U.S. DEPARTMENT OF ENERGY | Nuclear Energy

The Office of Nuclear Energy

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Assistant Secretary for Nuclear Energy
U.S. Department of Energy

Nuclear Waste Technical Review Board
Washington, DC
January 9, 2012

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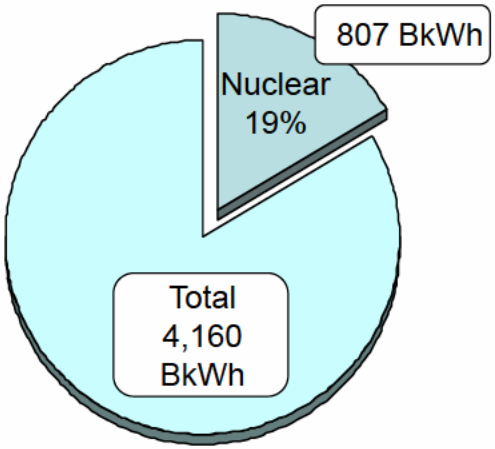
Nuclear Energy
Plays an Important Role in US Energy Supply

- **Nuclear power is clean, reliable base load energy source**
  - Provides 19% of U.S. electricity generation mix
  - Provides over 70% of U.S. emission-free electricity
  - Avoids about 700 $MMTCO_2$ each year
  - Helps reduces overall NOx and SOx levels
- **U.S. electricity demand projected to increase ~24% by 2030**
- **100 GWe nuclear capacity - 104 operating plants**
  - Fleet maintaining approximate 90% average capacity factors
  - Most expected to apply for license renewal for 60 years of operation.

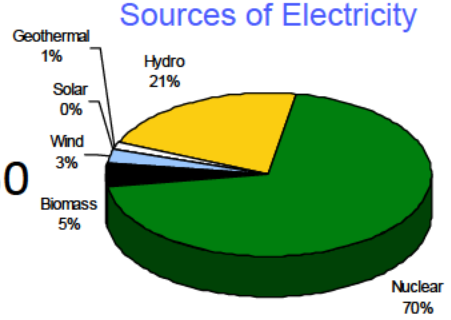
U.S. Electricity Net Generation



2007

Source: Energy Information Administration

Net Non-emitting Sources of Electricity



Source: Energy Information Administration

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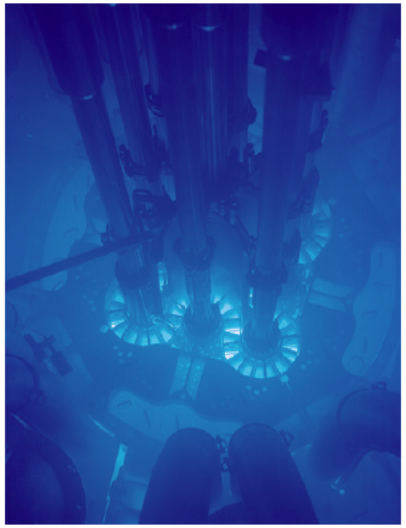
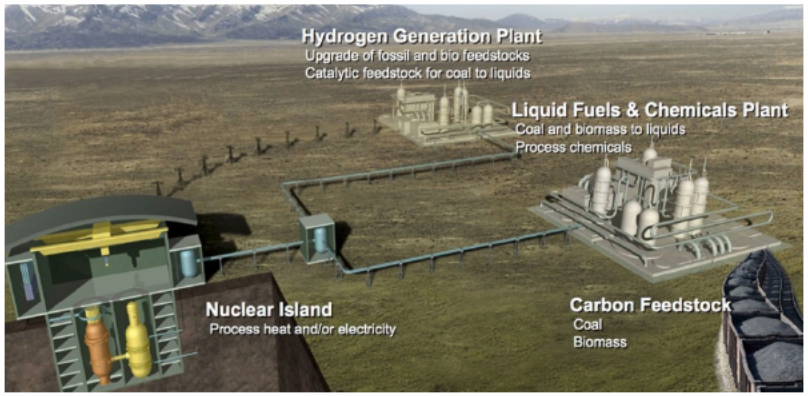
Office of Nuclear Energy Mission





