Written Testimony of Amy C. Roma

Founding Member, Nuclear Energy and National Security Coalition (NENSC), Atlantic Council; Partner, Hogan Lovells US LLP

Before the Senate Committee on Environment and Public Works

Hearing on Discussion draft bill, S.____, the American Nuclear Infrastructure Act of 2020.

Wednesday, August 5, 2020, 10:00 a.m.

My name is Amy Roma and I am a founding member of the Nuclear Energy and National Security Coalition at the Atlantic Council and a nuclear regulatory lawyer at Hogan Lovells. Thank you for the opportunity to testify at this hearing in support of this important piece of legislation. My testimony will discuss the state of the nuclear energy industry today and the ways in which this bill rightfully supports U.S. interests and national security. This testimony represents my observations and in no way represents the views of the Atlantic Council, Hogan Lovells or its clients.

The American Nuclear Infrastructure Act of 2020 (ANIA) is a great step forward for ensuring that U.S. nuclear capabilities will be preserved and expanded, providing America with clean and reliable energy, tens of thousands of jobs, and billions of dollars in foreign trade opportunities for U.S. companies. But a strong civilian nuclear power industry also brings with it significant national security benefits ANIA would support, which include promoting U.S. leadership in foreign nuclear trade—and ensuring the highest levels of safety and nonproliferation standards—supporting the infrastructure needed for the U.S. Navy's nuclear-powered aircraft carriers and submarines, and positioning the U.S. to stay at the forefront of next generation nuclear technologies, like advanced reactors and fusion.

I. Introduction

Commercial nuclear power and the United States government share a long history that is intertwined with the global struggle for peace and security.[1] Soon after the end of the Second World War, the U.S. government understood that its monopoly on nuclear weapons and nuclear technology would be short lived. In particular, the Soviet Union was catching up with the United States and could share the information with other countries to benefit its own geopolitical aims and undermine U.S. influence, safety, and policy of nonproliferation.[2]

[1] Michael Wallace, Amy Roma, and Sachin Desai, *Back from the Brink: A Threatened Nuclear Energy Industry Compromises National Security*, Center for Strategic and International Studies (Jul. 2018) (*available at* https://www.csis.org/analysis/back-brink-threatened-nuclear-energy-industry-compromises-national-security).

[2] Peter Lavoy, *Arms Control Today, The Enduring Effects of Atoms for Peace*, Arms Control Association (Dec.1, 2003) (*available at* https://www.armscontrol.org/act/2003_12/Lavoy) ("U.S. officials feared that the Kremlin would score a huge propaganda victory, especially in the developing world, if the United States did not alter its own nuclear export policy.")

In response, the U.S. government in the 1950s saw the value that peaceful use of nuclear power could bring not just for the world but for its own security. President Eisenhower presented a bold proposal to the United Nations: The U.S. would share its nuclear energy technology with other nations if the receiving nation committed to not use the technology to develop nuclear weapons.[3] This program, known as "Atoms for Peace," resulted in three important economic and national security objectives: (1) it prevented the spread of nuclear weapons because it would lead and thus have oversight over global nuclear development; (2) it made the U.S. the leader in nuclear power, ensuring the U.S. maintained dominance in nuclear safety, security, nuclear technology development, and nuclear trade; and (3) it ensured the U.S. benefitted from the geopolitical relationship that goes with such significant assistance with a foreign country's power supply.

President Eisenhower's historic move has paid dividends for decades. With the United States at the forefront, the Atoms for Peace policy gave rise to many of the most important safety and nonproliferation standards of today's nuclear world.

Remarkably, the same arguments used to support the U.S. government's decision to bring nuclear power to the world in the 1950s are still just as relevant today—that is, the United States should lead in nuclear trade because if we do not, another country will, which will undermine U.S. influence, as well as U.S. safety and nonproliferation standards. At the same time, Russia and China have identified building nuclear power plants and nuclear trade as national priorities promoted by the highest levels of government and backed by state financing and state-owned enterprises. As a result, Russia now dominates nuclear power plant construction around the world, using it as a tool to exert foreign influence and reap significant economic gains. Nuclear energy is also a component of China's "Belt and Road" initiative.[4] The struggling U.S. nuclear power industry—competing against foreign governments for new projects abroad—has quickly been sidelined on the foreign stage.

