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U.S. Department of Energy Office of Nuclear Energy Supercritical CO2 Brayton Cycle Energy Conversion Program*

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The US Department of Energy, Office of Nuclear Energy, has continued the development of advanced energy conversion technology focusing on the Supercritical Carbon Dioxide Brayton Cycle (S-CO_2). Formerly under the Generation IV Nuclear Energy Program, the S-CO2 program is now supported by the Nuclear Reactor Technologies Office under the Advanced Reactor Concepts program. Brayton cycles are favored candidates for these higher temperature applications, and the supercritical CO_2 Brayton cycle continues to be well suited for application to advance reactor concepts. This application has the potential for lower costs and high efficiency in addition to resolving some of the safety issues associated with steam Rankine cycles on conventional nuclear reactors. To support the development of this cycle, the DOE program is also conducting S-CO_2 heat transfer experiments in compact heat exchangers and materials compatibility testing for the higher temperature applications. The next step in the DOE plan is to demonstrate the S-CO_2 cycle at a sufficiently large scale to confirm system performance and control strategies for a commercially relevant sized system. The S-CO_2 cycle is now being considered for application to solar, advanced fossil, and other energy applications. DOE NE will seek broader participation with other DOE offices, industry, or international partners to identify the best approach for next level of scaling and demonstration.

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