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.

CONTACTS
Project Leader:
Mr. Shaun Sullivan: sullivan@braytonenergy.com

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