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Good afternoon Chairwoman Kaptur, Ranking Member Simpson, and Members of the Subcommittee, it is an honor to appear before you today to discuss the President's Fiscal Year (FY) 2021 budget request for the Office of Nuclear Energy (NE).

As the Nation's largest source of clean, reliable and resilient electricity, nuclear energy is a strategic national asset for the United States. It is an essential element of our Nation's diverse energy portfolio helping to sustain the U.S. economy and support our national goals. Nuclear energy reliably generates over 55% of the nation's clean energy and about 20% of the electricity in the U.S. As the primary source of clean energy, the existing nuclear fleet must be sustained while innovative, affordable, advanced nuclear technologies are developed and deployed.

As a result of its historic leadership in nuclear energy, the U.S. currently enjoys the benefits of the world's largest fleet of nuclear fission reactors. As the use of nuclear energy continues to expand internationally, U.S. leadership is being ceded to countries such as Russia and China, who are quickly becoming leading suppliers of nuclear technologies. The unique nature of nuclear technology creates a national strategic imperative to maintain U.S. leadership in nuclear energy and enhance U.S. influence by being competitive in global nuclear energy markets.

The average age of the nuclear power plant fleet is now 38 years. Almost all of the operating plants have received approval to conduct at least one capacity uprate and to date, these uprates have contributed eight gigawatts electric (GW) of additional nuclear capacity. Efficiency improvements have also significantly increased the total amount of nuclear generation, helping to keep nuclear energy at 20 percent of the Nation's total electricity generation even though the total number of nuclear units has decreased. This is a true testament of our Nation's world-class plant operators, who consistently demonstrate the highest capacity factors of any nuclear fleet in the world.

Of the 96 operating nuclear reactors, 88 have received license extensions to 60 years. Two reactors at Florida Power and Light's Turkey Point nuclear power plant have been granted license extensions to 80 years. Two additional plants (four reactors) have applied for a subsequent license renewal to 80 years. These include, Exelon's Peach Bottom (two reactors) and Dominion's Surry (two reactors). Dominion has also announced its intention to seek subsequent license renewal for its North Anna plant (two reactors) in Virginia. Duke Energy (11 reactors in total) also announced that they will seek subsequent license renewals for their units, meaning almost 25% of the current fleet is planning to operate beyond 2050.

Since 2013, nine reactors have retired prematurely and eight more are scheduled to retire as a result of historically low natural gas prices, and flat or declining demand. While premature retirements have generally been driven by market conditions, in other instances, state policies contribute to the retirement of plants, such as in California (Diablo Canyon), New York (Indian Point), and New Jersey (Oyster Creek). An additional nine reactors were slated to retire prematurely, but those

decisions were reversed as a result of state action in New York, Illinois, and Ohio to value the clean energy benefits of those plants. New Jersey and Connecticut have also taken similar steps to ensure the continued operation of their nuclear power plants. It will be incredibly harmful to U.S. energy security, economic prosperity, and environmental sustainability if this shutdown trend were to grow.

Sustaining the current fleet of operating nuclear power plants is a priority for the nation. Without a robust nuclear industry, we will not be able to maintain the current contributions to clean electricity generation, nor maintain the associated U.S.-based supply chains, nor maintain the fuel cycle infrastructure necessary for a vibrant civilian nuclear industry and strong national security. A robust and highly developed nuclear infrastructure is also essential for the introduction and deployment of advanced nuclear technologies. If we do not stop the downward trajectory of our existing fleet now, it may be too late to recover and realize the benefits of nuclear technologies in the future.

NE is working to ensure the long-term economic viability of our existing nuclear fleet by conducting early-stage R&D to enable the development of the technical basis for the continued reliable and economic operation of the current fleet of nuclear plants, as well as the development of technical solutions to enhance the economics and performance of nuclear power plants, including investigating alternative revenue streams. The Department is excited to investigate and support new uses for nuclear energy, like hydrogen production and other industrial uses. NE is also supporting progress towards developing one or more concepts of accident tolerant fuels, $36 million in the FY21 request, which offer real potential for substantially improved economics and safety margins for our existing fleet and advanced reactors as well.

Today, utility customers and communities around the United States, and internationally, who may be interested in acquiring nuclear energy's long-term clean and reliable source of power for their communities, are faced with a startling limited choice of only nuclear reactors designed to produce over 1,000 megawatts (MW) of electricity; many U.S. utilities and international markets find these gigawatt class reactors simply too large for their electricity grids. As long as there are only reactors of this size, nuclear energy will remain constrained relative to its true market potential.

So what do we see in response to this lack of product choice by those who otherwise seek the unique attributes offered by nuclear energy? We see the market respond through the emergence of dozens of U.S. nuclear reactor developers looking to seize this opportunity by advancing highly innovative small, scalable, flexible, resilient and more financeable nuclear reactors. These innovative technologies include small modular reactors (SMRs), microreactors, high temperature reactors (HTRs), molten salt reactors, and liquid metal fast reactors.

The flexibility offered by advanced reactors also enhance the ability to load follow and integrate with renewables as integrated, or hybrid, energy systems. This is an important evolution of nuclear energy as the grid continues to rely on higher concentrations of variable and intermittent generation.

The innovative design features of advanced reactors also enable new opportunities for power plant siting. SMRs and microreactors could be considered for microgrids, remote locations, and even data centers. It is envisioned that many of these reactor designs could also be placed closer to population centers, with a smaller emergency-planning zone (EPZ) – something the U.S. Nuclear Regulatory Commission (NRC) is evaluating. In fact, NRC staff already evaluated and accepted one major innovation that would exempt the NuScale design from the requirement to have safety-related off-site electrical power available to support any primary safety systems. In the event of a loss of offsite

power or loss of coolant, the reactor is designed to not need such power and to passively shut down safely on its own. This advancement has the added advantage of allowing this type of reactor to restore electricity generation operations to recover from a total or partial shutdown, also referred to as a black start capability. The implications to distributed generation and resiliency are enormous. Having a diverse catalogue of technology options will make U.S. nuclear technologies vendors more attractive and competitive in the global market, and expand into countries that had not previously considered nuclear energy as part of their energy mix.

