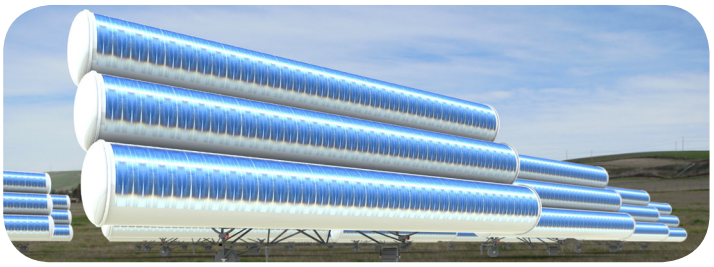
Sandia's Livermore Site to Help Validate Cool Earth Solar's CPV Technology

Sandia and Cool Earth Solar (CES) are collaborating to install a five-acre array of their innovative concentrating photovoltaic (CPV) technology at Sandia's Livermore Valley Open Campus (LVOC) site—providing LVOC with electricity and CES with long-term performance-validation data.

Working Together

Sandia and Cool Earth Solar (CES) have signed a cooperative research and development agreement (CRADA) to test, over five years, their innovative concentrating photovoltaic (CPV) equipment on five acres of the Livermore Valley Open Campus (LVOC). This will be a major step in validating this transformative solar PV technology with bankable performance data. It also represents a strong, green commitment from Sandia and the U.S. Department of Energy (DOE).

CES' technology is a dramatic departure from traditional CPV, from individual components through system integration. Many technological elements are novel solutions, creating an intriguing opportunity to improve PV systems. The CES product also presents new technical/hardware hurdles. If successful, CES could help meet U.S. low-cost and high-manufacturability goals embodied in the DOE SunShot Initiative.



An array of CES concentrators using their proprietary direct-drive-to-ground sun tracking system.

SunShot is a collaborative national initiative to make solar energy cost competitive with other energy generation by 2020. Reducing the installed cost of solar energy systems by ~75% will drive widespread, large-scale renewable energy adoption. This Sandia-CES CRADA is another avenue in the Labs' efforts to support DOE in reaching its SunShot Initiative goals.

Sandia will employ its decades of solar/PV and engineering experience to help CES characterize their component and system performance, such that CES can validate and verify their operational and predictive models regarding power generating performance, reliability, overall system lifetime costs, etc.

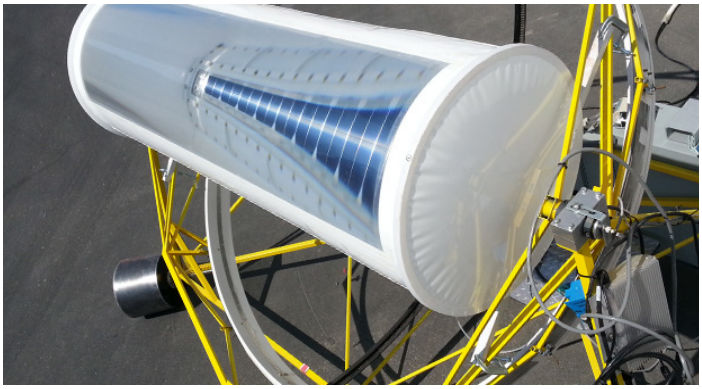
This will be the first time CES' product has undergone a manufacturing process (as opposed to single-unit production) and is the first time production-ready units will be in continuous operation for an extended period. The Sandia-CES CRADA goals include addressing technical issues that can be resolved via large-scale manufacturing—allowing CES to optimize essential system elements to bring this new, low-cost PV solution to market.

Cool Earth Solar: A New Approach to Concentrating PV

CPV optics concentrate sunlight onto a small area of PV material (a significant cost component). As a consequence, CPV units must closely track the sun. Concentrator and tracking system costs can defeat savings from reducing the PV material.

Solar cells generate electrical energy that is proportional to the light energy they receive; for example, concentrating 100 times the amount of light on a solar panel makes it possible to generate 100 times the electricity. Unfortunately, PV cell efficiency declines as its temperature rises. To retain the power-generation increase, the PV cell must be kept relatively cool.

Traditional CPV technologies employ a heavy framework and rigid optical elements that are installed on dual-axis trackers supported by either concrete footings or deeply buried pedestals. In contrast, CES' direct-drive-to-ground sun-tracking system pivots around a simple ground screw. Required site preparation is even less than needed for a simple flat-plate PV array.



