

**Testimony of Jeremy Harrell
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Chair of the Board of Directors
U.S. House Energy and Commerce Committee
Subcommittee on Energy, Climate, and Grid Security
*“American Nuclear Energy Expansion: Powering a Clean and Secure Future.”***

April 18, 2023

Good morning Chairman Duncan, Ranking Member DeGette and other members of the Committee. My name is Jeremy Harrell, and I am here representing the U.S. Nuclear Industry Council (USNIC), where I have served as the Chair of the Board of Directors for the past four years. The Council is a global leader in advancing nuclear development, representing more than 90 companies engaged in nuclear innovation and supply chain development. Its membership includes technology developers, manufacturers, construction engineers, key utility movers, and service providers.

Additionally, I am the Chief Strategy Officer of ClearPath, a 501(c)(3) organization that develops and advances policies that accelerate innovations to reduce and remove global energy emissions. Nuclear is one of the technology focus priorities for ClearPath.

Thank you for the opportunity to testify today and for holding this important hearing. The expansion of American nuclear energy can power a clean and secure future, if the U.S. seizes this moment. Nuclear energy is already making a comeback—at home in America and worldwide. The drumbeat for climate action on the global stage remains loud, and the profound effects of the war in Ukraine on global energy markets are lasting. The expansion of carbon-free, reliable, and secure nuclear power has never been more important, and American nuclear entrepreneurs and the U.S. supply chain are ready to bring their game-changing technologies to the marketplace.

An increase in demand for carbon-free, dispatchable electricity has coincided with unprecedented momentum within the U.S. nuclear industry. American electrical utilities are projecting a need for 90 GW of new nuclear power by 2050, nearly doubling our nuclear energy capacity in the next 30 years¹. The U.S. Nuclear Regulatory Commission (NRC) has publicly stated it anticipates at least 13 applications for advanced reactors by 2027.² And this domestic momentum is getting international attention. At least eight U.S.-based companies have publicly-announced international partnerships to explore deployment in more than 10 countries, and even more are in the works.

The many projects in the pipeline today, and the robust U.S. supply chain already in place employs nearly half a million Americans³. A person working in the nuclear energy industry

¹<https://www.powermag.com/u-s-utility-survey-suggests-industry-mulling-additions-of-90-gw-of-new-nuclear/>

² <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML22038A001>

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<https://www.energy.gov/sites/default/files/2022-02/Nuclear%20Energy%20Supply%20Chain%20Report%20-%20Final.pdf>

makes a higher median wage than any other energy industry and twice the national median wage.⁴ Tens of thousands of more high-paying, stable jobs will be created as our industry continues to grow.

Congress, and this Committee specifically, has played a major role in advancing bipartisan policy over the past five years that has enabled significant growth in the U.S. nuclear supply chain. Thanks to your leadership in the 115th, 116th, and 117th Congresses, bipartisan bills like the Nuclear Energy Innovation and Modernization Act, the Nuclear Energy Innovation Capabilities Act, the Energy Act of 2020, and the Bipartisan Infrastructure Law, have provided robust support for the existing civilian fleet, increased focus on nuclear fuel security, and helped catalyze the next generation of advanced reactors and foster a robust American nuclear workforce.

The advanced reactor market is at an inflection point. Investors and potential end-users are closely watching first-of-a-kind utility-scale projects eyeing the late 2020s and early 2030s for commercial operation. These projects include the NuScale-Utah Associated Municipal Power Systems Carbon Free Power Project in Idaho; the TerraPower Natrium demonstration in Kemmerer, Wyoming; the X-energy-Dow high temperature gas reactor demonstration on the Gulf Coast; and the GE Hitachi small modular reactor at the Clinch River, Tennessee site and partnership between Tennessee Valley Authority, Canada's Ontario Power Generation, and Poland's Synthos Green Energy global deployment consortium. Furthermore, the U.S. military, major data centers, and heavy-industrial users are exploring a variety of advanced reactor designs, including microreactors like those being developed by BWX Technologies, Oklo, and Ultra Safe Nuclear Corporation (USNC), to meet their secure power and clean heat needs. These applications also have significant national security benefits, improving the resilience of critical infrastructure,⁵ enhancing servicemember safety,⁶ and humanitarian and disaster relief.⁷ Institutions of higher learning, like Abilene Christian University (ACU) in Texas, are advancing state of the art research reactors to advance R&D and cultivate our future workforce.⁸ Even the National Aeronautics and Space Administration (NASA) is looking at nuclear space propulsion to further space exploration and potentially take humans to Mars by the early 2030s⁹.

