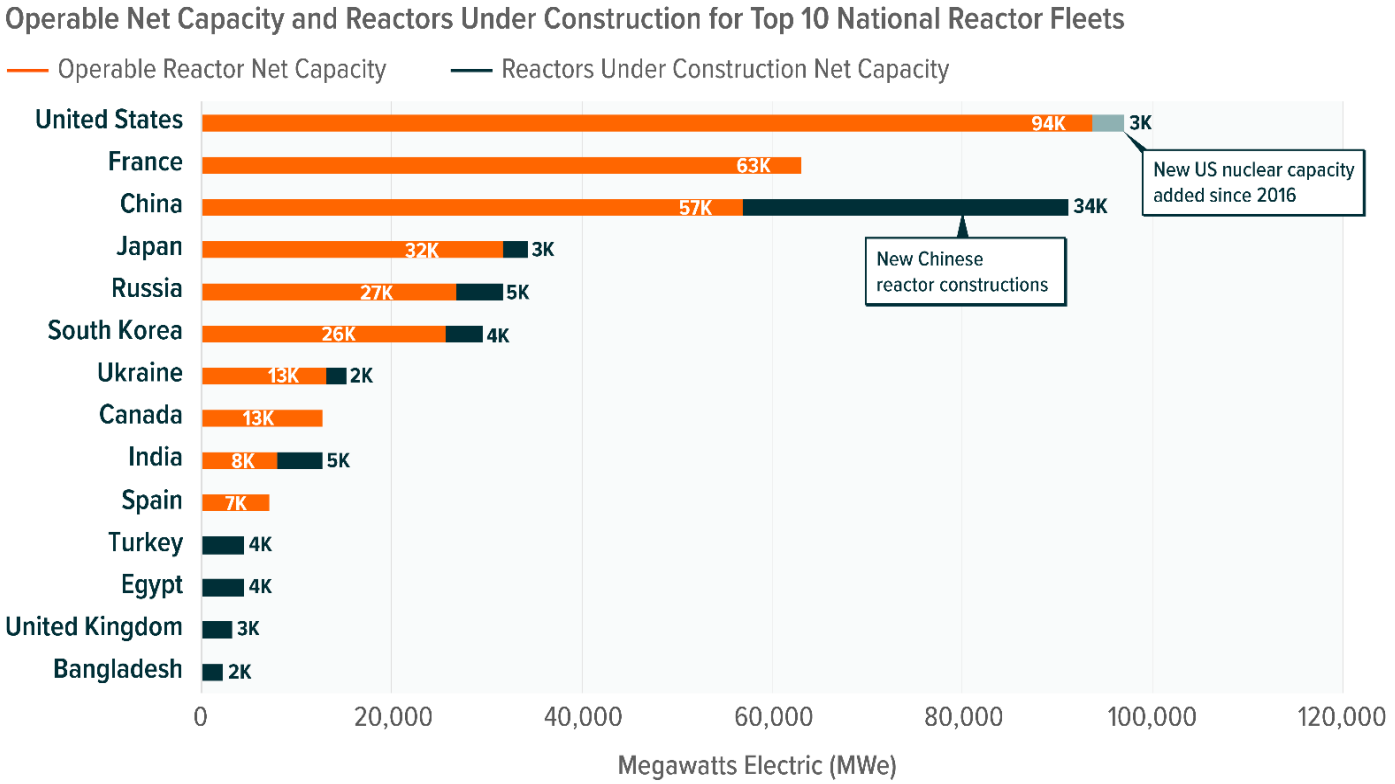
A New Cold War for Power

Energy security is likely to be a vital concern for the 21st century. Global power consumption is expected to surge 4% annually through 2027, rising as much as 50%, or 13,300 TWh of electricity by 2040[2]. Developing markets are expected to contribute the majority of that growth, as rapidly industrializing countries expand their infrastructure to meet rising consumption from an emerging middle class. At the same time, the West is not expected to stand idle, as current growth projections for electricity consumption within the United States calls for another California worth of power demand over the next three years[3], contrasting starkly with the 0.1% annual growth rate we saw from 2005-2020[4].

