TESTIMONY OF DR. JOHN C. WAGNER

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BEFORE THE UNITED STATES SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES HEARING TO EXAMINE THE DEPARTMENT OF ENERGY'S IMPLEMENTATION OF PRESIDENT TRUMP'S MAY 2025 NUCLEAR ENERGY EXECUTIVE ORDERS

March 19, 2026

Chairman Lee, Ranking Member Heinrich, and members of the committee, thank you for the opportunity to testify today. My name is John Wagner, and I am the director of the Idaho National Laboratory (INL), the nation's nuclear energy research, development, and demonstration center. In this role, I lead a Department of Energy (DOE) national laboratory with more than 6,000 scientists, engineers, and support staff focused on changing the world's energy future and securing our nation's critical infrastructure.

I hold a Bachelor of Science degree in nuclear engineering from the Missouri University of Science and Technology and Master of Science and Doctorate degrees in nuclear engineering from the Pennsylvania State University. My career has been deeply involved with every aspect of the nuclear fuel cycle. My first position following graduate school was with a private company designing and licensing spent nuclear fuel storage and transportation systems. Later, during a 17-year tenure at Oak Ridge National Laboratory, I supported DOE and the Nuclear Regulatory Commission (NRC) on long-term storage, transportation, and disposal issues, ultimately serving as director of the Reactor and Nuclear Systems Division. I joined INL in February 2016, progressing from chief scientist for the Materials and Fuels Complex to associate laboratory director for the Nuclear Science and Technology Directorate before becoming laboratory director. I am the author and co-author of more than 170 refereed journal and conference articles, technical reports, and conference summaries, and a Fellow of the American Nuclear Society and the American Association for the Advancement of Science.

I am grateful for the opportunity to testify before this committee at what I believe is the most consequential moment for American nuclear energy in the past half-century.

OPENING: AMERICA'S NUCLEAR MOMENT

We stand at an unprecedented inflection point for American nuclear energy. For the first time in decades, market forces, national-security imperatives, and federal and state policy have achieved remarkable alignment. The question is no longer whether America needs nuclear energy, rather it is how much, how quickly, and how to make it happen.

This moment differs from past nuclear "renaissances" in fundamental ways. Historic energy-demand growth driven by data centers and artificial-intelligence (AI) infrastructure, unprecedented private-sector investment flowing into nuclear technologies, the emergence of genuinely new reactor developers, and critical national-security needs requiring reliable baseload power have converged with bipartisan Congressional support and a federal commitment to removing decades of regulatory barriers. Secretary of Energy Chris Wright has stated that AI will rapidly accelerate our ability to make nuclear reactors faster, cheaper, and more capable. He has also noted that nuclear power is the only viable 24/7 non-carbon-emitting power source for the infrastructure America needs to lead the world in AI.[1] This time, market demand is driving the resurgence, not just policy aspiration.

The scale of ambition is not modest. Administration policy calls for expanding American nuclear capacity from approximately 100 GW today to 400 GW by 2050, which requires a quadrupling of the nuclear fleet in less than 30 years.[2] Achieving this necessitates facilitating 5 GW of power uprates at our 94 existing reactors,[3] restarting shutdown reactors where possible, demonstrating and deploying the next generation of advanced microreactors and small modular reactors, and having at least 10 new large reactors under construction by 2030. Four executive orders signed in May 2025 established the most aggressive nuclear-deployment timelines in American history, with the goal of three reactors achieving criticality by July 4, 2026.[4]

China and Russia have advanced their nuclear capabilities while American deployment has stagnated for nearly 40 years, and they account for the vast majority of planned new reactors globally.[5] China and Russia account for 94% of all reactors currently under construction worldwide (59 of 63 units) and initiated 44 of 45 reactor construction starts globally from January 2020 through mid-2025. China alone has 32 reactors under construction, while Russia's state-owned Rosatom is building 27 units, including 20 reactors in seven other countries, dominating the international-export market.[6, 7, 8] China and Russia have engaged in successful nuclear diplomacy and have commercial nuclear export programs intended to reduce costs and increase certainty for countries interested in expanding existing nuclear programs and nuclear newcomers.[9] Competition for nuclear expansion is not limited to terrestrial applications. China's reported collaboration with Russia on a 1.5 MW nuclear reactor deployed on the moon by

[1] Chris Wright, Secretarial Order, "Unleashing the Golden Era of American Energy Dominance." February 5, 2025. https://www.energy.gov/articles/secretary-wright-acts-unleash-golden-era-american-energy-dominance.

[2] Executive Order 14300, "Ordering the Reform of the Nuclear Regulatory Commission." May 23, 2025. https://www.govinfo.gov/content/pkg/FR-2025-05-29/pdf/2025-09798.pdf.

[3] https://www.energy.gov/ne/utility-power-reactor-incremental-scaling-effort-uprise ~~LINK TO UPRISE ANNOUNCEMENT~~

[4] Executive Order 14301, "Reforming Nuclear Reactor Testing at the Department of Energy." May 23, 2025. https://www.govinfo.gov/content/pkg/FR-2025-05-29/pdf/2025-09799.pdf.

[5] Daniel Helmeci and Jonas Goldman, "Reframing the U.S. Role in a New Nuclear Renaissance: Ensuring Flexibility in Fuel Procurement as a Counter to FEOC Influence." November 17, 2025. Carnegie Endowment for international Peace. https://carnegieendowment.org/research/2025/11/reframing-the-us-role-in-a-new-nuclear-renaissance-ensuring-flexibility-in-fuel-procurement-as-a-counter-to-feoc-influence?lang=en.

[6] International Atomic Energy Agency (IAEA), "Six Global Trends in Nuclear Power You Should Know." November 24, 2025. https://www.iaea.org/newscenter/news/six-global-trends-in-nuclear-power-you-should-know.

[7] World Nuclear Association, *World Nuclear Performance Report 2025*, January 2025. https://world-nuclear.org/our-association/publications/global-trends-reports/world-nuclear-performance-report.

[8] Mycle Schneider Consulting, World Nuclear Industry Status Report 2025: The Independent Assessment, Paris, France, September 2025. https://www.worldnuclearreport.org.

[9] Sarah Sobalvarro, "US Inaction Is Ceding the Global Nuclear Market to China and Russia." April 2, 2025. Wilson Center. https://www.wilsoncenter.org/article/us-inaction-ceding-global-nuclear-market-china-and-russia.

2036,[10] demonstrates how our competitors are positioning nuclear technology as the foundation for long-term strategic advantage in space. We must reclaim nuclear leadership to project American values and standards globally.

Against this backdrop, INL has an essential role. The executive order "Reforming Nuclear Reactor Testing at the Department of Energy" states that "The Idaho National Laboratory has principal responsibility for constructing and testing new reactor designs."[11] Correspondingly, test beds are being completed, reactor components are being fabricated and assembled, fuel is being fabricated, AI tools are being developed, and much more. This work is happening now, and with an urgency that reflects what this moment demands.

The United States previously led the development of civilian nuclear power. Fifty-two reactors were designed, built, and operated at what is now INL, more than any other place in the world. This committee helped create this moment, and with your continued leadership and support, we are making this a reality.

THE POLICY FOUNDATION: WHAT HAS BEEN BUILT AND WHAT REMAINS

Legislative Achievements Creating the Framework

Congress, largely driven by this committee, has provided critical bipartisan support through landmark legislation that has fundamentally reshaped the policy landscape for nuclear energy deployment. I will summarize the essential provisions here and focus my more detailed discussion on where gaps remain and where additional legislative action is most needed.

