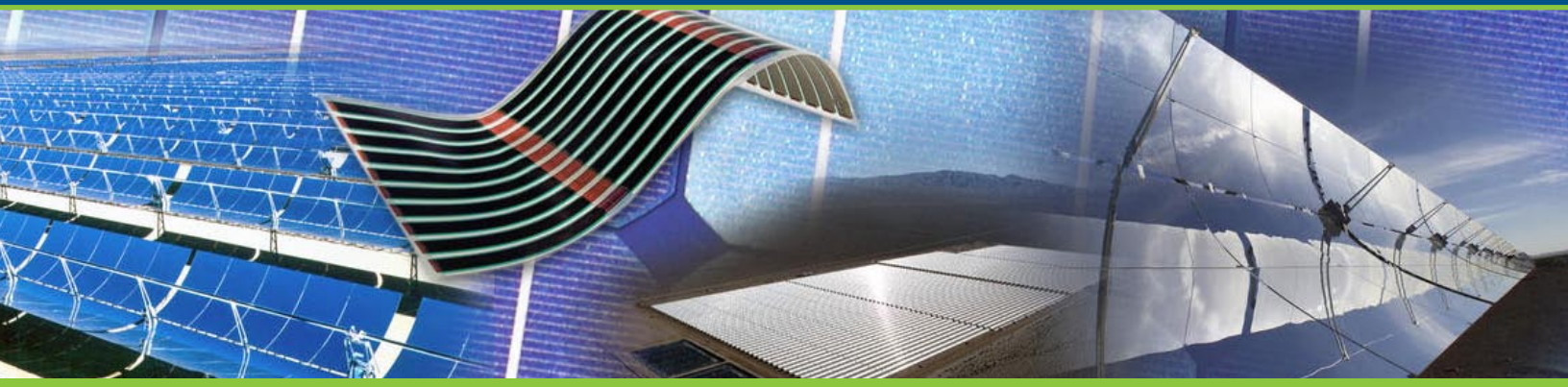

# SOLAR ENERGY TECHNOLOGIES PROGRAM NEWSLETTER

## JULY 2009

## President Announces $117M for Solar Projects

The Administration's vision for the energy future of America continues to brighten the solar world. On May 27, 2009, President Obama announced more than $467 million from the American Reinvestment and Recovery Act (ARRA) to accelerate the growth of solar and geothermal energy in the United States. Of this amount, more than $117 million is dedicated specifically to solar technologies:

> "These technologies [solar and geothermal] represent two pieces of a broad energy portfolio that will help us aggressively fight climate change and renew our position as a global leader in clean energy jobs."
>
> Energy Secretary Steven Chu

- **Photovoltaics (PV)** – $51.5 million
- **Concentrating Solar Power (CSP)** – $25.6 million
- **High Penetration Solar Deployment** – $40.5 million

ARRA solar funding announcements are posted on the Web site of the Solar Energy Technologies Program (SETP) at www.eere.energy.gov/solar/recovery.html. Current opportunities include funding in the following areas:

- **PV Technology Incubators** – focuses on solving technical challenges to scaling up manufacturing and commercializing new products by 2012.
- **Foundational PV and CSP Research and Development (National Laboratory Call)** – complements ongoing SETP-funded private sector research and is restricted to DOE national labs.
- **Solar Market Transformation** – funds different Solar America Cities Special Projects which help the 25 Solar America Cities scale-up innovative programs and concepts and provide solar installer instructor training in PV and solar heating and cooling systems.
- **High Penetration Solar Deployment** – accelerates the placement of high levels of PV penetration into existing or newly designed distribution circuits.

To view funding opportunities, visit www.solar.energy.gov/financial_opportunities.html.

For information about ARRA funds, visit www.energy.gov/recovery/.

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

# Program Happenings and Highlights

## New Manager Takes Reins of DOE Solar Program

*JoAnn Milliken, Acting Program Manager of SETP*

**JoAnn Milliken**, a veteran leader of the U.S. Department of Energy (DOE), was named Acting Program Manager of the DOE Solar Energy Technologies Program (SETP) in March 2009. In this role, Milliken oversees DOE solar research, development, demonstration, and market transformation activities.

Milliken heads up SETP as part of a long and successful history at DOE. She joined the Agency in 1994 to manage battery and fuel cell research and development, and she led hydrogen and fuel cell technology development. In 2007 she became Program Manager of the DOE Hydrogen Program, directing the program's accelerated research, development, and demonstration efforts under the Hydrogen Fuel Initiative. In addition, Milliken served as Acting Program Manager of the DOE Wind Program in 2008, launching the program's road-mapping efforts to enable the United States to achieve 20% of its energy from wind by 2020.

Prior to joining DOE, Milliken was a research chemist at the U.S. Naval Research Laboratory and a program manager at the Office of Naval Research, where she conducted and managed mission-related materials research. She earned a Doctorate in chemistry from the University of Pennsylvania under Nobel Laureate Professor Alan MacDiarmid. She also received a Bachelor of Arts in chemistry from LaSalle University.

**John Lushetsky**, the former Program Manager, was selected for a special assignment as the Acting Deputy Assistant Secretary for the DOE Office of Energy Efficiency and Renewable Energy (EERE).

On a related note, **Cathy Zoi** was confirmed by the U.S. Senate as the new Assistant Secretary for EERE, which oversees SETP, on June 19, 2009.

## PV Supply Chain, Cross-Cutting Technologies Awards Announced

On May 27, 2009, SETP announced the awardees of the Program's PV Supply Chain and Cross-Cutting Technologies project, which funds companies with capabilities critical to PV manufacturing. Funded projects have the potential to impact a substantial segment of the PV industry within 2 to 6 years.

Awards are given in two topic areas: proof of concept technical/feasibility assessment; and research, development, and demonstration. Recipients are as follows:

### Proof of Concept Technical/Feasibility Assessment

- Accustrata (College Park, Maryland)
- Advanced Cooling (Lancaster, Pennsylvania)
- Alenas Imaging (Conway, Massachusetts)

*Continued on following page*

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

### NREL Cell Wins Federal Technology Transfer Prize

A new class of ultra-light, high-efficiency solar cells developed by National Renewable Energy Laboratory (NREL) has been awarded a national prize for commercialization of federally funded research. The Inverted Metamorphic Multijunction (IMM) Solar Cell was named a winner of the 2009 Award for Excellence in Technology Transfer by the Federal Laboratory Consortium (FLC) for Technology Transfer.

