



# **Update on the United States Department of Energy's Used Fuel Disposition R&D Campaign**

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Conference**  
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## Outline

### Nuclear Energy

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#### ■ Where the Used Fuel Disposition (UFD) R&D Campaign fits in the US Program

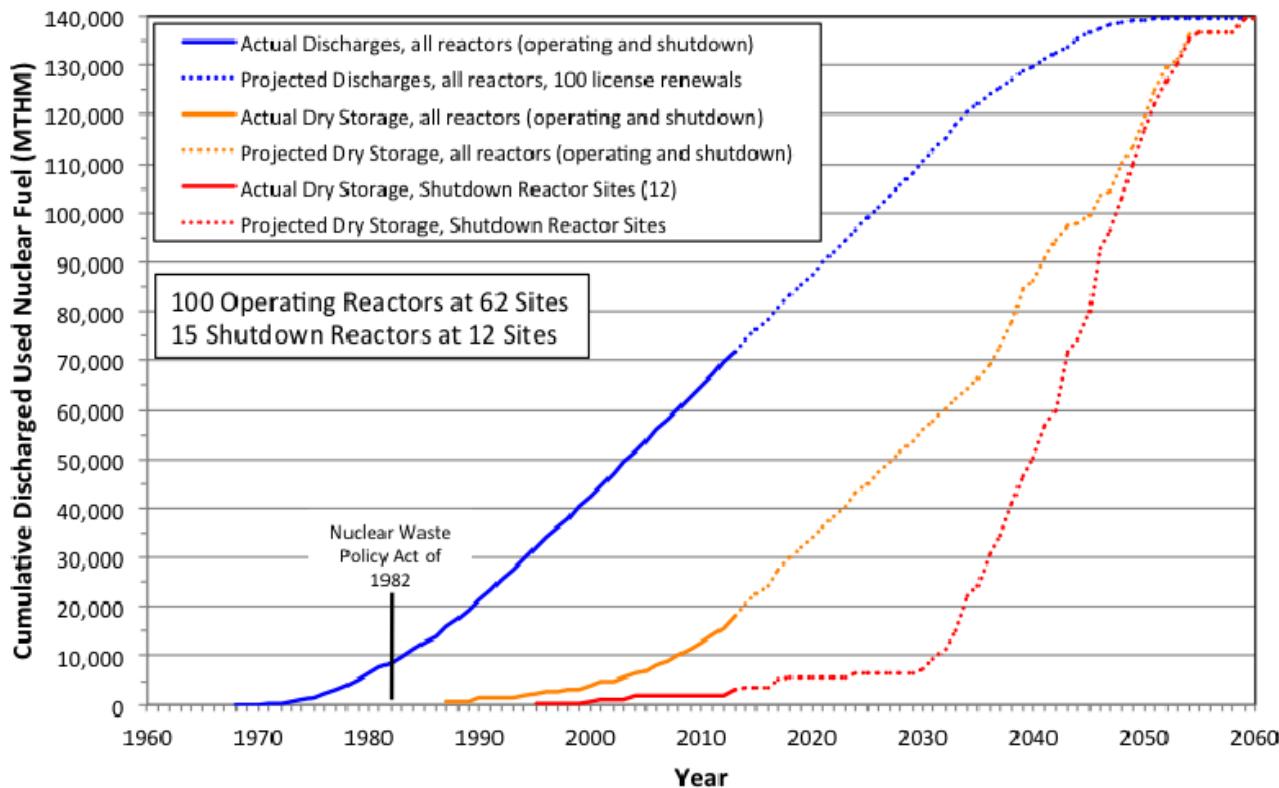
- Organization
- Mission

#### ■ Scope of the UFD R&D program

#### ■ Near Term R&D Priorities

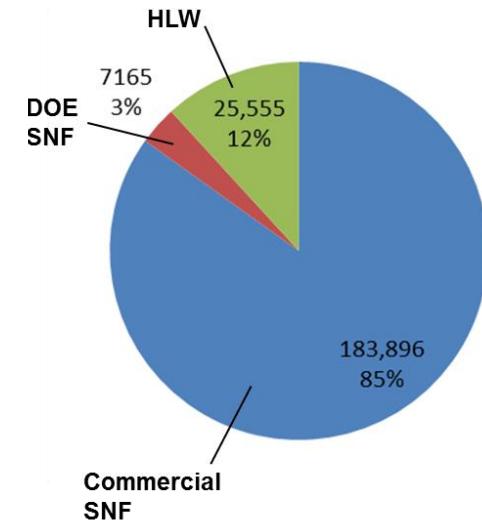


# Historical and Projected Spent Nuclear Fuel (SNF) and High-Level Radioactive Waste (HLW) in the United States



Historical and Projected Commercial SNF Discharges