NE is working to move forward our Nation's next generation of advanced nuclear reactors so nuclear energy continues to be part of our energy mix now and well into the future. Through the Advanced Reactor Technologies and Advanced Small Modular Reactor Research and Development (R&D) subprograms, NE supports early-stage R&D that helps stimulate the nuclear industry as it works to address particularly high-risk fundamental technical challenges in advanced reactor concepts. These subprograms are key towards conducting the R&D needed to bring microreactors, SMRs, HTRs, molten salt reactors, and liquid metal fast reactors to the market place.

Historically, commercial deployment of new nuclear energy systems has been preceded and supported by significant development activity. These efforts are essential to stimulate the nuclear industry by maturing the technologies, supporting supply chains, verifying expected plant performance, and lowering the risk for follow-on commercial units. To that end, and in support of these innovative reactor technologies, the President's FY 2021 budget requests $20 million for additional research and capabilities in the Advanced Reactor Demonstration program needed to support the development and demonstration of advanced nuclear technologies.

The National Reactor Innovation Center (NRIC) established at Idaho National Laboratory (INL) will provide industry technology developers with direct engagement, coordination, and access to the strategic infrastructures and assets of the national laboratories needed to execute demonstrations of advanced nuclear technologies. The FY 2021 budget request includes $10 million for the operation of NRIC.

Stewarding a modern, world-class nuclear energy research and development infrastructure is an essential responsibility of NE programs. This infrastructure needs to be made available to all nuclear technology developers and innovators to the extent appropriate. We have assessed our national infrastructure across our national laboratory complex, universities and industrial research centers and have taken action to ensure they maintain the right set of capabilities. To that end, the Administration is prioritizing the need for a fast spectrum test reactor. Such a reactor would accelerate innovation in advanced fuels and materials for U.S. nuclear vendors and pave the path to U.S. global leadership in advanced nuclear R&D by reestablishing this capability. On February 22, 2019, the Secretary of Energy approved, Critical Decision (CD)-0, mission need for the Versatile Test Reactor (VTR) project, and CD-1, Alternative Selection and Cost Range, is expected by the end of the third quarter of FY 2020. The FY 2021 request of $295 million for the VTR program – the largest line item for NE – will be used to complete the preliminary design and commence procurement of critical long lead components. The VTR serves as a cornerstone to the Administration's focus on strengthening the nuclear sector in the United States, is essential for long-term innovation, and is necessary to compete with the likes of Russia and China. The VTR will support advanced reactor innovations as well as support innovation for the existing nuclear fleet.

Some of the advanced reactor concepts currently under development by industry are expected to use high-assay low-enriched uranium (HALEU) fuel, for which there is currently no commercially

available supply in the world. NE is actively addressing this issue through multiple pathways by investigating technologies that could provide a limited supply of HALEU to support fuel-fabrication R&D needs for potential demonstrations of advanced reactor concepts. The FY21 Budget also provides the third and final year of funding for the HALEU enrichment demonstration project.

U.S. energy and national security depends upon a viable U.S. nuclear fuel cycle. In support of strategic U.S. fuel cycle capabilities and for the assurance in the event of a market disruption, the FY21 Budget requests $150 million for a Uranium Reserve (UR) program. The UR establishes a reserve of U.S.-origin uranium in response to an overreliance on imported uranium that has undermined U.S. energy security and impacted U.S. fuel supply capabilities. This action addresses near-term challenges to the production and conversion of domestic uranium, where the risks are most immediate, and is consistent with the priorities of the Administration's Nuclear Fuel Working Group.

Finally, to realize the full potential of nuclear energy, we must have a path forward towards disposal of spent nuclear fuel. The Department remains committed to fulfilling the Federal Government's legal and moral obligation to properly manage and dispose of that material. The President's FY 2021 Budget request $27.5 million derived from the Nuclear Waste Fund for the Interim Storage and Nuclear Waste Fund (NWF) Oversight program which prioritizes the development and implementation of an interim storage program for nuclear waste. It would lay the groundwork necessary for near-term deployment of interim storage to ensure safe and effective consolidation and temporary storage of spent nuclear fuel. NWF oversight activities would include responsibilities for the Yucca Mountain site to include the security, maintenance, and environmental requirements. Coupled with the $60 million for Used Nuclear Fuel Disposition R&D to support R&D and analysis of storage, transportation, and disposal technologies and pathways, the President's request supports the development of a durable, predicable yet flexible plan that addresses more efficiently storing waste temporarily in the near term, followed by permanent disposal.

The Administration is fully committed to nuclear energy as a vital component of our Nation's energy system. I firmly believe that support for early-stage R&D, including private-public partnership approaches working closely and thoughtfully with key U.S. stakeholders, we can strengthen our Nation's nuclear energy sector and restore our global nuclear energy leadership. By leveraging our national laboratory system, and enabling innovative thinking across academia and the private sector, we can support industry's development of a new and highly innovative class of U.S. advanced nuclear reactors, an innovative and responsive nuclear energy supply chain, and advanced nuclear energy fuel cycle technologies, positioning the U.S. for energy dominance in the 21st century. We have a lot of work to do, but by taking these actions, we can help ensure that future American generations continue to benefit, as we have, from this emission-free, reliable, and secure power source for our Nation.

Thank you very much, and I look forward to answering your questions.