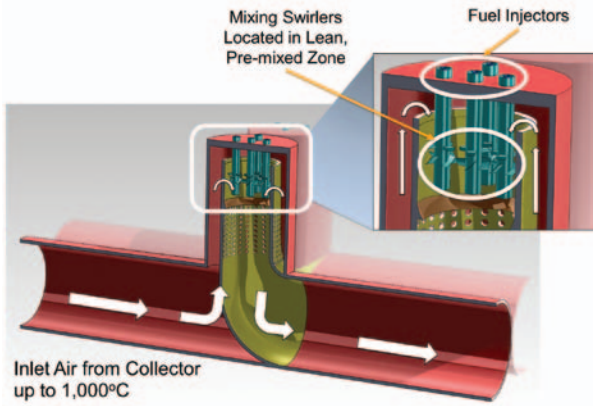
CSP Tower Air Brayton Combustor

SOUTHWEST RESEARCH INSTITUTE

PROGRAM:	SunShot CSP R&D 2012
TOPIC:	Advanced Power Cycles
LOCATION:	San Antonio, Texas
AWARD AMOUNT:	Up to $3.1 million
PROJECT TERM:	2012–2014



Conceptual combustor design that is optimized for inlet temperature range from 300°C (572°F) to 1,000°C (1,832°F) and low emissions. *Illustration from Southwest Research Institute*

CONTACTS

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Partnering Organizations:

- Solar Turbines Incorporated
- Oak Ridge National Laboratory
- German Aerospace Center (DLR)
- San Diego State University

MOTIVATION

The majority of today's commercial concentrating solar power (CSP) plants generate steam to support steam turbine electric power generation. The steam generated by these state-of-the-art commercial CSP plants is limited to a maximum temperature of 400ºC, yielding approximately 40% thermal efficiencies. This project aims to increase the temperature capabilities of the CSP tower air receiver and gas turbine to 1,000ºC and achieve energy conversion efficiencies greater than 50%.

PROJECT DESCRIPTION

Southwest Research Institute is working to develop an external combustor that allows for the mixing of CSP-heated air with natural gas in hybridized power plants. The proposed combustor is capable of operating at higher temperatures because of the novel design and materials being developed that are optimized for CSP applications.

IMPACT

This combustor will allow for an inlet temperature that is 350ºC higher for CSP Brayton cycles than the current state-of-the-art technology, which is a critical step to achieve 50% CSP cycle efficiency. In addition, this system is able to generate dispatchable power at full load, regardless of the time of day or meteorological conditions. The system releases extremely low emissions when running on renewable fuels or natural gas, and zero emissions when operating on solar energy only.

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

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DOE/GO-102012-3673 • September 2012

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