## Projected Volumes of SNF and HLW in 2048



Volumes shown in m<sup>3</sup>, assuming constant rate of nuclear power generation and packaging of future commercial SNF in existing designs of dual-purpose canisters



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

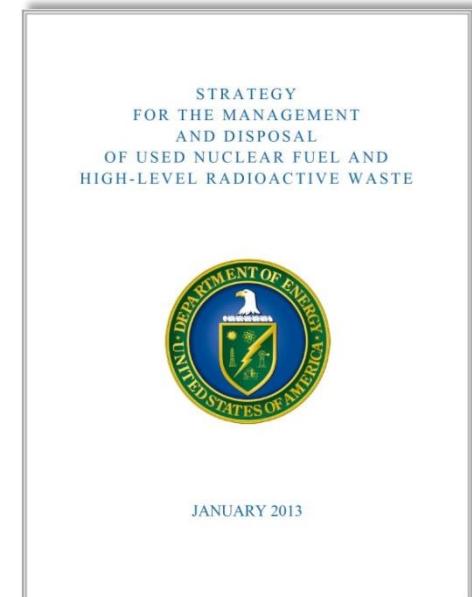
***Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste issued January 2013***

The Strategy is:

- A statement of Administration policy regarding the importance of addressing the disposition of used nuclear fuel and high-level radioactive waste
- The response to the final report and recommendations made by the *Blue Ribbon Commission on America's Nuclear Future*
- The initial basis for discussions among the Administration, Congress and other stakeholders

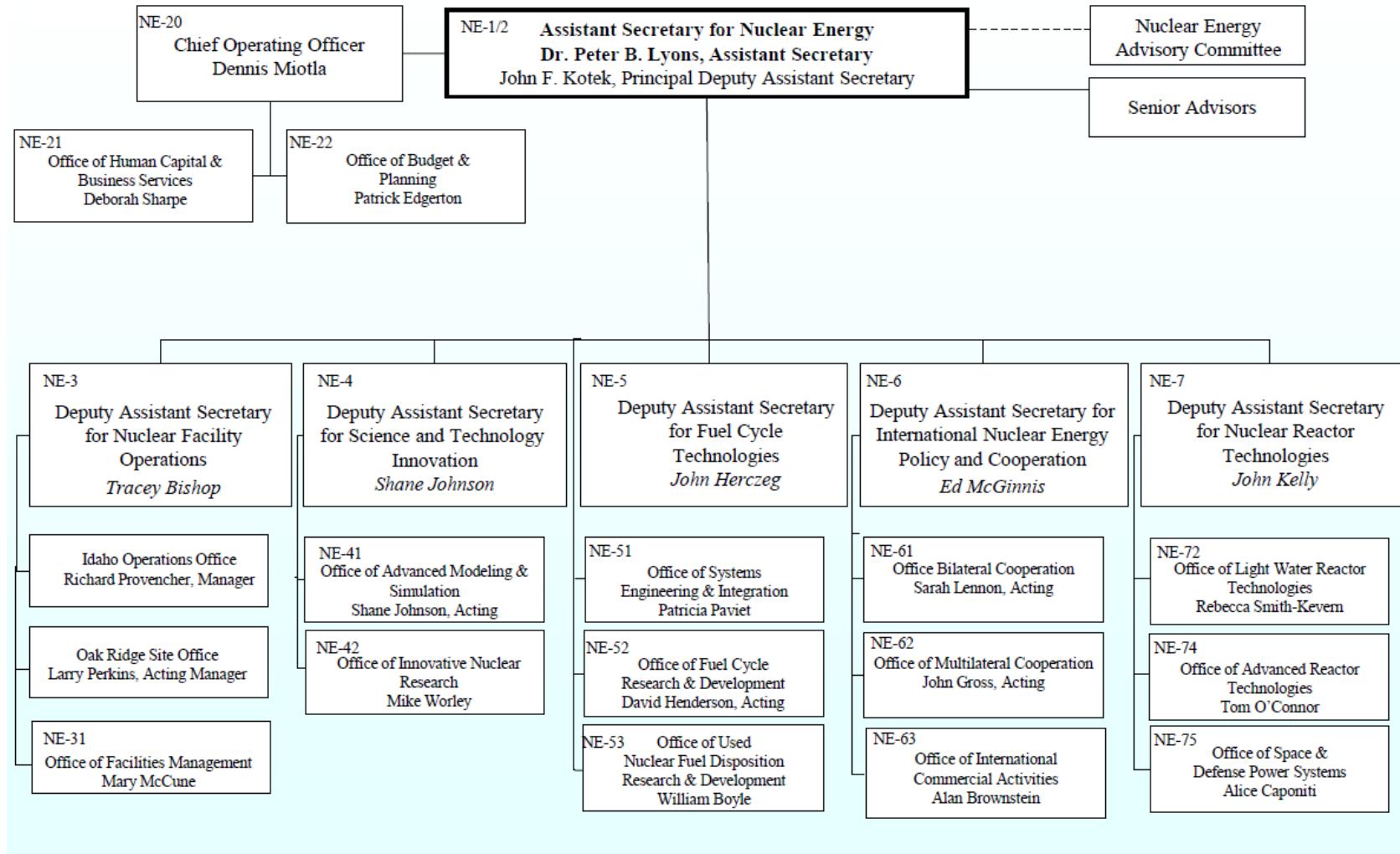
The Strategy outlines a 10-year program of work that:

