

# SUNSHOT GRAND CHALLENGE

Summit and Technology Forum

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## EVENT PROGRAM

JUNE 13 - 14  
2012

DENVER, CO  
HYATT REGENCY

The banner features a dark background with diagonal lines and a vertical white line. On the right side, there is a photograph of a blue solar panel being held by a robotic arm. The text is positioned on the left side of the banner.

WELCOME TO THE  
SUNSHOT  
GRAND  
CHALLENGE

Summit and Technology Forum

The SunShot Grand Challenge: Summit and Technology Forum convenes the best minds in developing and deploying solar technology—scientists, engineers, utility executives, manufacturers, and policymakers—who are working toward the common goal of achieving cost-competitive solar energy by 2020.

Over the two days of the Summit and Forum, you'll participate in a variety of events designed to foster collaborations that span sectors, industries, and disciplines. The SunShot Summit and Technology Forum will highlight solar innovations funded through the program, discuss how to sustain that innovation, and help determine future SunShot Initiative research, development, and demonstration priorities.

Thank you for participating.



## EVENT HIGHLIGHTS

- **PLENARY SESSIONS**

Attend plenary sessions featuring top experts in the field, including a lead-off address by Secretary Chu, as well as two high-level panel discussions on global competitiveness in solar and the interplay between solar technology developers, utilities, and regulatory bodies.

- **INTERACTIVE TECHNOLOGY FORUM**

Meet and network with fellow SunShot participants and see their cutting-edge technologies up close and personal. Hands-on demonstrations and poster presentations track the full technology pathway, from the lab bench to the production line to wide-scale deployment.

- **GRAND CHALLENGE DEEP DIVES**

Take the opportunity to share your thoughts and transformational ideas on how to achieve the SunShot goal of cost-competitive solar by the end of the decade. These ideas will be incorporated into future SunShot funding priorities.

# EVENT SCHEDULE

## WEDNESDAY, JUNE 13

- 7:00 a.m.** Registration and Continental Breakfast  
Location: Mineral Foyer
- All morning sessions are in the Centennial Ballroom B-D
- 8:00 a.m.** **Welcoming Remarks: Arun Majumdar**,  
Founding Director, ARPA-E
- 8:15 a.m.** **Steven Chu**, Secretary of Energy,  
U.S. Department of Energy
- 9:00 a.m.** **Dorothy Robyn**, Deputy Under Secretary of  
Defense for Installations and Environment, U.S.  
Department of Defense
- 9:25 a.m.** **Introduction: Minh Le**, SunShot Initiative,  
U.S. Department of Energy
- 9:30 a.m.** **R. Ramesh**, Director, SunShot Initiative,  
U.S. Department of Energy
- 9:45 a.m.** **Harry Atwater**, Howard Hughes Professor  
and Professor of Applied Physics and Materials  
Science, California Institute of Technology
- 10:15 a.m.** **John Woolard**, President and CEO,  
BrightSource Energy
- 10:45 a.m.** **Global Competitiveness Panel**
- Lidija Sekaric**, SunShot Initiative,  
U.S. Department of Energy (Moderator)
- Dan Armbrust**, President and CEO, SEMATECH
- Gordon Brinser**, President, Solar World  
Industries America
- Diana DeGette**, U.S. House of Representatives,  
1st District of Colorado
- Mark Pinto**, Executive Vice President of Energy  
and Environmental Solutions, Applied Materials
- 12:00 p.m.** **Connections Lunch**  
Location: Mineral Hall
- 1:00 p.m.** **Grand Challenge Deep Dives**  
(A, B, C, D Parallel Sessions –  
see opposite page for details)
- 4:00 p.m.** **SunShot Technology Forum:  
Poster Sessions and Exhibits  
Reception**  
Location: Centennial Ballroom
- 8:00 p.m.** Close

## GRAND CHALLENGE DEEP DIVES

### A. Systems Integration ■

According to the *SunShot Vision Study* ([http://www1.eere.energy.gov/solar/sunshot/vision\\_study.html](http://www1.eere.energy.gov/solar/sunshot/vision_study.html)), solar technologies could provide approximately 14% of the nation's energy supply by 2030 and 27% by 2050 when the cost goals of the SunShot Initiative are met. This high level of solar deployment poses significant technical challenges with respect to grid integration. These panels will focus on the current progress and future efforts in systems integration that will help successfully meet SunShot Initiative goals.

