



Microreactor Program: System Integration and Analysis

Microreactor Program Winter Review Meeting
Idaho National Laboratory

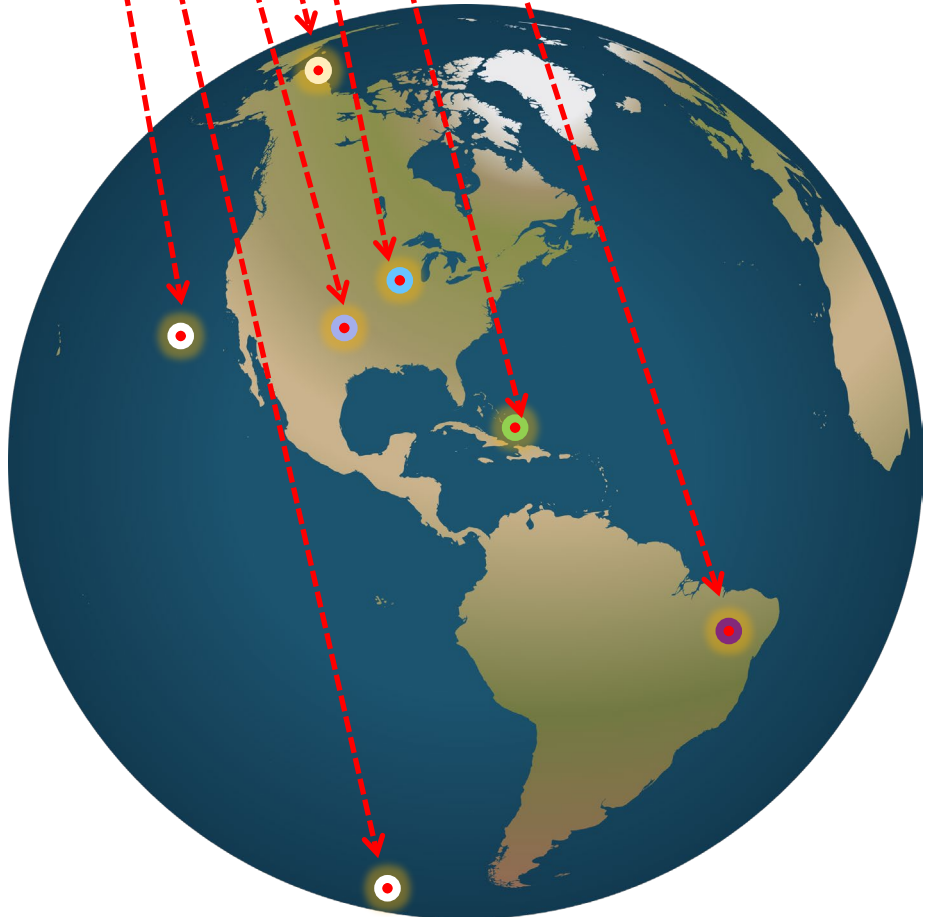
March 3rd, 2026

Gale Hauck, ORNL

Agenda

Time	Topic	Presenter
8:30	System Integration and Analysis Overview	Gale Hauck (ORNL)
8:50	Microreactor Economics	Botros Hanna (INL)
9:20	Microreactor Codes and Standards	Chandu Bolisetti (INL)
10:10	Break	
10:20	Microreactor Transportation	Steve Maheras (PNNL)
10:50	Development of the Technical Bases to Support Flexible Siting of Microreactors Based on Right-Sized Emergency Planning Zones	Saya Lee (PSU)
11:10	Feasibility Study of Micro-Nuclear Reactor Thermal Output for Air Rotary Kilns in the High-Temperature Manufacturing of Portland Cement Clinker	Martin Nieto Perez (PSU)
10:30	Wrap up	Gale Hauck (ORNL)

Microreactors are critical to energy and national security



Potential applications include:

- Offshore and floating nuclear power plants (etc., shipping, oil & gas)
- University microgrid, combined heat and power
- Arctic and Antarctic communities
- Mining and trona
- Island power
- Emergency response and recovery operations
- US export and global economic development

