

The Energy Security program area accelerates the development of transformative energy solutions that will enhance the nation's security and economic prosperity.

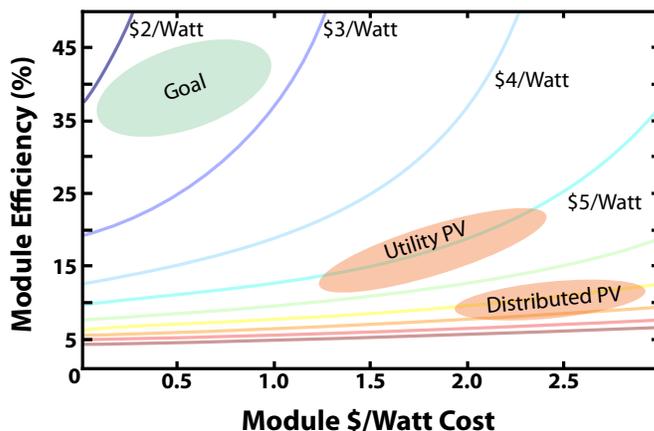
Vision

To enhance the nation's security and prosperity through sustainable, transformative approaches to our most challenging energy, climate, and infrastructure problems.

Goal: Develop advanced solar energy technologies & systems that will enable a domestic solar industry to deliver at >10¢/kWh

The 2008 average U.S. residential price per kilowatt-hour (kWh) for electricity was 11.26¢—cheaper in some states (Idaho: 7¢) and more expensive in others (Connecticut: 19.5¢). Once wind-generated electricity became competitive with these prices, U.S. wind turbine deployment skyrocketed to where we became the leading nation for wind-generated electricity in 2007—with 36,300 MW of generating capacity installed by June 2010.

The DOE Solar Energy Technology Program has key targets and funded research activities to accelerate the development of photovoltaic (PV) technology capable of producing electricity at grid parity, ~10¢/kWh. Sandia supports this goal through innovative R&D, technology development, performance testing and reliability, and deployment. Sandia's goal is to leverage our broader laboratory capabilities and recent R&D advancements in microsystem-enabled PV and related materials, solar resource forecasting using high-performance computing, and large-scale (1 kW) integrated PV modules. Additionally, the program will focus on developing key strategic industry partnerships



in solar energy, including Fraunhofer and with industry consortia (for example SEMATECH) bidding on the recently announced

Industry must manufacture more efficient PV cells in order to substantially penetrate the market.



DOE Energy Efficiency and Renewable Energy Solar Energy Technologies Program Manufacturing Initiative.”

In order to meet the administration’s aggressive clean-energy goals, the industry must reduce costs and improve the efficiency of renewable technologies through

PV systems that meet the 10¢/kWh goal would increase the viability and deployment of solar systems throughout the nation. Key technology breakthroughs would enable PV to compete with other forms of renewable and fossil-based electricity generation to meet both our future energy demand and contribute to the nation achieving its energy independence.

Solar Glitter

Sandia developed tiny glitter-sized PV cells that could revolutionize solar energy collection. The crystalline silicon micro-PV cells will be cheaper and have greater efficiencies than current PV collectors.

Micro-PV cells require relatively little material to form well-controlled, highly efficient devices. Cell fabrication uses common microelectronic and microelectromechanical systems techniques. From 14–20 µm thick, they are 10 times thinner than conventional cells, yet perform at about the same efficiency.

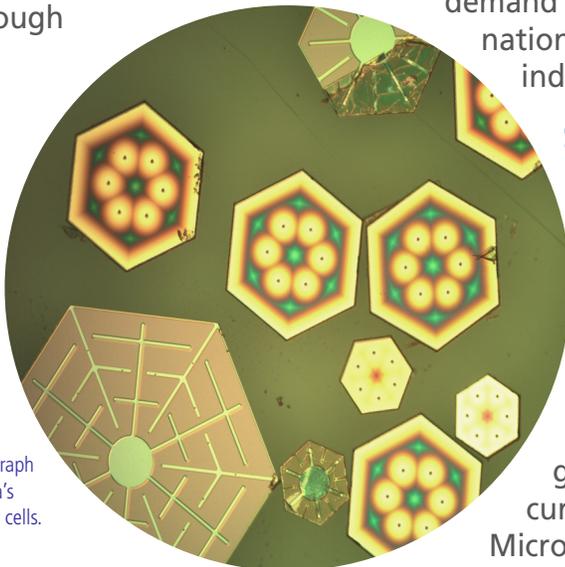
Micro-PV benefits include improved performance, reduced costs, higher efficiencies, and new applications. Units could wrap around unusual shapes

transformational technology advancements. Although solar energy deployment has experienced large industrial growth over the last few years, the cost of energy is still higher than needed to achieve truly large-scale deployment. Developing advanced solar technologies and systems that will deliver electricity at less than 10¢/kWh will provide the U.S. industry with a worldwide competitive advantage.



Greg Nielson displays a strip of solar glitter.

for solar power integrated into buildings, tents, and maybe even clothing. Rooftop micro-PV modules could have intelligent controls, inverters, and even storage built into the chip—simplifying the grid-integration process. The tiny cells could turn a person into a solar battery charger—military personnel in the field or backcountry hikers could recharge batteries for phones, cameras, and other electronics as they walk or rest.



A micrograph of Sandia’s micro-PV cells.

For more information please contact:

Jose Zayas

E-mail: jrzayas@sandia.gov

Phone: (505) 284-9446

Website: <https://share.sandia.gov/crf/>