- Sites, designs, licenses, constructs and begins operations of a pilot interim storage facility (operating 2021)
- Advances toward the siting and licensing of a larger interim storage facility (operating 2025)
- Makes demonstrable progress on the siting and characterization of repository sites (repository sited 2026, licensed 2042, operating 2048)



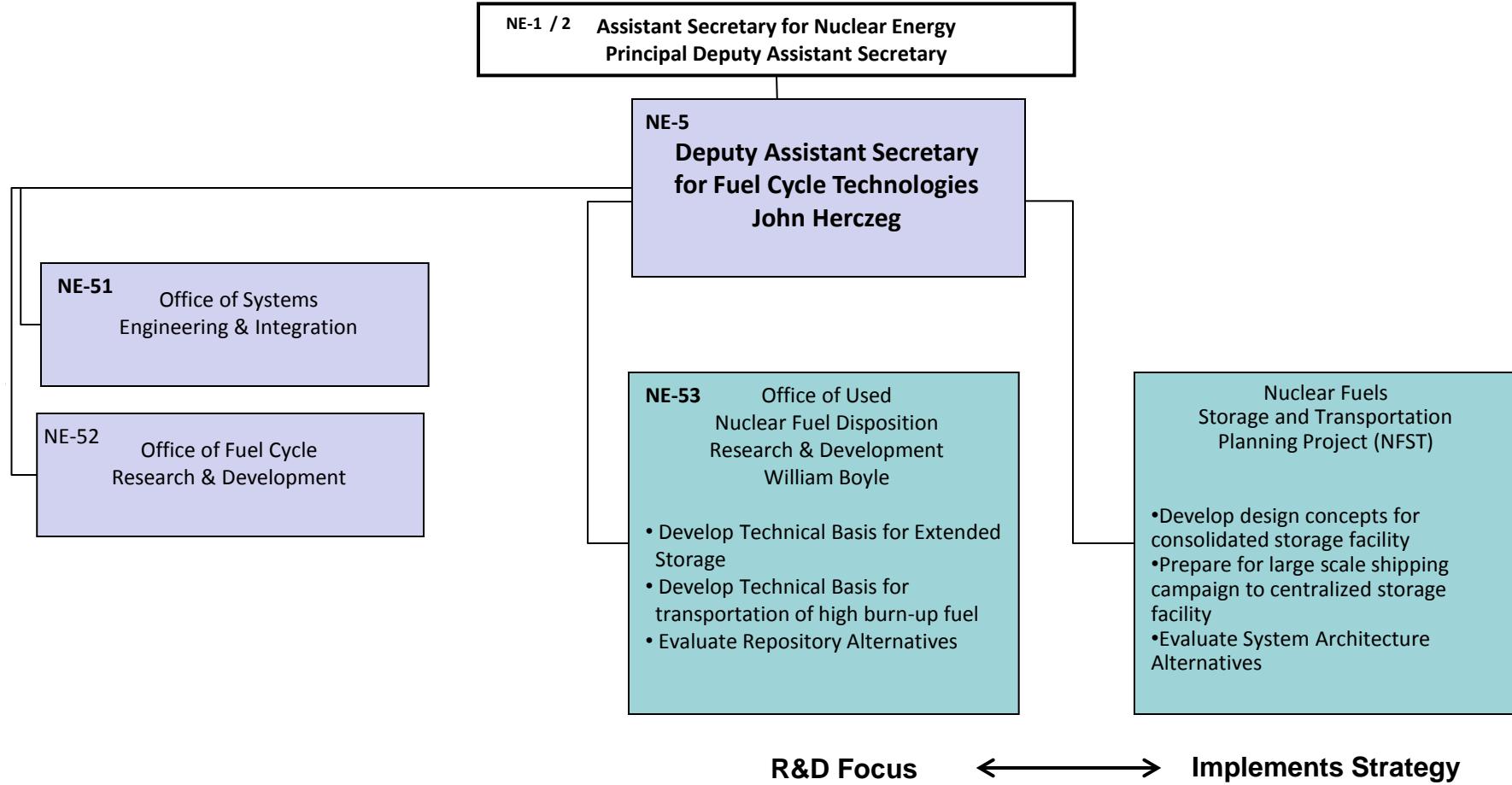


# DOE-NE Organization Chart





# DOE Office of Nuclear Energy Office of Fuel Cycle Technologies (NE-5)





# Used Fuel Disposition R&D Campaign Mission

*The DOE Office of Used Nuclear Fuel Disposition Research and Development and nine national laboratories participate in the DOE Office of Nuclear Energy's "Used Fuel Disposition Campaign"*

