

COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

HEARING CHARTER

*“Charting the Course for American Nuclear Technology:
Evaluating the Department of Energy’s Nuclear Energy Research and Development Roadmap”*

Wednesday, May 19th, 2010
10:00 am – 12:00 pm
2318 Rayburn House Office Building

Purpose

On Wednesday, May 19th, 2010 the House Committee on Science & Technology will hold a hearing entitled: *“Charting the Course for American Nuclear Technology: Evaluating the Department of Energy’s Nuclear Energy Research and Development Roadmap.”*

The Committee’s hearing will explore the Administration’s strategy for research and development to advance clean and affordable nuclear technology. Amongst the issues to be considered will be how the federal government will enhance the safety and economic viability of nuclear power and what programs it recommends for managing nuclear waste, advancing reactor design, sustaining the existing nuclear fleet, and minimizing risk of proliferation of nuclear materials.

Witnesses

Panel I

- **Dr. Warren P. Miller is the Assistant Secretary for the Office of Nuclear Energy at the U.S. Department of Energy.** Dr. Miller will testify on the Department of Energy’s recently released *Nuclear Energy Research and Development Roadmap* and provide additional guidance on the Office of Nuclear Energy’s technology and innovation initiatives.

Panel II

- **Mr. Christofer Mowry is the President and CEO of Babcock & Wilcox Nuclear Energy, Inc.** Mr. Mowry will testify on Small Modular Reactors and provide an overview of B&W’s reactor operations. He will provide information on the role Small Modular Reactors can play in reducing capital costs and improving the safety of nuclear power. Mr. Mowry will also comment on DOE’s *Nuclear Energy Research and Development Roadmap*.

- **Dr. Charles Ferguson is the President of the Federation of American Scientists.** The Federation of American Scientists (FAS) is a public policy think-tank that was originally founded by scientists from the Manhattan Project. Currently FAS is conducting a project titled the *Future of Nuclear Energy in the United States* to explore and analyze the direction of nuclear energy technology innovation. Dr. Ferguson will provide an overall analysis and critique of the *Nuclear Energy Research and Development Roadmap* and Small Modular Reactor technology.
- **Dr. Mark Peters is the Deputy Director for Programs at Argonne National Lab.** Dr. Peters will testify on the *Nuclear Energy Research and Development Roadmap* with particular attention to the Administration’s strategy for waste management technology. He will also present a summary of new waste management technologies currently under development at Argonne National Lab.
- **Mr. Gary M. Krellenstein is a Managing Director in JPMorgan’s Energy and Environmental Group and is a former nuclear engineer at the Department of Energy and Nuclear Regulatory Commission.** Mr. Krellenstein’s areas of focus are municipal utilities, Rural Electric Cooperatives, alternative energy technologies and project financing, and is also involved in JPMorgan’s “carbon” policies. Mr. Krellenstein will testify on private capital interest in nuclear power including how Small Modular Reactors and other new technologies may attract private capital investment.
- **Dr. Thomas L. Sanders is the President of American Nuclear Society.** The American Nuclear Society is a nuclear professional society dedicated to promoting the awareness and understanding of the application of nuclear science and technology. Dr. Sanders will provide an overall evaluation of the *Nuclear Energy Research and Development Roadmap* and provide recommendations of policy areas to more fully develop or explore.

Background

According to the Department of Energy’s Energy Information Agency (EIA), the nation’s 104 commercial nuclear reactors currently provide 70 percent of the emissions-free energy in the United States and approximately 20 percent of the country’s electricity generation. However, nuclear power as it exists today relies on a “once-through” fuel cycle that produces high level radioactive waste from enriched uranium. In the United States there exists a stockpile of approximately 63,000 metric tons of nuclear waste from reactors and generates roughly 2,000 more tons per year. Furthermore, the capital costs of nuclear plants have risen steeply and present a high hurdle to deployment of new reactors. Some have argued that without a fully developed strategy to deal with these challenges, nuclear power will be unable to compete with other fuel sources.