Russia and China are responsible for constructing over 60% of the world's new nuclear plants.[5] Russia has more than 50 reactors either under construction, planned, or proposed in 19 countries. China has over 20 reactors in 12 countries. Russia has a $133 billion order book for new foreign reactors. Russia estimates every 1 ruble of nuclear export contributes 2 rubles to national GDP.[6] China has aspirations similar to, if not greater than Russia. China estimates that it could build as many as 30

---

[3] Address of Dwight D. Eisenhower, President of the United States of America, to the 470th Plenary Meeting of the United Nations General Assembly (Dec. 8, 1953) (*available at* https://www.iaea.org/about/history/atoms-for-peace-speech).

[4] *China could build 30 'Belt and Road' nuclear reactors by 2030: official*, Reuters (Jun. 20, 2019) (*available at* https://www.reuters.com/article/us-china-nuclearpower/china-could-build-30-belt-and-road-nuclear-reactors-by-2030-official-idUSKCN1TL0HZ).

[5] Atlantic Council, *U.S. Nuclear Energy Leadership: Innovation and the Strategic Global Challenge, Report of the Atlantic Council Task Force on U.S. Nuclear Energy Leadership* (May 2019) (*available at* https://www.atlanticcouncil.org/wp-content/uploads/2019/05/US_Nuclear_Energy_Leadership-.pdf); *see* World Nuclear Association, Nuclear Power in Russia (last updated July 2020), *available at* https://www.world-nuclear.org/information-library/country-profiles/countries-o-s/russia-nuclear-power.aspx.

[6] See Reuters, *Russia's Rosatom sees foreign revenues, new products fueling rapid growth*, by Katya Golubkova and Gleb Stolyarov (June 24, 2019), available at https://www.reuters.com/article/us-russia-rosatom-strategy/russias-rosatom-sees-foreign-revenues-new-products-fuelling-rapid-growth-idUSKCN1TP1LI.

foreign nuclear reactors through its involvement in the "Belt and Road" initiative over the next decade, earning Chinese firms as much as $145.5 billion by 2030.[7] It further estimates that capturing just 20% of the market for proposed new reactors in the Belt and Road countries will create 5 million Chinese jobs and generate billions of dollars for Chinese companies.[8]

The U.S. has no orders for new nuclear reactors abroad.

Russian energy policy, in particular, expressly recognizes the export of energy technologies as a geostrategic tool to promote Russian national security, and provides financial backing to its energy exports accordingly. Lower-cost "turnkey" projects offered by the Russians and Chinese—which include state-supported financing packages—shuts out the United States.[9] As China and Russia succeed in the deployment of their nuclear energy technologies in emerging economies, they gain critical geopolitical influence in these countries by effectively controlling baseload power and the fuel cycle (and spent fuel byproducts) to run these nuclear units.[10] This influence runs for the long-term, at least for the life of the project and plant which can stretch to 100 years, with long-term implications for the geopolitical balance of power and economic influence, potentially threatening U.S. peace and security. For example, Egypt and Russia recently finalized a $21 billion contract for the Russians to supply four reactors in Egypt.[11] A few months later, Egypt and Russia announced a preliminary agreement to allow Russian military jets to use its airspace and bases. The agreement will give Russia its deepest presence in Egypt since 1973.[12]

While we have ceded the mantle currently, we have a chance to regain it when it comes to the next generation of advanced reactors. The U.S. leads the world in the development of advanced reactors and fusion facilities. If the United States leads in implementing this new technology wave, safety will improve, our geopolitical relationships will strengthen, and non-proliferation will remain strong. However, if U.S. companies do not receive more support these benefits will fall to the wayside and other countries will emerge as leaders. We currently are well-positioned to deliver this new technology but are increasingly yielding our advantage to China and Russia. The American Nuclear Infrastructure Act of 2020 will help close the gap between U.S. potential and our ability to execute on that potential at home and abroad.