#### **Overcoming the Barriers to Grid Integration: Successes in SunShot**

Each panelist will present 10-minute overviews discussing advances made in their SunShot-funded projects. A 20-minute question-and-answer session will follow the presentations.

#### **Overcoming the Barriers to Grid Integration: Achieving Our Goals**

Each panelist will speak for 10 minutes about what challenges need to be overcome to enable solar technologies to be integrated into the grid in a safe, reliable, and cost-effective manner. The moderator will then initiate a discussion with the panel and take questions from the audience. The goal for this session will be to elicit input from the panelists and the audience on future directions for SunShot in grid integration.

### B. Photovoltaics (PV) ■

#### **New Frontiers in Science and Technology of Photovoltaics**

This panel will discuss new scientific approaches to advance PV systems beyond the 2020 SunShot Initiative goals. Topics of discussion will center on the feasibility of ultra-high efficiency cells and modules. This session will also explore cost reduction strategies, looking toward new architectures and earth-abundant materials with the potential to go beyond the 2020 SunShot goal of \$0.50/W per module.

### C. Concentrating Solar Power (CSP) ■

#### **Opening Remarks: Ranga Pitchumani, SunShot Initiative, U.S. Department of Energy**

#### **To the Sun: Breakthrough CSP Concepts and Technologies**

This session will feature a sampling of four new concentrating solar power concepts and technologies that, when successful, could deliver on the SunShot goal of \$0.06/kWh and be ready to bridge the first "valley of death" to commercialization with the aid of venture capital (VC) funding. Each speaker will present an idea as a potential pitch to a venture capitalist for funding. Each presentation will be 15 minutes long, followed by 5 minutes of questions and answers from the VC panelists.

#### **Bridging the First Valley of Death: From the Laboratory to the Commercial Arena**

The goal of this panel session is to get perspectives from venture capitalists, as well as those who have been successful in commercialization with VC funding, on what is needed for successful transition past the "first valley of death" to commercialization with VC funding. Each panelist will present for 10 minutes, followed by discussion and an open forum for questions and answers. The panelists will also provide feedback on the presentations in the preceding session.

### D. Soft Costs ■

#### **Transforming Solar Markets at the State and Local Level**

This panel will focus on specific actions that can reduce solar process times and costs at the state and local levels. The panel will focus first on the challenges and opportunities to transform solar markets at the state level, and then turn its attention to the local level. Panelists will share their experiences during an interactive question-and-answer discussion with the moderator and audience.