We believe that this global growth will be underpinned by rapid industrialization, electrification, and the budding AI revolution, for which nuclear energy will be a fundamental necessity. 24/7 industries like hyperscale data centers require a substantial ramp-up in baseload output, given their need for continuous, uninterrupted operations; we think nuclear power may be optimally suited for this task.

Pit rising power needs against a U.S. nuclear power grid that has deployed nary two reactors over the past twenty years, and it's easy to spot the glaring disparity between the U.S. and its overseas rivals, with China alone constructing 33 reactors over that same timeframe[5]. While the U.S. and Europe continue to maintain the world's largest fleets of operational nuclear reactors, it's clear that without substantial investment, Western nations run the risk of falling behind. Put another way, we find it difficult to envision an AI-revolution without the corresponding ramp-up in power output to support it. We think this necessitates substantial policy support.

THE U.S. BOASTS THE WORLD'S LARGEST OPERATIONAL NUCLEAR REACTOR FLEET



Sources: Global X ETFs with information derived from the World Nuclear Association Reactor Database: Total Operable Reactor Net Capacity (Top 10) and Reactors Under Construction Net Capacity (Top 10). Data accessed July 23, 2025.

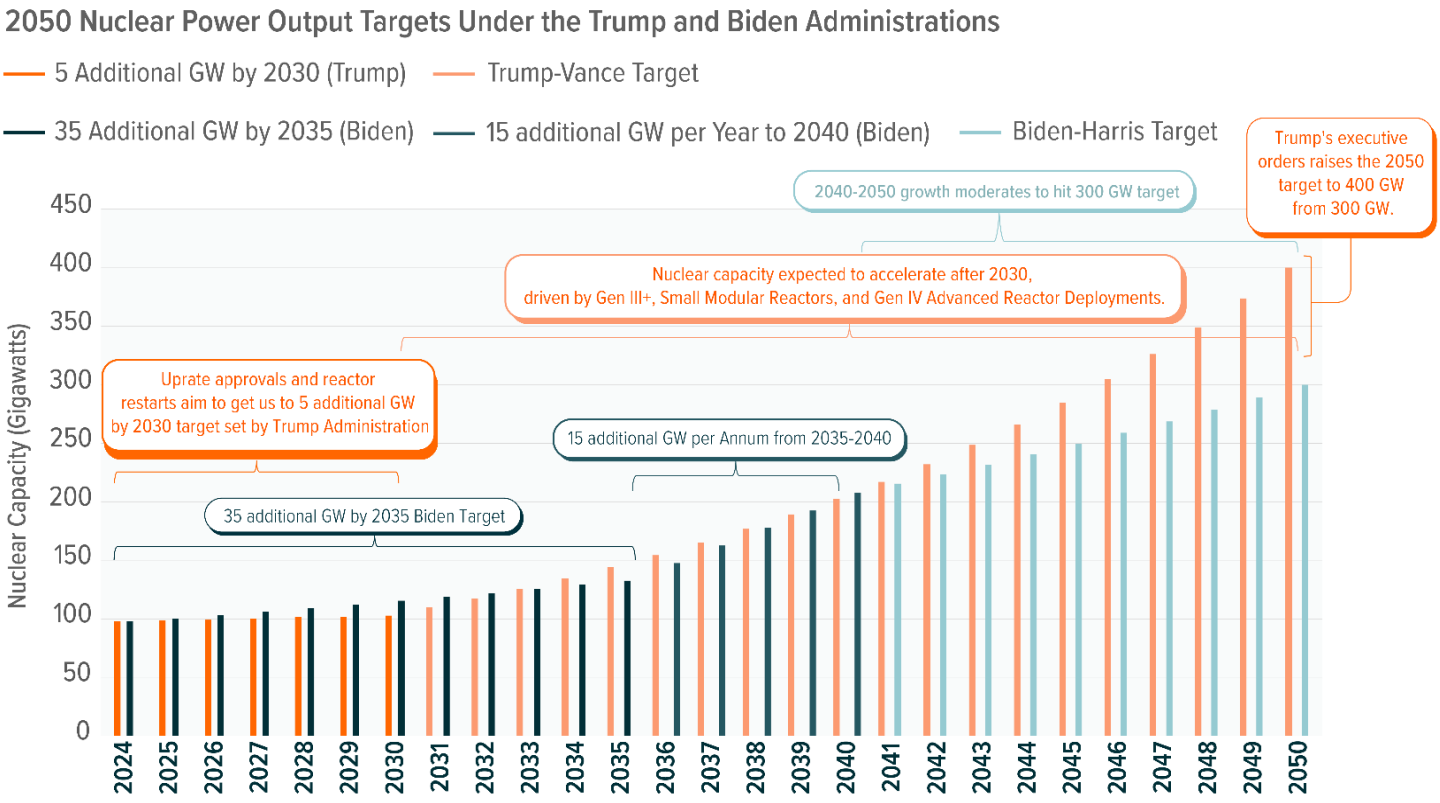
While the United States currently operates the world's largest reactor fleet, China and Russia together have at least 39 nuclear reactors currently under construction, representing over 39,000 Megawatts of potential capacity.

