



U.S. DEPARTMENT OF
ENERGY

Office of
Nuclear Energy



Delivering Innovative Solutions for America's Energy Challenges

Peter Lyons

Acting Assistant Secretary for Nuclear Energy

U.S. Department of Energy

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Innovation and Competitiveness

Office of Nuclear Energy

“This is our generation’s Sputnik moment. ... We’ll invest in biomedical research, information technology, and especially clean energy technology — an investment that will strengthen our security, protect our planet, and create countless new jobs for our people.”

“So tonight, I challenge you to join me in setting a new goal: By 2035, 80 percent of America’s electricity will come from clean energy sources. Some folks want wind and solar. Others want nuclear, clean coal and natural gas. To meet this goal, we will need them all...”

President Barack Obama
State of the Union Address
January 25, 2011

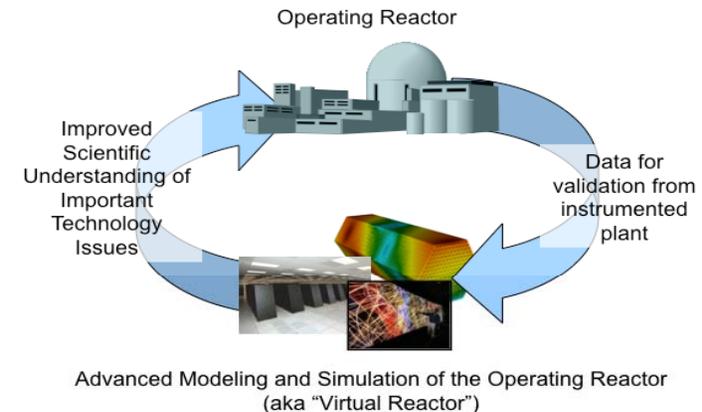
Innovation: Modeling and Simulation Hub

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“At Oak Ridge National Laboratory, they’re using supercomputers to get a lot more power out of our nuclear facilities.”

-- President Obama, 2011 State of the Union Address

- CASL: The Consortium for Advanced Simulation of Light Water Reactors
 - A unique lab-university-industry partnership with a remarkable set of assets
- CASL vision: Create a virtual reactor for predictive simulation of LWRs
- CASL mission: Develop and apply the virtual reactor to address 3 critical performance goals
 - Reduce capital and operating costs
 - Reduce nuclear waste
 - Enhance nuclear safety
- Selection announced on May 28, 2010
- FY 2012 request: \$24.3M



Competitiveness: Small Modular Reactors

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“If we can develop this technology [SMRs] in the U.S. and build these reactors with American workers, we will have a key competitive edge.”

-- Secretary Chu, Wall Street Journal Op-Ed, March 23, 2010

- Many potential advantages (financing, licensing, cost) for SMRs
- Wide program scope
 - Competitively-selected cost-share on first of a kind engineering associated with design certification and licensing activities for LWR SMRs
 - Long-range R&D for advanced designs
- Total FY 2012 request: \$95.7M
 - Competitively-selected cost-share: \$67M
 - Advanced Concepts R&D: \$28.7M



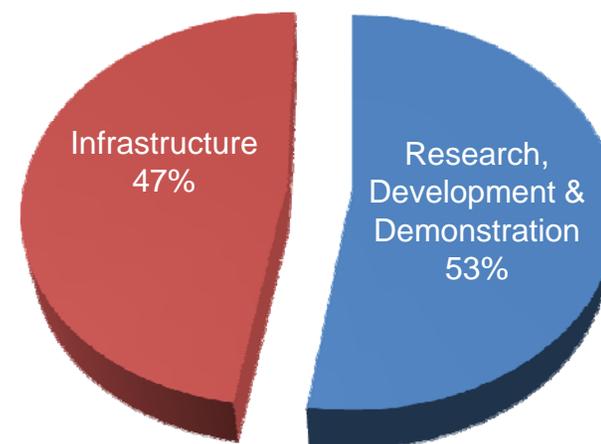
FY 2010 Appropriations Breakdown (\$k)