# EVENT SCHEDULE

## THURSDAY, JUNE 14

- 7:00 a.m.** Registration and Continental Breakfast  
Location: Mineral Foyer
- 8:35 a.m.** All morning sessions are in the Centennial Ballroom B-D  
**Introduction: David Danielson**, Assistant Secretary of Energy Efficiency and Renewable Energy, U.S. Department of Energy
- 8:45 a.m.** **Dan E. Arvizu**, Director, National Renewable Energy Laboratory
- 9:20 a.m.** **Richard Swanson**, President Emeritus, SunPower
- 9:55 a.m.** **Bill Ritter**, Former Governor of Colorado
- 10:30 a.m.** **The Energy Trinity: Interplay Between Technology, Utilities, and Regulatory Policies**  
**Eran Mahrer**, Vice President, Solar Electric Power Association (Moderator)  
**Brian Steel**, Executive in Residence and Lecturer, University of California Berkeley Haas School of Business (Moderator)  
**Ron Binz**, Senior Policy Advisor, Center for the New Energy Economy  
**Thomas Brill**, Director of Regulatory and Policy Analysis, Sempra Energy  
**Angiolo Laviziano**, CEO, Mainstream Energy/REC Solar  
**Ed Perlmutter**, U.S. House of Representatives, 7th District of Colorado  
**Jared Schoch**, Managing Director of Utility Sales, SunEdison
- 12:00 p.m.** **Connections Lunch**  
Location: Mineral Hall
- 1:00 p.m.** **Grand Challenge Deep Dives**  
(A, B, C, D Parallel Sessions – see opposite page for details)
- 3:30 p.m.** **Reflections on the SunShot Grand Challenge Summit**  
**Danny Kennedy**, Founder, Sungevity  
**Richard Swanson**, President Emeritus, SunPower  
**Greg Wilson**, Director of the National Center for Photovoltaics, National Renewable Energy Laboratory  
Location: Centennial Ballroom B-D
- 4:00 p.m.** End

## EVENT SPEAKERS



**STEVEN CHU**  
Secretary of Energy,  
U.S. Department of Energy



**DAN ARVIZU**  
Director and Chief  
Executive, National  
Renewable Energy  
Laboratory (NREL)



**HARRY ATWATER**  
Howard Hughes Professor  
and Professor of Applied  
Physics and Materials  
Science, California Institute  
of Technology



**BILL RITTER**  
41st Governor of Colorado,  
Director of the Center for  
the New Energy Economy  
(CNEE) at Colorado State  
University

- Room A
- Room B
- Room C
- Room D

## GRAND CHALLENGE DEEP DIVES

### A. Systems Integration ■

In order to reach the goals of the SunShot Initiative, power electronics and balance of system hardware must reach \$0.10/W and \$0.18/W, respectively, while maintaining required levels of performance and reliability. In support of those goals, SunShot has developed the BOS-X, SEGIS-AC, and Solar ADEPT programs and the Regional Test Centers (RTCs). These panels will address current progress and future directions, as well as the role of technology risk in the deployment of solar technologies.

#### Reducing Hardware Costs and Technology Risk: Successes in SunShot

Each panelist will present 5-minute overviews discussing advances made in his or her SunShot-funded projects. A 15-minute question-and-answer session will follow the presentations.

#### Reducing Hardware Costs and Technology Risk: Achieving Our Goals

Each panelist will speak for 5 minutes about what challenges need to be overcome to enable solar technologies to be integrated into the grid in a safe, reliable, and cost-effective manner. The moderator will then initiate a discussion with the panel and take questions from the audience. The goal for this session will be to gather input from the panelists and the audience on the future direction for SunShot in grid integration.

### B. Photovoltaics (PV) ■

#### Tech to Market: Commercialization, Scale-Up, Finance, and Technology Validation

The concept of "build it and they will come" is not sufficient in today's PV market space. A breakthrough product may be developed and brought to the production prototype stage where access to capital, talent, and the entire ecosystem network is critical for success. A successful scale-up must be accompanied by technology performance validation for deployment and bankability. The goal of this panel is to discuss current hurdles and best practices for PV product development, validation, and financing, including the impact of global markets. Best practices will be highlighted by companies at varying levels of maturity and production capacity, as well as by venture capitalists, institutional investors, and data validation specialists.

### C. Concentrating Solar Power (CSP) ■

#### Grand Challenge: Concentrating Solar Power (CSP)

This panel session will focus on the market and technical challenges to widespread adoption of concentrating solar power as a baseload power-generation solution. Perspectives from the supply-and-demand side inform a strategy to move toward this goal. Each panelist will present for 10 minutes, followed by discussion and an open-forum question-and-answer session.

