



Project Accomplishment Summary

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.



Sandia National Laboratories

Operated for the U.S. Department of Energy by
Sandia Corporation
Albuquerque, New Mexico

PROJECT ACCOMPLISHMENTS SUMMARY

Cooperative Research and Development Agreement (#SC14/01811.03.00) between Sandia National Laboratories and the Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Note: This Project Accomplishments Summary will serve to meet the requirements for a final abstract and final report as specified in Article XI of the CRADA.

Title: Solar-Driven Supercritical CO₂ Brayton Cycle Testing (ANC)

Final Abstract:

Sandia National Laboratories (SNL) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) collaborated to conduct an investigation of the dynamic performance of a solar-driven supercritical CO₂ (SCO₂) Brayton cycle. This was performed on the SNL recompression closed Brayton cycle (RCBC) at the Nuclear Energy Systems Laboratory / Brayton Lab. Historical data were provided to CSIRO since the test assembly remained inoperable throughout the project. Also, multidimensional trade studies were generated using the SNL Recompression closed Brayton cycle Engineering and Trade Studies (RETS©) tool.

Background:

This project aims to join the different strengths of the two parties, SNL and CSIRO, in order to further the state of research into high efficiency solar energy systems. Due to an ongoing supercritical CO₂ power cycle hardware development program, SNL has one-of-a-kind facilities and infrastructure, and SNL personnel have a unique understanding of Brayton cycle operations. CSIRO has a wealth of experience in concentrated solar power (CSP) technology, including receiver design and power cycle analysis.

The state of the art prior to initiation of this CRADA was approximately TRL 3. This assessment is made at the system level, not the component level, of the power cycle. Individual components are at generally higher TRL's. The project was needed to demonstrate power cycle performance during various conditions commonly experienced by solar power systems. Demonstrating this performance provides insight into cycle operations and generates confidence that the power conversion technology can be successfully applied to solar thermal fields. Laboratory and facility expertise included the RCBC present at NELS/Brayton Lab, and the expertise of engineers and technologists to operate this system.

Description:

The objective of the project was to complete a test matrix that would demonstrate the performance of the power conversion cycle during various conditions commonly expected to occur in solar thermal applications. The role of the laboratory (SNL) was to conduct the tests. The role of the company (CSIRO) was to develop the test matrix and evaluate the data.

Benefits to the Department of Energy:

This builds upon the cooperation between the U.S. DOE and the CSIRO, reflecting a mutual need to accelerate the transition to a clean renewable energy economy, while enhancing energy security, addressing climate change, and supporting sustainable economic growth. This project forms a part of the broader project with the same name which is funded under the U.S.-Australia Solar Energy Collaboration.

Economic Impact:

The results may be applied to CSP applications in the mid 2020's, if then, possibly by the CSIRO. The extent cannot be predicted – anywhere from no implementation at all to 100% implementation of the turbomachinery technology. Industry is better off by having the test data and model predictions to understand the potential of this technology. The disadvantage that is overcome is the lack of experimental data that existed previously. The expected impact on the power generation industry is to increase power plant efficiency from current 33% to something on the order of 50% efficiency. This will increase revenue. As a result, consumers will pay less for electricity, and less greenhouse gas will be emitted into the atmosphere.

Project Status:

This project has been completed.

ADDITIONAL INFORMATION

Laboratory/Department of Energy Facility Point of Contact for Information on Project

James Pasch
Sandia National Laboratories
(505) 284 6072
jjpasch@sandia.gov

Company Size and Points of Contact

Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Wes Stein
+612 49606094
Wes.Stein@csiro.au

CRADA Intellectual Property

None

Technology Commercialization

N/A

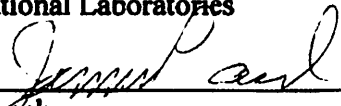
Project Examples

Results are in terms of data and model predictions and can be provided as needed.

PROJECT ACCOMPLISHMENTS SUMMARY
Cooperative Research and Development Agreement (SC14/01811.03.00)
between Sandia National Laboratories and the
Commonwealth Scientific and Industrial Research Organisation (CSIRO)

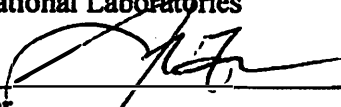
This summary has been approved for public release by Sandia and Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Sandia National Laboratories

By 
James Pasch
Principal Investigator

12/7/17
Date

Sandia National Laboratories

By 
Manager
WFO/CRADA Agreements

12/6/17
Date

Commonwealth Scientific and Industrial Research Organisation (CSIRO)

By _____
Title:

Date

In order to expedite the process, if we do not receive your signed reply by 12/15/17 we will assume your concurrence for the release of this document to the public.