Sandia National Laboratories

Energy, Climate & Infrastructure Security

Solar User Facilities:

National Solar Thermal Test Facility (NSTTF) Distributed Energy Technology Laboratory (DETL) and Photovoltaic Systems Evaluation Laboratory (PSEL)

Sandia's solar user facilities integrate emerging energy technologies into new and existing electricity infrastructures for testing and evaluation to address the nation's increasing demands for clean, secure, and reliable energy.

Sandia has three user facilities dedicated to maturing solar technologies where staff work side-by-side with external partners to conduct investigations and explore new systems approaches. These partnerships span the spectrum of utilities, manufacturers, system integrators, universities, state energy offices, other national laboratories and defense institutions, and even international collaborators.

National Solar Thermal Test Facility

The primary goal if the NSTTF 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 NSTTF is a Designated User Facility that comprises a range of facilities and systems for conducting research and development and testing on concentrating solar power systems for large-scale power generation. The power tower enables hardware to be tested on its 60 m (200 ft) tower with up to 5 MW incident solar thermal power. The molten salt test loop, with construction slated to be completed in fall 2012, has three test bays where hardware can be tested in a flowing molten salt environment at temperatures up to 585°C.

Other facilities at the NSTTF include a 16 kW solar furnace, a dish-engine test area, a parabolic trough rotating platform, a high-bay machine shop, and laboratories for component testing. NSTTF engineers have vast breadth of experience designing, developing, testing and analyzing CSP systems.

Distributed Energy Technology Laboratory

DETL is a user facility open to industry partners that uses a reconfigurable infrastructure comprised of distributed generation sources, storage, and programmable loads to simulate electric grid and microgrid scenarios such as island and campus grids, remote operations, and scaled portions of utility feeders and transmission infrastructure. DETL engineers are skilled in high-penetration renewable integration, component and system performance testing, modeling, cyber-security integration, microgrid communications, enhanced efficiency, and load control.

At DETL, renewables, energy storage, and distributed generation can be integrated into a controlled system for testing and evaluation. DETL also offers the ability to conduct tests on numerous utility-scale devices, utilizing utility and surge simulators, high power waveform analyzers, and other related test equipment. DETL engineers use this equipment to assess compliance with various national and international codes and standards, such as UL, IEC, and others, as well as to identify gaps that provide the basis for new standards.

Photovoltaic Systems Evaluation Laboratory

PSEL is a user facility that conducts research in photovoltaic (PV) cells and modules and performs detailed analysis in PV systems design and characterization. Research conducted at PSEL accelerates the development and adoption of new and emerging PV technologies by providing highly accurate, comprehensive performance characterization of cells, modules, arrays, and balance of system components in real world scenarios. In addition to reliability and availability testing, PSEL capabilities include irradiance calibrations, spectral characterizations, and reference cell measurements. The extensive data collection and analysis methods developed by PSEL personnel also support the development and validation of predictive performance and reliability models for new PV technologies.

Commercialization Path

Sandia National Laboratories has extensive experience in helping members of industry, academia, and other organizations take their new technologies and products to a commercial-ready level. These facilities can be accessed by industry, utilities, and government users for a variety of projects.

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U.S. DEPARTMENT OF ENERGY

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