U.S. DEPARTMENT OF ENERGY | Office of NUCLEAR ENERGY

Office of Nuclear Energy

David Henderson

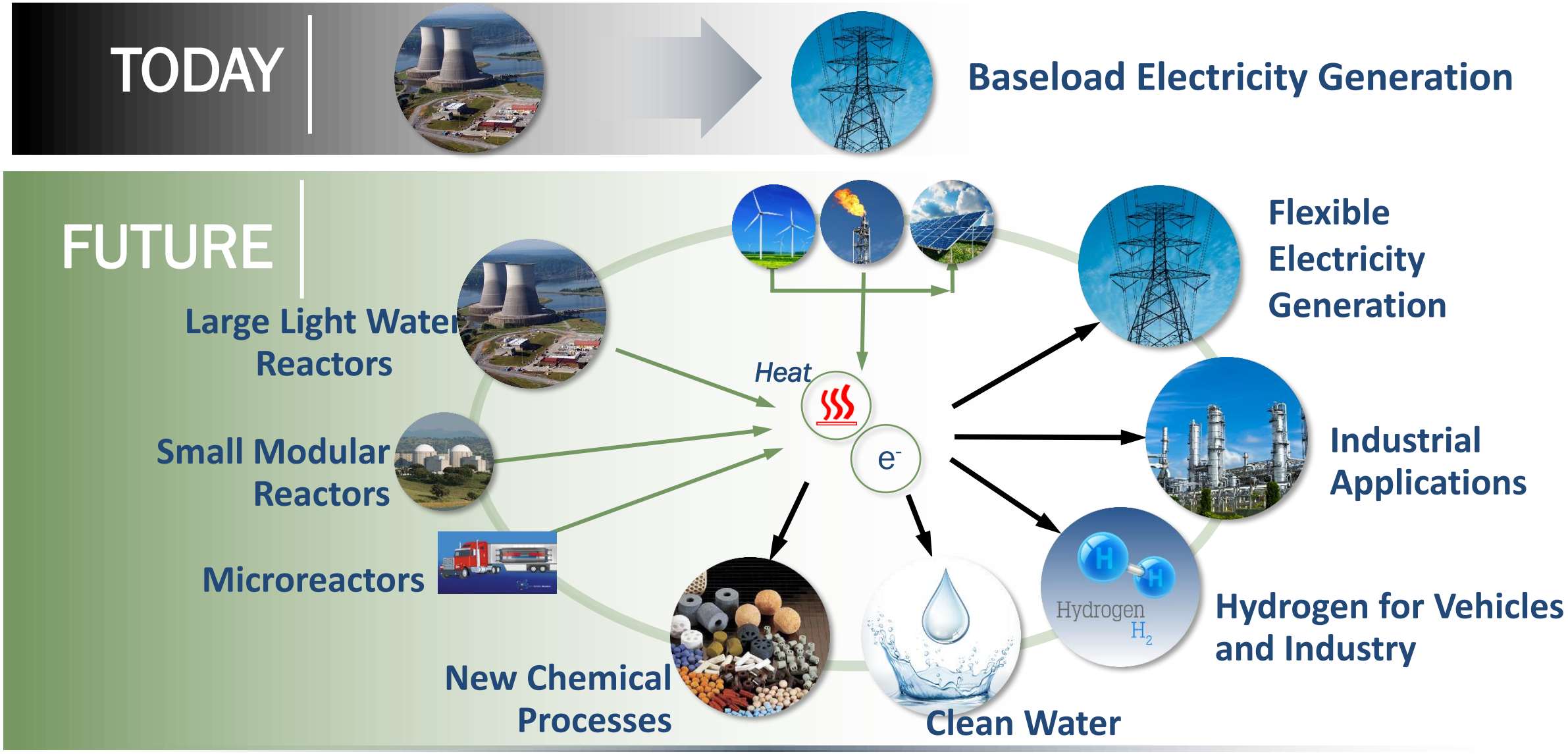
Program Manager, Advanced Modeling & Simulation

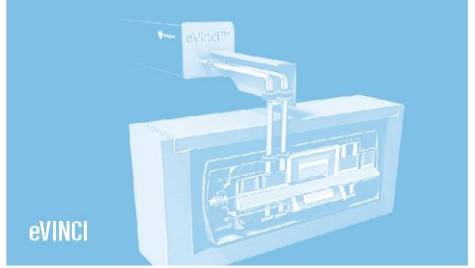
Office Nuclear Energy Technologies (NE-51)

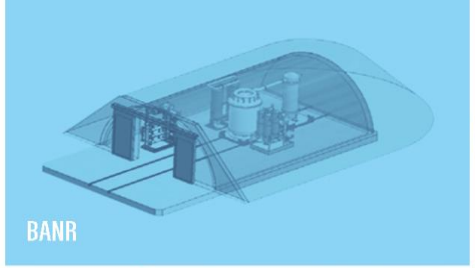
- In the United States, we are committed to getting to:
  - 100 percent clean energy on our transmission grid by 2035, and
  - net-zero carbon emissions by 2050.

