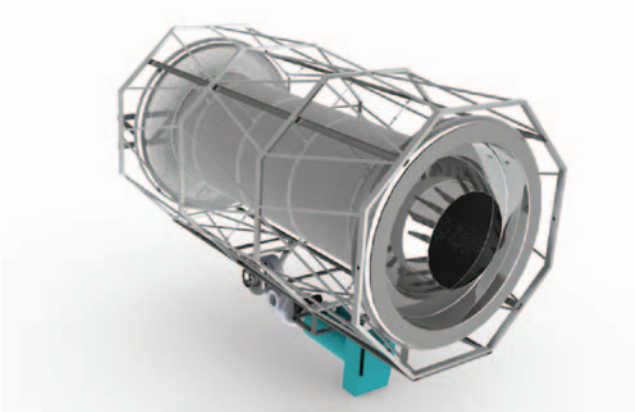
High-Efficiency Receivers for Supercritical Carbon Dioxide Cycles

BRAYTON ENERGY	Brayton Energy LLC
PROGRAM:	SunShot CSP R&D 2012
TOPIC:	Advanced Receivers
LOCATION:	Hampton, New Hampshire
AWARD AMOUNT:	Up to $1.6 million
PROJECT TERM:	2012–2015



Brayton Energy's supercritical carbon dioxide (s-CO_2) solar receiver has the potential to significantly improve reliability, increase efficiency, and reduce costs of CSP systems. *Image from Brayton Energy*

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

eere.energy.gov • energy.gov/sunshot
DOE/GO-102012-3661 • September 2012

Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 10% post consumer waste.

U.S. DEPARTMENT OF ENERGY