



U.S. DEPARTMENT OF  
**ENERGY**

**Nuclear Energy**

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# **OFFICE OF NUCLEAR ENERGY UPDATE**

**Dr. Peter Lyons**  
**Assistant Secretary for Nuclear Energy**  
**U.S. Department of Energy**

**Nuclear Energy Advisory Committee**  
**Washington, DC**  
**June 13, 2013**



## Recent Key Events

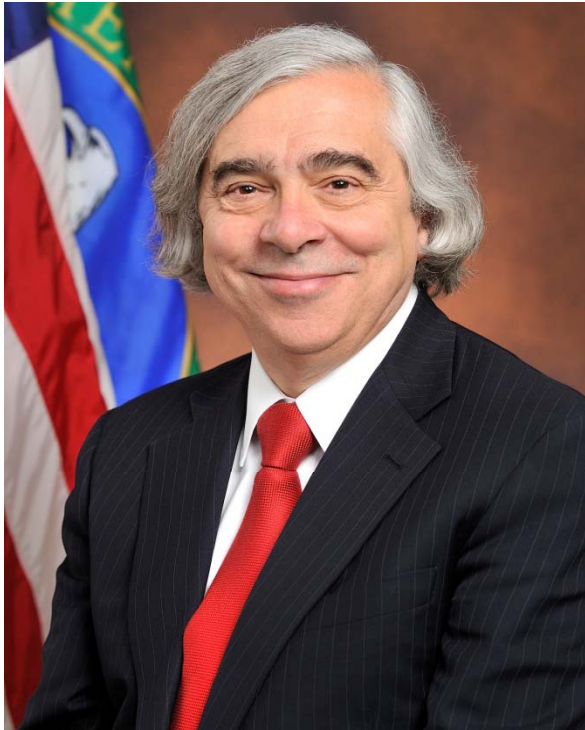
- **Dr. Ernest Moniz Confirmed as Secretary of Energy**
- **President Obama's FY 2014 Budget Released**
- ***Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* issued January 13, 2013**
- **Second Small Modular Reactor FOA issued**
- **Investment in High Burn-up Used Nuclear Fuel Dry Storage Project**
- **International – Advancing cooperation with Czech Republic**



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## Secretary of Energy, Dr. Ernest Moniz confirmed on May 16, 2013



- Professor of Physics and Engineering Systems at MIT and founding Director of the MIT Energy Initiative and of the MIT Laboratory for Energy and the Environment
  - Under Secretary of the Department of Energy (1997 to 2001)
  - Associate Director for Science in the Office of Science and Technology Policy in the Executive Office of the President (1995-1997)
  - Served on the President Obama's Council of Advisors on Science and Technology; the Department of Defense Threat Reduction Advisory Committee; the Blue Ribbon Commission on America's Nuclear Future; and the Council on Foreign Relations
- 
- Fellow of the American Association for the Advancement of Science, the Humboldt Foundation, and the American Physical Society.
  - Bachelor of Science degree *summa cum laude* in Physics from Boston College, Doctorate in Theoretical Physics from Stanford University



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## Dr. Moniz on Nuclear Energy

U.S. Senate Committee on Energy & Natural Resource  
Confirmation Hearing April 9, 2013

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“DOE should continue to support a robust R&D portfolio of low-carbon options: efficiency, renewables, nuclear, carbon capture and sequestration, energy storage.”

“I believe small modular reactors could represent the next generation of nuclear energy technology, providing a strong opportunity for America to lead this emerging global industry.”



## NE FY 2014 Budget Highlights

### ■ President's NE Budget Key Priorities:

- Small Modular Reactors
- Used Fuel Disposition
- Nuclear Energy University Program
- Nuclear Energy Modeling and Simulation HUB
- Idaho Facilities Management

### ■ Administration Focus on Disposition of Used Nuclear Fuel

- The Administration released its Strategy in January 2013
- \$60M for Used Fuel Disposition under Fuel Cycle Research and Development
  - \$30M for Research and Development
  - \$30M for High-Level Waste Management and Disposal System Design Activities

### ■ Changes within Radiological Facilities Management

- Space and Defense Infrastructure moves to full cost recovery (-\$65M)

