Testimony of Edward G. McGinnis
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Chairman Smith, Ranking Member Johnson, Subcommittee Chairman Weber, Subcommittee Ranking Member Veasey, and Members of the Subcommittee, I am pleased to appear before you today to discuss the very important matter of commercial nuclear energy.

As the major source of reliable clean baseload electricity, nuclear energy is a key asset for the United States. It is an essential element of the Nation's diverse energy portfolio helping to sustain the U.S. economy and support our national goals. A strong domestic nuclear industry enabled by the existing nuclear fleet and enhanced by innovative technology developers is critical to our national security interests as well.

Today, nuclear energy is the third largest source of domestic electricity generation and is the largest source of clean energy. Besides providing reliable clean baseload electricity, nuclear power plants also provide price stability, an important but rarely talked about attribute.

Nuclear power plants serve as bedrocks to communities across the country, providing high-paying, skilled jobs to almost half a million Americans[1]. The U.S. nuclear energy fleet is also a significant contributor to the economy, generating $10 billion in federal taxes, and $2.2 billion in state taxes each year[1]. These units are drivers of local economies as well, often serving as the largest employer and economic engine of small communities.

Even with all of these benefits, the nuclear energy sector is undergoing a major transformative period of time due to a variety of factors that include changing and very challenging market conditions, an aging fleet of reactors, and an absence of nuclear energy product choices and innovative business/technology deployment models available to customers. In my view, these factors are actually driving the transformative bow-wave of highly innovative technologies, advanced additive manufacturing techniques, and new innovative business models coming out of the U.S. nuclear energy sector.

So what do I mean when I say the nuclear sector lacks product choice? Today, utility customers and communities around the United States, who may be interested in acquiring nuclear energy's long-term clean and reliable source of power for their communities, are faced with a rather startling limited choice of only large or larger nuclear reactors designed to produce between 1,000 MWe to 1,500 plus megawatt electric (MWe). These large reactors can take up to10 years to build before generating revenue from power production. Additionally, many international markets find these gigawatt class reactors simply too large for their electricity grids. As long as there are only large and larger reactors, the nuclear energy reactor markets will remain substantially constrained relative to nuclear

[1] https://www.nei.org/resources/fact-sheets/nuclear-by-the-numbers

energy's true market potential.

So what do we see happening to respond to this lack of product choice by those who otherwise would very much like to have the unique energy attributes offered by nuclear energy? We see the market response through the emergence of over 50 U.S. nuclear technology developers who are looking to seize this opportunity by advancing highly innovative small, scalable, flexible, versatile, and more financeable nuclear reactors. These innovative concepts include small modular reactors (SMRs), micro reactors, high temperature gas reactors, molten salt reactors and liquid metal fast reactors.

We are not only seeing game-changing and highly disruptive advancements in the U.S. nuclear reactor design space, but also in the advanced manufacturing area as well. The ultimate goal with our early-stage advanced manufacturing research and development (R&D) is to enable the development of innovative processes, such as 3-D printing, that can be applied to nuclear energy technologies. This is what I call a game-changer. Finally, the U.S. industry is leading multiple advanced nuclear fuels development efforts with some of the design components already in U.S. reactors for testing.

I hope what I have said thus far gives the Subcommittee a sense of the tremendous opportunity facing the United States due to the bow-wave of U.S. advanced nuclear companies, and the historic demand and need for new and innovative nuclear energy products and services. Now I'd like to shift the discussion a bit to discuss the role my office plays in supporting the development of these concepts and how that relates to some key pieces of legislation of interest to this Subcommittee.

Utilizing our greatest strengths, the Department is mobilizing its world-class capabilities, and implementing targeted early-stage R&D partnerships between academia, the national laboratories and the U.S. nuclear industry. Through the Gateway for Accelerated Innovation in Nuclear (GAIN), for example, NE is enabling industry to have more efficient access to DOE's facilities and expertise. Through GAIN, DOE also provides vouchers that direct-fund its laboratories to support the needs of U.S. industry nuclear technology developers through application of their unique experimental, analytical and engineering capabilities.

The support of the Department of Energy and its world-class laboratories is essential to the U.S. nuclear industry as it works to bring forth new innovative technologies and approaches.

