

**COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY
U.S. HOUSE OF REPRESENTATIVES
HEARING CHARTER**

*How the Domestic Nuclear Industry Boosts Local Economies, Curbs Emissions, and Strengthens
National Security*

Friday, May 3, 2019

10:00AM EST

Shippingport Borough Municipal Building in Shippingport, PA

PURPOSE

The overall purpose of the hearing is to recognize nuclear energy broadly for the role it plays as an emissions-free energy source and as a national security asset, as well as for the impact these plants have on local economies. A specific focus will be on research and development needs to extend the lifetime of currently operating nuclear plants. Many of the nuclear plants in Pennsylvania are now at risk of being permanently shut down, and there is state legislation under consideration to support nuclear energy sources in similar ways to other emissions-free sources.

WITNESSES

- **Dr. Pete Lyons** is a former DOE Assistant Secretary for Nuclear Energy and NRC Commissioner. He was nominated by President Obama and confirmed by the U.S. Senate as Assistant Secretary for Nuclear Energy on April 14, 2011. Before joining DOE, Dr. Lyons was appointed by President Bush as a Commissioner of the U.S. Nuclear Regulatory Commission, starting on January 25, 2005. He now consults on several corporate and laboratory boards, as well as assisting several international groups.
- **Admiral William Fallon** is retired from the United States Navy after a distinguished 40-year career of military and strategic leadership. He previously has held the positions of head of U.S. Central Command, U.S. Pacific Command, Presidential Envoy to Japan, and Vice Chief of the Navy. He currently serves on many defense boards and consults in Washington, D.C.
- **Ms. Tina M. Taylor** is Deputy Chief Nuclear Officer and Senior Director of Research and Development at the Electric Power Research Institute. She is responsible for a diverse portfolio of research addressing technically challenging issues facing nuclear power. Her team is responsible for work in the areas of maintenance, engineering,

equipment reliability, instrumentation and control, risk and safety management, chemistry, fuel, high and low-level waste, and decommissioning.

- **Dr. Jay Apt** is a Professor at the Tepper School of Business and Department of Engineering & Public Policy. He is also Co-Director of the Carnegie Mellon Electricity Industry Center. He is a Fellow of the American Association for the Advancement of Science. He received the NASA Distinguished Service Medal and the Metcalf Lifetime Achievement Award for significant contributions to engineering.

Emissions-Free Electricity and Climate Change

There are 98 nuclear reactors operating at power plants in the U.S. today that collectively generate almost 20 percent of the nation's electricity. These plants provide more than 55 percent of the nation's emissions-free electricity. That is almost three times as much as that currently generated by hydropower, more than three and a half times as much as that generated by wind, and more than 18 and a half times that generated by solar.¹ To achieve deep decarbonization by mid-century, several independent studies have determined that nuclear energy will likely need to be included as a significant portion of the U.S. energy portfolio.^{2,3,4} A case study that shows how nuclear power impacts a nation's ability to meet its climate goals is Germany. In 2011, German leaders decided to phase out all of that country's nuclear power by 2022. Since then, nuclear generating capacity in the country has halved, and Germany relies more on coal. In the same period, Germany more than doubled its renewables capacity but even so, Germany is now expected to miss its 2020 emissions targets. Based on capacity factors of Germany's nuclear plants prior to the phase-out, Germany would have been able to meet its climate goals.⁵

Resiliency, Reliability, and Subsequent License Renewal

Nuclear plants can store two years of fuel on-site, and the U.S. nuclear industry has had a nationwide average capacity factor of 90% over the last 20 years.⁶ Nuclear power plants are originally licensed to operate 40 years. The Nuclear Regulatory Commission has approved initial

¹ "Climate." Nuclear Energy Institute. <https://nei.org/advantages/climate>

² "Nuclear Power and the Paris Agreement." IAEA. <https://www.iaea.org/sites/default/files/16/11/np-parisagreement.pdf>

³ "Nuclear for the Next Generation: Addressing Energy, Climate and Security Challenges." The Global Nexus Initiative. <http://globalnexusinitiative.org/uncategorized/nuclear-power-for-the-next-generation/>

⁴ "The Future of Nuclear Energy in a Carbon-Constrained World." Massachusetts Institute of Technology. <https://energy.mit.edu/wp-content/uploads/2018/09/The-Future-of-Nuclear-Energy-in-a-Carbon-Constrained-World.pdf>

⁵ "Germany to miss 2020 carbon dioxide emissions target because of nuclear closure policy." World Nuclear Association. <https://www.world-nuclear.org/press/briefings/germany-to-miss-emissions-target-because-of-nuclea.aspx>

⁶ "Nuclear by the numbers." Nuclear Energy Institute. <https://nei.org/CorporateSite/media/filefolder/resources/factsheets/nuclear-by-the-numbers.pdf>

license renewal applications for 94 reactors in the U.S.⁷ This would extend the life of the plant from 40 to 60 years. There are currently six reactors in the U.S. that have submitted subsequent license renewal applications to the Nuclear Regulatory Commission which, if approved, would extend the period of operation from 60 to 80 years. The Nuclear Regulatory Commission utilizes research on aging plants and applies a rigorous review of applicant aging management programs before granting approval.⁸

