Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste

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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)
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
“We can build the next-generation nuclear reactors that are smaller and safer and cleaner and cheaper.”

Ohio State University-March 22, 2012

“With rising oil prices and a warming climate, nuclear energy will only become more important. That’s why, in the United States, we’ve restarted our nuclear industry as part of a comprehensive strategy to develop every energy source.”

Seoul, Korea - March 26, 2012
Renewed Interest in Nuclear Energy

- **Early Site Permits**: 4 early site permits approved for Clinton, Grand Gulf, North Anna sites, and Vogtle; additional permit applications filed.

- **License Applications**: 18 Construction and Operating License applications for 28 new reactors have been submitted for NRC review; Areva and USEC enrichment licenses filed; 73 reactor license renewals approved.

- **Reactor Design Certifications**: Four designs have been certified; three new designs (APWR, EPR, and ESBWR) are under review; ESBWR through ACRS; **AP1000 certified**.

- **New Plant Orders**: 4 plant construction contracts initiated; 9 power companies have placed large component forging orders.

- **Plant Construction**: TVA construction activities at Watts Bar 2, and reinstated construction permits for Bellefonte 1 and 2. LES enrichment plant operating. **Vogtle and Summer COL issued, construction in progress**.

- **Financial Incentives**: Conditional loan guarantees approved for Vogtle and Eagle Rock.

- **Small Modular Reactor Program**: Administration support for multiyear SMR Licensing and Deployment Program. $65M requested in FY13. **Made first selection and announced second FOA Nov 20, 2012**.
Global Demand for Nuclear Energy Continues

- **Sanmen - January 2012**
- **Summer - May 2012**
- **Vogtle – November 2012**

**Key Drivers:**

- Long-term energy supply/energy security
- Clean, base-load source of energy
- Significant source of jobs and economic benefit
Secretary of Energy Steven Chu announced the formation of a 15-person commission to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle.

The Commission was co-chaired by former Congressman Lee Hamilton and former National Security Advisor General Brent Scowcroft.

The Commission provided recommendations for developing a safe, long-term solution to managing the United States’ used nuclear fuel and nuclear waste.

The Commission released a draft report in July 2011 and the final report in January 2012.
Blue Ribbon Commission
Recommendations


2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.

3. Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management.

4. Prompt efforts to develop one or more geologic disposal facilities.

5. Prompt efforts to develop one or more consolidated storage facilities.

6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.

7. Support for continued U.S. innovation in nuclear energy technology and for workforce development.

8. Active U.S. leadership in international efforts to address safety, waste management, non-proliferation, and security concerns.
The Department recognizes that the BRC Report represents “a critical step toward finding a sustainable approach to disposing used nuclear fuel and nuclear waste”.

The Department acknowledges that “the specifics of a new strategy for managing our nation’s used nuclear fuel will need to be addressed in partnership with Congress”.

The Department “will work in parallel to begin implementing the new strategy” by taking sensible steps toward the implementation of near-term recommendations.
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
Key Strategy Elements

System Design
- Pilot interim storage facility
- Consolidated interim storage facility
- Geologic repository
- Transportation system designed, regulated, and executed for safe and secure interstate shipping

Consent-based Facilities Siting
- Agreement at multiple jurisdictional levels
- Open and transparent communication of benefits and risks
- Mutually agreed upon off-ramps

Governance & Funding
- A new organization, empowered with the authority to succeed
- Timely access to sufficient funding
- Fees collected; applied to their intended purpose
Implementation: Interim Storage Facilities

- Facilities sited using consent-based process and licensed by the Nuclear Regulatory Commission
- Pilot-scale interim storage facility
  - Focused on servicing shutdown reactors
  - Operational in 2021
- Consolidated interim storage facility
  - Larger capacity to provide system flexibility
  - Operational in 2025
- Facilities could service environmental cleanup and defense sites
Stranded Spent Fuel at Shutdown Reactor Sites

- Trojan-UNF 34; GTCC 0
- Humboldt Bay-UNF 5; GTCC 1
- Rancho Seco- UNF 21; GTCC 1
- La Crosse – UNF 5; GTCC 0
- Zion- UNF 61; GTCC TBD
- Big Rock Point- UNF 7; GTCC 1
- Yankee Rowe- UNF 15; GTCC 1
- Ct. Yankee-UNF 40; GTCC 3
- Maine Yankee- UNF 60; GTCC 4

Key
UNF – used nuclear fuel canisters
GTCC – canisters of greater than class C waste
Geologic Repository

- Sited using consent-based process by 2026
- Designed and licensed by 2042
- Operational in 2048

Transportation

- Build on experience in industry and with WIPP
- Capability to service facilities safely and securely
- Ongoing planning activities provide foundation for implementation

One of each facility for now, possible additions based on consent-based process
Based on retention needs, current UNF can be divided into 3 categories:

- **Disposal**
  - Excess material not needed for other purposes

- **Research**
  - Material needed for R&D to support
    - UNF management
    - Advanced fuel cycle development

- **Recycle**
  - Material with inherent and/or strategic value
Disposal of 98% of current inventory: No adverse impact on deployment of future alternative fuel cycles
Implementation: Consent-based Process and New Organization

**Consent-based process**
- Host jurisdictions to be recognized as partners
- Consent required at multiple levels
- Public trust and confidence necessary for success
- Defining process and terms is critical initial step

**New Organization**
- Multiple workable models
- RAND study looked at independent government agency and government corporation models
- Critical attributes: accountable, autonomous, mission-oriented, stable
- No specific model endorsed at this time
Implementation: Funding

- **Ongoing appropriations**
  - Ongoing role for Appropriations Committees with funds from the General Fund
  - Could fund specific activities – e.g., management, personnel, regulatory development activities
  - Could meet obligation to fund disposal of government UNF and HLW

- **Reclassification of fee income or spending**
  - Needed to support:
    - interim storage facility development and operations
    - repository siting and licensing
  - Could move fee income to discretionary or move spending to mandatory
  - Annual amounts limited by incoming fees (~$750M/year)

- **Access to “corpus” of the Nuclear Waste Fund**
  - Needed for construction of repository
  - Could be tied to specific milestones or performance triggers
Initiating planning for a large-scale transportation program

Evaluating operational options for consolidated storage and furthering the design of a generic consolidated storage facility

Planning for initiating a consent-based siting process

Evaluating the inventory, transportation interface, and shipping status of used nuclear fuel at shut-down reactor sites

Engaging state and regional groups and tribal representatives on transportation planning and emergency response training consistent with NWPA Section 180(c).

Conducting disposal-related research and development work on various geologic media, thermal scenarios, and disposal containers
Conclusion: Legislation Needed for Implementation

- Active engagement in a broad, national, consent-based process to site storage and disposal facilities
- Siting, design, licensing, and commencement of operations at a pilot-scale storage facility
- Significant progress on siting and licensing of a larger consolidated interim storage facility
- Development of transportation capabilities to begin movement of fuel from shut-down reactors
- Reformation of the funding arrangements
- Establishment of a new organization to run this program