

Testimony of Jeremy Harrell
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U.S. Senate Committee on Environment and Public Works
Legislative Hearing on the American Nuclear Infrastructure Act (S. 2373) and the
Sensible, Timely Relief for America's Nuclear Districts' Economic Development Act (S.
1290)

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Good morning Chairman Carper, Ranking Member Capito, and other members of the Committee. My name is Jeremy Harrell. I am the Chief Strategy Officer of ClearPath Action, a 501(c)(4) organization devoted to accelerating breakthrough innovations to reduce emissions in the energy and industrial sectors. To further that mission, ClearPath develops cutting-edge policy solutions on clean energy and industrial innovation. ClearPath provides education and analysis to policymakers and collaborates with relevant partners to inform our independent research and policy development.

Additionally, I serve as the Chairman of the U.S. Nuclear Industry Council, a leading advocate for American nuclear energy technologies. The Council represents more than 80 companies engaged in nuclear innovation and supply chain development, including technology developers, manufacturers, construction engineers, key utility movers, and service providers.

Thank you for the opportunity to testify today and for holding this important hearing. Climate change is an urgent challenge that merits significant action at every level of government and the private sector. While there is no one thing policymakers can do to solve this challenge, accelerating the global deployment of cutting-edge American nuclear technologies is important to driving down carbon dioxide emissions while meeting the world's growing clean energy needs. Dozens of American entrepreneurs developing advanced nuclear reactors and fuels are racing to contribute to that cause, and the Advanced Nuclear Infrastructure Act (ANIA) could help unlock their deployment at scale.

Since the dawn of the nuclear age in the 1950s, nuclear reactors have been supplying Americans with **clean, reliable, and affordable energy**. To this day, America leads the world in nuclear energy production, and innovators are making great strides to bring the nuclear power of tomorrow to market today.

Accelerating the development of the next generation of nuclear technologies is essential to combating climate change as many of the largest utility companies in the U.S. and governments around the world are making big bets they will reach net-zero carbon dioxide (CO₂) emissions by 2050.

Without a larger share of nuclear power — from both existing and advanced reactors — these pledges are less likely to succeed and will certainly be more expensive.

Thankfully Congress has recognized the importance of nuclear energy from both a clean energy and a competitiveness perspective. On a bipartisan basis in the 115th, 116th, and 117th Congresses, legislation has been passed that makes America's nuclear industry stronger. These legislative victories have provided robust support for the existing civilian fleet, which provides about half of total clean energy generation in this country, and have catalyzed a next generation of advanced reactors. As I highlight throughout my testimony, the challenge before Congress now is to recognize that private sector innovation in the nuclear industry is still outpacing the government and continued legislation like ANIA is needed.

Congress should provide the direction and exercise the oversight needed to ensure there is a clear path for new reactor designs to be licensed, sited and permitted. If done effectively, the American nuclear innovation story will move to its next chapter: the deployment of a new generation of advanced reactors that will make immense contributions to global security, economic growth, and emissions reduction efforts.

With this in mind, I will discuss in my testimony:

- **The U.S. today:** All 93 existing reactors and the two under construction in the United States are large light water reactors. The Nuclear Regulatory Commission (NRC) is using the same licensing review process designed for the current fleet of large light water reactors to license a new breed of advanced reactors, which are much different than the current fleet. Many of the NRC's existing regulatory requirements need to be right-sized and these NRC modernization efforts must happen immediately. The overall result must avoid unnecessarily burdensome regulation.
- **Why the clean energy future requires American innovation:** The world needs advanced nuclear technology. America leads the world in innovation - the NRC should also be innovative. Modernizing the NRC's process to enable new designs to be brought to market will help us regain global leadership in nuclear energy, strengthen international security and mitigate climate change.
- **The roadmap to get there:** The American Nuclear Infrastructure Act (ANIA) removes roadblocks that are in the way of deploying the next generation of nuclear reactors by continuing to modernize the regulatory framework for innovative manufacturing and construction techniques. Directing the NRC to continue to modernize aspects of its review process provides additional deployment certainty, and will help enable nuclear energy to deploy at a rapid enough scale to support decarbonization.

I. Building on American Nuclear Energy Success

America has reduced its power sector emissions by 40 percent over the last 15 years, but the easy part is over. Power sector emissions could flatline under current conditions.

A bright spot is that some of America's largest publicly owned utilities and major American companies are addressing climate change by pledging to further reduce carbon dioxide emissions by midcentury. These "net-zero commitments" seek to avoid the flatline, and with the help of improved public policy, developers can accelerate the deployment of clean, reliable, and affordable energy technologies at the scale necessary to fully reach net-zero.

According to our recent report, *Clear Path to a Clean Energy Future*, which tracks the latest power sector trends and models future technology and policy impacts – maintaining existing nuclear reactors is one of the cheapest and most efficient ways to help meet utility commitments and reduce carbon emissions. When optimizing for the cheapest emissions reductions and without raising electricity prices, over 22 gigawatts of nuclear energy were preserved that would have otherwise retired early.

