Summary of DOE-NE's Micro-Reactor RD&D Program

DOE Federal Manager: Thomas Sowinski, DOE NE-5
Thomas.Sowinski@Nuclear.Energy.Gov, 301-903-0112

National Technical Director: Jess C. Gehin, Idaho National Laboratory
jess.gehin@inl.gov, 208-526-3486

The Department of Energy (DOE) Office of Nuclear Energy's (NE) Micro-Reactor Research, Development, and Deployment (RD&D) Program manages national laboratory-led early-stage generic research and technology development for micro-reactor systems and provides cost-shared support for micro-reactor vendor development and licensing activities through the DOE-NE Industry Funding Opportunity Announcement. The program also coordinates efforts between the Department of Defense (DoD), industry, and Nuclear Regulatory Commission (NRC) to support the demonstration of micro-reactor technology on a DOE national laboratory site. National laboratories supporting the Micro-Reactor Program include Idaho National Laboratory (INL), Oak Ridge National Laboratory (ORNL), Los Alamos National Laboratory (LANL), Argonne National Laboratory (ANL), and Sandia National Laboratory (SNL).

As DOE's lead laboratory for nuclear energy, INL has taken the role of the lead laboratory for the micro-reactor program. INL has significant historical background as a reactor demonstration location; has been identified as a primary candidate site for micro-reactor pilot projects by several reactor vendors; has access to fuel fabrication capabilities; has substantial technical expertise in relevant micro-reactor technology development areas; has an extensive nuclear energy R&D infrastructure; and has significant land available for reactor demonstration projects. LANL and ORNL also have significant roles due to their experience in small reactor designs for space applications and advanced materials and manufacturing capabilities. ANL supports advanced micro-reactor materials and legacy fuel data qualification while SNL conducts innovative micro-reactor energy conversion system R&D. INL closely coordinates the efforts among the participating laboratories.

In FY18, INL and LANL conducted a detailed analyses of commercial and defense micro-reactor applications to determine leading high priority micro-reactor R&D program areas. These analyses along with DoD and industry stakeholder feedback have formed the basis for FY19 DOE-funded micro-reactor efforts in the following areas: accelerating micro-reactor HALEU production and fuel fabrication capabilities; preparing potential national laboratory micro-reactor demonstration sites; demonstrating innovative crosscutting micro-reactor technologies such a heat pipes and advanced moderators; qualifying advanced high temperature materials; exploring additive manufacturing techniques; developing remote monitoring and semi-autonomous control systems; and assessing potential DOE, DoD, and NRC regulatory pathways for both near-term micro-reactor demonstration licensing and future "nth of a kind" commercial applications.