The Infrastructure Investment and Jobs Act (IIJA) (2021) and Inflation Reduction Act (IRA) (2022) together deliver more than $40 billion in direct funding and tax incentives that are reshaping the economics of nuclear power in the United States. The IIJA's $6-billion Civil Nuclear Credit Program helped prevent premature closure of economically viable existing reactors. The IRA's production and investment tax credits, estimated to provide approximately $30 billion in support for existing plants over their remaining operational lives, finally recognize nuclear energy's contribution to grid reliability in ways that wholesale electricity markets historically have not.

The Prohibiting Russian Uranium Imports Act (May 2024) banned imports of low-enriched uranium (LEU) from Russia beginning August 2024 and unlocked $2.72 billion for domestic LEU and high-assay low-enriched uranium (HALEU) production, in addition to $700 million specifically for HALEU from the Inflation Reduction Act. This legislation addresses one of our

[10] Bhavya Lal and Roger Myers, "Weighing the Future: Strategic Options for U.S. Space Nuclear Leadership." INL/RPT-25-85616. https://inl.gov/content/uploads/2023/07/Weighing-the-Future_Strategic-Options-for-U.S.-Space-Nuclear-Leadership.pdf.

[11] Executive Order 14301, "Reforming Nuclear Reactor Testing at the Department of Energy." May 23, 2025. https://www.govinfo.gov/content/pkg/FR-2025-05-29/pdf/2025-09799.pdf.

most critical vulnerabilities: virtually all uranium currently used in American reactors is imported, with Russia supplying approximately 25–27% of enrichment services.

The ADVANCE Act (July 2024) represents some of the most significant nuclear energy legislation since the Atomic Energy Act. It modernizes the NRC through comprehensive reforms addressing longstanding barriers to advanced-reactor deployment. Most consequentially, it mandates completion of licensing reviews within 18 months for certain new reactors, eliminating the open-ended timelines that have historically plagued nuclear projects; cuts licensing fees for advanced reactor applicants by 50%; streamlines National Environmental Policy Act (NEPA) environmental review processes; and updated the NRC's mission statement, which now reads: "The NRC protects public health and safety and advances the nation's common defense and security by *enabling* the safe and secure use and deployment of civilian nuclear energy technologies and radioactive materials through efficient and reliable licensing, oversight, and regulation for the benefit of society and the environment." The word "enabling" represents a genuine philosophical shift in how the nation's nuclear regulator understands its role.

The FY2026 National Defense Authorization Act (December 2025) provided critical statutory clarity for Department of Defense (DoD) nuclear-energy deployment. Section 318 designates an executive agent within the DoD for installation and operational nuclear energy, establishing clear organizational accountability for what has historically been fragmented across multiple DoD components. Section 321 establishes a 10-year Navy small modular reactor pilot program for Navy shore-installation energy needs. Section 8366, the **International Nuclear Energy Act of 2025**, establishes a comprehensive legislative framework to reassert U.S. leadership in the global civil-nuclear market, authorizing $65.5 million over fiscal years 2026–2030 for export support, establishing a Nuclear Export Working Group, and mandating pursuit of at least 20 new Section 123 peaceful nuclear-cooperation agreements.[12]

Four May 2025 Executive Orders

The four nuclear-specific executive orders signed on May 23, 2025, represent the most comprehensive Administration-led reform of American nuclear policy in recent history:[13]

EO 14302 — Reinvigorating the Nuclear Industrial Base establishes America's path to nuclear energy dominance by securing fuel supply chains, further expanding domestic uranium capabilities, and leveraging the Defense Production Act to build nuclear-industry consortia. It establishes the Fuel Line Pilot Program and directs comprehensive action across the full fuel cycle, from domestic uranium mining and enrichment through recycling and reprocessing.

EO 14301 — Reforming Nuclear Reactor Testing at DOE finds that the design, construction, and operation of non-commercial advanced reactors under DOE control are for research purposes and thus within DOE jurisdiction. It creates the Reactor Pilot Program with the goal of at least three reactors achieving criticality by July 4, 2026, authorizes DOE to expedite qualified test

[12] FY2026 National Defense Authorization Act, Public Law No. 119-60, signed December 18, 2025.
[13] "9 Key Takeaways from President Trump's Executive Orders on Nuclear Energy." U.S. Department of Energy, Office of Nuclear Energy. June 10, 2025. https://www.energy.gov/ne/articles/9-key-takeaways-president-trumps-executive-orders-nuclear-energy.

reactors to operational status within two years of substantially complete applications, and explicitly recognizes INL's principal responsibility for constructing and testing new reactor designs. This order, and what it enables at INL and sites across the nation, is central to the discussion that follows.

EO 14300 — Ordering the Reform of the Nuclear Regulatory Commission mandates comprehensive regulatory reform, directing the NRC to complete rulemakings within 18 months, provide final decisions within 18 months for new reactors, adopt science-based radiation limits, and establish expedited pathways for reactors tested by DOE and DoD. It directs that the NRC accelerate many reforms identified in INL's April 2025 report, *Recommendations to Improve Nuclear Licensing.*[14]

EO 14299 — Deploying Advanced Nuclear Reactor Technologies for National Security positions nuclear energy as critical defense infrastructure. The Army must establish nuclear-reactor operations at a military base by September 2028, DOE must deploy advanced reactors within 30 months, and the State Department will pursue 20 new international nuclear-cooperation agreements.

These nuclear-specific orders were accompanied by EO 14303, "Restoring Gold Standard Science," which establishes that federal agencies should be "skeptical of findings and assumptions" and that "highly unlikely and overly precautionary assumptions and scenarios should only be relied upon in agency decision-making where required by law or otherwise pertinent to the agency's action." This principle has direct and significant relevance to nuclear regulation, where decades of overly conservative assumptions have imposed substantial costs without commensurate safety benefits.

What the Policy Framework Has Not Yet Fully Resolved

The legislative and executive action described above is historic. But its promises will only be realized if the underlying statutory framework enables DOE and its national laboratories to move with the speed these timelines demand. Several statutory gaps remain that this committee is well-positioned to address, and I will return to these in detail later in this testimony.

ON THE GROUND: WHAT'S HAPPENING AT INL TODAY

The four executive orders signed in May 2025 did not find INL unprepared. The work described in this section reflects INL's direct and ongoing response to those orders — accelerating test bed construction, advancing reactor demonstrations, strengthening fuel cycle capabilities, and supporting the Reactor Pilot and Fuel Line Pilot Programs. In each case, the connection to specific EO directives is explicit and the progress is measurable.

[14] Stephen J. Burdick, John C. Wagner, and Jess C. Gehin, "Recommendations to Improve Nuclear Licensing." Idaho National Laboratory. INL/RPT-25-84292. https://inl.gov/content/uploads/2024/11/Recommendations-to-Improve-Nuclear-Licensing.pdf.

The Reactor Development Pathway and INL's Infrastructure as an Essential Enabler

For members less familiar with nuclear technology, a brief explanation provides essential context. Nuclear fission occurs when an atom's nucleus splits, releasing enormous amounts of energy. When enough fissile material is assembled in the right configuration, it achieves "criticality," a sustained fission chain reaction. Reactors are carefully designed systems that control this process to generate heat, which produces electricity.

Most advanced-reactor designs build on concepts demonstrated decades ago, many of them proven at INL. The development process follows a structured path: from initial design and fundamental research, through critical experiments demonstrating the physics, through dry or low-power criticality, to a fully operational power system generating electricity. This progression allows developers to validate safety and performance at each stage before advancing to the next. The interdependencies are significant: reactor physics, nuclear materials and fuels research, and the fuel cycle all must advance together.