America has led the world in nuclear innovation since the first defense nuclear reactors were utilized during World War II and the early Cold War buildup. Since then, the U.S. has developed a world class supply chain for fuel, production and distribution. America mastered siting and permitting reactors while making safety a top priority. Today, the U.S nuclear industry's roughly 95 thousand megawatts of capacity provides about 20 percent of our grid's electricity. As a bonus, it is the single largest source of carbon-free electricity in the United States – comprising roughly half of our nation's total zero-carbon energy.

Now, a flurry of next-generation nuclear reactor companies including Oklo, X-energy, TerraPower, General Electric, Kairos, NuScale, and many more are all on the cusp of being built this decade.

Over the past five years, strong bipartisan support for this clean energy technology has materialized in Congress, yielding signature public policy wins that will help maintain the United States' position as a global leader in nuclear power.

- **The Nuclear Energy Innovation and Capabilities Act (NEICA)** established the National Reactor Innovation Center and strengthened the Department of Energy's (DOE's) and the NRC's ability to support advanced reactor development.
- **The Nuclear Energy Innovation and Modernization Act (NEIMA)**, signed into law in 2019, provided the NRC the initial direction and financial resources to modernize nuclear safety licensing. It contained a specific requirement to develop a technology-inclusive framework for advanced reactor licensing by 2027. The NRC is currently planning on finalizing this framework in 2025.
- **The Energy Act of 2020** reinvigorated advanced nuclear energy by formally authorizing the moonshot **Advanced Reactor Demonstration Program (ARDP)** and a program to kick start the domestic development of High-Assay Low-Enriched Uranium (HALEU) fuel, which the majority of advanced reactor companies require but today can only be purchased from Russia.

Two companies have already been selected for major ARDP projects: TerraPower and

X-energy. These two companies, along with their teams that include fuel suppliers, engineering and construction firms, and prominent investor-owned utilities, will partner with DOE and the National Labs to commercially demonstrate these cutting-edge designs in the next seven years. In addition, five other designs received risk reduction awards to advance a second wave of designs towards commercialization in the early 2030s. Importantly, Congress has reinforced the ARDP program by providing significant financial support in both the Bipartisan Infrastructure Law (Infrastructure Investment and Jobs Act; P.L. 117-58) and the annual appropriations process.

Many of the strongest proponents of these signature laws sit on this Committee, and I thank you for your work. These past successes provide the momentum necessary to tackle one of the single largest barriers to American nuclear technologies and the immense contribution they can make to global emission reductions - an antiquated licensing and regulatory regime.

II. The Clean Energy Future Require Nuclear Energy

Climate change is regularly top of mind here in Washington as well as for many of your constituents. And it is clear that while the American natural gas renaissance and growing renewable energy sectors have reduced domestic carbon dioxide emissions in the U.S., a flexible, dispatchable, and reliable clean energy source is still required to keep the lights on. This need is just as prevalent globally. Nearly 50 countries are projected to have markets for advanced nuclear power before 2050, a potential ~\$360 billion per year market opportunity for the American supply chain. Make no mistake about it: if the U.S. does not seize that opportunity, Russia and China will.

Nuclear power has not only re-emerged as a smart, reliable power source, but also as an integral part of the solution to reducing carbon emissions.

These next-generation advanced nuclear technologies build on the decades of experience that make the U.S. nuclear fleet the safest and most efficient operating in the world. These technologies also offer new opportunities:

- they are generally smaller which allows them to be sited in new locations,
- their high temperature heat and steam provides more opportunities to decarbonize beyond the electricity sector,
- they can operate flexibly and even pair with thermal energy storage to complement the expansion of renewable energy, and
- like their predecessors, they provide clean, reliable power and support stable jobs and taxes in local communities.

Now is the time to seize the opportunity to build upon private industry interest and bipartisan support so that the U.S. can continue this momentum and maintain its global leadership in nuclear energy. However, this outcome will only happen if Congress supports these innovators and removes any unnecessary barriers to commercialization.

III. The American Nuclear Innovation Act Roadmap

The Nuclear Energy Innovation and Modernization Act (NEIMA) directed NRC to begin to prepare for licensing advanced reactors, and Congress has provided funding to the NRC to help them prepare since 2017. However, a new licensing structure for advanced reactors will not be available until 2025 and advanced reactor companies are ready now. Oklo for example, the first advanced reactor company to submit a license application to the NRC, recently had its application rejected. It is imperative that rejection was a hiccup and does not become the norm.

The NRC could receive nearly 10 new advanced reactor licenses before 2025, and today's NRC is seemingly not equipped to review them. That is why the NRC needs to modernize and fix its processes to unlock the potential of these companies, rather than add layers of unnecessarily conservative and overly burdensome regulations.