The original IMM cell was invented by Mark Wanlass of NREL's Concentrating Photovoltaics (CPV) Group. The design established a solar cell efficiency of 37. 9% under concentrated light equal to 10 suns in 2005. In 2008, a modified version of the IMM design set a new record of 40.8% efficiency under 326 suns at NREL.

Since 2005, NREL and Wanlass have worked with Emcore Corp of Albuquerque, New Mexico, to develop a commercial version of the IMM cell under a Cooperative Research and Development Agreement. Commercialized versions of the IMM cell are aimed at the space satellite market and for use on Earth in concentrated photovoltaic arrays, which use lenses or mirrors to focus sunlight onto the solar cells.

Wanlass and Emcore's director of research and development Paul Sharps received the award at a ceremony on May 7 at the FLC national meeting in Charlotte, North Carolina. Sharing the award is NREL's solar cell R&D team.

- Fraunhofer USA, Inc., Center for Laser Technology (Plymouth, Michigan)
- Optomec, Inc. (Albuquerque, New Mexico)
- Palo Alto Research Center, Inc. (Palo Alto, California)
- Photonic Glass Corp. (Sharon, Massachusetts)
- PPG Industries, Inc. (Allison Park, Pennsylvania)
- SiOnyx Inc. (Beverly, Massachusetts)
- Solar Red (San Jose, California)
- Texas Engineering Experiment Station (College Station, Texas)
- University of Houston (Houston, Texas)
- University of Missouri (Rolla, Missouri)
- The University of Texas at Arlington (Arlington, Texas)
- Washington Technology Center (Seattle, Washington)

### Research, Development, and Demonstration

- 3M (St. Paul, Minnesota)
- Air Products and Chemicals, Inc. (Allentown, Pennsylvania)
- DuPont (Wilmington, Delaware)
- General Electric (Niskayuna, New York)
- Sierra Solar Power (Fremont, California)
- Silicon Genesis Corporation (San Jose, California)
- Varian Semiconductor (Gloucester, Massachusetts)
- XeroCoat (Redwood City, California)

To learn more about the awards, visit www.solar.energy.gov/pv_supply_chain.html.

## U.S. Trade Mission Learns About Solar in India

Representatives from U.S. government and industries involved in solar energy embarked on a solar trade mission to India, March 22-27, 2009, to meet with their Indian counterparts. The trade mission, which was organized and led by the U.S. Department of Commerce (DOC), introduced 14 U.S. solar firms to the emerging Indian solar market through industry roundtables and client meetings in New Delhi, Jaipur, and Ahmedabad. A total of nearly 100 business-to-business meetings were facilitated, and the group also met with government officials.

John Lushetsky, Acting Deputy Assistant Secretary of DOE EERE, William Zarit, Deputy Assistant Secretary of International Operations of DOC, and Carmine D'Aloisio, Minister-Counselor for Commercial Affairs in India, led the event. Commercial Service India and other DOC agencies assisted in planning and execution.

NATIONAL LABORATORY
TECHNOLOGY DEVELOPMENTS

### New TOPCAT System Tested at California CSP Plants

In March, a new alignment technique—Theoretical Overlay Photographic Collector Alignment Technique (TOPCAT)—was used to analyze mirror alignment at the Solar Energy Generating Systems (SEGS) plants in California. The resulting data was acquired in half the time the process has typically taken.

TOPCAT, a variation on dish alignment approaches developed at Sandia National Laboratories, takes photographs of the reflected receiver images in each of the four mirror rows in a trough module, whether LS-2 or 3. The data from the SEGS test will be analyzed, and the amount of adjustments needed will be calculated to bring each mirror into alignment. TOPCAT takes into account receiver misalignment and module-to-module alignment errors. A typical LS-2 loop consisted of two rows with 48 modules per row. Average time to acquire images and move to the next module was less than 20 seconds.

This was the second trip to the SEGS plants in CA using the TOPCAT system, and the first time it was used on SEGS plants using LS-3 modules.

## New RSS Feed Offers Instant Notice of Funding Opportunities

SETP has launched a RSS (Really Simple Syndication) feed to notify users of new funding opportunity announcements (FOAs). Users may register to receive real-time information as FOAs are released. To register, go to www.solar.energy.gov/financial_opportunities.html and click on "Subscribe to the SETP Financial Opportunities RSS feed."

## DOE Seeks Proposals, Announces Awards for PV Technology Incubator Program

DOE's National Renewable Energy Laboratory (NREL) is seeking project proposals as part of recently announced DOE funding to accelerate commercialization of solar energy. Proposals will be part of the DOE PV Technology Incubator program, which builds partnerships with U.S. industry and helps accelerate prototype and precommercial PV technologies into pilot and pre-scale manufacture.

The anticipated ARRA program funding is $9 million. Subcontracts, up to $3 million each, will be awarded as 18-month phased subcontracts. The minimum entrance criteria are demonstrated PV cells, process lab devices, or modules. The successful exit criteria are for prototype modules and pilot production demonstration at greater than 3 megawatts a year. Letters of intent are due by July 13, 2009. For more information, visit www.nrel.gov/business_opportunities/solicitations_rfps.html.

As part of the DOE PV Technology Pre-Incubator program, NREL also announced partnerships with 13 U.S. small solar businesses that have the capability to enter the market by 2012. These awards are aimed at small companies that are developing innovative technology concepts that will result in prototypes with project manufacturing costs of less than $1/watt. The total anticipated subcontracts under ARRA are $6 million.