### ■ Idaho Safeguards and Security

- Requested within Nuclear Energy, currently appropriated in Other Defense Activities



# Office of Nuclear Energy FY 2014 Budget Request Summary

(Dollars in Thousands)

	<b>FY 2012 Current</b>	<b>FY 2014 Request</b>
Integrated University Program	5,000	0
SMR Licensing Technical Support	67,000	70,000
Reactor Concepts RD&D	110,652	72,500
Fuel Cycle R&D	180,993	165,100
Nuclear Energy Enabling Technologies	71,307	62,300
Radiological Facilities Management	69,510	5,000
International Nuclear Energy Cooperation	2,983	2,500
Idaho Facilities Management	154,097	181,560
Idaho Safeguards and Security <sup>a</sup>	93,350	94,000
Program Direction	91,000	87,500
Adjustments <sup>b</sup>	7,924	-5,000 <sup>c</sup>
<b>Total, Nuclear Energy</b>	<b>853,816</b>	<b>735,460</b>

a) Requested within Nuclear Energy in FY14 (retains Defense function), appropriated within Other Defense Activities in FY12.

b) Includes +\$7,924,00 transfer from Department of State.

c) Use of Prior Year Balances

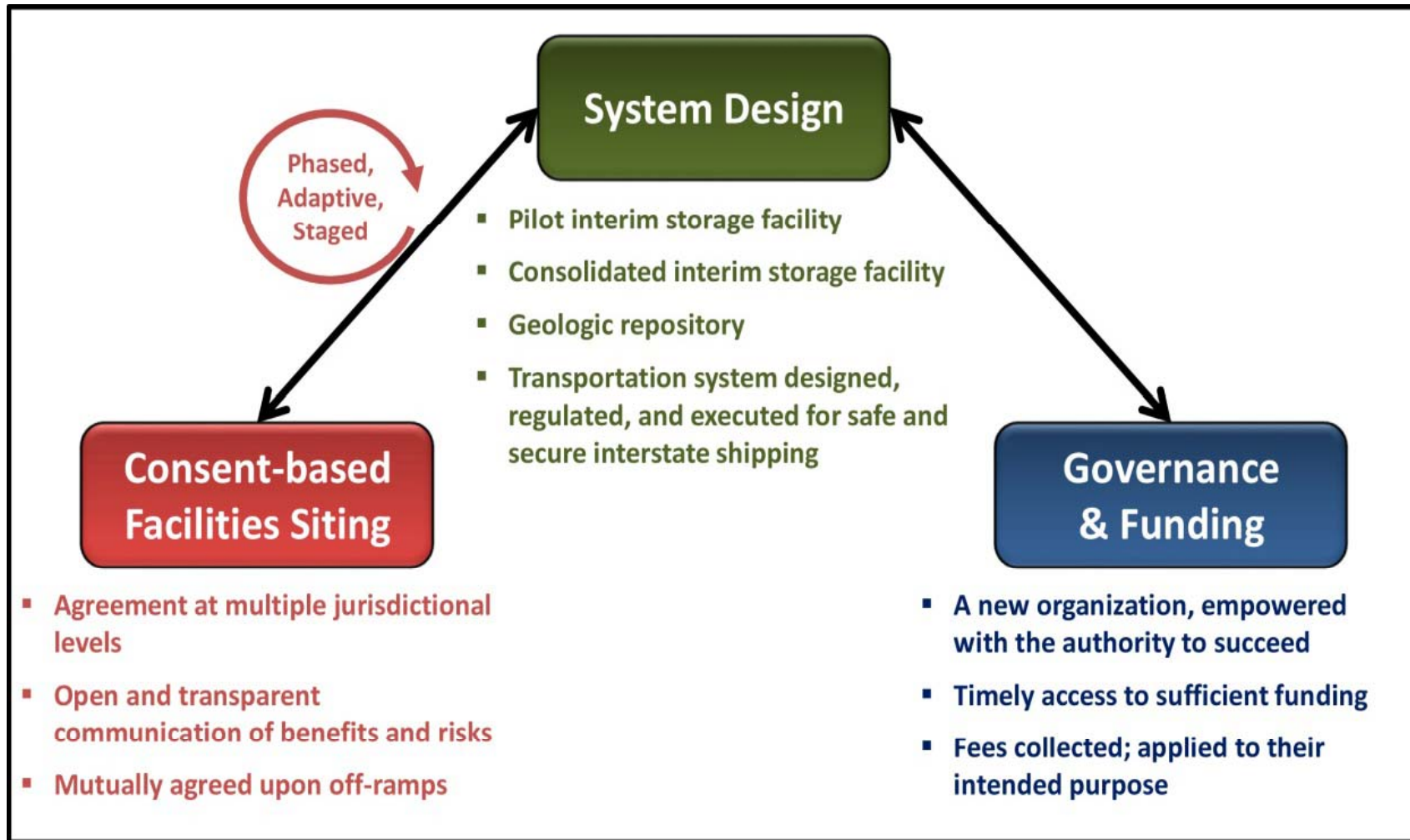


# Administration Focus on Disposition of Used Nuclear Fuel

- **The program is a very long term, flexible, multi-faceted approach to dispose of the nation's commercial and defense waste. The estimated programmatic cost of this effort over its first 10 years is \$5.6 billion including:**
  - construction and operation of a pilot interim waste storage facility
  - progress on both full-scale interim storage and long-term permanent geologic disposal
- **Proposed funding will consist of:**
  - Ongoing discretionary appropriations of up to \$200M beginning in 2014 and continue for the duration of the waste management mission
  - Mandatory appropriations from the fee collections and balance of the Nuclear Waste Fund in addition to the discretionary funding provided annually beginning in 2017 to fund the balance of the annual program costs
- **Other Strategy Elements in President's Budget**
  - Funding and authority for EPA to begin the revision of generic (non-site specific) disposal standards to help guide the siting of used fuel and high-level waste facilities
  - Explicit recognition of liability payments



## Key Strategy Elements







## Summary of the Administration's UNF and HLW Strategy

- **Statement of Administration policy regarding the importance of addressing the disposition of used nuclear fuel and high-level radioactive waste**
