



U.S. DEPARTMENT OF
ENERGY

Nuclear Energy

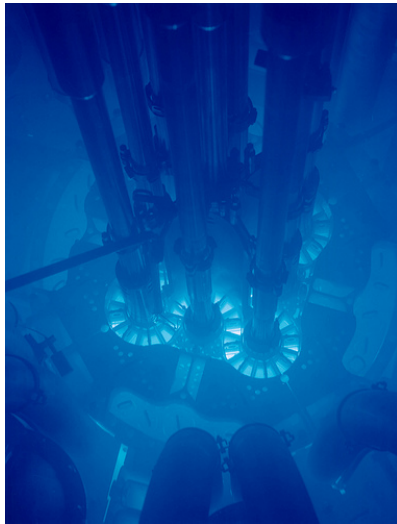
Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste

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

**INMM Spent Fuel Management Seminar XXVIII
Arlington, VA
January 14, 2013**



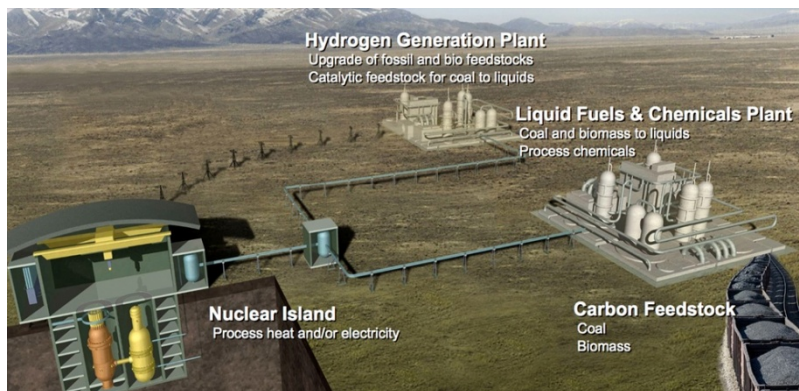
Office of Nuclear Energy Mission



- 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

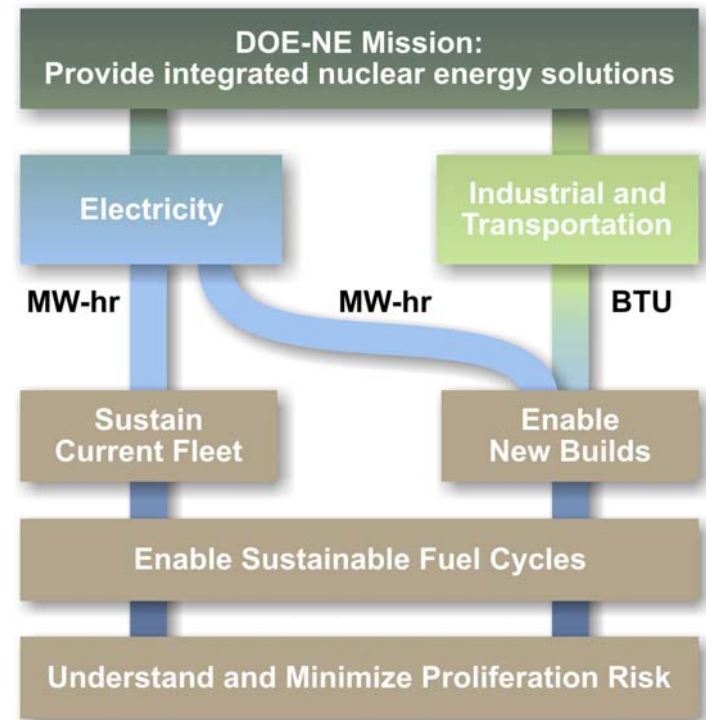
- Production of electricity (MWh)
- Process heat (BTUs)





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





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President Obama's Nuclear Energy Goals

"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 .**



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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



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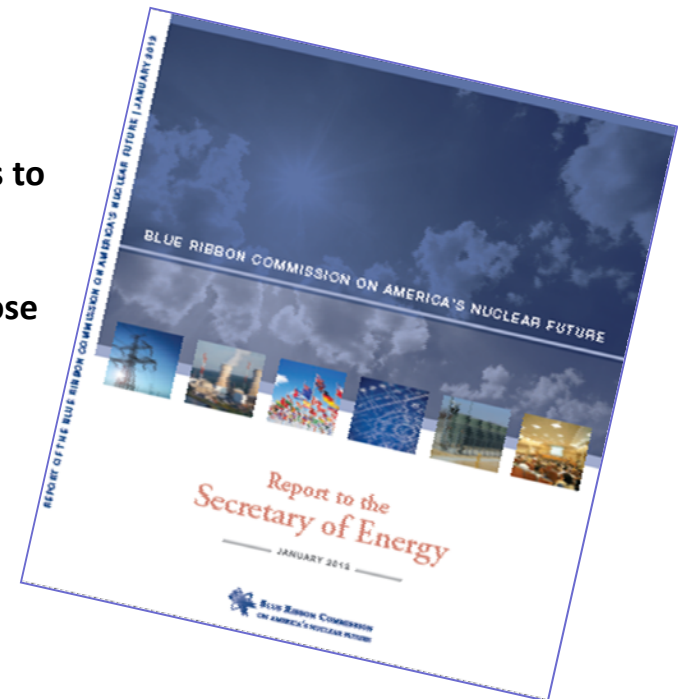
Blue Ribbon Commission Established January 2010

