Nuclear Energy Overview

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Oregon House Interim Committee on Climate, Energy and Environment
December 10 , 2024

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Gateway for Accelerated Innovation in Nuclear

INL/MIS-18-50189

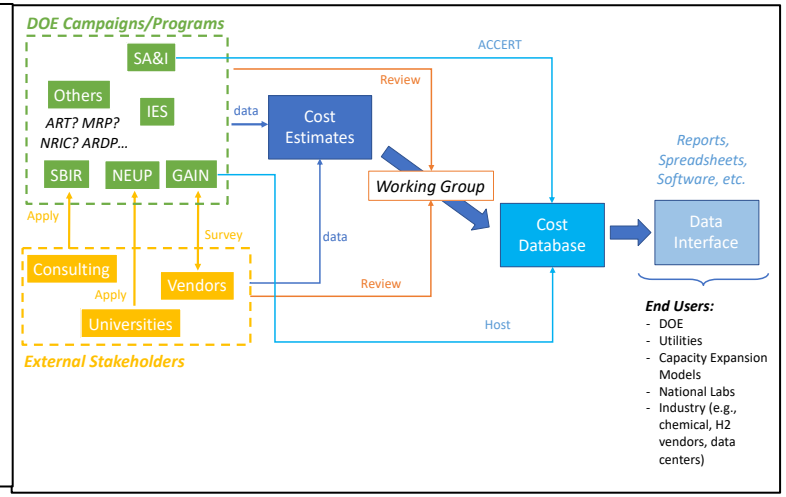
2024 Activities

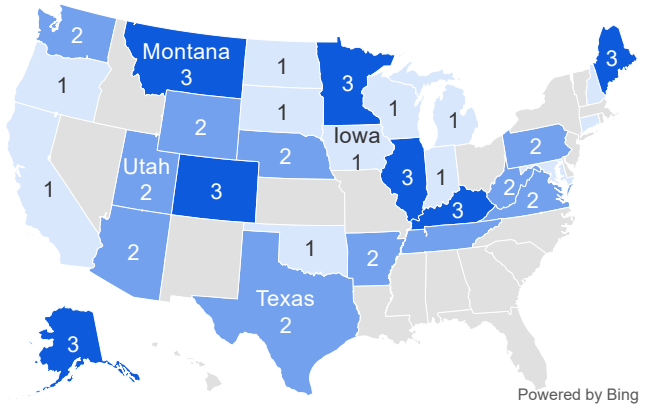
GAIN Gateway for Accelerated Innovation in Nuclear

Advanced Reactor Cost

Project will update latest costs combining two approaches

- Use existing public nuclear cost data to develop advanced reactor cost ranges.
- Work with developers and utilities under NDA to collect cost projections to develop an anonymous advanced reactor cost ranges.





