



NRIC

National
Reactor
Innovation
Center

Advanced Reactor Technology Demonstration with NRIC

JAEA Fourth Symposium on US-Japan Nuclear
Energy Research Cooperation

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inspire

empower

deliver



NRIC

5-Year Program Objectives

Enable demonstration of at least 2 advanced reactors

- Make available infrastructure, sites, materials, expertise
- Provide regulatory support
- Best practices in public engagement

Prepare DOE/labs for continuing innovation and demonstration

- Develop best practices for planning/construction/demonstration of nuclear projects
- Develop enduring infrastructure and expertise
- Establish methods for efficient coordination among laboratories

3-year High-Level Milestones

Establish resource team structure and inter-lab cooperation modes

Complete preparation of demonstration test bed facilities

Demonstration of MARVEL with private sector partners

Prepare potential demonstration sites

Demonstrate advanced construction technology in cost-shared partnership

NRIC and GAIN are Complementary and Coordinated Efforts to Support the Nuclear Energy Industry



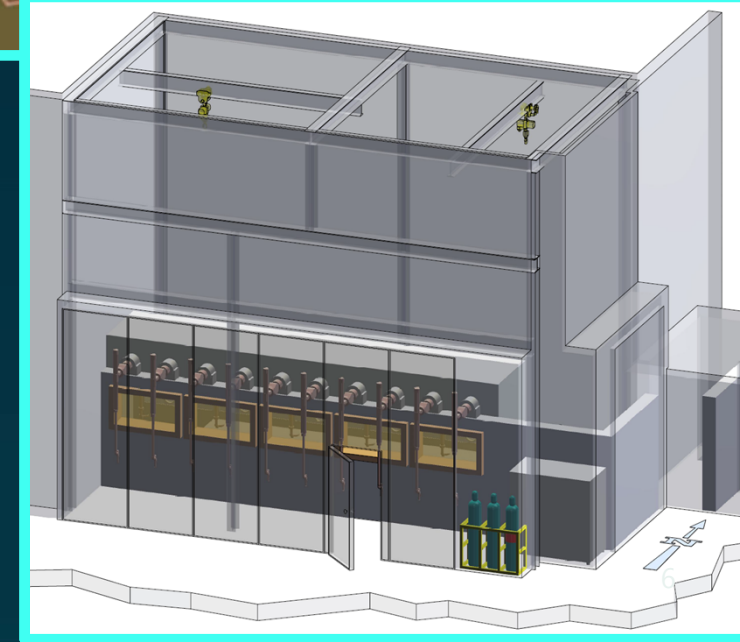
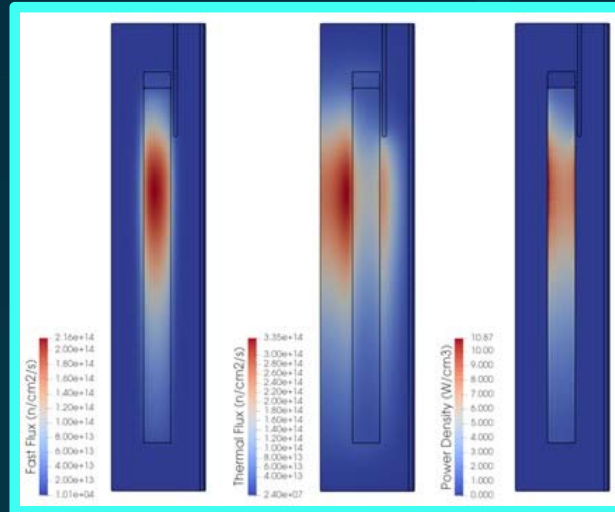
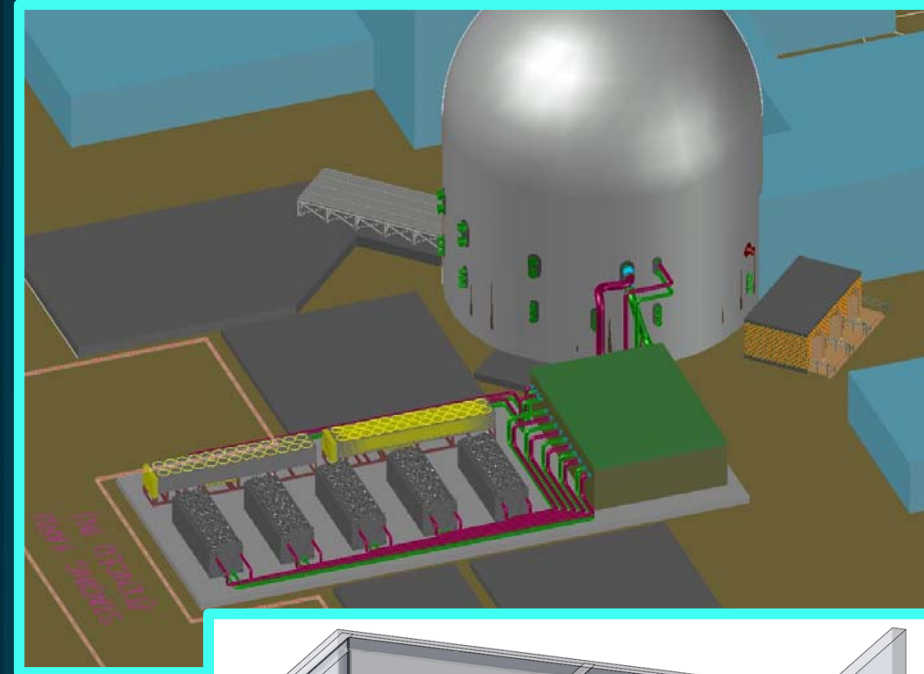
- Established in 2015 as a resource for accelerated development of nuclear innovations with lab partners
 - Comprehensive resource to entire nuclear innovation ecosystem at all development stages
 - Provides streamlined access to testing, MASL, experimental facilities, lab expertise, and legacy data
 - Regulatory expertise (e.g. NRC advanced reactor licensing strategy support)
 - Financial support