Awardees are as follows:

- Banyan Energy, Inc. (Kensington, California)
- Crystal Solar, Inc. (Santa Clara, California)
- International Solar Electric Technology, Inc. (Chatsworth, California)
- TiSol, LLC (Pasadena, California)
- Ascent Solar Technologies, Inc. (Littleton, Colorado)
- EPIR Technologies, Inc. (Bolingbrook, Illinois)
- MicroLink Devices (Niles, Illinois)
- 1366 Technologies, Inc. (Lexington, Massachusetts)
- Lightwave Power, Inc. (Cambridge, Massachusetts)
- Vanguard Solar, Inc. (Sudbury, Massachusetts)
- Semprius, Inc. (Durham, North Carolina)
- SpectraWatt, Inc. (Hillsboro, Oregon)
- Luna Innovations Incorporated (Danville, Virginia)

To learn more about each company's pre-incubator technology, visit www.nrel.gov/news/press/2009/696.html.

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

### NREL Develops Capability to Model and Evaluate Sub-Hourly PV System Output

NREL has been working on developing higher temporal resolution PV output sets as part of the Western Wind and Solar Integration Study (WWSIS). This is the largest regional renewable energy integration study undertaken to date.

NREL developed an algorithm based on measured PV system performance that provides realistic 10-minute PV output values at sites that have satellite-modeled hourly irradiance data available. This enables realistic simulations of PV output for the 10-minute utility dispatch timeframe for almost any scenario of residential, commercial, and utility-scale PV deployment. In future work, this model will continue a validation process for sites outside the Southwest and examine the possibility of providing PV output and/or plane-of-array irradiance for the entire United States.

The algorithm has been shown to work for different PV collector types, including fixed flat plates and one-axis-tracking PV systems. This algorithm has been automated to provide a complete set of 10-minute PV outputs for 29 different locations, for three complete years (2004–2006), and for 15 different PV collector orientations. More information is available at www.westconnect.com/init_wwis.php.

# Event News

## UPCOMING EVENTS

### Solar Grid Integration and Energy Storage Workshop Planned

SETP staff, national laboratory teams, and industry professionals gathered June 24–25, 2009, in Santa Ana Pueblo, New Mexico, to focus on energy storage issues related to integrated PV/grid systems. Part of the Solar Energy Grid Integration Systems efforts, the workshop addressed topics such as identifying and prioritizing needs of energy storage for high penetration PV applications in residential and commercial sectors; determining high-priority research, development, and demonstration activities; and defining performance requirements for those activities.

### DOE Teams Up with Industry on PV Roadmaps

DOE is partnering with industry association SEMI/PV Group for a joint workshop to discuss the development of a global PV industry roadmap. "Photovoltaic Industry Roadmaps: Opportunities through Collaboration" will solicit input from SEMI members to help develop an industry roadmap, which will be used to evaluate common components with the goal of reducing system costs. Speakers, including Solar Energy Industries Association representatives, will share PV roadmap experiences in Japan, the European Union, and the United States, highlighting key lessons from roadmap models in other industries. Participants will share input from PV manufacturers and supply chain partners, discuss potential roadmap models, and develop next steps. The workshop will be held in San Francisco on July 12, 2009. More information is available at www.solar.energy.gov/meetings_workshops.html.

### International Reliability Workshop to Address Quality, Safety

The International PV Reliability Workshop II will be held July 29–31, 2009, at the Tempe Mission Palms in Tempe, Arizona. The event will address global quality and safety of PV materials, including testing and certification of components, international codes and standards, grid integration, safety, and market transformation efforts. Speakers include experts from China, Japan, and the United States.

The workshop will include tours of Arizona Public Service's STAR Facility, TUV Rheinland's PV test laboratory at Arizona State University (ASU), and Atlas Materials Testing facility. The event is organized by Sandia National Laboratories, NREL, and TUV/ASU.

More information and registration are available at www.nrel.gov/pv/ipr_workshop.html.

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

### SNL Signs MOU with Japanese National Institute for PV Project Development

SNL and Japan's National Institute of Advanced Industrial Science and Technology (AIST) have signed an agreement to conduct and share research of mutual interest. Areas of immediate importance named in the memorandum of understanding include photovoltaics, nanoelectronics, nanomaterials, and computational investigations of the properties of materials.

Collaborations are expected to include staff exchanges between the two labs and information-sharing through jointly held workshops. SNL Vice President Rick Stulen and Tamotsu Nomakuchi, president of AIST, signed the agreement on May 4 at the DOE headquarters in Washington, D.C. Japan's Minister of Economy, Trade and Industry Toshihiro Nikai and U.S. DOE Secretary Steven Chu were present for the signing.

This MOU signing follows a three-day workshop last April between the State of New Mexico and various Japanese government and private organizations, in which SNL participated, to define collaborations for high-penetration PV and smart grid applications in New Mexico.

## Future of PV Manufacturing Focus of DOE-Sponsored Workshops

A series of workshops to explore the future of PV manufacturing in the United States is being planned to augment the ongoing National Research Council (NRC) project "Competing in the 21st Century: Best Practice in State & Regional Innovation Initiatives." The goal of the workshops, which are sponsored by DOE and organized by NRC, is to examine factors that impact the PV market and enable the United States to capture and maintain competitive positions in domestic and foreign PV markets. Workshop speakers will include industry leaders, members of academia, government officials, and other stakeholders.

The first workshop was held April 2, 2009. Audio from the event is available at http://sites.nationalacademies.org/pga/step/index.htm.

The next workshop is tentatively scheduled for July 2009.

### PAST EVENTS

## DOE Participates in Solar Fact-Finding Trip to Spain

*Heliostats at the Abengoa PS 10 facility in Spain.*

A fact-finding trip to Spain to learn more about the country's solar energy efforts included a representative from the SETP, 11 utility companies, both small municipals and large investor-owned utilities, and the Electric Power Research Institute.

The journey began in Madrid with presentations about the Spanish feed-in tariff system and cost/grid parity. The group also visited the Spanish Ministry Institute of Diversification and Saving of Energy and toured the Phoenix Solar Installation. Following a briefing at Iberdrola, trip participants toured SunPower's 8.4-MW installation—a single-axis tracker system in a former rice paddy.