---

[7] Reuters, *China could build 30 'Belt and Road' nuclear reactors by 2030: official*, by David Stanway (June 30, 2019), available at https://www.reuters.com/article/us-china-nuclearpower/china-could-build-30-belt-and-road-nuclear-reactors-by-2030-official-idUSKCN1TL0HZ.
[8] *Id.*
[9] Wallace, *supra* note 1.
[10] *Id.*
[11] *See* Al-Masry Al-Youm, *Construction of First Nuclear Reactor at Dabaa Station to Start after Christmas Holidays*, Egypt Independent (Dec. 13, 2017) (*available at* http://www.egyptindependent.com/construction-first-nuclear-reactor-dabaa-station-start-christmas-holidays/). The article notes that of the $21 billion price tag for the four new reactors, Russia will fund 85 percent of the plant through a loan, and the rest will be financed by Egypt. The deal was finalized in September 2017.
[12] *See* David D. Kirkpatrick, *In Snub to U.S., Russia and Egypt Move toward Deal on Air Bases*, New York Times (Nov. 30, 2017) (*available at* https://www.nytimes.com/2017/11/30/world/middleeast/russia-egypt-air-bases.html.) ("The United States has provided Egypt more than $70 billion in aid in the four decades since, at a rate of more than $1.3 billion a year in recent years. The cost is often justified in part by the argument that it secures the use of Egypt's airspace and bases for the U.S. military.")

II. Nuclear power provides significant benefits to the United States

Nuclear power is an effective solution to help combat greenhouse gas emissions, while also producing more energy than alternative renewable sources and requiring far less land to produce a comparable amount of energy. About 55% of zero-carbon emission electricity in the U.S. is generated by nuclear power, and the utilization of nuclear energy has prevented the emission of 528 million metric tons of carbon dioxide emissions.[13] Nuclear power is an important tool in the toolbox of no- and low-carbon electricity. Moreover, while renewable energy sources like solar and wind may play an important role in our clean energy framework, nuclear energy provides a more efficient solution. Nuclear power operates with a capacity factor of 92.2%, which is more than double the capacity of solar and wind plants, which have capacity factors of 27% and 37%, respectively.[14]

A recent report estimates that based on future carbon mitigation goals, the U.S. nuclear market revenues could amount to $1.9 trillion over the next 30 years.[15] Moreover, according to the Department of Commerce, over the next ten years, the international market for nuclear equipment and services will yield about $740 billion, and every $1 billion of exports by U.S. companies will support anywhere from 5,000 to 10,000 jobs domestically.[16] Nuclear power requires lots of skilled labor that is highly compensated—job opportunities in nuclear energy include reactor designers, service and maintenance professionals, and those working in fuel cycle facilities to mine, mill, and enrich uranium. Additionally, tens of thousands of STEM jobs are required to support nuclear plant operation. These positions open the door for highly skilled domestic employees, many of whom come to the field from the Navy or after pursuing extensive university programs.[17]

Aside from the benefits of increased domestic employment opportunities, spreading U.S. nuclear technology and standards will help ensure high standards for safety and nonproliferation globally.[18] The United States has historically used its technological leadership in nuclear energy to promote nonproliferation objectives worldwide. This started with Eisenhower's "Atoms or Peace" speech in 1954 and continued with the negotiation of the Non-Proliferation Treaty (NPT) in 1968—where the world's nuclear powers agreed to share civilian nuclear technology with non-nuclear states who agreed to forego

---

[13] Nuclear Energy Institute, Climate webpage (*available at* https://www.nei.org/advantages/climate) (last accessed Aug. 1, 2020).

[14] U.S. Energy Information Administration, *Electric Power Monthly, with Data for February 2018*, Table 6.7.B (Apr. 2018) (*available at* https://www.energy.gov/policy/initiatives/quadrennial-energy-review-qer/quadrennial-energy-review-second-installment). Nuclear power plants also operated at a much higher capacity factor than even coal and natural gas combined-cycle plants, which in 2017 operated with capacity factors just above 50 percent. *Id.* at Table 6.7.A.

[15] UxC, LLC, *Global Nuclear Market Assessment Based on IPCC Global Warming of 1.5° C Report* (Jul. 2020) (*available at* https://www.nei.org/CorporateSite/media/filefolder/resources/reports-and-briefs/UxC-NEI-(IPCC-2050-Nuclear-Market-Analysis-PUBLIC)-2020-07-01.pdf).