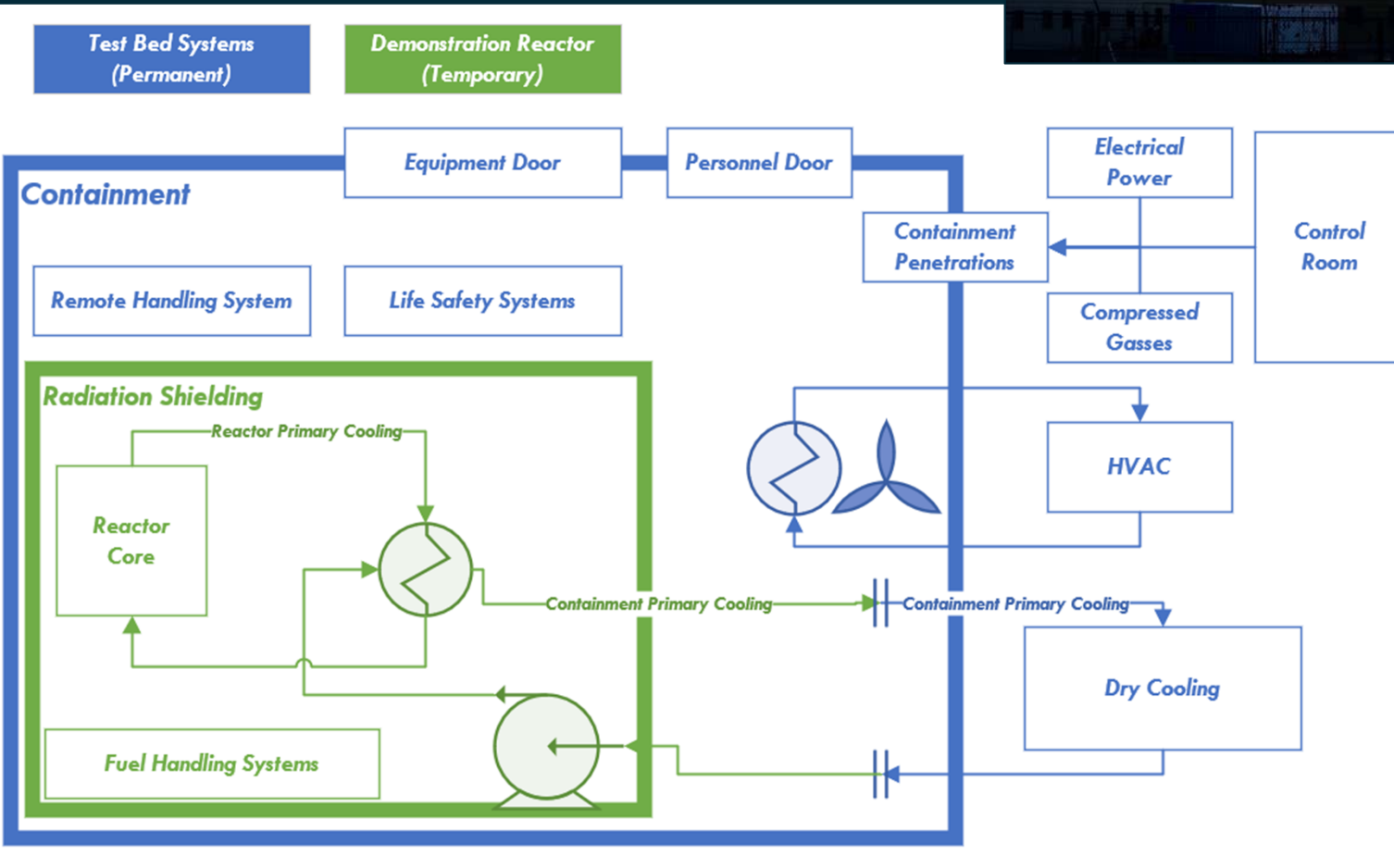
- Provides a capability for building and demonstrating reactor concepts
 - Focused program to enable innovators nearing demonstration stage
 - Provides access to sites, required upgrades, site services, fuel material/fabrication facilities, and demonstration process support
 - Provides regulatory assistance related to demonstration
 - Facilitates NRC observation/learning

