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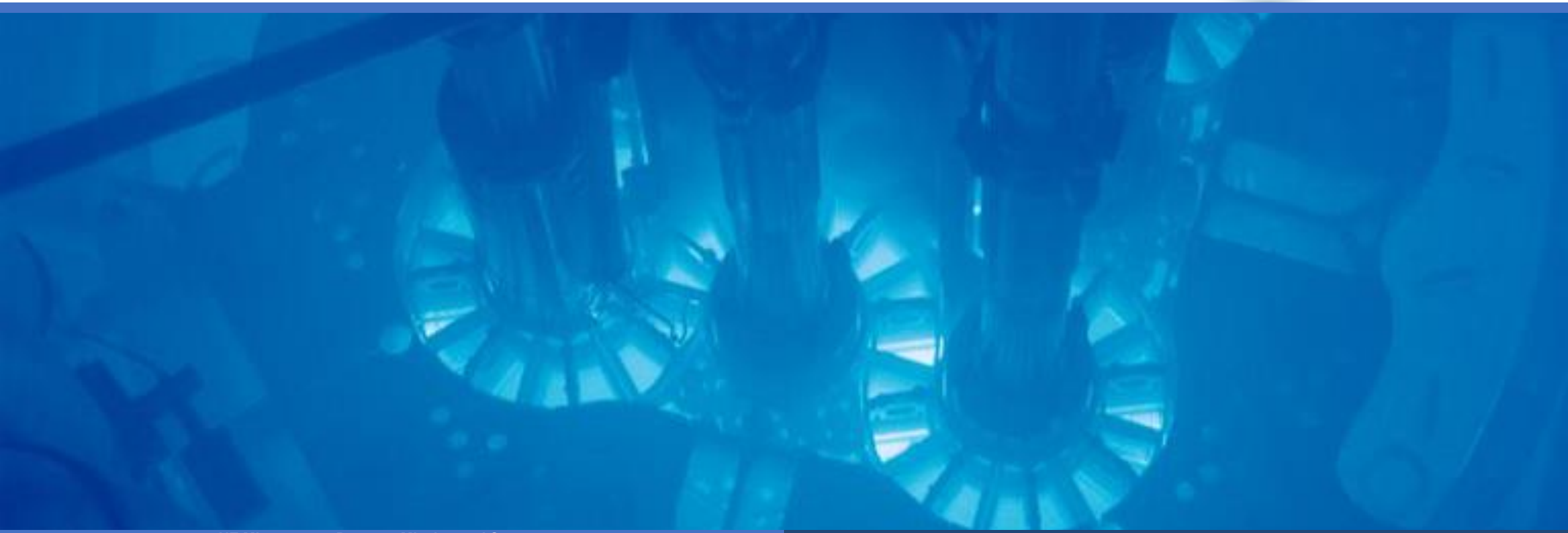


NE Microreactor Program Mission and Strategy

GAIN Virtual Microreactor Program Stakeholders Workshop

May 2021

Federal Manager: Diana Li, DOE-NE

National Technical Director: John Jackson, INL

Program Vision and Goals

Through cross-cutting research and development and technology demonstration support, by 2025 the Microreactor Program will:

- Achieve technological breakthroughs for key features of microreactors
- Empower initial demonstration of the next advanced reactor in the US
- Enable successful demonstrations of multiple domestic commercial microreactors.

Direct Funded NE Microreactor Program Activities

NE Microreactor Program established in FY 2019 as part of Reactor Concepts Research, Development, and Demonstration Program.

FY19	FY20	FY21
$20M	$20M	$**15M**

Major program activities include:

- Developing test platforms to support integrated microreactor systems and end-user applications in both non-nuclear and nuclear prototypical environments at Idaho National Laboratory (INL)
- Maturing cross-cutting microreactor technologies such as heat pipes, advanced moderators and materials
- Validating remote monitoring and semi-autonomous control systems
- Performing initial microreactor deployment market analyses
- Addressing technical regulatory challenges
- University research through Consolidated Innovative Nuclear Research (CINR) program
- Small Business Integrated Research (SBIR)

Planned Accomplishments in FY 2021

Issue first version of advanced moderator material handbook
Complete irradiation of advanced moderator material
Complete the fabrication of components for heat pipe test article including structural core block and heat exchanger
Initiate MAGNET non-nuclear test bed modification design for power cycle testing
Complete preliminary design and NEPA analysis for MARVEL nuclear microreactor test bed
Continue MARVEL safety analysis
Complete market study on the potential use of microreactors to support government installations
Complete microstructural modeling for Grade 91 steel

