Energy &
Homeland Security

NATIONAL SOLAR THERMAL TEST FACILITY (NSTTF)

The NSTTF's primary goal is to provide experimental engineering data for the design, construction, and operation of unique components and systems in proposed solar thermal electrical plants planned for large-scale power generation.

The 200 ft. Solar Tower at Sandia National Laboratories provides 212 computer-controlled heliostats to reflect concentrated solar energy onto the tower, producing a total thermal capacity of 6 MW and peak flux to 300 W/cm^2.

The NSTTF offers a complete testing environment for a variety of activities, including:

- Thermal flash simulation
- Thermal performance testing and thermophysical properties measurement
- Space technology systems testing
- Solar array and solar applications testing
- Air-to-ground target testing

SOLAR TOWER FEATURES:

- 4 - 350 sq. ft. test bays
- 1 - 750 sq. ft. test bay
- Elevating module brings tests from ground level to bay/roof
- Heat rejection system at each test bay
- Analog and digital data logger with multiple channels with variable frequency control

HELIOSTAT FIELD

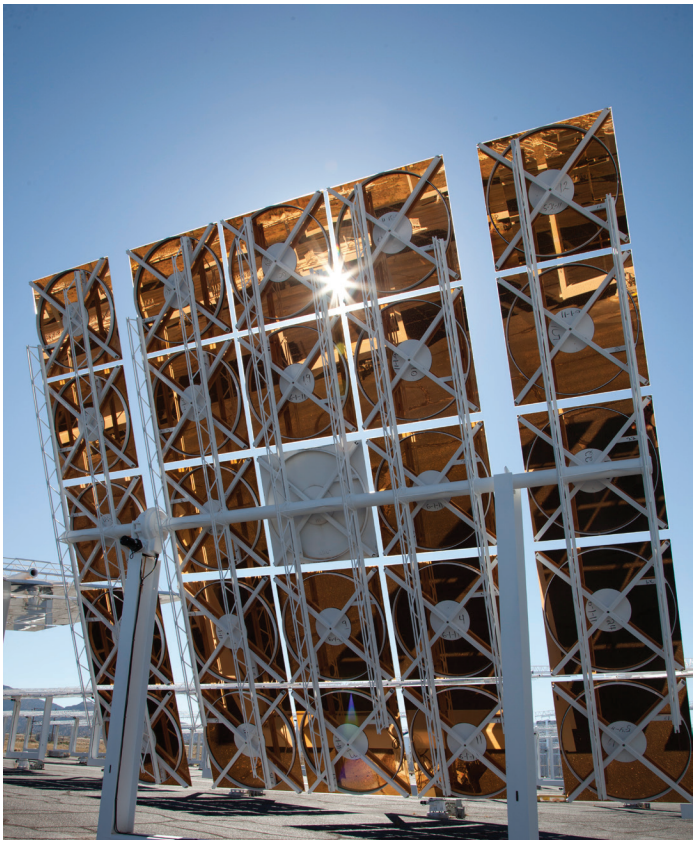
212 high-quality, individually computer controlled heliostats can produce high flux on target on the Tower. Also used for astronomy experiments, high temperature transient tests, material testing, thermo-nuclear test simulations, or radiation hardening experiments.

HELIOSTAT TEST FACILITY

This site provides setup and testing heliostats with special canting and focusing requirements. Various optical tools are available to cant and focus heliostats for various applications including tracking and canting heliostats for near earth stationary objects in space.

HIGH-FLUX SOLAR SIMULATOR WITH AUTOMATED SAMPLE HANDLING & EXPOSURE SYSTEM (ASHES) :

a one-of-a-kind robotic solar simulator which can be used 24/7. ASHES provides accelerated lifetime aging tests for materials under high-temperature/high-flux conditions. A robotic sample-handling system can be used to move multiple coupons automatically into and out of the



concentrated flux sequentially to expose the samples to predetermined temperatures, fluxes, and/or durations. The peak irradiance is ~1.1 MW/m^2 with an average irradiance of ~0.9 MW/m^2 over a spot size of ~1 inch (2.5 cm).

