High-Efficiency Receivers for Supercritical Carbon Dioxide Cycles

**MOTIVATION**

Current state-of-the-art power tower receivers rely on working fluids, such as molten salt or air. However, air has low thermal transfer properties and molten salt is hazardous, temperature-limited, and has high maintenance and capital costs. A solar receiver adapted to the supercritical carbon dioxide (s-CO$_2$) recompression cycle could greatly improve reliability and overall system efficiency while reducing receiver material and manufacturing costs.

**PROJECT DESCRIPTION**

The proposed receiver uses s-CO$_2$ as the heat-transfer fluid, which would enable s-CO$_2$ Brayton cycle engines to be used in concentrating solar power (CSP) applications. The research team plans to develop and demonstrate a low-cost, high-efficiency solar receiver that is compatible with s-CO$_2$ cycles and modern thermal storage subsystems. The goal is to use the solar receiver in utility-scale and distributed electrical power generation.

**IMPACT**

Supercritical CO$_2$ Brayton-cycle engines have the potential to increase conversion efficiency to more than 50%. This high conversion efficiency drives down the cost of the supporting solar field, tower, and thermal storage systems, which could significantly reduce the lifetime costs of a CSP system to achieve the SunShot goal.

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For more information, visit the project page at: www.solar.energy.gov/sunshot/csp_sunshotrnd_brayton.html