State Level Outreach

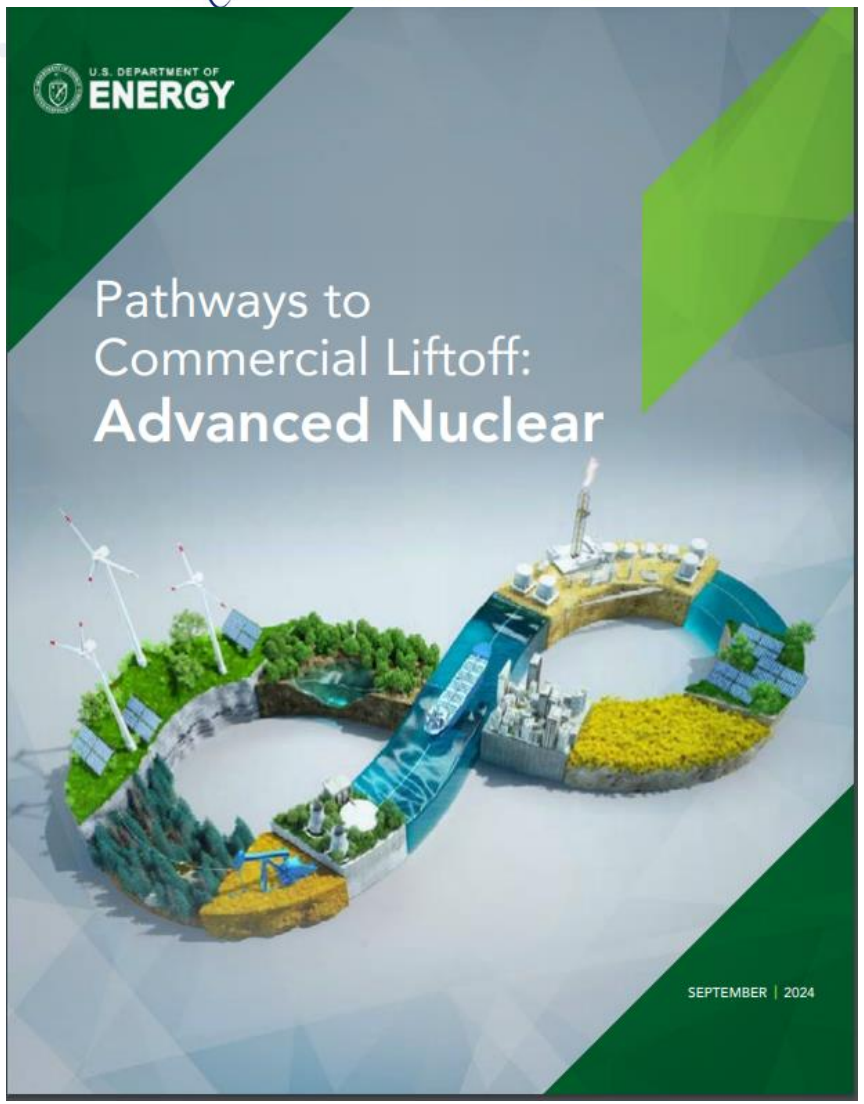
- Policymakers, NGOs, Utilities, Regulators, Industrials, Commissioners
- Introduce Advanced Nuclear through direct conversation or testimony
- Help connect states to financial or technical resources across DOE complex
- Looking at state level regs

Reaching U.S. net-zero goals, we need new nuclear capacity

"Power system decarbonization modeling, regardless of level of renewables deployment, suggests that the U.S. will need ~700-900 GW of additional clean, firm capacity to reach net-zero."

***Domestic nuclear capacity has the* potential to scale from ~100 GW in 2023 to ~300 GW by 2050**

- ***Preservation of existing fleet 100 GW***
  - *Large light water reactors (generally ~1000 MW) are essential for bulk electricity production.*
- ***200 GWs from new nuclear***
  - *Small modular reactors (SMRs) are generally considered ~50 to ~350 MW.*
  - *Microreactors are generally <50 MW.*



https://liftoff.energy.gov/wp-content/uploads/2024/09/LIFTOFF_DOE_AdvNuclear-vX6.pdf

State Nuclear Energy Feasibility Studies

Completed Working Groups

- Nebraska
- South Dakota

Completed Studies

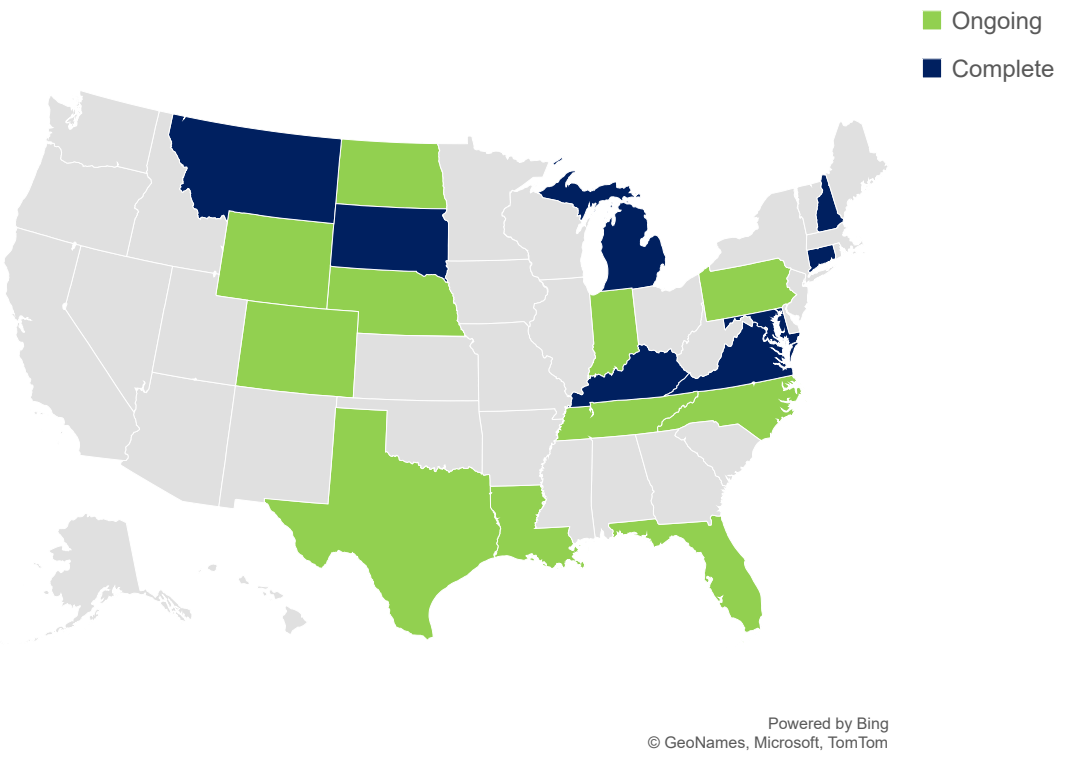
- Connecticut
- Kentucky
- Maryland
- Michigan
- New Hampshire
- Pennsylvania
- Virginia
- Montana