These interdependencies underscore why achieving the timelines outlined in this testimony requires unprecedented collaboration across the entire nuclear-innovation ecosystem. National laboratories provide specialized testing infrastructure and research expertise, universities advance fundamental science while training the workforce, and private companies bring innovation and commercial discipline. When these sectors work in true partnership sharing data, facilities, and expertise, we can compress development cycles that historically took decades into timeframes measured in years.

No other institution in the world operates the integrated suite of facilities INL has assembled to support this development pathway. These facilities represent decades of federal investment. They cannot be rapidly replicated. And new capabilities are being designed, developed, and completed on timelines accelerated to meet the goals of the executive orders and the needs of industry.

The Reactor Demonstration Ecosystem

DOME — Demonstration of Microreactor Experiments. The former EBR-II facility is being repurposed as DOME, a premier national testing facility enabling rapid microreactor demonstrations in existing nuclear-qualified infrastructure. Construction completion, anticipated by March 31, 2026, was accelerated by almost a year from the original schedule to meet EO goals. DOME is designed for advanced microreactors up to 20 MWth using HALEU fuels, and the facility will be ready for installation of the first demonstration system in April 2026. The significance of this facility cannot be overstated. Repurposing existing nuclear infrastructure, rather than building from greenfield, dramatically reduces the time and cost of reactor demonstrations compared to any alternative approach. Radiant's Kaleidos Demonstration Unit is the first reactor scheduled for installation and testing in DOME in Spring 2026.

To support reactor testing in DOME, INL is developing a comprehensive reactor-testing ecosystem that includes facilities for fueling, transporting, defueling, and decommissioning reactors — the full lifecycle infrastructure that reactor developers cannot efficiently build themselves.

LOTUS — Laboratory for Operation and Testing in the United States. The LOTUS test bed will host experimental microreactors up to 500 kWth that require an enhanced security posture, providing a safe environment for developers to test nuclear systems going critical for the first time. LOTUS is designed specifically for first-of-a-kind reactors, providing the safety envelope and operational experience that supports subsequent NRC commercial licensing.

SPARC — System Physics Advanced Reactor Critical Facility. SPARC will reclaim U.S. capability for large-scale critical experiments using a horizontal split table, a flexible experimental capability for nuclear-physics testing of new fuels and reactor designs that this country has lacked for decades. The facility will support licensing, deployment, and optimization of advanced fuels and reactors and has received strong industrial support that demonstrates its direct relevance to EO implementation. INL is leading engineering, installation, and future operations, with collaborative support from Oak Ridge National Laboratory, Los Alamos National Laboratory, and Lawrence Livermore National Laboratory.

RACE — Reactor and Critical Experiment Facility. RACE will support defense and space reactor systems, including Antares' reactor experiments and future programs. The facility structure originally housed the ML-1 reactor in the 1960s and will undergo anticipated modifications to support upgrade to Hazard Category 2 nuclear facility status.

Together, DOME, LOTUS, SPARC, and RACE constitute an integrated ecosystem for nuclear demonstration that is unique in the world. Each facility serves a distinct purpose in the development pathway, and together they enable INL to support multiple reactor technologies simultaneously at different stages of development. No foreign competitor possesses a comparable integrated system.

Reactors in Progress: Real Milestones, Real Dates

Microreactor Applications Research Validation and EvaLuation (MARVEL). This 85 kW DOE test reactor is helping INL reestablish the full capability to develop new reactor systems from concept through operation. MARVEL provides a research platform for understanding microreactor applications while supporting licensing, environmental assessments, and deployment strategies. Recent milestones include completion of the Primary Coolant Apparatus Test in May 2025, submission of the updated Preliminary Documented Safety Analysis in September 2025, and start of fuel fabrication at TRIGA International in November 2025. Initial dry criticality is targeted for late in calendar year 2026.[15] MARVEL is not just a reactor, it is proof of process. Its successful development has restored institutional muscle in new reactor authorization that had atrophied during decades without new builds.

The Reactor Pilot Program (EO 14301). As of December 2025, ten companies and eleven projects have been selected as participants: Aalo Atomics, Oklo, Radiant, Antares, Natura Resources, Deep Fission, Terrestrial Energy, Last Energy, Valar Atomics, and Atomic Alchemy.[16] INL is providing direct technical support to multiple participants, including infrastructure access,

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[15] Learn more at https://inl.gov/marvel/.

[16] U.S. DOE, "U.S. Department of Energy Reactor Pilot Program." Accessed January 2026. https://www.energy.gov/ne/us-department-energy-reactor-pilot-program.

safety analysis support, and fuel cycle services. Multiple reactors are targeting the July 4, 2026, criticality deadline.[17] I am optimistic that we will see at least three reactor criticalities by July 4 of this year and that these reactors will demonstrate that achievement with full adherence to the gold standard of safety and security the American public expects.

Project Pele. Developed by BWXT for the DoD, Pele is a mobile microreactor delivering 1–5 MW of electrical power that will help our armed forces reduce dependence on diesel fuel in remote or emergency locations. INL received TRISO fuel in November 2025,[18] validating the fuel supply chain and paving the way for military and eventual commercial applications. Full-power demonstration operations are planned for late 2028 at INL's Critical Infrastructure Test Range Complex,[19] with early 2028 initiation of testing.

The Fuel Cycle: INL's Unmatched Capabilities at the Materials and Fuels Complex

INL is not just a reactor institution – it is a fuel cycle institution, and that distinction is strategically important. The nation's 400-GW ambition cannot be achieved without a comprehensive domestic fuel cycle, and INL's Materials and Fuels Complex (MFC)[20] represents the most capable fuel-cycle research infrastructure in the United States.

The Hot Fuel Examination Facility[21] enables post-irradiation examination of spent fuel to understand performance and failure mechanisms that no other facility can match. The Fuel Cycle Facility produces HALEU from spent nuclear fuel from EBR-II through pyroprocessing of DOE-owned sodium-bonded metal fuel. This uranium recovered and downblended from highly enriched uranium provides a critical bridge supply while commercial HALEU capabilities develop.

HALEU: The Fuel Supply Challenge. HALEU, uranium enriched to 5–20% U-235, enables advanced-reactor designs to achieve smaller physical footprints with improved efficiency. Currently, no commercial-scale HALEU production exists outside of Russia and China, and commercial supply remains effectively monopolized by Russia's Tenex. INL and other DOE facilities are working to provide meaningful quantities to industry from existing inventories, and the Centrus enrichment demonstration facility in Ohio has produced approximately 900 kg of HALEU as of June 2025 — the first domestic HALEU enrichment in over 70 years.[22] But projected demand through the 2026–2030 period from advanced reactor demonstrations, military deployments, and early commercial orders will far exceed current production capacity. Advanced-reactor demonstrations, military deployments, and potential commercial orders will

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[17] Neil Ford, "Nuclear Startups Bullish on Hitting US Pilot Program Deadlines." Reuters. February 24, 2026. https://www.reuters.com/business/energy/nuclear-startups-bullish-hitting-us-pilot-program-deadline--reeii-2026-02-24/.

[18] INL Media Relations, "INL Advances Department of Wars Project Pele Demonstration Microreactor with First TRISO Fuel Delivery." December 2, 2025. https://inl.gov/news-release/inl-advances-department-of-wars-project-pele-demonstration-microreactor-with-first-triso-fuel-delivery/

[19] Learn more at https://inl.gov/national-security/test-range-facilities/.