Campaign Mission: to identify alternatives and conduct scientific research and technology development to enable storage, transportation and disposal of used nuclear fuel and wastes generated by existing and future nuclear fuel cycles





## Campaign Strategic Focus: Storage and Transportation R&D

**Prepare for extended storage and eventual large-scale transport of used nuclear fuel (UNF) and high-level waste**

■ **Develop additional confidence in the technical basis for:**

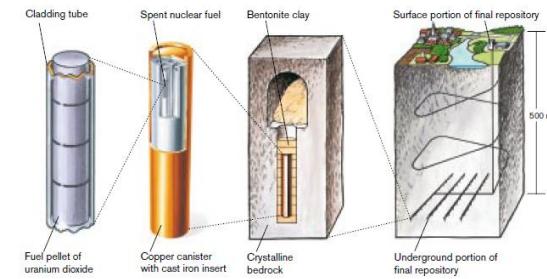
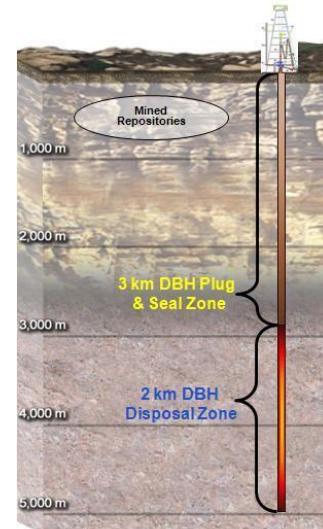
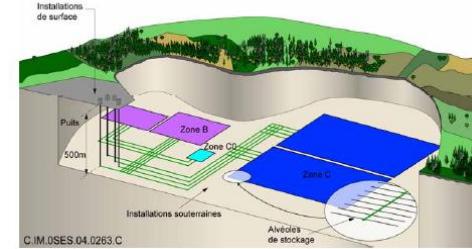
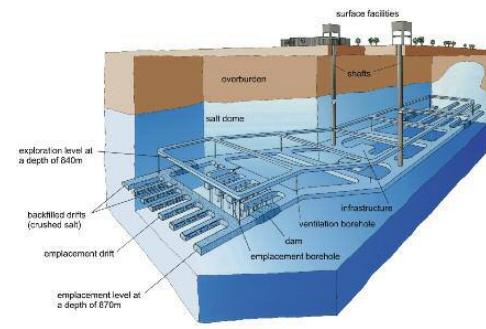
- Extended storage of used nuclear fuel
- Fuel retrievability and transportation after extended storage
- Transportation of high-burnup used nuclear fuel