- 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

1. A new, consent-based approach to siting future nuclear waste management facilities.
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.





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Secretary of Energy Dr. Steven Chu Statement on the BRC Recommendations



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.

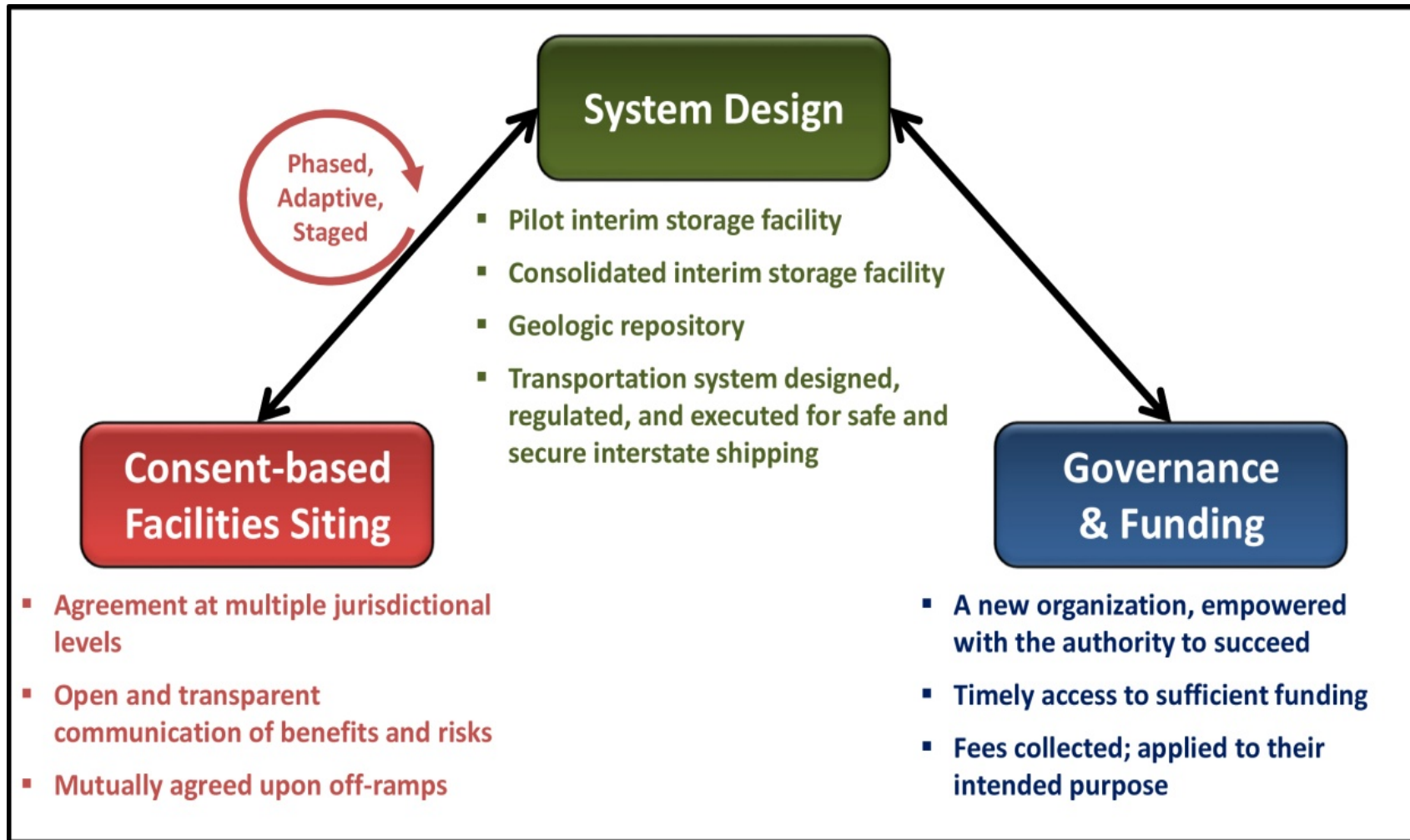


Summary of the Administration's UNF and HLW Strategy

- **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





