

Office of Nuclear Energy

Dr. Thomas H. Fanning Senior Advisor Office of Nuclear Energy



Mission Pillars

- Advance nuclear power to meet the nation's energy, environmental, and national security needs.
- Resolve technical, cost, safety, security and regulatory issues through research, development and demonstration.





Nuclear Beyond Electricity – Advanced Reactors







Baseload Electricity Generation

Electricity



Hydrogen **Production**

Infrastructure Investment and **Jobs Act (IIJA)**

Became public law on 11/15/2021

Key Nuclear Provisions

Civil Nuclear Credit Program

 \$6 billion for the DOE to establish a Civil Nuclear Credit Program to provide funding for plants that might be forced to close without such support.

Hydrogen Hubs

- \$8 billion to establish at least four regional clean hydrogen hubs.
- The law explicitly requires that at least one of these hubs must demonstrate the use of nuclear energy to produce clean hydrogen.

Support for Advanced Reactors

- Nearly \$2.5 billion to fund the demonstration of advanced reactor technologies.
- This is a notable change from most other DOE cost-sharing arrangements in which the department will make selections, but funds must subsequently be provided through Congressional appropriations each year. The prepaying of the DOE's share removes a key uncertainty in project development.



Inflation **Reduction Act** (IRA)

Became public law on 8/16/2022

Key Nuclear Provisions

- Nuclear PTC for Operating Plants up to \$15 per megawatt-hour for electricity produced by existing nuclear plants (assuming labor/wage requirements are met)
- PTC for Clean Energy Electricity technology neutral tax credit for clean energy technologies (Advanced Nuclear Production Tax Credit can't) be claimed under both programs)
- Investment Tax Credit for Clean Energy Electricity credit of 30% of investment in new zero-carbon electricity facilities, including nuclear plants
- \$40B in loan guarantee expansion for DOE's Loan Programs Office and \$3.6B for credit subsidy cost, available to all technologies including nuclear
- Clean Hydrogen Credit
- \$700M for R&D and production of HALEU





ADVANCED NUCLEAR TECHNOLOGY

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Nuclear Data Needs

- Data needs are driven by the materials and flux spectrum comprising the advanced reactor and fuel technologies
- Materials include
 - Different coolants (sodium, molten chloride or fluoride salts, lead)
 - Moderators (graphite)
 - Reflectors
 - Control material
 - Fuels and cladding (UZr, UN, SiC, stainless steel, etc.)





Nuclear Data Needs

Reactor Coolants

		Water		Liquid Metal		Molten Salt		Gas	
Fuel Form	Spectrum:	Fast	Thermal	Fast	Thermal	Fast	Thermal	Fast	Thermal
	Ceramic								
	Metallic								
	Molten Salt								
	TRISO								



Nuclear Data Priorities

- Data priority must be driven by the requirements to accurately predict reactor behavior during steady-state and transient operation as well as postulated accident scenarios
 - Uncertainty quantification in the context of risk important to NRC licensing
 - Depends highly on the quality of covariance data for uncertainty propagation
- Need to prioritize isotope data of significance as relates to the prediction of key parameters of interest
 - Core reactivity
 - Decay heat
 - Power distribution
 - Feedback response due to material changes during anticipated and postulate transients
 - Source term for offsite dose



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