# UFD Campaign Strategic Focus: Disposal R&D

- Provide a sound technical basis for multiple viable disposal options in the US
- Increase confidence in the robustness of generic disposal concepts
- Develop the science and engineering tools needed to support disposal concept implementation





# Used Fuel Disposition R&D Campaign External Collaborations

## ■ Industry

- DOE/Electric Power Research Institute (EPRI) Storage Demonstration Collaboration initiated FY13
- Participation in EPRI Extended Storage Collaboration Program (ESCP) (with NRC and international groups)

## ■ International Collaborations

- Participation in international Underground Research Laboratories in Europe and Korea and in multi-national disposal research activities
- Bilateral agreements on storage and disposal R&D with Korea, Japan, China
- MOU for salt disposal R&D with Germany
- IAEA working groups in storage and transportation
- Collaboration with Germany and Japan on extended performance of bolts and seals for bolted storage casks

## ■ DOE NE University Programs

- 20 UFD-relevant university grants awarded since 2010 (total value ~ \$14M)
- 3 UFD-relevant Integrated Research Projects in storage R&D since 2011 (total value ~\$11.5M)

## ■ Other university collaborations (MIT, U. of Oklahoma, UNLV, University of Sheffield UK)



## ■ Storage and Transportation R&D Activities

- Collaborate with industry in designing and fielding a full-scale high-burnup dry storage demonstration test
- R&D to support the storage demonstration test
- Develop data and models for performance of fuel, cladding, canister, and canister internals in storage and transportation environments

## ■ Disposal R&D Activities

- Assess feasibility of direct geologic disposal of existing dry storage canisters
- Conduct analyses and experiments to evaluate disposal options in crystalline, clay/shale, and salt host rocks, including continuation of international collaborations
- Develop technical basis for deep borehole disposal concepts
- Initiate a field test to examine viability of deep borehole disposal of HLW

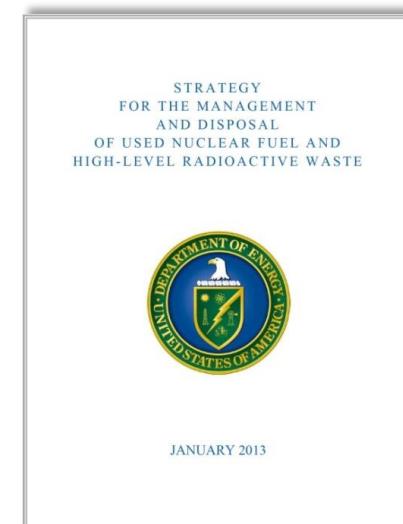
See DOE FY2016 Congressional Budget Request vol. 3, p. 452-455, available at  
<http://www.energy.gov/cfo/downloads/fy-2016-budget-justification>