[20] Learn more at https://inl.gov/mfc/.

[21] Learn more at https://inl.gov/document/hot-fuel-examination-facility/.

[22] Centrus Energy, HALEU production update, June 2025.

all compete for limited HALEU supplies during this critical period. This is why recent decisions to pursue nuclear fuel recycling and maximize the beneficial use of DOE-owned material inventories are so critical.

INL has developed the Zirconium Extraction (ZIRCEX) process specifically to recover HEU from a range of used fuels, then downblend the recovered uranium to HALEU levels, providing an important additional domestic feedstock. Used fuel from INL's Advanced Test Reactor and other similar sources across the DOE complex have also been identified as a potential HALEU resource. These pathways require time and investment, but they represent meaningful opportunities to diversify the domestic HALEU supply chain.

The Fuel Line Pilot Program, established under EO 14302, is accelerating domestic fuel fabrication by establishing a domestic nuclear-fuel supply chain under DOE authorization. Five companies have been selected: TRISO-X (X-energy), Oklo, Terrestrial Energy, Standard Nuclear, and Valar Atomics.[23] INL is providing technical support to each, leveraging MFC capabilities that cannot be replicated outside a national laboratory context.

Back End of the Fuel Cycle: Center for Used Fuel Research at INL

A significant and timely step toward addressing the back-end challenge came in January 2026, when DOE formally established the Center for Used Fuel Research at INL,[24] officially designating the laboratory as its leading institution for research, development, and demonstration efforts concerning used nuclear fuel management. This designation delivers on a key element of the 1995 Idaho Settlement Agreement and was made possible by a targeted waiver of that agreement reached between DOE and the State of Idaho in April 2025, a testament to the kind of creative, mission-focused partnership that this nuclear moment demands. The Center is designed as a national and international hub, operating through a hub-and-spoke model that connects INL with other national laboratories, universities, and industry partners across the country and abroad. Its mandate to support safe storage and transportation of both commercial and DOE-managed used nuclear fuel while building public confidence and advancing technical solutions addresses one of the most consequential and long-deferred responsibilities in the entire nuclear enterprise. The Center gives the nation's premier nuclear laboratory a formal, funded institutional home for the used-fuel challenge, and this committee's sustained support for the Center's research agenda will be essential to translating that designation into durable national progress.

Nuclear Waste Management.

A comprehensive nuclear strategy requires addressing the full fuel cycle, including the back end. DOE's pursuit of state-led nuclear innovation campuses marks a significant and much-needed step forward in ultimately addressing the nation's nuclear waste management stalemate. But it is only a first step. The Nuclear Waste Policy Act of 1982, as amended in 1987, reflects national priorities from four decades ago, designed for a nuclear landscape dominated by large light-water

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[23] U.S. DOE, "U.S. Department of Energy Fuel Line Pilot Program." https://www.energy.gov/ne/energy-department-fuel-line-pilot-program.

[24] U.S. DOE, Department of Energy Establishes Center for Used Fuel Research at Idaho National Laboratory." January 14, 2026. https://www.energy.gov/ne/articles/department-energy-establishes-center-used-fuel-research-idaho-national-laboratory.

reactors with no consideration of advanced-reactor fuel cycles, potential recycling pathways, or the need for consolidated interim storage while permanent disposal solutions are developed. As I testified before this committee in November 2023, only Congress can provide the updated framework needed to address the full spectrum of spent-fuel management challenges facing our expanding nuclear enterprise. That need has only grown more urgent as the advanced reactor fleet begins to take shape. However, updating this framework is a complex undertaking that must be pursued thoughtfully and in partnership with DOE and interested states — and the time to begin is now.

The Nuclear Energy Launch Pad: Bridging the Demonstration Gap

One of the challenges facing every nuclear energy "renaissance" of the past 30 years was that technology that works in a laboratory or test environment cannot make the leap to commercial deployment because the intermediate demonstration step is prohibitively expensive, time-consuming, and uncertain. The Nuclear Energy Launch Pad is INL's answer to this chronic failure point.[25]

Launch Pad INL establishes the nation's first modern, comprehensive nuclear-demonstration ecosystem, a 2,000+ acre dedicated site at INL specifically designed to support privately funded advanced nuclear facilities across the full spectrum of reactor demonstration and fuel-cycle activities. The site accommodates advanced reactors of diverse designs and scales, fuel-fabrication facilities for new fuel forms, fuel-recycling and reprocessing operations, and other innovative nuclear technologies. The Launch Pad INL pathway is complemented by Launch Pad USA, a second pathway that allows developers to demonstrate at other DOE sites, national laboratories, or non-federal locations nationwide all with the flexibility to leverage regional and site-specific advantages.

The concept leverages the successful NASA Stennis and Marshall Space Flight Center models, which fundamentally reimagined how the United States supports aerospace innovation by consolidating shared infrastructure that individual developers cannot efficiently duplicate. Launch Pad provides established frameworks and shared infrastructure that allow developers to focus resources on their core technologies. Rather than requiring each company to independently navigate site characterization, environmental reviews, infrastructure development, and regulatory pathways — processes that typically consume years and millions of dollars — developers can turn their first shovel of dirt without duplicating work that Launch Pad has already done for them.

A critical feature of Launch Pad is its dual-pathway approach to regulatory strategy. Developers can choose between DOE authorization pathways that accelerate demonstration timelines or pursue NRC licensing for facilities intended for commercial power production or services. This recognizes that different technologies and different business models require different regulatory frameworks, while preserving the option to transition from DOE-authorized demonstrations to NRC-licensed commercial operations as technologies mature. Successful demonstrations under DOE authorization provide validated operational data and regulatory precedents that advance subsequent NRC licensing and commercial deployment at private sites.

[25] Learn more at https://nric.inl.gov/nuclear-energy-launch-pad-at-idaho-national-laboratory/.

ACCELERANTS: AI, THE NUCLEAR RESURGENCE, AND AMERICA'S GLOBAL POSITION

AI as INL's Force Multiplier

The connection between artificial intelligence and nuclear energy is not metaphorical, it is operational, and it runs in both directions. AI accelerates nuclear development; nuclear enables AI infrastructure. Understanding both directions is essential to grasping the strategic significance of INL's current work.

INL is collaborating with world leaders in AI, including Amazon, Microsoft, NVIDIA, and Atomic Canyon, to develop customized generative-AI tools aimed at enhancing design, safety analysis, manufacturing, and operational processes. In partnership with Oak Ridge and Argonne National Laboratories, INL recently showcased a conceptual design tool capable of generating 3D computer-aided design models, building multi-physics input decks, running advanced simulations, and rendering results with significant automation. While this research is still in its early stages, it demonstrates a promising integration of national-laboratory simulation capabilities and industry generative-AI models that has the potential to revolutionize the design process. INL has also begun initial automation of documented safety analyses in the DOE-STD-3009 format. This work is still led by human engineers, but with automation potential that could significantly reduce the time required for preparing documentation for submission. In the realm of reactor operations, INL has achieved the first autonomous non-nuclear demonstration at the MAGNET test bed[26] and the first digital twin of a nuclear reactor in collaboration with Idaho State University.[27]

Early feedback from INL researchers using AI for development of nuclear modeling and simulation applications indicates that development speed has more than doubled for tasks such as drafting documentation, writing tests, and integrating algorithm details into code. These tools have also been invaluable in debugging and resolving compilation errors. The productivity gains are real and growing.