#### Perspective: Inventing the CSP Energy Future

### D. Soft Costs ■

#### Developing Big and Small Ideas: How Can We Lower the Costs of Project Finance to Achieve Our 2020 Vision?

Generating reliable and affordable solar energy is both a public good and a national goal. A necessary component to achieve this is the availability of scalable, low-cost financing. This session will generate ideas for the private and public sectors that will spur transformative innovation and effectively lower the cost of capital for large and small solar installations. The format will feature a series of "pitches" from a broad variety of stakeholders that will bring their experience and creativity to this challenge. Ideas will be evaluated by an all-star panel of judges and the audience.

## SUNSHOT TECHNOLOGY FORUM

The Technology Forum showcases the broad array of efforts focused on achieving the SunShot cost-reduction targets. It features a series of hands-on demonstrations, poster presentations, and interactive experiences assembled by more than 220 participating organizations. The exhibit layout tracks the full technology pathway, from the lab bench to the production line to wide-scale deployment.

### PHOTOVOLTAICS

The SunShot PV Technology Pipeline displays the comprehensive and coordinated efforts of the scientists, engineers, startup entrepreneurs, and manufacturers across America who are making the \$0.50/W PV module a reality.

### CONCENTRATING SOLAR POWER

The SunShot goal for \$0.06/kWh utility-scale solar energy will be met with focused efforts on the individual components (collectors, receivers, power blocks, and thermal storage) that compose the building blocks for CSP systems.

### SYSTEMS INTEGRATION

A structured framework is on track to overcome technical barriers to large-scale solar deployment by enabling predictable interactions with the electric power grid, quantifying risks associated with solar technologies, and reducing hardware balance of system costs.