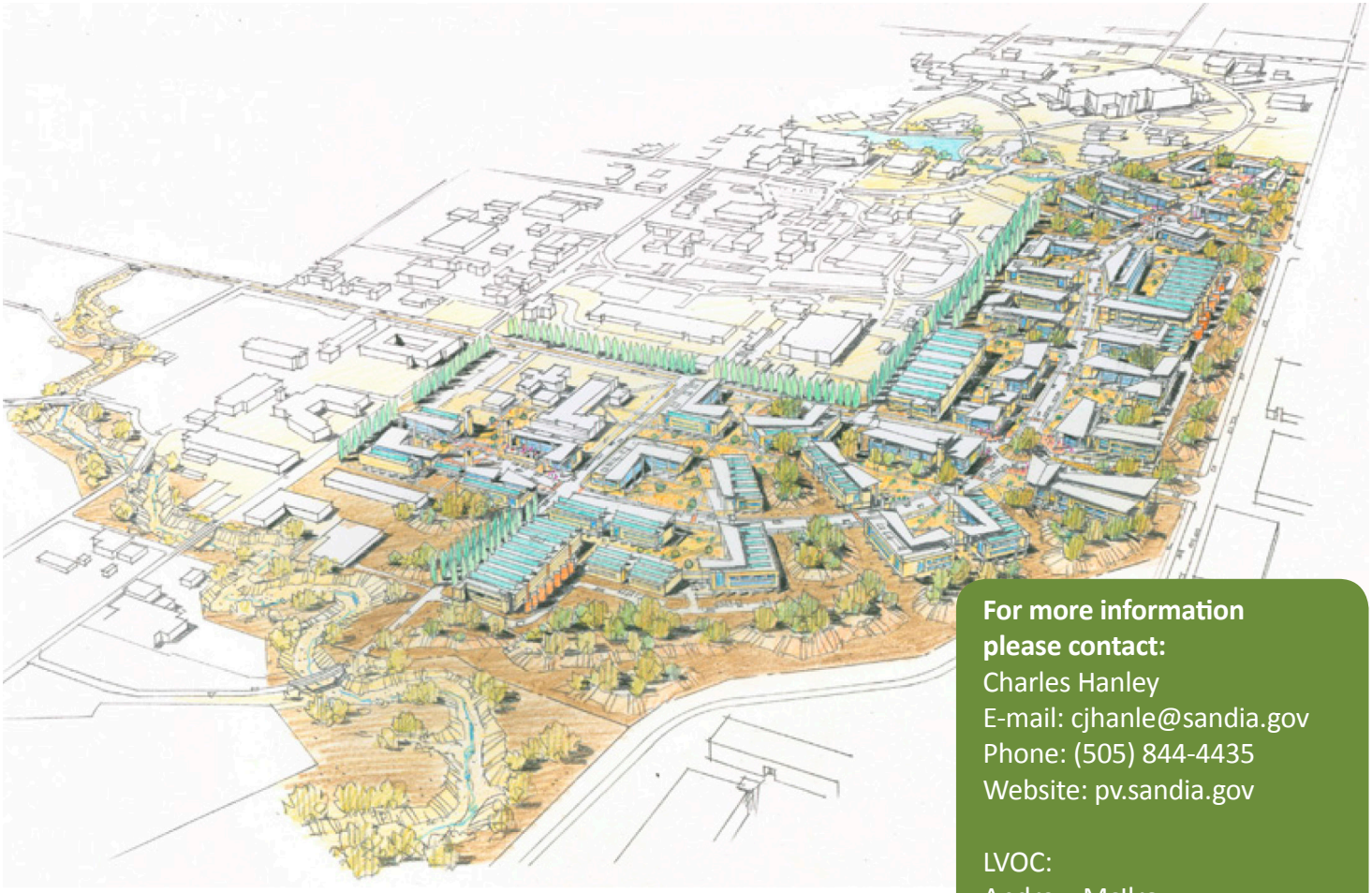
Inflation air allows CES to make an effective concentrator from thin clear and reflective plastic films bonded to each other like a foil balloon. Actively controlled inflation optimizes the device's optical properties. This strong, lightweight structure can survive high winds and protects the PV cell and receiver from rain, snow, insects, and dirt.

CES bonds two sheets of inexpensive, extended-temperature plastic film at the edges and then inflates the construct. Their concentrator naturally focuses the sunlight to a point (with a concentrating power of 1200 suns).

Livermore Valley Open Campus

Two neighboring research facilities in Livermore Valley, California—Lawrence Livermore National Laboratory (LLNL) and Sandia National Laboratories/ California—are working together to create an open, national security research and development space called LVOC. The campus is being built on 110 acres of contiguous land adjoining the southeast corner of LLNL's main site and the northeast corner of the Sandia site.

Current and future national security challenges require increased coupling to the private sector in order to understand threats and deploy solutions in areas such as energy and environmental security, economic security, cyber security, high-performance computing, and nonproliferation. LVOC provides a collaborative space for these activities supported by core institutional competencies, well established expertise, and world-class facilities. This Sandia-CES CRADA project will provide power to an Open Campus building.



The Livermore Valley Open Campus at the juncture of LLNL and Sandia-California.

For more information please contact:
Charles Hanley
E-mail: cjhanle@sandia.gov
Phone: (505) 844-4435
Website: pv.sandia.gov

LVOC:
Andrew McIlroy
E-mail: amcilr@sandia.gov
Phone: (505) 844-4435
Website: www.sandia.gov/lvoc

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