PROMETHEUS is INL's nuclear moonshot: a first-of-its-kind demonstration of an autonomous reactor designed, analyzed, manufactured, and operated by AI systems with minimal human intervention. By validating a complete AI-driven pipeline from generative design and autonomous safety analysis to advanced manufacturing and operations, PROMETHEUS promises up to fivefold schedule acceleration and multi-billion-dollar cost savings, enabling rapid deployment of reactors for critical applications such as AI data centers and national-security missions.

VULCAN tackles one of the most persistent bottlenecks in nuclear innovation: materials discovery and qualification. Through AI-driven discovery, high-throughput autonomous experimentation, and regulatory-compliant data generation, VULCAN could compress decadal

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[26] Learn more at https://inl.gov/document/microreactor-agile-non-nuclear-experimental-test-bed-magnet/.

[27] U.S. DOE, "Idaho National Laboratory Demonstrates First Digital Twin Simulated Microreactor." July 14, 2022. https://www.energy.gov/ne/articles/idaho-national-laboratory-demonstrates-first-digital-twin-simulated-microreactor.

timelines to years, potentially unlocking revolutionary alloys and fuels essential for advanced reactors. The limiting constraint on advanced reactor deployment is often not reactor design but materials qualification, a process that has historically consumed 10 to 20 years. VULCAN directly attacks that constraint.

The Genesis Mission represents DOE's coordinated national effort to accelerate AI adoption across all 17 national laboratories, creating a unified framework that applies AI to complex scientific and engineering challenges.[28] INL's PROMETHEUS and VULCAN are contributing to this national framework, positioning the laboratory system as a cohesive force in advancing nuclear technology applications. The Genesis Mission will apply this platform to nuclear-energy challenges creating a new paradigm for nuclear energy that shortens development timelines while strengthening safety and performance.

The AI-nuclear symbiosis has a concrete institutional expression that this committee should understand: an advanced reactor co-located with a data center at a national laboratory would demonstrate this partnership in action. The reactor provides reliable, clean power for energy-intensive AI computing; AI algorithms continuously optimize reactor operations and accelerate safety validation. This pairing addresses two challenges simultaneously, and it has commercial precedent with Microsoft's 20-year commitment to Three Mile Island Unit 1, now the Crane Clean Energy Center, and similar announcements from Google, Amazon, and Oracle demonstrating the market pull that makes this economic model viable.

The Global Stakes: Why Speed Matters

The urgency of INL's work and the importance of removing statutory barriers need to be fully understood in the context of what our global competitors are doing.

China and Russia have advanced their nuclear capabilities while American deployment has stagnated for nearly 40 years. They account for 94% of all reactors currently under construction worldwide: 59 of 63 units. China alone has 32 reactors under construction; Russia's state-owned Rosatom is building 27 units, including 20 reactors in seven other countries, dominating the international export market.[29] Since 2017, 92% of all nuclear-reactor construction starts globally have been Chinese or Russian designs. China is likely to become the world's leader in nuclear capacity by 2030, surpassing the United States.

China's reported collaboration with Russia on a 1.5 MW nuclear reactor deployed on the moon by 2036 demonstrates how our competitors are positioning nuclear technology as the foundation for long-term strategic advantage in space.[30] We must reclaim nuclear leadership across all domains.

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[28] Learn more at https://genesis.energy.gov/.
[29] International Atomic Energy Agency, "Six Global Trends in Nuclear Power You Should Know." November 24, 2025. https://www.iaea.org/newscenter/news/six-global-trends-in-nuclear-power-you-should-know; World Nuclear Association, *World Nuclear Performance Report 2025*, January 2025.
[30] Bhavya Lal and Roger Myers, "Weighing the Future: Strategic Options for U.S. Space Nuclear Leadership." INL/RPT-25-85616.

What's at stake is not merely market share. Nations purchasing nuclear reactors select not just technology, but long-term strategic partners. The vendor relationship encompasses fuel-supply and enrichment services, operational training and technical support, maintenance and component manufacturing, regulatory-framework development, research collaboration, and nonproliferation monitoring across a 60-to-80-year operational relationship. When American companies win reactor contracts, these relationships advance U.S. foreign-policy objectives, strengthen alliances, and ensure global nuclear development follows robust safety and security standards. When China or Russia win, they export their standards, their fuel relationships, and their geopolitical influence for generations.

The competition for nuclear exports is ultimately a competition to shape the global nonproliferation regime itself.

Recent developments suggest meaningful opportunity for American resurgence. Poland selected Westinghouse AP1000 technology for its first nuclear power plant — a three-unit project valued at approximately $47 billion, representing a major strategic win for the U.S.-Polish partnership.[31] Ukraine has committed to nine AP1000 reactors.[32] Bulgaria selected the AP1000 in 2023 for two units at the Kozloduy site.[33] Romania selected NuScale for SMR deployment. Other countries are actively evaluating AP1000 reactors and other U.S. technologies.

The Domestic Deployment Imperative for Export Success. The key link between what happens at INL and what happens in Poland or Romania is this: foreign customers purchase proven technology. A 2024 INL analysis identified 65 potential sites across the United States where AP1000s could be deployed, finding that 18 are particularly promising for near-term deployment, with an additional 29 sites having strong potential.[34] Industry analysis suggests subsequent AP1000 deployments beyond Vogtle could achieve 25–55% construction-cost reductions through standardized designs, modular construction techniques, an experienced workforce, and established supply chains.[35] DOE analysis projects that the next AP1000 could achieve levelized costs under $100/MWh, approaching approximately $60/MWh with available incentives and construction improvements. That trajectory creates a fundamentally different competitive picture than the $30 billion that Vogtle Units 3 and 4 cost, and it enables U.S. companies to compete for the hundreds of billions of dollars in global reactor contracts that will be awarded over the coming decades.

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[31] U.S. Department of Energy, "United States Signs Agreement to Advance American Civil Nuclear Deal in Poland." April 28, 2025. https://www.energy.gov/articles/united-states-signs-agreement-advance-american-civil-nuclear-deal-poland.

[32] World Nuclear News, "Work under way for first Westinghouse AP1000 in Ukraine." April 15, 2024. https://www.world-nuclear-news.org/Articles/Work-under-way-for-first-Westinghouse-AP1000-in-Uk.

[33] Westinghouse Electric Company, "Westinghouse Signs Contract for Engineering of AP1000 Reactors in Bulgaria." Press release, November 4, 2024.

[34] Bradley J. Williams, John C. Wagner, and Jess C. Gehin, "Opportunities for AP1000 Deployment at Existing and Planned Nuclear Sites." Idaho National Laboratory. INL/MIS-24-80216. August 2024. https://inldigitallibrary.inl.gov/sites/STI/STI/Sort_128167.pdf.

[35] Ryan Spangler et al., "Potential Cost Reduction in New Nuclear Deployments Based on Recent AP1000 Experience." Idaho National Laboratory. INL/RPT-25-84701. https://sai.inl.gov/content/uploads/29/2025/06/M3_SAI-AP1000_Lessons_Rev6-nocomments-002.pdf.

No amount of export financing, no expansion of Section 123 agreements, and no diplomatic engagement can substitute for the credibility that comes from active domestic deployment and operational experience. Every advanced reactor INL demonstrates builds the U.S. export case.

The International Nuclear Energy Act of 2025, included in the FY2026 NDAA, creates important tools including a Nuclear Export Working Group, $65.5 million for export support and technical assistance, a strategy to counter Rosatom influence, and direction to pursue 20 new Section 123 agreements. These tools will be far more effective in the hands of a country that is actively building and demonstrating advanced reactors at home.