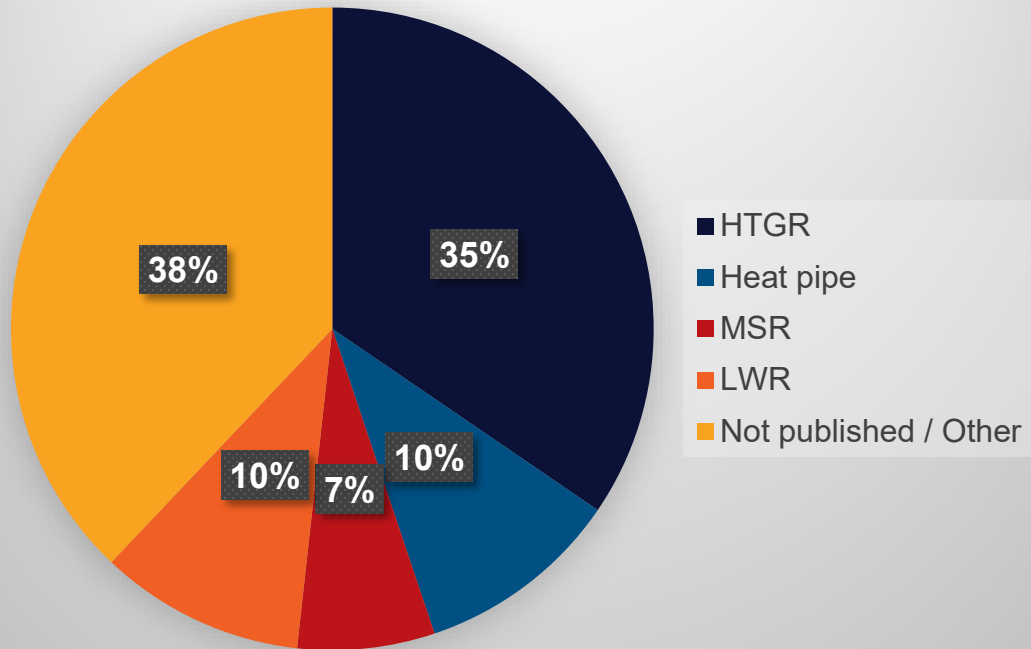
How to ensure Nth-of-a-Kind (NOAK) Success?

- Demonstrated economic viability
- Regulatory framework that enables novel operational regimes
- Flexible operations, tools, technologies, and capabilities that can address emerging challenges and new risks

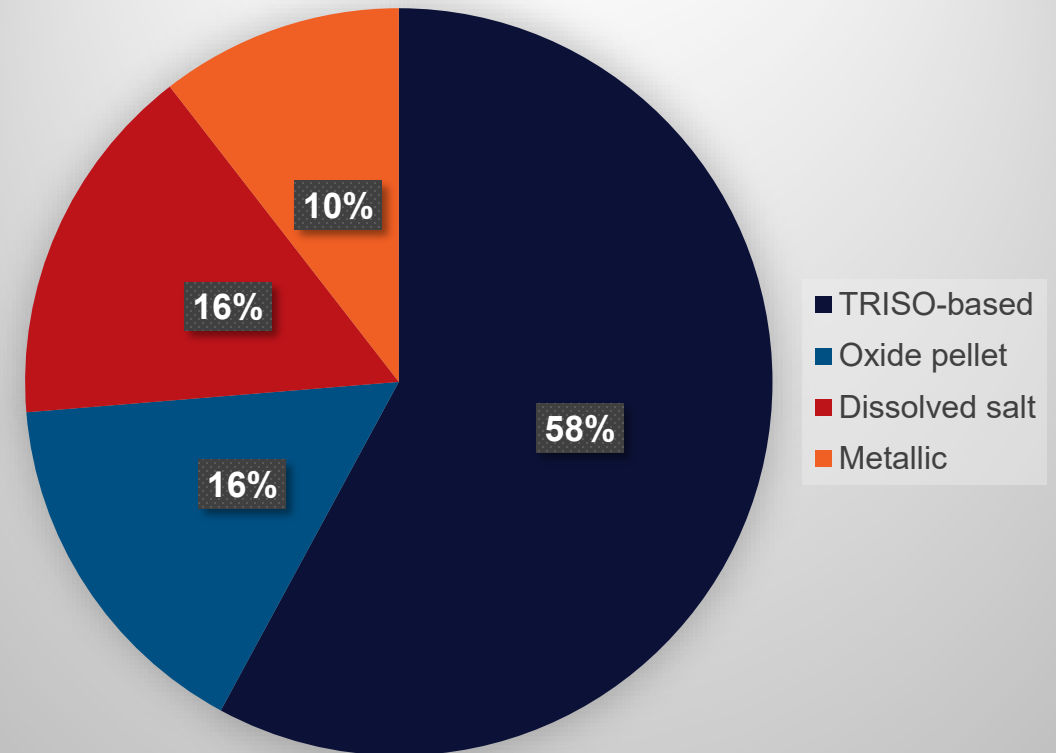
U.S.-Based Microreactor Developer Landscape

Technology Diversity Snapshot (25+ Active Designs)

Reactor Type



Fuel Form



DOE Microreactor Program

Program Vision

Through cross-cutting research and development and technology demonstration support, the Microreactor Program will enable broad deployment of microreactor technology by:

- Achieving technological breakthroughs for key features of microreactors
- Identifying and addressing technology solutions to improve the economic viability and licensing readiness of microreactors.
- Enabling successful demonstrations of multiple domestic commercial microreactors.

