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Overview of U.S. Fast Reactor Technology R&D Program

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This paper provides an overview of fast reactor research and development efforts in the United States. Fast reactors are envisioned for a wide variety of actinide management strategies ranging from actinide destruction in closed fuel cycles to enhanced uranium utilization. With successful technology development, fast reactors are also intended for electricity and heat production, as being pursued through the Generation-IV International Forum collaborations. Several new initiatives for industry-led R&D, advanced reactor licensing framework, and discussions on advanced test/demonstration reactors are indicative of rising national interest in advanced nuclear technologies.

Because capital investment in reactors is the dominant cost of any nuclear fuel cycle, R&D efforts to improve fast reactor performance are the primary focus. A variety of innovative features that hold the promise for significant cost reduction are being pursued; the diverse R&D activities are funded by several Programs in the DOE nuclear energy portfolio. Innovative technology options that may yield significant cost reduction benefits have been identified through concept development studies: high strength structural materials, a supercritical CO₂ Brayton energy conversion cycle, advanced modeling and simulation tools, and in-service inspection techniques. In addition, technology development efforts for safety and licensing, and improved transmutation fuels are ongoing. For each technical area, recent accomplishments and key facilities will be identified to provide an indication of current status.

Country/Int. Organization

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