U.S. Administration Jump Starts the Nuclear Industrial Base Via Executive Orders

On May 23rd, the U.S. Federal government announced four executive orders with the stated goals of "re-establishing the U.S. as the global leader in nuclear energy" and expanding American nuclear energy capacity to 400 Gigawatts (GW) by 2050 (from under 100 GW today). The executive orders effectively quadruple the U.S. nuclear output capacity target while addressing the regulatory burdens that have long constrained industry growth, cutting down approval procedures while codifying support for domestic nuclear supply chains and reactor deployments[6].

Taken together, we believe these orders potentially amount to the most consequential policy actions enacted on behalf of the nuclear industry in the 21st century, representing a pivotal milestone for advancing U.S. nuclear policy. The orders have been dissected and broken down in the following sections.

TRUMP ADMINISTRATION'S 2050 TARGET FOR NUCLEAR POWER EXCEEDS THE BIDEN TARGET BY 100 GIGAWATTS



Sources: Global X ETFs with information derived from Reuters (2025, August 7). US eyes 7% more nuclear power through restarts, upgrades; , UtilityDive (2025, May 28). Trump aims for 400 GW of nuclear by 2050, 10 large reactors under construction by 2030., and The Biden White House (2024, November 12). Biden-Harris Administration Establishes Bold U.S. Government Targets for Safely and Responsibly Expanding U.S. Nuclear Energy and Announces Framework for Action to Achieve these Targets.

The Trump administration amended the 2050 target for U.S. nuclear power output to 400 GW from 300 GW previously. With roughly ~97 GW operational in 2024, this represents a near quadrupling of nuclear power capacity.

Reforming the U.S.'s Nuclear Regulatory Commission (NRC)

