



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Nuclear Energy

# Investing in Energy Security and Technical Leadership

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# Nuclear Energy in the Administration

Office of Nuclear Energy

*“But to create more of these clean energy jobs, we need more production, more efficiency, more incentives. And that means building a new generation of safe, clean nuclear power plants in this country.”*

President Obama from the State of the Union,  
January 27, 2010

*“President Obama and I are committed to restarting the nuclear industry in the United States.”*

Secretary Chu at the American Nuclear Society Meeting,  
November 16, 2009

# Office of Nuclear Energy

Office of Nuclear Energy

## ■ Mission

- The primary mission of the Office of Nuclear Energy is to advance nuclear power as a resource capable of making major contributions in meeting the Nation's energy supply, environmental and energy security needs by resolving technical, cost, safety, security, and regulatory issues through research, development and demonstration.

## ■ FY2011 Budget Request

- \$912M
- Funding supports:
  - Refocused RD&D activities on reactor and fuel cycle technologies
  - Nuclear facilities used for advanced nuclear energy technology R&D
  - Responsibilities for waste management activities under the Nuclear Waste Policy Act

# RD&D Activities Reorganized and Refocused

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- RD&D program supports:
  - Exploring technology and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors
  - Improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals
  - Understanding of options for nuclear energy to contribute to reduced carbon emissions outside the electricity sector
  - Development of sustainable nuclear fuel cycles
  - Understanding and minimizing of risks of nuclear proliferation and terrorism
- Three complementary programs focused on:
  - Reactors
  - Fuel Cycle
  - Crosscutting and transformative technologies

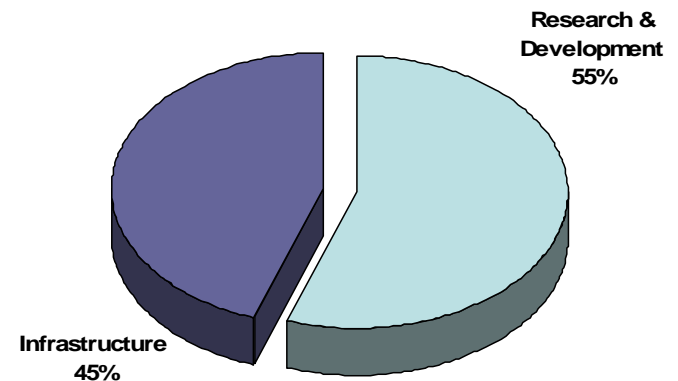
# FY2011 Budget Request Breakdown (\$k)

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Program:	FY 2010 Approp	FY 2011 Request
<b>Research &amp; Development</b>		
Nuclear Energy Enabling Technologies	0	99,300 <sup>a</sup>
Integrated University Program	5,000	0
Re-Energise	0	5,000
Reactor Concepts RD&D	0	195,000 <sup>a</sup>
Generation IV Nuclear Energy Systems	220,137	0
Nuclear Power 2010	105,000	0
Fuel Cycle Research and Development	136,000	201,000 <sup>a</sup>
International Nuclear Energy Cooperation	0	3,000
<b>Infrastructure</b>		
Radiological Facilities Management	72,000	66,818
Idaho Facilities Management	173,000	162,482
Idaho Sitewide S&S	83,358	88,200
Program Direction	73,000	91,452
<b>Congressionally Directed Projects</b>		
	2,500	0
<b>Total NE:</b>	<b>869,995</b>	<b>912,252</b>

## FY 2010 Funding

Total: \$912,252



a) up to 20% of R&D funds are competitively awarded to universities

# Significant Changes

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- **Nuclear Energy Enabling Technologies**
  - New program to develop crosscutting technologies and transformative breakthroughs with applicability to multiple reactor concepts and fuel cycle approaches
- **Re-Energise**
  - New program to encourage students to pursue careers in science, engineering, and entrepreneurship related to clean energy
- **Reactor Concepts RD&D**
  - New program, replacing the Generation IV Nuclear Energy Systems Program, to continue reactor RD&D activities, including the Next Generation Nuclear Plant, and to initiate a Small Modular Reactors effort
- **Fuel Cycle R&D**
  - Redirected from near-term technology deployment to long-term, results-oriented, science-based R&D
- **Nuclear Power 2010**
  - Nuclear Power 2010 Program closeout after the successful completion of its goals and objectives
- **International Nuclear Energy Cooperation**
  - New program to support NE's international engagement and other relevant international commitments in civilian nuclear energy matters