## Long-Term UFD R&D Campaign Objectives

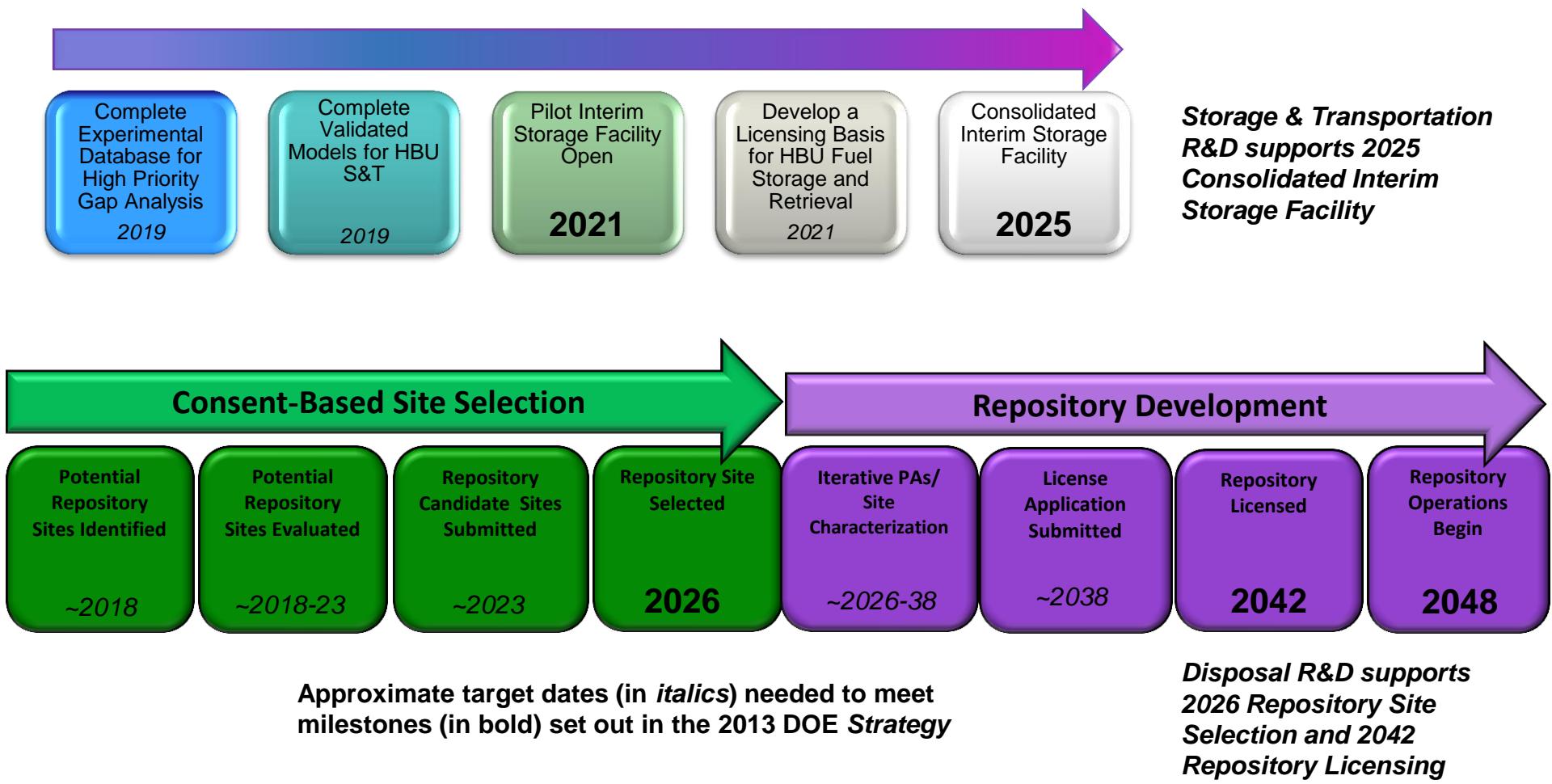
- Support the implementation of a full-scale NRC-licensed confirmatory storage demonstration facility, in collaboration with industry
- Develop the technical basis necessary to support eventual transportation of used nuclear fuel, including high-burnup fuel
- Collaborate with the Nuclear Fuel Storage and Transportation Planning Project to implement integrated storage, transportation, and disposal concepts

**Support the Administration's 2013  
*Strategy for the Management and  
Disposal of Used Nuclear Fuel and  
High-Level Radioactive Waste***





# R&D Path to Support DOE Waste Management Strategy





U.S. DEPARTMENT OF  
**ENERGY**

Nuclear Energy

# Questions?

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