[16] Nuclear Energy Institute, *Nuclear Exports & Trade Overview* (*available at* https://www.nei.org/advocacy/compete-globally).

[17] *See, e.g.*, Department of Energy, *Nuclear Energy University Program* (*available at* https://www.energy.gov/ne/nuclear-reactor-technologies/nuclear-energy-university-program). Since 2009, the Nuclear Energy University Program has awarded "approximately $290 million to 89 colleges and universities in 35 states and the District of Columbia to train the next generation of nuclear engineers and scientists in the United States and continue U.S. leadership in clean energy innovation."

[18] Atlantic Council, *supra*, note 5.

nuclear weapons. The United States has required each country with whom it has worked to sign and enforce strict commitments on the sharing of nuclear technology (i.e., U.S. 123 Agreements); adopt U.S. operational safety standards (e.g., those promulgated by the U.S. Institute of Nuclear Power Operations); and set forth a global fuel supply framework that reduces risk of proliferation (e.g., 2007 U.S. Assured Fuel Supply Program).

Furthermore, nuclear power plant export collaborations between nations create strong geopolitical ties and long-term partnerships that can last 100 years. In fact, our core strategic allies—i.e., Japan, United Kingdom, and Korea—are also our main strategic nuclear generation partners. Other alliances that are less mature, such as that with the United Arab Emirates, have been solidified through more recent nuclear cooperation agreements.[19] Many key U.S. allies and areas of geostrategic importance lack domestic energy reserves and are highly dependent on foreign energy imports making them dependent on other countries to support their energy needs. Nuclear power plants provided by the U.S. can reduce our allies' dependence on potentially unstable energy sources, and deepen U.S. ties. Besides national security, investing in the nuclear sector also adds value to the U.S. research mission by providing engineers' and scientists' resources for research.[20] The research resulting from nuclear reactors at leading U.S. universities has numerous spin-offs for other disciplines, such as superconductors, polymers, metals, and proteins.[21] Nuclear technology also aids in determining quality control for aerospace, automotive, and medical components. Nuclear power itself is a key component of extra-orbital space research. For example, the Voyager spacecraft[22] and the Mars rover, Curiosity, use Radioisotope Thermoelectric Generators (RTGs) to continue to function.[23]

III. The existing domestic nuclear operating fleet is generally struggling to stay open and emerging new technologies are struggling to gain a foothold

As recently as 2013, the U.S. had 104 operating domestic nuclear power reactors—today there are 95, and about 1/3 of them are facing economic hardships. These reactors generate electricity at relatively low long-term operational costs, and generate thousands of high-paying jobs.[24] They are designed and able to operate up to 60 and 80+ years, if they are permitted to do so. Maintenance, refueling, and upgrades will keep nuclear experts employed and nuclear suppliers with contracts. With roughly half of the nuclear fleet operating in "merchant" markets priced for the short term, the low price of natural gas is making nuclear plants temporarily uncompetitive. At the same time, however, certain critical benefits of nuclear power plants—e.g., reliability, grid stability, low-carbon energy source, national security asset—go largely uncompensated.[25]

---

[19] Wallace, *supra*, note 1.
[20] U.S. Nuclear Regulatory Commission, *Backgrounder on Research and Test Reactors* (last updated May 5, 2020) (*available at* www.nrc.gov/reading-rm/doc-collections/fact-sheets/research-reactors-bg.html).
[21] *Id.*
[22] NASA, *Voyager Spacecraft* (*available at* www.voyager.jpl.nasa.gov/mission/spacecraft/).
[23] NASA, *Radioisotope Power Systems* (*available at* www.rps.nasa.gov/).
[24] Wallace, *supra*, note 1.
[25] *Id.*

Nuclear power plants cannot be "mothballed"—shutting down during bad economic times and then restarting when the economics are better. When nuclear power plants shut down, regulatory requirements essentially mean that the shutdown will be permanent. If the global reactor lifetimes only average 50 years, with decommissioning and shut-down plans, the current nuclear capacity of around 405 GWe could be halved.[26] To maintain the current fleet and reduce the need for new construction, the current fleet's lifecycle must be extended 20 to 30 years.[27] Several expert views suggest that within the next decade or two, commercial nuclear plants may face shutdown or be tagged with a near-term date for shutdown.[28] The loss of commercial nuclear power plants also creates decline in the supporting infrastructure—especially in the fuel cycle supply chain, human supply chain, and the military to civilian workforce pipeline—further jeopardizing not only our domestic ability to support our domestic fleet, but also our ability to supply and assist at nuclear reactors abroad.