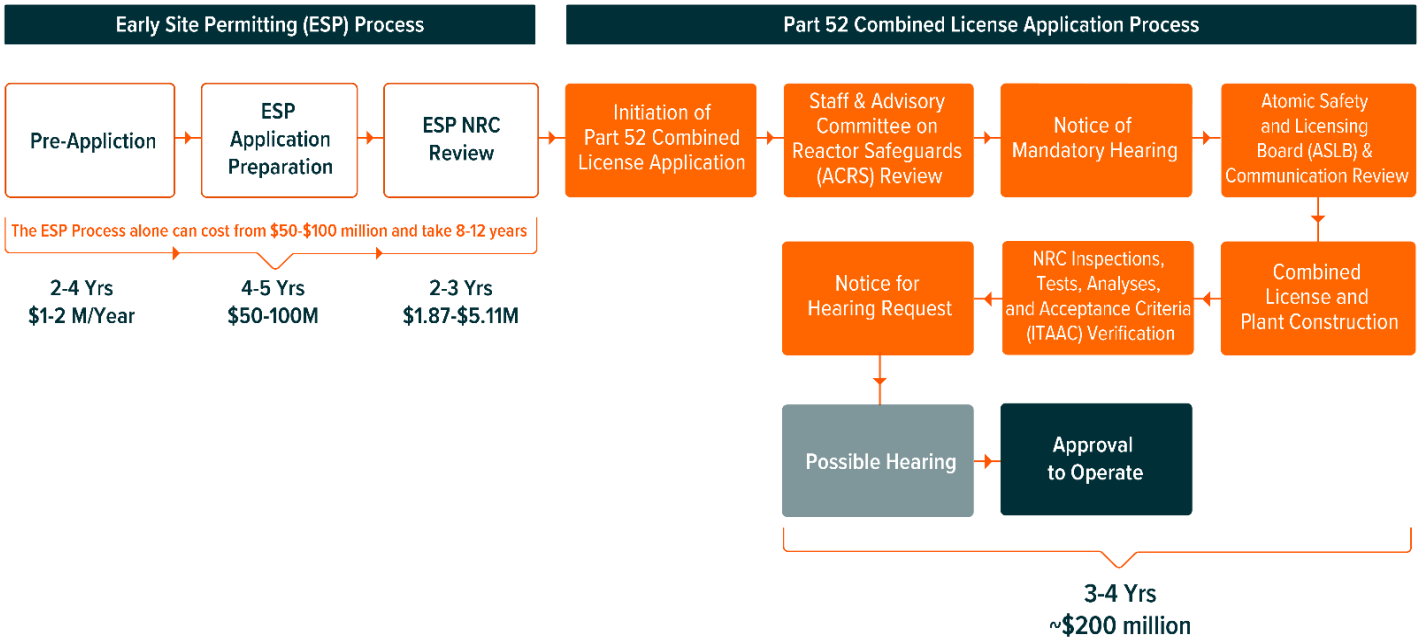
In its September 2024 presentation on reducing cost and times for licensing SMR (small modular reactor) projects, Microsoft cited that "Licensing is the single biggest bottleneck for getting new [nuclear] projects online," noting project approval timelines that had taken decades and application costs that ranged from tens to hundreds of millions of dollars[7]. The 1st executive order titled "Reforming the Nuclear Regulatory Commission," seeks to address this very concern.

Based on the legacy review process cited in a September 2022 report published by LG&E and KU, review timelines for SMRs ranged from 8-12 years from the point of pre-application to the NRC's final approval of operating license, while total costs could range from as much as $400 million to $600 million (in the case of the Tennessee Valley Authority and Duke Energy) to pursue all required NRC licenses[8].

We believe the most consequential aspects of the first order, which directs the reform of the NRC, were the explicit limitation in licensing costs and mandated reduction in approval timelines[9]. This includes the setting of 1) an 18-month deadline for rendering a final decision on applications to construct and operate a new reactor, 2) a 12-month deadline for rendering a final decision on applications to continue operating an existing reactor, as well as 3) fixed caps on the NRC's recovery of hourly fees. In theory, this order could shave years off review timelines, potentially saving the nuclear industry hundreds of millions of dollars in regulatory costs and substantially shifting the economics for new nuclear builds and restarts.

THE NRC'S COMBINED SMR PERMITTING PROCESS COULD COST HUNDREDS OF MILLIONS AND TAKE DECADES

Estimated Costs and Timeline for Early Site Permitting of SMR, Combined Operation License Process



Sources: Global X ETFs with information derived from Louisville Gas and Electric Company and Kentucky Utilities Company (2022, September). Estimated Resources Necessary to Pursue and Early Site Permit for a Small Modular Nuclear Reactor Site.

The Early Site Permitting and Combined License Application Process can take as long as 11-16 years and cost as much as $400-600 million. The executive order to reform the NRC aims to cut the application portion of the review process down to 18-months following the start of the license application, down from the estimated 3-4 year+ timeframes under the legacy process.