- **The primary mission of NE 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 (RD&D).**

- **Objective is to enable the development and deployment of fission power systems for**
  - Production of electricity (MWh)
  - Process heat (BTUs)

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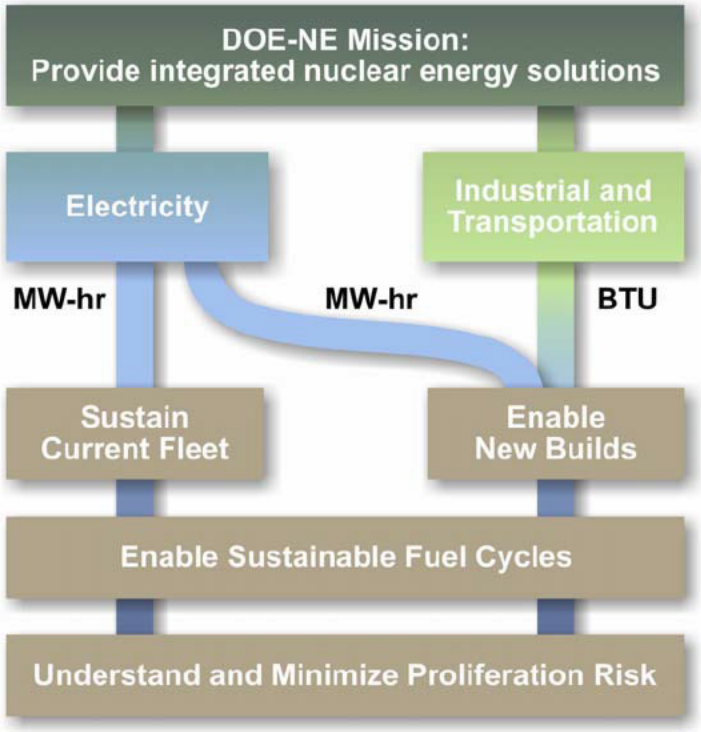
Nuclear Energy Objectives

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



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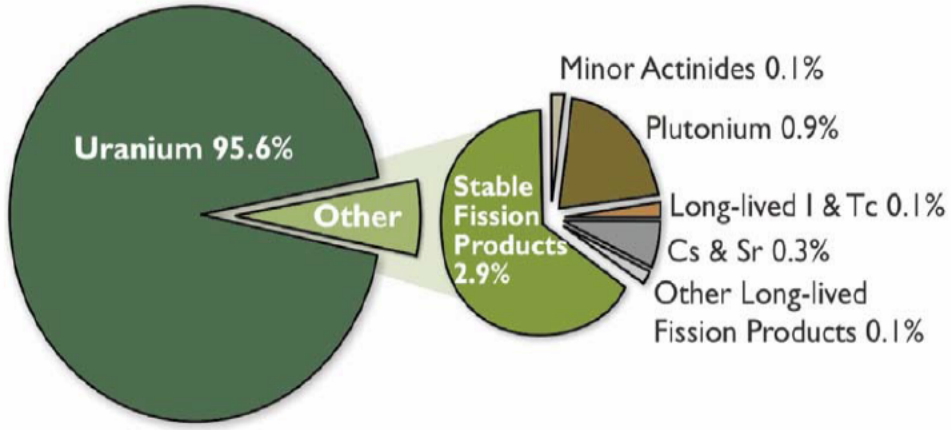
Objective 3: Sustainable Fuel Cycles

- **Goals**
  - In the near term, define and analyze fuel cycle technologies to develop options that increase the sustainability of nuclear energy
  - In the medium term, select preferred fuel cycle option for further development
  - By 2050, deploy preferred fuel cycle

- **Challenges**
  - Develop high burnup fuel and structural materials to withstand irradiation for longer periods of time
  - Develop simplified separations, waste management, and proliferation risk reduction methods
  - Develop optimized systems to maximize energy production while minimizing waste