At Abengoa, the group visited PS10 and PS20 power tower installations, a molten salt storage system, an in-progress trough system, and the company's assembly facility. The group also viewed trough systems at Andasol plant 1, the first commercial parabolic trough power plant in Europe, and its sister system, Andasol 2. After a drive through "renewable alley," where wind and solar abound in the Spanish desert, the group visited Plataforma Solar de Almeria, Europe's largest center for research, development, and testing of CSP technologies. The trip, which was organized by the Solar Electric Power Association, concluded with a tour of First Solar's 5.8-MW thin film PV plant.

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

### Recovery Act Investments at NREL

U.S. Department of Energy Secretary Steven Chu made his first visit to NREL as secretary and announced $110 million in funding under the American Recovery and Reinvestment Act.

More than $100 million will accelerate construction of NREL's Golden, Colorado, campus, dramatically expanding its capacity for renewable energy research and partnerships while showcasing some of the world's most energy efficient buildings.

The announcement was part of a half-day tour of NREL by the Secretary and Colorado Gov. Bill Ritter. With NREL Director Dan Arvizu, they toured the Process Development Integration Laboratory, NREL's unique collaborative facility where industry works directly with researchers to rapidly turn solar photovoltaic innovations into commercial products.

Secretary Chu outlined the Administration's efforts in its first 100 days to streamline DOE procedures and loan approval for $26B authorized since mid-February for clean energy projects that will create green jobs and promote economic recovery. He also reiterated the Administration's goal of doubling the percentage that renewable energy contributes to the nation's electricity supply by 2012—from 5 to 10 percent. Chu identified the hurdles in several categories where the Laboratory already performs critical research, including efficient building design, solar energy and improved energy storage for both personal vehicles and utility-scale power.

"It's a start," Chu said of the new investments. "By 2050 we need to reduce carbon emissions by 80% or more. To reach that goal we will need transformative new technologies."

## Industry Workshop Focuses on Reliability of c-Si PV Cells

A procurement specification guideline for c-Si PV cells, completed by the Solar America Board of Codes and Standards (Solar ABCs) as part of its effort to ensure that PV modules will meet long-term reliability goals, served as the basis of a workshop on May 13, 2009. Held by DOE and SEMI/PV Group, the workshop explored expanding the scope and support for developing useful cell standards.

SEMI, a global industry association serving manufacturing supply chains for the microelectronic, display, and PV industries, and PV Group, SEMI's global PV initiative, have significant experience in developing standards for equipment, materials, and process standards in device manufacturing. Through collaboration with SEMI/PV Group, SETP hopes to bring suppliers together to drive down costs of PV materials, tools, and components.

The findings of this workshop, which was hosted by Dr. Govindasamy TamizhMani, a member of the Solar ABCs, at Arizona State University's Polytechnic campus, will also be shared with a team of industry experts working in SEMI's PV Group-supported Global Standards Roadmap project.

The full Solar ABCs report, "Crystalline Silicon Terrestrial Photovoltaic Cells–Supply Chain Procurement Specification Guideline," can be downloaded at www.solarabcs.org/cellprocurement.

## SETP Holds Peer Review; Summary Report Planned

SETP held its Program Peer Review on March 9–11, 2009, in Denver, Colorado (a Solar America City), during which outside experts evaluated the program and its projects. In addition, program staff, national laboratory teams, and industry partners discussed SETP subprograms and projects funded by DOE. The resulting feedback will help guide SETP in its strategic planning process.

Proceedings for the event covered four areas: PV research; CSP research and development; evaluation, validation, and analysis; and market transformation activities.

DOE will summarize reviewer feedback into a report later this summer and provide details to individual principal investigators.

Session presentations can be downloaded at www.solar.energy.gov/review_meeting/program_review_meeting_2009.html.

## Pre-Solicitation Conference at Princeton Lab for PPA Proposal

More than 50 attendees from approximately 30 companies attended a solar pre-solicitation conference at DOE's Princeton Plasma Physics Laboratory (PPPL) on March 19, 2009. In February 2009, the Defense Energy Support Center issued a Power Purchase Agreement (PPA) request for proposal for rooftop and/or carport PV systems on behalf of PPPL. The request for proposal sought fixed-price bids for a 10-year PPA contract and includes a 10-year license between the solar developer and DOE to provide access to the installations. The Federal Energy Management Program, SETP, and NREL will provide technical support. The solicitation closed May 15, 2009. Awards, if any, are expected in September 2009.

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

### SNL, UL Collaborate on PV Arc Fault Circuit Interrupter Requirements

The PV industry is responding to recent fires associated with PV systems with efforts better understand the causes and impacts of direct current arc faults in high voltage systems. There is no direct protection in a PV system to reliably detect and mitigate a PV arc fault failure mode.

In April, Underwiters Laboratories (UL) convened an ad hoc working group to address this topic with representatives from the PV industry, protection equipment manufacturers, UL, SNL, and the Solar America Board of Codes and Standards. As a result of the two-day meeting, SNL and UL are collaborating to replicate PV arc faults under controlled lab conditions to characterize faulting signal signatures and develop proposed modifications to the 2011 National Electric Code (NEC) for PV AFCI protection.

# Solar America Cities Notes

## Solar America Cities Recognizes Philadelphia at PV America Conference

On June 8, 2009, SETP Acting Program Manager JoAnn Milliken presented Mayor Michael Nutter of Philadelphia with a Solar America City sign, officially recognizing the city as a DOE Solar America City.


*JoAnn Milliken, Acting Program Manager of SETP, presents Philadelphia Mayor Michael Nutter (left) with the city's Solar America City sign. Rhone Resch, President and CEO of SEIA (right), looks on. Photo courtesy Solar Energy Industries Association.*

The presentation was part of the PV America Conference in Philadelphia June 8-10, 2009, which brought together PV manufacturers, developers, and installers to provide the most current updates on PV technology, industry trends, and business opportunities. The event was presented by the Solar Energy Industries Association and the Institute of Electrical and Electronics Engineers.

Philadelphia's Solar America City team has many innovative projects underway, and is guided by a community-based Solar Partnership Advisory Board. Philadelphia recently announced a rebate program that funds 35% of the cost of residential and small business solar installations.