Empowering Innovators

- Private Sector Driven Effort
- NRIC Resource Team
- Virtual Test Bed
- Demonstration Resource Network
 - Experimental facilities
 - Fuel facilities
 - Test beds
 - Demonstration sites



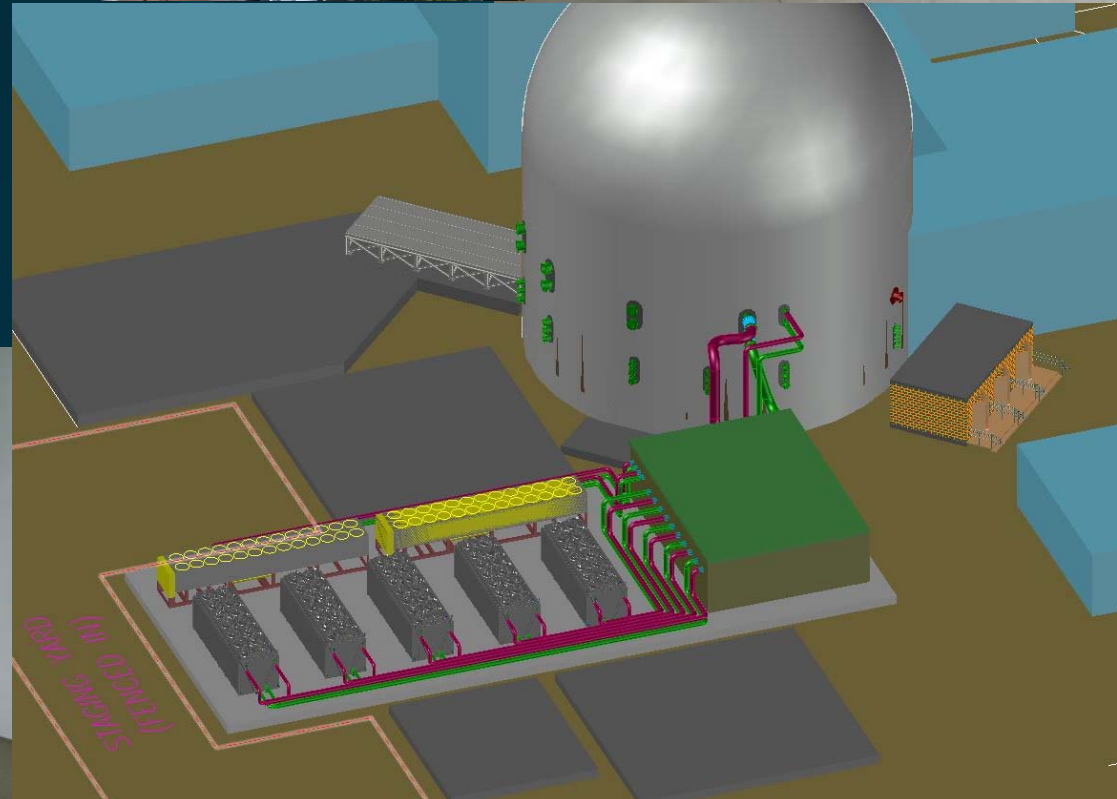
Demonstration Test Bed In Development



- User input received
- Functional and Operational Requirements Defined
- Concept of Operations Defined
- Digital engineering implemented
- Preconceptual design complete
- Preliminary design in FY21

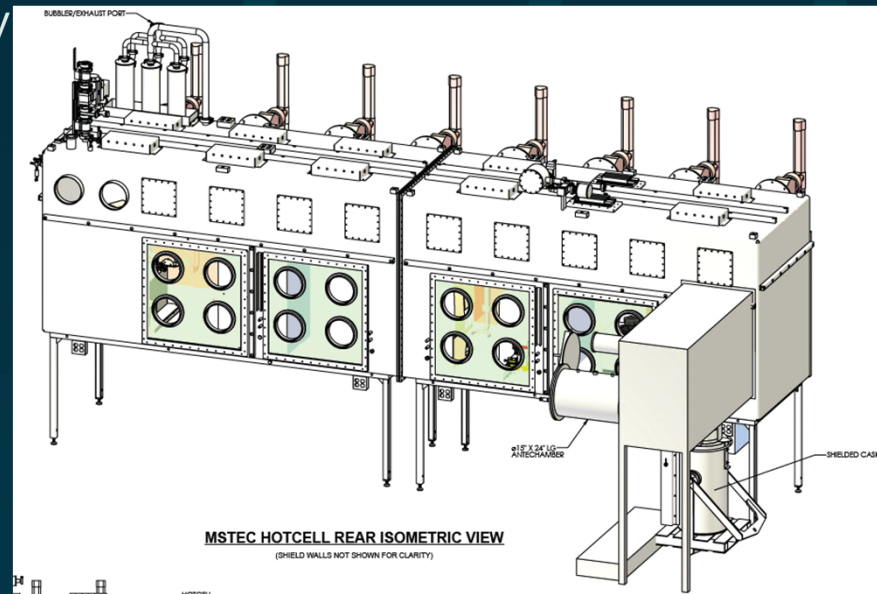
EBR-II Test Bed Information

- 80' Diameter x 45' Tall
- Built to house EBR-II reactor which began operations in 1964, ran across 30 years
- 6-month Pre-Conceptual Design effort to modify facility for reactor demonstrations completed in September of FY' 20



MSTEC: Molten Salt Thermophysical Examination Capability

- modular hot cell where the safety and performance of irradiated molten salt fuel samples can be characterized
 - First-of-a-kind capability – world leading
 - Support for designers currently developing MSRs
 - Capacity to validate liquid fuel performance and safety to enable operation
 - Comparable to existing solid fuel testing capabilities



