

DOE/CF-009

# DEPARTMENT OF ENERGY

## FY 2007 CONGRESSIONAL BUDGET REQUEST

### BUDGET HIGHLIGHTS



FEBRUARY 2006

OFFICE OF CHIEF  
FINANCIAL OFFICER

Section 2. Energy Strategic Goal / General Goal 4. Energy Security

**Nuclear Energy, Science and Technology**

(discretionary dollars in thousands)

	FY 2005 Current Approp.	FY 2006 Current Approp.	FY 2007 Congressional Request	FY 2007 vs. FY 2006	
				\$	%
<b>Office Of Nuclear Energy, Science And Technology</b>					
Energy Supply and Conservation					
University reactor infrastructure and education assistance.....	23,810	26,730	—	-26,730	-100.0%
Research and development.....	168,350	223,740	347,132	+123,392	+55.1%
Infrastructure.....	248,986	241,060	145,012	-96,048	-39.8%
Spent nuclear fuel management.....	6,681	—	—	—	—
Program direction.....	60,076	60,498	67,608	+7,110	+11.8%
Transfer from state department.....	14,000	—	—	—	—
Subtotal, Energy Supply and Conservation.....	521,903	552,028	559,752	+7,724	+1.4%
Use of prior year balances and other adjustments.....	-128,564	-136,029	—	136,029	+100.0%
Total, Energy Supply and Conservation.....	521,903	552,028	559,752	+7,724	+1.4%
Other Defense Activities					
Infrastructure.....	78,381	91,872	75,949	-15,923	-17.3%
Spent nuclear fuel management.....	1,488	—	—	—	—
Program direction.....	33,587	30,792	—	-30,792	-100.0%
Subtotal, Other Defense Activities.....	113,456	122,664	75,949	-46,715	-38.1%
Use of prior year balances and other adjustments.....	-3,003	-3,003	-3,003	—	—
Total, Other Defense Activities.....	110,453	119,661	72,946	-46,715	-39.0%
<b>Total, Nuclear Energy, Science And Technology.....</b>	<b>503,792</b>	<b>535,660</b>	<b>632,698</b>	<b>+97,038</b>	<b>+18.1%</b>

The **Office of Nuclear Energy, Science and Technology** (NE) is funded in two accounts within the Energy and Water Development Appropriations: Energy Supply and Conservation and Other Defense Activities. All funding for research and development and landlord activities for the Idaho National Laboratory is requested in the Energy Supply and Conservation account. Funding for Safeguards and Security is requested within Other Defense Activities. Within the two accounts, DOE is requesting a total of \$632.7 million for NE activities in FY 2007.

*PROGRAM DESCRIPTION*

NE leads the government's efforts to develop new nuclear energy generation technologies to meet energy and climate goals; develop advanced, proliferation-resistant nuclear fuel technologies that maximize energy from nuclear fuel; and maintain and enhance the national nuclear infrastructure. NE serves the present and future energy needs of the country by managing the safe operation and maintenance of our critical nuclear infrastructure that provides nuclear technology goods and services. A key mission of DOE's nuclear energy research and development program is to lead the U.S. and international research community in planning and conducting applied research to chart the way toward the next leap in technology. The aim of these efforts and those of industry and our overseas partners is to enable nuclear energy to fulfill its promise as a safe, advanced, inexpensive and environmentally benign approach to providing reliable energy to all of the world's people.

The programs within NE fully support development of new nuclear generation technologies that may provide significant improvements in sustainability, economics, safety and reliability, proliferation resistance, and physical protection. Through the **Advanced Fuel Cycle Initiative**, DOE seeks to develop advanced, proliferation resistant nuclear fuel technologies that maximize the energy produced from nuclear fuel while minimizing wastes. Associated with this program, the **Global Nuclear Energy Partnership** will further provide for the expansion of nuclear power plants in the United States and around the world, in addition to promoting nuclear nonproliferation goals and helping resolve nuclear waste disposal issues.

The **Nuclear Power 2010** program supports technology development and demonstration activities that advance the “National Energy Policy” goals for enhancing long-term U.S. energy independence and reliability and expanding the contribution of nuclear power to the nation’s energy portfolio. In addition, the **Generation IV Nuclear Energy Systems Initiative** establishes a basis for expansive cooperation with our international partners to develop next-generation reactor and fuel cycle systems that represent a significant leap in economic performance, safety, and proliferation-resistance. Finally, the **Nuclear Hydrogen Initiative** will develop advanced technologies that can be used in tandem with next-generation nuclear energy plants to generate economic, commercial quantities of hydrogen to support a sustainable, clean energy future for the United States.

