United States Senate, Committee on Energy & Natural Resources
"Opportunities and Challenges Associated with Advanced Nuclear Reactor Commercialization"

The Honorable Jeffrey S. Merrifield, Commissioner, U.S. Nuclear Regulatory Commission (1998-2007)
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Chairman Manchin, Ranking Member Barrasso and members of the Committee, it is an honor to testify before you today on a topic of critical importance to the United States – the role that nuclear power will play in securing the clean, reliable, and resilient energy that we need to power our nation's electric grid and decarbonize critical industrial capabilities. I am appearing here today in my role as the Vice Chairman of the U.S. Nuclear Industry Council (USNIC) and Chairman of its Advanced Nuclear Working Group, although my full-time occupation is as a Partner in the nuclear energy practice group of Pillsbury Law Firm.

USNIC is the leading U.S. business advocate for the promotion of advanced nuclear energy and the American supply chain globally. USNIC represents over 90 companies engaged in nuclear innovation and supply chain development, including technology developers, manufacturers, construction engineers, key utility movers, and service providers.

I anticipate that my comments on behalf of USNIC represent the views of many of our members, but they may not necessarily reflect a unanimous view of our membership.

First, I want to start by thanking this Committee and your colleagues in both the Senate and House for the overwhelming bi-partisan support that nuclear energy has enjoyed over the last eight years. This atmosphere is far different than the post-Chernobyl reaction to nuclear energy that existed when I first became a junior Senate staffer in 1987.

Unlike that time, when 1000–1400-megawatt nuclear power plants were sold by a half-dozen companies principally to large utilities, today there are well over a dozen viable U.S. advanced reactor developers. These new technologies represent a variety of different sizes that can address the need for zero-carbon electricity as well as a much wider range of industrial requirements for heat and power. As the head of Pillsbury's nuclear practice, I have had the opportunity to engage with many

developers, utilities, and companies who are evaluating the deployment of advanced reactors, and I can validate that the potential interest in utilizing these technologies is large and growing.

Remote-sited microreactors, molten salt research reactors, data centers, steel mills, chemical complexes, mining operations and offshore mounted platforms are all creative uses of these technologies that have been spurred by the potential capabilities of the newest generation of nuclear technologies. Companies such as Dow, Microsoft, Google and Nucor, among many others, are all considering how nuclear energy can meet their need for clean power and industrial heat. What these companies share is a large balance sheet, and all of them conduct extensive and ongoing infrastructure design and construction. Thus, they are not deterred by the additional complexity and patience that comes with the deployment of nuclear power. As these companies require very large amounts of energy and have a long-term vision for the future of their companies, they have significant project management and financial capabilities to assess and manage project and financial risk in their energy portfolios.

But this begs a question: Where are the electric utilities?

While there are some very large state-owned or quasi state-owned utilities, including Ontario Power Generation in Canada and Tennessee Valley Authority that have leaned further forward, many U.S. regulated and unregulated utilities that currently own nuclear reactors have not yet committed to the purchase of new nuclear generation. Rather than take a lead position, many of these utilities indicate that they want to be the buyer of the second, third or fourth unit of a given design.

Why is that?

The answer is that financial markets and public utility commissions have viewed what is admittedly a tortuous path that it took to get Southern Company's Vogtle Units 3-4 online and the failure of the VC Summer project and have made it abundantly clear that they do not want to repeat that example. Despite the provision of government-backed loan guarantees and other federal tax incentives that are intended to jump start the order process, utility executives who are compensated on meeting quarterly financial targets, avoiding risk, and managing the prudency reviews of Public Utility Commission (PUC) commissioners, have a variety of built-in incentives for not jumping to the front of the line. Further, the balance sheets of utilities are of a size where the risks associated with a delayed nuclear unit could put potential strains on ratepayers and shareholders alike.

Now some might say that we need to focus on a few designs to make things simpler, but I believe this is a false narrative. As I mentioned previously, there are a very wide variety of industrial uses that need to be decarbonized and which would

benefit from a broad toolbox of nuclear technologies, and there are identified needs that range from 1 megawatt to 1000 megawatts. By way of comparison, our country deployed over 1000 gigawatts of gas fired generation over a 10-year period from 2008-2018 representing dozens of various types of combined cycle, simple cycle and combustion turbine technologies with similar size ranges. To decarbonize our economy, we will need a similarly wide variety of potential technologies to meet this need.

What utilities fear the most is that they will commit to building a first-of-a-kind plant and that there will be financial and timing risk on the back end of the project that could put the utility at economic risk. One way this could be addressed is to have a financial backstop program for first-of-a-kind nuclear deployment projects that would share the risk between the utility(ies) and the federal government for potential delays and unexpected cost increases. This type of program would provide greater certainty for the capital markets and utility commissions that a single utility would not be forced to bear undue risk for being the first to deploy a new nuclear design.