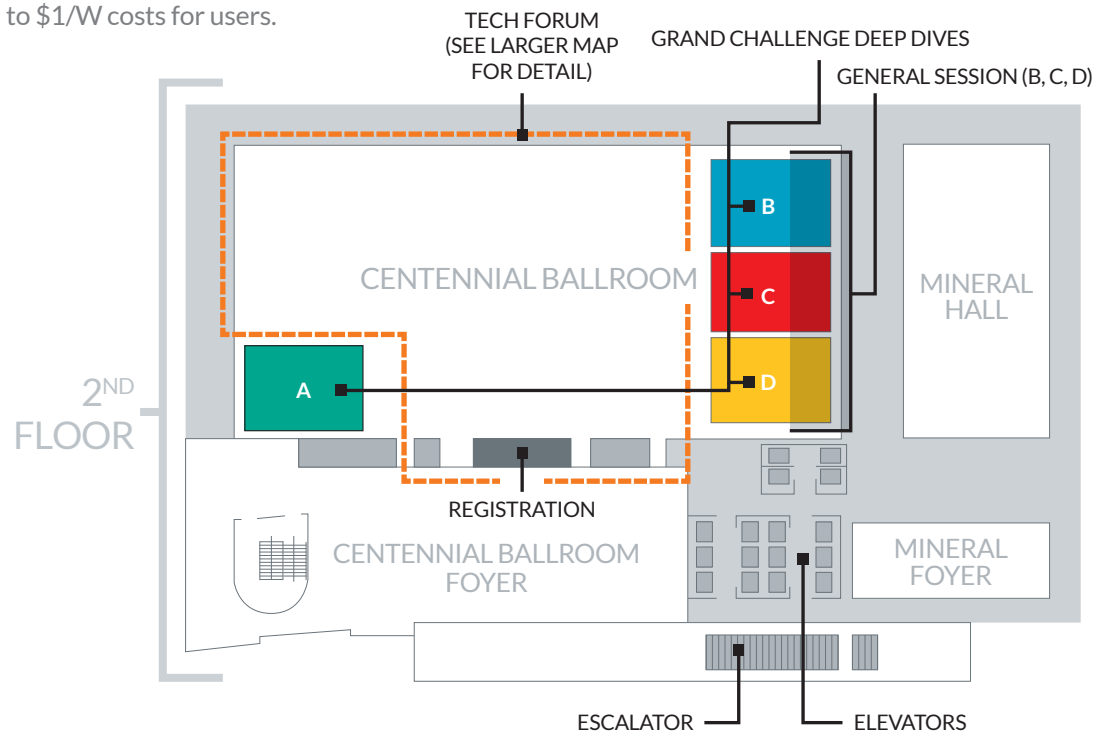
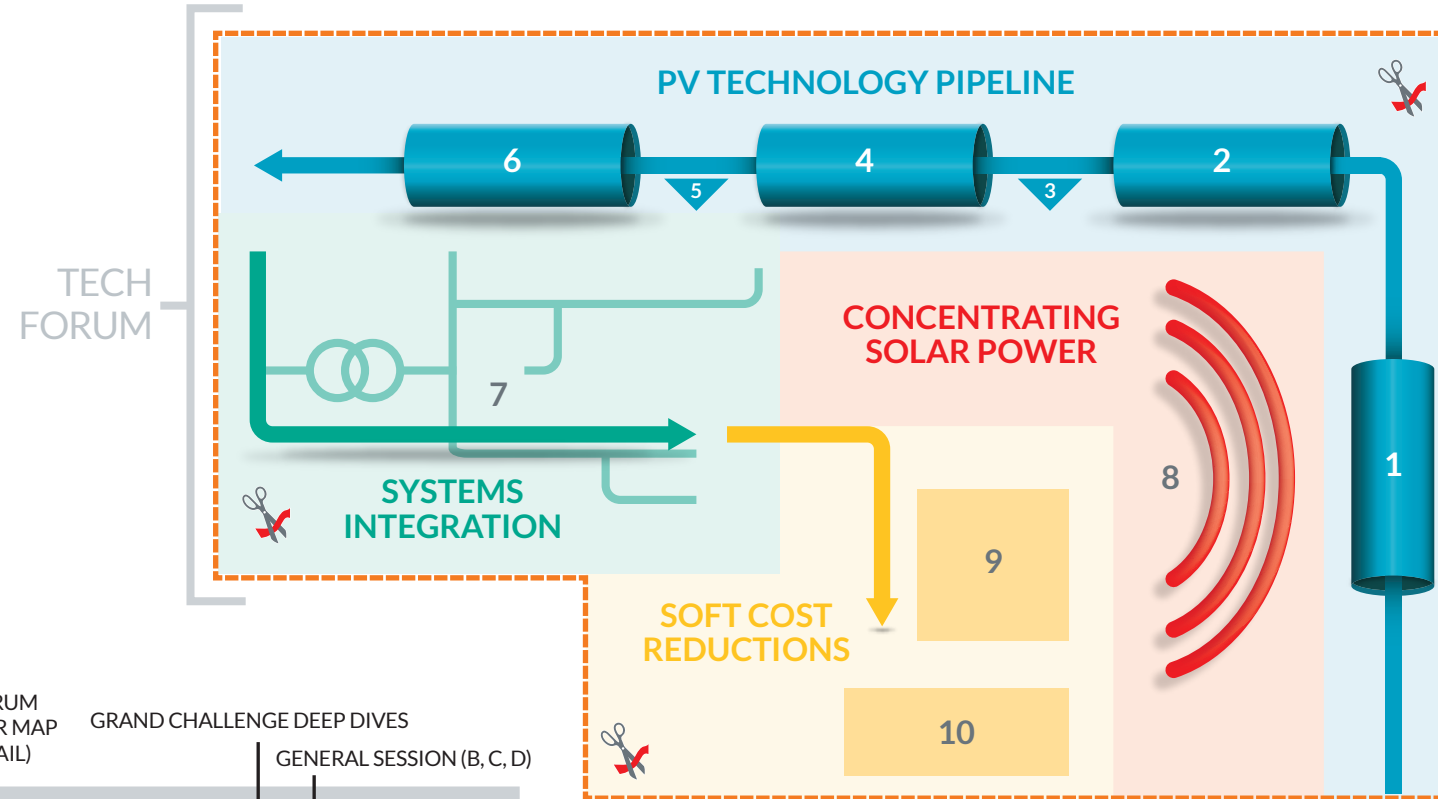
### SOFT COSTS

The development of innovative tools and approaches will reduce non-hardware balance of system costs through complementary efforts such as the Rooftop Solar Challenge, the SunShot Incubator for Soft Cost Reduction, and the SunShot Prize.