The U.S. currently leads in advanced reactor design and, while traditional nuclear reactors may be the greatest source of nuclear power in the near-term, advanced reactors are projected to become most prevalent moving forward.[29] There are about 75 domestic ventures in next-generation nuclear technologies and new opportunities are being created every day.[30] These endeavors of innovation take many forms. Some hope to use liquid metal coolants, some want to use gaseous helium, and some want to greatly improve current light water reactor designs. Some want to have liquid uranium (or thorium) fuel, and some want to use nuclear waste as fuel. Some propose to cut out fission altogether and move straight to nuclear fusion. Nearly all of them offer modular designs that can start small and scale with customer needs. TerraPower, a molten salt reactor design that proposes to use spent nuclear fuel as feedstock, is supported by Bill Gates, and has garnered multiple rounds of financing and is moving toward development of a demonstration plant. In recent years, TerraPower tried to move overseas to develop its technology in China due to a more supportive government and faster regulatory approval process, but has since terminated these activities at the direction of the U.S. government due to the U.S. government's concerns over the national security risks associated with China's diversion of commercial technology for military uses and misappropriation of U.S.-origin intellectual property.[31]

---

[26] UxC, LLC, *supra,* note 15.
[27] *Id.*
[28] *See* Wallace, *supra,* note 1.
[29] UxC, LLC, *supra,* note 15.
[30] Third Way, *Keeping Up with the Advanced Nuclear Industry* (Jan. 2018) (*available at* https://www.thirdway.org/graphic/keeping-up-with-the-advanced-nuclear-industry). This number shows a marked increase from the previous year, so the advanced reactor field is currently growing. *See also* Third Way, *The Advanced Nuclear Industry: 2016 Update* (Dec.12, 2016) (*available at* https://www.thirdway.org/infographic/the-advanced-nuclear-industry-2016-update).
[31] U.S. Department of Energy, National Nuclear Security Administration, *U.S. Policy Framework on Civil Nuclear Cooperation with China* (*available at* https://www.energy.gov/sites/prod/files/2018/10/f56/US_Policy_Framework_on_Civil_Nuclear_Cooperation_with_China.pdf); Hogan Lovells New Nuclear Blog, *US Government Clamps Down on Nuclear Exports to China*, by Amy Roma and Sachin Desai (Oct. 12, 2018) (*available at* https://www.hlnewnuclear.com/2018/10/us-government-clamps-nuclear-exports-china/).

Another company, NuScale, which promotes a factory-built-and-shipped small modular reactor design, is nearly at the end of its U.S. Nuclear Regulatory Commission (NRC) design certification application review. Another company Oklo, just submitted an application to the NRC for a combined construction permit and operating license for its microreactor design. And recently, three companies—X-energy, Westinghouse, and BWXT—were selected by the Department of Defense to move forward with preliminary designs for microreactors that can be used to power forward operating bases for the U.S. military. And along with the advanced fission reactors under development, there are also a number of fusion ventures looking to demonstrate and commercialize fusion power technologies.[32]

To that end, the U.S. Department of Energy has provided considerable first-round funding in support of initial research and development of advanced reactors. Continued development of all of the foregoing technologies likely will provide further opportunities for flexible, carbon-free commercial power. Yet, after initial research is done domestically, the U.S. regulatory regime and financial challenges drive nuclear ventures to look abroad as they move to the test and demonstration stage, as was the case with TerraPower.

However, the necessity for nuclear innovation and technology development is not solely for commercial purposes. New nuclear reactors and technologies will be needed to support the U.S. military, such as the U.S. Navy's nuclear propulsion program, the Department of Defense's microreactor project for forward operating bases, energy independence for U.S. military bases, and future air and space travel. For example, the U.S. Navy has a command of the sea that affords the United States unrivaled international influence. For decades, its size and sophistication have enabled leaders in Washington to project American power over much of the earth, during times of both war and peace.[33] If the U.S. expects to maintain a strong naval presence, then it must prioritize new reactor designs that are likely to move naval vessels faster and more efficiently; otherwise, the U.S. risks falling behind other countries that are already working on such developments.