- **Response to the final report and recommendations made by the *Blue Ribbon Commission on America's Nuclear Future***
- **Initial basis for discussions among the Administration, Congress and other stakeholders**
- **10-year program of work that:**
  - Sites, designs, licenses, constructs and begins operations of a pilot interim storage facility
  - Advances toward the siting and licensing of a larger interim storage facility
  - Makes demonstrable progress on the siting and characterization of geologic repository sites



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## SMR Licensing Technical Support Program

- **Supports first phase for deployment**
- **Facilitates and accelerates commercial development and deployment of near term U.S. SMR designs at domestic locations**
- **\$452 M in cost-share program over 6 years**
  - FY12 funding is \$67M and FY14 request is \$70M
- **DOE selected one award under the first SMR funding opportunity announcement (FOA)**
  - Babcock and Wilcox mPower design selected; cooperative agreement signed April 2013
- **DOE issued a second FOA that places more emphasis on innovation in improved safety attributes and further reduces regulatory risk for some of the SMR technologies through:**
  - lower core damage frequencies
  - longer post-accident coping periods
  - enhanced resistance to natural phenomena
  - potentially smaller emergency preparedness zones
  - smaller workforce requirements

***\*\* Both the 1<sup>st</sup> and 2<sup>nd</sup> funding opportunities will be funded out of the \$452M program\*\****



## Investment in Storage: “High Burn-up Used Nuclear Fuel Dry Storage Project”

- Agreement among DOE, NRC and industry to investigate extended storage of high burn-up fuel to support storage license extension and transport.
- Goals:
  - 1) Benchmark predicative models and empirical conclusions developed from short-term lab testing for aging of dry storage cask system components, and
  - 2) Build confidence in ability to predict performance of these systems over extended time periods.
- Cost & Schedule: \$15.8M over 5 years
  - industry contributes at least 20% of total project cost.
- Contract was awarded to EPRI Team in April
  - Team includes Dominion and Areva
  - First task is preparation of Test Plan that will be shared with the public