# Nuclear Energy Enabling Technologies

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<b>Budget Summary</b> \$ in thousands		
<b>Program Element</b>	<b>FY 2010 Approp</b>	<b>FY 2011 Request</b>
Crosscutting Technology Development	0	43,332
Transformative Nuclear Concepts R&D	0	28,888
Energy Innovation Hub for Modeling & Simulation	21,384 <sup>a</sup>	24,300
SBIR/STTR	0	2,780
<b>Total:</b>	<b>21,384</b>	<b>99,300</b>

a) FY2010 funding was in Generation IV Nuclear Energy Systems Program

- **Mission**
  - Develop crosscutting technologies that directly support and complement NE's development efforts and encourage transformative, "out of the box" solutions.
- **FY2011 Planned Accomplishments**
  - Evaluate innovative materials for use in high radiation/high temperature areas
  - Develop improved tools and methods for assessing proliferation risks
  - Complete R&D roadmap and initiate competitive projects improve reactor component manufacturing
  - Develop advanced systems to control and monitor plant materials and performance
  - Award investigator-initiated projects across the full range of nuclear energy generation
  - Establish an oversight board and continue work towards achieving the goals of the Modeling & Simulation Hub

# RE-ENERGYSE

## (Regaining our Energy Science and Engineering Edge)

Office of Nuclear Energy

<b>Budget Summary</b> \$ in thousands		
	<b>FY 2010 Approp</b>	<b>FY 2011 Request</b>
RE-ENERGYSE	0	5,000
<b>Total:</b>	<b>0</b>	<b>5,000</b>

- **Mission**
  - Provide the education and training necessary to build a highly skilled U.S. clean energy workforce dedicated to solving the world's greatest energy challenges.
- **FY2011 Planned Accomplishments**
  - Award scholarships and fellowships to support the development of future nuclear researchers, scientists, and engineers.
    - Approximately 88 one-year scholarships
    - Approximately 30 three-year fellowships

# Reactor Concepts Research, Development, and Demonstration

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<b>Budget Summary</b> \$ in thousands		
<b>Program Element</b>	<b>FY 2010 Approp</b>	<b>FY 2011 Request</b>
Small Modular Reactors (SMR)	0	38,880
Next Generation Nuclear Plant (NGNP) Demonstration Project	164,268 <sup>a</sup>	103,032
Light Water Reactor Sustainability	9,700 <sup>a</sup>	25,758
Advanced Reactor Concepts (formerly Gen IV R&D)	18,261 <sup>a</sup>	21,870
SBIR/STTR	6,164 <sup>a</sup>	5,460
<b>Total:</b>	<b>198,753<sup>a</sup></b>	<b>195,000</b>

a) FY2010 funding was in Generation IV Nuclear Energy Systems Program

## ■ Mission

- Develop new and advanced reactor designs and technologies that advance the state of reactor technology to broaden applicability, improve competitiveness, contribute to our nation's energy portfolio, and address environmental challenges.

## ■ FY2011 Planned Accomplishments

- Implement workshop recommendations to facilitate SMR design certifications
- Begin NGNP Phase 2 design and licensing activities under a public/ private partnership
- Develop technologies that support safe and economical long-term operation of the existing nuclear fleet
- Evaluate innovative reactor systems to identify promising areas for further R&D

# Fuel Cycle Research and Development

Office of Nuclear Energy

## Budget Summary

\$ in thousands

Program Element	FY 2010 Approp	FY 2011 Request
Separations and Waste Forms	41,615	31,324
Advanced Fuels	29,651	40,000
Transmutation R&D	4,288	0
Modeling & Simulation	26,009	15,570
Systems Analysis & Integration	14,783	15,664
Materials Protection, Accountancy & Controls for Transmutation	6,826	7,814
Used Nuclear Fuel Disposition	9,124	45,000
Modified Open Cycle	0	40,000
SBIR/STTR	3,704	5,628
<b>Total:</b>	<b>136,000</b>	<b>201,000</b>

## ■ Mission

- Research and develop nuclear fuel and waste management technologies that will enable a safe, secure, and economic fuel cycle.

## ■ FY2011 Planned Accomplishments

- Examine 3 fuel cycle strategies: once-through, modified open, and full recycle.
- Continue to develop advanced concepts for electrochemical processing and alternative waste forms.
- Begin to develop innovative fuel systems that support advanced fuel cycles.
- Provide technical expertise to inform decision-making for storage, transportation, and disposal of used nuclear fuel and radioactive waste.

# International Nuclear Energy Cooperation

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<b>Budget Summary</b> \$ in thousands		
	<b>FY 2010 Approp</b>	<b>FY 2011 Request</b>
International Nuclear Energy Cooperation	0	3,000
<b>Total:</b>	<b>0</b>	<b>3,000</b>

## ■ **Mission**

- Support the NE program offices in implementing international cooperative R&D activities to further NE's overall mission and provide advice and support to DOE and other Federal agencies engaging in international civil nuclear activities.