TEST BED DISH CONCENTRATORS

36' diameter dishes each produce 75kW thermal power and peak fluxes up to 1500 W/cm^2. They are individually controlled to track to sun with 2 axis control.

SOLAR FURNACE

To protect equipment, this dish is in a fixed configuration inside an open-sided building. A heliostat reflects the sun through an attenuator to control the amount of solar flux on target. Produces 5000 degrees K black body thermal output of 16kW.

BENCH TEST FACILITY

Features an assembly bay, two test cells, control room, and bench test capabilities. Each bay has a variety of energy supply options. Use for testing components under high temperature conditions. Analog and digital data collecting systems plus protected viewing from the control room.

ROTATING PLATFORM

Outdoor 10'x 20' platform rotates 360 degrees under computer control. Use to test components under specific solar angles of incidence. Complete data acquisition systems.

ASSEMBLY BUILDING

2500 square foot warehouse/assembly building with 34' ceiling. Includes 5 ton mobile crane with 24' lift, welding and machining tools.

MOLTEN SALT TEST LOOP (MSTL)

The MSTL enables testing of molten salt hardware at high-flow and high-pressure, over a range of temperatures.

MSTL FEATURES & CAPABILITIES:

- 3 Test Stands
- 60% $NaNO_3$ / 40% KNO_3
- Flow rate: 1.5 m^3/min (400 gal/min)
- Salt temperature range: 300-585°C (572-1085°F)
- Maximum salt pressure: 40 bar (580 psi)
- Remove up to 1.4MW solar thermal input

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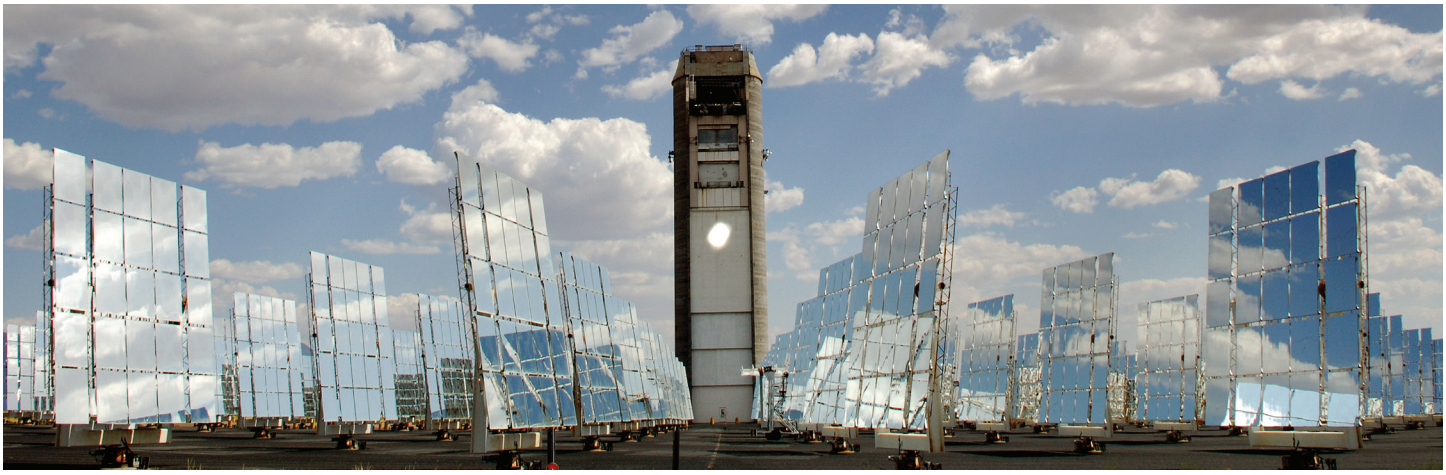

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