IEEE★USA

POSITION STATEMENT

Nuclear Technology Leadership

Approved by IEEE-USA
Board of Directors (November 21, 2025)

The U.S. commercial nuclear power industry is at a critical juncture. Once a global leader in nuclear technology, safety, and non-proliferation, the U.S. ecosystem has fallen behind in several key areas, including research and development (R&D), manufacturing capabilities, and intense competition from foreign state-owned enterprises, particularly from Russia and China. This trend poses a significant threat not only to our economic competitiveness in the global market, estimated at $8 trillion over the next two decades, but also to our national security and energy objectives.

A robust domestic nuclear industry is essential to:

- **Strengthen U.S. Competitiveness:** Secure a share of the global atomic market and foster a high-tech domestic manufacturing base.
- **Secure the Supply Chain:** Ensure a reliable and secure supply of nuclear materials and components for both civilian energy needs and Department of Defense requirements.
- **Regain Leadership in Non-Proliferation:** Promote global safety and security standards through the export of U.S. technology, as countries receiving U.S. nuclear technology are demonstrably less likely to engage in activities of proliferation concern.
- **Reduce Emissions and Enhance Grid Reliability:** Provide a proven source of base load energy and capacity to meet growing electricity demand and support the transition to a low-carbon energy economy.
- **Develop the Workforce:** Cultivate a skilled nuclear workforce to support both domestic and international nuclear initiatives.

IEEE-USA | 2001 L Street, N.W., Suite 700, Washington, D.C. 20036-4928 USA
Office: +1 202 785 0017 | Fax: +1 202 785 0835 | E-mail: ieeeusa@ieee.org | Web: https://www.ieeeusa.org

Recommendations

To achieve these strategic goals, IEEE-USA recommends the following actions:

1. **Accelerate Nuclear Energy Innovation and Deployment**
   - **Public-Private Cooperation:** Accelerate cooperative efforts to commercialize next-generation nuclear energy systems. This includes providing state-of-the-art test and experimental facilities, initiating advanced reactor demonstration projects, and establishing a reliable domestic supply of high-assay, low-enriched uranium (HALEU).
   - **Regulatory Modernization:** The Nuclear Regulatory Commission (NRC) must accelerate efforts to streamline regulatory review times without compromising safety.
   - **Prioritize Advanced Reactors:** The Department of Energy (DOE) and the Department of Defense (DOD) should prioritize support for the development, licensing, and deployment of Small Modular Reactors (SMRs)[1] and microreactors, which offer flexibility for a wide range of applications, including industrial, governmental, and international uses.

2. **Establish a Comprehensive Spent Fuel Management Program**
   - **R&D on Reprocessing:** The DOE should continue R&D on spent fuel reprocessing systems to reduce waste volume and storage time, with a focus on non-proliferation.
   - **Comprehensive Waste Management:** Congress should enact a comprehensive spent nuclear fuel management program as mandated by the Nuclear Waste Policy Act of 1982. This program must establish an integrated waste management system and develop a permanent disposal facility.

3. **Expand Nuclear Energy Applications**
   - **R&D for Hybrid Systems:** Government and industry should prioritize R&D for nuclear hybrid systems, remote power applications, emergency response power, and industrial processes such as hydrogen production.
   - **Federal Support:** Research grants to U.S. universities and consortia are recommended to maintain the knowledge base essential for long-term nuclear capability.

4. **Secure the Global Commercial Supply Chain**
   - **Strategic Supply Chain Analysis:** The DOE should identify key elements of the global commercial nuclear energy supply chain that offer the greatest

[1] "The Rise of Small Reactors: A New Era in Sustainable Power", Nuclear Insider, Dec 6, 2023 https://nuclearinsider.com/the-rise-of-small-modular-reactors-a-new-era-in-sustainable-power/

competitive and national security benefits. This includes strengthening the domestic supply chain and developing manufacturing expertise for advanced reactors.

- **Domestic Uranium Production:** The DOE should implement authorized funding to promote domestic uranium production[2] and fuel-related services, reducing over-reliance on foreign sources.