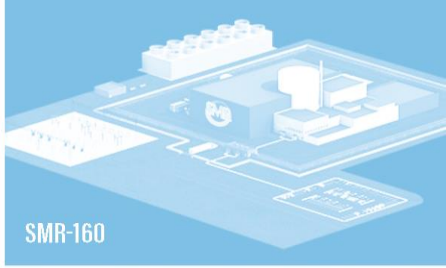
- Investments in clean energy technologies will ensure the U.S. is the global leader in research, development, and deployment of critical energy technologies to combat the climate crisis, create good-paying union jobs, and strengthen our communities in all pockets of America.

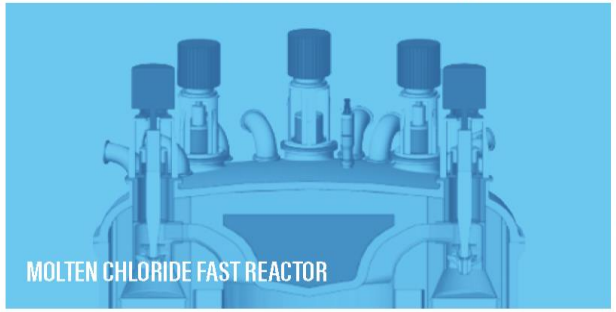
Advanced Reactors: Integrated Grid for Net-zero Future

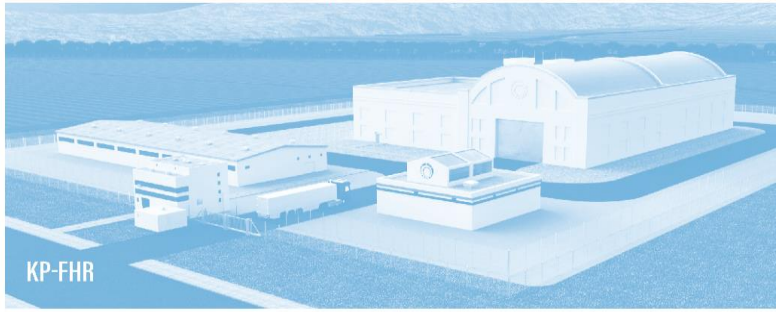












ADVANCED NUCLEAR TECHNOLOGY

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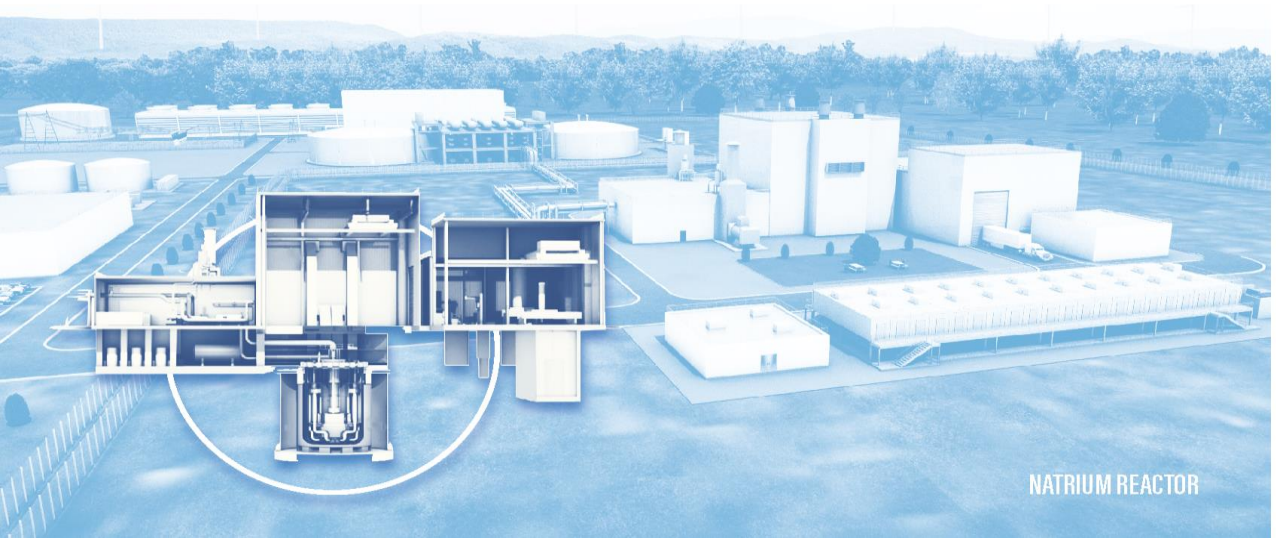