## ■ **FY2011 Planned Accomplishments**

- Effectively support and coordinate international programmatically-driven civil nuclear energy research, development and demonstration-related requirements and activities
- Ensure that the Department effectively implements, and appropriately meets, its civil nuclear energy commitments pursuant to its bilateral civil nuclear energy agreements and research initiatives, with countries such as France, China, Japan, India, Russia, Brazil, Argentina and South Korea
- Support the USG on international civil nuclear energy matters and initiatives as a technically-based expert office within the U.S. Department of Energy.

# Radiological Facilities Management

Office of Nuclear Energy

## Budget Summary \$ in thousands

Program Element	FY 2010 Approp	FY 2011 Request
Space and Defense Infrastructure	42,000	47,000
Research Reactor Infrastructure	10,000	4,818
Oak Ridge Nuclear Infrastructure	10,000	0
Los Alamos Nuclear Infrastructure	10,000	0
Plutonium-238 (Pu-238) Production Restart Project	0	15,000 <sup>a</sup>
<b>Total:</b>	<b>72,000</b>	<b>66,818</b>

a) National Aeronautics and Space Administration requesting \$15M for a total of \$30M for the project.

## ■ Mission

- Maintain NE managed nuclear facilities at Idaho National Laboratory, Oak Ridge National Laboratory, and Los Alamos National Laboratory and initiate Pu-238 production activities.

## ■ FY2011 Planned Accomplishments

- Support customer programs, including the National Aeronautics and Space Administration launch of the Pu-238 powered Mars Science Laboratory
- Improve selected facilities to assure that products meet specifications
- Initiate the Pu-238 production restart project by completing National Environmental Policy Act requirements, preparing a conceptual design, and irradiating targets in reactors
- Purchase fresh fuel for two to four university research reactors and ship used fuel to DOE facilities.

# Idaho Facilities Management

Office of Nuclear Energy

<b>Budget Summary</b>		
\$ in thousands		
<b>Program Element</b>	<b>FY 2010 Approp</b>	<b>FY 2011 Request</b>
INL Nuclear Research Reactor Operations & Maintenance	58,537	58,537
INL Non-Reactor Nuclear Research Facility Operations & Maintenance	53,825	51,506
INL Engineering & Support Facility Operations & Maintenance	20,741	14,005
National Scientific User Facility	4,000	4,000
INL Regulatory Compliance	7,388	12,183
INL Facility Infrastructure Revitalization Program	28,509	22,251
<b>Total:</b>	<b>173,000</b>	<b>162,482</b>

## ■ Mission

- Manage the planning, acquisition, operation, maintenance, and disposition of nuclear facilities and resources at INL.

## ■ FY2011 Planned Accomplishments

- Enable INL facility operations supporting nuclear science, engineering, and energy-related R&D programs for the Department of Energy, National Nuclear Security Administration, and U.S. universities.
- Conduct ATR base operations to support over 40 irradiation campaigns as scheduled while maintaining an operating efficiency greater than 80%.
- Award 3-5 university experiments using the ATR and other INL research facilities and support 6 university partnerships to increase available capabilities for National Scientific User Facility experiments.

# Idaho Sitewide Safeguards and Security

Office of Nuclear Energy

## Budget Summary \$ in thousands

	FY 2010 Approp	FY 2011 Request
Idaho Sitewide S&S	83,358	88,200
<b>Total:</b>	<b>83,358</b>	<b>88,200</b>

## ■ Mission

- Provide protection of nuclear materials, classified matter, Government property, and other vital assets at the INL.

## ■ FY2011 Planned Accomplishments

- Maintain a highly effective safeguards and security program at Idaho National Laboratory consistent with the approved Site Safeguards and Security Plan.
- Maintain and implement the DOE cyber security program for both classified and unclassified systems at Idaho National Laboratory.
- Implement the 2008 Graded Security Policy Implementation Plan policy to ensure appropriate protective measures commensurate with risk and consequence.

# Program Direction

Office of Nuclear Energy

## Budget Summary \$ in thousands

Program Element	FY 2010 Approp	FY 2011 Request
Salaries and Benefits	51,948	66,706
Travel	2,281	2,726
Support Services	5,376	6,318
Other Related Expenses	13,395	15,702
<b>Total:</b>	<b>73,000</b>	<b>91,452</b>

## ■ Mission

- Provide the Federal staffing resources and associated costs required for the overall of direction and execution of NE, including responsibilities under the Nuclear Waste Policy Act

## ■ FY2011 Planned Accomplishments

- Support 200 FTEs at Headquarters
- Support 197 FTEs at Idaho
- Support 8 at Oak Ridge
- Support 19 FTEs for the Radiological and Environmental Sciences Laboratory