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Program	FY 2010 Approp ^a
Research, Development & Demonstration	
Integrated University Program	5,000
Nuclear Power 2010	101,960
Generation IV Nuclear Energy Systems ^b	212,904
Fuel Cycle Research and Development ^b	131,938
Infrastructure	
Radiological Facilities Management	71,760
Idaho Facilities Management	172,716
Idaho Sitewide S&S	83,358
Program Direction	73,000
Congressionally Directed Projects	2,500
Transfer from State Department	2,800
Total NE:	857,936^a

FY 2010 Appropriation

Total: \$857,936



a) Reflects FY 2010 Rescission

b) Up to 20% of R&D funds are competitively awarded to universities

R&D in the FY 2012 Budget

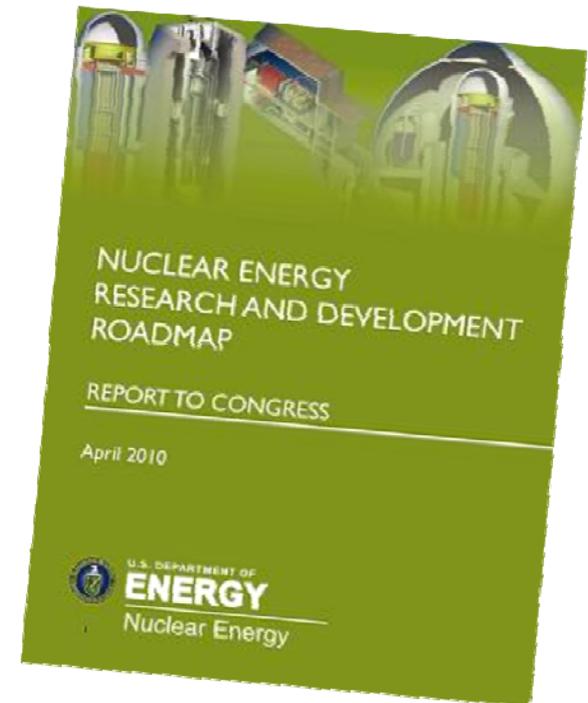
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➤ Nuclear Energy R&D Objectives

1. Develop technologies and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors
2. Develop improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals
3. Develop sustainable nuclear fuel cycles
4. Understand and minimize the risks of nuclear proliferation and terrorism

➤ Four complementary R&D programs in the FY 2012 budget

- Reactor Concepts
- Fuel Cycle
- Nuclear Energy Enabling Technologies
- International Nuclear Energy Cooperation



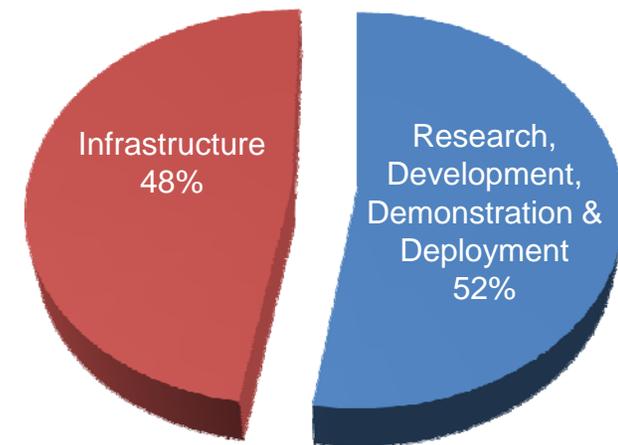
FY 2012 Budget Request Breakdown (\$k)

Office of Nuclear Energy

Program	FY 2012 Request
Research, Development, Demonstration & Deployment	
LWR SMR Licensing Technical Support	67,000
Reactor Concepts RD&D ^a	125,000
Fuel Cycle Research and Development ^a	155,010
Nuclear Energy Enabling Technologies ^a	97,364
International Nuclear Energy Cooperation	3,000
Integrated University Program	0
Infrastructure	
Radiological Facilities Management	64,888
Idaho Facilities Management	150,000
Idaho Sitewide S&S	98,500
Program Direction	93,133
Use of Prior Year Balances	-1,367
Total NE:	852,528