5. **Enhance International Competitiveness**
   - **Focused Diplomacy and Export Finance:** Diplomatic efforts should focus on cultivating international customers for U.S. nuclear technology. The Export-Import Bank and other export finance agencies must be empowered to support U.S. exporters in competing with foreign state-owned companies.
   - **Revising Export Restrictions:** Congress should revise the Atomic Energy Act and other legislation to remove or ameliorate export restrictions that hinder U.S. technology from competing in world markets, as contemplated by the recently passed ADVANCE Act. This is critical to building the demand for U.S. technology and combating the use of stolen intellectual property by offshore vendors.

Background

United States leadership has been essential to establishing global standards for nuclear safety, security, and non-proliferation. However, with the erosion of our R&D infrastructure, design capabilities, and manufacturing capabilities, as well as increased foreign competition, notably from Russia and China, we are losing the economic and strategic benefits of a domestic supply.

Security: Department of Defense requires a robust and secure domestic nuclear energy supply chain. A federal multi-agency Working Group attributes the loss of domestic uranium mining, enrichment, and conversion facilities to dependence on offshore sources[3].

Studies show that countries that have received U.S. nuclear technology are significantly less likely to get involved in activities that raise proliferation concerns, such as

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[2] "Restoring America's Competitive Nuclear Energy Advantage", US Dept. of Commerce, April 22, 2020, pages 15, 23 https://www.energy.gov/articles/restoring-americas-competitive-nuclear-energy-advantage

[3] ibid, Executive Summary, page 4, "First…" plantshttps://www.energy.gov/articles/restoring-americas-competitive-nuclear-energy-advantage

enrichment or reprocessing of special nuclear material (SNM). However, the U.S. is unlikely to have much influence in countries that purchase reactors from foreign vendors.

World markets: The global market for nuclear technology has been estimated at $8 trillion over the next two decades. The export restrictions in the Atomic Energy Act are intended to assure non-proliferation but impede America's ability to compete internationally. CFR 10 Part 810 implements Atomic Energy Act § 57 b.(2) to empower the Secretary of Energy, with the concurrence of the Department of State and after consultation with the NRC, DoC, and DoD, to authorize persons to directly or indirectly engage or participate in the development or production of special nuclear material, including parts, outside the United States.

That notwithstanding, the uncertainty of obtaining NRC design certification has caused the development and demonstration of some U.S. designs to move abroad. Foreign competitors are strong on financing and able to react much faster.

Electricity demand will increase worldwide to serve electrification, new manufacturing and especially to meet data center growth forecasts. Data center firms may add their own SMRs or fossil-fueled generation, mostly from natural gas.

Storage: Spent nuclear fuel is currently stored safely at current and former commercial nuclear power reactor sites in underwater spent fuel pools or above ground in dry casks in 35 states. The Nuclear Waste Policy Act of 1982 mandated that a permanent storage facility be developed to provide long-term storage and to maintain the viability of future deployment of nuclear technologies[4]. On June 18, 2025, a U.S. Supreme Court decision authorized a privately operated interim storage facility in Texas.

Test reactor: Our universities and national lab infrastructure have supported world-class thermal-neutron RD&D since the 1960s. But facilities need upgrading: In particular, the laboratories need a fast-spectrum Test Reactor to validate materials and verify performance for the safest and most economical nuclear designs for us to compete.

[4] USDOE Office of Policy, "Quadrennial Energy Review Second Installment: Transforming The Nation's Electricity System", January 6, 2017, Summary for Policymakers; page S-10, item 6 https://www.energy.gov/policy/articles/quadrennial-energy-review-second-installment

Workforce: Following a 2016-2022 decline in the number of nuclear science enrollments, there has been a slight increase in student interest[5]. But the medium to long-term nuclear energy workforce will need to grow and evolve to support transformational and increasingly sophisticated power generation adequately.

This statement was developed by the IEEE-USA Energy Policy Committee and represents the considered judgment of *a group of U.S. IEEE members with expertise in this subject field. IEEE-USA advances the public good and promotes the careers and public policy interests of the nearly 160,000 engineering, computing and allied professionals who are U.S. members of IEEE. The positions taken by IEEE-USA do not necessarily reflect the views of IEEE, or its other organizational units.*

[5] ORISE, STEM Workforce Development, Workforce Studies, Nuclear Engineering Enrollments and Degrees Survey; 2019, 2021-2022 data https://orise.orau.gov/stem/workforce-studies/nuclear-engineering-enrollments.htm