U.S. DEPARTMENT OF ENERGY
Nuclear Energy

RIC 2010
Increasing Interest in Small Modular Reactors

DOE Programs for Small Modular Reactors and Advanced Reactor Concepts

Richard Black

Office of Advanced Reactor Concepts
Office of Nuclear Energy

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- **Mission**
  - Advance nuclear power as a resource capable of making major contributions in meeting the Nation's energy supply, environmental goals and energy security needs by resolving technical, cost, safety, security, and regulatory issues through research, development and demonstration (RD&D).
- **FY2011 Budget Request for Nuclear Energy**
  - $912M
  - Funding supports:
    - Refocused RD&D activities on reactor and fuel cycle technologies
    - Transformative and Investigator-Initiated R&D
    - Nuclear facilities used for advanced nuclear energy technology R&D
    - Responsibilities for waste management activities under the Nuclear Waste Policy Act
- **FY2011 NE Budget Request for SMRs and Advanced Reactor Concepts (ARCs)**
  - SMRs: $39M
  - Advanced Reactor Concepts: $22M

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SMRs and Advanced Reactor Designs and Concepts

- **SMR and advanced reactor designs and concepts can be grouped into three sets based on (a) design type, (b) estimated licensing and deployment schedule, and (c) maturity of design.**
  - Light Water Reactor (LWR) evolutionary based designs
    - 5-10 years
  - Non-LWR designs
    - 10-15 years
  - Advanced (Transformative) Reactor Concepts and Technologies
    - 15-25+ years

Note: DOE currently defines SMRs as those reactor designs that are ≤300MWe, and fabricated in modules that are transportable from the factory to the site by rail or truck.

SMR/ARC Program Focus Areas

Focus areas for RD&D based on estimated deployment schedules for reactor types:

- 5-10 Year Focus: Cost-share partnership with LWR SMR designs where near-term NRC licensing can be completed.
- 10-15 Year Focus: Engage industry, universities, and DOE National Laboratories on new and innovative technologies and advanced reactor concepts (non-LWR) to enable them for licensing and deployment.
- 15-25+ Year Focus: Support previously established international collaborations established under GEN IV on advanced/transformative reactor concepts.

SMR/ARC Program Activities

TARGET -- Demonstrate if SMRs/ARCs meet safety requirements and offer economic or other advantages supporting deployment.

FY 2010:

- Conduct FY10 workshops to evaluate SMR designs, establish priorities to enable development and deployment, identify appropriate federal roles, and establish DOE programs.
- Visit SMR vendors/customers to determine viability of design and commercial markets.

SMR/ARC Program Activities

FY 2011+ Potential Activities:

- Solicit, select and fund, NRC design certification fees on a cost-share basis for up to two LWR SMR designs.
- R&DD, cost-shared where appropriate, on advanced SMR/ARC designs involving experiment, theory, risk-assessment, and modeling and simulation.
- Work with NRC to develop an SMR/ARC licensing framework. Identify where DOE R&D can support NRC's regulatory decision-making.
- Develop objective cost models to assess the SMR business case.
- Support development of new and/or revised nuclear industry codes and standards to support SMR/ARC licensing.

SMR Deployment Challenges

Technical
- Validating design for innovative structures, systems and components
- Developing necessary R&D and demonstration of new reactor technologies

Licensing
- Applicability of LWR requirements, codes and standards
- Application "completeness" for certification and licensing
- NRC staffing and skill mix for non-LWR SMRs

Financial
- Cost validation of advanced, simpler designs
- Upfront financial investment for first-of-a-kind designs
- Availability of loan guarantees

DOE-NE SMR/ARC Program Benefits

Administration and Congress recognize nuclear energy must be part of the nation's future energy portfolio.
- Nuclear Power Plants provide carbon-free energy for diverse applications.
- DOE will work with the NRC to enhance regulatory requirements and licensing process for SMRs/ARCs.
- DOE and DoD are evaluating SMR/ARC options for energy security .

SMRs can potentially support job creation and non-proliferation goals.
- Jobs span manufacturing, technical and operational fields.
- U.S. leadership revitalized in nuclear design, engineering and manufacturing.
- SMR/ARC designs will incorporate proliferation resistant features.

SMRs can respond to diverse market needs for electricity and process heat.

DOE Role in SMR/ARC Program

DOE ROLE – Partner with industry and governmental organizations to evaluate SMR market potential and support appropriate RD&D and cost-share activities for licensing and deployment.

- FY11 and beyond RD&D activities targeted for the SMR Program will be consistent with the NE R&D Roadmap and supporting Implementation Plans
- NE R&D Roadmap will focus on the technical and licensing challenges
- NE cost-share activities will focus on the licensing and financial challenges