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U.S. Department of Energy
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Mr. Chairman, Senator Reid, and Members of the Subcommittee, it is a pleasure to be here today to discuss the Department of Energy's FY 2007 budget request of \$250 million, to begin investments in the Global Nuclear Energy Partnership (GNEP). This new initiative, which is part of President Bush's *Advanced Energy Initiative*, is based on a simple principle: that energy and security can go hand in hand.

It is a comprehensive strategy that would lay the foundation for expanded use of nuclear energy in the U.S. and the world by demonstrating and deploying new technologies that recycle nuclear fuel, significantly reduce waste, and address proliferation concerns. GNEP seeks to encourage the future leasing of fuel from fuel cycle states in a way that allows new states to enjoy the benefits of abundant sources of clean, safe nuclear energy in exchange for their commitment to forgo enrichment and reprocessing activities, to help alleviate proliferation concerns.

The Department of Energy recently estimated that the global demand for energy may increase as much as 50 percent by 2025, with more than half of that growth coming from the world's emerging economies. Specifically, regarding electricity, the growth is projected to be particularly steep, increasing over 75 percent over the next two decades. To begin addressing that challenge today, the President has stated a policy goal that includes world-wide expansion of nuclear power.

The reasons for this are clear. Nuclear power is a mature technology of significant potential to provide large amounts of emissions free base load power. Benefits from nuclear power include the abatement of greenhouse gas emissions, air pollution, and energy diversity. Other nations have reached a similar conclusion. With 24 new nuclear plants under construction world wide and additional plants planned or under consideration, it is important that nuclear energy expand in a way that supports safety, security, and the environment.

All of these factors point to the need for a widespread expansion in the use of nuclear energy. To encourage and support such an expansion, the Department is advocating a new approach to the fuel cycle which we believe will significantly enhance our management of used nuclear fuel. This approach should allow us to make more efficient use of our uranium resources. Based on technological advancements that would be made through GNEP, the volume and radiotoxicity of waste requiring permanent disposal will be greatly reduced, delaying the need for an additional repository through the end of the century.

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To meet the goals of GNEP, the Department has developed a broad implementation strategy comprised of seven elements.

First, we must sustain and expand the use of nuclear power in the U.S. Action is needed to

ensure that there are successor plants to those that supply nearly 20 percent of our electricity. Efficiency gains to existing reactors over the past decade have added the equivalent of 25 additional reactors to the grid, but such gains are approaching a limit. We must build on advances made by the President and Congress to stimulate new nuclear plant construction.

In 2002, the Administration announced the Nuclear Power 2010 program, a cost-shared initiative with industry aimed at demonstrating the streamlined regulations for siting and constructing new nuclear plants. Much progress has been made since this program was first announced and today the Department is sponsoring two demonstrations aimed at submitting and obtaining approval of the first combined Construction and Operating License (COL) applications.

DOE is currently working with two consortia of nuclear generating companies and vendors to prepare and submit these COL applications to the NRC by 2007 and 2008, respectively. This, together with the incentives enacted through the Energy Policy Act of 2005 (EPACT 2005) will enable generating companies to proceed with new nuclear plant projects.

The Department is responsible for implementing the *Standby Support for Certain Nuclear Plant Delays* provisions of EPACT, which is a form of federal risk insurance to encourage investment in advanced nuclear power facilities by providing coverage for certain costs resulting from certain regulatory or litigation delays. Additionally, EPACT 2005 contains provisions for production tax credits for advanced nuclear facilities, and a loan guarantee program for low-emission energy production technologies, such as nuclear power plants. We are confident we will see new plants under construction within the next ten years.

Second, we must address the issue of nuclear waste. A geologic repository is a necessity under all fuel management scenarios, and the 2007 budget request provides \$544.5 million to maintain steady progress toward opening the Yucca Mountain repository.

Under GNEP, commercial spent nuclear fuel would be recycled so that transuranic elements would be consumed, not disposed of as waste. Residual waste fission products would be reconfigured for disposal at a geologic repository. In addition, direct disposal will be the only option for a small portion of older commercial spent fuel and certain specialized fuels for which separations processes have not been developed.

GNEP would provide three improvements to spent fuel disposal at a repository by significantly reducing the volume of nuclear waste, enhancing thermal management by reducing the waste form heat load, and reducing the amount of long-lived radionuclides

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requiring disposal eliminating the need for an additional repository through the end of the century.

Third, we propose to demonstrate recycling technology that would enhance the proliferation-resistance of the fuel cycle compared to existing reprocessing technologies called Plutonium-Uranium Extraction or PURER. To accomplish this, the Department would accelerate through the Office of Nuclear Energy, Science and Technology's Advanced Fuel Cycle Initiative (AFCI), the development, demonstration, and deployment of new technologies to recycle spent fuel - these are technologies that would not result in separated plutonium - a

key proliferation concern presented by current generation reprocessing technologies. Moreover, this technology would only be deployed in partnership with other fuel supplier nations.

The AFCI program legislated by the Congress has over the years identified promising advanced nuclear technology options that are sufficiently developed to allow for a demonstration program to proceed. Acting now will enable us to help shape the global fuel cycle and prepare to accommodate growth in emission-free nuclear power.

In support of this effort, the U.S. would propose to work with international partners to conduct an engineering-scale demonstration of advanced recycling technologies (e.g., a process called Uranium Extraction Plus or UREX+), that would separate the usable components in used commercial fuel from its waste components, without separating pure plutonium.