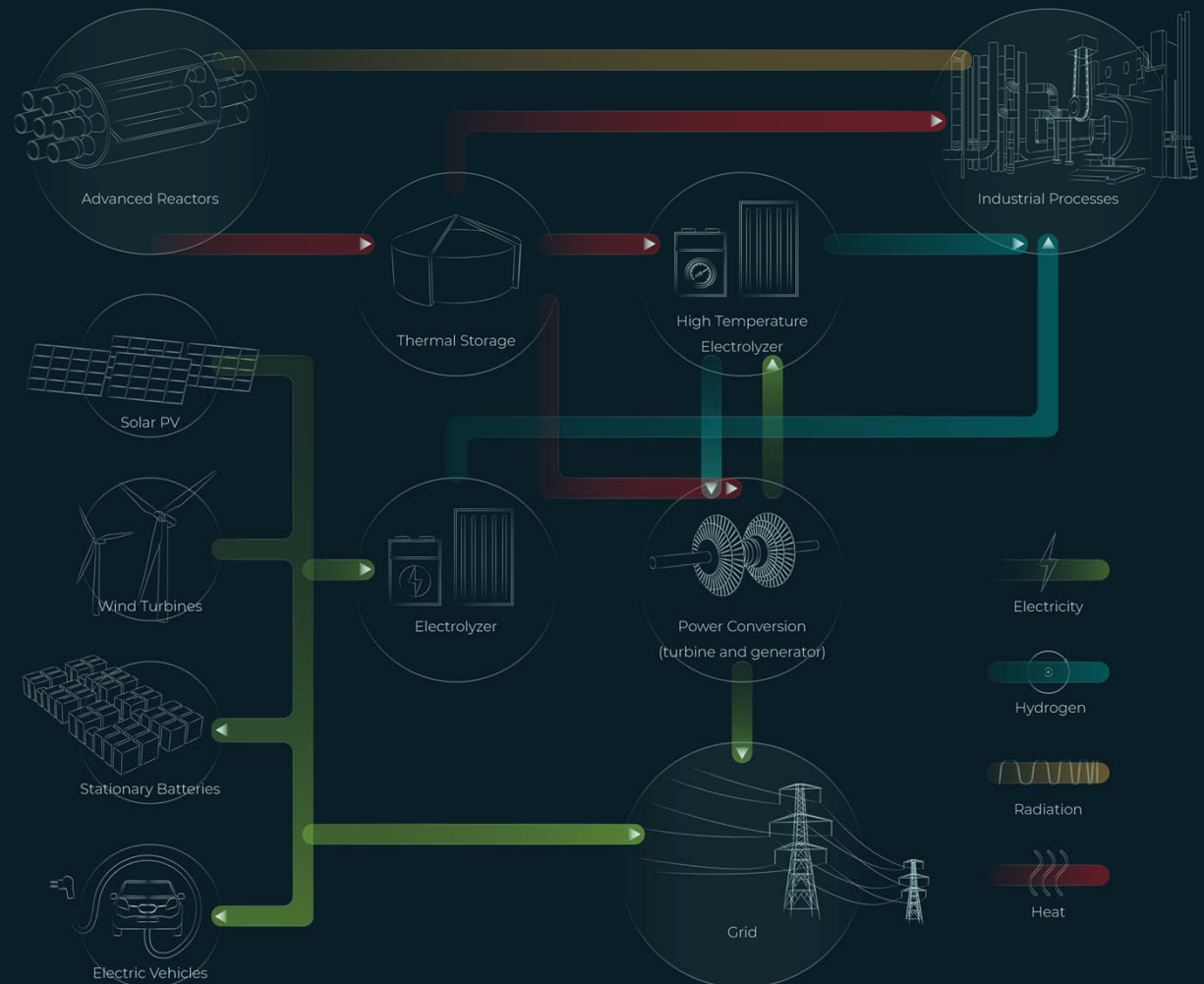
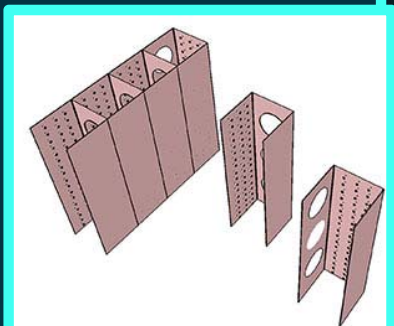
Siting Preparations Underway

- Completed Initial Siting Evaluation of 8 national sites with ANL, ORNL, U-Michigan
 - Additional sites in FY21

- Identified 9 candidate INL sites and initiated preparation for demonstration projects
 - Seismic; meteorological; grid access; water; environmental; regulatory; cost savings.