Reforming Nuclear Reactor Testing at the Department of Energy (DOE)

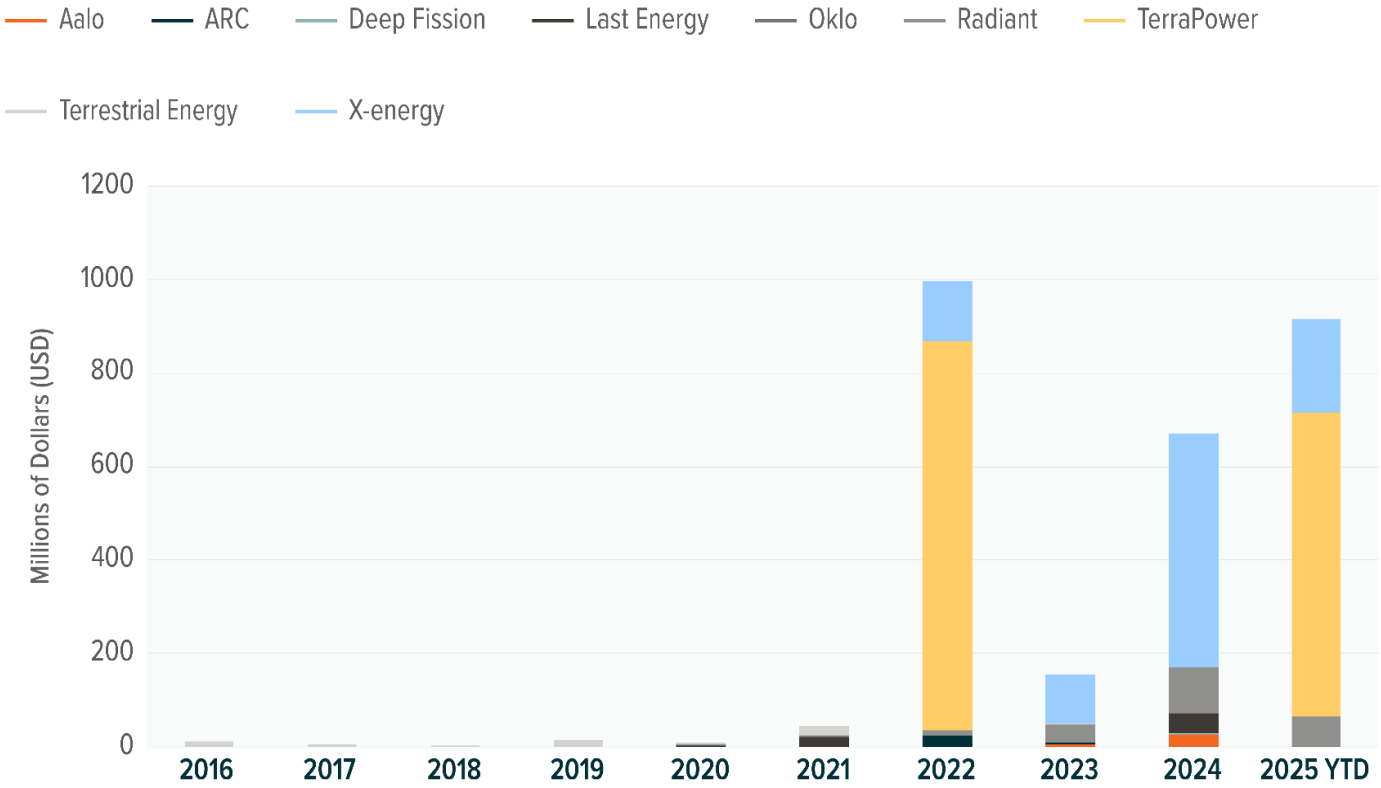
Onerous regulations imposed by the NRC may have impeded U.S. nuclear reactor deployments for decades, resulting in the approval and construction of only three new nuclear plants over the past 25 years, and even leading a consortium of states and nuclear startups to file suit against the NRC[10]. Despite having the world's largest reactor fleet, the United States has been slowly ceding nuclear leadership to overseas competitors, where the regulatory environment has been more cooperative.

