

SOLAR ENERGY TECHNOLOGIES PROGRAM NEWSLETTER

Program Notes

205-kW Photovoltaic System Installed at DOE Headquarters



This 205-kW photovoltaic installation on the roof of DOE's headquarters was unveiled in September 2008.

A new 205-kilowatt solar power system was turned on for the first time at the U.S. Department of Energy's (DOE) Forrester Building—DOE's headquarters building in Washington, DC—on September 9, in an inaugural ceremony led by Secretary of Energy Samuel Bodman. The new rooftop solar electric system, designed and installed by SunPower Corporation, consists of 891 solar photovoltaic (PV) modules and is 40 to 50 times larger than a typical residential system. Each module is able to convert 18.5% of the sunlight hitting it into electricity, which is one of the highest conversion efficiencies available for purchase today. The installation is integrated into the existing roof system using a tongue and groove design that allows the modules to fit together like a puzzle. The ballasted system secures the modules without rooftop penetrations.

The system will generate about 200 megawatt-hours of electricity per year, providing up to 8% of the Forrester complex's energy during peak hours and saving as much as \$26,000 in utility costs in its first year of operation. Insulation incorporated into

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U.S. Department of Energy
**Energy Efficiency
and Renewable Energy**

each module will provide additional energy savings by reducing the building's heating and cooling load, and the system will ultimately help DOE avoid the emission of 186 metric tons per year of greenhouse gases. In addition to the 205 kW of high-efficiency crystalline silicon modules, the installation features a technology showcase, which consists of four 1-kW PV systems, each using a different PV module technology: crystalline silicon, copper indium gallium diselenide (CIGS), amorphous silicon, and cadmium telluride. This technology showcase will allow for testing and evaluating multiple new PV technologies that can be swapped out over time.

A kiosk in the Forrestal building lobby displays the power output of the PV system during the day and the energy produced over time. This information will educate the public, provide valuable information to federal and local agencies, and demonstrate the commitment of the federal government to address both its own energy use and the commercialization of renewable energy technologies.

DOE's new solar power system will help it comply with the Executive Order that President Bush issued in January 2007, calling for all federal agencies to reduce their energy consumption per square foot by 30% and requiring all agencies to utilize more renewable energy. In response, DOE developed the Transformational Energy Action Management (TEAM) initiative, with the aim of being the first federal agency to meet or exceed the energy efficiency and renewable energy requirements laid out in the Executive Order.



Secretary Bodman unveiled the PV installation at a ribbon-cutting event on September 9, 2008.

DOE to Invest \$17.6 Million in Six Early-Stage Photovoltaic Projects

DOE announced on September 29 that it will invest \$17.6 million, subject to annual appropriations, in six company-led, early-stage photovoltaic (PV) projects under the Solar America Initiative's "PV Incubator" funding opportunity. The "PV Incubator" project is designed to fund prototype PV components and systems with the goal of moving them through the commercialization process by 2010. The 2008 funding will be the second funding opportunity released under the PV Incubator program. With the cost-share from industry, which will be at least 20 percent, up to \$35.4

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS & DOE NEWS

NREL Solar Research Gains Two R&D 100 Awards

An ultra-light, highly efficient solar cell and use of ink-jet printing to manufacture thin-film photovoltaics—both developed at the DOE National Renewable Energy Laboratory—have been named among this year's most significant innovations by Research & Development (R&D) Magazine.

Known as "the Oscars of Invention," the R&D 100 Award showcases the most significant new technologies commercialized worldwide. NREL has won a total of 42 of the awards, which the magazine has been presenting annually since 1969.

The new Inverted Metamorphic Multi-Junction solar cell was developed at NREL and is being commercialized by Emcore Corp. of Albuquerque, N.M., in partnership with the Air Force Research Laboratories Space Vehicles Directorate at Kirtland Air Force Base in Albuquerque. The cell already had set a pair of world records for solar conversion efficiency when it was nominated for the R&D 100 award, and recently it set a third world record with a solar conversion rate that exceeded 40%.

The thin-film photovoltaic (PV) manufacturing process combines NREL's precursor inks with a rapid reactive bonding technique being commercialized by HelioVolt Corp. of Austin, Texas. The combination eliminates complex manufacturing methods and could create enough of the flexible film to turn entire buildings and other structures into small, self-sustaining power plants. Xcel Energy also supported the work. Both R&D 100 awards recognize research at NREL's National Center for Photovoltaics.

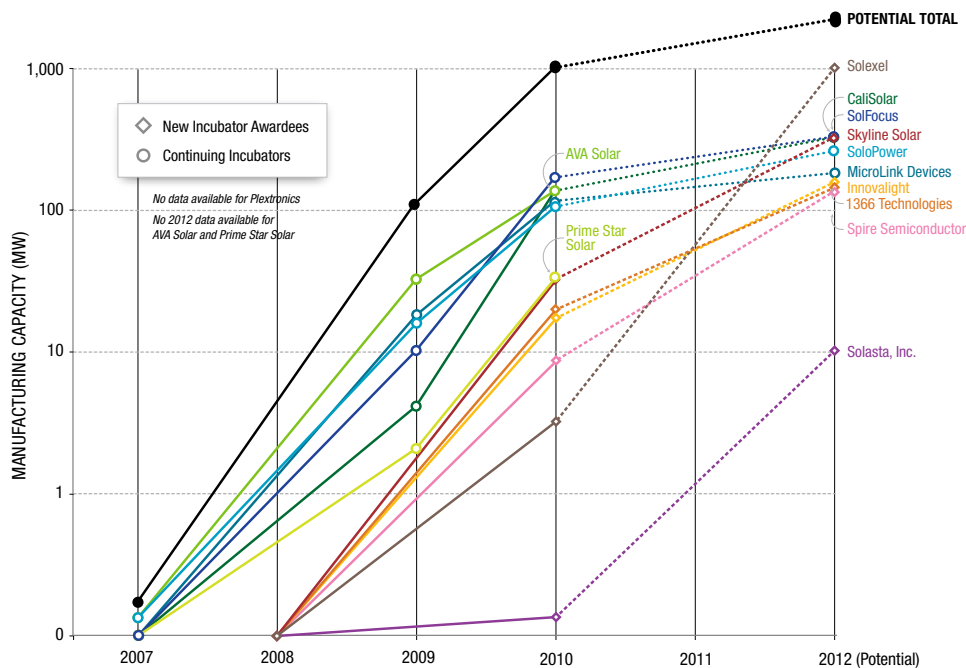
Senate Energy and Natural Resources Committee Field Hearing Held at Sandia

U.S. Senators Bernie Sanders (VT), Jeff Bingaman (NM), and Pete Domenici (NM) held a field hearing on concentrating solar power (CSP) at Sandia National Laboratories on July 2. The senators took testimony from industry, utility, and laboratory representatives concerning the future of CSP and the ability of CSP to meet the energy needs of the United States. Afterwards, Senator Sanders got hands-on exposure to all the current CSP technologies including dishes, troughs, towers, and fuels.

million will be invested in these projects. The projects will run for 18 months and will be subcontracted through DOE's National Renewable Energy Laboratory.

Most of the projects will receive up to \$3 million in funding, with the exception of Solasta and Spire Semiconductor, which will receive up to \$2.6 million and \$2.97 million, respectively. Massachusetts-based 1366 Technologies will develop a new cell architecture for low-cost, multi-crystalline silicon cells, which will enhance cell performance through improved light-trapping texturing and grooves for self-aligned metallization fingers. California's Innovalight will use ink-jet printing to transfer their "silicon ink" onto thin-crystalline silicon wafers to produce high-efficiency, low-cost solar cells and modules. Skyline Solar, also in California, will develop an integrated, lightweight, single-axis tracked system that reflects and concentrates sunlight more than 10 times onto silicon cells. Solasta, in Massachusetts, is working on a novel cell design that increases currents and lowers the materials cost. Solexel, another California-based company, will commercialize a disruptive, 3-D, high-efficiency monocrystalline silicon cell technology that dramatically reduces manufacturing cost per watt. Finally, Spire Semiconductor in New Hampshire will develop three-junction tandem solar cells that better optimize the optical properties of their device layers; the company is targeting cell efficiencies over 42% using a low-cost manufacturing method.

The PV Incubator project is part of the Solar America Initiative, which aims to make solar energy cost-competitive with conventional forms of electricity by 2015. More information on the PV Incubator awards can be found at http://www1.eere.energy.gov/solar/pdfs/sai_pv_incubator_doe_prospectus.pdf.



Incubator projects quickly ramp production capacity to pilot and commercial levels

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS & DOE NEWS

Sandia Conducts PV Performance Model Comparison with Full-Year Data

Sandia National Laboratories is leading a study to evaluate and improve the accuracy of PV performance models used in DOE's Solar Advisor Model (SAM) and other models. The approach being taken is to collect a full year of accurate, detailed weather, solar radiation, and system performance data for well-characterized systems. The weather and solar radiation data are then converted to TMY-2 format to allow comparison of system output as predicted by various models to actual measured output.

A paper was presented at the 33rd IEEE PV Specialists Conference in San Diego that compared modeled to measured performance for three crystalline silicon arrays operated for a year at Sandia's PV Systems Optimization Laboratory. PV algorithms evaluated include the Sandia Array Performance Model, used in SAM and in a commercially available model, PVDesignPro; PVWATTS, an Internet-accessible NREL model; and the University of Wisconsin 5-parameter model used by the California Energy Commission New Solar Homes Partnership. Also evaluated was a Sandia inverter performance model and five solar radiation models. All models evaluated worked well for crystalline silicon in a desert climate, but model-to-model comparisons showed disagreement for some thin-film technologies. Future work will evaluate these and additional models in collaboration with industry for additional sites and additional technologies.

Parabolic Trough Freeze/Thaw Tests Begin at Sandia

Recent studies in the United States suggest that parabolic trough levelized energy costs can be reduced 10 to 15 percent through integration of a large salt energy storage system coupled with the direct heating of molten salt in the solar field. Although noteworthy, this improvement may not justify the increased technical risk associated with potential freezing of the salt in the field. Other potential issues include increased design complexity associated with heat trace in the field and higher maintenance costs. To investigate the salt-freezing risk, Sandia has started to perform experiments in which HiTek molten salt is allowed to freeze in two receiver-long heat-collection elements manufactured by Schott Solar.

Solar Energy Grid Integration Systems (SEGIS) Award Decisions

On August 12, DOE announced its plan to invest up to \$24 million in FY 2008 and beyond, with up to \$16 million in industry cost share and therefore up to a \$40 million possible total investment, in Solar Energy Grid Integration Systems (SEGIS) projects. Awards were made for the current fiscal year to 12 industry teams, with plans to award additional contracts in Fiscal Year 2009 and beyond—subject to the availability of funds—for projects demonstrating technology advances that exhibit the highest likelihood of commercial success. SEGIS focuses on research and development (R&D) of products that will allow PV to be incorporated into household and commercial smart energy systems. It is integral to President Bush's Solar America Initiative, which aims to make solar energy cost-competitive with conventional forms of electricity by 2015.

SEGIS' development of lower cost, higher performance products will enhance the value of PV systems in many ways. Building energy managers will be able to better respond to time-of-use pricing and weather conditions, minimizing building energy costs and stabilizing the effect on the electricity grid. Secure back-up power sources during outages will be enabled, and interaction between solar energy systems and plug-in hybrid vehicles will be facilitated. Finally, intelligent controls developed in SEGIS will be critically important in creating net-zero-energy homes, buildings, and communities powered by PV.

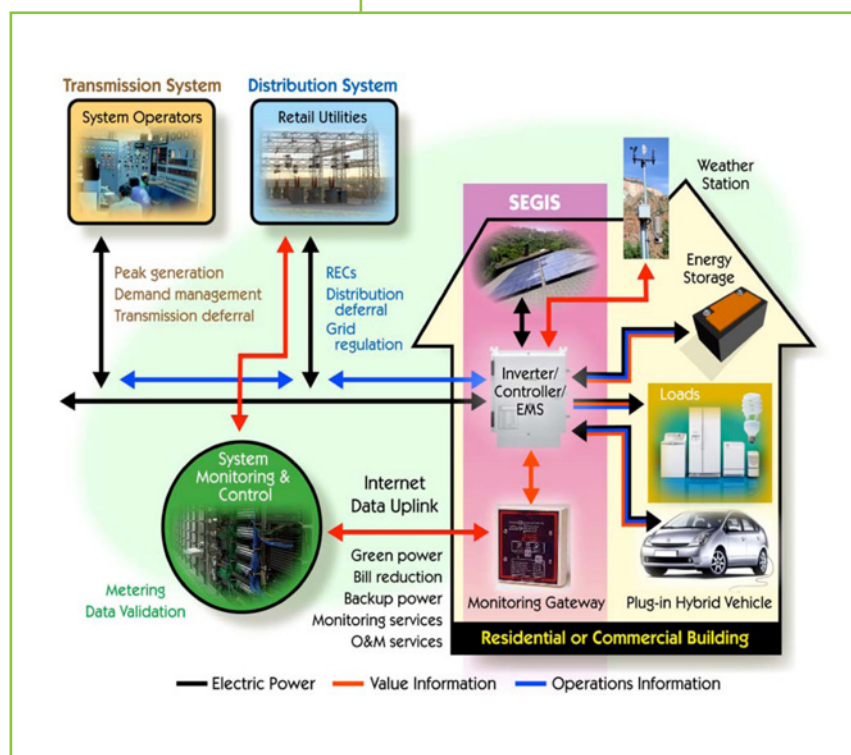
Projects awarded this fiscal year are from the following industry teams—for the 12 winning projects, \$2.9 million total in DOE funding is leveraging \$1.7 million in industry cost-share:

- Apollo Solar (Bethel, CT)
- EMTEC (Dayton, OH) Emerson Network Power, Liebert Corporation, Hull and Associates, and Ohio State University
- Enphase Energy Inc. (Petaluma, CA)
- General Electric (Niskayuna, NY) and Sentech, Inc., in collaboration with candidate utilities including American Electric Power, Duke, and Hawaii Electric Company
- Nextek Power Systems (Detroit, MI and Hauppauge, NY) with Houston Advanced Research Center
- Petra Solar (Somerset, NJ) with Florida Power Electronics Center and Florida Solar Energy Center
- Premium Power (North Reading, MA)
- Princeton Power Systems (Princeton, NJ) with TDI Power and World Water and Solar Technologies Corp.
- PV Powered (Bend, OR) with Portland General Electric Team, South Dakota State University, and Northern Plains Power Technologies
- SmartSpark Energy Systems, Inc. (Champaign, IL) with Evergreen Solar and Innovolt, Inc.
- The Florida Solar Energy Center of the University of Central Florida (Orlando, FL) with SatCon, Sentech, Inc., EnFlex, SunEdison, Northern Plains Power Technologies, Lakeland Electric Utilities and additional utilities
- VPT Inc. (Blacksburg, VA) with Center for Power Electronics, Plug-in Conversions, Moonlight Solar, Breakell Inc., and Delta Electronics

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS & DOE NEWS

DOE to Hold International PV Reliability Workshop in December

DOE's Solar Program will hold an International PV Reliability Workshop in Shanghai, China on December 4-5, 2008. The workshop will address PV module manufacturing in Asia. Co-organizers include the Shanghai Solar Energy Institute, major Chinese solar companies, certification and testing centers, and Shanghai Jiao-Tong University.



A schematic depiction of the Solar Energy Grid Integration Systems (SEGIS) concept

DOE Funds 15 New Projects to Develop Solar Thermal Storage and Heat Transfer Fluids with up to \$35 Million

On September 19, DOE announced selections for negotiations of award under the Funding Opportunity Announcement (FOA), *Advanced Heat Transfer Fluids and Novel Thermal Storage Concepts for Concentrating Solar Power Generation*. DOE has selected seven companies and six universities for funding under this award. In total, DOE will provide up to \$35 million over four years, subject to annual appropriations; with cost-share, the total public-private investment will be up to about \$67.6 million for the selected projects. The projects will facilitate the development of lower-cost energy storage for concentrating solar power (CSP) technology.

A CSP plant with storage can operate continuously during periods of intermittent sun and produce electricity for extended periods without the sun. With thermal storage, the CSP plant is also able to match its electricity production with demand. This enables solar power to be provided to homes and businesses whenever it is most needed, day or night. In addition, thermal storage can lower the levelized cost of electricity from a CSP plant.

Selected projects are expected to promote DOE's goal of reducing the cost of CSP electricity from 13–16¢/kWh today with no storage to 8–11¢/kWh with 6 hours of storage by 2015, and to less than 7¢/kWh with 12–17 hours of storage by 2020.

Proposals were selected from the following categories:

Advanced heat transfer fluids research and development (R&D)

- **Symyx**—Deep Eutectic Salt Formulations Suitable as Advanced Heat Transfer Fluids (Sunnyvale, CA)

Thermal energy storage R&D

- **Abengoa**—Advanced Thermal Energy Storage for Central Receivers and Supercritical Coolants (Lakewood, CO)
- **Acciona**—Sensible Heat, Direct, Dual-Media Thermal Energy Storage Module (Henderson, NV)
- **City University of New York**—A Novel Storage Method for Concentrating Solar Power Plants Allowing Operation at High Temperatures (New York, NY)
- **General Atomics**—Thermochemical Heat Storage for Concentrating Solar Power (San Diego, CA)
- **Infinia Corporation**—Innovative Application of Maintenance Free Phase Change Thermal Energy Storage for Dish Engine Solar Power Generation (Kennewick, WA)
- **Lehigh University**—Novel Thermal Energy Storage Technologies for Concentrating Solar Power Generation (Bethlehem, PA)
- **Terrafore**—Heat Transfer and Latent Heat Storage in Inorganic Molten Salts for Concentrating Solar Power Plants (Riverside, CA)
- **Texas Engineering Experiment Station**—Molten Salt Carbon Nanotube Thermal Energy Storage for Concentrating Solar Power Systems (College Station, TX)
- **University of Alabama**—Novel Molten Salts Thermal Energy Storage for Concentrating Solar Power Generation (Tuscaloosa, AL)

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS & DOE NEWS

Final Accelerated Aging Report Available

The Accelerated Aging Testing & Reliability in Photovoltaics workshop reassessed the PV industry's needs, priorities, and recommendations on accelerated aging and reliability research in light of recent growth and changes in both the industry and the DOE Solar Energy Technologies Program. The reliability team is now responding to the five major themes that emerged from the discussions: (1) Failure definitions vary with application and customers, (2) Need for shared data on and analysis of reliability of fielded systems, (3) Correlation needed between accelerated test results and field performance to improve predictions, (4) Arcing and other safety-related failures are a high priority, and (5) Need improvements in existing tests and sharing of best practices for reliability.

Numerous summary tables in the report capture the industry needs and recommendations. Reliability concerns that warrant investigation by the national laboratories are identified for each of the PV module technologies and for inverters. A summary conclusion indicates that with new technologies and larger-scale manufacturing processes continually being deployed, we now need substantial expansion and extension of accelerated aging techniques and tools for predicting and improving reliability to assure even better, more reliable PV energy systems.

NREL Hosts State of Hawaii Renewables Workshop

NREL hosted more than 50 members of Hawaii state government, utilities, tourism, and other island stakeholders for a workshop on renewable energy on July 24–26. The contingent included Governor Linda Lingle, who earlier this year signed a Memorandum of Understanding to establish the Hawaii Clean Energy Initiative, a long-term partnership designed to accelerate the transformation of Hawaii into one of the world's first economies based primarily on clean energy resources. The goal of the Hawaii Clean Energy Initiative is to use renewable resources—such as wind, sun, ocean, geothermal, and bioenergy—to supply 70 percent or more of Hawaii's energy needs by 2030.

NREL staff gave presentations on topics including wind, biomass, geothermal, photovoltaic and CSP technologies, resource assessment, and renewables financing. Because of the size of the island grids and the desire for high renewable penetration, energy storage is a significant issue. It is conceivable that 12+ hours of storage may be justified for Hawaii CSP plants to help stabilize their grid(s). If the resource is validated and the models predict a strong need for energy storage, CSP with storage in Hawaii could be valuable showpiece—albeit for a very special case.

- **University of Arkansas**—Development and Performance Evaluation of High Temperature Concrete for Thermal Energy Storage and Solar Power Generation (Fayetteville, AR)
- **University of Connecticut**—Novel Thermal Energy Storage for Concentrating Solar Power (Storrs, CT)

Thermal energy storage near-term demonstration

- **Abengoa**—Reducing the Cost of Thermal Energy Storage for Parabolic Trough Solar Power Plants (Lakewood, CO)
- **Acciona**—Indirect, Dual-Media, Phase Change Material Thermal Energy Storage Module (Henderson, NV)
- **US Solar Holdings**—CSP Energy Storage Solutions—Multiple Technologies Compared (Boise, ID)

DOE Announces Three New Solar America Showcases

In July 2008, the U.S. Department of Energy announced three new recipients of the Solar America Showcase award: District Department of the Environment/ District of Columbia Energy Office (DDOE/DCEO); Steiner and Associates; and the Energy, Conservation and Management Division of the State of New Mexico. The Solar America Showcase Award provides technical assistance from solar energy experts to high-visibility, large-scale solar installations.

DDOE/DCEO

The District of Columbia will install solar on three school sites under this grant: H.D. Woodson Senior High School, Alice Deal Middle School, and the Aquatic Center of Woodrow Wilson Senior High School. Two schools will install at least 150 kW of PV, and an innovative solar hot-water system is proposed for the Aquatic Center. Each project represents a different application of solar technology. The first will improve the city's disaster preparedness by providing power for an emergency shelter, the second will exhibit the use of PV arrays on an historic school building, and the third will provide a clean source of heating and cooling for an innovative recreational facility.

Steiner and Associates

Steiner and Associates develops "town-center" projects that integrate retail, entertainment, office, hotel public space, and housing options in large, high-density sites. DOE will supply technical assistance to integrate 50–100 kW of PV into a town-center marketplace in three locations: Ohio, Virginia, and Texas.

The State of New Mexico

The State of New Mexico will receive technical assistance from DOE to enable grid-tied PV systems to be installed in Mesa del Sol, a new large-scale residential and community development. The Mesa del Sol development in Albuquerque is considering installing grid-tied PV systems on as many as 300 energy-efficient homes slated to be built between March 2009 and March 2010. The potential size of this project is 750 kW and would provide direct benefits to as many as 1,200 residents.

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS & DOE NEWS

IEA PV Trends Report Online

The International Energy Association (IEA) released its "Trends in Photovoltaic Applications: Survey report of selected IEA countries between 1992 and 2007" report in September. This report provides an overview of PV power systems applications and markets in the reporting countries at the end of 2007 and analyzes trends in the implementation of PV power systems between 1992 and 2007.

The scope of the report is limited to PV applications with a rated power of 40 W or more. Most national data supplied were accurate to $\pm 10\%$. Data on production levels and system prices vary depending on the willingness of the relevant national PV industry to provide data for the survey. Key data for this publication were drawn from national survey reports, which were supplied by representatives from each of the participating countries.

The complete IEA report is available at www.iea-pvps.org/products/rep1_17.htm.

DOE's PV Reliability Program: Predictive Reliability Model Providing Early Results

In response to a slew of requests to the DOE from both new and established PV industry members, Sandia National Laboratories and NREL personnel have teamed up to develop a rigorous PV reliability program. These efforts are designed to identify and address issues related to long-term operability, from materials and subcomponents through integrated and fielded PV systems. New tools are being developed with industry and academic partners to predict, detect, and mitigate reliability-related issues in PV technologies. The objective is a framework for reliability evaluations that will then be transferred to any willing industrial partners.

In August, Sandia reliability engineers demonstrated a draft version of a predictive reliability model to DOE program leaders. Results from this model offer insights into time-dependent system reliability, availability, and failure rates, and provide distributions of failures and repairs that affect these outcomes. The use of real data and statistical methods provide uncertainty estimates on these predictions. The model facilitates the conduct of predictive "what if" scenarios, based on variations in system architecture, maintenance and operation strategies, availability of spare parts, different cost parameters, and other variables. This model is still evolving. Although the structure of the model is sound, it currently uses data from a single source (fielded PV system), while additional sources are currently being added to the data set. Stakeholders and expected beneficiaries include manufacturers, system integrators, financiers, and power purchasers.

Public Meetings Completed for the Solar Programmatic Environmental Impact Statement

The DOE and the Bureau of Land Management (BLM) have identified solar energy development in six western states—Arizona, California, Colorado, New Mexico, Nevada, and Utah—as a potentially critical component in meeting specific federal energy mandates. For this reason, a Notice of Intent (NOI) to prepare the Solar Energy Development Programmatic Environmental Impact Statement (PEIS) was published in the *Federal Register* in May.

The DOE and BLM conducted public scoping for the PEIS in June and July in eleven cities throughout the six states. A total of 595 people registered their attendance, and more than 15,000 individuals, organizations, and government agencies provided written comments regarding the scope of the PEIS. Moreover, comments were received from all 50 states, the District of Columbia, a few U.S. territories, and Canada.

Comments received included questions and concerns regarding the following: environmental and socioeconomic impacts of solar energy development, siting of facilities, technologies to be used, mitigation of impacts, and stakeholder participation in the National Environmental Policy Act (NEPA) process. Most commentors supported the development of solar energy on public lands. A recurring theme, however, was a request that the agencies proceed in an environmentally responsible manner.

Scoping is the first phase of public involvement under the NEPA process. The next phase of participation will involve public review and comment on the Draft PEIS. At this time, the DOE and BLM anticipate releasing the Draft PEIS for public review in spring 2009. Information concerning the issue will be maintained on the project Web site (<http://solareis.anl.gov>).

Committee to Plan for PV/Distribution Grid Integration Workshop

A committee is being assembled to plan for a 1-1/2-day workshop in February 2009 to discuss high-penetration targets or scenarios for PV/distribution grid integration, their technical challenges, and associated research, development, and deployment (RD&D) areas. This workshop will build on the Renewable Systems Interconnection (RSI) study reports to further define performance requirements for identified high-priority RD&D areas to reach the defined penetration targets and scenarios. The workshop findings will be used to guide development of a FY 2009 solicitation for industry-led projects, in partnership with national laboratories, to analyze and demonstrate effects of high-penetration PV systems on varying designs and operations of distribution feeders. The planning committee will consist of 12 members representing national laboratories, PV system integrators, electric utilities, and building communities. Further details on the workshop will be announced on October 14 at the Solar Power International conference in San Diego.

Solar Program Manager Presents at EERE's Technology Commercialization Showcase

In August, the second Technology Commercialization Showcase was held at DOE Headquarters in Washington, DC. During the two-day event, John Lushetsky and other Program Managers within DOE's Office of Energy Efficiency and Renewable

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS & DOE NEWS

NREL's Contreras to Receive HENAAC Outstanding Technical Achievement Award

NREL's Miguel A. Contreras, a senior scientist with the National Center for Photovoltaics, will receive the 2008 Hispanic Engineer National Achievement Awards Corporation (HENAAC) Outstanding Technical Achievement Award during the 20th Anniversary Career Conference and Awards Show in Houston, Oct. 9 - 12. This award recognizes Contreras as one of America's best and brightest scientists in the area of photovoltaics within the Hispanic community.

Among the most visible of Contreras' achievements are his contributions to help NREL reach several world records in energy conversion efficiency for thin-film solar cells. In fact, he and his co-workers in the CIGS group hold a thin-film efficiency record at 19.9 percent.

ASE Selected to Manage and Operate NREL

DOE announced on July 29 that the Alliance for Sustainable Energy (ASE), LLC—consisting of Midwest Research Institute and Battelle Memorial Institute—will be the new management and operating contractor. The transition to the new contract begins immediately and will be completed in no more than 60 days.

Sandia Conducting Long-Term Evaluation of PV Inverter Operation

Sandia National Laboratories' Distributed Energy Technologies Laboratory (DETL) has completed the first two years of its Long-Term Inverter Performance Characterization effort. The purpose of this project is to determine lifetime operability issues, if any, of residential-sized inverters. Possible issues pertain to operating efficiency, utility compatibility as set forth in IEEE Standard 1547, or any other unforeseen long-term degradation effects. Although PV module degradation has been widely studied, this is the first controlled experiment designed to explore the potential impact of inverter degradation over time. This is a teamed effort with New Mexico State University (NMSU) and the Florida Solar Energy Center (FSEC).

Each facility has four or five inverters operating in normal outdoor conditions. Initially, all inverters were fully characterized in a controlled laboratory setting at the DETL and were then set in the field for continuous operation. Characterization involves applying the Sandia-developed California Energy Commission inverter test protocol to fully assess performance. After 2 years of operation, the Sandia-located inverters have been recharacterized and have shown no appreciable amount of degradation in performance, nor any adverse effects related to utility interconnection, such as tolerance for voltage and frequency shifts. Evaluations on samples from FSEC, representing a humid and potentially harsher environment, and from NMSU, will be conducted in the near future.

Energy (EERE) made presentations to cleantech venture capital firms from around the country that are actively seeking investment opportunities. The goal of the showcase was to provide the venture capital community with EERE Program and industry overviews, investment gaps, and commercialization opportunities for the various technologies in EERE's portfolio.

DOE to Announce Funding Opportunity for Photovoltaic Supply Chain and Crosscutting Technologies

The Photovoltaic Supply Chain and Cross-Cutting Technologies project is intended to identify and accelerate the development of unique products or processes that potentially have a large impact on the industry, or a segment of the industry, in support of the overall goals of DOE's Solar Program. It is anticipated that applicants will focus on component and/or manufacturing technologies with the potential to have a near-term impact on a substantial segment of the PV industry. Responsive applications will either 1) have a high impact on innovative evolutionary improvements that can be supplied across the industry at high volumes and lower costs than conventional technology today, or 2) propose disruptive technologies, applicable to a narrower segment of the industry, which can dramatically reduce costs and drive future growth of the relevant technology. The Solar Program plans to announce this funding opportunity in October 2008. Visit http://www1.eere.energy.gov/solar/financial_opportunities.html for updates on this funding opportunity.

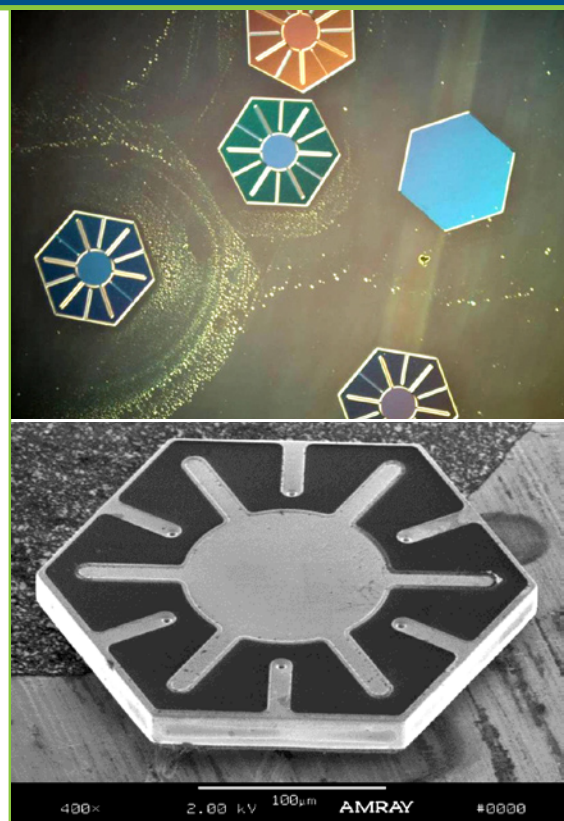
Industry Update

Underwriters Laboratories Unveils Solar Equipment Testing Facility in San Jose

On July 14, representatives from DOE attended the grand opening of a new testing facility in San Jose, CA, designed by Underwriters Laboratories (UL) specifically for testing PV modules and other solar-related equipment. Due to the rapid increase in the PV marketplace, UL opened this new facility to help manufacturers bring new products to market more quickly. The laboratory equipment at the facility tests the resistance of PV modules to environmental conditions such as thermal cycling, high heat and humidity, and hail. The City of San Jose, also a Solar America City, was an excellent location for the laboratory because there are so many PV manufacturers within the city.

Opening of Ausra's Solar Thermal Power Manufacturing Plant

On June 30, Solar Program Manager John Lushetsky attended the opening of Ausra's first North American solar thermal manufacturing and distribution center in Las Vegas, NV. Called the "Detroit in the Desert," this factory is the largest-capacity assembly line for solar thermal power systems in the world. It will be able to manufacture up to 700 megawatts annually. This 130,000 square-foot, highly automated facility is the first of its kind in the United States. Sen. Harry Reid and Ausra CEO Robert Fishman participated in the official starting of the assembly line.



(Top) Crystalline silicon PV cells with backside contacts. Fabricated at Sandia National Laboratories, these cells are 20 microns thick and 500 microns across and are manufactured in a manner that allows highly efficient use of c-Si material.

(Bottom) Scanning electron microscope image of microscale, crystalline silicon PV cell fabricated at Sandia National Laboratories

NATIONAL LABORATORY TECHNOLOGY DEVELOPMENTS & DOE NEWS

Sandia National Laboratories Demonstrates Prototype Ultra-Thin PV Cells

The top image above shows five functional crystalline silicon (c-Si) PV cells that are only 20 microns thick—a factor of eight thinner than c-Si PV cells in production today. Fabricated with backside contacts and suspended in fluid, these prototype micro-PV cells represent a new way to produce solar cells using microsystems manufacturing techniques. With technical support from NREL solar cell specialists, Sandia scientists and engineers are applying their expertise in the design of microelectromechanical devices to reduce high-grade silicon use, assemble micro-PV cells into full-scale modules, and enable faster installation of these new modules. To date, the Sandia-led team has demonstrated the lift-off of thin, fully functional c-Si cells in a manner that allows the reuse of the remaining c-Si substrate to produce more cells. Sponsored by the DOE Solar Seed Fund, this work is being done to develop novel approaches to reduce significantly the most expensive costs associated with PV technologies.

Solar Program Manager Presents at the National Academy of Sciences' Workshop on Solar

John Lushetsky, the Solar Program manager, presented at the National Academy of Sciences' Workshop "Making Big Solar Work: Achievements, Challenges & Opportunities" in Washington, D.C. on July 29. Entitled "Accelerating the Future of Solar: Providing Signals to the Market," the talk provided an overview of the Solar Program and strategies for engaging with industry to achieve technology and market transformation objectives. Dr. Samuel Baldwin, Chief Technology Officer for DOE's Office of Energy Efficiency and Renewable Energy, was the keynote speaker at the event.

SETP Staff Attend 23rd European Photovoltaic Solar Energy Conference & Exhibition

Solar Program Manager John Lushetsky, along with Grid Integration team lead Dan Ton and Presidential Management Fellow Katie Bolcar, attended the 23rd European Photovoltaic Solar Energy Conference and Exhibition from September 1-5 in Valencia, Spain. Dan Ton presented information on renewable systems interconnection and explained to the international audience the work that DOE is funding. Solar Program staff also met with Japanese and German counterparts to discuss collaboration on PV system performance and reliability. The event, the world's largest solar energy conference, covered research results, developments in the industrial and market sectors, and political framework conditions. A highlight at this year's conference was the strong interest in grid integration of PV and discussion of large-scale systems. One of the many notable take-aways from the conference included the significant market transformation activities funded by the European Commission and individual European countries.

Western Governor's Association Launches Western Renewable Energy Zone Project

The Western Governors' Association (WGA) and U.S. Department of Energy launched the Western Renewable Energy Zones (WREZ) Project in May 2008. Utilizing those areas in the West with vast renewable resources to expedite the development and delivery of clean and renewable energy is the central goal of the WREZ project. Participating in the project are 11 states, two Canadian provinces, and areas in Mexico that are part of the Western Interconnection. The WREZ project will generate:

- reliable information for use by decision-makers that supports the cost-effective and environmentally sensitive development of renewable energy in specified zones, and
- conceptual transmission plans for delivering that energy to load centers within the Western Interconnection. A number of factors will be considered, including the potential for development, timeframes, common transmission needs and costs. The project will also evaluate all feasible renewable resource technologies that are likely to contribute to the realization of the goal in WGA's policy resolution that calls for the development of 30,000 megawatts of clean and diversified energy by 2015.



(top) Dan Ton, Grid Integration lead at DOE's Solar Program, presents on grid integration at the 23rd European Photovoltaic Solar Energy Conference in Valencia, Spain.



Entrance to the Photovoltaic Solar Energy Conference (above), and inside the exhibit hall (below).



Guiding this initiative is the WREZ Steering Committee, comprising governors, public utility commissioners and premiers. Officials from the U.S. Departments of Energy, Interior and Agriculture, as well as the Federal Energy Regulatory Commission, will participate as ex officio members.

The work groups of the WREZ project have made significant headway in identifying resources, crafting modeling criteria and gathering environmental sensitive lands for exclusion. Work groups accept public comment on draft work products.

Visit the WGA WREZ website for the latest information and activities at <http://www.westgov.org/wga/initiatives/wrez/index.htm>.

Market Transformation

Cities across the U.S. Kick Off Solar America Cities Efforts

A number of DOE's partner cities across the country held press events over the last few months to kick off their Solar America Cities efforts.

On June 2, Ann Arbor (MI) Mayor John Hieftje, the Ann Arbor City Council, and DOE representative Steve Palmeri, attended the groundbreaking of a solar installation at the Farmer's Market. The following day, June 3, Madison (WI) Mayor David Cieslewicz unveiled the city's Solar America City road signs at an event at the city's public swimming pool just prior to its opening for summer. The pool features a solar canopy. The following week, on June 9, Charlie Hemmeline from DOE's Solar Program presented Houston (TX) Mayor Bill White with a Solar America City road sign at a public solar fair at City Hall, featuring the mayor's zero-money-down challenge. San Jose (CA) rounded off the cities' kickoff events for the month of June with the Mayor's Summer Solstice Solar Fair on June 20. Charlie Hemmeline and San Jose Mayor Chuck Reed unveiled the city's Solar America City road sign at the fair, where a number of solar companies provided solar information to the community. The mayor issued the challenge to the solar industry to provide solar energy systems to San Jose residents with no upfront cost.

On August 28 in San Diego (CA), Tom Kimbis, the Market Transformation lead for the Solar Program, spoke during the Solar San Diego Kickoff with Mayor Jerry Sanders. The event garnered news coverage on four English and two Spanish channels.

On September 18, Solar Sonoma County (CA) officially launched its efforts at an event that drew 200 people representing local governments, industry, universities, and non-profit organizations. Five mayors from Sonoma County spoke, along with John Lushetsky, DOE's Solar Program manager, who gave the keynote address. The City of Santa Rosa, which is the lead grantee for the Solar America City award, joined forces with the eight other city governments within Sonoma County, as well as the county government, to launch this Solar Sonoma County effort.

On September 26, Sacramento Vice Mayor Steven Cohn, along with Hannah Muller from DOE's Solar Program, and Clean Start Executive Director Ingrid Rosten, unveiled Sacramento's Solar America City road sign, officially acknowledging the city's designation



Recently retired City Energy Coordinator David Konkle (left), Ann Arbor Mayor John Hieftje, DOE Project Officer Steve Palmeri, and Dave Feldbauer of RCI Roofing and Sheet Metal Inc. hold a roof panel featuring a solar collector that was later installed at the Ann Arbor Farmers' Market.



Madison Mayor David Cieslewicz poses with Madison's new Solar America City sign.



San Jose Mayor Chuck Reed (left) and DOE Solar Program's Charlie Hemmeline unveil San Jose's new Solar America City sign at the Mayor's Summer Solstice Solar Fair in June 2008.

as a Solar America City. The presentation was given at the Sacramento Regional Clean Energy Showcase. Following the sign presentation, Congresswoman Doris Matsui delivered a speech via video acknowledging the city's efforts in solar energy.

San Francisco Mayor Gavin Newsom wrapped up the latest round of city press events on September 30, where he announced a challenge to San Francisco businesses to install 5 MW of solar electricity by September 2009, which would double the city's current solar generation capacity. As part of this challenge, the city will provide free rooftop assessments and energy efficiency audits to local businesses, which will be funded in part by the city's Solar America City grant. Solar Program Manager John Lushetsky congratulated the city on its progress in expanding the local solar market and acknowledged the key role cities play in accelerating the widespread adoption of solar technologies.

National Interest in the Solar America Cities Program

On September 30, Tom Kimbis and Kevin Lynn from DOE Headquarters, along with the company CH2M Hill, met with the New York Times, Business Week, and Time Magazine to discuss interest in the Solar America Cities Program. All three media outlets were very interested in the idea of transforming the solar marketplace through the 25 Solar America Cities. CH2M Hill also demonstrated the use of the solar mapping technology called Solar Automated Feature Extraction (SAFE).

Forest City Military Communities Commissions PV System

On June 16, Forest City Military Communities, a Solar America Showcase in Honolulu, HI, commissioned the Halsey Terrace Community Center's photovoltaic system at a ceremony including Rear Admiral T.G. Alexander, commander Navy region Hawaii; Jon Wallenstrom, senior vice president of Forest City Military Communities Hawaii; Hawaii Governor Linda Lingle; DOE's Solar Market Transformation lead, Tom Kimbis; and Rear Admiral Michael Giogone, commander, Naval Facilities Engineering Command Pacific.

The 107-kW PV system installed at the Halsey Terrace Community Center is the first of more than 6,300 solar systems being installed at Ohana Military Communities, a residential community for over 6,500 Navy and Marine Corps families in Honolulu. The community is a public-private venture between the Department of Navy and builder Forest City Hawaii. The \$2 billion project is one of the largest real-estate developments in the nation.

As part of this effort, DOE provided hands-on technical assistance to integrate solar electric and solar thermal technologies into the community. The team was led by Sandia National Laboratories, with support from experts from the National Renewable Energy Laboratory, New Mexico State University, and CH2MHill. The team provided analysis, infrastructure assessments, information on financial options, and technical construction recommendations, all which resulted in a viable business model for large-scale solar adoption.



The new 107 kW photovoltaic system on the Halsey Terrace Community Center at Forest City Military Communities in Honolulu was commissioned on June 16.

Visit to Mystic Seaport Museum

On September 29, Tom Kimbis and Kevin Lynn from DOE Headquarters visited the Mystic Seaport Museum, one of the latest awardees of the Solar America Showcases Program. Mystic Seaport—The Museum of America and the Sea—is the nation's leading maritime museum. Dave Click, from the Florida Solar Energy Center, will provide technical assistance to the Museum to help them install a 1 MW PV system on the roof of the building. Because parts of the building are over 100 years old, the system will need to be installed in keeping with its historic tradition.

Solar America Board of Codes and Standards Releases Three New Reports

The Solar America Board of Codes and Standards (SolarABCs) is pleased to announce the publication of the following three reports:

- ***Comparison of the Four Leading Small Generator Interconnection Procedures***—This report is intended to serve as a guide for utility regulators at the state and local levels in the process of revising their interconnection procedures.
- ***A Comprehensive Review of Solar Access Law in the United States Suggested Standards for a Model Statute and Ordinance***—This report reviews the ability of existing law and regulation to protect solar access and recommends specific measures to improve solar access.
- ***Utility External Disconnect Switch Study Report***—This report includes information and recommendations to help regulators make decisions on utility external disconnect-switch requirements as they develop or revise interconnection rules for small renewable generators.

All three of these reports are available online at www.solarabcs.org. The Solar America Board of Codes and Standards is one of the major projects of the U.S. DOE's Solar America Initiative Market Transformation efforts. The Solar ABCs identifies current issues, establishes dialogue among key stakeholders, and catalyzes appropriate activities to support the development of codes and standards that facilitate the installation of high quality, safe photovoltaic systems. It serves as a centralized repository for such documents, regulations, technical and 'best practices' materials. It makes all materials and information easily accessible to the public and stakeholders.

National Electric Code Compliance for PV Systems Workshop

An increasing number of PV systems are being installed in Colorado as a result of financial incentives from Colorado utilities and federal tax credits. In response, the Interstate Renewable Energy Council, a member of the Solar America Board of Codes and Standards, and the Colorado Solar Energy Industries Association hosted an 8-hour workshop attended by 45 code enforcement officers, building department officials, and third-party electric inspectors representing cities and counties throughout the state. Guidelines have been developed to assist local building-code officials and to clarify the installation requirements for PV system installers. These guidelines, developed with funding from DOE, provide a common set of informational requirements needed to demonstrate satisfaction of electrical and building-code standards. The workshop was conducted by Bill Brooks, Brooks Engineering, who is the principal author of *Inspector Guidelines for PV Systems*.



Tom Kimbis and Kevin Lynn from DOE's Solar Program, and Dave Click from the Florida Solar Energy Center visit Mystic Seaport Museum, one of the newly awarded Solar America Showcases.

IEC TC 82 US TAG Meeting Held in Tempe, AZ

The US Technical Advisory Group (USTAG) for the International Electrotechnical Commission (IEC) Technical Committee 82 Solar Photovoltaic Energy System (TC82) met on September 24-25, 2008 in Tempe, AZ. The TC82 US TAG acts on behalf of the IEC US National Committee as the review body for documents and proposals from IEC TC 82. The Scope of TC82 is “to prepare international standards for systems of photovoltaic conversion of solar energy into electrical energy and for all the elements in the entire photovoltaic energy system.” The meeting was the first of its kind since 1999 and was supported by the Solar America Board of Codes and Standards.

Cities Tackling Climate Change Study Tour

In mid-July, DOE’s Solar America Cities lead, Hannah Muller, participated in a study tour in London along with representatives from Boston, New York City, and Pittsburgh, three of DOE’s Solar America Cities. The group met with elected officials and staff from the Greater London Authority, Energy Savings Trust, London Climate Change Agency, and the Borough of Woking. They discussed ways in which British cities are tackling climate change through renewable energy deployment and creative financing schemes. Muller presented an overview of the Solar America Cities program to London officials, and she will hold follow-up meetings with DOE partner cities to explore the potential for replicating some of the best practices seen on the study tour.

Solar Program Travels to Asia for “Standards in Trade Workshop” and Information Sharing

Thomas Kimbis, Ted James, and Kevin Lynn of the Solar Program participated in the Standards in Trade Workshop for China on Renewable Energy and Efficient Lighting Systems sponsored by the National Institute of Standards and Technology (NIST) in Shanghai, China, June 23–25, 2008. The purpose of the meeting was to bring together government and industry representatives to share information between the two countries, particularly in regards to the state of the marketplace and the status of standards development.

DOE representatives gave overviews of the Office of Energy Efficiency and Renewable Energy (EERE), the state of the U.S. solar industry, and the Solar America Board of Codes and Standards (SolarABCs). To better understand potential obstacles to transforming the solar marketplace in the United States, the three visited Japan to learn more about the state of its solar programs. They met with the Tokyo Electric Power Company, the New Energy and Industry Development Organization (NEDO), and the Japanese Photovoltaic Energy Association. They also visited the city of Ota, site of a program sponsored by NEDO, which installed and studied the impacts of 553 grid-connected residential PV systems totaling 2.2 MW in capacity on a single utility feeder.



DOE's Solar America Cities lead Hannah Muller (center) is joined by members of Boston, New York, and Pittsburgh's Solar America Cities teams, along with others, at the climate change study tour in London.

DOE Solar Program and Partner Publications

Renewable Energy Data Book

September 2008

U.S. Department of Energy

In September, EERE published the Renewable Energy Data Book, which contains important information concerning some of the following: installed nameplate capacity, generation, and cost of energy prices. The myriad graphs and charts make it easier to identify growth trends during the last several years in both the United States and the world. Additionally, one of the many useful features includes state rankings in a variety of categories.

http://www1.eere.energy.gov/maps_data/pdfs/eere_databook_091208.pdf

PHOTOVOLTAICS

Final Report for Accelerated Aging Testing & Reliability in Photovoltaics Workshop II

2008

U.S. Department of Energy

The final report has been completed for the Accelerated Aging Testing & Reliability in PV Workshop. This workshop reassessed the PV industry's needs, priorities, and recommendations on accelerated aging and reliability research in light of recent growth and changes in both the industry and the DOE Solar Energy Technologies Program. The reliability team is now responding to the major themes that emerged from the discussions.

http://www1.eere.energy.gov/solar/accelerated_aging_2008_workshop.html

Opportunities and Challenges for Development of a Mature Concentrating Photovoltaic Power Industry

2008

National Renewable Energy Laboratory

This report describes the status of the concentrating photovoltaic industry and the challenges that must be overcome for this industry to achieve maturity.

www.nrel.gov/pv/pdfs/43208.pdf

IEA PV Trends Report

September 2008

International Energy Association

The International Energy Association (IEA) released its "Trends in Photovoltaic Applications: Survey report of selected IEA countries between 1992 and 2007" in September. This report provides an overview of PV power systems applications and markets in the reporting countries at the end of 2007 and analyzes trends in implementing PV power systems between 1992 and 2007.

www.iea-pvps.org/products/rep1_17.htm

GRID INTEGRATION

SEGIS and Smart Grid: An Introduction

October 2008

U.S. Department of Energy, Solar Energy Technologies Program

This brochure presents an overview of how Solar Energy Grid Integration Systems (SEGIS) and Smart Grid can work together to maximize the benefits of photovoltaic systems for residential and commercial customers, as well as further the wide-scale deployment of solar.

www.eere.energy.gov/solar/pdfs/segis_brochure_2008.pdf

MARKET TRANSFORMATION

Comparison of the Four Leading Small Generator Interconnection Procedures**October 2008**[Solar America Board of Codes and Standards](#)

Public interest in distributed generation, particularly solar energy systems, has fostered federal and state legislation calling for streamlined procedures for interconnection of generators to the electric grid. Existing procedures have proven inadequate in many cases, with high costs, lengthy timelines, bureaucracy, and uncertainty acting as formidable barriers to entry. In response to the continuing wave of legislation, utility regulators at the state and local levels are actively revising their interconnection procedures and will continue to do so in the future. This paper is intended to serve as a guide for those regulators.

www.solarabcs.org/interconnection

A Comprehensive Review of Solar Access Law in the United States Suggested Standards for a Model Statute and Ordinance**October 2008**[Solar America Board of Codes and Standards](#)

Solar energy systems require direct access to sunlight to operate efficiently. The installation of a solar energy system on a new or existing building requires exterior modifications that are subject to building codes and private regulation. This report reviews the ability of existing law and regulation to protect solar access and recommends specific measures to improve solar access.

www.solarabcs.org/solaraccess

Utility External Disconnect Switch Study Report**October 2008**[Solar America Board of Codes and Standards](#)

Regulators must address the issue of utility external disconnect-switch requirements as they develop revised interconnection rules for small renewable generators. This report includes important information on this topic and a recommendation for regulators.

www.solarabcs.org/utilitydisconnect

Taking the Red Tape Out of Green Power**September 2008**[Network for New Energy Choices](#)

This new report identifies the most significant municipal-level planning and permitting obstacles to the expansion of distributed renewable energy systems (solar photovoltaics and small wind turbines), and provides a set of recommendations for states and municipalities for removing these obstacles.

www.newenergychoices.org/index.php?sd=rt&page=redTape

Summary of 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.

Figure 1. Summary of Solar Program Funding Opportunities

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FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) OR SOLICITATION	AWARD DATE	FUNDING AMOUNT	DESCRIPTION	STATUS
Systems Development and Manufacturing: Technology Pathway Partnerships (TPP)	March 8, 2007	\$168 M over 3 years	Cost-shared industry-led projects for PV systems development, and manufacturing demonstrations. Collective portfolio of projects will reduce direct manufacturing and installation costs by at least 30% by 2010, and will deliver up to 2.4 GW of new manufacturing capacity by year-end 2010.	<ul style="list-style-type: none"> • Amonix (CA) • Boeing (CA) • BP Solar (MD) • Dow Chemical (MI) • General Electric (DE) • GreenRay (MA) • Konarka (MA) • Miasole (CA) • Nanosolar (CA) • Soliant (CA) • SunPower (CA), includes PowerLight (CA) • United Solar Ovonic (MI)
Market Transformation: Codes and Standards	March 26, 2007	\$4.2 M over 5 years	Working Group will address code development and outreach activities in areas of critical importance to solar market penetration (e.g., interconnection procedures, net metering, product safety, international standards coordination). Will lead to a major improvement in the responsiveness, effectiveness, and accessibility of codes and standards to U.S. solar stakeholders at all levels.	Solar America Board of Codes and Standards (SolarABCs) PV Capacity Credit Valuation Study: <ul style="list-style-type: none"> • State University of New York (NY) • Tucson Electric Power (AZ)
Market Transformation: State/Utility Solar Technical Outreach	March 27, 2007	\$1.7 M over 3 years	Will conduct tailored solar technical outreach to states and utilities and will provide resources and best practices to address solar issues faced by states and utilities.	Utility Technical Outreach: <ul style="list-style-type: none"> • Solar Electric Power Association (DC) State Technical Outreach: <ul style="list-style-type: none"> • Clean Energy Group (VT) • National Association of Regulatory Utility Commissioners (DC) • National Conference of State Legislatures (CO)

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Summary of Solar Program Funding Opportunities, *Continued*
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FOA OR SOLICITATION	AWARD DATE	FUNDING AMOUNT	DESCRIPTION	STATUS
Market Transformation: Solar America Showcases (SAS)	May 16, 2007	Technical assistance only	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. SAS does not provide financial assistance; instead, it provides technical assistance through teams of DOE-funded solar experts from the National Renewable Energy Laboratory, Sandia National Laboratories, the Southeast and Southwest Regional Experiment Stations, and private firms.	<ul style="list-style-type: none"> • City of San Jose (CA) • Forest City Military Communities (HI) • Orange County Convention Center (FL)
Component and Pilot Scale Production: PV Module Incubators	June 20, 2007	\$27 M over 18 months	Projects focused on solving technical challenges that must be overcome to scale-up manufacturing and commercialize new products by 2010 and shortening the timeline for companies to transition pre-commercial PV technologies into full-scale manufacturing.	<ul style="list-style-type: none"> • AVA Solar (CO) • Blue Square Energy (MD) • CaliSolar (CA) • EnFocus Engineering (CA) • MicroLink Devices (IL) • Plextronics (PA) • PrimeStar Solar (CO) • Solaria (CA) • SolFocus (CA) • SoloPower (CA)
Market Transformation: Solar America Cities	June 20, 2007	\$2.5 M and technical support over 2 years	Cities will integrate solar technologies into city energy planning, zoning, and facilities; streamline city-level regulations and practices that affect solar adoption by residents and local businesses (e.g., permitting, inspections, local codes); and promote solar technology among residents and local businesses (e.g., outreach, curriculum development, and/or implementation, incentive programs).	<ul style="list-style-type: none"> • Ann Arbor (MI) • Austin (TX) • Berkeley (CA) • Boston (MA) • Madison (WI) • New Orleans (LA) • New York (NY) • Pittsburgh (PA) • Portland (OR) • Salt Lake City (UT) • San Diego (CA) • San Francisco (CA) • Tucson (AZ)

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Summary of Solar Program Funding Opportunities, *Continued*
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FOA OR SOLICITATION	AWARD DATE	FUNDING AMOUNT	DESCRIPTION	STATUS
Device and Process Proof of Concept: Next Generation PV Devices and Processes	November 8, 2007	\$21.7 M over 3 years	For companies to perform exploratory R&D for developing innovative, highly disruptive future-generation solar electric technologies. Device and manufacturing process research targeted here is expected to produce prototype cells and/or processes by 2015, with full commercialization in the 2020–2030 timeframe.	<ul style="list-style-type: none"> • Arizona State University (Tempe, AZ) • California Institute of Technology (Pasadena, CA) • Massachusetts Institute of Technology (Cambridge, MA) • Mayaterials, Inc. (Ann Arbor, MI) • Pennsylvania State University (University Park, PA) • Rochester Institute of Technology (Rochester, NY) • Solasta, Inc. (Newton, MA) • Solexant, Inc. (Sunnyvale, CA) • Soltaix, Inc. (Los Altos, CA) • Stanford University (Stanford, CA) • University of California, Davis (Davis, CA) • University of California, San Diego (La Jolla, CA) • University of Colorado (Boulder, CO) • University of Delaware (Newark, DE) • University of Florida (Gainesville, FL) • University of Illinois (Urbana, IL) • University of Michigan (Ann Arbor, MI) • University of South Florida (Tampa, FL) • University of Washington (Seattle, WA) • Voxel, Inc. (Beaverton, OR) • Wakonda Technologies (Fairport, NY)
Concentrating Solar Power Funding Opportunity Announcement	November 29, 2007	\$5.2M for Phase 1	For companies to develop storage solutions, manufacturing approaches, and new system concepts for large-scale concentrating solar power (CSP) plants. Collaborative public/private partnerships established herein will work to reduce the nominal levelized cost of energy of CSP power plants from 13-17 ¢/kWh in 2007 to 7-10¢/kWh by 2015 and 5-7¢/kWh by 2020.	<ul style="list-style-type: none"> • 3M (St. Paul, MN) • Alcoa (Alcoa Center, PA) • Brayton Energy (Hampton, NH) • Hamilton Sundstrand (Canoga Park, CA) • Infinia (Kennewick, WA) • PPG Industries (Pittsburgh, PA) • Skyfuel (New York, NY) • Solar Millennium (Berkeley, CA) • Solucar (Lakewood, CO)

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Summary of Solar Program Funding Opportunities, *Continued*
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Systems Development and Manufacturing: University Product and Process Development Support	March 12, 2008	Up to \$30M over 3 years	For universities to perform targeted materials science and process engineering research that offers direct, near-term improvements in PV products and development processes for commercialization by 2010.	<ul style="list-style-type: none"> • Arizona State University with SolFocus and Soliant Energy • California Institute of Technology with Spectrolab • Georgia Institute of Technology with Sixtron • Massachusetts Institute of Technology with CaliSolar • North Carolina State University with Spectrolab • Pennsylvania State University with Honeywell • University of Delaware with Dow Corning • University of Delaware with SunPower • University of Florida with Global Solar Energy Inc., International Solar Electric Technology Inc., Nanosolar Inc., and Solyndra Inc • University of Toledo with Solar Fields, LLC • University of Toledo with Xunlight
Solar America Cities	March 28, 2008	\$2-\$3 M over 2 years	Building on the success of the initial Solar America Cities FOA, the Solar Program issued a similar FOA to allow more cities to participate. Solar America Cities are recognized as partners who are highly committed to solar technology adoption at the local level.	<ul style="list-style-type: none"> • Denver (CO) • Houston (TX) • Knoxville (TN) • Milwaukee (WI) • Minneapolis-St. Paul (MN) • Orlando (FL) • Philadelphia (PA) • Sacramento (CA) • San Antonio (TX) • San Jose (CA) • Santa Rosa (CA) • Seattle (WA)
Solar America Showcases	May 29, 2008	Technical assistance only	The 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. SAS does not provide financial assistance; instead, it provides technical assistance through teams of DOE-funded solar experts from the National Renewable Energy Laboratory, Sandia National Laboratories, the Southeast and Southwest Regional Experiment Stations, and private firms.	<ul style="list-style-type: none"> • Mystic Seaport Museum (CT)

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Summary of Solar Program Funding Opportunities, *Continued*
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Solar America Showcases	July 2008	Technical assistance only	The 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. SAS does not provide financial assistance; instead, it provides technical assistance through teams of DOE-funded solar experts from the National Renewable Energy Laboratory, Sandia National Laboratories, the Southeast and Southwest Regional Experiment Stations, and private firms.	<ul style="list-style-type: none"> • District Department of the Environment/ District of Columbia Energy Office (Washington, DC) • Steiner and Associates (OH, VA, and TX) • Energy, Conservation and Management Division of the State of New Mexico (Albuquerque, NM)
Component and Pilot Scale Production: Solar Energy Grid Integration Systems	August 12, 2008	<p>Up to \$24 M per year over 3 years.</p> <p>In Phase I, \$2.9 M total in DOE funding is leveraging \$1.7 M in industry cost-share.</p>	SEGIS awards will focus on collaborative R&D to develop products that will allow PV to become a more integral part of household and commercial smart energy systems through developing less expensive, higher performing products to enhance the value of solar PV systems to homeowners and business owners. The developments will allow building energy managers to better respond to time-of-use pricing and weather conditions to minimize building energy costs and stabilize the effect on the electricity grid. The teams will also develop products that facilitate interaction between solar energy systems and plug in hybrid vehicles, and provide a secure back-up power source during outages. The intelligent controls and energy management efforts are a critical step towards developing net-zero-energy homes, buildings, and communities.	<ul style="list-style-type: none"> • Apollo Solar (Bethel, CT) • EMTEC (Dayton, OH) • Enphase Energy Inc. (Petaluma, CA) • General Electric (Niskayuna, N.Y.) • Nextek Power Systems (Detroit, MI and Hauppauge, NY) • Petra Solar (Somerset, NJ) • Premium Power (North Reading, MA) • Princeton Power Systems (Princeton, NJ) • PV Powered (Bend, OR) • The Florida Solar Energy Center of the University of Central Florida (Orlando, FL) • VPT Inc. (Blacksburg, VA)

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Summary of Solar Program Funding Opportunities, *Continued*
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	Concentrating Solar Power: Advanced High Temperature Storage Solicitation	September 19, 2008	Up to \$35 M over 4 years	Two topic areas are of interest for this solicitation to support CSP technologies: (1) advanced high temperature heat transfer fluids (HTF) with an objective to identify and characterize novel fluids or fluid types that possess the physical and chemical properties required for an improved HTF and thermal storage fluid for CSP technologies; and (2) novel concepts for high temperature thermal energy storage (TES) with an objective is to generate and evaluate novel concepts for TES that have potential to reduce the cost of TES to less than \$15/kWh thermal and achieve round trip efficiencies greater than 93%. Work in TES may be applicable to any or all CSP technologies, parabolic trough, power tower, linear Fresnel, or concentrating dish. Both objectives work toward the 2015 and 2020 goals of making CSP technologies cost competitive.	Advanced heat transfer fluids research and development (R&D) <ul style="list-style-type: none"> • Symyx (Sunnyvale, CA) Thermal energy storage R&D <ul style="list-style-type: none"> • Abengoa (Lakewood, CO) • Acciona (Henderson, NV) • City University of New York (CUNY) (New York, NY) • General Atomics (San Diego, CA) • Infinia Corporation (Kennewick, WA) • Lehigh University (LU) (Bethlehem, PA) • Terrafore (Riverside, CA) • Texas Engineering Experiment Station (College Station, TX) • University of Alabama (UA) (Tuscaloosa, AL) • University of Arkansas (UA) (Fayetteville, AR.) • University of Connecticut (UConn) (Storrs, CT) Thermal energy storage near-term demonstration <ul style="list-style-type: none"> • Abengoa (Lakewood, CO) • Acciona (Henderson, NV) • US Solar Holdings (Boise, ID)
	Component and Pilot Scale Production: PV Module Incubators- Round 2	September 29, 2008	\$3 M per award	Projects focused on solving technical challenges that must be overcome to scale-up manufacturing and commercialize new products by 2010-2011 and shortening the timeline for companies to transition pre-commercial PV technologies into full-scale manufacturing. PV Incubator is led by the National Renewable Energy Laboratory.	<ul style="list-style-type: none"> • 1366 Technologies (Lexington, MA) • Innovalight (Sunnyvale, CA) • Skyline Solar (Mountain View, CA) • Solasta (Newton, MA) • Solexel (Milpitas, CA) • Spire Semiconductor (Hudson, NH)
FOA OR SOLICITATION		CLOSING DATE	FUNDING AMOUNT	DESCRIPTION	STATUS
	Solar America Showcases	June 12, 2008	Technical assistance only	The Solar America Showcases Notice of Technical Assistance (NOTA) was well received and the Solar Program plans to release a similar NOTA. To receive technical assistance for a Solar America Showcase, the project must be a large-scale (>100 kW), high-visibility solar installation that uses a novel solar technology, a novel application for a solar technology, and replicable components.	

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Summary of Solar Program Funding Opportunities, *Continued*
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  PROPOSED

FOA OR SOLICITATION	CLOSING DATE	FUNDING AMOUNT	DESCRIPTION	STATUS
PV Supply Chain	FY 2009	TBD by appropriations	The PV Supply Chain solicitation will address the grid parity goals of SAI by developing subsystem components, materials, or processes that can be supplied across the industry to reduce cost, enhance performance, or extend lifetime over today's technology.	
Minority University Research Associates	FY 2009	TBD by appropriations	DOE plans to provide support to attract and encourage qualified science, engineering, and business minority undergraduate and graduate students to pursue advanced degrees and careers in science and technology by providing scientific and technical R&D opportunities in solar energy technologies. Will solicit applications from accredited universities and colleges defined as Minority Serving Institutions.	
Education, Training, and Certification	FY 2009	TBD by appropriations	The Solar Energy Technologies Program is also anticipating releasing a new FOA this year for education, training, and certification, with the details to be released at a later date.	

SOLAR EVENTS CALENDAR

Solar Power International
October 13–16, 2008, San Diego, CA
www.solarpowerconference.com

Solar America Board of Codes and Standards Stakeholder Meeting
October 17, 2008, San Diego, CA
<http://solarabcs.eventbrite.com/>

The Third Annual Investing in Solar
October 20–21, 2008, Phoenix, AZ
www.frallc.com/conference.aspx?ccode=B657

Solar Industry Conference 2008
October 23–24, 2008, Madrid, Spain
www.solarpraxis.de/index.php?id=1060

The 4th Dresche International Solar Energy & PV Project Exhibition
November 8–10, 2008, Shenzhen, China
www.huiyee.com/event/2008_tyn/index.html

International Conference on Solar Concentrators for the Generation of Electricity
November 16–19, 2008, Palm Desert, CA
www.icsc5.com

Greenbuild International Conference and Expo
November 19–21, 2008, Boston, MA
www.greenbuildexpo.org

PV Tech Milan 2008
November 25–28, 2008, Milan, Italy
www.hitechexpo.eu/en/conf_2008.asp?fiera=PVM

3rd International Solar Energy Society Conference, Asia Pacific Region
November 25–28, 2008, Sydney, Australia
www.isesap08.com

Photon Expo: Searching for the “Second Solar”
December 2–4, 2008, San Francisco, CA
www.photon-expo.com/en/index.htm

Solar Innovation & Investment USA
December 2–3, 2008, New York, NY
www.greenpowerconferences.com/renewablesmarkets/solar_usa.html

APEC Workshop on Grid Integration of Renewable Energy
January 13–15, 2009, Honolulu, HI

18th International Photovoltaic Science and Engineering Conference & Exhibition
January 19–23, 2009, Calcutta, India
www.pvsec18.in

Conferenza dell'Industria Solare
February 5–6, 2009, Rome, Italy
www.solarpraxis.de/index.php?id=1351

2nd International Photovoltaic Power Generation Expo
February 25–27, 2009, Tokyo, Japan
www.pvexpo.jp/2009_eng/index.phtml

International Solar Energy Expo & Conference 2009
February 25–27, 2009, Seoul, South Korea
www.exposolar.org

Photon's 4th Photovoltaic Technology Show 2009 Europe
March 4–6, 2009, Munich, Germany
www.photon-expo.com/en/index.htm

Asia Solar (Solar PV Exhibition)
March 30–April 1, 2009, Shanghai, China
www.asiasolarexpo.com/EN_index.html

Globalcon 2009
April 1–2, 2009, Atlantic City, NJ
www.globalconevent.com

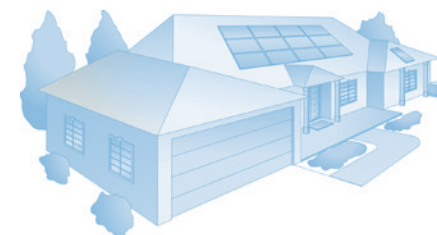
SNEC 3rd International Photovoltaic Power Generation Conference & Exhibition
May 6–8, 2009, Shanghai, China
www.snec.org.cn/indexe.asp

ASES National Solar Conference
May 12–16, 2009, Buffalo, NY
www.ases.org/index.php?option=com_content&view=article&id=18&Itemid=18

International PV Reliability Workshop
December 4–5, 2008, Shanghai, China
www.nrel.gov/pv/pdfs/12-08_ipr_workshop.pdf

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.

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