Prepared Statement of
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On the FY 2008 Budget Request
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Subcommittee on Energy and Environment
Committee on Science & Technology
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Chairman Lampson, Ranking Member Inglis, and Members of the Committee, it is a pleasure to be here to discuss the Fiscal Year (FY) 2008 budget request for The Department of Energy's (DOE) Office of Nuclear Energy.

The Department of Energy's strategic plan portrays a long-term vision of a zero-emission future, free from the reliance on imported energy. A portfolio of nuclear programs is provided for in this plan for near-term, medium-term, and long-term sustained advances in nuclear technology.

The Office of Nuclear Energy has made a great deal of progress in the last several years in advancing our Nation's energy security and independence in support of the Department's strategic plan. The Department remains committed to enabling industry to deploy a new generation of nuclear power plants. We have also made steps forward in developing advanced nuclear reactor and fuel cycle technologies while maintaining a critical national nuclear infrastructure.

Today, 103 nuclear reactors generate roughly 20 percent of America's electricity. U.S. electricity demand is anticipated to grow 50 percent over the next 25 years – the equivalent of 45 to 50 one-thousand megawatt nuclear reactors must be built to maintain that 20 percent share. With nuclear power as the only proven base load producer of electricity that does not emit greenhouse gases, it is vital that our current fleet of reactors be expanded in order to meet our needs for carbon-free, dependable and economic electric power.

Any serious effort to stabilize greenhouse gases in the atmosphere, while providing the increasing amounts of energy needed for economic development and growth, requires the expanded use of nuclear energy. This will inevitably require us to address the spent fuel and proliferation challenges that confront the expanded, global use of nuclear energy. To meet these challenges, the Department initiated the Global Nuclear Energy Partnership (GNEP), a comprehensive approach to enable an expansion of nuclear power in the U.S. and around the world, promote non-proliferation goals, and help minimize the amount of nuclear waste disposal.

GNEP is a perfect example of where global cooperation is required to address a changing global energy landscape. The United States has a unique opportunity to influence global energy policy,

and more specifically global nuclear energy policy. However, for the U.S. to have influence abroad, we must have an established domestic policy supportive of a significant role for nuclear power in our energy future, an aggressive nuclear research and development program, and a viable nuclear technology infrastructure. Through the GNEP program, we are pursuing in parallel the development of the policies, technologies, and facilities necessary for the U.S. to be a global leader in the nuclear energy enterprise and to ensure our energy security and national security objectives.

The Department's FY 2008 budget request proposes an $874.6 million investment in nuclear research, development and infrastructure for the Nation's future. This budget request supports the President's priorities to enhance the Nation's energy security while enabling significant improvements in environmental quality. Our request supports development of new nuclear generation technologies and advanced energy products that provide significant improvements in sustainability, economics, safety and reliability, and proliferation and terrorism resistance.

While we have made great progress in all program areas, much remains to be done. Our FY 2008 request moves us in the right direction and I will now provide you a full report of our activities and explain the President's request for nuclear energy in detail.

NUCLEAR POWER 2010

To support near-term domestic expansion of nuclear energy, the FY 2008 budget requests $114 million for the Nuclear Power 2010 program to support continued cost-shared efforts with industry to reduce the barriers to the deployment of new nuclear power plants in the U.S. The technology focus of the Nuclear Power 2010 program is on Generation III+ advanced, light water reactor designs, which offer advancements in safety and economics over the Generation III designs certified in the 1990s by the Nuclear Regulatory Commission (NRC). To reduce the regulatory uncertainties and enable the deployment of new Generation III+ nuclear power plants in the U.S., it is essential to demonstrate the untested Federal regulatory processes for the siting, construction, and operation of new nuclear plants. In addition, design finalization of two standard plant designs and NRC certification of these Generation III+ advanced reactor concepts are needed to reduce the high initial capital costs of the first new plants so that these new technologies can be competitive in the deregulated electricity market and deployable within the next decade.

The FY 2008 budget request continues the licensing demonstration activities started in previous years. Activities include completion of the last Early Site Permit demonstration projects and continuation of the New Nuclear Plant Licensing Demonstration projects that will exercise the untested licensing process to build and operate new nuclear plants and complete and obtain certification of two advanced Generation III+ advanced reactor designs. Engineering activities in support of the submission of two combined Construction and Operating License (COL) applications to the NRC will continue. In addition, two reactor vendors will continue first-of-a-kind design activities for two standard nuclear plants.

