



U.S. DEPARTMENT OF
ENERGY

Nuclear Energy

Update on DOE Small Modular Reactor Program

NRC Briefing on Small Modular Reactors

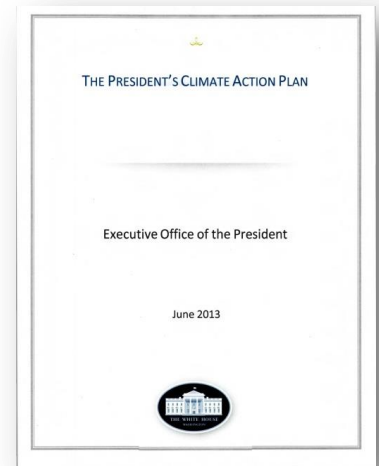
John E. Kelly
Deputy Assistant Secretary for Nuclear Reactor Technologies
Office of Nuclear Energy
U.S. Department of Energy

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SMRs Directly Support the President's Climate Action Plan

- **Clean energy goals cannot be met without significant contributions from nuclear power**
- **SMRs will complement large units giving utilities more nuclear power options**
 - Reduce capital cost and project risk
 - Improve passive safety technology
 - Potentially replace aging fossil plants
- **SMR deployment would create high-quality domestic manufacturing, construction, and engineering jobs**
- **SMR technology would give the US the opportunity to influence the safety, security, and safeguards of nuclear power globally**





Licensing Technical Support Program is Cornerstone of DOE Effort

■ Public/Private projects

- Reduce regulatory and financial risk
- Support design/engineering, testing, certification and licensing through cost sharing agreements
- Accelerate commercial SMR development
- Expect deployment in 2020's

■ Program began in 2012

- 6 year/\$452 Million program

■ Agreements signed with mPower and NuScale teams and work is progressing



NuScale



mPower



Engineering and Testing Infrastructure For Design Validation is Progressing



*MASLWR integral test facility continues to support **NuScale** design development and validation.*

Component prototype testing on reactor coolant pumps and control drive mechanisms



Bore hole drilling at Clinch River

***B&W mPower** Integrated System Test facility in Lynchburg, VA*



***NuScale** Control Room at Corvallis, OR*



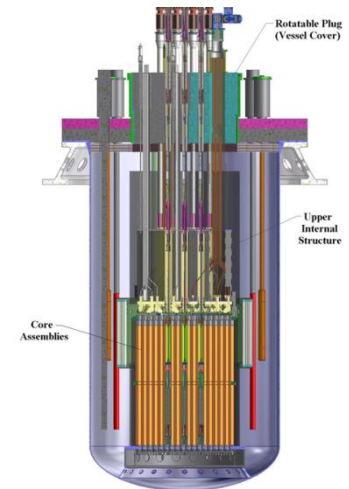
Additional DOE Efforts to Advance SMR Technology

- **SMR update to EPRI Utility Requirements Document**
- **Economic viability assessments**
 - Cost Comparison Study
 - Manufacturing Learning Study
 - Portfolio Analysis Study
 - SMR Business Case Study
- **Supporting EPRI aerosol deposition project**
- **Assessments of potential SMR sites**
 - Assessing Federal sites for potential SMR siting
 - Several States are also conducting feasibility studies
- **NNSA International Safeguards and Security Assessment**
 - LW-SMRs do not differ from conventional LWRs for the purposes of international safeguards and security



Advanced Small Modular Reactors

- **Industry designers continue to show significant interest in the development of Advanced SMRs**
 - Seven Advanced SMR concepts were submitted during the 2014 DOE Technical Review Panel process to identify advanced reactor R&D needs
 - Fourteen applications were received in response to a Funding Opportunity Announcement for cost-shared, industry-led R&D
 - Broad participation by industry in the United States Nuclear Infrastructure Council and Argonne National Laboratory sponsored Advanced Reactor workshop in early 2014
- **DOE and NRC are working to develop Advanced Reactor General Design Criteria**
 - Over eighty industry, university and national laboratory participants
- **DOE is supporting R&D for Advanced SMRs in several areas**
 - Advanced fuels - TRISO coated particle fuel qualification
 - Advanced materials and graphite qualification
 - Advanced design and testing of compact reactor components
 - In-service inspection technology/techniques
 - Supercritical CO₂ energy conversion systems
 - Advanced high temperature instrumentation





NRC Actions are Very Important for SMR Program

- **Extensive and ongoing pre-application engagement with SMR vendors**
- **Design Specific Review Standard development**
- **Standard Review Plan revisions (NUREG-0800)**
- **Regulatory Guide 1.206 update**
- **Engagement on design and risk-informed approaches**
 - Source Term calculations
 - Appropriately sized Emergency Planning Zones (EPZs)
 - Treatment of multiple modules at a site
 - Staffing requirements for operations and security
- **Readiness assessment in SECY-14-0095**



- Nuclear Power is important for the U.S. All-of-the-Above Energy Strategy
- DOE stands behind continued SMR development and sees the market emerging in the 2022-2025 timeframe
- We will continue to support efforts that improve SMR market potential domestically and internationally



“All-of-the-Above is not merely a slogan, but a clear-cut pathway to creating jobs and at the same time reducing carbon emissions, which recently stood at their lowest level in 20 years...”

*President Obama has made clear that he sees **nuclear energy** as part of America’s low carbon energy portfolio. **And nuclear power is already an important part of the clean energy solution here in the United States.**”*

*~ Secretary of Energy, Dr. Ernest Moniz,
National Press Club, February 19, 2014*