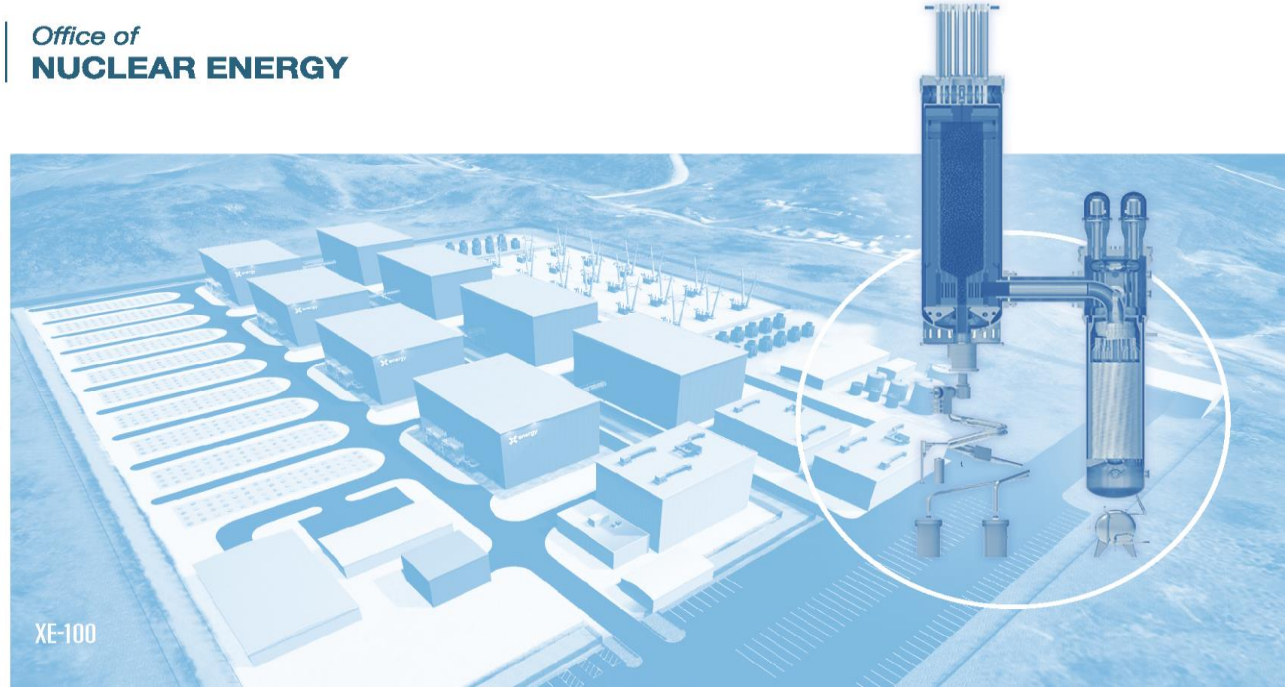

Nuclear Data Needs

- Driven by the anticipated materials and reactor flux spectrum comprising advanced nuclear reactor and fuels technologies
- Materials includes:
  - Coolants (e.g. FLiBe, molten chloride salts)
  - Moderators (e.g. graphite)
  - Control materials
  - Advanced fuels and clad (e.g. UN, SiC, etc.)

		Reactor Coolants							
		Water		Liquid Metal		Molten Salt		Gas	
	Spectrum →	Fast	Thermal	Fast	Thermal	Fast	Thermal	Fast	Thermal
Fuel Form	Ceramic								
	Metallic								
	Molten Salt								
	TRISO								

*Chart not necessarily an exhaustive list

Nuclear Data Needs Priority

- Data needs priority should 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

- Priorities needs to be based on:
  - Identification of isotope data of significance as relates to the prediction of key parameters of interest
  - Parameters of interest include (to name a few):
    - Core reactivity
    - Decay heat
    - Power distribution
    - Feedback response due to material changes during anticipated and postulate transients
    - Source term for offsite dose

- For priority nuclear data, efforts need to generally focus on:
  - Missing data and “unphysical” artifacts in evaluations
  - Missing covariance data
  - Large covariance data

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