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

Development and Deployment of Innovative Advanced Reactors

Alison Hahn

Director for Nuclear Reactor Deployment

Office of Nuclear Energy

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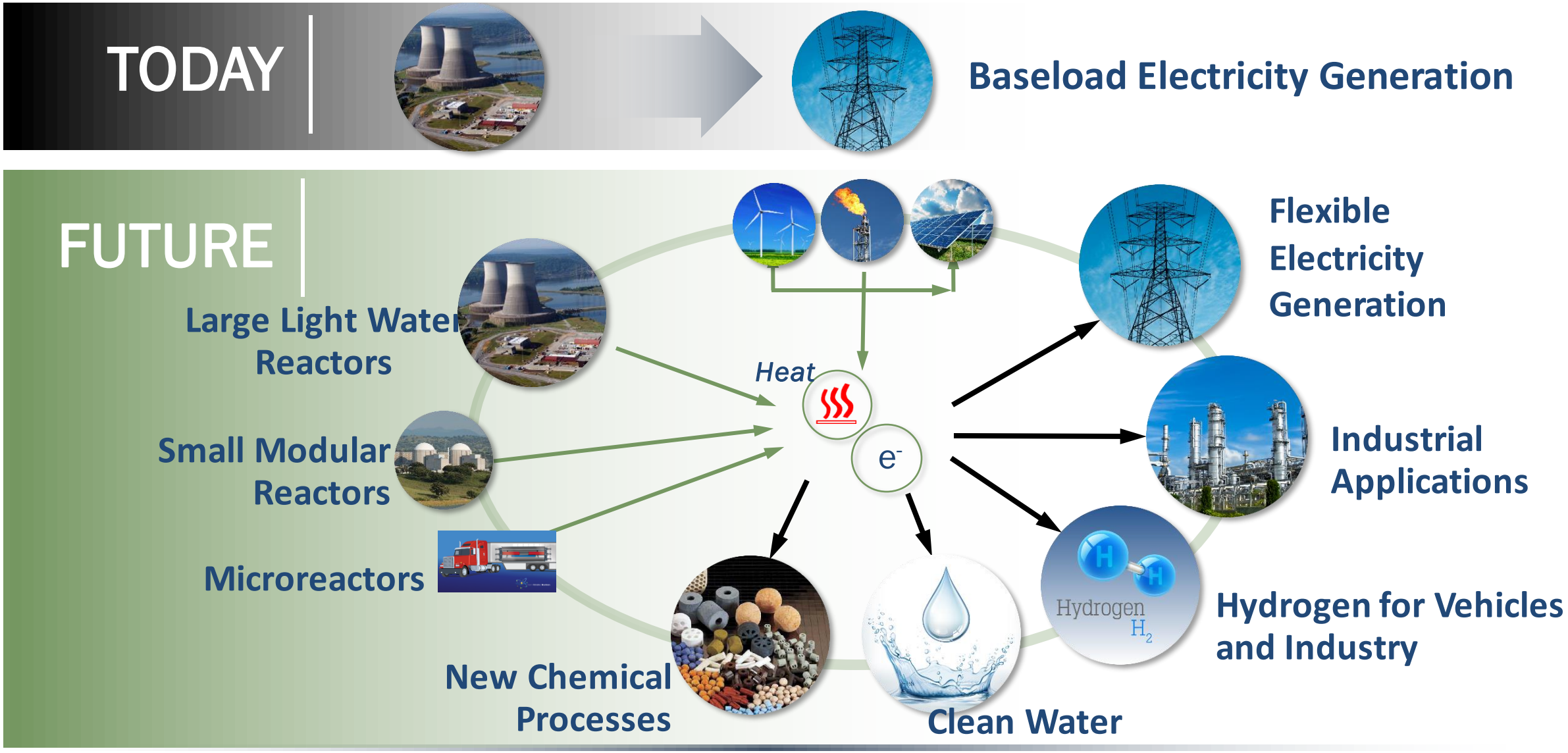
- In the United States, we are committed to:
  - 100 percent clean energy on our transmission grid by 2035
  - Net-zero carbon emissions by 2050

- Investments in clean energy technologies are essential to combat the climate crisis, create good-paying union jobs, and strengthen our communities.

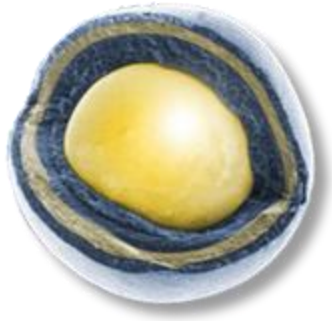
Advanced Reactors: Integrated Grid for Net-Zero Future



Advanced Reactor Technologies (ART) Program

Mission: Support the development and commercialization of innovative concepts including microreactor, fast reactor, molten salt reactor (MSR), and high temperature gas-cooled reactor (HTGR) technologies through national laboratory-led R&D, university research programs, and cost-shared private-public industry partnerships.

- **Fast Reactor Technologies**
  - Demonstrate feasibility of advanced systems and component technologies
  - Methods and code validation to support design and licensing
- **Gas Reactor Technologies**
  - Advanced alloy qualification
  - Scaled integral experiments to support design and licensing
  - TRISO fuel and graphite qualification
- **MSR Technologies**
  - Investigate fundamental salt properties
  - Materials, models, fuels and technologies for salt-cooled and salt-fueled reactors
- **Microreactors**
  - Non-nuclear and nuclear integrated system testing supporting commercial demonstrations and end-user applications
  - Maturation of innovative components and semi-autonomous operating regimes

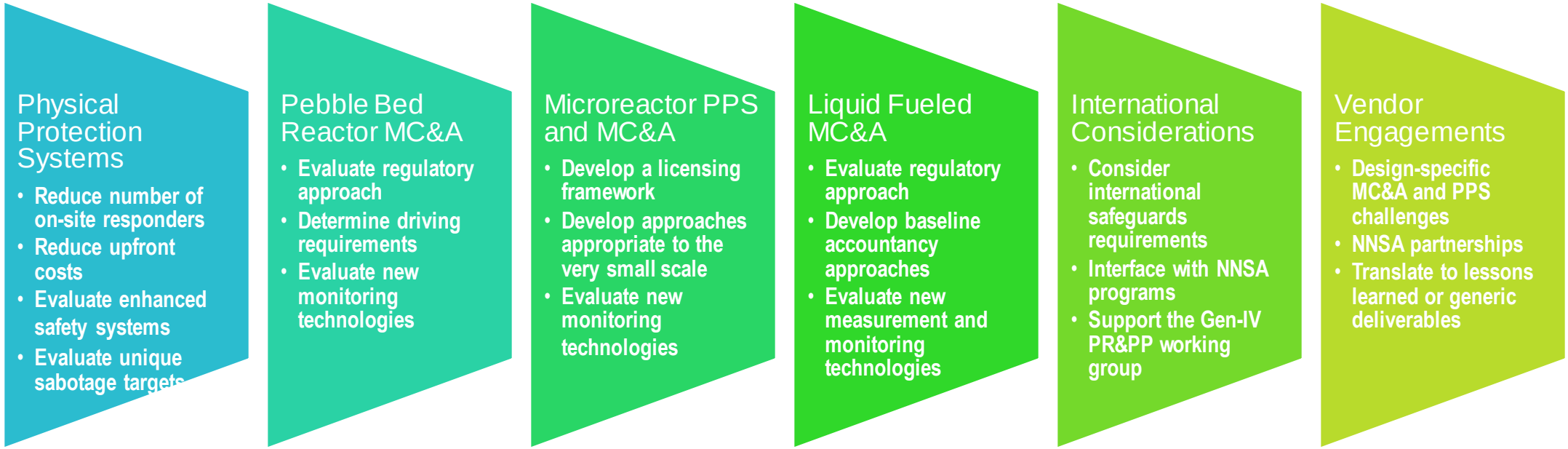


METL Facility, Argonne National Laboratory

Security and Safeguards R&D

Advanced Reactor Safeguards: Address near-term challenges advanced reactor vendors face in meeting U.S. domestic Material Control and Accounting (MC&A) and Physical Protection System (PPS) requirements.

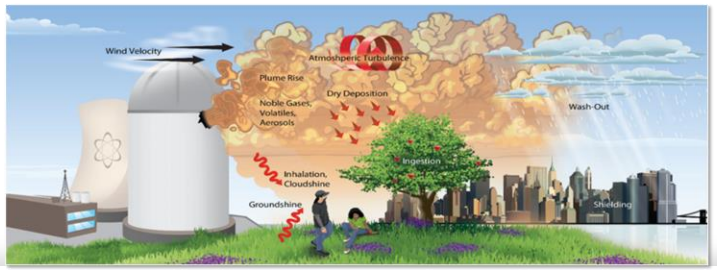
Crosscutting Technology Development (CTD) Cybersecurity: Develop technologies and methods to address cyber threats to the U.S. nuclear power infrastructure, in coordination with the Department's Cybersecurity, Energy Security, and Emergency Response office, and support secure implementation of advanced technologies such as wireless control and remote or autonomous operations

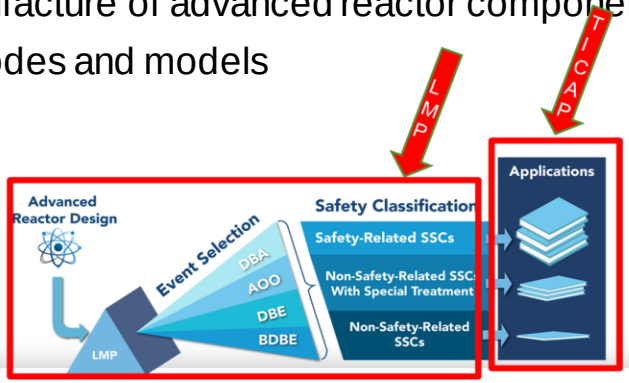


Advanced Reactor Regulatory Development

Mission: Coordinate with the Nuclear Regulatory Commission (NRC) and industry to address and resolve key regulatory framework issues that directly impact the "critical path" to advanced reactor demonstration and deployment.

- **DOE NE cost-share support of industry-led initiatives to adapt and establish a regulatory framework for advanced reactors**
  - Technology-Inclusive Content of Applications Project (TICAP) is a risk-informed, performance-based (RIPB) approach to right-size information in a license application to increase efficiency of generating and reviewing an application
  - Builds on NRC-endorsed Licensing Modernization Project systematic risk-informed process
  - Opportunity for early movers to demonstrate implementation of risk-informed, performance-based approach
- **NE R&D activities directly reduce technical and regulatory risks by providing bases for establishment of licensing technical requirements**
  - Establish technical insights and tools regarding radionuclide transport and release from advanced reactors, including fast reactors, gas-cooled reactors, and molten salt reactors
  - Supporting NRC endorsement of codes and standards important for the manufacture of advanced reactor components
  - Validation and access to priority material property data to be used in safety codes and models





Gateway for Accelerated Innovation in Nuclear (GAIN)

GAIN Gateway for Accelerated Innovation in Nuclear

- Simplify private industry's access to the assets of the DOE complex:
  - expertise
  - historical data
  - facilities
- Funding opportunities to accelerate deployment

@GAINnuclear

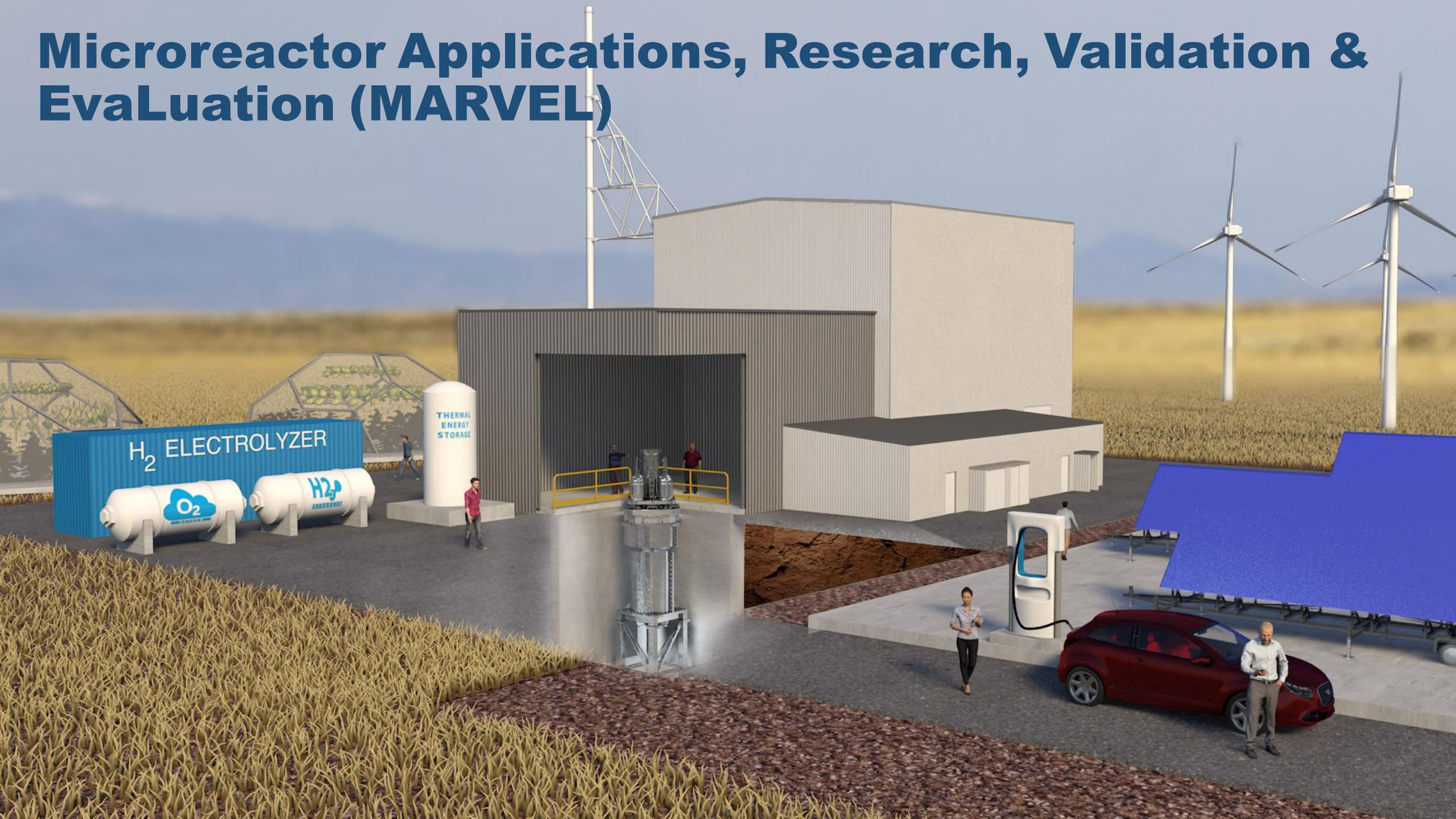
gain.inl.gov

National Reactor Innovation Center (NRIC)

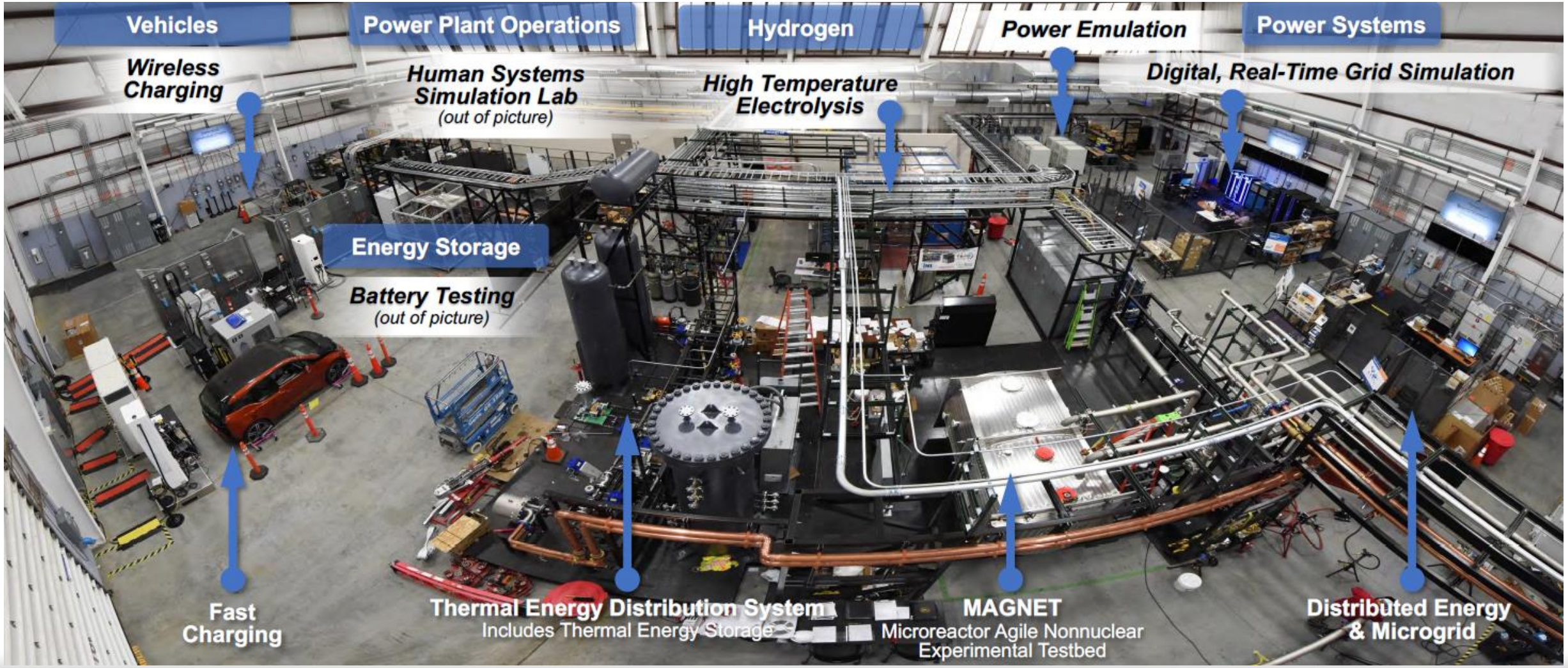
- Demonstration siting support
- Demonstration test beds
- Experimental infrastructure
- Advanced Construction Technology Initiative

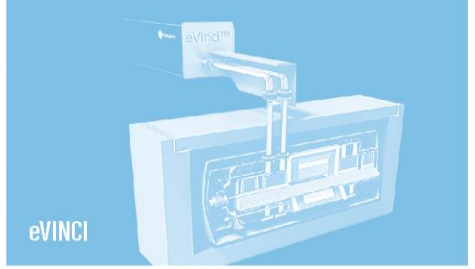
Visit https://nric.inl.gov

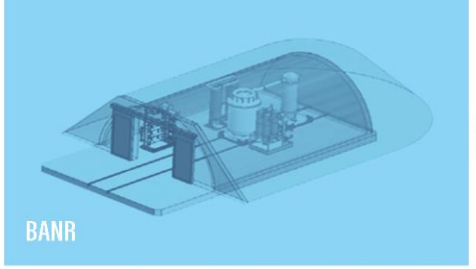
Microreactor Applications, Research, Validation & EvaLuation (MARVEL)

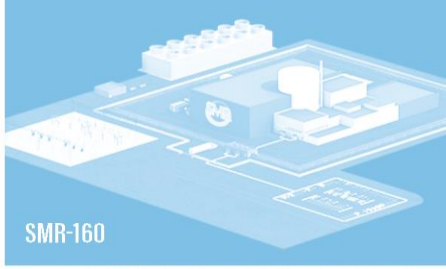


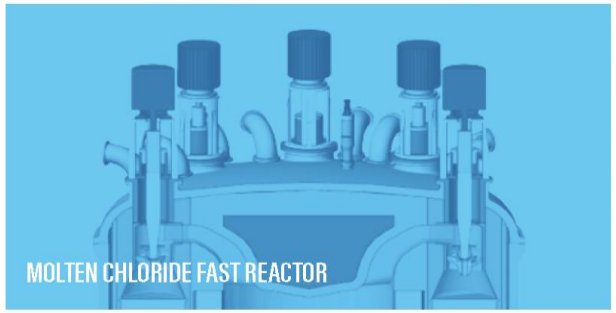
Dynamic Energy Transport and Integration Laboratory (DETAIL)

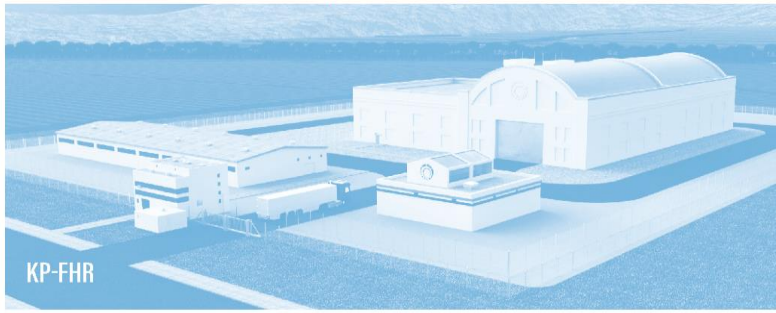












ADVANCED NUCLEAR TECHNOLOGY

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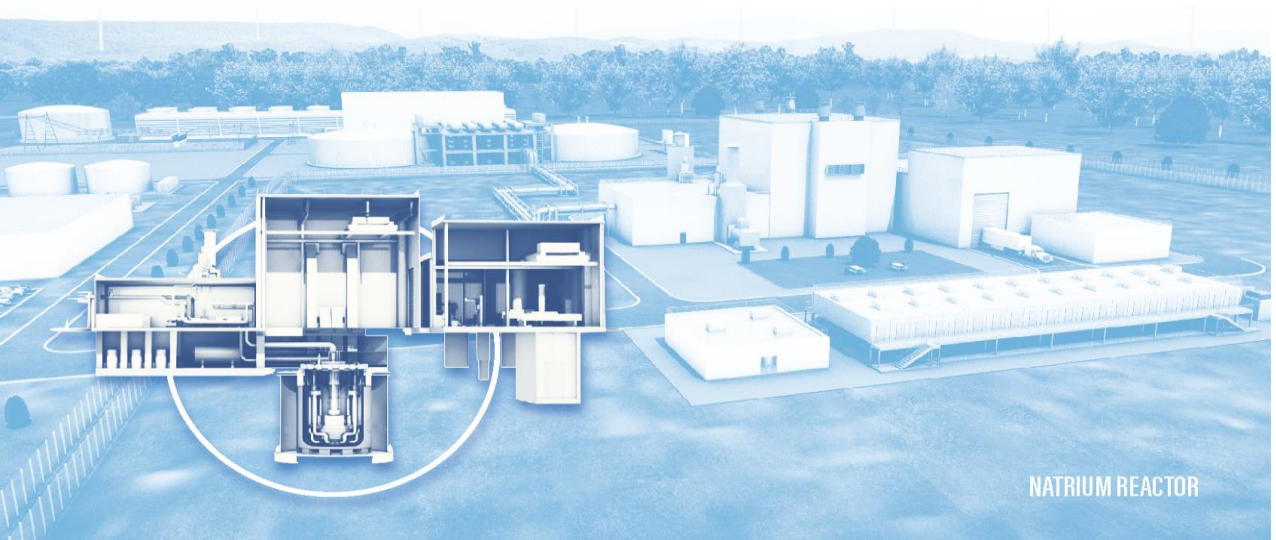

