# Design for Supercritical CO2 Turbo-Alternator-Compressor (TAC)

## Summary

The TAC unit works with supercritical fluids and high pressure gases that are above critical pressure to create energy. By harnessing the heat from the reactor, the TAC creates efficient, cost-effective energy with significantly less space consumption. Sandia's Brayton cycle solves the problem between pressure variations as well as handling of supercritical fluids.

The compressor unit contains a turbine, compressor, alternator/generator, bearings, and seals. Each of these components have been examined for how to increase efficiency, accommodate high pressures, fluid densities, reduce windage loss, bearing cooling, etc.

### BENEFITS

- Revolutionary performance
- Increased efficiency & power
- Environmentally friendly
- Not restricted to $CO_2$
- Significantly smaller size
- Reduced cost
- Supercritical $CO_2$ spans all thermal heat processes for power generation
- Brayton cycle can be used for internal and external combustion

### APPLICATIONS

- Electric utility
- Nuclear power
- Oil and gas
- Renewable power/ energy

### PATENTS PENDING on SD#

- 11321
- 11560

### INTELLECTUAL PROPERTY & LICENSING CONTACT

Virginia Cleary
505.284.8902
vdclear@sandia.gov

## Licensing & Partnering Status:

Various license and partnering options are available. Please contact the Intellectual Property department to discuss.

## Technology Readiness Level:

Sandia has demonstrated that key elements of this technology work together. TAC is currently working on Proof Principle Research Loops with the Supercritical $CO_2$ Compression Loop and is in the conceptual design/ preliminary testing stage.

National Nuclear Security Administration

Sandia is a multiprogram laboratory operated by Sandia Corporation, a LockheedMartin Company, for the United States Department of Energy's National Nuclear Security Administration under contact DE-AC04-94AL85000.
SAND #2010-0460P

Sandia National Laboratories