Ongoing Working Groups

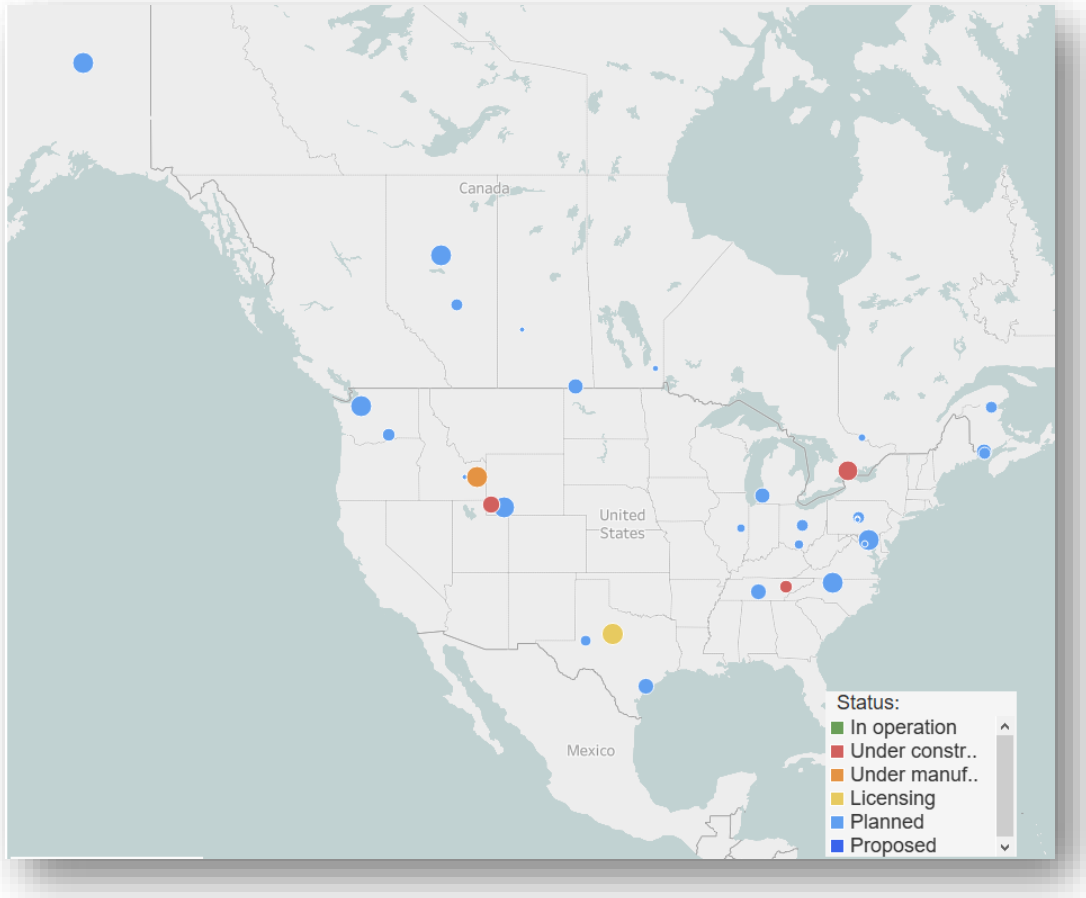
- North Dakota
- Tennessee
- Texas
- Virginia

