**Hearing Charter**

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

**Opportunities and Challenges for Nuclear Power**

Wednesday, April 23, 2008
10 a.m. – 12 p.m.
2318 Rayburn House Office Building

## Purpose

On Wednesday, April 23, 2008 the House Committee on Science & Technology will hold a hearing entitled "***Opportunities and Challenges for Nuclear Power.***"

The Committee's hearing will explore the potential for nuclear power to provide an increased proportion of electric generating capacity in the U.S. Nuclear power generation offers the opportunity for increasing electricity generation without associated increases in greenhouse gas emissions, however, challenges to this expansion remain including high costs, waste disposal, and concerns about nuclear proliferation issues. The hearing will also examine the Department of Energy's programs to support and advance nuclear technologies and their potential to address the challenges associated with expansion of nuclear power generation.

## Witnesses

- **Mr. Robert Fri** is a Visiting Scholar at Resources for the Future, and the Chair of a recent study conducted by the National Academies on the Department of Energy's nuclear research and development program. Mr. Fri will testify on the findings of this report.

- **Mr. Jim Asselstine** is a recently retired Managing Director at Lehman Brothers, and a former Commissioner of the Nuclear Regulatory Commission. Mr. Asselstine will testify on the current overall state of financing for new nuclear power plants.

- **Dr. Thomas Cochran** is a Senior Scientist in the Nuclear Program at the National Resources Defense Council (NRDC). Dr. Cochran will explain NRDC's position on whether nuclear power merits additional federal support in comparison to other sources of energy.

- **Mr. Robert Van Namen** is the Senior Vice President of Uranium Enrichment at USEC. Mr. Van Namen will describe the current status of the domestic uranium enrichment industry, and provide background on advancement of uranium enrichment technologies.

- **Ms. Marilyn Kray** is the President of NuStart Energy, and also the Vice President of Project Development at Exelon Nuclear. Ms. Kray will provide the perspective of utilities on the ability for nuclear power to significantly increase its share of electric generating capacity in the U.S.

- **Vice Admiral John Grossenbacher** is the Director of Idaho National Laboratory. Mr. Grossenbacher will testify on DOE's programs to support and advance nuclear energy.

## Background

Nuclear power is derived from energy that is released when relatively large atoms are split in a series of controlled nuclear reactions. The resulting heat is used to boil water which drives a steam turbine to generate electricity. The process of splitting an atom is known as nuclear fission. Nuclear power represents approximately 20 percent of the total electric generating capacity in the U.S. with 104 nuclear plants currently operating. Because they are a low-carbon emitting source of energy in comparison to fossil fuels, increased use of nuclear power is being proposed by the Administration and several electric utilities as a way to mitigate climate change while meeting the nation's growing energy needs.

### *Nuclear Waste Storage*

There are, however, several drawbacks to the expanded use of nuclear power. Disposal of radioactive waste produced in nuclear power plants has been a significant issue for decades. While on-site storage has become a default interim solution, the Nuclear Waste Policy Act of 1982 (NWPA) called for disposal of spent nuclear fuel in a deep, underground geologic repository. In 1987, amendments to the NWPA restricted DOE's repository site studies to Yucca Mountain in Nevada. Technical and legal challenges have since delayed its use until at least 2017. All operating nuclear power reactors are storing spent fuel in Nuclear Regulatory Commission (NRC)-licensed onsite spent fuel pools. Most reactors were not designed to store the full amount of the spent fuel generated during their operational life. Currently, there is over 50,000 metric tons of spent fuel stored in the United States. Earlier this year, the Administration proposed draft nuclear waste legislation repealing the 70,000 metric ton limit on the amount of waste that can be stored at the repository at Yucca Mountain. It is expected that the 70,000 metric ton limit would be exceeded by the waste generated from the nuclear plants currently operating in the U.S.

### *Waste Reprocessing*

Reprocessing spent fuel could also eventually be necessary to meet nuclear fuel demands if worldwide growth meets projected targets. The Administration has proposed a multi-billion dollar federal program called the Global Nuclear Energy Partnership (GNEP) to foster the expansion of nuclear power internationally by having a select set of nations reprocess nuclear fuel for the rest of the world. GNEP expands upon the Department of Energy's Advanced Fuel Cycle Initiative, which has conducted a program of research and development in spent fuel

reprocessing since 2002. A second objective of the GNEP program is to reduce the amount of radioactive waste requiring disposal in a geologic repository.

Technologies required to achieve the goals of the GNEP program are not yet fully developed and tested. Therefore further research is required before the facilities necessary to accomplish the intended goals of the program can be constructed and operated. GNEP includes the design and construction of advanced facilities for fuel treatment, fabrication, and an advanced reactor which raises concerns about the financial risks associated with the program. In addition, reprocessing spent fuel raises concerns about the potential for proliferation of weapons-grade nuclear materials because existing reprocessing technologies separate plutonium from the spent fuel. While the plutonium can be recycled into a new fuel for use in nuclear reactors, as is done in France, it can also be used to make nuclear weapons. DOE has yet to identify a proliferation-resistant method to achieve this goal.