However, the challenge ahead is project delivery. The U.S. is in the "era of the deployment," where our industry must show the world that we are up to the challenge of scaling these exciting technologies and bringing projects in "on time and on budget." Recently enacted federal policies, like the clean electricity tax credit and public-private partnerships, boost the confidence of investors and end-users who need to scale from building one reactor to building hundreds of reactors domestically and internationally.

⁴ <https://www.usenergyjobs.org/wages>

⁵ <https://www.safie.hq.af.mil/News/Article-Display/Article/3169035/request-for-proposal-released-for-eielson-air-force-base-micro-reactor-pilot-pr/>

⁶ https://www.cto.mil/pele_eis/

⁷ https://c70e8cf9-e47c-4b0a-9da6-222b08a3b87d.usfiles.com/ugd/c70e8c_d2dc61982a514e439799e8ccb577e6.pdf

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<https://www.neimagazine.com/news/newsus-abilene-christian-university-applies-to-build-molten-salt-research-reactor-9946847>

⁹ https://www.nasa.gov/mission_pages/tm/nuclear-thermal-propulsion/index.html

The challenge before the 118th Congress and the industry is to double down on this era of deployment. Supporting the nuclear fuel supply chain, providing regulatory certainty for investors, and enabling the deployment of new American technologies internationally can accelerate commercialization, enhance our national security, and fuel a secure clean energy future both at home and for our allies. With this in mind, I will discuss three priorities in today's testimony:

- **Secure the Nuclear Fuel Supply Chain:** The availability of High-Assay Low Enriched Uranium (HALEU) is essential to the success of many advanced reactor projects, including the two recipients of the Advanced Reactor Demonstration Program (ARDP). Today, Russia unfortunately appears to be the only source of large volumes of HALEU, and it is a national security imperative that the U.S. promptly creates a reliable domestic supply of commercial HALEU for itself and its allies. Industry, the DOE, and Congress must work together to execute and fund the Advanced Nuclear Fuel Availability Program to enable a private-industry-led, domestic HALEU supply chain. Securing the nuclear fuel supply chain will require domestic and allied capabilities to both source and process uranium. We must also enable the enhanced domestic supply of Low Enriched Uranium (LEU) for our current fleet and future light water reactors as Russia has been supplying 20% of our nation's LEU fuel. Ensuring fuel security is paramount to American nuclear expansion.
- **Ensure Regulatory Predictability:** The commercial nuclear operating fleet has reliably and safely served the U.S. for decades serving as a backbone source of power with operating capacity averaging over 94%. While the Nuclear Regulatory Commission (NRC) has served as an able regulator of the existing fleet, it is challenged with concurrently regulating the burgeoning advanced reactor industry. Despite the fact that these advanced technologies represent enhanced safety in comparison with their traditional light-water counterparts, as well as the desire of Congress to create an expedited, efficient and risk-informed regulatory framework, the NRC response has been sorely lacking. Disappointedly, the proposed Part 53 process designed by the NRC staff, is more complicated, more conservative, more expensive and less efficient than its existing regulatory processes, and creates needless uncertainty that could result in the U.S. being left behind other countries which seek to deploy advanced reactor technologies. In fact, a survey of USNIC member companies expressed significant concerns with Part 53, and supported a delay in its development timeline to ensure a useful and implementable rule.¹⁰ While the proposed Part 53 framework continues to move through the NRC process, first movers in advanced nuclear must use the existing regulatory pathways designed for our current fleet to obtain their licenses. Though doable, the existing pathways come with their own complexities and inefficiencies. This regulatory uncertainty translates into financial uncertainty and deters investors and end-users from pursuing new nuclear technologies. Congressional direction is vitally needed to modernize the NRC as soon as practical, in order to provide for an efficient, effective and timely regulatory process that enables these game-changing technologies

¹⁰ <https://www.nrc.gov/docs/ML2119/ML21196A499.pdf>

while maintaining its vital safety and security mission.

- **Foster Global Market Opportunities for American Technologies:** Recent actions by countries in Europe, Africa, the Middle East and South Asia have shown that advanced nuclear deployment is highly desired. Nations want clean, reliable, and secure energy. Unfortunately, this gap is getting filled by countries like China and Russia, which today are building dozens of new reactors both domestically and internationally. The United States and its allies should be the ones to establish these new, 100-year international partnerships in place of our adversaries. The U.S government must develop a robust and effective interagency strategy to proactively build and enhance relationships with partner nations, as well as create competitive financing and technology packages to offset the growing influence of Russia and China.