The second executive order cuts at the heart of the U.S. nuclear research & development effort, aiming to reform testing requirements, and specifies several reforms, including: 1) expediting the review, approval, and deployment of qualifying advanced test reactors at DOE owned or controlled facilities within 2-years of a completed application, 2) expediting or eliminating environmental reviews and creating categorical exclusions as appropriate and relying on supplemental analyses when constructing on existing reactors sites. Collectively, these orders could cut down on the time hurdles that have delayed prototype constructions.

In addition to the efficiency mandates cited above, this order establishes a goal of achieving criticality (a continuous self-sustaining fissioning reaction) across three new reactor builds by Independence Day 2026. It's already represented a potential contributor to fast-tracking R&D efforts within the United States, with the DOE announcing its selection of 11 advanced reactor projects for the Nuclear Reactor Pilot Program on August 13th. Combined with the over $8.9 billion in venture and private equity capital raised since 2016, this order potentially reflects strong momentum among advanced nuclear reactor developers within the United States[11].

NUCLEAR STARTUPS RAISED OVER $8.9 BILLION OF VENTURE AND PRIVATE EQUITY CAPITAL SINCE 2016

Venture capital and private equity investment into select nuclear fission startups engaged with the NRC



Sources: BloombergNEF (2025, June 23). Developments in the US Advanced Reactor Industry.

Nuclear Startups in the United States have gained momentum, having collectively raised over $2 billion in private equity and venture capital funding from 2024 thru June 18, 2025.

Reinvigorating the Nuclear Industrial Base

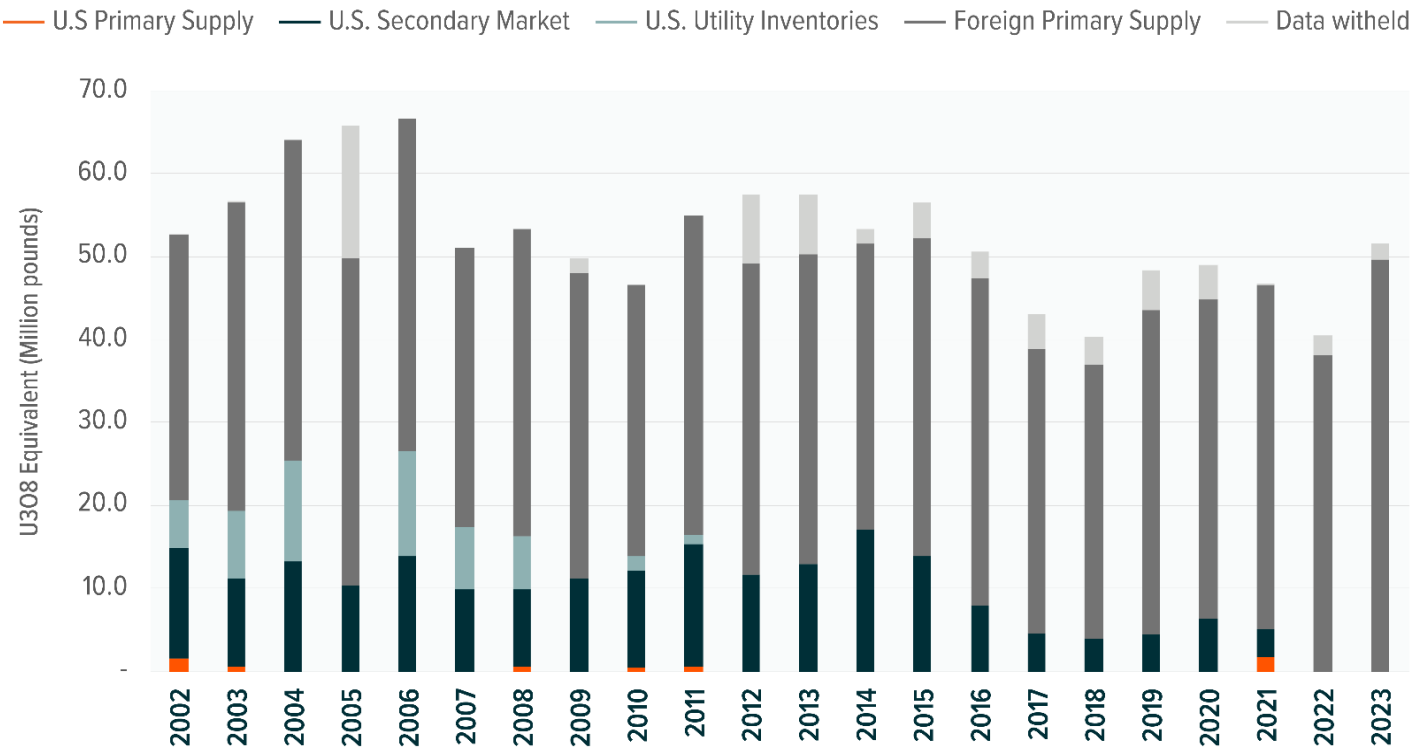
The third order, which seeks to reinvigorate the nuclear industrial base, targets the domestic supply chain for nuclear fuel. Among the most critical portions of this order include a directive to develop a plan for expanding domestic uranium conversion and enrichment capacity to levels sufficient to meet projected civil and defense needs for low enriched uranium (LEU), high enriched uranium (HEU), and high-assay low enriched uranium (HALEU).