FY 2012 Request

Total: \$852,528



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

LWR Small Modular Reactor Licensing Technical Support

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Budget Summary \$ in thousands

Program Element	FY 2012 Request
LWR SMR Licensing Technical Support	67,000
Total:	67,000

➤ Mission

- Support design certification and licensing activities for LWR SMR designs through cost-shared arrangements with industry partners in order to promote accelerated deployment of SMRs

➤ FY 2012 Planned Accomplishments

- Manage competitively-selected cooperative agreements with SMR vendors and utility partners for cost-shared design certification and licensing activities
- Continue to work with NRC and industry in addressing regulatory issues that are vital to the licensing of SMR designs

Reactor Concepts Research, Development, and Demonstration

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Budget Summary \$ in thousands

Program Element	FY 2012 Request
Small Modular Reactor Advanced Concepts R&D	28,674
Next Generation Nuclear Plant (NGNP)	49,572
Light Water Reactor Sustainability	21,384
Advanced Reactor Concepts	21,870
SBIR/STTR	3,500
Total:	125,000

➤ 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

➤ FY 2012 Planned Accomplishments

- Conduct R&D on advanced SMR designs
- Establish critical path R&D activities and work with industry to establish the business plan and approach for the long-term execution of NGNP
- Research technologies that support safe and economical long-term operation of the existing nuclear fleet
- Conduct R&D on Advanced Reactor Concepts

Fuel Cycle Research and Development

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Budget Summary \$ in thousands

Program Element	FY 2012 Request
Separations and Waste Forms	36,893
Advanced Fuels	40,443
Transmutation R&D	3,109
Systems Analysis & Integration	20,466
Materials Protection, Accountancy & Control Technology	7,864
Used Nuclear Fuel Disposition	37,249
Fuel Resources	4,646
SBIR/STTR	4,340
Total:	155,010

➤ Mission

- Conduct science-based, goal-oriented research and development in support of developing options to the current U.S commercial fuel cycle management strategy to enable the safe, secure, economical and sustainable expansion of nuclear energy while reducing proliferation risks

➤ FY2012 Planned Accomplishments

- Examine three fuel cycle strategies: once-through, modified open, and full recycle
- Apply new approaches to R&D that integrate theory, experiment, and high-performance modeling and simulation to enable the development of safe, secure and economical fuel cycle options
- Investigate technologies that support increased utilization of fuel resources and reduce long-lived radiotoxic elements that would require disposal
- Research the economic feasibility of extracting uranium from seawater

Nuclear Energy Enabling Technologies

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Budget Summary \$ in thousands

Program Element	FY 2012 Request
Crosscutting Technology Development	41,178
Transformative Nuclear Concepts R&D	14,580
Energy Innovation Hub for Modeling & Simulation	24,300
National Scientific User Facility	14,580
SBIR/STTR	2,726
Total:	97,364

➤ Mission

- Develop crosscutting technologies that directly support and complement NE's R&D efforts and encourage transformative, "out of the box" solutions

➤ FY 2012 Planned Accomplishments

- Evaluate innovative materials for use in high radiation/high temperature areas
- Develop improved tools and methods for assessing proliferation risks
- Improve reactor component manufacturing
- Develop advanced systems to control and monitor plant materials and performance
- Award investigator-initiated transformative nuclear technology research
- Major release of the Virtual Reactor Code with significantly improved capabilities
- Support and expand the NSUF partnerships
- Deliver advanced modeling and simulation capabilities to be used in support of the reactor and fuel cycle R&D programs

International Nuclear Energy Cooperation

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Budget Summary \$ in thousands

	FY 2012 Request
International Nuclear Energy Cooperation	3,000
Total:	3,000



➤ **Mission**

- Serve as the overall lead for the Office of Nuclear Energy in implementing international cooperative R&D activities and provide advice and support to DOE and other Federal agencies engaging in international civil nuclear policy activities