Fourth, the U.S. would develop and demonstrate Advanced Burner Reactors (or ABRs). These "fast neutron" reactors would be designed to consume transuranic elements in used fuel from nuclear power plants, avoiding the need to accommodate this radioactive, radiotoxic, and heat-producing material in a geologic repository for hundreds of thousands of years while it decays. The Department would also propose a new facility that could potentially serve the fuel testing needs of the nation for the next fifty years, and be used to develop and test the fuels for the advanced burner reactor made from the transuranic product from the UREX+ process.

Fifth, GNEP would build and strengthen a reliable international fuel services consortium of nations with advanced nuclear technologies to enable developing nations to acquire nuclear energy while minimizing nuclear risk. Under a cradle-to-grave fuel leasing approach, fuel supplier nations would provide fresh fuel to conventional nuclear power plants, including small scale reactors, located in user nations that agree to refrain from enrichment and reprocessing.

Used fuel would then be returned to the fuel supplier nations and recycled using a process that does not result in separated plutonium. The recycled fuel would then be used in an ABR in fuel supplier nations. Arrangements would be available to assure secure supply to user nations. Such an approach would allow user nations to receive the benefit of having a reliable supply of reactor fuel without having to make the significant infrastructure investments required for enriching, recycling and disposal facilities.

This approach builds on and goes beyond current International Atomic Energy Agency (IAEA) obligations - user nations would consent to refrain from enrichment and reprocessing for an agreed period, based on economic interest. States choosing to stay outside the GNEP framework and develop their own fuel cycle facilities would receive increased scrutiny. We recognize that there are responsible states that have partial fuel cycles, that do not fit the basic conceptual model, but whose interests can be accommodated in the GNEP framework.

Sixth, the U.S. would work with the international community to pursue development and deployment of small-scale reactors designed to be cost-effective, inherently secure and

well-suited to conditions in developing nations. The U.S. would also encourage developing and deploying a small scale reactor that utilizes the same nuclear fuel for the lifetime of the reactor, eliminating the need for fuel replacement. As world population increases by 3 billion people by 2050, energy demands and world cities will expand, making it all the more important to provide the option of meeting some of that increased energy demand without increased greenhouse gas emissions or pollution.

Finally, under GNEP, an international safeguards program is an integral part of the global expansion of nuclear energy and the development of future fuel cycle technologies with enhanced proliferation-resistance. In order for the IAEA to effectively and efficiently monitor and verify nuclear materials, the U.S. would propose to design advanced safeguards approaches directly into the planning and building of new, advanced nuclear facilities and small-scale reactors. Over the next year, we will work with other elements of the Department to establish GNEP, paying special attention to developing advanced safeguards and developing the parameters for international cooperation. We will also continue to work closely with IAEA and our international partners to ensure that civilian nuclear facilities are used only for peaceful purposes.

The Department has proposed \$250 million in the FY 2007 budget as an initial step of a plan to accelerate the development of technology as part of GNEP. With these funds, the Department would focus its AFCI research and development on preparing for an engineering-scale demonstration of the most promising recycling technologies, such as the UREX+ separations technology, advanced burner reactors and an advanced fuel cycle facility, used to fabricate and test the fuels for advanced burner reactors.

This request represents the Department's best assessment of the GNEP program technical development priorities and sequencing toward demonstration facilities. The FY 2007 request shows that significant growth in funding over the FY 2006 request is necessary for the planning of the three integrated demonstration facilities.

In FY 2006, mission need would be established for these facilities and the Department would begin work on an Environmental Impact Statement for the three facilities, which would continue through FY 2007. In parallel with this, in both FY 2006 and FY 2007, the Department would continue research and development to refine the UREX+ technology, begin work on a conceptual design report, acquisition strategy, functions and

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operating requirements and other analyses leading to the development of baseline costs and schedules for the UREX+ demonstration, the advanced burner reactor, and the advanced fuel cycle facility by the end of 2007.

The Department would propose to invest \$25 million on the advanced burner reactor technology in FY 2007, to complete pre-conceptual design and complete a series of extensive studies to establish cost and schedule baselines and determine the scope, safety, and health risks associated with fuel design, siting and acquisition options. Last month, the U.S. signed a systems arrangement agreement with France's atomic energy commission and the Japan Atomic Energy Agency to cooperate on the development of sodium fast reactors. It is anticipated that this agreement will establish the foundation for further collaborations on fast reactors with these countries, and others that are expected to join the agreement in the

future, in support of GNEP.

The Department's goal is to continue research, development and experiments on the key technologies, complete technical and economic feasibility studies and develop a more detailed costs and schedules for these demonstration facilities to inform decisions by early 2008 on whether to proceed to the next phase, building these demonstration facilities. Appropriate pilot scale research and development for the demonstration projects would proceed to develop an improved planning basis for these facilities.

More accurate estimates of the demonstration phase will be available as the conceptual design phase is completed. As noted earlier, the Department has already started to engage other countries and we will be looking for a sizeable portion of GNEP costs to be shared by our partners and industry starting in FY 2008.

In summary, nuclear energy by itself is not a silver bullet for energy supply, in the world or for the U.S. and we need all technologies to address the anticipated growth in demand for energy. Regardless of the steps the U.S. takes, nuclear energy is expected to continue to expand around the globe.

We can continue down the same path that we have been on for the last thirty years or we can lead a transformation to a new, safer, and more secure approach to nuclear energy, an approach that brings the benefits of nuclear energy to the world while reducing vulnerabilities from proliferation and nuclear waste. We are in a much stronger position to shape the nuclear future if we are part of it and hence, GNEP. GNEP is a program that that looks at the energy challenges of today and tomorrow and envisions a safer and more secure future encouraging cooperation between nations to permit peaceful expansion of nuclear technology while helping to address the challenges of energy supply, proliferation, and global climate change.

Thank you. This concludes my formal statement. I would be pleased to answer any questions you may have at this time.