Regulatory modernization is critically important as it is the necessary step between the development of these new designs and commercialization. If America is not proactive with licensing the next generation of designs, the U.S. could fail to meet its clean energy needs and continue to lose ground to China and Russia on technology innovation.

As I mentioned above, all 93 existing reactors and the two under construction in the U.S. are large light water reactors. Oklo is a brand-new design, 1/1000th the size of what is traditionally operated in the U.S. But, the NRC is using the same licensing review process designed around the current fleet of large light water reactors, and many requirements they are imposing are not relevant for the next generation of designs.

This is especially problematic because what is not licensed cannot be built. Without a better system in place, the NRC's process will stifle innovation and risk America's ability to lead in this space.

The NRC is limited by 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 not unduly burdensome.

Congress should ensure there is oversight and accountability at the NRC, and continue to direct the NRC to modernize its review process. Today, the best plan for this is ANIA.

ANIA contains several provisions to support the next generation of reactors. These include prizes to offset initial licensing fees for some of the first licensed advanced reactor designs, continued regulatory modernization, and broader international development and investments.

Uncertainty in the licensing process creates an unnecessary burden on developers and does not support the NRC's safety and security mission. Being a first mover also requires an advanced reactor company to navigate a complex and outdated regulatory regime that is not designed for – nor could have contemplated – their unique technologies. The NRC needs to proactively

investigate manufacturing and construction techniques that advanced reactors will likely leverage so they will be prepared to address those techniques in the licensing process. Congress can help support these first movers through ANIA and help them pave the way for future companies.

Furthermore, as many of these designs are looking to provide more than just clean electricity, the NRC needs to be proactive in identifying and addressing any potential issues so the Commission can license projects with non-electric applications like heat and steam for industrial facilities. Advanced nuclear reactors are reliable energy sources that can supply large amounts of heat at temperatures up to 800 degrees Celsius. Industrial facilities are large operations that run day and night. Nuclear reactors can easily supply low- and medium-temperature heat and steam; high temperature needs could be addressed by burning hydrogen gas that is produced using high-capacity, carbon-free nuclear electricity. As many industrial companies are not familiar with the nuclear industry, a perception that the regulatory process is an insurmountable challenge will prevent them from even considering nuclear energy as an option. Not even considering nuclear energy can have profound implications on decarbonizing industrial sectors, and make it more challenging and costly.

With the growing global market for nuclear energy, especially in countries that have not traditionally operated nuclear reactors, the U.S. needs to continue leveraging its superior resources abroad. Key strategic allies like Poland, Ukraine, and the United Kingdom are hoping to partner with American vendors rather than their Chinese or Russian competitors. The NRC can and should provide technical and regulatory experience to countries so they can develop the necessary skills to safely regulate nuclear energy. Given the immense global market opportunity, this not only bolsters nuclear security abroad but unlocks economic opportunities for American entrepreneurs.

Regulatory expertise is one such area where the U.S. can lead globally on nuclear energy, and the potential to share this expertise has not received the attention it deserves. Even though the NRC has major work to do to modernize their licensing process domestically, harmonizing regulations is easier to do when building from the ground up; and many of the countries interested in starting nuclear programs have no existing program. There are dozens of countries that will likely establish a nuclear program; a proactive all-of-government approach, including the NRC, should be undertaken to ensure other countries with less-robust safety standards do not fill that need first. There is an added benefit from early engagement – by helping other countries structure their regulatory process, these countries will already be compatible with U.S. nuclear reactors that have navigated the U.S. licensing process. So exporting decades of U.S. regulatory expertise can not only help maintain international safety and security standards, but also enhance the ability of U.S. companies to export their technologies. ANIA looks to address some challenges in deploying nuclear abroad.

In addition to the provisions currently in ANIA, there are additional areas where the NRC can improve.¹ The Committee should look to expand upon the modernization efforts in NEIMA, and make ANIA as robust as possible to modernize the NRC. ClearPath Action looks forward to offering our support in this effort.

¹ Nuclear Innovation Alliance, Promoting Efficient NRC Advanced Reactor Licensing Reviews to Enable Rapid Decarbonization, December 2021, <https://nuclearinnovationalliance.org/licensingdurationsforclimatemitigation>

Before I conclude, I would also be remiss if I did not underscore the importance of having a full five-person Commission. The Commission has been down two Commissioners since Commissioner Annie Caputo's term expired at the end of June. The Commission must be at full strength to effectively undertake this important work and prepare for the influx of American entrepreneurs slated to put their technologies forth for review. The Biden Administration should nominate two Commissioners expeditiously.

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 as marked by the enactment of the NEIMA in 2019. 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. Modernizing the NRC would go a long way in getting new innovations to market and maintaining our global competitiveness.

The close of 2020 saw exciting progress with the passage of the Energy Act. In 2021, your work to craft the Infrastructure Investment and Jobs Act with strong bipartisan support cleared the path for its enactment. And in 2022, there are many exciting opportunities to continue the progress that has been made. ClearPath 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.