## Orange County Convention Center Flips the Switch

*DOE'S John Lushetsky (second from right) joins Orange County Mayor Richard Crotty, Orlando Mayor Buddy Dyer, Senator Lee Constantine, and representatives from Orlando Utilities Commission and Orange County Convention Center to flip the switch on a new 1-MW rooftop solar installation. Photo courtesy Gil Ihrig, Orange County Photographer.*

The Orange County Convention Center (OCCC) in Orlando, Florida, held a "Flipping the Switch" solar installation ceremony to mark the launch of OCCC's 1-MW rooftop installation on May 20, 2009.

*Continued on following page*

NATIONAL LABORATORY
TECHNOLOGY DEVELOPMENTS

### Workshop on CSP Qualification Methods and Standards

Development of qualification methods and standards for CSP components and systems was the subject of a recent workshop hosted by NREL and the German Aerospace Center in Golden, Colorado. Attendees, which included representatives from U.S., German, and Spanish research laboratories, as well as representatives from U.S. and international component suppliers, developers, EPC contractors, and owner/debt engineering firms, provided expert opinions on testing and standards. Discussions focused on the development of standards for parabolic trough mirror/module characterization, mirror lifetime and durability testing, parabolic trough receiver characterization, and solar field acceptance testing.

The information wll be used to prepare for an additional workshop that will be held to coincide with the 2009 SolarPACES Symposium in September.

Participation in these working groups is open to anyone interested in actively supporting one or more of the topic areas. For solar field component testing, contact Dr. Peter Heller at peter.heller@dlr.de. For solar field acceptance testing, contact Mark Mehos at mark.mehos@nrel.gov.

The OCCC received a Solar America Showcase award in 2007 to develop the solar system, which is the largest of its kind in the southeastern United States. The multi-purpose project also includes a Climate Change Education Center where the public can learn about the benefits of solar and other renewable energy technologies. The OCCC is the second largest convention center facility in the country, hosting an estimated 1.4 million attendees per year.

In his remarks at the event, DOE Acting Deputy Assistant Secretary for Energy Efficiency and Renewable Energy John Lushetsky praised Orlando for its efforts as a DOE Solar America City, and recognized the convention center as a highly visible reminder of the community's commitment to solar.

## City of Tucson Dedicates First of Seven Solar Projects

Tucson, Arizona, one of DOE's 25 Solar America Cities, unveiled the first of seven municipal PV systems funded by Clean Renewable Energy Bonds (CREBs) during a dedication ceremony on May 29, 2009, at the El Pueblo Activity Center. The roof-mounted 100 kW system is part of 1 MW total capacity that is planned for the seven projects. The system was built by SPG Solar using panels from local manufacturers Kyocera Solar and racks from Schletter, Inc. Through the Solar America City award, DOE provided Tucson with technical assistance from financial experts at NREL to help the city navigate the CREBs process.

## Berkeley Launches SmartSolar for Consumers

The City of Berkeley, California, launched its SmartSolar program on April 28 to provide Berkeley residents and businesses with free consulting services, energy audits, and referrals to solar vendors. This independent service will educate consumers on energy efficiency, solar hot water, and solar electric technologies, and can provide site-specific project advice. The first year of the program is being funded by the DOE Solar America Cities partnership. The program will be administered by Berkeley nonprofit organization Community Energy Service Corporation.

More information is available at www.ebenergy.org/smartsolar/.


*Berkeley Mayor Tom Bates announces SmartSolar, a program for residents and businesses.*

"I'm really happy to see the program come to Berkeley, because it provides us with another tool to assess [whether] solar energy makes sense for people and their homes."

Berkeley Mayor Tom Bates

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

### Hybrid Cooling Analyzed for Desert CSP

NREL has contracted with WorleyParsons in Golden, Colorado, to determine the economics of hybrid parallel cooling systems for parabolic trough electricity generating plants. The study builds on NREL's prior examination of CSP water consumption and will allow designers to determine the impact of water-saving measures on plant-levelized electricity cost, plant profits, and water consumption.

The study will compare hybrid combinations of water- and air-cooled condensers to pure wet-cooled and pure dry-cooled cases. Dry cooling loses effectiveness on very hot days, so an optimum system might provide a wet-cooling option for a few days of the year, while relying on dry cooling for the rest. The analysis will also look at two different U.S. locations, including the Nevada Test Site that is northwest of Las Vegas.

The Nevada Test Site location is of particular interest, given DOE's National Nuclear Security Administration (NNSA) intent to locate a solar plant at the site. On March 16, NNSA issued a Notice of Intent to Award to Johnson Controls Inc. for a 125-MW parabolic trough plant. Water consumption is a major concern for the location and examination of dry- or hybrid-cooling options will be critical to the Environmental Impact Statement for the project.

## Solar America Cities Participates in National League of Cities Green Conference

The National League of Cities held its first Green Cities Conference and Expo, April 18-21, 2009, in Portland, Oregon, hosting more than 750 participants from 235 cities. During the conference's opening plenary, DOE Solar America Cities representative Hannah Muller presented Portland Mayor Sam Adams with a Solar America City road sign and congratulated him on Portland's achievements in streamlining solar permitting and incorporating solar energy into the city's climate action plan. Muller recounted the lessons learned from the Solar America Cities program and the creative approaches DOE's 25 partner cities are taking to remove market barriers and make solar a viable energy option. DOE representatives and conference attendees had the opportunity to interact at the Solar America Cities booth, where scores of city representatives inquired about what they could do to promote local advancement of solar energy.


*Lee Rahr (left), Portland's Solar America City lead, with Hannah Muller (right) of DOE's Solar America Cities program, at the National League of Cities Green Cities Conference in Portland, Oregon.*

Presentations from the conference will be available at www.nlc.org/CONFERENCES___EVENTS/GreenCities/greenprogram.aspx.

