

U.S. Advanced Nuclear Energy Deployment Strategy

Introduction

A robust nuclear energy sector is vital to achieving America’s energy, climate, environmental, economic, and national security goals. Both current and advanced nuclear power technologies dramatically reduce carbon emissions, offer the benefits of safe and reliable power, and can be employed to decarbonize a wide array of thermally intense industrial processes. Simply put, nuclear energy represents the best opportunity for America to lead the world in the transition to clean energy while dramatically increasing American energy and national security.

To provide strong international leadership, the foundation of this strategy is the goal of tripling domestic nuclear power generating capacity by 2050, in line with the existing multinational commitment from the World Climate Action Summit of the 28th Conference of the Parties to the U.N. Framework Convention on Climate Change (COP28), where the United States pledged to support a three-fold increase in nuclear output worldwide.

Vision

The United States will lead the world in tripling nuclear capacity, and this strategy seeks to add no less than 200 Gigawatts (electric) of new advanced nuclear capacity across our nation by 2050. This tripling of capacity will be accompanied by the establishment of a secure, reliable North American fuel supply chain for both conventional and advanced nuclear fuels, in particular the high-assay, low-enriched uranium (HALEU) fuel needed by many advanced reactor designs. This expansion of America’s nuclear energy sector will further accelerate the decarbonization of the electrical grid and provide nuclear-generated thermal heat for hydrogen production and numerous industrial applications.

This strategy requires five lines of effort for a “whole of government” approach to supporting, promoting, deploying, and expanding U.S. nuclear capacity. Importantly, this strategy consolidates decision-making within the Executive Office of the President to facilitate coordinated leadership and actions across all federal agencies, to send a clear signal to the nuclear marketplace that the United States is committed to a tripling of domestic nuclear capacity, and to assure synergy between the activities of various federal agencies in the deployment of advanced nuclear technologies.

This strategy will drive engagement between the federal government, industry, states, and individual communities to unlock new opportunities and ensure America stands apart as the global leader in the next generation of clean energy technologies.

To minimize budgetary impacts, funding for the programs included in this strategy shall, to the maximum practical extent, be re-purposed from previously appropriated but currently unobligated funding.

(1) Accelerate Deployment of Advanced Nuclear Reactors

Advanced nuclear includes a broad range of technologies, from transportable and stationary micro-reactors and radioisotope systems that can provide localized energy production for civil and national defense needs, to larger reactors with intrinsically safe designs that can provide electricity, benefit the decarbonization of many energy-intensive industrial processes, or produce life-saving medical isotopes.

History shows that in the early years of the nuclear era, the federal government funded dozens of advanced reactor demonstrations, with over 50 reactors built at the Idaho National Laboratory alone. Today's few demonstrations, while essential, will be buttressed by additional demonstration projects across the broad range of nuclear technologies and applications. This includes:

- Five or more additional Department of Energy (DOE) advanced reactor demonstrations, for both civil electricity and process heat production, with program commencement no later than 2026 and on-grid availability of the reactors by 2033;
- Three commercial micro-reactor demonstrations, with a goal of on-grid, behind-the-meter, or industrial heat power availability by 2031;
- Additional Department of Defense (DOD) demonstration programs for providing electricity to DOD bases and other facilities, to power ten or more additional facilities with micro-reactors by 2034;
- The Department of Homeland Security, in coordination with DOD and DOE, demonstrating a mobile micro-reactor technology for disaster response by 2031; and
- The Departments of Energy and Defense and the National Aeronautics and Space Administration conducting no less than six demonstration projects by 2029 to employ advanced Radioisotope Power System technologies for a wide array of critical missions.

Nuclear technologies require three overlapping stages to realize the industry's potential to support the energy transition: (1) committed order book generation (2) project delivery, and (3) industrialization. As such, it is essential for reactor developers to retain government support as they deploy "fast followers" after their initial demonstrations, and the Department of Energy will establish a program to provide continued government support for fast-follower deployment, until economies of scale for each new reactor technology have been reached.

