

Vacuum Process Engineering, Inc. (VPE) plays a major role in designing and fabricating heat exchangers for a next generation concentrating solar-thermal (CSP) plant.

The Department of Energy (DOE) recently announced a Phase III, \$25 million award to Sandia National Laboratories to build, test, and demonstrate a next generation Concentrating Solar Thermal Power (CSP) plant at the National Solar Thermal Test Facility (NSTTF) in Albuquerque, New Mexico. Vacuum Process Engineering, Inc. (VPE) was a critical contributor to the program by designing and fabricating the subscale prototype heat exchanger, as well as designing the primary heat exchangers for both a 1 MW_{th} and 200 MW_{th} CSP plant. Prior to the award decision, the subscale (20 kW_{th}) prototype heat exchanger was tested and demonstrated improved performance, assisting in DOE's decision for Phase III program approval.

During Phase 1 and 2 of the program, VPE contributed the following:

- Designed and manufactured a subscale (20 kW_{th}) prototype stainless steel diffusion bonded microchannel heat exchanger with novel design features to understand manufacturing steps and verify performance.
- This subscale (20 kW_{th}) prototype heat exchanger was tested with supercritical CO₂ (sCO₂) up to 500°C at 17 MPa, which yielded overall heat transfer coefficients of >300 W·m⁻²·K and pressure drop <7 kPa (0.04%). This testing was vital in DOE approving Phase III of the program.
- Performed the bonding and brazing of different alloys considered for the heat exchangers including IN740H, IN617, and HR230.
- Designed the primary heat exchangers for both a 1 MW_{th} and 200 MW_{th} full-scale CSP plant in collaboration with Solex Energy Science.

The award was announced on March 25th, 2021 during a ["100% Clean"](#) webinar by DOE Secretary Granholm, and is part of a \$70 million multi-year [DOE Generation 3 CSP Systems \(Gen3 CSP\) program](#) that began in 2018. The overall objectives of the Gen 3 Particle Pilot Plant (G3P3) project are to design, construct, and operate a multi-MW_{th}, falling particle receiver systems that can operate for thousands of hours, provide six hours of energy storage, and heat a working fluid (e.g., sCO₂ or air) to ≥ 700°C, while demonstrating the ability to meet [SunShot cost and performance goals](#).

During Phase III, VPE and Solex Energy Science will continue to support Sandia National Laboratories through design and fabrication of heat exchangers for a ≥ 1 MW_{th} high-pressure sCO₂ flow loop in the CSP plant.

See Sandia National Laboratories' article related to this subject:

[Gen 3 Particle Pilot Plant \(G3P3\)](#)

Since 1976, VPE has established a reputation as both an innovator and reliable thermal engineering and manufacturing company, providing science based metallurgical services including, precision brazing, diffusion bonding, hot pressing, thin film coating, and complex assemblies.

VPE is a developer and manufacturer of diffusion bonded microchannel heat exchangers, hydrogen pre-cooling heat exchangers, and commercial off-the-shelf heat exchangers for a wide range of applications.

Vacuum Process Engineering, Inc.
Sacramento, California USA. | www.vpei.com | +1 (916) 925-6100

CONTACT: Dereje Amogne | info@vpei.com