Testimony before the Senate Committee on Energy and Natural Resources
Mr. Robert Coward
President, American Nuclear Society
Principal Officer, MPR Associates, Inc.
Tuesday, July 18, 2017

Thank you, Chairman Murkowski and members of the Committee for the opportunity to testify before the Committee today. I am here in my role 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 members spread across all 50 states. We also have 41 local sections near key commercial and government nuclear technology facilities, as well as 48 student sections at major US universities and 9 local sections in other countries.

Our members come from all sectors of the nuclear energy community: utilities, research laboratories, government and state agencies, industrial vendors and suppliers, universities, and other areas of nuclear science and medicine. We have 22 technical divisions that cover essentially all aspects of nuclear science and technology, from the mining of uranium ore to the disposal of fuel cycle byproducts, and all the valuable uses in between.

We commend the Committee on its bipartisan work to modernize U.S. energy research and development and production policies. This includes the recent progress on the crucial research and development for advanced reactors. We appreciate that important attention.

The focus of today's hearing is energy security. By energy security, what we really mean is *resiliency* – the ability to provide reliable, cost-effective energy regardless of unexpected or abnormal conditions. Energy security and resiliency are critical to our country. Indeed, it is the basic foundation upon which our modern economy and high standards of living are built.

We believe nuclear energy is arguably the most important energy source in our portfolio. During his turn as Secretary of Energy, Samuel Bodman stated, "nuclear power in this country goes to the very intersection of our energy security, our national security and our economic security." I agree, and my testimony today is intended to reinforce this conclusion.

Energy resiliency is a simple concept – no matter what is happening around us, energy continues to be delivered in a reliable and stable manner. Whether the sun is shining or not, the wind is blowing or not, the coal pile is stocked or not, or the natural gas pipeline is flowing or not can have significant impact on our ability to deliver electricity to the power grid. During the polar vortex of 2014 in the Northeast, the coal piles froze and the natural gas pipelines were choked. Luckily, or should I say by design, the nuclear power plants remained online generating power reliably throughout the event. Research indicates that, if not for those plants, widespread blackouts likely would have occurred, threatening lives and livelihoods. We truly did dodge a rather large bullet.

Nuclear power plants typically reload about 1/3 of their fuel every 18 to 24 months. They don't rely on just-in-time fuel delivery or specific weather conditions to operate at full power. Over the past 15 years, US nuclear power plants have typically operated over 90% of the time, with hardly any shutdowns other than for refueling. This is truly the definition of resilient.

Resiliency's definition also extends to stability and predictability of pricing and cost. Continued availability of power isn't acceptable if variable weather and market conditions can cause prices to spike by 10 to 20 times or more. In comparison, on January 1 of each year, a nuclear power plant can predict with very high accuracy the cost of the power it will produce for every day of the coming year. In fact, they can typically look out multiple years – the costs are stable and predictable.

Nuclear power plants also help anchor the electricity grid in the US. Grid operators rely on nuclear' s roughly 20% share of power production to maintain the stability of their systems as the electricity demand of our factories, businesses, and homes rise and fall throughout the day. This anchoring function has become increasingly important as intermittent sources makes up a larger percentage of our overall electricity generation portfolio.

Finally, an often-overlooked element of resiliency is industrial safety. Industrial safety events can shut down facilities, drive up costs, and present risks to operations. The US nuclear power industry has an industrial safety record that most other industries would aspire to. Indeed, as a worker today, you are more likely to have an OSHA "reportable event" if you work in an office building than if you work in a nuclear power plant.

I'm here today as the President of the American Nuclear Society. However, I also wear another hat. I'm Principal Officer, i.e., president, of MPR Associates, the leading specialty engineering firm in the power industry. Our firm was founded by the three chief lieutenants of Admiral Hyman Rickover. They worked as his right-hand men in the development of the naval nuclear propulsion program and the origins of the commercial nuclear power industry. We are widely recognized in the industry as the owners of the Rickover legacy for excellence and professionalism. I have been blessed with the opportunity to know, work with, and learn from our founders. One key lesson I learned was the need for stewardship in all of our endeavors, in particular stewardship for our natural resources. It isn't enough to reliably generate power; we need to strive to generate that power in ways that preserve our resources and protect our environment.