Ongoing Studies

- Colorado
- Florida
- Indiana
- Nebraska
- North Carolina
- Tennessee
- Texas



Advanced Nuclear in North America



- 34 active projects that includes a mix of reactor demonstrations, commercial demonstrations, and commercial reactors
- 12 deployment dates prior to 2030
- Variety of agreements, 7 are firm contracts

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MICROREACTORS

4	HIGH TEMPERATURE GAS REACTOR
3	SODIUM FAST REACTOR
2	MOLTEN SALT REACTOR
3	SOLID CORE HEAT PIPE
2	TBD

18
SMALL MODULAR REACTORS

4	HIGH TEMPERATURE GAS REACTOR
3	SODIUM FAST REACTOR
3	MOLTEN SALT FAST REACTOR
7	LIGHT WATER REACTOR
1	FLUORIDE SALT-COOLED HIGH-TEMPERATURE REACTOR

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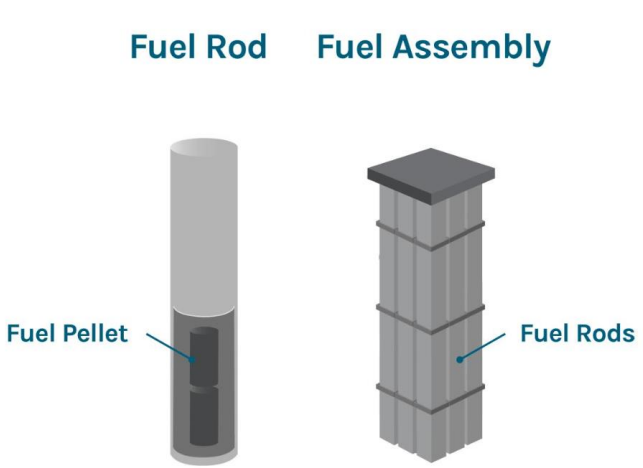
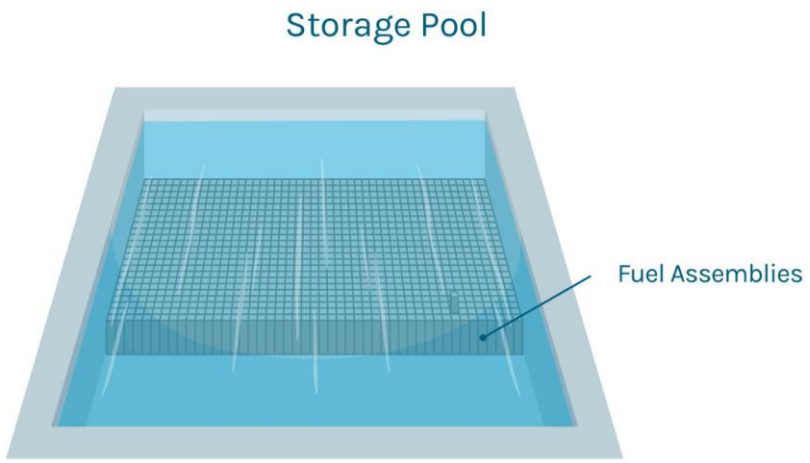
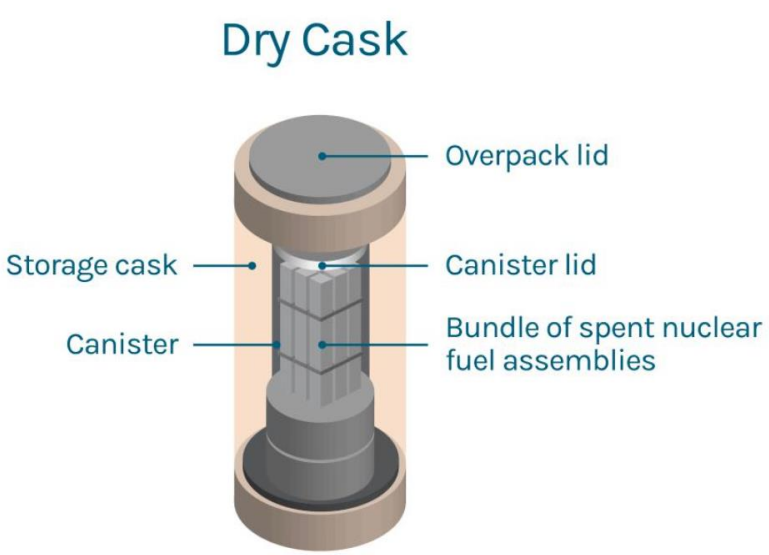