THE CASE FOR EXPANDED DOE AUTHORIZATION

This section addresses what I believe is an important and actionable policy contribution this committee can consider to further accelerate and support America's nuclear buildout. The ADVANCE Act has reformed the NRC. The executive orders have pushed DOE to move with new urgency. But the statutory foundation for DOE's authorization role, the framework that determines what private-sector reactors can proceed under DOE authority versus what requires NRC licensing, contains gaps and ambiguities that are already creating friction and may impede progress as the Reactor Pilot Program and Launch Pad advance.

I want to be precise about the committee's role here. The Senate Committee on Energy and Natural Resources has direct jurisdiction over DOE programs and activities. The Senate Committee on Environment and Public Works (EPW) has jurisdiction over the NRC. Accordingly, the DOE authorization recommendations I make in this section fall squarely within this committee's purview. Recommendations that require changes to the Atomic Energy Act as administered by the NRC will ultimately need to work through the EPW Committee, and I will note those distinctions clearly.

How the Current Authorization Framework Works and Where It Falls Short

INL has published detailed analysis of these statutory questions in its April 2025 report, *Recommendations to Improve Nuclear Licensing*, which I commend to the committee's attention as a technical resource.[36] I will summarize the key issues here.

The basic principle is straightforward: Section 110 of the Atomic Energy Act provides that nothing in that law shall be deemed to require a license from the NRC for "the construction or operation of facilities under contract with and for the account of [DOE]." This starting position means that nuclear facilities operated under DOE contracts, for example, test reactors operated at national laboratories, do not need an NRC license and can proceed under DOE authorization.

The complication arises from Section 202 of the Energy Reorganization Act, which carves out certain categories of facilities that are subject to NRC licensing notwithstanding AEA Section 110. The most consequential of these carve-outs covers "other demonstration nuclear reactors" when "operated in any other manner for the purpose of demonstrating the suitability for commercial application of such a reactor." The problem is that this language is undefined, and

[36] Burdick, Wagner, and Gehin, *Recommendations to Improve Nuclear Licensing*, INL/RPT-25-84292 (April 2025). *See supra* note 19.

one could reasonably argue that virtually any demonstration project with a private company proponent is being pursued as part of eventual commercial application. This ambiguity has the potential to force projects into NRC licensing timelines that may create challenges to meeting the ambitious goals and timelines of EO 14301 and the same ambiguity creates the risk that individual facilities may face conflicting DOE and NRC jurisdictional claims.

There is a second, more fundamental gap. DOE's existing authorization authority is strongest for non-commercial nuclear activities conducted at government-owned or -controlled sites. But the growing demand for commercial-scale nuclear on federal lands to power AI data centers, support defense applications, and demonstrate technologies in operational environments creates situations where the technology and the site meet DOE's goals but the commercial nature of the power sale appears to require NRC licensing under longer timelines.

What Expanded DOE Authorization Would Enable

INL's *Recommendations to Improve Nuclear Licensing* report identifies two specific statutory actions this committee can advance:

First, clarify DOE's authority for non-commercial demonstration reactor projects with no exceptions (Atomic Energy Act reform). The preferred approach is to delete the "other demonstration nuclear reactors" exception from ERA Section 202 in its entirety, or to clarify it so that the NRC has licensing jurisdiction for DOE projects only for reactors that commercially sell electricity or another commercial product to an entity other than DOE. Projects constructed and operated under contract with and for the account of DOE, which do not sell commercial power, should be allowed to proceed under DOE authorization regardless of whether the intended design is the commercial design. There is no incentive for a private company to pursue a project at a national laboratory site without selling power unless the project is needed for research and development purposes and the cost simply cannot be justified otherwise. Requiring NRC licensing under these conditions could add significant time and cost without commensurate safety benefit. Note: this change to ERA Section 202 will require coordination with the Senate EPW Committee given its jurisdiction over the NRC.

Second, expand DOE's statutory authority, with appropriate limitations, to authorize commercial reactor projects on federal lands. This committee can act directly on a broader and more immediately consequential change: legislation explicitly authorizing DOE to authorize construction and operation of commercial nuclear reactor projects on federal lands. This builds on DOE's 70-year track record of safe reactor authorization including INL's 52 authorized reactors and extends it to the growing category of commercial applications on DOE sites.

At INL alone, the nuclear energy demand associated with prospective AI data center partnerships, military applications, and commercial technology demonstrations creates a category of projects that the nation needs within years, not decades. Although there have been recent improvements, NRC licensing timelines may not be able to accommodate these goals. DOE, with its deep expertise in reactor authorization, existing site infrastructure, and mission alignment with the national interest, is the right authorizing body for commercial applications on federal lands. Limiting this authority to federal lands maintains a clear geographic boundary while meeting the demonstrated need.

INL's analysis suggests at minimum a more limited change would be valuable as an interim measure, such as: authorization for DOE to authorize first-of-a-kind reactors on federal lands for up to 10 years of initial operation, with a clear framework for transitioning to NRC oversight for commercial continuation. This approach allows reliance on the efficiencies of DOE authorization in a first-of-a-kind environment while preserving the integrity of the NRC's commercial licensing role.

In addition, growing federal energy requirements, especially related to the need for mass buildout of data centers to meet various national security needs, including execution of the Genesis mission, and growing intel community requirements, would significantly benefit from improved contracting mechanisms. Specifically, granting broader authority for DOE and other agencies to enter into long-term power purchase agreements, including by permitting price premiums for national security needs, would help the federal government serve as early adopters of advanced nuclear reactors. Such authority would not only serve growing federal requirements, but also play a significant role in reducing risk for future utility-led deployments.

Safety Is Strengthened, Not Compromised

I anticipate the natural concern that this recommendation raises, and I want to address it directly: expanded DOE authorization is not regulatory relaxation. It is the application of a rigorous, experienced, evidence-based authorization framework to a broader category of nuclear activities. This distinction matters.

As I have communicated to INL's own workforce in the context of DOE's recent order reforms: the fundamental commitment to nuclear safety does not change. What changes is how we demonstrate compliance with regulatory limits. INL subject-matter experts, people who have devoted careers to nuclear safety, provided significant input in developing updated DOE directives to ensure that any changes maintain or enhance safety while enabling the urgent mission ahead. Our team drew on real operational data, radiological protection science, and practical experience to identify requirements that had become administrative burdens without corresponding safety benefits. The safety standards have not changed. What has changed is the requirement to submit redundant paperwork to multiple entities documenting compliance.

The DOE authorization framework includes the Documented Safety Analysis process, robust operating experience, and the analytical rigor of national laboratory safety expertise that has supported 52 reactor operations at INL. Stop work authority, the right and responsibility of any worker to stop work if safety is compromised, remains absolute. The flexibility created by expanded DOE authorization demands more professional judgment and responsibility, not less.

Furthermore, DOE-authorized demonstrations are not the final word on commercial safety. They generate the operational data, collected under real conditions, with real materials, in real environments, that makes subsequent NRC commercial licensing more rigorous and better-grounded in reality. The reactors demonstrated under DOE authority at INL over the past 70 years provided the technical foundation for the NRC's licensing frameworks. Expanded DOE authorization continues this tradition of building safety knowledge through operational experience, rather than attempting to resolve all safety questions through analysis before a single watt of electricity is generated.