## *PROGRAM HIGHLIGHTS*

The FY 2007 request supports innovative applications of nuclear technology to develop new nuclear generation technologies and advanced energy products, develop advanced proliferation-resistant nuclear fuel technologies that maximize energy output, and maintain and enhance national nuclear capabilities to meet future challenges.

The **Advanced Fuel Cycle Initiative**, which is integral to the Generation IV Nuclear Energy Systems effort, aims to develop a better, more efficient and proliferation-resistant nuclear fuel cycle. This research and development program is focusing on methods to reduce the volume and long-term toxicity of high-level waste from spent nuclear fuel, reduce the long-term proliferation threat posed by civilian inventories of plutonium in spent fuel, and provide for proliferation-resistant technologies to recover the energy content in spent nuclear fuel. The focus of this initiative will be the **Global Nuclear Energy Partnership** (GNEP).

GNEP will accelerate the work being done under the AFCI program. Advanced recycling technologies can extract highly radioactive elements of commercial spent nuclear fuel and use that material as fuel in fast spectrum reactors to generate additional electricity. The extracted material, which includes all transuranic elements (e.g., plutonium, neptunium, americium and curium), would be consumed by fast reactors to reduce significantly the quantity of material requiring disposal in a repository and to produce power. The plutonium would remain bound with other highly radioactive isotopes, thereby preserving its proliferation resistance and reducing security concerns. With the transuranic materials separated and used for fuel, the volume of waste that would require disposal in a repository would be reduced by 80 percent.

Improving the way spent nuclear fuel is managed in this manner will facilitate the expansion of civilian nuclear power in the United States and encourage civilian nuclear power in foreign countries to evolve in a more proliferation-resistant manner. Once these recycling technologies are proven, the United States and other countries having the established infrastructure could arrange to supply nuclear fuel to countries seeking the energy benefits of civilian nuclear power, and the spent nuclear fuel could be returned to partner countries for eventual disposal in international repositories. In this way, foreign countries could obtain the benefits of nuclear energy without needing to design, build, and operate uranium enrichment or recycling technologies to process and store the waste.

The **Nuclear Power 2010** program is requesting funding of \$54.0 million in FY 2007 to complete the issuance of three Early Site Permits by the U.S. Nuclear Regulatory Commission (NRC). In addition, the program will complete the industry cost-shared project initiated in FY 2003 to develop generic guidance for the Construction and Operating License (COL) application preparation, to resolve generic COL regulatory issues and continue the implementation phase of the two New Nuclear Plant Licensing Demonstration Projects awarded in FY 2005.

The goal of the **Generation IV Nuclear Energy Systems Initiative** (Gen IV) is to address the fundamental research and development issues necessary to establish the viability of

next-generation nuclear energy system concepts. The 2007 budget provides \$31.4 million for the Gen IV initiative to expand research and development that could help achieve the desired goals of sustainability, economics, and proliferation resistance.

The **Nuclear Hydrogen Initiative** (NHI), with funding of \$18.7 million, will conduct research and development on enabling technologies, demonstrate nuclear-based hydrogen production technologies, and develop technologies that will apply heat from Generation IV nuclear energy systems to produce hydrogen. DOE's Offices of Nuclear Energy, Fossil Energy, Science, and Energy Efficiency and Renewable Energy are working together to provide the technological underpinnings of the **Hydrogen Fuel Initiative**. Research and development work carried out by NHI may enable the United States to generate hydrogen at a scale and cost that would support a future hydrogen-based economy.

The **Radiological Facilities Management** program maintains irreplaceable DOE nuclear technology facilities in a safe, secure, environmentally compliant and cost-effective manner to support national priorities, including the provision of radioisotope power systems that can generate electrical power in remote harsh environments for space exploration. This program also supports the medical isotope production infrastructure and research reactor infrastructure.

The **Idaho Facilities Management** program provides INL with the site-wide infrastructure required to support the laboratory's research and development programs. The Department has developed a detailed INL Ten Year Site Plan that will guide its investments in INL's infrastructure over the next decade. It is the government's objective to develop INL into a world-class nuclear energy research and development center by 2015.

The **Idaho Site-Wide Safeguards and Security** program protects DOE interests from theft, diversion, sabotage, espionage, unauthorized access, compromise, and other hostile acts, which could cause unacceptable adverse impacts on national security, program continuity, the health and safety of employees, the public, or the environment at the INL.

