Statement of Peter Lyons
Acting Assistant Secretary for Nuclear Energy
U.S. Department of Energy
Before the
Subcommittee on Energy and Water Development, and Related Agencies
Committee on Appropriations
U.S. House of Representatives

FY 2012 Appropriations Hearing
March 31, 2011

Chairman Rogers, Chairman Frelinghuysen, Ranking Member Dicks, Ranking Member Visclosky, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the President's fiscal year (FY) 2012 budget request for the Office of Nuclear Energy at the Department of Energy.

As I testify before you today, I know we are all still mindful of the people in Japan who are still dealing with the effects of a devastating earthquake and tsunami. Those who have lost their lives and the survivors are in our prayers. The damaged reactors at Fukushima represent the biggest nuclear incident the world has seen in nearly a quarter century. Efforts are ongoing to contain the nuclear material and mitigate the effects of the crisis, but there is no doubt that for many years the nuclear community will be studying the combined effects of the earthquake and tsunami on the Fukushima reactors to determine if further safety upgrades are required.

During the crisis, the Office of Nuclear Energy provided continual support to the DOE emergency operations center to help interpret technical and environmental data arriving from the field. Our principal laboratory, Idaho National Laboratory, stood up a technical response team that is coordinating six national labs to supply required expertise.

Turning to domestic matters, President Obama has called for a clean energy standard, under which clean energy sources would provide the United States with 80 percent of its electricity by 2035. It's an ambitious goal that will require all sources of clean energy: solar, wind, and other renewable technologies, as well as carbon capture and sequestration facilities and nuclear power. Investments in clean energy technology will strengthen our security, protect our planet, and create countless new jobs for our people. Such a standard will also provide additional market pull to encourage private investment in new nuclear reactors.

The President's FY 2012 budget request supports nuclear power by requesting up to $36 billion in additional loan guarantee authority for new nuclear power plant construction. In addition, the budget request includes $852.5 million for the Office of Nuclear Energy, a decrease of 0.6 percent from the FY 2010 current appropriation.

One particular area I want to highlight from our 2012 request is our proposed Small Modular Reactor (SMR) program. I think SMRs represent a tremendous opportunity for

the United States to regain leadership in the nuclear realm. They offer many potential advantages. For example, building reactors in a factory setting and shipping them to a plant site could offer cost savings; if they can be air-cooled, that would lessen regulatory and siting challenges; and if they can replace similarly-sized fossil fuel plants, some of the needed infrastructure would already be in place. There are other potential advantages, as well.

To help accelerate the availability of SMRs, we have proposed a near-term, five-year program focused on cost-sharing for first-of-a-kind engineering support for design certification and licensing activities. If the request is supported, we plan to promulgate a funding opportunity announcement that would initiate a competition to select two vendor/utility teams. This will spur innovation and help American companies to compete internationally.

The President also mentioned our nuclear energy Hub in his State of the Union address. Last May, we announced the winning team for the Hub, and this May we will have a ribbon-cutting planned for the opening of the new one-roof collaboration site at Oak Ridge National Laboratory (ORNL), as well as first results for the public. We remain extremely excited about the prospects for improving nuclear power plant efficiency with advanced computing capabilities.

I have not covered all of our programs in detail, but I would be pleased to take any questions now. Thank you.

OFFICE OF NUCLEAR ENERGY (NE) PROGRAMS

LWR SMR Licensing Technical Support

The Light Water Reactor (LWR) SMR Licensing Technical Support program will focus on engineering support for LWR SMR licensing to help improve the timeline for the commercialization and deployment of these relatively mature technologies. These SMRs may help to improve the affordability of nuclear power because of the potential to reduce costs of licensing and constructing one or multiple units, ultimately making nuclear more appealing to owners and investors. Other key benefits could include:

- Improving cost, schedule and quality through the modularization of components by replication in a factory setting.
- Providing power for applications where large plants are not needed or where infrastructure to support a large reactor unit is lacking.
- Providing a carbon-free option for repowering aging fossil power plants or process heat for industrial applications.
- Providing potential nonproliferation benefits to the U.S. and the wider international community.

One additional benefit of the program may be the reestablishment of the U.S. as a technological leader in an emerging international market, leveling the playing field with growing foreign competition.