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Bases for Fuel Cycle Research and Development Program (FCRD)

- **Dry cask storage is safe, and used nuclear fuel can be stored for at least 50 years.**
  - R&D includes work on long-term storage.
- **From safety perspective, there is not an urgency to implement a final fuel cycle.**
  - There is time to purse R&D to assess better approaches.
- **The once-through fuel cycle is the baseline.**
  - Options will be evaluated against the baseline.
  - Final choice may include both once-through and reprocessing.
- **At least one repository will be needed for all options.**
- **Blue Ribbon Commission will provide a policy/planning framework that will guide FCRD.**

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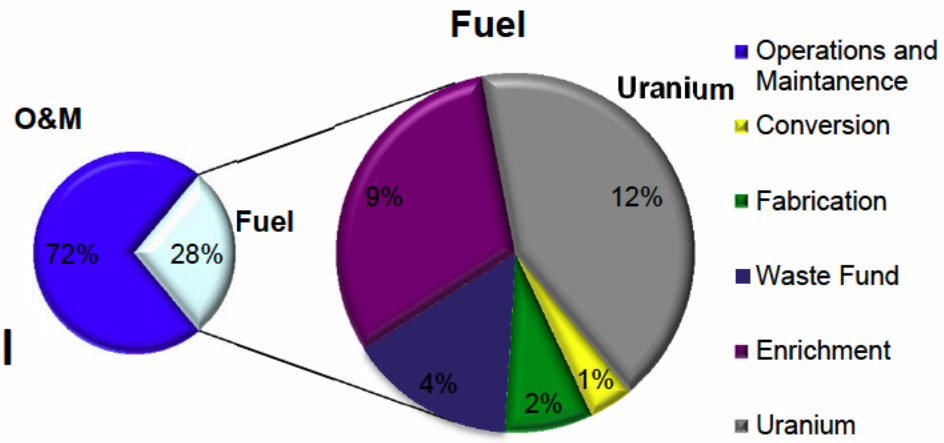
Issues Impacting Choices

- Technology readiness
- Costs of reactor systems
- Availability/costs of uranium
- Repository issues (capacity, availability, costs, geological media, etc.)
- Proliferation risks
- Social issues (intergenerational equity, resource stewardship, repository siting, etc.)
- Etc.

Contributions to the Costs of Electricity from Operating Nuclear Power Plants



- Average cost of operating plants is approximately 2 cents per kilowatt-hour (NEI).
- Uranium cost will be a smaller fraction of new plants costs.

Source: Ventyx Velocity Suite; Energy Resources International via NEI

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Draft Blue Ribbon Commission Report: Key Recommendations (July 29, 2011)

- A New Consent- Based Approach to Siting
- A New Organization to Implement the Waste Management Program
- Access to Utility Waste Disposal Fees for their Intended Purpose
- Prompt Efforts to Develop One or More Permanent Geologic Disposal Facilities
- Prompt Efforts to Develop One or More Consolidated Interim Storage Facilities
- Support for Advances in Nuclear Energy Technology and for Workforce Development
- Active U.S. Leadership in International Efforts to Address Safety, Non-Proliferation and Security Concerns