This is where nuclear power begins to truly stand out from the rest in the value it provides.

Nuclear power accounts for about 60% of all U.S. non-emitting electricity generation, providing large-scale power while emitting essentially no greenhouse gases or pollutants such as sulphur monoxide, nitrogen oxides, mercury, or particulates. Yes, nuclear power plants generate used fuel and other contaminated waste. However, those products are small in volume, contained in space, and can be handled and disposed of in safe, non-hazardous, and clean methods.

Nuclear power plants also have a high *energy density*, producing significant amounts of energy without requiring a large physical footprint. For example, the electricity generated from a 1,000 MW nuclear power reactor on about 1.5 square miles, would require about 50 square miles of solar panels or a collection of wind turbines over an area roughly 300 square miles. As we look forward to the societal challenges of balancing the demands of delivering needed energy, food, and water in a manner that balances environmental impacts and land use, the energy density issue will become ever more important.

At a local level, nuclear power plants are engines that drive economies across the country. Unlike fossil energy generation, the budget of a nuclear power plant is mostly driven by the cost of people. Fuel is typically less than 25% of the total expense; the majority of the remainder is dedicated to paying salaries for highly skilled, professional careers – the kind of good jobs we are seeking more of in the US. These salaries drive the local economy around the power plants. The power plants themselves tend to be the largest or among the largest taxpayers. Those taxes support local schools, first responders, and the local infrastructure. Beyond the direct financial benefits, the hard work and professionalism nuclear plant employees bring to their day jobs also extend to the community through charitable works and local leadership.

Finally, the U.S. nuclear sector contributes to our national security in ways that are as important as they are misunderstood.

Nuclear power was born in the USA. Almost all nuclear power programs around the world can trace their technology back to U.S. origins. For decades, the U.S. has been recognized as the worldwide leader in nuclear technology, a role has enabled us to positively influence the nuclear safety and nonproliferation norms of the rest of the world.

Right now, dozens of nations around the globe are building nuclear power plants or actively considering adding nuclear to their energy generation portfolio. These nations recognize the same energy security and societal benefits reasons I've just described. In my MPR role, I have engaged with some of those decision-makers and I am confident that many will succeed. Through the development of a regulatory authority, plant construction, supply of fuel and services, operations, and eventual decommissioning, there is a commercial and civic force that binds together the supplier and host nations in a partnership which can endure for decades. These countries are serious, and if U.S. suppliers do not or cannot compete in this geopolitically-significant marketplace, our competitors in Russia and China will win. I don't think we want that to occur. Similarly, it is unrealistic to think that U.S. suppliers can compete effectively in world markets without having a healthy domestic nuclear power program here at home.

Nuclear power is the ultimate strategic long-term asset. However, it feels like we have all together wound up in an overwhelmingly tactical, "what did you do for me yesterday" world.

The strategic benefits of nuclear power are significant, yet current electricity markets do not value those benefits. The practical result is that resilient, reliable, non-emitting, clean, and

economy-driving power plants are shutting down because of the spot price of a kilowatt of electricity at 2:00 am on a Monday.

As leaders – industry leaders, policymakers, and others – when we talk about energy and make decisions about energy, we need to spend more time considering energy security. And when we think energy security, we need to automatically think "strategic." Our energy decisions needs to be strategic rather than tactical decisions.

With that goal in mind, we recommend Congress consider the following strategic policy directions:

1. Support the current U.S. nuclear fleet by equalizing the level of government subsidies, tax credits, and regulatory costs for all non-emitting energy sources and fund continued investment in R&D to extend the life of the reactors.
2. Continue and expand support for the development of small modular and advanced non-light water reactor systems.
3. Continue to invest in training and development of the next generation workforce and our U.S. R&D infrastructure at national laboratories and universities.
4. Demonstrate some forward progress in fixing our broken nuclear waste policy.
5. Improve our nuclear export regulations and financing opportunities to ensure that U.S. nuclear manufacturers can be competitive in international markets.

I thank you again for the opportunity to speak today. I'm happy to answer any questions.