TESTIMONY OF
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Thank you, Chairman Bingaman and members of the Committee for the opportunity to testify before the Committee today. I am here in my capacity as President of the American Nuclear Society (ANS). Our society is dedicated to the peaceful use of nuclear science and technology. We have about 11,000 "national" members and another 10,000 or so who are strictly members of 51 "local sections" spread across 38 states. We also have 38 student sections at major US universities and 11 sections in other countries.

Our constituents come from all sectors of the nuclear enterprise: utilities, research laboratories, government and state agencies, industrial vendors and suppliers, universities, and other areas of nuclear science and medicine. We have 19 technical divisions that cover almost every aspect of nuclear science and technology – from the mining of ore to the burial of fuel cycle byproducts.

In general, the ANS membership believes that nuclear energy can and should play a major role in the provision of affordable and reliable energy in a carbon-constrained environment. Let me say from the outset that there are significant roles for both large and small reactors in the future US energy mix. The discussion of small modular reactors (SMRs) should not be viewed as an "either-or" proposition. That said, SMRs offer many unique benefits, from affordability to transportability and ease of manufacturing and construction. SMR designs and market opportunities have been discussed thoroughly over the past five years at ANS conferences and we have started several special committees to look at economic, licensing, policy, and US infrastructure issues related to small reactor development. Some of these preliminary results will be discussed here and are presented in detail in the background report submitted for the record.

We are also supporting SMR-related activities initiated by other government and private organizations. For example, we have supported the Department of Commerce's Civil Nuclear Trade Initiative and are working closely with the AFL-CIO in revitalizing the US nuclear manufacturing sector.

The debate on nuclear in Washington these days tends to focus on the cost of nuclear energy versus other forms of energy generation. Thus, the current domestic interest in SMRs has originated primarily from the challenges in financing the large up-front costs of installing new domestic nuclear generation capacity and for distributed energy applications throughout the US. However, to view the nuclear issue solely through the lens of US low carbon energy needs and domestic economic opportunities is to miss half the picture.

As you'll see from the chart before you, more than 60 countries are actively seeking or have expressed interest in developing new nuclear energy generation capacity. While some of these countries already have existing nuclear plants, others would be new entrants, many of whom are from the developing world. At the same time, you will see from the pie chart over 80% of the world electrical grids cannot absorb 1 GW nuclear plant in their current configuration.

So what are the take away lessons? First, it's clear that the world is about to embark on a global nuclear renaissance with all the associated opportunities and risks. Despite the headlines we see these days, the overwhelming majority of nations interested in nuclear energy are motivated by a desire to improve standards of living for their people. And in general, a world with plentiful clean energy will be more peaceful, more prosperous, and more environmentally sustainable.

Second, the US actually has very little say over whether this renaissance happens, as the nuclear energy supply infrastructure has become thoroughly internationalized in the last three decades. If the US is unable or unwilling to provide nuclear technology, there are plenty of other supplier options for interested nations.

Frankly, from a global standpoint, the choice we face today is clear. We can either commit ourselves to actively facilitating this renaissance as a major supplier of safe, proliferation-

resistant nuclear energy technology, or we can stick our heads in the sand and hope that other supplier nations will do it right.

If we choose the path of global engagement, the next step required is to build a better mousetrap that can compete on the global marketplace. This is where SMRs come into the picture.

As you'll see from the next chart, the category of small modular reactors comprises a diverse set of technologies and applications. The common thread is their size, generally from 10 to 300 MW electricity, small enough to be shipped on a flatbed or rail car and exported to other nations as a complete unit.

For purposes of this discussion, SMRs can be grouped into four different kinds.

1. Small light water reactors These are based on well understood technology, and the US possesses an existing domestic manufacturing capacity for the purposes of supplying the Navy with propulsion reactors. These reactors would make an attractive option for existing nuclear plant operators to add capacity in a scalable fashion.