In comparison, China is building a molten salt reactor (a new type of advanced nuclear reactor) for potential application on aircraft carriers and flying drones.[34] Because molten salt reactors can be much smaller and safer than conventional pressurized light water reactors, and require less maintenance, the United States risks Chinese naval warships and offensive/defensive air systems quickly outpacing those of the United States. Both Russia and China are developing nuclear powered ice breakers for use in the arctic, an area of growing strategic importance for great power competition.

---

[32] *See* Amy Roma and Sachin Desai, *The Regulation of Fusion – A Practical and Innovation-Friendly Approach* (Feb. 2020) (*available at* https://www.hoganlovells.com/~/media/hogan-lovells/pdf/2020-pdfs/2020_02_14_hogan_lovells_the_regulation_of_fusion_a-practical.pdf?la=en).

[33] *See* Council on Foreign Relations, *Sea Power: The U.S. Navy and Foreign Policy* , by Jonathan Masters (Aug. 19, 2019) (*available at* https://www.cfr.org/backgrounder/sea-power-us-navy-and-foreign-policy).

[34] Wallace, *supra* note 1.

Both China and Russia are developing floating nuclear power plants to move from one location to another to support emerging electricity needs. China, in particular, plans to build a number of floating nuclear reactors to provide power to the artificial islands that it is building in the South China Sea.[35]

As Russian and Chinese governments recognize the geopolitical and economic benefits to building new nuclear projects abroad and staying at the forefront of emerging nuclear energy and propulsion technologies, the U.S. should take action to ensure U.S. interests are protected.

IV. We are at a critical time to support nuclear power, not only in saving thousands of jobs and a key carbon-free baseload power source, but also to support the promising advanced reactor industry. That is why I am supporting the American Nuclear Infrastructure Act of 2020 (ANIA).

The U.S. needs a nuclear energy framework that is effective, agile, and responsive to the needs of U.S. economic and national security interests in the twenty-first century. ANIA targets three key areas to support these interests: (1) supporting advanced reactor development; (2) supporting the existing fleet; and (3) supporting nuclear infrastructure development.

(1) Advanced reactor development

The current U.S. nuclear regulatory regime is geared toward the current light water reactor fleet, because that is what it has worked with for the past four decades. As a result, rather than maintaining a flexible licensing regime to accommodate new plant designs, the U.S. nuclear regulator—NRC—has codified by rule a number of requirements that only make sense for large light water reactors. Although the NRC states that it is ready to review and license an advanced reactor design today, the reality is that it will take significant time and resources to bring the NRC up to speed with any non-light water reactor technology.

Under these facts, the business case for a new nuclear technology developer becomes very challenging if left only to the private-sector commercial market. Previous recent legislation, including the Nuclear Energy Innovation and Modernization Act (Public Law No: 115-439), which requires the NRC to develop and implement strategies for the use of risk-informed, performance-based techniques and guidance for licensing advanced nuclear reactors, significantly helps in this regard.

ANIA will help further streamline the NRC licensing process and create incentives for innovation in nuclear technology, to better ensure a predictable and environmentally-conscious advanced reactor development. At this time, the United States leads in the next generation of advanced reactor designs, which tend to be smaller, more scalable, safer, and more secure than their large-scale cousins. These designs include nuclear fission and fusion and they present huge potential, such as the capability to generate power for 20 years without refueling; provide off-grid power for remote communities and military installations; use nuclear waste as fuel; power space vehicles and stations;

[35] *See China's Risky Plan for Floating Nuclear Power Plants In The South China Sea,* The Diplomat, by Viet Phuong Nguyen (May 10, 2018) (*available at* https://thediplomat.com/2018/05/chinas-risky-plan-for-floating-nuclear-power-plants-in-the-south-china-sea/).

and propel a faster fleet of ships fielding more powerful weapons—including nuclear submarines and aircraft carriers—across the world's oceans.[36]