INL's January 2026 report, *Reassessing Double-Ended Guillotine Break Requirements: Evidence-Based Analysis of Regulatory Assumptions After Five Decades of Nuclear Operation*, illustrates this principle in a specific technical context.[37] After more than 20,000 reactor-years of global commercial nuclear operation, zero double-ended guillotine breaks (DEGB: the complete, instantaneous circumferential severance of primary coolant piping) have been documented in commercial reactor coolant systems. Yet DEGB remains the fundamental design-basis assumption driving emergency core cooling system sizing, structural protection requirements, and containment design specifications, imposing estimated costs of hundreds of millions of dollars per plant without commensurate safety benefit. This is precisely the kind of outdated, legacy conservatism that the Gold Standard Science executive order directs agencies to revisit. The report recommends removing DEGB from design-basis requirements through formal rulemaking, not case-by-case exemptions, so that the technical basis applies consistently across the fleet. The NRC, under direction from EPW-jurisdictioned legislation and EO 14300, is the appropriate body to act on this specific recommendation. But it illustrates the broader principle: evidence-based regulation strengthens, rather than weakens, the safety culture that distinguishes American nuclear from all competitors.

Specific Legislative Changes Within This Committee's Jurisdiction

There are three specific legislative actions within this Committee's jurisdiction over DOE programs that I encourage the committee to consider:

1. Congressional direction clarifying that DOE may authorize offsite DOE activities for which it has statutory authority, including activities not located on government-owned or -controlled sites, without additional NRC approval, removing the geographic limitation in NRC regulations that has no statutory basis.

2. Congressional direction explicitly authorizing DOE to authorize construction and operation of commercial nuclear reactor projects on federal lands, with appropriate scope and oversight provisions to ensure safety, security, and environmental protection requirements are maintained.

3. Support for INL's Launch Pad infrastructure development, recognizing that the demonstration ecosystem is national energy security infrastructure, not simply laboratory support. The integration of site preparation, regulatory guidance, shared infrastructure, and operational support that Launch Pad provides cannot be replicated by private investment alone.

The committee should also communicate to the Senate EPW Committee the urgency of complementary NRC reforms, including elimination of the mandatory hearing requirement for new reactor licensing actions, a procedural step that adds months to the critical path of every new reactor license without any practical safety benefit, as INL's analysis of mandatory hearings from

[37] Kevan Weaver, John Wagner, Timothy Stout, Svetlana Lawrence, and Scott Ferrara, "Reassessing Double-Ended Guillotine Break Requirements: Evidence-Based Analysis of Regulatory Assumptions After Five Decades of Nuclear Operation." Idaho National Laboratory. INL/RPT-26-90155. January 2026. https://inl.gov/content/uploads/2026/02/INLRPT_26-90155_DEGB-Technical-Assessment.pdf.

2009 through 2023 demonstrated. The Efficient Nuclear Licensing Hearings Act (H.R. 6464, S. 4288), pending in both chambers, would address this directly.

CHALLENGES AND WHAT CONGRESS CAN DO

The Fuel Cycle Bottleneck: America's Critical Vulnerability

The current state of America's nuclear fuel cycle represents a critical vulnerability that must be addressed urgently and in parallel with reactor demonstrations. We import virtually all of the uranium used in American reactors, maintain limited domestic enrichment capacity with only one facility capable of meeting approximately one-third of current fleet needs[38] and possess virtually no commercial-scale HALEU production capability. This dependence on foreign sources, particularly from adversary nations, creates both national-security risks and supply-chain uncertainties that threaten our energy security and ability to achieve deployment goals.

The Russian uranium ban and the associated Nuclear Fuel Security Act authorities and $2.72 billion in funding represent significant progress, but the execution timeline is critical: investments recently made by DOE will likely result in commercial fuel availability in the early 2030s. That is why expanding our efforts and aggressively working to minimize unnecessary delays across multiple parallel pathways are essential. Urenco's New Mexico facility plans a 0.7 million separative-work-unit expansion by 2027. Orano's Oak Ridge facility is targeting 1 million separative work units by 2030. Centrus is scaling HALEU production from 2026 onward. New entrants such as General Matter are also expanding the field of commercial uranium enrichment. Finally, INL's ZIRCEX process is in development to recover and downblend HEU from spent fuels, providing an additional domestic feedstock option.

Even with rapid progress across all of these initiatives, we face significant challenges meeting projected HALEU demand through this decade. Commercial efforts to date are primarily focused on addressing much needed enrichment and deconversion needs. However, we must also produce more uranium ore and expand conversion capability needed to enable enrichment. In addition, DOE can and should do more to bridge the HALEU gap. Sustained federal appropriations beyond initial investments and legislative support for INL's fuel cycle infrastructure at MFC and related capabilities across the complex are essential to bridging the gap.

The committee should also support DOE's January 2026 initiative to establish Nuclear Lifecycle Innovation Campuses,[39] a new effort to modernize the nation's full nuclear fuel cycle through voluntary federal-state partnerships designed to advance regional economic growth and build a coherent, end-to-end nuclear energy strategy. The proposed campuses would support activities spanning the full fuel lifecycle, including conversion, enrichment, fuel fabrication, recycling of used nuclear fuel, and final waste disposition, with the flexibility to also host advanced reactor deployment, power generation, advanced manufacturing, and co-located data centers depending

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[38] URENCO press release, "URENCO USA Expands U.S. Enrichment Capability With Second New Cascade." September 10, 2025. https://www.urenco.com/news/usa/2025/urenco-usa-expands-u.s-enrichment-capacity-with-second-new-cascade.

[39] U.S. DOE, "Department of Energy Seeks Hosts for Nuclear Innovation Lifecycle Campuses." January 28, 2026. https://www.energy.gov/articles/department-energy-seeks-hosts-nuclear-lifecycle-innovation-campuses.

on state priorities and regional capabilities. DOE issued a Request for Information on January 28, 2026, inviting states to express interest and provide feedback on campus structure, with responses requested by April 1, 2026. This initiative reflects exactly the kind of integrated, whole-of-fuel-cycle thinking that the nuclear resurgence demands and congressional support for the partnerships, infrastructure investments, and funding structures that will be required to establish and sustain these campuses will be essential to their success.

The Regulatory Gaps That Remain

The ADVANCE Act and the May 2025 executive orders deliver substantial improvements to the regulatory landscape. But important challenges remain.

The NRC's 18-month licensing-decision requirement is now law, and early achievements — such as the recent construction permit approval[40] for TerraPower's Natrium reactor — are encouraging, but until it is reliably and consistently achieved in practice, first-of-a-kind demonstrations will continue to face the schedule uncertainty that increases cost of capital and discourages investment. Timeline certainty is as important as timeline aspiration.

The Atomic Energy Act continues to require an uncontested "mandatory hearing" for all new reactor construction permits. INL's analysis of mandatory hearings from 2009 through 2023 found that they consistently add four to seven months to the critical path of licensing actions — time squarely on the critical path for every new reactor license. In that same period, not one mandatory hearing reached a different conclusion from the NRC Staff. The Efficient Nuclear Licensing Hearings Act (H.R. 6464, S. 4288), pending in both chambers, would eliminate this requirement. This committee should encourage its Senate partners on EPW to advance that legislation.

The NRC's ongoing rulemaking to establish a risk-informed, technology-inclusive framework (10 CFR Part 53) represents important progress, but implementing regulations for diverse advanced reactor designs — molten-salt, gas-cooled, sodium-cooled — remain incomplete. Each reactor type presents unique regulatory questions requiring NRC staff expertise, and the NRC faces workforce challenges including an aging staff with pending retirements and insufficient recruitment to review many simultaneous advanced-reactor applications. Appropriations to expand NRC's technical workforce are as important as regulatory reform.