Program Objectives

- Address critical cross-cutting R&D needs that require unique laboratory/university capability or expertise
- Develop R&D infrastructure to support design, demonstration, regulatory issue resolution, and M&S code validation
- Develop advanced technologies that enable improvements in microreactor viability



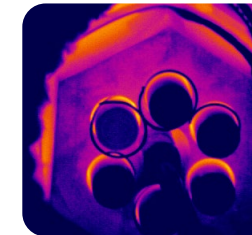
Microreactor Application

- Integrated Nuclear Testing
- Applied R&D



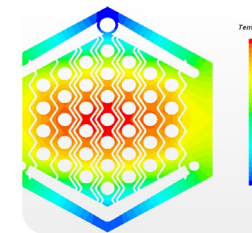
Demonstration Support Capabilities

- Non-nuclear Testing
- Test-beds for developers/regulators



Technology Maturation

- Matures fundamental microreactor enabling technologies and capabilities



System Integration & Analyses

- Identification of technology and regulatory gaps for Microreactors

Systems Integration & Analysis (SIA)

- Drive the future focus of the Microreactor Program by using market analysis to pinpoint microreactor needs, applications, and functional requirements that **improve economic performance and deployment viability**.
- Shape the microreactor design space by **evaluating and prioritizing innovative technologies** and supporting concepts.
- Advance a fit-for-purpose regulatory framework for microreactors by targeting and **resolving key licensing and deployment barriers**.

Licensing & deployment

- Address microreactor-specific licensing challenges (e.g., manufacturing licenses, factory fueling) and develop regulatory recommendations.

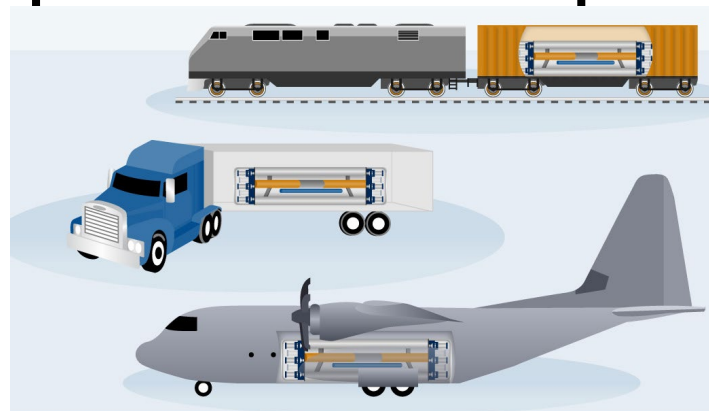
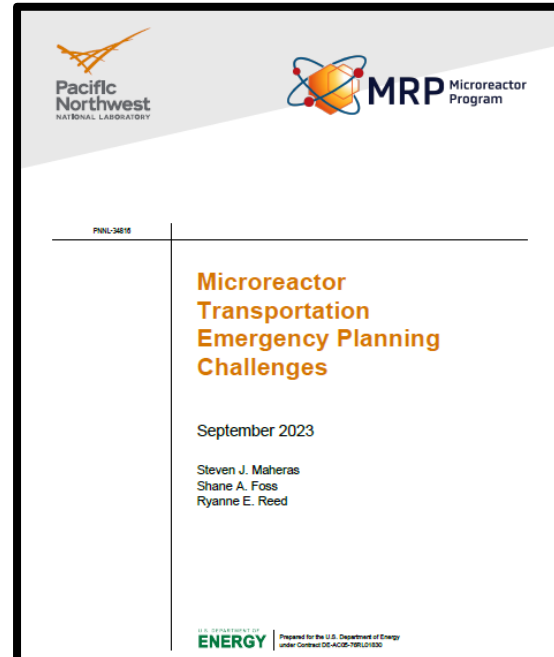
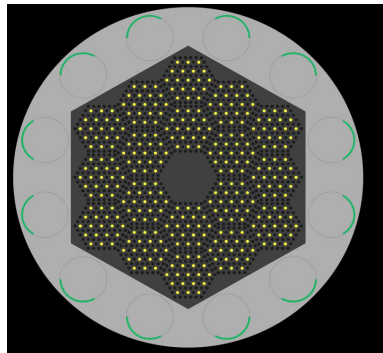
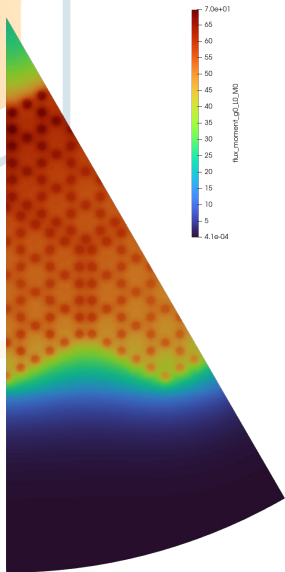
Sociotechnical methods