Secure the nuclear fuel supply chain:

A secure and robust nuclear fuel supply chain is critical to ensuring American families receive clean, affordable, and reliable energy from our nation's nuclear power plants. This Committee showed early leadership on this topic by considering the Prohibiting Russian Uranium Imports Act, for which USNIC and ClearPath Action submitted letters of support. We must back that commitment up with specific actions on the part of the U.S. government that will provide U.S. nuclear suppliers with the tools needed to meet these energy supply challenges.

In the absence of new legislation, much can still be accomplished through the Advanced Nuclear Fuel Availability Program, but only if the program is executed in accordance with Congressional direction. At this point, the DOE has not made this program structure public and the draft request for proposals has been pushed back for months, with no end in sight. As the Chair of the U.S. Nuclear Industry Council, I have heard far and wide from nearly every company how this is one of the biggest barriers to the deployment of their cutting-edge technologies. Congressional oversight, where appropriate, is necessary to hold the Administration accountable.

Approximately 95% of the uranium used in the U.S. today is imported, of which nearly 50% comes from Russia and Kazakhstan.¹¹ Because nuclear energy accounts for 1/5th of U.S. electricity production, this leaves 10% of total U.S. electricity vulnerable to these two countries.¹²

The need for a secure nuclear fuel supply chain extends beyond traditional, large light-water reactors. LEU is used as a feedstock in HALEU production, but does require a different configuration and NRC license. Today, only Russia has the capability to produce HALEU in large quantities. Furthermore, Russia controls over 40% of aspects of the global LEU supply chain.¹³

¹¹ <https://www.eia.gov/energyexplained/nuclear/where-our-uranium-comes-from.php>

¹² <https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php>

¹³

<https://world-nuclear.org/information-library/nuclear-fuel-cycle/conversion-enrichment-and-fabrication/uranium-enrichment.aspx>

It is a national security imperative that the U.S. establish a secure and reliable supply of nuclear enrichment capabilities for itself and its allies. While the near term priority needs to be on the front end of the fuel cycle, some of this pressure could be alleviated through the support for innovative technologies like processing used nuclear fuel. For example, some companies are pursuing recycling of used fuel from the existing fleet. For example, Oklo is planning to use electrorefining technology, which it submitted a licensing project plan to the NRC at the end of 2022. As these companies develop their technologies, they are collaborating with the national labs and the Department of Energy through ARPA-E awards and other grants. These efforts could enable the productive reuse of over 90% of this material and reduce the need for Russian imported uranium, but it would also have the commensurate benefit of dramatically reducing the need for long term storage of high-level waste. Reducing America's reliance on Russian fuel provides the market certainty required to incentivize domestic industry, build new capacity, and support our allies and Congress should act expeditiously to further the development of this capability.

The two flagship advanced nuclear reactor demonstration projects underway through the Department of Energy require HALEU fuel. The Department of Defense's Strategic Capabilities Office (SCO) microreactor project, Project Pele, also requires it. New end-users, including industrial heat users and utilities that have not historically operated nuclear plants, are closely watching the first demonstration projects and are poised to place large orders once they see success. According to modeling by the International Energy Agency, to meet our global climate goals, around 500 gigawatts of new nuclear power must be brought online by 2050¹⁴ and global investment will be over \$60 billion annually starting in 2030.¹⁵ Congress and DOE must ensure that the opportunity provided by the ARDP is not squandered by the lack of a reliable fuel supply.

There has been a lot of exciting news in the last few months that underline the imminence of new nuclear.

- **X-energy and Dow**¹⁶ have partnered to demonstrate how advanced nuclear can decarbonize industry by providing heat and steam at one of Dow's facilities on the Gulf Coast;
- **TerraPower and PacifiCorp**¹⁷ have announced plans to deploy at least two additional TerraPower Sodium reactors in PacifiCorp's 2023 Integrated Resource Plan;
- **GE Hitachi and Ontario Power Generation**¹⁸ penned the first commercial contract for a grid-scale, small modular reactor in North America which will deploy GE Hitachi's

¹⁴ <https://www.iea.org/reports/world-energy-outlook-2021>

¹⁵ <https://www.iea.org/reports/world-energy-outlook-2022>

¹⁶

<https://x-energy.com/media/news-releases/dow-and-x-energy-to-drive-carbon-emissions-reductions-through-deployment-of-advanced-small-modular-nuclear-power>

¹⁷

<https://www.terrapower.com/pacificorp-forecasts-need-for-two-additional-sodium-reactors-in-new-regulatory-filing/>

¹⁸

<https://www.ge.com/news/press-releases/ge-hitachi-signs-contract-for-the-first-north-american-small-modular-reactor>

BWRX-300 at the Darlington New Nuclear Project site in Ontario, Canada and then at the Tennessee Valley Authority Clinch River site in Tennessee;

- **NuScale**¹⁹ received the first ever advanced reactor design approval from the Nuclear Regulatory Commission and is currently seeking approval for their larger design.