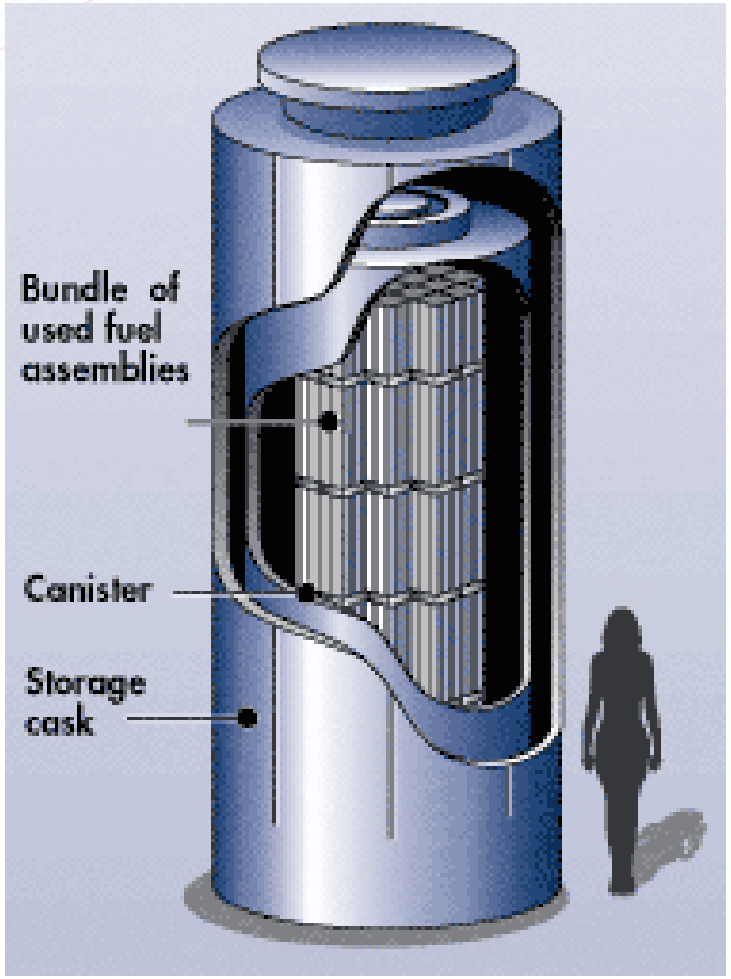
- Small ceramic uranium pellets are stacked inside metal tubes, called fuel rods.
- Fuel rods are bundled together into fuel assemblies that are placed inside the nuclear reactor.

- Assemblies are moved underwater from the reactor to a storage pool located inside or next to reactor building
- The water in the pool shields workers from radiation emitted from the spent nuclear fuel while the fuel cools

- Five years or more later, spent nuclear fuel assemblies are transferred from the pool to dry storage casks
- The casks are designed and certified to provide radiation shielding

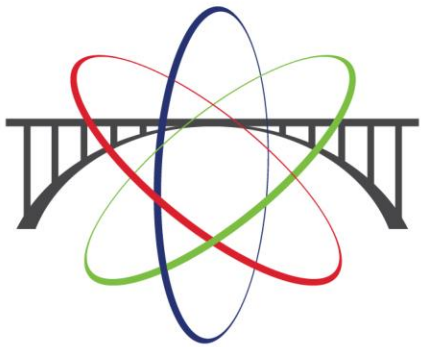
Source: Consent-Based Siting for Consolidated Interim Storage Story Map

On-Site Storage of Used Fuel



Source: https://www.nrc.gov/waste/spent-fuel-storage/diagram-typical-dry-cask-system.html

The 57 used fuel casks hold all the fuel from 49 years of the DC Cook Plant in Michigan operations. Both units at DC Cook are still operating.



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