# SUNSHOT GRAND CHALLENGE

Summit and Technology Forum

The interactive, multi-dimensional Technology Forum will feature all the SunShot awardees from the labs, academia, and industry, on Wednesday from 4:00 p.m. to 8:00 p.m. The Technology Forum is designed to emphasize cost barriers and demonstrate where the U.S. Department of Energy is focusing its resources to drive down costs in order to achieve the SunShot goals. This forum also serves as a think-tank platform for asking the right questions and brainstorming solutions to continue down the road to \$1/W costs for users.



## LEGEND

- |                                   |   |
|-----------------------------------|---|
| 1 Basic Science                   | 7 Systems Integration Circuit                       |
| 2 Breakthrough Research           | 8 CSP Field   |
| 3 1 <sup>st</sup> Valley of Death | 9 SunShot Prize Speed Networking                    |
| 4 Lab Bench to Prototype          | 10 Solar Instructor Training Network                |
| 5 2 <sup>nd</sup> Valley of Death | ✂️ Rooftop Solar Challenge Red Tape Run Action Area |
| 6 Scaling Up Production           |   |

## PV PIPELINE

The PV Pipeline signifies the supply chain process in technology readiness levels (TRLs) of solar PV energy: research, development, demonstration, and deployment. Posters in this area describe research and development activities in the various stages of PV technology evolution.

## SYSTEMS INTEGRATION CIRCUIT

The Systems Integration Circuit focuses on the mitigation of the intermittent and unpredictable nature of solar energy to enable high penetrations of solar electricity on the national power grid. Through the SunShot Initiative, funding opportunities continue to be awarded for research with distributed grid integration, transmission grid integration, solar resource assessment, and technology validation for risk mitigation. These research opportunities identify ways to support the grid integration of solar energy and technology for a more seamless transition from powering our society with traditional energy production to solar technologies such as PV and CSP.

## CSP FIELD

The CSP Field reflects the funding opportunities for research and development of CSP technologies to achieve SunShot Initiative cost targets with systems that can supply solar thermal power on demand through the use of thermal storage.

## RED TAPE RUN

The Red Tape Run is an interactive portion of the Technology Forum that engages participants in the many stages of the process for installing residential, commercial, and utility-scale solar energy. Participants will experience how financing, permitting, installation, and maintenance costs and barriers challenge the market readiness of solar energy technologies.





## **DOROTHY ROBYN**

Deputy Under Secretary  
of Defense for Installations  
and Environment, U.S.  
Department of Defense



## **RICHARD SWANSON**

President Emeritus,  
SunPower Corp.



## **JOHN WOOLARD**

President and CEO,  
BrightSource Energy

## SUNSHOT: A NATIONAL COLLABORATIVE

SunShot is a DOE partnership among EERE, ARPA-E, and the Office of Science. We also strategically partner on projects with the National Science Foundation, the U.S. Department of Defense, and other federal agencies and organizations.

### SHARE YOUR THOUGHTS AND IDEAS AT:

[SunShotSummit@ee.doe.gov](mailto:SunShotSummit@ee.doe.gov)

[energy.gov/sunshot](http://energy.gov/sunshot)

*Page 3 photo by Dennis Schroeder, NREL/PIX 19884*

*Page 11 photo by John Eisele/Colorado State University, NREL/PIX 15283*

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