Reactor Concepts Research, Development and Demonstration

The mission of the Reactor Concepts Research, Development and Demonstration (RD&D) program is to develop new and advanced reactor designs and technologies that advance the state of reactor technology and broaden its applicability, improve its affordability and competitiveness, and ensure its lasting contribution to meeting our nation's energy and environmental challenges.

Small Modular Reactors Advanced Concepts R&D

The SMR Advanced Concepts R&D program would support laboratory and university and industry projects to conduct nuclear technology R&D, including the development of codes and standards, novel sensors, control systems for multiple units, probabilistic risk assessments, advanced SMR concepts, and other technologies that are unique and would be useful to support development of advanced SMR concepts for use in the mid-to long-term.

Next Generation Nuclear Plant

This program sponsors a collaborative effort with universities, industry, and the NRC to conduct the design, licensing, and R&D necessary to demonstrate a new generation of gas-cooled reactors in the United States.

In FY 2010, the Department engaged with industry to initiate a cost-shared conceptual design for the NGNP, which was completed at the end of 2010. The Nuclear Energy Advisory Committee commenced review of the conceptual design reports along with the state of NGNP R&D and licensing activities and plans to make a recommendation on whether or not to proceed into Phase 2 of the project during the third quarter of FY 2011. The Secretary will make a decision about the future of this project during the fourth quarter of FY 2011. The Secretarial decision will consider technical, financial, performance, and other issues in determining the appropriate next steps, including whether to proceed further on the project. The FY 2012 request for this program supports continued critical path R&D activities and work with industry.

Light Water Reactor Sustainability

This program will conduct R&D to explore extending the operating lifetime of current plants beyond 60 years and, where possible, enable further improvement in their productivity. The program will partner with industry and work with the NRC to conduct the long-term research needed to inform major component refurbishment and replacement strategies, performance enhancements, and plant license extensions. The research will focus on aging phenomena and issues that require long-term research that

affect the existing fleet of both boiling and pressurized water reactors. Because industry has a significant financial incentive to extend the life of existing plants, the Department will work to ensure that activities are cost-shared to the maximum degree possible.

Advanced Reactor Concepts

This program was previously referred to as the Gen IV R&D program. It will continue the Gen IV R&D work but has been modified to encompass reactor technologies beyond Generation IV. The program will focus on reactors that could dramatically improve performance in sustainability, safety, economics, security, and proliferation resistance. This work includes scientific R&D at national laboratories and universities, as well as through collaboration with international partners.

Both advanced thermal and fast reactor systems will be considered within the ARC program. Fast reactors could be employed to consume long-lived, high-activity elements found in used LWR fuels as part of a long term waste management approach if economic, technical, safety, and proliferation challenges are addressed.

Nuclear Energy Enabling Technologies

The mission of the Nuclear Energy Enabling Technologies (NEET) program is to conduct research and development and provide crosscutting technologies that directly support and enable NE's broad portfolio. In addition, it will encourage the development of transformative, outside-the-box innovations in nuclear energy science and engineering.

Crosscutting Technology Development

Crosscutting Technology Development provides either crosscutting or enabling technologies to support multiple reactor concepts in the areas including reactor materials, advanced methods for manufacturing, new sensor technologies for monitoring material and equipment conditions in existing reactors, creative approaches to further reduce proliferation risks, and advanced modeling and simulation tools.

Transformative Nuclear Concepts Research and Development

This program supports, via an open, competitive solicitation process, investigator-initiated transformative projects that are high-risk, high-reward concepts with the potential for making significant leaps forward in advanced nuclear technology development. The primary goal of this program is to encourage the identification and development of innovative options in all aspects of the civilian nuclear energy program; ensuring that good ideas have sufficient outlet for exploration. The scope covers the full range of nuclear energy technology and is not specific to any on-going mission activities. However, information and results obtained through this program will be used to inform planning decisions in ongoing NE R&D programs.

Energy Innovation Hub for Modeling and Simulation

The Hub is creating a virtual reactor model of actual Tennessee Valley Authority-owned, Westinghouse-designed, operating pressurized water reactors (PWRs) that will be able to simulate reactor behavior. Engineers will be able to use this virtual model to improve the economics and safety of reactor operations by simulating proposed solutions to reactor power production increases and reactor life and license extensions. The combination of data gained from the virtual model and the physical reactor will be used to resolve technology issues confronting nuclear energy development. The Hub will also serve to educate today's reactor engineers in the use of advanced modeling and simulation through direct engagement in Hub activities. ORNL is leading a consortium (CASL – Consortium for Advanced Simulation of Light Water Reactors) of national labs, universities, and industry partners to manage Hub execution. CASL began operations in late June 2010. In FY 2010, the Hub was funded under the Generation IV budget line.