- Develop sociotechnical tools and methods to support responsible deployment, including stakeholder engagement and siting support.

Transport & emergency response

- Identify microreactor transportation and emergency response planning challenges and provide guidance and recommendations.

Key contributions to analysis and deployment pathways



Source: GAO. | GAO-20-380SP

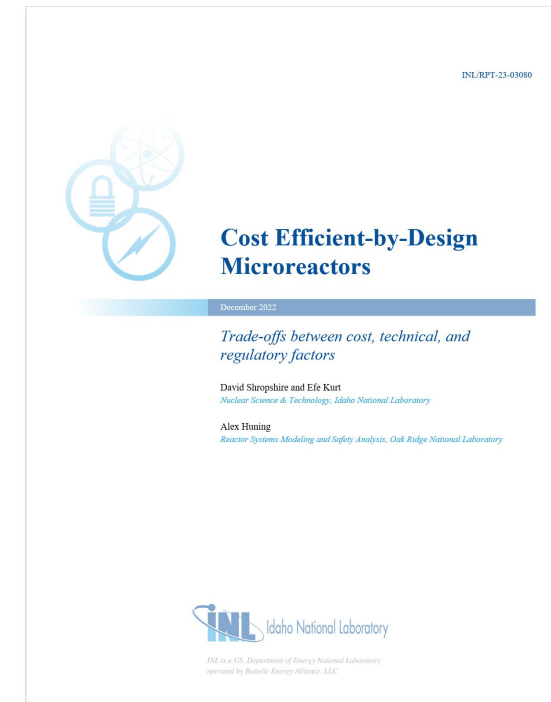
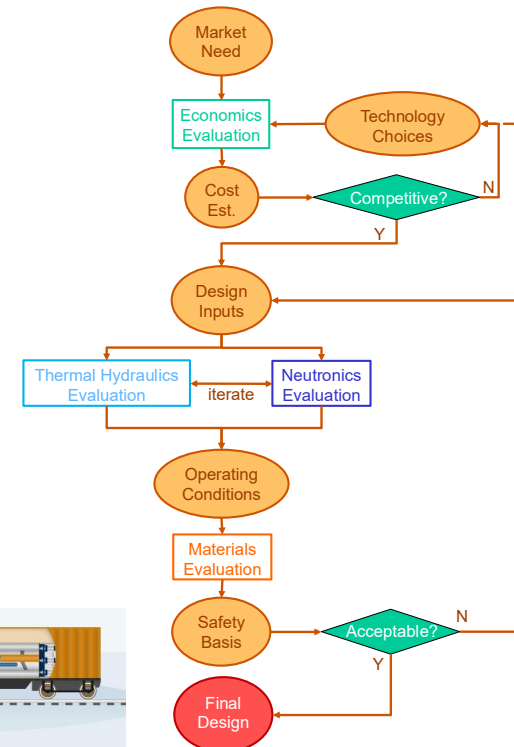
BLUECRAB

1. Power Density
2. Decay Heat
3. Kinetic Parameters
4. Nuclides Inventories

MELCOR

1. Spatial distribution of Fission Products

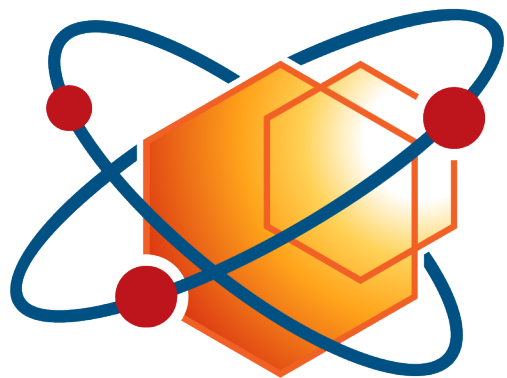
Economics-by-Design



Next up...



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MRP Microreactor
Program