***Nuclear Fuel Supply***

The nuclear fuel cycle begins with mining uranium ore, but naturally occurring uranium does not have enough fissionable uranium to make nuclear fuel for commercial light-water reactors. Therefore, the uranium is first converted to uranium hexafluoride before it is put through an enrichment process to increase the concentration of the fissionable uranium. Finally, the enriched uranium is fabricated into fuel appropriate for use in commercial light-water reactors.

The United States' primary uranium reserves are located in Arizona, Colorado, Nebraska, New Mexico, Texas, Utah, Washington and Wyoming. According to the Energy Information Administration, five underground mines and five in-situ mines were operating in the U.S. in 2006. Much of the world's uranium supply comes from Canada and Australia. While the security of uranium supplies is a policy concern, over-production in the industry's early years and the United States' maintenance of military and civilian stockpiles of uranium have helped to provide confidence that uranium resources can meet projected demand for multiple decades.

There is one conversion facility operating in the United States in Metropolis, IL. The expansion of the facility is expected to be completed this year.

The United States Enrichment Corporation (USEC) operates the only uranium enrichment facility in the United States. Commercial enrichment services are also available in Europe, Russia, and Japan. Recently, four companies announced plans to develop enrichment capabilities in the U.S. According to March 5, 2008 testimony in the Senate Energy and Natural Resources Committee by the President of the Louisiana Energy Services, it is more than a year into construction of an advanced uranium enrichment plant in New Mexico. In addition, USEC is undertaking the development of advanced enrichment technology through the American Centrifuge Plant, which is U.S. technology originally developed by the Department of Energy.

There is an ongoing debate about the ability of the United States to ensure we maintain a reliable, domestic source of nuclear fuel. A major element of that debate is whether or not an agreement between Russia and the U.S., which limits Russian fuel imports, will be enforceable. If not, there

is concern that Russian fuel would be imported without limit, potentially jeopardizing the domestic enrichment industry.

***Federal Programs to Support Nuclear Energy***

Another important issue with nuclear power is cost. The 2003 MIT Report *The Future of Nuclear Power* discusses nuclear power as an energy source which is not economically competitive because nuclear power requires significant government involvement to ensure that safety, proliferation, and waste management challenges meet policy objectives and regulatory requirements. In addition, the success of nuclear power depends on its ability to compete with other energy production technologies. However, the MIT report points out: "Nuclear does become more competitive by comparison if the social cost of carbon emissions is internalized, for example through a carbon tax or equivalent 'cap and trade' system."

While high oil and gas prices are helping to revive interest in nuclear power and improve its economic viability, another factor adding to the interest in nuclear power is the improved performance of existing reactors. However, there is little doubt that the federal incentives included in the Energy Policy Act of 2005 for the nuclear power industry make the economics more attractive.

The last order for a new nuclear plant came in 1973, and many in the industry have expressed that strong federal incentives are necessary to build new plants. Such incentives authorized within the last three years include: $18.5 billion in loan guarantee authority for new nuclear plants and $2 billion for uranium enrichment plants; cost-overrun support of up to $2 billion total for the first six new plants; a production tax credit of up to $125 million total per year, estimated at 1.8 cents/kWh during the first eight years of operation for the first 6 GW of generating capacity; and Nuclear Power 2010, a joint government-industry cost-shared program to help utilities prepare for a new licensing process.

It is expected that currently authorized loan guarantees will only cover the first 4-6 new plants, depending on their size, and utilities will advocate for more federal loan guarantee authority before building additional plants. In all, nearly 30 applications for new plants are expected to be submitted to the Nuclear Regulatory Commission by the end of 2009 in order to meet the eligibility criteria for the production tax credit in addition to the other incentives.

The federal government provides other indirect financial support for the nuclear industry as well. While costs to develop the Yucca Mountain site are primarily covered by a fee on nuclear-generated electricity paid into the Nuclear Waste Fund, the government takes full responsibility for waste storage. Because the project is decades behind schedule, DOE estimates that the U.S. government has incurred a liability of approximately $7 billion for the department's failure to begin accepting spent nuclear fuel from existing commercial plants. The nuclear industry is also given Price-Anderson liability protection for any accident involving operating reactors. This establishes a no fault insurance-type system in which the first $10 billion is industry-funded, and any claims above that level would be covered by the federal government. Furthermore, any accelerated development of reprocessing technology, such as GNEP, may cost the government tens of billions of dollars.

***Nuclear Workforce***

As advanced technologies transform the energy industry there will be an increased demand for an appropriately skilled workforce to meet its needs. As the energy sector of our economy changes and grows, the nuclear industry faces increasing competition for engineering talent. In addition to greater demand, the Nuclear Energy Institute's 2007 nuclear workforce survey estimates that 39 percent of nuclear utility maintenance workers, 34 percent of radiation protection workers and 27 percent of operations staff may reach retirement eligibility within five years. There is a general concern that a revival in the nuclear power industry could be hampered by the availability of the necessary skilled, technical workforce. November 2007 testimony by the Assistant Secretary of Labor underscores the need for creative workforce solutions because energy industry workers are difficult to replace as training programs were reduced during the downturn of the industry in the late 1980s and early 1990s. She goes on to state that training programs have not expanded at the same rate at which the industry is rebounding. The MIT report *The Future of Nuclear Power* punctuates concerns about workforce development acknowledging that the nuclear workforce has been aging for more than a decade "due to lack of new plant orders and decline of industrial activity."