National Science User Facility (NSUF)

NSUF promotes the use of unique nuclear research facilities for science-based experiments to encourage active university, industry, and laboratory collaboration in relevant nuclear scientific research. The NSUF provides a mechanism for research organizations to collaborate, conduct experiments, and conduct post-experiment analysis at facilities not normally accessible. In this manner, researchers are introduced to new techniques, equipment, and personnel such that their research benefits from new technologies and experimental capabilities. The Idaho National Laboratory (INL) Advanced Test Reactor (ATR) and post-irradiation examination facilities of the Materials and Fuels Complex are available as user facilities. In addition, research reactors at the MIT and North Carolina State University and examination facilities at the Universities of Wisconsin, Michigan and Nevada-Las Vegas are partnered with the NSUF bringing additional user facilities to the research community.

Fuel Cycle Research and Development

The mission of the Fuel Cycle Research and Development (R&D) program is to implement R&D to help achieve the objective to develop sustainable fuel cycles as described in the *Nuclear Energy Research and Development Roadmap* (Roadmap). Specifically, the program will research and develop a suite of technology options that will enable future decision-makers to make informed decisions about how best to manage nuclear waste and used fuel from reactors. A long-term, science-based approach is employed to foster innovative, transformational technology solutions to achieve the mission.

The program also supports the other objectives described in the Roadmap regarding current reactors, new reactors, and minimizing the risk of nuclear proliferation and terrorism.

International Nuclear Energy Cooperation

International Nuclear Energy Cooperation (INEC) serves as overall lead for all NE international activities, including effectively coordinating international cooperative research and development activities; leading international nuclear energy collaboration efforts through bilateral and multilateral forums; providing technical, policy, and administrative support; and leading international nuclear fuel service discussions and other related activities.

Radiological Facilities Management

The Radiological Facilities Management (RFM) program maintains NE-managed nuclear facilities at the INL and provides support to nuclear and associated support facilities at ORNL and Los Alamos National Laboratory (LANL). Facilities related to the manufacture of radioisotope power systems for national security and space exploration missions are supported through the Space and Defense Infrastructure subprogram. DOE and the National Aeronautics and Space Administration (NASA) will initiate a project to restart the production of plutonium-238 (Pu-238) for future NASA missions and potential national security applications. NE's Research Reactor Infrastructure subprogram will continue to provide fresh reactor fuel services to operating university reactors that support nuclear energy R&D.

Idaho Facilities Management

The mission of the Idaho Facilities Management (IFM) program is to manage the planning, acquisition, operation, maintenance, and disposition of nuclear facilities and resources at the INL. The IFM program maintains DOE mission-supporting facilities and resources at INL in a safe, compliant status to support the Department's nuclear energy research, testing of naval reactor fuels and reactor core components, and range of national security technology programs that support the National Nuclear Security Administration (NNSA) and other Federal agencies such as the Department of Homeland Security in the areas of critical infrastructure protection and nuclear nonproliferation.

University Programs

NE designates up to 20 percent of funds appropriated to its R&D programs for work to be performed at university and research institutions, through open, competitive solicitations for investigator-led projects. The past two years, the university programs have awarded more than $110 million in competitive awards to support innovative research, infrastructure grants, and scholarships and fellowships.

Program Direction

Program Direction provides the Federal staffing resources and associated costs required to provide overall direction and execution of the Office of Nuclear Energy. Also included

is funding for NE and General Counsel federal personnel responsible for oversight of Nuclear Waste Policy Act activities, including litigation involving the termination of the Yucca Mountain Nuclear Waste Repository, legal issues related to the standard contract with utility companies, administration of the Nuclear Waste Fund, and the Department's responsibilities regarding spent fuel and high level waste.

In addition to appropriated funds, NE also manages approximately $91 million dollars annually in work for others and reimbursable funding from NASA and the Department of Defense for the development of advanced radioisotope power systems for space exploration and national security missions.