The third order opens government stocks of plutonium and excess uranium up for use by qualified pilot program reactors, alleviating near-term concerns for prototype reactor trials and supporting the administration's order to reform nuclear reactor testing. Given the order's emphasis on uranium supply chains, we think firms with significant exposure to the U.S. nuclear fuel cycle stand to benefit most. As of August 2025, the existing U.S. supply chain for nuclear fuel remains inadequate for meeting domestic reactor demand; while 2024 domestic uranium production rose to its highest level in 6-years of ~677 thousand pounds[12], it amounted to barely 1.3% of the total 51.6 million pounds of uranium purchased by domestic utilities just one year prior[13].

Further provisions in the order were made to accelerate the pace of nuclear deployments by prioritizing the work needed to facilitate 5 GW of power uprates at existing nuclear reactors. We believe this represents the first step in a process that will gradually see new reactors begin to hit the market in the 2030's, with the long-term goal of having 10 new large reactors under construction by 2030.

THE UNITED STATES IMPORTS NEARLY THE ENTIRETY OF ITS URANIUM SUPPLY

U.S. Uranium Purchases by Source 2002-2023



Sources: U.S. Energy Information Administration (2024, June). 2023 Uranium Marketing Annual Report. The EIA has withheld data where necessary to avoid disclosure of individual company data.

In 2023, over 95% of uranium purchases in the United States were imported from foreign sources.

Deploying Advanced Nuclear Reactor Technologies for National Security

Piggybacking off the uranium focus of the previous order, the situation is more dire for specialized enriched nuclear fuels like HALEU, which are critical to the deployment of advanced nuclear reactors, like SMRs. DOE projections call for as much as 50 metric tonnes of HALEU annually to meet nuclear demand in the 2030s[14]. However, U.S. private industry's ability to meet this demand was forecast in 2023 to be just six metric tonnes per year by the late-2020s[15]. This issue is further compounded by foreign competition for global HALEU supplies, as overseas rivals vie to develop their own native nuclear technologies.

The fourth executive order directs the Secretary of Energy to release not less than 20 metric tons of HALEU to support any private sector project authorized to operate at DOE facilities with the aim of developing power infrastructure. The measure addresses the HALEU shortage that had been cited by reactor developers as a critical barrier to scaling SMR technology[16], making government supplies available for private-sector use. It also instructs DOE to implement plans for a robust domestic supply chain to secure a reliable long-term supply of enriched uranium necessary for the sustained deployment of advanced reactors.

This order further ties the U.S. nuclear expansion to energy security and national defense, mandating the deployment of a nuclear reactor at a domestic military installation no later than September 30, 2028. It directs the Secretary of Energy to begin designating AI data centers tied to DOE facilities as critical defense assets, while classifying the electrical infrastructure supporting those data centers as "defense critical electric infrastructure." Together, these measures underscore the national security element of this expansion[17].