The Obama Administration recently proposed a substantial modification of federal nuclear energy policy which may have widespread implications for the nation’s energy portfolio and for the focus of the Department of Energy’s nuclear energy research, development, demonstration and commercial application initiatives. The *Waste Policy Act of 1982* requires the

federal government to construct a nuclear waste repository, and Yucca Mountain was later designated as the site for a permanent waste repository in 1987. However, in its Fiscal Year 2011 budget request, the Administration proposes to terminate funding for Yucca Mountain. To address the growing backlog of nuclear waste and the environmental concerns surrounding this issue, the President convened the bipartisan Blue Ribbon Commission on America's Nuclear Future. This Commission shall evaluate the best path forward for managing nuclear waste. Also reflected in the Fiscal Year 2011 budget request is a reorganization of the Office of Nuclear Energy to account for the cancellation of the Yucca project and a priority shift towards a "goal-oriented, science-based approach" that will include a larger focus on research & development in addressing post-generation nuclear waste. Furthermore, the Administration proposes to increase loan guarantees for nuclear power by \$36 billion. This is intended to provide funding guarantees for construction of at least six new nuclear plants and will likely result in development of the first new U.S. commercial reactor in decades.

The Administration's Roadmap

On April 15, 2010 the Department of Energy (DOE) published the *Nuclear Energy Research and Development Roadmap* (Roadmap) with the goal of providing a guide to the Office of Nuclear Energy's internal programmatic and strategic planning going forward. The report lays out four objectives: 1) establish solutions that can improve reliability and safety of the current fleet of reactors and extend their life; 2) advance reactor technology to both improve affordability and performance; 3) develop sustainable nuclear fuel cycles; and 4) understand and minimize the risks of proliferation and terrorism.

Objective 1: Safety and Life Extension

While nuclear power today accounts for twenty percent of all electricity consumed in the United States, the plants supplying that energy are nearing retirement age. By 2035 most of the 104 operating reactors will have surpassed their 60 year life expectancy. Should new nuclear plants not be constructed in the interim, it is possible that retiring nuclear plants will be replaced by fossil fuel generation in order to meet rising demand. The Roadmap outlines a list of research initiatives that will explore how to extend reactor life and how to increase their safety and efficiency.

Objective 2: Improve Reactor Technology and Reduce Costs

According to Moody's Investors Service, the current cost to construct a nuclear power plant is around \$5000 to \$7000 per kWe of capacity in comparison to the \$1625 per kWe for a traditional pulverized coal plant. The Roadmap highlights a series of programs to reduce the capital cost of nuclear and create advanced, clean reactors. Among DOE's priorities is the creation of a dedicated Small Modular Reactor (SMR) program. SMRs by definition are smaller than conventional reactors, which can be as large as approximately 1500 mWe. Furthermore, certain SMR designs allow for in tandem or "stackable" use of multiple units to achieve large generation capacity. As envisioned by SMR supporters, this technology should reduce capital costs related to nuclear deployment as well as increase overall safety of nuclear generation. What is unclear is

if the private capital and finance community will embrace SMRs as a worthwhile and acceptable risk investment.

Objective 3: Sustainable Nuclear Fuel Cycles

In the Roadmap, DOE provides a broad outline of its strategy for nuclear waste management which focuses largely on the development of a suite of options that future decision makers may pursue. This approach reflects the uncertainty created by the pending Blue Ribbon Commission decision and its two year investigation. Until its resolution the Department will endeavor to establish the programs that will serve as the basis to implement the Commission's recommendations. The Roadmap provides three potential strategies for waste management: 1) advanced once-through; 2) modified-open; and 3) full recycle. Advanced once-through cycle is similar in process to the fuel cycle used by commercial nuclear power today, but will develop fuels for use in current reactors that will increase efficiency and reduce waste output. A modified open cycle would use innovative fuel-forms and advanced reactors to increase the use of the energy content of fuel and reduce waste output. This approach would also employ some technologies to separate waste products from reusable isotopes. A full recycle approach endeavors to create a cost-effective and low proliferation risk process of repeatedly cycling fuel waste products to reduce radioactivity and decay heat and increase total energy consumption. All approaches will require some degree of waste storage.

Objective 4: Understanding and Addressing Proliferation

To address the concern that civilian nuclear power resources could be used by foreign entities for weapons applications, DOE recommends a strategy to better account for and understand proliferation risks. The Roadmap advises that any technology innovation and development program must be informed by development of more advanced risk assessment tools to limit, mitigate and manage the risks of nation-state proliferation and lead to innovation of next generation physical security technologies.

Conclusion

The Obama Administration's Roadmap is intended to demonstrate its commitment to encouraging wider use of current nuclear energy and to innovation of advanced nuclear technology. Specifically through federal research and development, the Administration seeks to address the widely known risks and concerns that have hampered the industry since its inception, including waste management, capital cost reduction, and proliferation security.