Coordination with Other NE Programs and Initiatives

- **Advanced Reactor R&D Campaigns**
  - Direct activities on structural materials and legacy fuel qualification
- **TRISO/Graphite Program**
  - Multiple microreactor concepts using TRISO fuel form and leveraging TRISO program data
- **National Reactor Innovation Center**
  - Joint project on Microreactor Applications Research, Validation and Evaluation (MARVEL)
  - Work supporting demonstration reactor test beds, demonstration reactor siting, transportation
- **Nuclear Energy Advanced Modeling and Simulation (NEAMS)**
  - Use of NEAMS-developed tools within the program to support research and provide feedback
  - Coordination on microreactor program experiments to specifically support NEAMS software
- **Advanced Reactor Safeguards**
  - Projects focusing on developing framework and techniques for microreactor safeguards and security

Coordination with Other NE Programs and Initiatives (continued)

- **Advanced Reactor Regulatory**
  - Cross cutting scope for advanced reactors relevant for microreactors
- **Gateway for Accelerated Innovation in Nuclear (GAIN)**
  - Facilitating workshops with microreactor stakeholders and hosting Microreactor Program website
- **Advanced Methods for Manufacturing**
  - Expand engagement between programs, sharing of relevant program research to AMM community
- **Nuclear Cyber Security**
  - Operating modes for remote monitoring, autonomous operations
- **Integrated Energy Systems (IES)**
  - Program activities on microreactor-application integration can leverage IES technologies and end-user engagement.
- **Nuclear Science User Facilities (NSUF)**
  - Strong needs for material irradiations for moderators, reflectors, structures
- **NE-4 Fuel Cycle R&D**
  - Leverage advanced fuel R&D for microreactors – metallic, ceramic, TRISO, HALEU access

Coordination with Other Government Agencies

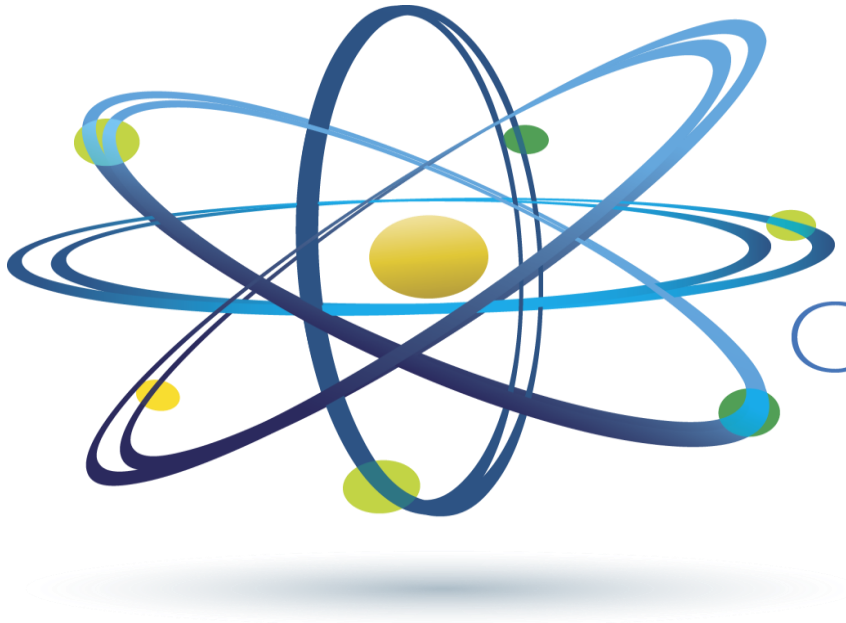
- **Department of Defense**
  - Potential synergies exist between the civilian and defense applications of commercial microreactor technologies
  - The program remains engaged with relevant DoD organizations to offer technical expertise and share publically available cross-cutting R&D results
- **Nuclear Regulatory Commission**
  - The NRC will license and regulate microreactors for commercial use
  - The program remains engaged with the NRC and industry stakeholders through periodic workshops/meetings on microreactor licensing needs
- **ARPA-E**
  - Participation in program meetings, sharing of experience
  - Awareness of ARPA-E-supported cost-shared industry microreactor activities to avoid duplication in efforts

Recent NE Industry Awards for Microreactor Technologies

Through Industry Funding Opportunity Announcement (FOA), Advanced Reactor Demonstration Program (ARDP) Risk Reduction, and GAIN Voucher awards, NE is supporting industry development of innovative commercial microreactor concepts.

- **Industry FOA**
  - March 2019, Westinghouse Industry FOA award to develop and mature its eVinci heat pipe-cooled microreactor concept. : $28,555,147 (**DOE share is $12.9M**)
- **ARDP Risk Reduction Awards**
  - December 2020, Westinghouse ARDP Risk Reduction award to further advance their eVinci heat pipe-cooled microreactor and support a nuclear demonstration unit by 2024. Total planned award value: $9.3M **(DOE share is $7.4M**)
  - December 2020, BWXT ARDP Risk Reduction award to develop their BWXT Advanced Nuclear Reactor (BANR) transportable commercial microreactor concept. Total planned award value: $106.6M (**DOE share is $85.3M**)
- **GAIN Vouchers**
  - Concept development vouchers for Oklo Inc., Radiant, Natura Resources, Ultra Safe Nuclear, HolosGen microreactor designs

Questions



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