Conclusion: We Believe The Stars are Aligning for Nuclear Power

After decades of subdued growth, U.S. nuclear power appears to be at an inflection point, propelled by the confluence of public, private, and popular support. Public sentiment has shifted meaningfully, with a recent Gallup Poll showing 61% of Americans now support nuclear energy, a level near record highs[18]. At the same time, the current administration has built on the initiatives of its predecessors, doubling down its support for the industry via executive orders. With private capital flowing into the sector and the proliferation of power-hungry data centers heightening concerns over energy security, the conditions now seem aligned for a long-awaited resurgence in this once-beleaguered sector.

Related ETFs

URA – Global X Uranium ETF

Click the fund name above to view current performance and holdings. Holdings are subject to change. Current and future holdings are subject to risk.

Footnotes

1. Center for Strategic & International Studies (2025, June 9). White House Executive Orders Target Ambitious Nuclear Deployment in the United States and Abroad.
2. International Energy Agency (2025, February 25). Growth in global electricity demand is set to accelerate in the coming years as power-hungry sectors expand.
3. S&P Global (2024, April 24). Datacenters provide a boost to the total US gas demand in the near term, but longer-term prospects are more uncertain.
4. U.S. Energy Information Administration (2025, May 13). After more than a decade of little change, U.S. electricity consumption is rising again.
5. World Nuclear Association (2025). Nuclear Reactors in China.
6. The White House (2025, May 23). Fact Sheet: President Donald J. Trump Deploys Advanced Nuclear Reactor Technologies for National Security.
7. The Financial Times (2024, November 27). Microsoft bets on artificial intelligence to power a nuclear resurgence — and more AI.
8. LG&E and KU (2022, September). Estimated Resources Necessary to Pursue and Early Site Permit for a Small Modular Nuclear Reactor Site.
9. The White House (2025, May 23). Ordering the Reform of the Nuclear Regulatory Commission.
10. Wired (2025, April 19). States and Startups Are Suing the Nuclear Regulatory Commission.
11. BloombergNEF (2025, June 23). Developments in the US Advanced Reactor Industry.
12. U.S. Energy Information Administration (2025, August 5). Domestic Uranium Production Report – Annual.
13. U.S. Energy Information Administration (2024, June 6). Domestic Marketing Annual Report.
14. U.S. Department of Energy (2024, December 3). What is High-Assay Low-Enriched Uranium (HALEU)?
15. Centrus Energy Corp (2023, September 6). Centrus to Begin HALEU Production in October.
16. International Atomic Energy Agency (2023, September). Fueling the Future: Building Fuel Supply Chains for SMRs and Advanced Reactors.
17. The White House (2025, May 23). Deploying Advanced Nuclear Reactor Technologies for National Security.
18. Gallup (2025, April 9). Nuclear Energy Support Near Record High in U.S.

Glossary

Criticality: The stable operating state in which a fissioning nuclear reactor is able sustain a continuous self-sustaining chain reaction.
Decommissioning Status: The process leading to the safe shutdown, decontamination, and release of a nuclear facility from service, with the intent to restore a reactor site to a condition with no risk to public health.
Early Site Permitting: The U.S. Nuclear Regulatory Commission's process for approving site suitability, independent of the construction permit or combined license.
HALEU: High-Assay Low-Enriched Uranium; uranium fuel enriched between 5 and 20 weight percent U-235. Serves as the proposed fuel used for many advanced reactor designs.
LEU: Low-Enriched Uranium; uranium fuel enriched to no more than 5 weight percent U-235. Serves as the primary fuel source for most global reactors currently in operation.
Nuclear Regulatory Commission: Also known as the "NRC"; an independent U.S. government agency established to license and regulate the public use of radioactive materials for civilian purposes.
10 CFR Part 52 Combined Operating License: Single NRC license that grants both permissions to construct and operate a nuclear plant. Combines the construction and operating phases into one licensing step.
SMR: Small Modular Reactor; advanced reactor designs intended to be manufactured in a factory and assembled on site, with a power capacity of no more than 300 MWe per unit.