Jobs and Contributions to the Economy

Each nuclear power plant employs 400 to 700 workers. Nuclear worker salaries are 36 percent higher than the average local salary.⁹ The U.S. civil nuclear industry consists not only of the current fleet of operating nuclear power plants, but also the fleet of research and test reactors at national labs and academic institutions and the private industry working on furthering advanced reactor concepts. Various types of skillsets are needed in this workforce, not just nuclear engineers. Electricians, welders, sheet metal workers, operators, scientists, accountants, and many more other professionals are required. Expanding the scope of the industry to include the military, the required workforce further increases.

National Security

Military leaders have stated that a strong domestic nuclear industry is essential to U.S. national security not only to strengthen national competitiveness but also to maintain influence and leadership over nuclear safety and nuclear nonproliferation worldwide.¹⁰ The nuclear workforce is shared between the civil nuclear industry and the nuclear military sector. Each benefit from the other in terms of workforce, technology innovation, and procurement pipelines. The more civil nuclear power plants that close, the more vendors such as fuel facilities will likely shut down, which would adversely affect this shared supply chain between the civil program and the military.¹⁰ The Department of Defense is currently considering using micro-reactors to increase the energy reliability of the nation's defense installations.¹¹

Other countries are making significant progress in advancing their nuclear industries both domestically and through exporting nuclear technologies. Russia has six reactors under construction today and has begun operating five reactors in the past five years. There are

⁷ "U.S. Nuclear License Renewal Filings." Nuclear Energy Institute. <https://nei.org/resources/statistics/us-nuclear-license-renewal-filings>

⁸ "Status of Subsequent License Renewal Applications." U.S. Nuclear Regulatory Commission. <https://www.nrc.gov/reactors/operating/licensing/renewal/subsequent-license-renewal.html>

⁹ "Jobs." Nuclear Energy Institute. <https://nei.org/advantages/jobs>

¹⁰ "Nuclear Energy, Naval Propulsion, and National Security." Center for Strategic and International Studies. <https://www.csis.org/events/nuclear-energy-naval-propulsion-and-national-security>

¹¹ "Input on a Pilot Program for Micro-Reactor Demonstration." USDOE. https://www.id.energy.gov/MICRO-REACTOR_REQUEST_FOR_INFORMATION%20Final.doc

currently 17 reactors of Russian design under construction globally. China has 13 plants under construction domestically and has begun operating 26 reactors in the past five years. There are currently 12 reactors of Chinese design under construction globally.¹² For comparison, the U.S. has two plants under construction domestically and has brought only one online in the past five years. The U.S. is not currently building any reactors abroad, while China and Russia are quickly becoming major players in supplying the rest of the world with nuclear technology.

Premature Plant Closures

In the past six years, seven nuclear reactors have been prematurely closed, mostly due to non-competitive economics versus other generation types. Cheap natural gas prices and disparity among subsidies that renewables are currently able to qualify for versus those for nuclear power contribute to premature plant closures. There are currently 12 reactors that have been announced to shut down in the next six years. For example, the nine nuclear reactors in Pennsylvania are at risk of premature closure, and three of these have been announced to shut down in the next two years.³ These nine reactors produce almost 40 percent of the state's electricity and 92 percent of the state's carbon-free electricity. According to the Nuclear Energy Institute, these plants prevent more than 37 million metric tons of CO₂ emissions per year, which is equivalent to what 8 million passenger cars would release, more than double the number of registered cars in the state.¹³ A study by the Brattle Group found that the retirement of all five Pennsylvania nuclear plants would result in a Pennsylvania GDP loss of \$2 billion annually, with employment (direct and indirect) declining by 15,900 jobs.¹⁴

Twelve reactors have been saved from premature closure in the past few years in New York, Illinois, New Jersey, and Connecticut. The driver that saved these plants from closing early was state policy intervention. Currently, the Pennsylvania State Legislature is considering two bills (House Bill 11 and Senate Bill 510) that would provide support to keep the plants in Pennsylvania open.

¹² "National Security." Nuclear Energy Institute. <https://nei.org/advantages/national-security>

¹³ "Pennsylvania and nuclear energy." Nuclear Energy Institute. <https://www.nei.org/CorporateSite/media/filefolder/resources/fact-sheets/state-fact-sheets/Pennsylvania-State-Fact-Sheet.pdf>

¹⁴ "Impacts of Announced Nuclear Retirements in Ohio and Pennsylvania." The Brattle Group. https://d3n8a8pro7vhmx.cloudfront.net/nuclearmatters/pages/313/attachments/original/1523484599/Impacts_of_Premature_Nuclear_Retirements_in_Ohio_and_Pennsylvania..pdf?1523484599