DOE has taken an important step to streamline environmental review for advanced reactor projects through the establishment of a new categorical exclusion for the authorization, siting, construction, operation, reauthorization, and decommissioning of advanced nuclear reactors, published in the Federal Register on February 2, 2026.[41] This committee should understand and help communicate that categorical exclusions are not exemptions from NEPA; they are a well-established, commonly used tool within the NEPA process that reduces documentation requirements and shortens review timelines for actions whose environmental impacts are well understood and consistently limited in scope. Categorical exclusions are used routinely across the federal government: the Federal Highway Administration relies on them for dozens of

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[40] NRC Issues Construction Permit for TerraPower Natrium Reactor, March 4, 2026, https://www.nrc.gov/sites/default/files/cdn/doc-collection-news/2026/26-028.pdf

[41] Learn more at https://www.energy.gov/nepa/categorical-exclusion-advanced-nuclear-reactors.

transportation project categories, the National Telecommunications and Information Administration recently adopted them for broadband infrastructure deployment, and DOE itself has established categorical exclusions covering energy storage and solar facilities. Section 109 of the Fiscal Responsibility Act of 2023 further allows agencies to adopt categorical exclusions established by other agencies, meaning the analytical groundwork done once can be applied efficiently across the federal enterprise. DOE, for example, formally adopted Forest Service categorical exclusions in July 2024 for activities relevant to transmission line maintenance.

All other environmental statutory obligations remain fully intact under a categorical exclusion; what changes is the documentation burden for actions that evidence has shown, repeatedly and consistently, do not produce significant environmental impacts. The NEPA reviews INL has conducted for MARVEL, Project Pele, and the TREAT reactor restart each reached that same conclusion: small or not-significant impacts across all resource categories. Establishing a categorical exclusion for advanced nuclear reactors codifies what the operational record already demonstrates, and this committee's support for its implementation will meaningfully accelerate the demonstration timelines the executive orders demand.

INL's *Recommendations to Improve Nuclear Licensing* also identifies several additional reforms worth this committee's attention: extending initial NRC commercial reactor license terms from 40 to 60 years to eliminate a pro forma license renewal process driven by economic rather than safety rationales; broadening DOE's authority to authorize activities by prime contractors away from government-owned sites; and reducing the Advisory Committee on Reactor Safeguards review burden by focusing ACRS reviews on unique or new safety issues with significant hazard potential rather than requiring comprehensive review of every new reactor application.

Scale, Manufacturing, and Workforce

Moving from demonstrations to deployment at the scale needed for 400 GW requires industrial transformation that cannot be achieved solely by removing regulatory barriers. The manufacturing, workforce, and supply-chain challenges are substantial.

Current manufacturing capacity for reactor components, particularly large forgings, specialized materials, and pressure vessels, is inadequate for the scale of deployment envisioned. Many critical capabilities were lost during the decades without new domestic builds as suppliers exited the nuclear market or shifted focus to international customers. Rebuilding this industrial base requires coordinated investment that only the federal government can catalyze.

The nuclear industry needs tens of thousands of workers, engineers, operators, health physicists, nuclear-grade welders, and craft workers, to build and operate new capacity at the scale envisioned. Current training pipelines are insufficient to meet this demand. INL is working extensively with universities and community colleges on workforce-development initiatives. Military-to-civilian transition programs leveraging Navy nuclear experience represent a particularly valuable and underutilized pipeline. But the scale of workforce need requires coordinated federal investment across the entire educational pipeline.

Transmission infrastructure will also require strategic investment. DOE's 2024 National Transmission Planning Study projects the United States must expand its transmission system by

2.1–2.6 times its 2020 size by 2050.[42] Nuclear energy's 93% capacity factor as compared to 23% for solar and 34% for wind means that transmission infrastructure connected to nuclear plants achieves far higher utilization rates per mile built.[43] Nuclear's geographic flexibility also allows siting near existing infrastructure, potentially reducing new transmission requirements by up to 50% compared to scenarios dominated by variable renewables. These strategic advantages should inform how Congress shapes transmission policy.

This committee's support for coordinated federal investment in manufacturing capacity, workforce pipelines, and transmission infrastructure will be as important to achieving 400 GW as any regulatory reform.

Military Deployment: Resolving Statutory Ambiguity

The Army's Project Janus plans to deploy microreactors at nine bases by 2027–2028, representing a major commitment to nuclear power for defense energy security.[44] This program is encountering the same statutory ambiguities that affect commercial demonstration: military contracting mechanisms were not designed for purchasing nuclear power plants as long-term energy infrastructure. The question of acquisition authority for nuclear power plants on military installations remains unclear, as do facility siting criteria, security requirements, emergency planning, and fuel handling and waste management under DoD rather than NRC oversight.

The FY2026 NDAA's Sections 318 and 321 are meaningful steps. But congressional direction explicitly clarifying DoD's authority to procure and operate reactors for base power — not just naval propulsion, which has clear historical precedent — would accelerate military deployment. Military deployment can serve as a pathfinder for commercial applications, demonstrating reactor technologies in demanding operational environments while meeting critical defense energy-security needs. The lessons learned from military deployments in logistics, operations, maintenance, and workforce training will benefit subsequent commercial applications.

CLOSING: INL'S COMMITMENT AND THE PATH FORWARD

The consequences of success or failure in this nuclear moment extend far beyond electricity generation. Energy security is national security. Economic prosperity follows from reliable, abundant, affordable power. America's ability to lead in AI, advanced manufacturing, and space exploration depends on energy infrastructure that only nuclear can reliably provide at the required scale and quality. And the reactors America builds now will operate for 80 years or more, shaping energy security, economic prosperity, and global influence for the rest of the century.

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[42] U.S. DOE, *National Transmission Planning Study.* 2024. https://www.energy.gov/gdo/national-transmission-planning-study.

[43] U.S. Energy Information Administration, "Capacity factors for utility scale generators primarily using fossil fuels." 2023 data. https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_6_07_a.

[44] Army Communications and Outreach Office, "Army announces next steps on Janus Program for next-generation nuclear energy." November 18, 2025. https://www.army.mil/article/289074/army_announces_next_steps_on_janus_program_for_next_generation_nuclear_energy.

The technology exists. The market demand is real. The policy framework is being built. Private investment is mobilizing. What remains are the specific statutory decisions, particularly around DOE authorization, fuel cycle infrastructure, and the sustained investment in demonstration capabilities that determine whether we capitalize fully on this moment.

At INL, we are doing our part. DOME will be complete and ready for its first reactor this spring. MARVEL will achieve dry criticality this year. Launch Pad is welcoming its first developers. PROMETHEUS and VULCAN are underway. Our fuel cycle capabilities are supporting the Reactor Pilot Program and the Fuel Line Pilot Program simultaneously. And our workforce is embracing AI tools that are already measurably accelerating research timelines because we understand that achieving 400 GW by 2050 with traditional approaches alone is not possible.

The nuclear energy future we have long envisioned is no longer a distant aspiration. It is our immediate responsibility. As we celebrate America's 250th anniversary this year, the path to the next century of American energy leadership runs through the work happening in Idaho. INL rose to this moment once before when the nation called on the National Reactor Testing Station to build the foundation of the American nuclear industry. We are rising to it again.

I appreciate the opportunity to testify, and I want to thank the committee for its sustained attention to this critical issue. I look forward to your questions.