The ANIA incentivizes development in the form of a prize award equal to licensing regulatory fees to the private company that receives the first operating or combined permit from NRC for an advanced nuclear reactor.[37] A similar prize can be awarded to a private company that is first to receive approval of an advanced nuclear fuel. One of the biggest impediments to investments in advanced reactor investment is regulatory uncertainty and costs. Improving regulatory framework and guidance for advanced reactors—including through the development of a technology neutral, risk-informed framework—is critical. Furthermore, ANIA consolidates nuclear export activities within NRC. It will require NRC to coordinate with various entities, such as national labs and the private sector, when developing technical standards and legal frameworks for international activities.[38] Equally important is the NRC's timing and budget certainty. While Congress and the NRC's internal actions have improved the NRC's timing for conducting reviews, I would further recommend the Committee consider implementing NRC budget accountability measures to ensure that projects are completed not only on time but do not come at the cost of destroying the NRC's own estimate budget for project review. For example, the NRC could be required to submit a report to Congress when costs exceed the NRC's own budget by more than 30% for the various aspects of the project. This would not prevent the NRC from undertaking the work it needs to ensure a thorough licensing review, but would provide more accountability and transparency to ensure completing a project on time does not come at the expense of budget predictability and discipline.

Another roadblock in the NRC licensing process lies with the daunting and, sometimes, financially crippling requirements of environmental reviews. The National Environmental Policy Act (NEPA) requires environmental review of "major Federal actions significantly affecting the quality of the human environment."[39] These environmental reviews generally come in the form of an Environmental Impact Statement (EIS) and is a major part of NRC licensing. While environmental reviews for new nuclear projects are important, there is room for improving their efficiency without decreasing their quality. ANIA takes steps toward this improvement. ANIA instructs that the NRC use analysis and findings from existing EIS for construction or combined permits to create a Supplemental EIS.[40] Furthermore, ANIA requires that information used during the licensing process of existing nuclear projects is re-used when considering new projects at the same site.[41]

---

[36] Wallace, *supra*, note 1.
[37] Discussion Draft, American Nuclear Infrastructure Act of 2020, Section-by-Section (*available at* https://www.epw.senate.gov/public/_cache/files/f/3/f320cf1e-67d7-45b4-a9c5-cd323500429a/3F5714E9050FE4BBA8C044163FA63E82.discussion-draft-american-nuclear-infrastructure-act-of-2020-section-by-section.pdf).
[38] *Id.*
[39] National Environmental Policy Act, 42 U.S.C. §§ 4321 *et seq*. (1969).
[40] Discussion Draft, *supra*, note 26.
[41] *Id.*

While these measures help streamline the regulatory process, there may be additional steps that can be taken. The development of an EIS commonly requires about a third or more of agency staff effort and is often times the same length or longer than the NRC's substantive technical evaluation, found in its Safety Evaluation Report.[42] This proves to be a waste of resources and delays beneficial projects that have the potential of greatly improving environmental quality.[43] With advanced reactor designs being created by small or mid-size companies with limited resources, the burden of a lengthy and repetitive EIS process could significantly impede development.[44] Nuclear entrepreneurs in the U.S. will be unable to compete with developers abroad whose countries do not place significant regulatory burdens on innovation.

I would suggest that the NRC establish a "Generic Environmental Impact Statement" (GEIS) for High-Assay Low-Enriched Uranium (HALEU) fuel, and expand its current effort to develop a GEIS for Advanced Reactor generic issues. This should significantly streamline subsequent environmental reviews for Advanced Reactor applications, especially ones using HALEU. I would also recommend that NRC reconsider the presumption that an EIS is required under NEPA for environmental review. NEPA also allows for an Environmental Assessment (EA), which is a shorter, more efficient analysis that may be appropriate for advanced nuclear with the industry's inherent safety and zero-carbon emissions.[45] Finally NRC should consider its own precedent performing safety and environmental reviews for research reactors and commercial non-power reactors, which have historically been much more straightforward.[46] The time for Congress to act on these NEPA issues is ripe with the recent promulgation of the final NEPA rule implementing regulations on July 16, 2020.[47]

(2) Supporting the existing fleet

ANIA will help maintain existing plants and save jobs, while providing carbon free power to the masses. The law provides for targeted credit programs to keep existing plants running and modernizes rules to encourage investment in nuclear. ANIA updates the Atomic Energy Act's restriction on foreign, ownership, control, or domination (FOCD) of nuclear reactors. Updating the FOCD provision aligns the 1950s with modern times, including the global nuclear marketplace and new national security reviews from the Committee on Foreign Investment in the United States (CFIUS).

