Office of Nuclear Energy Support for U.S.-Based Small Modular Reactor Technologies

Office of Nuclear Technology
Demonstration and Deployment

October 13, 2017
DOE Support for SMR Technologies

- DOE recognizes the value of SMRs as a new power source for the U.S. electrical grid to enhance its reliability and resiliency
- Initiated *SMR Licensing Technical Support Program* in FY 2012
- Goal: Accelerate the availability of safe, affordable SMRs into the market by sharing financial and technical risk with the first movers in the industry
- Established cost-shared cooperative agreements with most mature designs
- B&W – First awardee selected in FY2013, agreement suspended in FY2015
  - Efforts on B&W design helped to establish regulatory blueprint for subsequent SMRs
- NuScale – Innovative option selected in FY2013, final funding year for program was FY2017
  - Program advanced NuScale development and certification
  - Success! Design Certification Application submitted to NRC in FY2017; review ongoing
Status of NuScale Power SMR Development

Design Certification Application (DCA) Review

• Submitted DCA to NRC in January 2017, docketed in March 2017

• NRC issued 46 Month review schedule (completion target – January 2021)

• Phase 1 of review, which results in completion of a preliminary safety evaluation report, ahead of schedule (Due April 2018)

• NuScale DCA dealing with significantly fewer requests for additional information that anticipated from benchmarks

• No significant safety concerns identified during NRC review

Progressing product realization in areas such as:

• Control room design and human factors engineering

• Instrumentation and control

• Emergency core cooling system valve design

• Steam generator fabrication and testing

• Alternative control rod drive mechanism design development

• Issued Major Manufacturer request for proposal in June 2017

• Supply chain development
Opportunity to Establish an Advanced Reactor Pipeline

- Over next 30 years many units of the existing U.S. light water reactor (LWR) fleet will be retired
- Light Water SMRs are the most mature with ability to immediately contribute to U.S. energy portfolio
- Non-light water SMR designs also viable, but likely have a longer licensing horizon
- Significant work remains to finalize designs and site licensing projects, as well as development of supply chain infrastructure

**Need for Government Teaming with Industry**
- Need new U.S. nuclear builds to regain leadership and global influence
- SMRs expected to be a key element of the nation’s future electricity generation portfolio
- Historically, all commercial deployments of new reactor technologies preceded by significant private-public partnerships
Next Steps

• No SMR-specific program funding in FY 2018; however, the FY 2018 request “invests in early-stage research and development on next generation reactor technologies, including $20 million supporting advanced small modular reactor.”

• FY 2018 Appropriation House mark recommends that the Department dedicate $60 million to “support technical, first-of-a-kind engineering and design and regulatory development of next generation light water and non-light water reactor technologies, including SMRs”

• NE is developing an industry-focused funding opportunity announcement (FOA) that will support early stage R&D and first of a kind engineering for advanced reactors, including SMRs.
**NE Support for U.S. Industry Initiatives:**

Notional Framework for New Reactor Development, Including SMR Support FOA

<table>
<thead>
<tr>
<th>Tier</th>
<th>Delineation of Tiers</th>
<th>Task Funding Range</th>
<th>Cost Share</th>
<th>Typical No. of Tasks</th>
<th>Length of Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>License Application with NRC and/or Contractual Arrangement w/ End User(s)</td>
<td>$10M-$100M</td>
<td>50/50</td>
<td>1-2</td>
<td>24-36 months</td>
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<tr>
<td>2</td>
<td>Reactor Technologies and/or Concepts at varying levels of technical and/or regulatory maturity</td>
<td>$1M-$10M</td>
<td>50/50 80/20</td>
<td>4-6</td>
<td>12-30 months</td>
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<td>1</td>
<td>Technical and Regulatory Vouchers for work to be performed by DOE labs or licensing discussions w/ NRC</td>
<td>Less than $1M</td>
<td>80/20</td>
<td>20+</td>
<td>6-18 months</td>
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