Small Modular Reactors (SMRs)

Presentation to the Secretary of Energy Science Advisory Board

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DOE Market Survey

- Sponsored public workshops to solicit input from nuclear industry
- Conducted one-on-one meetings and site visits with SMR designers, manufacturers, and owner/operators to explore viable business case scenarios and R&D needs
- Conclusions from interface:
  - SMR LWR designs are most likely deployable within the next decade
  - Partnerships established between SMR designers, manufacturers, and owner/operators are feasible
  - Cost-share licensing program is needed for industry to successfully deploy SMRs in the next decade
  - Suitable regulatory framework is needed to support SMR licensing
- R&D needed to support innovative advanced reactor designs to address expanded missions beyond electricity

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Small Modular Reactor RD&D Program

- DOE Small Modular Reactor Program:
  - Research, Development & Deployment (RD&D) to enable the deployment of a fleet of SMRs in the United States
  - SMR Program is a new program for FY 2011
  - Structured to address the need to enable the deployment of mature, near-term SMR designs based on known LWR technology
  - Conduct needed R&D activities to advance the understanding and demonstration of innovative reactor technologies and concepts

SMR RD&D Program

- SMR RD&D Program Elements:
  - LWR SMR Licensing Technical Support ($452M/5-year program)
    - Public-Private Partnerships for design certification and licensing activities
    - Reduce technical and regulatory risks of near-term SMRs
  - SMR Advanced Concepts RD&D (~$30M/per year); four technical pathways
    - R&D Program will be guided by input from vendors pursuing advanced SMR designs
    - Work organized into four technical pathways
      - Assessment Methods
      - Instrumentation, Controls and Human-Machine Interfaces
      - Materials, Fuels and Fabrication Technologies
      - Safety Assurance

LWR SMR Licensing Technical Support

- Industry Partnerships
  - Cost-share first-of-a-kind (FOAK) development and licensing costs to advance LWR SMR designs toward Design Certifications (DCs), early site permits (ESPs), and Combined Operating Licenses (COLs)
  - Maximum of 50% government cost share
  - Pursue business model(s) that promise a return on investment or other value proposition to the U.S. Government
    - Cost-shared first-mover SMRs are a performing asset that will return value to the U.S. Government
    - Cost-shared projects advance U.S. strategic missions and goals
    - Revitalize domestic manufacturing industry
  - Pursue business model(s) that advance U.S. commercial interests domestically and abroad

Proposed FOA Schedule

- New Start Approval
- Release FOA

1 mo.
- Industry Day
- Letters of Intent Due

2 mo.
- Receive Applications

3 mo.
- Merit Review

4 mo.
- Notify selected applicants

5 mo.
- Negotiations

6 mo.
- Issue and distribute awards

SMR RD&D Technical Focus Areas

- SMR Instrumentation and Control/Human Machine Interface
  - Develop techniques to improve measurements, diagnostics and controls for SMR-specific environments
  - Address needs for expanded functionality
- SMR Assessment Methods
  - Develop PRA capability to verify reduced risk of simpler, safer designs
  - Advanced economic models for near and long-term needs
- SMR Safety Assurance
  - Develop advanced technologies for intrinsic safety and security
  - Address issues identified in NRC SECY10-0034
- SMR Materials, Fuels and Fabrication Technologies
  - Evaluate materials and fuels for advanced SMR's
  - Examine material and fuel degradation phenomena to SMR-specific conditions
  - Support a project to advance integrated manufacturing of SMR module
  - Evaluate code cases for SMR materials and fuels