## 25 Solar America Cities Share Experiences at Annual Meeting

DOE assembled representatives from its 25 partner cities for the second Solar America Cities Annual Meeting, March 30–April 2, 2009, in San Antonio, Texas, to discuss solar best practices and lessons learned. The goal of the meeting was to strengthen the network of cities working to make solar mainstream at the local level. The partners were joined by representatives from the national laboratory, university, and private sector institutions that provide the cities with hands-on technical assistance. Topics covered included creative approaches to solar finance, workforce development, engaging utilities and communities on solar, solar permitting, and codes and standards.


*Tom Kimbis (left) is joined by the mayors of Pittsburgh, San Antonio, Berkeley, Santa Rosa, Austin, and Ann Arbor at the 2nd Annual Solar America Cities Meeting in San Antonio, Texas.*

Six mayors attended the meeting, from the cities of Ann Arbor, Austin, Berkeley, Pittsburgh, San Antonio, and Santa Rosa. A highlight was the Mayors'

*Continued on following page*

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

### VSHOT Demonstration for Industry Partner

The capabilities of the Video Scanning Hartmann Optical Test (VSHOT), a useful tool in research, development, and quality checking for both point and linear focus concentrators, were recently demonstrated at Skyline Solar's linear-focusing, low concentration reflector at NREL. The purpose was to show how VSHOT could be used to characterize Skyline's collector.

Two companies, Solar Systems Company and Abengoa Solar, have already implemented VSHOT at their facilities. NREL provided design, fabrication, and training assistance to both companies through a Cooperative Research and Development Agreement.

NREL, through DOE, is working on a licensing agreement to transfer VSHOT technology to industry, benefiting both existing and new industry users.

Roundtable, a facilitated discussion during which mayors fielded questions on the current and future role of solar in their cities.

Presentations from the meeting are available at http://SolarAmericaCities.energy.gov/AnnualMeeting2009

# Solar America Showcase Awards

## Winners Commit to Solar from the Farm Belt to the Islands

DOE announced the newest award winners of the Solar America Showcases on April 30, 2009. Solar America Showcases accelerate solar energy technology adoption and integration by providing technical assistance to large solar energy installation projects that are highly visible, novel, and replicable throughout the nation. The free technical assistance is offered by experts at DOE national laboratories, universities, and a competitively selected engineering firm.

The award winners are as follows:

### **Sequoia Foundation** (Berkeley, California): The Solar Schools Assessment and Implementation Project

Berkeley Unified School District, together with West Contra Costa Unified School District, Oakland Unified School District, the Sequoia Foundation, its sponsored project, KyotoUSA, and MIG, Inc., will prepare a "Solar Master Plan" to plan and deploy the installation of PV systems on all appropriate district schools and administrative buildings.

### **Forest City Communities** (Forest City, Hawaii)

This project builds on the success of a 2007 Showcase award, which deployed 477 new 225-watt PV panels at the Ohana Military Community. The add-on project will integrate PV solar rooftop systems with generating capacity to service 2,317 houses. A second, 3.6-MW solar farm will be constructed at the Forest City Affordable Housing Community on the Island of Hawaii.

### **National Community Builders** (Columbus, Ohio)

This project will model large-scale, 2-MW PV installations within LEED-certified, urban re-development neighborhoods in a northeastern climate zone. It will generate enough electricity to supply 600 to 800 residential and commercial tenants.

The Solar America Showcase opportunity closes and reopens each quarter of 2009 for review of applications. Applications received before the end of the remaining quarters (September 30, and December 31) will be reviewed during the following quarter.

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

## IEEE Magazine Publishes First Issue on Solar Energy Integration

Solar technologies and integration with the electric power system was the focus of the latest issue of "IEEE Power and Energy Magazine," a publication that disseminates information to electric power engineers and other professionals involved in the electric power industry.

SETP's Dan Ton and NREL's Ben Kroposki and Robert Margolis served as guest editors for the solar issue. Six articles discuss various aspects of solar technology and integration with the electric power system and the challenges of large-scale integration:

- General overview of solar technologies and includes discussions on PV and CSP
- Utilities' experience with solar energy and the role they play in solar deployments
- Planning for large-scale solar at the transmission and distribution level
- CSP
- Germany's experience with integrating a large amount of solar into their grid
- Two large PV demonstration projects in Japan.

The magazine can be viewed at http://ieeexplore.ieee.org/xpl/tocresult.jsp?isYear=2009&isnumber=4907258&Submit32=View+Contents.

# State and Industry Updates

## States Make Policy Changes to Boost Solar Integration

Michigan and Virginia instituted changes that will assist integration of renewables into the electric grid:

- In Michigan, the Interstate Renewable Energy Council (IREC) collaborated with SETP in March to provide comments to the Michigan Public Service Commission on the proposed definition of "customer-generator" in a Michigan regulation. IREC was concerned that the wording could unintentionally restrict third-party ownership of net-metered facilities. A successful change in terminology from "owns" to "uses" in the regulation is expected to help prevent that outcome.
- In May, Virginia's State Corporation Commission adopted a strong set of interconnection procedures that will cover all utilities, eligible technologies, and systems up to 20 MW, including interconnected PV systems. The Commission also reduced insurance requirements for smaller systems (less than 2 MW) and incorporated IREC's suggestions to implement a more effective, low-cost dispute resolution process. The rules went into effect July 1, 2009.

## NARUC Selects Technical Assistance Awardees

The National Association of Regulatory Utility Commissioners (NARUC), through its partnership with SETP, selected nine states and Washington, D.C. to receive technical assistance from DOE national lab experts. Topic areas, and the selected states, include feed-in tariff policies (Hawaii, Washington, Michigan, and Colorado), resource assessment (Colorado, Kentucky, Tennessee, Missouri, Georgia, Ohio, and Michigan) and grid integration (Washington, D.C.).

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS

### International Conference on Renewable Energy Planned for U.S. in 2010

The 4th International Conference on Renewable Energy and Distributed Resources will be held in Albuquerque, New Mexico, in December 2010. SETP SNL, and the Electric Power Research Institute have partnered to organize the internationally recognized event, which is expected to attract several hundred participants from the United States and abroad.