The Department is also conducting R&D activities that would be necessary for the development of a versatile advanced fast 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. Requirements have been developed and an R&D plan has been created. The fiscal year 2019 appropriation of $65 million will help us continue to move forward with this project.

Furthermore, many advanced reactor concepts, including the DOE versatile advanced fast test reactor currently under development, will need high-assay low-enriched uranium (HALEU), for which there is currently no commercially available supply in the world. HALEU is uranium that is enriched between 5 to 20% U-235. NE is very familiar with this issue and is working with the National Nuclear Security Administration (NNSA) to move forward on options for enrichment and spent nuclear fuel recycling that could support both

U.S. advanced reactors and other DOE needs.

The Department is also exploring other innovative and collaborative approaches to support our Nation's evolving electricity grid. One such area is our collaborative work with the Office of Energy Efficiency and Renewable Energy on integrated energy systems, also referred to as hybrid energy systems. Optimization of nuclear and variable renewables could be an excellent way to meet clean electricity needs, and it could also prove to be a disruptive step-change improvement for non-electric markets as well. By integrating with variable generation, nuclear power plants can increase operational flexibility and provide process heat for non-electric industrial applications, hydrogen production, or desalination and wastewater treatment; thereby increasing revenue generation and the overall economics of nuclear power.

The Administration is fully committed to nuclear energy as a vital component of our Nation's energy system. I firmly believe that with a focused and sustained collaborative private-public partnership approach, and by working closely and thoughtfully together with key U.S. stakeholders, this subcommittee and all of Congress, we can indeed revive, revitalize, and expand 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 the 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. 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.

Edward McGinnis, Principal Deputy Assistant Secretary for Nuclear Energy

Edward McGinnis serves as the Principal Deputy Assistant Secretary for the Office of Nuclear Energy. The Office is responsible for conducting research on current and future nuclear energy systems, maintaining the government's nuclear energy research infrastructure, establishing a path forward for the nation's spent nuclear fuel and high-level nuclear waste management program, and a host of other national priorities.

Prior to his current role, Edward McGinnis served as Deputy Assistant Secretary for International Nuclear Energy Policy and Cooperation and was responsible for the Department of Energy's international civilian nuclear energy activities, including international nuclear energy research, development and demonstration cooperation, multilateral nuclear energy cooperation, international nuclear energy policy, international nuclear safety cooperation, and advocacy for US civil nuclear exports and industry.

As part of these responsibilities, Mr. McGinnis served as Steering Group Chairman of the International Framework for Nuclear Energy Cooperation that consists of more than 65 countries and four international organizations. He also served as the Departmental Representative in the US interagency for civil nuclear energy trade and promotion. Moreover, Mr. McGinnis has served as a Vice Chairman and Principal U.S. Representative to the Generation IV International Forum and was responsible for US domestic nuclear fuel assurance matters, including technical oversight activities regarding the United States Enrichment Corporation, uranium inventory management matters, as well as US nuclear energy security matters.

Prior to working in the Office of Nuclear Energy, Mr. McGinnis led a number of other high priority United States Government initiatives at the Department of Energy, including having served as the senior Director for the Office of Global Radiological Threat Reduction where he managed global operations involving the search, recovery, security and disposal of high-risk radiological and nuclear sources in cooperation with over 40 countries, including within the U.S. These activities included recovery of high-risk radiological sources from Iraq, establishment of a Global Radiological Regional Partnership Program, and the first-of-its-kind repatriation of high-risk U.S.-origin plutonium-239 sources. Mr. McGinnis also established and served as the Director of the Nuclear and Radiological Threat Reduction Task Force which was created to carry out a number of key Secretarial national security initiatives, including the development of a global nuclear materials removal and research reactor security study that included the identification of nuclear research reactors throughout the world by level of vulnerability and an action plan to effectively mitigate such vulnerabilities.

Mr. McGinnis also served as senior advisor and special assistant to four Assistant Secretaries and Deputy Administrators for nonproliferation and national security at the Department of Energy where he served as a senior advisor for all aspects of the Department's nonproliferation missions, including nonproliferation research and development, materials protection, control and accounting, and warhead security.

Mr. McGinnis holds a master's degree from The American University's School of International Service in Washington, D.C., and is a graduate of the Kennedy School's Senior Executive Fellows Program as well as the Program for Senior Executives in National and International Security at Harvard University.