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Sandia National Laboratories

National Solar Thermal Test Facility

We serve the nation by utilizing our world class facility for thermal evaluation of materials and the deployment of next generation CST Systems.

The National Solar Thermal Test Facility (NSTTF) is operated by Sandia National Laboratories for the U.S. Department of Energy (DOE). The 10-acre research and development and testing facility located in Albuquerque, New Mexico, provides access to unique concentrated solar thermal (CST) and thermal energy storage (TES) testing infrastructure. The facility can achieve some of the highest and most controlled solar concentrations in the world. The NSTTF offers a complete testing environment for government, industry, and other CST & TES stakeholders, including:

- Thermal flash simulation
- Thermal performance testing
- Thermophysical properties measurement
- CST & TES technology deployment and testing
- Air-to-ground target testing
- Heliostat metrology and on target evaluation

◄ Solar Tower #1

- 200 ft. tower with 6 MW_{th} solar field (Peak flux 300 W/cm^2)
- 400 ton elevator lifts tests from ground level to bay/roof
- 4 - 350 sq. ft. test bays
- 1 - 750 sq. ft. test bay
- 1 MW_{th} glycol heat rejection loop available in tower
- 100 kW_{th} sCO2 heat rejection loop

Generation 3 Particle Pilot Plant ►

- 180 ft. tower with 6 MW_{th} solar field (Peak flux 250 W/cm^2)
- 2 MW_{th} falling particle solar receiver
- 1 MW_{th} sCO2 heat rejection loop
- 6 MWh_{th} two-tank particle based thermal energy storage (800 °C hot tank, 600 °C cold tank)
- Analog and digital SCADA

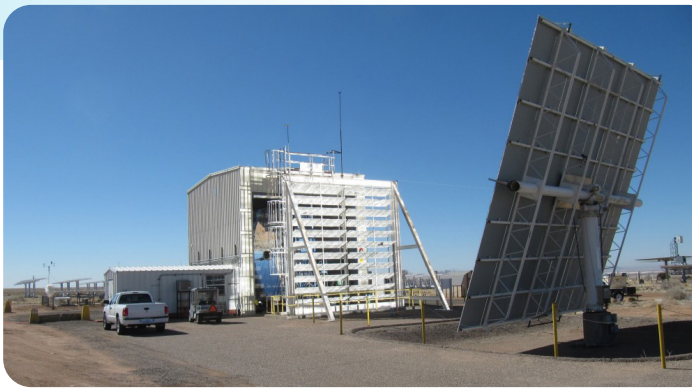
Molten Salt Test Loop (MSTL) ▶

- 600 GPM of molten salt flow
- 7000 gallon salt tank
- 6” SCH80 347H stainless steel piping
- 585 °C and 580 psi operations
- 1.4 MW_{th} cooling capability

◀ Static Sand TES Shipping Container

- 2 MW_{th} static sand thermal energy storage vessel
- Solar collector and concentrators for charging
- Autonomous controls for daily cycling
- 550 °C maximum operation temperature
- 2 kW_{th} hot air discharge

Solar Furnace ▶



- 6000 kW/m^2 solar flux concentration
- 12 kW_{th} power rating
- 3-Axis positioning table for precise targeting
- Infrared and visible cameras for target monitoring
- Vacuum and pressure chambers for atmosphere simulation and gas sampling

◀ Radial Packed Bed TES Facility

- 100 kWh_{th} thermal energy storage via 3/8” pea gravel
- 12.5 kW_e PV solar system for air heating/charging
- Autonomous controls for daily cycling
- 800 °C maximum operation temperature
- 20 kW_{th} hot air discharge

Heat Exchanger Test Stand – 20 kW_{th} ▶

- 0.25 kg/s particle circulation loop with 60 kW_e electrical heating – up to 775 °C
- 20 kW_{th} sCO2 heat rejection loop – up to 535 °C
- 20 kW_e sCO2 electrical heater
- Modular test bays for adaptable component testing
- Autonomous operations for prolonged testing

nsttf.sandia.gov

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

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