**Program Direction** provides the federal staffing resources and associated costs required to provide overall direction and execution of the Department's Nuclear Energy program.

*SIGNIFICANT FUNDING CHANGES – FY 2006 to 2007 Request (\$ in millions)*

**University Reactor Infrastructure and Education Assistance**  
**(FY 2006 \$26.7; FY 2007 \$0) ..... -\$26.7**

Enrollment target levels of this program have already been met and students no longer need to be encouraged to enter into nuclear related disciplines. Consequently, the Department has determined it no longer requires funding for this program. The FY 2007 Budget includes \$2.9 million to provide fresh reactor fuel to universities and dispose of spent fuel from university reactors under Research Reactor Infrastructure, within Radiological Facilities Management.

**Nuclear Power 2010 (FY 2006 \$65.3; FY 2007 \$54.0) ..... -\$11.3**

Changes to COL Project baselines resulting from later than planned project starts and additional appropriations from FY 2006 resulted in a decrease of \$13.1 million. \$1.8 million in additional funds are requested to develop the regulations, criteria, and process under which the Department would accept, evaluate, and approve applications for standby support contracts from sponsors of new nuclear power plants.

<b>Generation IV Nuclear Energy Systems Initiative (FY 2006 \$54.5; FY 2007 \$31.4)</b> .....	<b>-\$23.1</b>
Decrease reflects a reduction in R&D activities due to a change in focus to emphasize other research and development activities such as near-term deployment of new nuclear plants and enhanced waste minimization efforts.	
<b>Nuclear Hydrogen Initiative (FY 2006 \$24.8; FY 2007 \$18.7)</b> .....	<b>-\$6.1</b>
Decrease reflects reduced development costs for the S-I thermochemical and high-temperature electrolysis hydrogen production methods as the laboratory-scale experiments move out of the construction phase into the testing phase.	
<b>Advanced Fuel Cycle Initiative (FY 2006 \$79.2; FY 2007 \$243.0)</b> .....	<b>+\$163.8</b>
Beginning in FY 2007, the Advanced Fuel Cycle Initiative program will be re-focused and accelerated toward near-term demonstration, at engineering scale, of the most promising technologies developed. In FY 2007, under the Global Nuclear Energy Partnership (GNEP), the Department will initiate work towards conducting an engineering scale demonstration of the UREX+ separations process (operational 2011) and developing an advanced fuel cycle facility capable of laboratory development of advanced separations and fuel manufacturing technologies (operational 2016). Over the coming year, NE will collaborate with international and private parties to refine the GNEP concept and gauge interest in a demonstration of the sodium cooled reactor technology, which would serve as the fast Advanced Burner Reactor component of GNEP (operational 2014).	
<b>Radiological Facilities Management (FY 2006 \$54.0; FY 2007 \$49.7)</b> .....	<b>-\$4.3</b>
Cumulative change in funding is due to an increase of \$1.4 million for maintaining and upgrading the Medical Isotope Infrastructure, an increase of \$2.9 million to provide fuel for university research reactors, and the discontinuation of work toward the consolidation of nuclear activities related to the production of radioisotope power sources (-\$8.4 million) within Space and Defense Infrastructure.	
<b>Idaho Facilities Management (FY 2006 \$112.7; FY 2007 \$95.3)</b> .....	<b>-\$17.4</b>
Decrease reflects reductions in funding for base operations, general plant projects, capital equipment purchases and the Science and Technology Complex utility corridor, as a result of higher priorities. Decrease also reflects one-time IT investments for FY 2006, the transfer of monies from Naval Reactors to support operation of the Advanced Test Reactor (ATR), and the deferral of Gas Test Loop activities due to technical difficulties. Increased funding is requested for the ATR Life Extension Project and routine maintenance and repair.	
<b>Idaho Site-Wide Safeguards and Security (FY 2006 \$74.3; FY 2007 \$76.0)</b> .....	<b>+\$1.7</b>
Increase represents an increase in funding for activities related to the implementation of the Federal Information Process Standard (FIP 201), along with information security and material control and accountability activities.	
<b>Program Direction (FY 2006 \$60.5; FY 2007 \$67.6)</b> .....	<b>+\$7.1</b>
Increase represents a 2.5 percent escalation in accordance with established guidelines and funds for promotions and within-grade salary increases. In addition, the increase includes funds required to implement the acceleration of the Advanced Fuel Cycle Initiative, including salaries and benefits for an additional 10 FTEs, support service contractor support, and Working Capital Fund costs and training.	