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## Czech Republic Cooperation Milestones

- Transfer of 75 kg of fluoride salt from Oak Ridge National Lab to Czech Nuclear Research Institute Řež for experiments at Řež's critical test facility.
  - Data resulting from the tests will advance U.S. and Czech R&D on advanced reactors that might utilize molten fluoride salt coolants
- Establishment of a U.S.-Czech Civil Nuclear Cooperation Center in Prague
  - Center aims to facilitate/coordinate joint R&D and offer opportunities to host workshops, seminars, and academic exchanges on scientific, technical and commercial aspects of nuclear energy as well as nuclear security and nonproliferation issues.
  - IAEA has approved the use of \$500,000 of Peaceful Uses Initiative funds to support the Center's regional activities. Czech government will fund infrastructure costs.
- Expected Signing of DOE-MOIT R&D Agreement





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# Integrated Research Projects - Collaborators

## ■ 2012: Inherently Safe Reactors

*Georgia Institute of Technology, University of Michigan, Virginia Tech, University of Tennessee, University of Idaho, Morehouse College, Polytechnic University of Milan, University of Cambridge, Westinghouse, Southern Nuclear, INL*

## ■ 2012: Accident Tolerant Fuels

*University of Tennessee, Pennsylvania State University, University of Colorado-Boulder, University of Michigan, Oxford University, University of Manchester, University of Huddersfield, University of Sheffield, Australian Nuclear Science and Technology Organization, Westinghouse, LANL*

## ■ 2012: Accident Tolerant Fuels

*University of Illinois, Urbana Champaign, University of Florida, University of Michigan, University of Manchester, ATI, INL*

## ■ 2011: Accelerated Aging of Used Nuclear Fuel in Storage

*Texas A&M University, Boise State University; North Carolina State University; University of Florida; University of Illinois, Urbana-Champaign; University of Wisconsin, Madison, PNNL, SRNL*

## ■ 2011: Advanced Thermal Reactor Concepts

*Massachusetts Institute of Technology, University of California, Berkeley; University of Wisconsin, Madison*



## FY 12 Integrated Research Projects Award Statistics

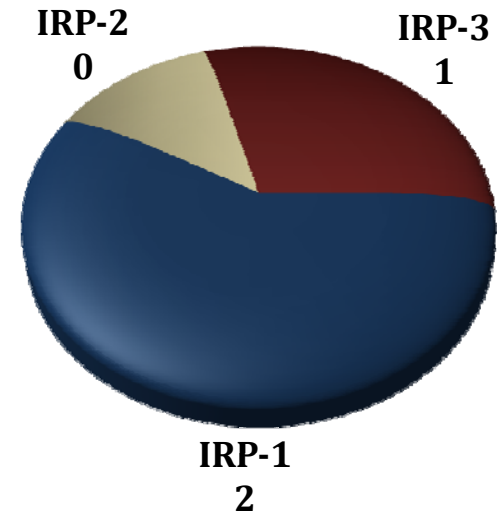
■ **3 total proposals selected from 3 lead universities**

■ **19 additional collaborating organizations**

- 13 universities
- 2 national laboratories
- 4 industrial partners
- 7 foreign institutions in 3 countries -  
Australia, Italy, UK

■ **These organizations represent**

- 12 states
- 1 minority-serving institution (MSI)
- 3 foreign countries





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# FY 13 Integrated Research Project Initial Proposal Statistics

- **6 total proposals submitted by 5 lead universities**
  
- **37 additional collaborating organizations**
  - 25 universities
  - 7 national laboratories
  - 4 industrial partners
  - 1 NNSA facility
  
- **These organizations represent**
  - 18 states
  - 0 minority-serving institutions (MSI)
  - 3 foreign countries (France, UK, Canada)



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# Global Demand for Nuclear Energy Continues



Sanmen – January 2013

*Source: SNPTC*



Summer – March 2013

*Source: SCE&G*



Vogtle – March 2013

*Source: Georgia Power Co.*

## ■ Key Drivers:

- Long-term energy supply/energy security
- Clean, base-load source of energy
- Significant source of jobs and economic benefit