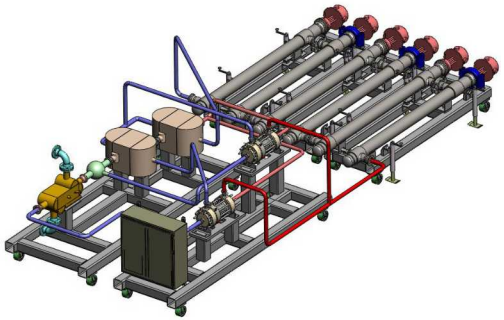
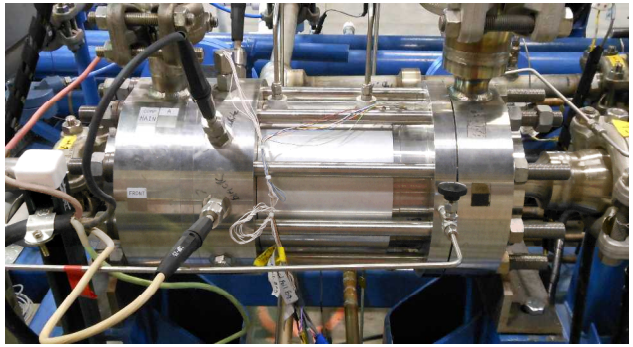
SAND2014-4858C

Exceptional service in the national interest

Sandia National Laboratories





Dr. James J. Pasch
Sandia National Laboratories
Albuquerque, New Mexico

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

SANDIA's Brayton Mission

- **Near Term:**

"By the end of FY 2019, Sandia National Laboratories shall develop, with industry, a fully operational 550˚C-10 MWe R&D Demonstration SCO_2 Brayton Power Conversion System that will allow the systematic identification and retirement of technical risks and testing of components for the commercial application of this technology."

- **Long Term:**

By the end of FY2024, Sandia National Laboratories shall convert the initial demonstration to a pilot demonstration and extend the infrastructure to support a fully operational 850˚C-50 MWe R&D Demonstration SCO_2 Brayton Power Conversion System scalable to a minimum of 300 MWe that will address the special materials and support the testing of components for commercial application. (Proposed)

- **Applications:**

advanced reactors, solar, fossil(NG and coal), geothermal and unique applications such as electric propulsion and military applications all as base load or waste heat recovery to achieve the highest efficiency affordable

Technology Gaps

Sandia National Laboratories

- Science basis for scaling to higher power levels
- Materials science:
  - Requirements for fluid purity for corrosion and erosion control
  - Commercially available materials that withstand the combination of temperature and pressure.
  - Accelerated life test in flowing fluids, material under stress, weldments, momentum impact
- Seals and Bearings for high temperature/high pressure S-CO2
- Modeling, scaling and benchmarking of steady state and transient phenomena and the impact on safe operations and equipment.
- Robust heat sources for component testing.
- Scaling of cost effective heat exchangers and recuperators.

Technology Gap Closure

Sandia National Laboratories

- Apply graded approach using applicable scientific and engineering rigor aimed at specific issue resolution in seals and bearings, materials, scaling and modeling.
- Re-configurable Demonstration Systems to allow the testing of commercially attractive configurations and system components that can be transferred to industry
- Formally apply systems engineering in the identification and retirement of technical risks in a phased approach
- Address development and maturation risks of commercially viable technologies for putting power on the grid, reducing the use of water, reducing carbon emissions, and/or reducing capital costs based on “industry pull.”