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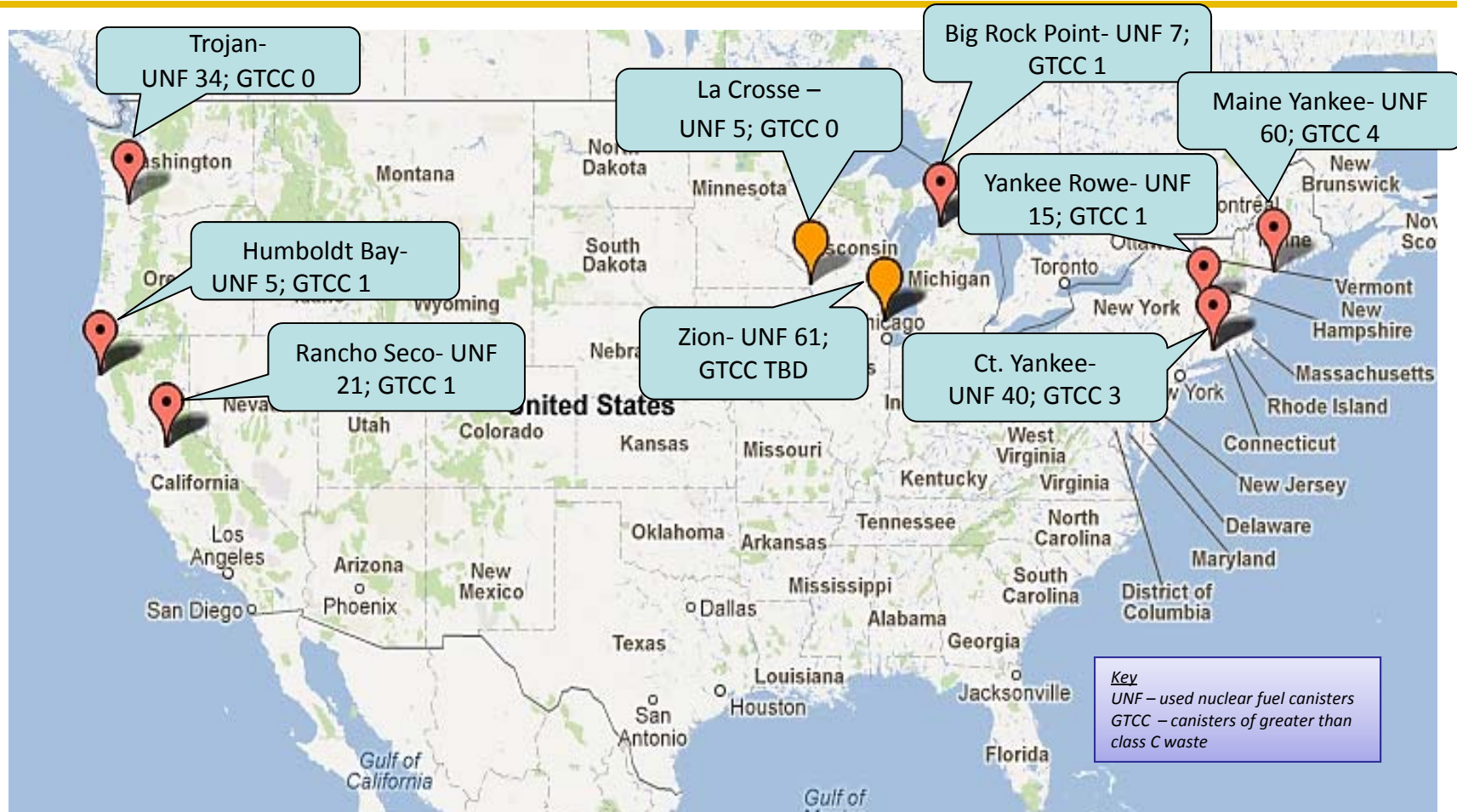
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Implementation: Interim Storage Facilities

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- **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





Implementation: Geologic Disposal and Transportation

■ 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



Oak Ridge National Laboratory's Technical Assessment of U.S. Used Nuclear Fuel Inventory

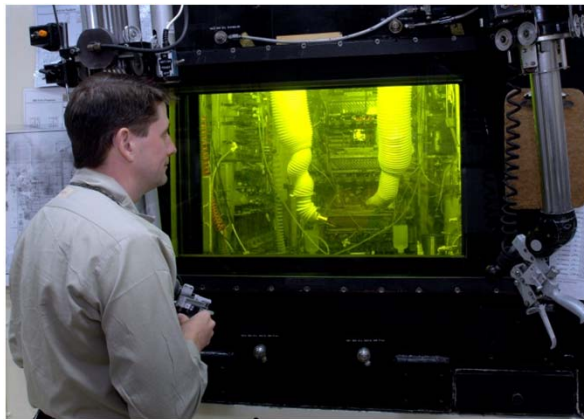
Based on retention needs, current UNF can be divided into 3 categories:

Disposal



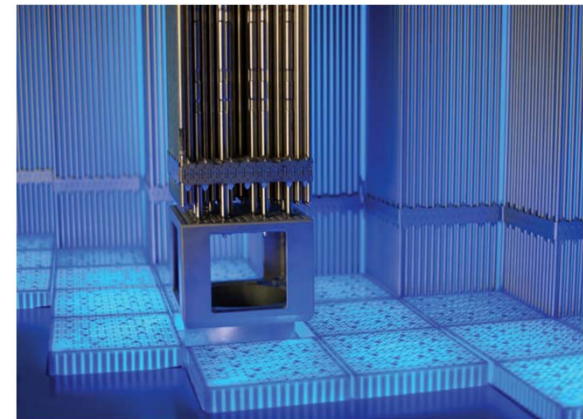
- Excess material not needed for other purposes

Research



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

Recycle

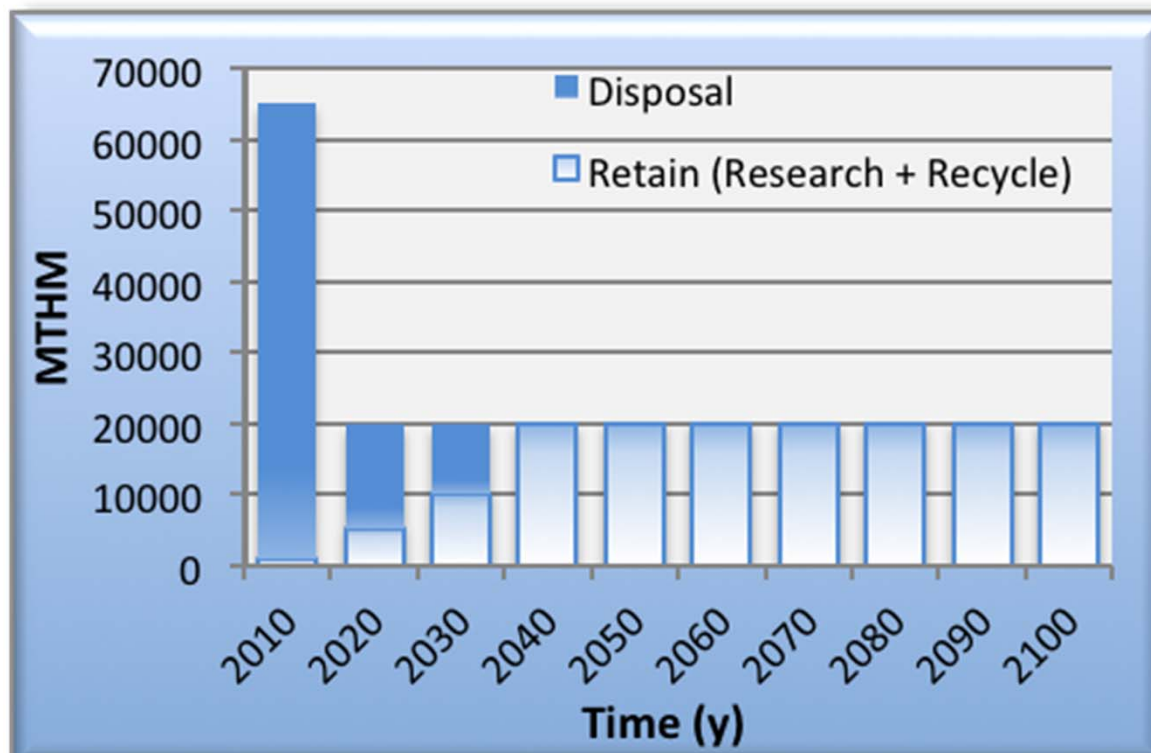


- Material with inherent and/or strategic value



Oak Ridge National Laboratory's Technical Assessment of U.S. Used Nuclear Fuel Inventory

- 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

Choosing a New
Organization for
Management and
Disposition of
Commercial and
Defense High-Level
Radioactive Materials

Lynn E. Davis, Debra Knopman, Michael D. Greenberg,
Laurel E. Miller, Abby Doll



Environment, Energy, and Economic Development
A RAND INFRASTRUCTURE, SAFETY, AND ENVIRONMENT PROGRAM



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



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Nuclear Fuel Storage and Transportation Planning Project: Ongoing Activities

-
- 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**