2. Sodium or lead cooled fast reactors. These are small pool type reactors that operate at low pressures. Their fast neutron spectrum essentially generates fuel at nearly the rate it is consumed, thereby allowing extended refueling intervals of up to 20-30 years. They have desirable safety characteristics, and when combined with advancements in turbine technology can be operated in an extremely safe manner for long periods of time. There are also other liquid metal coolants on the horizon that could further enhance those capabilities.

3. High-temperature gas reactors. These proposed designs can be optimized for process heat applications such as hydrogen production, water desalination, and shale oil recovery. They could be located in industrial parks to offset the use of fossil fuels for process heat generation.

4. The fourth category is what I call radical designs. While these innovative concepts will require longer-term research and development efforts, their simplicity of operation could provide "walk away safe" power to remote communities here in the US and around the world.

There are some who are not comfortable with the notion that the US should actively promote and supply nuclear technology around the world. They say that we can exercise sufficient influence simply by exporting our regulatory best practices to other nations. They believe that the risks of proliferation are too great. However, there is an emerging consensus in the US nuclear community that in fact the opposite is true - that a revitalized domestic nuclear manufacturing sector is a critical and necessary component to sustaining US nuclear influence around the world. Consider the so-called “123” agreement, which is our primary foreign-policy tool for promoting US nonproliferation objectives with other nations. 123 agreements with the US only make sense for other nations when they are actively interested in procuring US-owned technology, and, to put it bluntly, there isn’t much US owned nuclear energy technology left today.

So, what would a revitalized, SMR-focused US nuclear manufacturing industry look like?

As you can see from the next chart, our national security infrastructure provides us with a head start. We already have a manufacturing infrastructure in place to produce the components of small naval reactors, and the modular approaches used by our shipyards to construct naval vessels are applicable to the mass production of SMRs. We have an operating geological repository in our defense infrastructure that could potentially accommodate transuranic waste from recycling SMR fuel. We have many years of operational data for water and sodium cooled systems. We already have advanced manufacturing techniques. We have the ability now to manufacture the fuel forms envisioned in these different designs. What we need is the collective will to make long-term investments in these game-changing technologies so that the US is positioned to positively influence the global nuclear renaissance.

As a 501(c)(3) not-for-profit organization, the American Nuclear Society does not normally endorse congressional legislation. However, I can say confidently that S. 2812, The Nuclear

Power 2021 Act, represents a strong foundational effort to augment the federal government's role in US SMR development. It would provide the DOE with the authority to enter into public-private partnerships to develop and license small modular reactors. We believe this would significantly accelerate US SMR reactor development in a manner that furthers US environmental, foreign-policy, and economic objectives. In addition, S. 2052, The Nuclear Energy Research Initiative Improvement Act of 2009, would provide needed investments for revitalizing US competitiveness in the global marketplace. Its focus on SMR concepts, advances in energy conversion technologies, advanced manufacturing and construction, resolution of licensing issues, and enhanced proliferation controls will help develop the enabling technologies we need for large-scale SMR deployment in the US and around the world.

ANS also encourages Congress to consider other aspects of SMR development. These include accelerating the development of SMR-related codes and standards; updates to US laws and regulations that would facilitate accelerated maturation and transfer of SMR-relevant technology from the national laboratories to US industry; streamlining export control laws to minimize the incentives to “off-shore” SMR component manufacturing; and integration of university-based US nuclear science and engineering education programs with SMR development efforts to ensure we have technically skilled workforce to design, deploy, and operate these reactors in the future.

In closing, there are clear security, economic, and environmental imperatives for the US to be an active participant in the global nuclear renaissance. Many of our industrial members have recognized the huge potential for SMRs around the world. Organized labor sees the promise of hundreds of thousands of high-paying jobs. Our national laboratories and universities have developed ground breaking research and development and state-of-the-art technology that can be put to the task. We are ready to take the next step.

This concludes my testimony, and I would be happy to answer any questions the Committee may have.

Thank you.