Attendees represent a wide cross-section of industry, including utility planners and operators, manufacturers, regulators, policy makers, and scientists. The conference provides opportunities for participants to share experiences and address technical, market, and regulatory challenges in preparation for large-scale penetration of PV and other distributed resources. The 2010 conference will also encompass the emerging area of smart grid and microgrid technologies.

# DOE Solar Program and Partner Publications

## DOE Solar Energy Technologies Program Annual Report

DOE Solar Energy Technologies Program (SETP), May 2009

The annual report summarizes SETP's research, directives, and accomplishments for the 2008 fiscal year.

www.solar.energy.gov/pdfs/fy08_annual_report_43987.pdf

## High Penetration of Photovoltaic (PV) Systems into the Distribution Grid

DOE SETP, June 2009

The report summarizes the workshop findings on top issues and barriers surrounding high penetration of PV systems, their corresponding research, development, and deployment activities, and performance requirements for those activities.

www.solar.energy.gov/pdfs/pv_grid_penetration.pdf

## Solar Photovoltaic Financing: Residential Sector Deployment

National Renewable Energy Laboratory (NREL), March 2009

Information that homeowners and policy makers need to facilitate PV financing at the residential level is presented in this report.

www.nrel.gov/docs/fy09osti/44853.pdf

## State Clean Energy Practices: Renewable Energy Rebates

NREL, March 2009

This publication highlights the impacts of specific renewable energy rebate programs on renewable energy markets around the country, as well as rebate program impacts on overarching energy policy drivers.

www.nrel.gov/docs/fy09osti/45039.pdf

## Photovoltaic Systems Interconnected onto Secondary Network Distribution Systems—Success Stories

NREL, 2009

This report examines six case studies of PV systems successfully integrated into secondary network systems. The systems chosen are interconnected to secondary network systems in four Solar America Cities.

www.nrel.gov/docs/fy09osti/45061.pdf

## Feed-in Tariff Policy: Design, Implementation, and RPS Policy Interactions

NREL, 2009

This paper discusses feed-in tariff (FIT) payment options and the interaction between FIT and the renewable portfolio standard.

www.nrel.gov/docs/fy09osti/45549.pdf

### Harnessing the Sun

NREL and DOE, May/June 2009

Part of a guest editorial—"The Future's So Bright," in the May/June issue of IEEE's Power & Energy magazine—this feature piece provides an overview of solar resources, technologies, and cost-parity issues. You must be a member of IEEE to download the entire article.

www.ieee.org/organizations/pes/public/2009/may/index.html

### Solar Access: Recommendations for the City and County of Denver

DOE SETP, March 2009

This report recaps the importance of solar access on a local and national context for the city and county of Denver, Colorado, and provides best practices for promoting and protecting solar access. Denver is a Solar America City.

www.solaramericacities.energy.gov/PDFs/Solar_Access_Recommendations_City_And_County_Of_Denver.pdf

### Top Ten Utility Solar Integration Rankings

Solar Electric Power Association (SEPA), May 2009

This second annual report ranks U.S. utilities according to installed solar capacity in numerous categories, including both utility-side and customer-side of the meter and capacity per customer.

www.solarelectricpower.org (click on "Resource Library")

### Use of Municipal Assistance Programs to Advance the Adoption of Solar Technologies

American Solar Energy Society, May 2009

This paper discusses programs being implemented in three Solar America Cities to help businesses and residents determine whether to install solar energy systems. The paper is intended as a tool for municipalities and organizations examining programs to facilitate the installation of solar energy technologies at the local level. It educates readers about program design and other considerations in the design of municipal assistance programs.

www.solaramericacities.energy.gov/PDFs/Solar_Municipal_Assistance_Programs.pdf

# Summary of DOE Solar Program Funding Opportunities

## Pipeline of Program Activities


The Solar Energy Technologies Program (SETP) is engaged with a range of stakeholders and activities along the solar pipeline. From Materials and Device Concepts to key Market Transformation efforts, SETP is supporting the development of innovative projects to accelerate the growth of the U.S. solar industry.

OPEN PROPOSED

**Figure 1. Summary of DOE Solar Program Funding Opportunities**

| FOA OR SOLICITATION | CLOSING DATE | FUNDING AMOUNT | DESCRIPTION |
|---|---|---|---|
| **Solar America Showcases** | September 30, 2009 | Up to $500K per award | Solar America Showcases are designed to help facilitate large-scale installations that involve cutting edge solar technologies, novel applications of solar, high visibility sites, and/or high likelihood of replicability. Solar America Showcase is a Notice of Opportunity for Technical Assistance (NOTA) for proposed installations more than 250 kW and does not include direct federal funding for any recipient. Instead, showcase projects include technical assistance through teams of DOE-funded solar experts from national laboratories. |
| **Recovery Act: High Penetration Solar Deployment** | July 30, 2009 | Up to $37.5M Total; Maximum Per Award Varies By Topic | This project will accelerate the placement of high levels of photovoltaic (PV) penetration into existing or newly designed distribution circuits. By facilitating increased growth of grid-tied PV installations, this project supports the SETP mission to accelerate widespread commercialization of clean solar energy technologies in the United States. The three goals are:<br>• Develop modeling tools and database of experience with high penetration scenarios of PV on a distribution system<br>• Develop monitoring, control, and integration systems to enable cost-effective widespread deployment of small modular PV systems<br>• Demonstrate integration of PV and energy storage into Smart Grid applications.<br>The project's success will require both modeling tools and actual performance and validation data, so the focus will be in four R&D areas: improved modeling tools development, field verification of high-penetration levels of PV into the distribution grid, modular power architecture, and demonstration of PV and energy storage for Smart Grids. |

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## Summary of DOE Solar Program Funding Opportunities, *Continued*