We anticipate the NRC will soon vote on approval of the Early Site Permit for the Exelon Generation Company's Clinton site in central Illinois, which culminates a four–year, cost-shared project between DOE and the Chicago-based Exelon Corporation. NRC approval of the Clinton Early Site Permit would represent a major accomplishment in the Energy Department's effort to address the barriers and stimulate deployment of new nuclear power plants in the United States.

The project teams, Dominion Energy and NuStart Energy Development LLC., involved in the licensing demonstration projects represent power generating companies and reactor vendors that operate more than two-thirds of all the U.S. nuclear power plants in operation today. As a result of the Nuclear Power 2010 program and Energy Policy Act of 2005 financial incentives (e.g. standby support), fourteen power companies have announced their intentions to apply for combined construction and operating licenses. Several have specifically stated that they are building on work being done in the Nuclear Power 2010 program as the basis for their applications.

The U.S. is at a critical juncture in the future of nuclear power in the United States. Unlike many of our international research partners, our nuclear industry has not been heavily supported financially and politically over the past thirty years. Today the need for increased electrical generating capacity is clear and hopefully undisputed. We have only one growth option that allows us to have a diversified electrical generation portfolio that includes a significant carbon emissions-free component, and that is nuclear power. To realize this option, we are asking private companies to build plants whose collective cost will likely exceed their net worth. This represents an enormous financial risk, the same risk that caused many U.S. companies to go into bankruptcy in the past.

If one accepts the fact that we need more electrical generation capacity, and if one desires to have a component of that new capacity that is carbon free, and one recognizes the financial considerations associated with such a large private investment in technologies that we have not supported in thirty years, then the importance of this program to our future energy security is self-evident. These companies will be building new generating capacity in the very near future, but the question they must first answer is whether this generation will come from clean, safe, nuclear technologies or not.

If widely deployed in the U.S., these new technologies will create significant business opportunities and will support the rapid growth of heavy equipment fabrication, high technology and commercial construction industries in this country. Moreover, these American technologies and industrial capabilities will be highly competitive internationally and would support our leadership role in the global expansion of safe, clean nuclear power.

ADVANCED FUEL CYCLE INITIATIVE

One of the most important and challenging issues affecting future expansion of nuclear energy in the U.S. and worldwide is dealing effectively with spent nuclear fuel and high-level waste. For the medium-term, the Advanced Fuel Cycle Initiative (AFCI) will develop fuel cycle technologies that will support the economic and sustained production of nuclear energy while

minimizing waste in a proliferation-resistant manner. To support the development of these technologies, the FY 2008 Budget request includes $395.0 million for AFCI.

AFCI's near-term goals are to develop and demonstrate advanced, proliferation-resistant fuel cycle technologies for treatment of commercial light water reactor spent fuel, to develop an integrated spent fuel recycling plan, and to provide information and support on efforts to minimize the amount of material that needs disposal in a geologic repository. AFCI conducts research and development of spent fuel treatment and recycling technologies to support an expanding role for nuclear power in the U.S and to promote world-wide expansion of nuclear energy in a proliferation-resistant manner as envisioned for the Global Nuclear Energy Partnership (GNEP). AFCI is the U.S. technology component of the GNEP.

Specifically, in FY 2008, the Department intends to complete industry-led conceptual design studies for the nuclear fuel recycling center and the advanced recycling reactor Demonstration Analysis. Additionally, DOE will continue start-to-finish demonstrations of recycling technologies, which are expected to produce separated transuranics for use in transmutation fuel development, as well as conduct systems analysis and advanced computing and simulation activities focused on a variety of deployment system alternatives and supporting technology development. As part of GNEP Technology Development, the Department also intends to evaluate small, proliferation-resistant reactors for potential U.S. manufacture and export to reactor user nations.

GNEP seeks to bring about a significant, wide-scale use of nuclear energy, and to take actions now that will allow that vision to be achieved while decreasing the risk of nuclear weapons proliferation and effectively addressing the challenges of nuclear waste disposal. GNEP will advance the nonproliferation and national security interests of the United States by reinforcing its nonproliferation policies and limiting the spread of enrichment and reprocessing technologies, and will eventually eliminate excess civilian plutonium stocks that have accumulated. The AFCI budget request supports the Department's goal of realizing the GNEP vision. AFCI activities in FY 2007 and FY 2008 are focused on developing a detailed roadmap for implementing all aspects of the GNEP vision and informing a Secretarial decision in June 2008 on the path forward for GNEP.

Long-term goals for AFCI/GNEP will develop and demonstrate an advanced, proliferation-resistant closed nuclear fuel cycle system involving spent fuel partitioning and recycling of actinides and other long-lived radioactive elements for destruction through transmutation in fast reactors that could result in a significant increase in the effective capacity of the planned Yucca Mountain repository. This increase would come principally from the destruction of actinides that generate the heat that limits repository capacity that the Yucca Mountain repository would have. This capacity increase would ensure enough capacity to accommodate all the spent fuel generated in the United States this century from any reasonably conceivable deployment scenario for nuclear energy. Yet, under any fuel cycle scenario a geologic repository is necessary. Therefore, GNEP and Yucca Mountain are proceeding on parallel tracks.

GENERATION IV NUCLEAR ENERGY SYSTEMS INITIATIVE

The FY 2008 budget request includes $36.1 million to continue development of next-generation nuclear energy systems within the Generation IV program. For the long term, the Generation IV program will develop new nuclear energy systems that can compete with advanced fossil and renewable technologies, enabling power providers to select from a diverse group of options that are economical, reliable, safe, secure, and environmentally acceptable. In particular, the Next Generation Nuclear Plant (NGNP) reactor concept will be capable of providing high-temperature process heat for various industrial applications, including the production of hydrogen in support of the President's Advanced Energy Initiative.

The NGNP, with an investment of $30 million within the Generation IV Nuclear Energy Systems Initiative, will utilize a Generation IV Very High Temperature Reactor configured for production of high temperature process heat for the generation of hydrogen, electricity, and other industrial commodities. The Energy Policy Act of 2005 (EPACT) authorized the Department to create a two-phased NGNP Project at the Idaho National Laboratory (INL). The Department is presently engaged in Phase 1 of the EPACT defined scope of work which includes: developing a licensing strategy, selecting and validating the appropriate hydrogen production technology, conducting enabling research and development for the reactor system, determining whether it is appropriate to combine electricity generation and hydrogen production in a single prototype nuclear reactor and plant, and establishing key design parameters. Phase I will continue until 2011, at which time the Department will evaluate the need for continuing into the design and construction activities called for in Phase II.

The FY 2008 budget request maintains critical R&D that will help achieve the desired goals of sustainability, economics, and proliferation resistance. Further investigation of technical and economical challenges and risks is needed before a decision can be made to proceed with a demonstration of a next-generation reactor.

NUCLEAR HYDROGEN INITIATIVE

Hydrogen offers significant promise as a future energy technology, particularly for the transportation sector. The use of hydrogen in transportation will reduce U.S. dependence on foreign sources of petroleum, enhancing our energy security. The FY 2008 budget request for the Office of Nuclear Energy includes $22.6 million to continue to develop enabling technologies, demonstrate nuclear-based hydrogen production technologies, and study potential hydrogen production strategies to support the President's vision for a future hydrogen economy.

Currently, the only economical, large-scale method of hydrogen production involves the conversion of methane into hydrogen through a steam reforming process. This process produces ten kilograms of greenhouse gases for every kilogram of hydrogen, defeating a primary advantage of using hydrogen—its environmental benefits. Another existing method, electrolysis, converts water into hydrogen using electricity. Electrolysis is typically used for small production quantities and is inherently less efficient because electricity must first be produced to run the equipment used to convert the water into hydrogen. Additionally, the environmental benefits of electrolysis are negated unless a non-emitting technology, such as nuclear or renewable energy, is used to produce the electricity. The Nuclear Hydrogen Initiative is developing processes that

operate across a range of temperatures for the various advanced reactors being researched by the Generation IV Nuclear Energy Systems Initiative. These processes, coupled with advanced nuclear reactors, have the potential for high-efficiency, large-scale production of hydrogen.

The objective of this program is to demonstrate the technologies at increasingly larger scales ultimately culminating in an industrial scale that would be technically and economically suited for commercial deployment. FY 2005 and FY 2006 activities were focused on the validation of individual processes and components; FY 2007 and FY 2008 are focused on the design, construction and operation of integrated laboratory scale experiments. In FY 2008, the Department will complete construction of integrated laboratory-scale system experiments and begin testing to enable the 2011 selection of the technology that could be demonstrated in a pilot scale hydrogen production experiment.