These changes recognize the importance of foreign investment in U.S. nuclear energy while also protecting the U.S. from foreign threats. Revisiting the Atomic Energy Act's FOCD provisions to reflect modern times has been the subject of a number of recent articles and a July 28, 2020 letter to this

---

[42] Nuclear Innovation Alliance, *Streamlining NRC NEPA Reviews for Advanced Reactor Demonstration Projects While Safeguarding Environmental Protection* (Sept. 2019) (*available at* https://docs.wixstatic.com/ugd/5b05b3_e661eba94a224b28aac2a7e11d60e0c6.pdf).
[43] *Id.*
[44] *Id.*
[45] Atlantic Council, *supra*, note 5.
[46] *See* Environmental Impact Statement for the Construction Permit for the SHINE Medical Radioisotope Production Facility, U.S. NRC (Oct. 2015) (*available at* www.nrc.gov/docs/ML1528/ML15288A046.pdf).
[47] Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, Council on Environmental Quality, 85 Fed. Reg. 43304 (Jul. 16, 2020).

Committee and the House Energy and Commerce Committee signed by 10 former NRC Commissioners urging Congress to remove the FOCD provision.[48]

The FOCD Provision was established at the start of the Cold War, when only a few countries were nuclear powers, and thus foreign involvement in nuclear power was viewed with great skepticism. This restriction was not a problem in the early history of U.S. nuclear power, as reactors were built and owned by local utilities, with limited direct foreign involvement. However, today international partners play a key role in the U.S. nuclear industry and have large stakes in U.S.-based reactor designers and fuel cycle companies (such as uranium enrichment companies and fuel fabricators).

Foreign investment from our allies, far from being viewed with skepticism, is instead critical for the U.S. civilian nuclear industry to succeed.[49] U.S. allies are interested in supporting U.S. advanced reactor vendors, and often have higher tolerance for these investments than their U.S. counterparties.[50] However, instead of safeguarding American interests, the FOCD provision is more likely to push advanced reactor developers out of the country to demonstrate their technologies and will stifle investment in those that remain, harming U.S. nuclear technology leadership, U.S. nuclear export prospects (as there will be fewer U.S.-designed and built plants to thereafter export abroad), and overall nuclear security.

(3) Supporting nuclear infrastructure development

A strong civilian nuclear energy infrastructure is a fundamental strategic national asset for any major nation—and the United States is no exception. ANIA helps ensure that the U.S. can continue to meet our domestic nuclear needs through government support of nuclear infrastructure. ANIA aims to support HALEU, the fuel of many advanced reactor technologies, by ensuring adequate technical expertise for development of these fuels. It also requires the NRC to develop a report on the advanced methods of manufacturing and construction for nuclear applications that examines, among other things, licensing issues, requirements for the use of nuclear grade components for advanced nuclear applications, and potential safety issues, which will further assist the nuclear industry.[51]

V. Conclusion

Thank you for the opportunity to provide my support for this important piece of legislation. I have spent two decades working in the nuclear regulatory field. I care deeply about the topic, and the impact of effective regulation on our nation's economy and national security. For the reasons set forth herein, I urge the Committee to support ANIA in order to protect and promote U.S. interests.

---

[48] *See also* Columbia Center on Global Energy Policy, *Strengthening Nuclear Energy Cooperation between the United States and Its Allies*, Dr. Matt Bowen (Jul. 2020); Nuclear Innovation Alliance, *U.S. Nuclear Innovation in a Global Economy: Updating an Outdated National Security* (Jul. 2020) (*available at* https://nuclearinnovationalliance.org/updating-outdated-national-security-framework).

[49] Nuclear Innovation Alliance, *supra,* note 47.

[50] *Id.*

[51] *Id.*