The United States has the potential to supply both the technology and the fuel for this massive global market. While American innovation and leadership are well established, industry and government must work together to reinforce the advantages of a century-long partnership with the U.S.

Ensure Regulatory Predictability

Regulatory modernization is critically important because all roads to commercial deployment pass through the NRC. Every commercial reactor built in the U.S. will require an NRC license, but there is an open question in industry whether or not the NRC is ready to license the new reactors we'll need to meet our emissions reduction targets. The U.S. is a clear global leader in nuclear operation and innovation. In order to lead in nuclear deployment over China and Russia, the NRC must be properly structured and incentivized to efficiently license the next generation of new reactors.

While the NRC is working to modernize its processes, attract new talent, and further its technical understanding of new technology, the Commission admits it would struggle to review the anticipated wave of new reactor applications. Beyond the new regulatory structure authorized in NEIMA, the NRC needs to modernize its internal processes to unlock the potential of these companies. Inefficiency, ineffectiveness, and uncertainty in the licensing process creates an unnecessary burden on developers, sends the wrong signal to investors, and inhibits NRC's safety and security mission by distracting staff. The NRC must be prepared to handle the wave of applications that are anticipated pending the success of the first demonstration projects. Congressional direction, and a holistic review of the NRC's structure, processes, and procedures will incentivize the NRC to take action.

But what does that mean in practice? While improving licensing and environmental reviews are an important part of modernization, they would have little effect without realigning the NRC's administrative processes. That means ensuring fee structure compatibility with smaller project sizes, attracting and retaining talented and driven staff, and proactively harmonizing international regulation to unlock the global market and export our high standards for safety and security.

Like all project developers, USNIC's members also crave meaningful permitting reform. Deploying the nearly 100 gigawatts of new nuclear capacity the utility sector says it needs over the next thirty years would require a drastically different permitting regime than the patchwork of laws enacted nearly forty years ago offer. Fortunately, Republican and Democratic policymakers have never been closer-aligned on the need for significant permitting reform. The Council applauds the House for putting a proposal to fix this outdated and broken system at the top of the agenda as H.R.1, the The Lower Energy Costs Act. Though House-passage last month is likely just the start of the process, addressing the many bottlenecks that limit our nation's

¹⁹ <https://www.energy.gov/ne/articles/nrc-certifies-first-us-small-modular-reactor-design>

ability to deploy billions of dollars of capital is an imperative to realizing advanced nuclear potential—and the thousands of US jobs created, enhanced U.S. energy security, and reduced emissions.

The NRC is limited in what it can accomplish and currently has no incentive to change without Congressional direction and oversight. Congress can drive the NRC to modernize and thereby remove roadblocks to the commercialization of the next generation of nuclear reactor designs. Let me make it clear, we are not calling for a reduction in safety, only that the NRC's review process is efficient, effective and predictable.

A successful nuclear regulator would reassure investors, lend credibility to licensed projects, contribute to a clean energy future, unlock international markets, improve the common defense and security, and ultimately ensure the U.S. remains the global leader in deploying nuclear energy technology.

Enhancing Global Energy Security While Foster Economic Opportunities for American Technologies

The global market for nuclear energy is growing and the U.S. must seize this moment, work with our allies, and create a competitive alternative to Russian and Chinese energy exports. The partnerships formed from nuclear energy exports can last for a century, locking in trade and security benefits. Key strategic allies, like Poland, Canada, and the United Kingdom, are wanting to partner with American vendors. Recent international announcements include a partnership between GE Hitachi, Tennessee Valley Authority, and Ontario Power Generation in Canada,²⁰ the aforementioned agreements to build U.S. reactors in Poland, and financing reactor deployment in Romania.²¹ The Romanian partnership was particularly important, because the partnership included the Romanians abandoning initial plans to build new reactors in partnership with China.²²

Over the past year in Poland alone, Westinghouse signed one of the largest clean energy deals in history, a \$20+ billion agreement to build Poland's first nuclear power station by 2033.²³ GE Hitachi and NuScale have advanced partnerships to build their small modular reactors in the country, and Ultra Safe Nuclear Corporation solidified an agreement with Polish chemical company Grupa Azoty Police to build a test project aimed at integrating their micro-modular reactor into an industrial plant.²⁴

However, the many federal agencies that coordinate to enable nuclear exports can present a challenge. As a whole, the agencies serve a vital role to ensure safety, security, and democratic values, but they must be swimming in the same direction to deploy new reactors at scale

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<https://www.ge.com/news/press-releases/tennessee-valley-authority-ontario-power-generation-and-synthos-green-energy-invest>

²¹<https://www.world-nuclear-news.org/Articles/NuScale-marks-SMR-progress-in-USA,-Romania>

²²<https://balkaninsight.com/2022/11/10/romania-to-build-two-new-nuclear-reactors-with-us-technology/>

²³ <https://www.politico.eu/article/poland-20-billion-nuclear-power-us-westinghouse/>

²⁴

<https://www.usnc.com/grupa-azoty-police-ultra-safe-nuclear-corporation-and-west-pomeranian-university-of-technology-to-develop-mmr-research-reactor/>

internationally. To achieve this there should be a lead entity to develop and coordinate the execution of a cohesive federal strategy for engagement with foreign governments. This will require input from State, DOE, Commerce, NRC, Defense, the National Security Council, ExIm, DFC, and more.

Bills like the bipartisan International Nuclear Energy Act send a strong signal that the U.S. is ready to re-establish itself as the global leader in nuclear energy and create a robust civil nuclear export strategy. Strategic coordination can prepare key markets by proactively establishing framework agreements and trade controls, create financing packages that are competitive against China and Russia, and reinforce relationships with our allies. With decades of experience, the U.S. can lend its technical, operational, and regulatory expertise with countries looking to build nuclear energy for the first time.

The U.S. also must do more with the tools already available. For instance, in 2020 the DFC removed its restriction on supporting nuclear power projects. Yet, to-date, I have heard overwhelmingly from USNIC members that the DFC is only engaging on nuclear-related project financing on a limited basis. Similarly, EXIM's China Transformational Exports Program (CTEP) provides financing support to renewables like wind and solar, but excludes nuclear and many other viable clean energy technologies. This week's U.S.-Poland deal to support the development of roughly 20 GE Hitachi Nuclear Energy small modular reactors with up to \$4 billion in loans²⁵ is a great first step, but much more must be done to compete with our rivals.

I'd also like to recognize the need for nuclear energy financing from multilateral development institutions like the World Bank, which is currently absent. A recent bill from Reps. French Hill and Patrick McHenry, the International Nuclear Energy Financing Act, would require the United States Executive Director at the World Bank to advocate and vote for financial assistance for nuclear energy and permit U.S. representatives at other international financial institutions to push for nuclear projects.

There are dozens of countries²⁶ that will likely establish a nuclear program; a proactive all-of-government approach would unlock economic opportunities, pass down decades of U.S. regulatory expertise, and export U.S. energy security before our adversaries move to fill that gap.

Finally, I would be remiss if I did not underscore the direct relationship between the civilian nuclear industry and U.S. military in addition to the geopolitical benefits of U.S. leadership. A 2019 report by the Atlantic Council found that the crossover provides a monetary benefit of nearly 30 billion dollars to our national security. This is caused by shared research infrastructure, workforce, and supply chain diversity.²⁷ A strong domestic nuclear industry provides the incentive for individuals to acquire relevant skills and education, those talented people have the opportunity to contribute to our military, and in turn, the nuclear energy industry provides high-paying rewarding work after service. Future value could be provided by nuclear

²⁵<https://abcnews-go-com.cdn.ampproject.org/c/s/abcnews.go.com/amp/US/wireStory/us-ready-lend-poland-4-billion-nuclear-energy-98630150>

²⁶ <https://www.iaea.org/bulletin/developing-nuclear-power-infrastructure-in-newcomer-countries>

²⁷

<https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/the-value-of-the-us-nuclear-power-complex-to-us-national-security/>

powered microgrids at military bases. The Department of Defense's Strategic Capabilities Office plans to begin testing a transportable microreactor at Idaho National Laboratory in 2024.²⁸

Conclusion

This Committee has been at the forefront of Congressional efforts on clean energy innovation for many years. Importantly, you have an incredible record of bipartisanship in nuclear energy, and you have made sure that America does not fall behind in the race to provide reliable clean energy to the rest of the world. The challenge before Congress now is to clear the path for domestic deployment to support the nuclear fuel supply chain, provide regulatory certainty for investors, and enable the deployment of new reactors internationally to increase energy security at home and for our allies.

USNIC greatly appreciates what this Committee has accomplished, and we look forward to supporting your efforts in the months ahead.

Thank you again for this opportunity, and I look forward to the discussion.

²⁸ https://www.cto.mil/pele_eis/