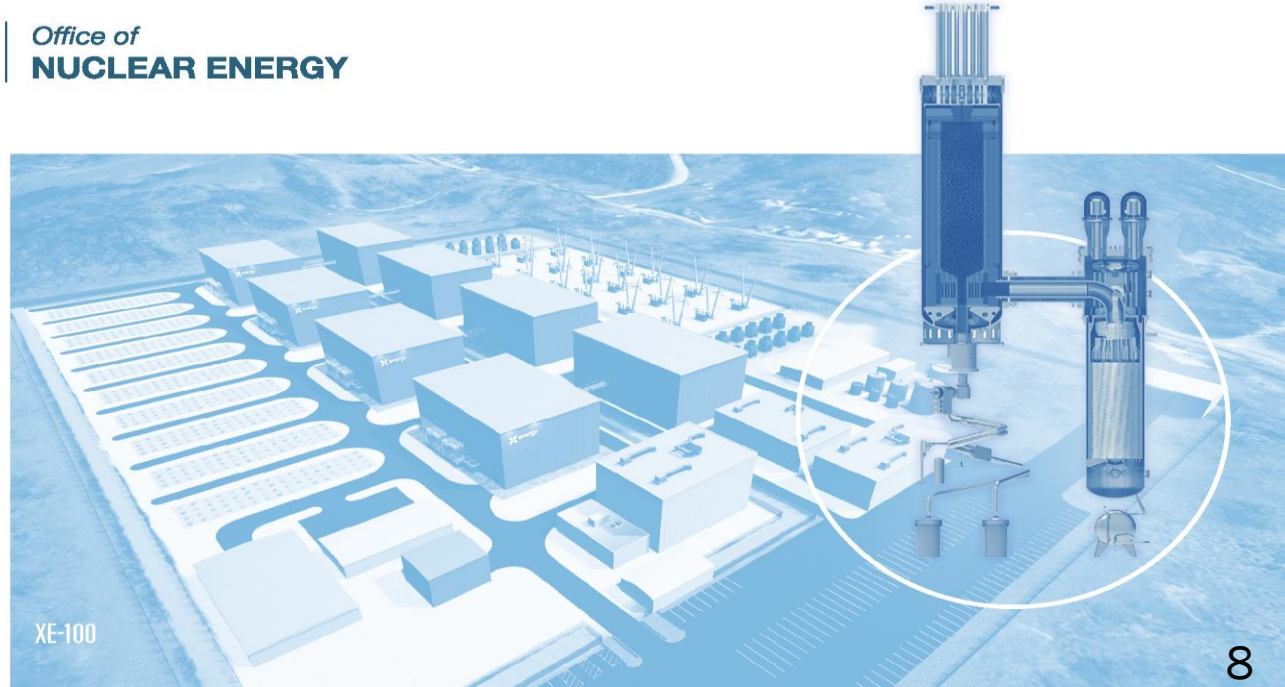

Conclusion

- Advanced reactors are crucial for achieving national and global carbon reduction goals
- The U.S. will continue to perform foundational R&D on advanced reactor and fuel cycle technologies to improve nuclear energy safety and performance
- We are linking nuclear developers with the expertise and capabilities of our National Laboratories
- Private-public partnerships are bringing first-of-a-kind demonstrations to the grid within this decade

Thank you!

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