Another area worth considering is to provide financial incentives for utilities that come together in a consortium to build a series of nuclear plants and spread the cost among a larger pool. This model was utilized with mixed success in New England with the so-called Yankee nuclear plants in the 1970s-90s. Others, including Former Secretary Ernie Moniz, have been working on versions of this concept and this may prove to be a useful model to incentivize utilities to move forward and lift the remaining impediments to ordering new nuclear generation. Indeed, in recent advanced nuclear conferences hosted by USNIC, there is evidence that the financial community is showing increased interest in investing in new nuclear projects, but they are waiting for the utilities and other customers to make the commitment to move forward.

Yet, even if we are successful at spurring new orders by utilities and others, Congress could take additional efforts to further smooth the deployment of these technologies.

To be successful, the advanced nuclear community will need to have a readily available group of people and suppliers who can assist in designing, fabricating and constructing these future power and heat generation facilities.

Frequently, when one talks about the next generation of nuclear power deployment, many look to our nation's nuclear engineering schools as the bellwether for this future growth. While it is critically important that we have young women and men trained in nuclear engineering and physics, frankly, those individuals only represent a small share of the technical staff involved with designing, building, and maintaining nuclear generation facilities. Over two-thirds of the cost and materials

involved in building a nuclear unit are associated with the non-nuclear portions of the plant including underground utilities, civil construction, switchyards, and cooling infrastructure.

Having served as an executive for the Shaw Group, which was the constructor of Vogtle Units 3-4, I saw firsthand many of the lessons learned from that construction project. As a nation, our skills at building very large infrastructure projects, to put it politely, are "rusty" and we need to have additional investment in university-based engineering programs focused on project management, digital twin technology, civil construction and the other engineering skill sets needed to build these complex facilities. Toward that end, Congress should revisit the way it funds university-based programs supporting nuclear power and ensure that an appropriate portion of those funds are focused on schools that are providing the civil construction engineers and project managers needed to support these designs.

Today, there remains a shortage of skilled and qualified welders, pipefitters and electricians who will build and maintain these units as this workforce is increasing in average age. While some of this training will come from the construction trades, our nation's high schools, community and technical colleges should also be an area of focus for these disciplines – a need that goes well beyond nuclear and has impacts across our country. Congress should consider targeted programs to incentivize young women and men to enter these fields and facilitate the training needed to make them successful.

Since the invasion of Ukraine, our country has introspectively looked at how we source many critical components across the technology spectrum. This is no different for nuclear technologies, where some of the capabilities needed to build new nuclear units either don't exist or have limited options in the U.S. While some of these come from friendly nuclear supplier countries such as South Korea and Japan, the vast potential for new nuclear deployment certainly begs the question as to why more of this supply of components can't be fabricated and built in the U.S.

That said, fabricating and manufacturing nuclear grade components can't be done at the snap of your fingers. If we are to achieve the economies of scale needed to efficiently and cost effectively manufacture multiple lines of small modular reactors (SMRs), the incentives I described above will be a necessary component to enable the committed set of multiple orders that will unlock the expected reductions in cost and time needed to deploy these designs.

Further, for new nuclear grade suppliers, there are rigorous and costly training and quality assurance requirements that are appropriately imposed to ensure that this highly specialized equipment meets the exacting standards of the U.S. Nuclear Regulatory Commission (NRC). An area where Congress might be able to assist in

facilitating this supply is to provide incentives to encourage existing non-nuclear manufacturers and fabricators to enter this field. This could include training and programing funded by the Departments of Energy and Commerce to educate non-nuclear suppliers about the potential to enter this field. It could also include tax incentives for companies that seek to meet these qualification standards or who expend training resources to prepare their workers in these highly specialized nuclear trades.

The events in Ukraine have also made it abundantly clear that our nation has become overly dependent on Russian supplied low enriched uranium (LEU) and was also relying on Russia to fill our short-term need for high-assay low enriched uranium (HALEU). I would like to recognize that recent Congressional efforts to address these issues are helpful, but additional legislation, including creating a federally owned inventory of LEU and HALEU, is vital to help spur additional private investment in domestic uranium enrichment capabilities. Toward this end, the President's recent request that $2.2 billion be included in the supplemental appropriations package to support critical domestic enrichment capabilities for both LEU and HALEU, is a vital step to addressing this gap, and I would urge Congress to support this request.

As a former NRC Commissioner, I have watched with some concern the development of a modernized regulatory framework for advanced reactor technologies under a future Part 53. While I recognize oversight of the NRC is under the jurisdiction of the Senate Environment and Public Works Committee, I would not want to ignore the important role that this Committee and some of its members who overlap with EPW play in overseeing the operations of my former agency. Rather than extend my remarks, I would ask that a copy of my testimony before the House Energy and Commerce Committee last summer be included in the record. I would be happy to engage on these issues further as desired by the Committee.

In closing, on behalf of USNIC and its members, I would like to again thank the Committee for the support it has given to advancing these critical technologies and I look forward to your questions.