➤ **FY 2012 Planned Accomplishments**

- Support and coordinate international civil nuclear energy research, development, and demonstration-related requirements and activities
- Support technical collaborations through bilateral Action Plans, Working Groups, and the International Nuclear Energy Research Initiative
- Coordinate NE R&D Roadmap implementation activities to understand and minimize the risks of nuclear proliferation and terrorism



University Program

Budget Summary \$ in thousands

	FY 2012 Request
Integrated University Program	0
Total:	0

- In FY 2012, no funds are requested for the Integrated University Program, reflecting the Administration's confidence that the nuclear industry, as it expands, will create incentives for students to enter nuclear-related programs
- Nuclear Energy University Programs will continue to provide up to 20 percent of NE's appropriated R&D funds to competitively-awarded university-based research

Radiological Facilities Management

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Budget Summary \$ in thousands

Program Element	FY 2012 Request
Space and Defense Infrastructure	49,902
Research Reactor Infrastructure	4,986
Plutonium-238 (Pu-238) Production Restart Project ¹	10,000
Total:	64,888



¹ The National Aeronautics and Space Administration is requesting a comparable level of funding in FY 2012 to support this 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

➤ FY 2012 Planned Accomplishments

- Ensure that DOE's nuclear capabilities supporting Space and Defense activities are maintained and operated in a safe, environmentally-compliant, and cost-effective manner
- In support of the Pu-238 Production Restart Project, continue target development and reactor optimization activities and initiate engineering design and long-lead equipment procurement
- Provide universities with fresh fuel and shipment of used fuel to support continued operation of their research reactors

Idaho Facilities Management

Office of Nuclear Energy

Budget Summary \$ in thousands

Program Element	FY 2012 Request
INL Nuclear Research Reactor Operations & Maintenance	63,809
INL Non-Reactor Nuclear Research Facility Operations & Maintenance	54,506
INL Engineering & Support Facility Operations & Maintenance	12,824
INL Regulatory Compliance	14,821
Advanced Post Irradiation Examination Capabilities	4,040
Total:	150,000

➤ Mission

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

➤ FY 2012 Planned Accomplishments

- Enable INL facility operations to support nuclear science, engineering, and energy-related R&D programs for the Department of Energy, National Nuclear Security Administration, and U.S. universities
- Conduct activities to assess transient testing capability needs and options
- Initiate activities to identify, develop and evaluate options for providing advanced post-irradiation examination capabilities

Idaho Sitewide Safeguards and Security

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Budget Summary \$ in thousands

	FY 2012 Request
Idaho Sitewide S&S	98,500
Total:	98,500



➤ Mission

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

➤ FY 2012 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
- Carry out the 2008 Graded Security Policy Implementation Plan policy to ensure appropriate protective measures commensurate with risk and consequence
- Maintain security system reliability with critical maintenance support

Program Direction

Office of Nuclear Energy

Budget Summary \$ in thousands

Program Element	FY 2012 Request
Salaries and Benefits	66,027
Travel	2,884
Support Services	6,994
Other Related Expenses	17,228
Total:	93,133

➤ Mission

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

➤ FY 2012 Planned Accomplishments

- Support 184 FTEs at Headquarters
- Support 197 FTEs at Idaho Operations Office
- Support 8 at Oak Ridge Operations Office
- Support 19 FTEs for the Radiological and Environmental Sciences Laboratory
- Support 18 FTEs at Nevada Site Office



Former OCRWM Responsibilities

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- In FY 2010, the Administration determined that the Yucca Mountain Project was not a workable option
- The Office of Civilian Radioactive Waste Management (OCRWM) was closed at the end of FY 2010; responsibilities were transferred to other Departmental elements, including LM, NNSA, EM, and
 - Office of Nuclear Energy (NE) – Responsible for on-going R&D related to long-term disposition of spent fuel and high level waste
 - Office of the General Counsel (GC) – Responsible for litigation and oversight, as well as legal activities associated with the NWPA, the Nuclear Waste Fund, and the standard contracts with utilities
- In FY 2012, funding to support on-going NWPA activities within both NE and GC is included in the NE budget request