Addressing Cost and Markets

- Digital Engineering
- Advanced Construction Technologies
- Integrated Energy Systems

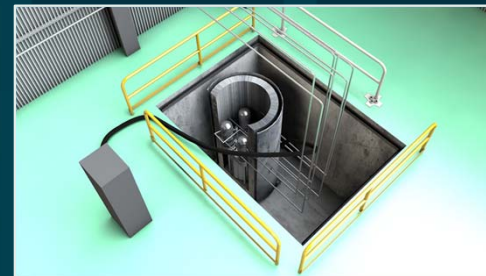


MARVEL: Microreactor Applications Research, Validation and Evaluation Project

- 100 kWth/20 kWe microreactor that produces electricity or heat for applications testing
- Resolve leading technology gaps
 - Integration with end-user applications (hydrogen, heat, desal, etc.)
 - Advanced operating modes; autonomy
 - Engage users to identify challenges
- Experience base for NRIC
 - Rapid demonstration at national lab
 - NEPA evaluations
 - Operator readiness and training
 - Safety basis
 - Engineering, design, assembly



Site: TREAT Storage Pit (8'x12'x10') and TREAT control room

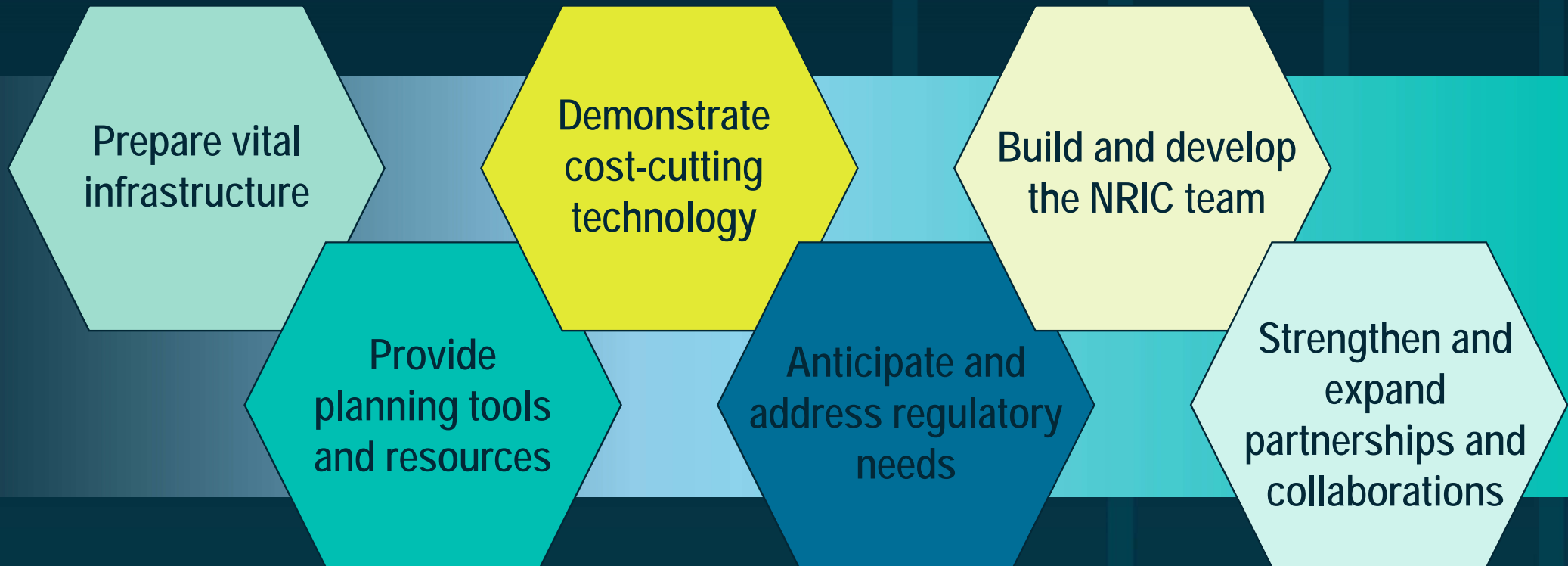


Reactor in TREAT storage pit



Control Room

Goals for FY21 – Maintain progress to support demonstrations by the end of 2025 and sustained innovation



Questions?

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