RADIOLOGICAL FACILITIES MANAGEMENT

The Office of Nuclear Energy's FY 2008 budget request also includes $53.0 million to maintain critical research and production facilities for medical isotopes and radioisotope power systems at the Idaho National Laboratory, the Oak Ridge National Laboratory, the Los Alamos National Laboratory, the Sandia National Laboratory, and the Brookhaven National Laboratory. This request also includes funding for University Research Reactors.

These funds assure that the infrastructure for the facilities meet essential safety and environmental requirements and are maintained at operable user-ready levels. Programmatic activities, including production and research, are funded either by other DOE programs, by the private sector, or by other Federal agency users.

The Department seeks $14.9 million to maintain one-of-a-kind facilities at the Idaho, Oak Ridge, Brookhaven, and Los Alamos National Laboratories for isotope production and processing. These isotopes are used to help improve the accuracy, effectiveness, and continuation of medical diagnoses and therapy, enhance homeland security, improve the efficiency of industrial processes, and provide precise measurement and investigative tools for materials, biomedical, environmental, archeological, and other research. Actual operations, production, research or other activities are funded either by other DOE programs, by the private sector, or by other Federal agency users.

The Department also maintains unique facilities and capabilities at the Idaho, Oak Ridge, and Los Alamos National Laboratories that enable the Department to provide the radioisotope power systems for space exploration and national security applications. The FY 2008 budget requests $35.1 million to maintain the basic facilities and associated personnel whereas mission specific development or hardware fabrication costs are provided by the user agencies. This arrangement is essential in order to preserve the basic capability regardless of periodic fluctuations in the demand of the end product users.

Finally, the Department requests $2.9 million in FY 2008 to provide research reactor fuel to universities and dispose of spent fuel from university reactors. Currently, there are 27 operating

university research reactors at 27 institutions in the U.S. Many of these facilities have permanent fuel cores and therefore do not require regular fuel shipments. However, DOE supplies approximately a dozen universities with fresh fuel and shipments of spent fuel as needed.

IDAHO FACILITIES MANAGEMENT

The Department is working to transform Idaho National Laboratory into one of the world's foremost nuclear research laboratories. As such, the FY 2008 budget request seeks $104.7 million for the Idaho Facilities Management Program to maintain and enhance the laboratory's nuclear energy research infrastructure.

The Idaho Facilities Management Program operates and maintains three main engineering and research campuses and the Central Facilities Area at the Idaho National Laboratory. The three main engineering and research campuses are: (1) the Reactor Technology Complex which houses the world-renown Advanced Test Reactor, (2) the Materials and Fuels Complex, and (3) the Science and Technology Campus. As the Idaho National Laboratory landlord, the Office of Nuclear Energy also operates and maintains the Central Facilities Area at Idaho National Laboratory, providing site-wide support services and from which various site infrastructure systems and facilities, such as electrical utility distribution, intra-laboratory communications systems, and roads are managed and maintained. Also included within the Central Facilities Area is the Radiological and Environmental Sciences Laboratory operated by the Office of Nuclear Energy.

IDAHO SITE-WIDE SAFEGUARDS & SECURITIES

The mission of the Idaho Site-wide Safeguards and Security program is to protect the assets and infrastructure of the Idaho National Laboratory from theft, diversion, sabotage, espionage, unauthorized access, compromise, and other hostile acts that may cause unacceptable adverse impacts on national security; program continuity; or the health and safety of employees, the public, or the environment.

The FY 2008 Budget Request includes $72.9 million to provide protection of nuclear materials, classified matter, Government property, and other vital assets from unauthorized access, theft , diversion, sabotage, espionage, and other hostile acts that may cause risks to national security, the health and safety of DOE and contractor employees, the public or the environment.

UNIVERSITY REACTOR INFRASTRUCTURE AND EDUCATIONAL ASSISTANCE

While the University Educational Assistance program has concluded, funding will continue to be provided to the Nation's nuclear science and engineering universities through our applied research and development programs by means of our Nuclear Energy Research Initiative (NERI). NERI funds are competitively awarded to support research objectives of the Advanced Fuel Cycle Initiative, the Generation IV Energy Systems Initiative and the Nuclear Hydrogen

Initiative. By increasing the opportunities for university participation in our research programs, the Department seeks to establish an improved education and research network among universities, laboratories, industry and government. Approximately $62 million in funding for universities is included in the research programs for FY 2008, a 21% increase over the FY 2007 request.

CONCLUSION

This concludes my prepared statement. Your leadership and guidance has been essential to the progress the program has achieved thus far and your support is needed as we engage the task ahead of investing in our energy security.

I would be pleased to answer any questions you may have.