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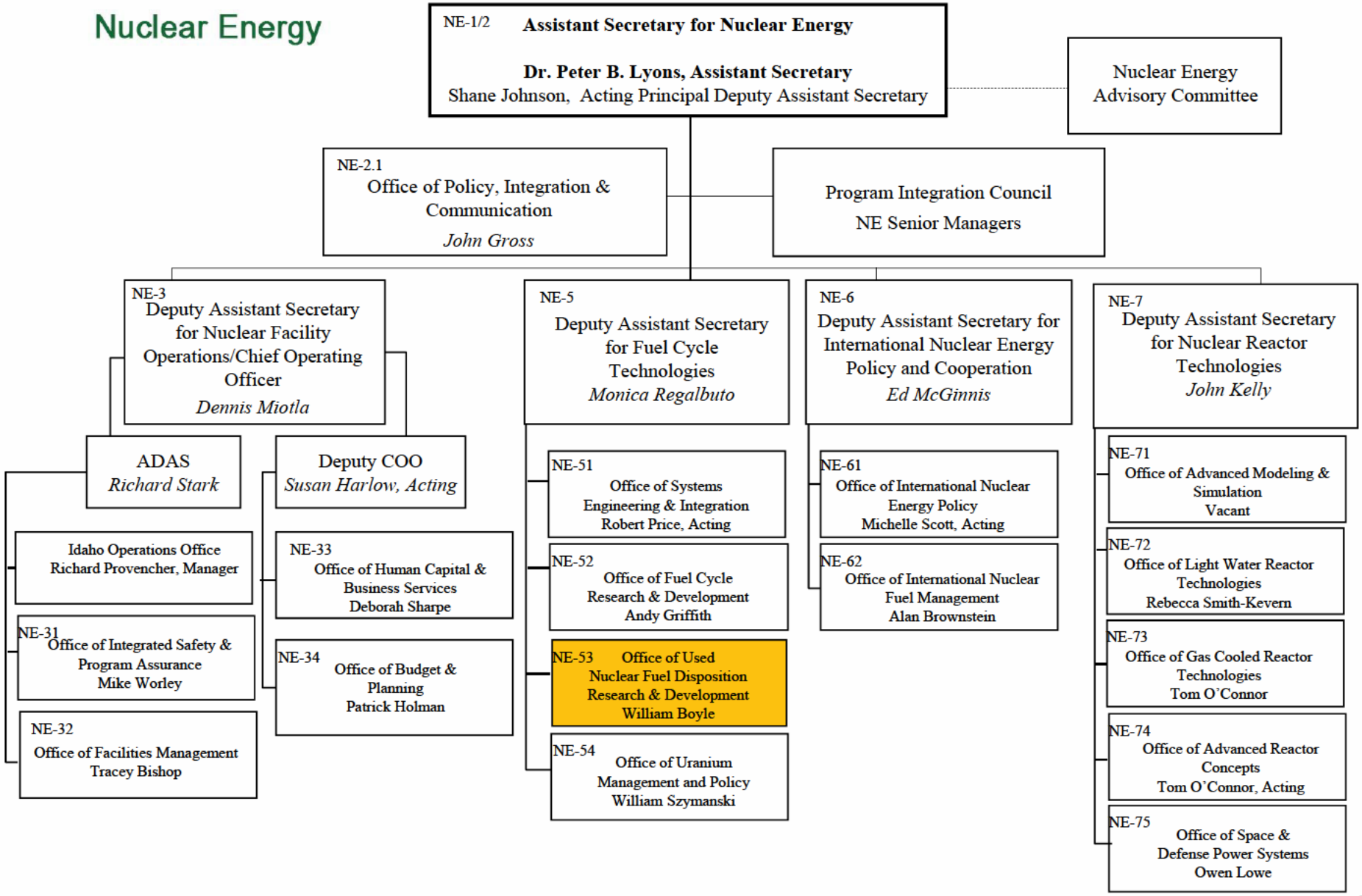

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FY 2011-12 Budget Summary

Program	FY 2011 Adjusted	FY 2012 Request	FY 2012 Appropriation
Research, Development, & Demonstration			
Integrated University Program	-	-	5,000
LWR SMR Licensing Technical Support	-	67,000	67,000
Reactor Concepts RD&D	163,876	125,000	115,554
Fuel Cycle Research and Development	182,428	155,010	187,351
Nuclear Energy Enabling Technologies	49,958	97,364	74,880
International Nuclear Energy Coop.	2,994	3,000	3,000
Infrastructure			
Radiological Facilities Management	51,715	64,888	69,888
Idaho Facilities Management	183,604	150,000	155,000
Idaho Sitewide S&S	88,200	98,500	93,350
Program Direction	86,279	93,133	91,000
Use of Prior Year Balances	-	-1,367	-
Rescission of Prior Year Balance	-6,321	-	-
Total NE:	**802,733**	**852,528**	**862,741**

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President Obama's Clean Energy Goals

"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