

Nuclear Regulatory Commission Workshop

Small Modular Reactors (SMRs)

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U.S. DEPARTMENT OF
ENERGY

Nuclear Energy

Office of Nuclear Energy Mission

h) **The mission of the Office of Nuclear Energy (NE) is to enable *integrated nuclear energy solutions* to address our most challenging energy, environmental, and economic problems.**

- Enable the development and deployment of nuclear power for the production of electricity and process heat applications.
- Support systems and technologies that contribute to energy security, environmental stewardship, and economic vitality.

h) **NE believes *Small (<350 MWe) Modular Reactors (SMRs)* support this mission statement.**

h) **NE will support and facilitate bringing SMRs to domestic markets.**

- FY2011 SMR Program Office proposed.
- Public/private partnerships preferred option.
- Work with NRC and industry to evaluate SMR unique licensing issues.

Collaboration and Dialogue

- h U.S. based vendors are seeking to bring SMR LWR designs to market within the next 5-10 years but will be confronted with technological, licensing and financial challenges.
- h To address these challenges NE will collaborate with NRC and industry to:
 - Research and develop new technologies (e.g., helical steam generators, ceramic fuels) that support multiple designs.
 - Support development of risk-informed safety analyses to support SMR licensing.
 - Engage NRC and industry early on unique SMR licensing/policy issues.
 - Develop new and/or revise current industry codes and standards for SMRs.
 - Establish cost models that validate a range of nuclear energy options.
- h A cost-share partnership for first-of-a-kind SMR design and licensing may be initiated in 2011.

SMR Designs and Concepts

h) **SMR designs and concepts can be grouped into three sets based on design type, licensing and deployment schedule, and maturity of design.**

- LWR based designs
 - » 5-10 years
- Non-LWR designs
 - » 10-15 years
- Advanced Reactor Concepts and Technologies
 - » 15-25 years

h) **NE will continue to engage industry on innovative technologies and advanced reactor concepts to enable them to come to domestic markets.**

SMRs Respond to Domestic Markets

- h Large base-load new generation not required.
- h Utility balance sheets favor smaller initial capital outlay.
- h Near-term demand projections require SMR flexibility.
- h New capacity needed to replace aging or costly generation.
- h Repowering old fossil generation sites.
- h Mission or business critical needs require reliable 24/7 energy.
- h Disaster and emergency response.
- h Electrical and process heat applications for co-located industry.
- h Remote location or distance from main electricity grid.
- h Integration with other energy systems.

Potential DOE Activities

- h) **Collaborate with NRC to optimize the licensing process.**
 - Enhance interpretation or application of technical requirements
- h) **Review opportunities to expedite SMR domestic deployment.**
 - Allocate DOE and laboratory/university resources to support SMR development.
- h) **Engage end-user communities on technology options.**
 - Identify needs and educate potential end-users on potential applications.
- h) **Collaborate with NRC and industry on nuclear codes & standards that support SMR designs.**
 - Assess existing codes & standards applicability and develop domestic standards as needed.
 - Engage international standards development organizations on “harmonization” issues as U.S. domestic standards are developed.
- h) **Consider Early Site Permit applications to “bank” sites for future SMR development.**
 - Possible “banked” sites are DOE, DoD, and other government/private locations.

Summary

- h **DOE believes there is a market and need for SMRs in the U.S.**
- h **SMRs complement the overall nuclear energy portfolio.**
- h **Developing SMR program in NE starting in 2011.**
- h **Enhancing regulatory framework and licensing with NRC.**
- h **Providing cost-share opportunities for first-of-a-kind designs seeking NRC licensing.**
- h **Advancing conceptual design for VHTGRs under NGNP.**
- h **Collaborating with international community on advanced GEN IV concepts.**
- h **Working with DoD to evaluate nuclear energy options and opportunities for collaboration.**