



Nuclear Energy University Programs (NEUP) Fiscal Year (FY) 2019

MS-RC-01

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Office of Advanced Reactor Technologies

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ART Special Purpose Applications Program

“Special Purpose Applications” is a technical area under the Advanced Reactor Technologies program that was established in FY18 to:

- Develop and demonstrate technologies and manufacturing approaches that will enable the near term deployment of Megawatt class, very small modular reactors (vSMR) (<20 MWt) for non-traditional applications
 - Development areas include core structural materials, heat exchangers, power conversion systems, reactor control and shutdown system

Key features and use-cases:

- Defense application
 - Uninterrupted mobile power without cyber vulnerabilities
 - Heat and power to support various operational needs
- Commercial application
 - Support for remote communities, mining sites, etc.
 - Features similar to defense applications, but with emphasis on economics

Current R&D Objectives

- Conduct fundamental R&D to reduce uncertainty and risk in the design and development of vSMRs; R&D selected to benefit multiple concepts
- DOE-funded R&D is selected to support technology maturation that is broadly applicable to multiple vSMR concepts to ensure that concepts can be licensed and deployed to meet specific use-case requirements
- Key R&D areas include (as they apply to this class of reactor):
 - Advanced manufacturing (AM) for components and systems
 - Heat exchanger design and PCU integration
 - Moderator options; e.g. high temperature hydride development
 - Instrumentation and control
 - Unique licensing challenges (e.g. transportation, semi-autonomous control, AM materials)

FY19 Scope

- Applications are sought for technologies that support portable compact reactors that would be used to produce electricity in a microgrid configuration, and/or to use heat directly for other applications.
- The program seeks technologies that advance existing concepts toward market readiness or improve on their economic performance, safety, security, and/or environmental impact.
- Specific areas of interest, specific to special purpose reactors, include:
 - Advanced manufacturing to support factory manufacture of reactor and system components
 - Advanced instrumentation and control approaches that support semi-autonomous or autonomous control
 - Novel power conversion systems, static or dynamic, that improve on the current state of the art, as well as the associated heat exchanger designs
- Though proposals are not limited to the example work areas above, applicants should indicate how their proposed work will support current DOE, national laboratory, and/or U.S. nuclear industry deployment and commercialization R&D initiatives.

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