(2) Secure a Domestic Nuclear Fuel Supply Chain and Manufacturing Capability

To obviate the need for Russian nuclear fuel imports, the U.S. and its trusted allies require a significant increase in uranium mining, milling, conversion, enrichment, and fuel fabrication capacity. This strategy takes steps to immediately facilitate the expansion of all segments of the domestic nuclear fuel industry, consistent with the highest standards of safety and environmental protection.

For decades, the United States led the world in uranium mining, processing, conversion, enrichment, and fuel fabrication, and was the premier supplier of nuclear fuel to the free world.

Over time this supply chain atrophied as other nations entered the market, in particular Russia, which possesses the largest uranium enrichment capacity in the world.

The specific objective is to have a fully-functioning North American nuclear fuel supply chain in place before the end of this decade, responsive to the needs of industry and government for providing both traditional low enriched uranium (LEU) as well as HALEU. Congress has provided significant funding to support these efforts, for domestic production of both HALEU and LEU. The Department of Energy will accelerate its HALEU Availability program to meet these urgent needs and will establish a new program dedicated to the expansion of domestic LEU conversion and enrichment capacity, using funds provided in the Consolidated Appropriations Act of 2024.

(3) Facilitate Funding Opportunities and the Export of U.S. Technology

Exporting American nuclear technologies to countries ready and able to operate them creates 100-year relationships that not only provide clean, reliable electricity and industrial heat to cut carbon emissions, but also help safeguard our security and the security of our partners. Nuclear energy developers in the United States need unfettered access to international markets to enhance a return on the significant investment needed to engineer, build, and operate the next generation of reactors.

As a first step, the administration shall establish the position of Senior Director of Civil Nuclear Energy on the National Security Council, to oversee interagency coordination, assure adequate budget support, and promote civil nuclear energy domestically and abroad. This vital position will be created immediately. The Senior Director will be tasked with overseeing an Advanced Nuclear Technology Interagency Policy Committee, comprised of representatives from key federal departments and independent agencies, to maintain strong momentum for carrying out this strategy.

Further, we will take every opportunity to employ the financing acumen of the federal government to support both domestic and international nuclear technology deployment, by leveraging the power and authorities of the Department of Energy's Loan Programs Office, the Export-Import Bank of the United States, and the U.S. International Development Finance Corporation, among others.

(4) Increase and Improve Regulatory Capacity

To meet the call to action in this strategy, the Nuclear Regulatory Commission (NRC) will need to scale its license-application capacity significantly and quickly. We cannot achieve our national goals for clean energy without the services of a well-funded and fully staffed nuclear regulator. The administration will seek additional resources and personnel to support an expanded licensing regime, and work with the NRC and industry to continue streamlining and modernizing the NRC's licensing processes for advanced nuclear technologies.

In achieving these goals, the United States must maintain world leadership in nuclear safety, security, regulation, and nonproliferation, including the continued safe storage of spent fuel. In addition, we will incentivize investments in technologies that will reduce the current inventory of

spent nuclear fuels, which, if harnessed through recycling and used to fuel advanced reactors, has enough energy to power the entire United States for over 150 years.

(5) Develop a 21st Century Nuclear Workforce

To meet the goals of this strategy, the U.S. will need a new generation of nuclear technicians, scientists, and operators, which will require a combined effort between government agencies, academia, and the private sector. The Department of Energy and the Department of Education shall partner to advance nuclear-focused education at the undergraduate, graduate, and postgraduate levels, and to implement creative programs to catalyze this expansion of nuclear education. Further, the Department of Labor shall work closely with American trade unions and the private sector to expand training programs related to building and operating critical nuclear infrastructure and facilities.

Conclusion

The administration and Congress have, in recent years, provided significant support for the U.S. nuclear industry; however, far more needs to be done to meet our essential goal of tripling both domestic and worldwide nuclear generating capacity by 2050. The United States must rise above the foreign powers that seek to dominate the international nuclear marketplace, by accelerating and expanding advanced reactor and nuclear supply chain development here at home.

This strategy constitutes an innovative and forward-thinking means to develop and deploy clean-energy nuclear technologies that are essential for promoting environmental stewardship, economic growth, prosperity, and American national and energy security.

The time to act is now, and boldly so.