OPEN PROPOSED

| | | | |
|---|---|---|---|
| **Recovery Act: Solar Market Transformation** | July 30, 2009 | Up to $37M Total; Maximum Per Award Varies By Topic | The objectives are to address current market barriers to the adoption of solar technologies and establish a nationally coordinated effort to spread solar installer training to the local level.<br><br>The two topic areas are listed below:<br><br>**Solar America Cities Special Projects** helps the 25 Solar America Cities scale-up innovative programs and concepts, so they can be tested in a broader marketplace; thereby, increasing the likelihood of replication in other U.S. cities.<br><br>**Solar Installer Instructor Training** promotes an increase in the quality and availability of instruction relating to the installation of photovoltaic (PV) and solar heating and cooling systems. |
| **Recovery Act: National Laboratory Call for Foundational Photovoltaics and Concentrating Solar Power Research and Development** | July 15, 2009 | Approximately $17M Total; Maximum Per Award Varies By Topic | This opportunity complements ongoing SETP-funded private sector research and is restricted to DOE national laboratories. For the PV industry, it supports new research and development projects for next-generation devices and processes as well as supply chain and crosscutting technologies. For the CSP industry, this project supports research on advanced heat transfer fluids and novel thermal storage and enhancing capabilities for testing and evaluating advanced concepts. |
| **Recovery Act: Photovoltaic (PV) Technology Incubators** | July 13, 2009 | Up to $3M each for 18 months | Projects are focused on solving technical challenges that must be overcome to scale-up manufacturing and commercialize new products by 2012 and shortening the timeline for companies to transition pre-commercial PV technologies into full-scale manufacturing. This financial opportunity is administered by DOE's National Renewable Energy Laboratory (NREL). |
| **Minority University Research Associate (MURA) Program** | July 13, 2009 | Up to $300,000 each up to $1.8M | MURA encourages minority students to pursue careers in science and technology. Research associates engage in solar energy research projects and help develop cost-competitive, market-applicable technologies. Key objectives: Strengthen research and education capabilities of minority-serving institutions in renewable energy technologies and market development; Encourage minority students to excel in science and technology by providing them with practical experience and training through research projects in solar energy technologies and market development; Broaden the scientific, technical, and market development knowledge and resource base in solar technologies; Contribute to making electricity generated from solar technologies cost-competitive with conventional sources of electricity. |
| **Solar America Cities - Technical Outreach** | October 15, 2009 | $10.5M maximum per award for a five-year performance period | This project will provide comprehensive outreach to local governments to help them build sustainable solar infrastructures and expand their solar markets. The project will help accelerate solar energy deployment by proactively addressing the needs of local governments for technical information and guidance, focusing on many areas such as policies and regulations, financial incentives, training, and community engagement. Maximum funding for the first phase of the project, which is three years, is $6M. Maximum funding for the second phase, which is two years, is $4.5M. |

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## Summary of DOE Solar Program Funding Opportunities, *Continued*

OPEN PROPOSED

| FOA OR SOLICITATION | OPENING DATE | FUNDING AMOUNT | DESCRIPTION |
|---|---|---|---|
| **Photovoltaic (PV) Supply Chain and Cross-Cutting Technologies** | September 2009 | Approximately $15M total | Focuses on component and/or manufacturing technologies with potential to have near-term (within 2-6 years of award) impact on a substantial segment of PV industry. Applications either have (1) high impact on evolutionary improvements that can be supplied across the industry at high volumes lower cost than current technology or (2) propose disruptive technologies applicable to a narrow segment of the industry which can dramatically reduce costs. |
| **Web-based PV Operational Performance Database** | July 2009 | Approximately $1.5M total for 5 years | This opportunity will support developing, populating, and maintaining a Web-based PV operational performance database. The database will contain operational data of grid-tied PV systems at field installation sites. These data will be useful for monitoring and evaluating long-term cost and performance information on PV systems and components and for trending progress toward reaching the grid-parity goals of the SETP. |
| **Baseload Concentrating Solar Power (CSP) Generation** | Summer 2009 | TBD | Objective will be to identify and evaluate future technology options and systems that can lead to the development of baseload CSP power plants capable of generating electrical power at a high capacity-factor and at competitive costs. |

To view all current opportunities, visit www.solar.energy.gov/financial_opportunities.html.

To view all past opportunities, visit www.solar.energy.gov/past_opportunities.html.

## SOLAR EVENTS CALENDAR

Fourth Annual New Energy Symposium
*July 8-9, 2009*
*New York City, New York*
http://neny.org/nes/2009/home

ASME: 3rd Annual Conference on Energy Sustainability
*July 19-23, 2009*
*San Francisco, California*
www.asmeconferences.org/ES2009/

National Association of Counties (NACo) Annual Conference and Expo
*July 24-29, 2009*
*Nashville / Davidson County, Tennessee*
www.naco.org
(Click on Conferences and Events)

First Annual Utility Solar Conference
*July 28-29, 2009*
*San Jose, California*
*Open only to utility employees*
www.utilitysolarconference.com

11th Annual SolWest Renewable Energy Fair
*July 24-26, 2009*
*John Day, Oregon*
www.solwest.org

IEEE Power & Energy Society 2009 General Meeting
*July 26-30, 2009*
*Calgary, Alberta, Canada*
http://ewh.ieee.org/cmte/PESGM09/

GovEnergy
*August 9-12, 2009*
*Providence, Rhode Island*
www.govenergy.com

Renewable Energy Markets 2009
*September 13-16, 2009*
*Atlanta, Georgia*
www.renewableenergymarkets.com

2009 Solar Decathlon
*October 9-18, 2009*
*Washington, D.C.*
www.solardecathlon.org

Solar Power International (formerly Solar Power 2009)
*October 27-29, 2009*
*Anaheim, California*
www.solarpowerinternational.com

National Association of Regulatory Utility Commissioners Annual Convention
*November 15-18, 2009*
*Chicago, Illinois*
http://annual.narucmeetings.org

New Ideas in Educating a Workforce in Renewable Energy and Energy Efficiency
*November 18-20, 2009*
*Albany, New York*
www.irecusa.org
(Click on Workforce Development)

## WE WANT TO HEAR FROM YOU

This *DOE Solar Energy Technologies Program Newsletter* is for you—the participants and stakeholders in the DOE Solar Program and the Solar America Initiative. We envision sending this newsletter at least every quarter. If you have any comments or suggestions about the newsletter, e-mail solar@ee.doe.gov.

## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

## For more information contact:

EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov