



AMERICAN SOLAR ENERGY SOCIETY



JULY 10 - 13
SAN FRANCISCO



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SOLAR 2016 National Organizing Committee

Dave Renné, Conference Chair

Richard Perez, Technical Review Committee Chair

Paulette Middleton Elaine Hebert Carly Rixham

Dave Panich David Comis Riley Shea

PROGRAM

Sunday July 10

- ❖ **Chapter Caucus** 8:30 – 12:00 Pacific Energy Center
- ❖ **Divisions Caucus** 1:30 – 5:00 Pacific Energy Center
- ❖ **Opening Reception** 6:30 – 9:30 Thirsty Bear

All SOLAR 2016 Conference Sessions --

Intercontinental Hotel 5th Floor

Registration and Badge Pickup

Intersolar Check-in, Intercontinental Hotel 3rd Floor

Monday July 11 7:30 – 9:00 Speaker Check-In Coffee & Tea

Monday July 11 9:00 – 10:30

FORUM: SPIRIT & SUSTAINABILITY

Intercontinental Ballroom C

Organizer: **Orlo Stitt**

Speakers: **Don Aitken**

- ✓ Feel the power of connection and inspiration through ASES camaraderie.
- ✓ Share feelings--successes, failures, challenges--in promoting sustainability.
- ✓ Create new and lasting friendships.

In honor of the originator of this session, the late Pia Aitken, aka Barbara Harwood--ASES presenter, developer, builder, writer--wife of Don Aitken, past ASES President.

TECHNICAL SESSION: SOLAR BUILDINGS & ARCHITECTURE I *

Howard Room

**Approved for (1, 1.5, 1.75) AIA Continuing Education System (CES) Learning Units*

Moderator: **Dave Panich**

Speakers:

Tabitha Crawford

Getting to Net Zero--Less is More

Moritz Limpinsel

SunHaus, a Solar-Powered Solution for Ecotourism and Emergency Shelters

David Drake

A Case Study on the Merits of a Solar Powered Internet of Things:
Intelligent Window Shade

Bryan Bowen

Community-Enhanced Sustainability: A Case Study of Placitas Sage

Co-housing

FORUM: CASE STUDIES ON RESILIENT PV SYSTEMS

Fremont Room

Organizer: **Erica Helson**

Sustainable CUNY's NYSolar Smart Distributed Generation (DG) Hub

Presenters:

➤ **Kate Anderson**

National Renewable Energy Laboratory

➤ **Kacia Brockman**

San Francisco's Department of the Environment

➤ **Russell Carr**

ARUP

➤ **Carl Linvill**

RAP

Solar Market Pathways teams in NYC and San Francisco, with US DOE SunShot support, are developing analyses to demonstrate the many values of solar+storage, including resiliency. Both teams are creating tools and resources, including a publicly available resiliency calculator, to help local governments integrate resilient PV into emergency planning.

TECHNICAL SESSION: SOLAR ELECTRICITY: ECONOMICS & POLICY

I

Jackson Room

Moderator: **Tom Thompson**

➤ **Galen Barbose**

Past their Prime or Primed for Progress? The Role of State RPS Policies in Supporting U.S. Solar Market Growth

➤ **John C. Schaefer**

Comparing Carbon Fees with Existing Financial Incentives for Solar Electricity

➤ **Naim R. Darghouth**

A Deep Dive into the Drivers of US PV Price Trends

➤ **Evan Schwartz**

Saved by the Sun: Ten Years After

➤ **Akinloluwa Tolulope Olumoroti**

Uber-like Disruption in Renewable Energy: Possibility or Wishful Thinking?

➤ **Vikram Aggarwal**

The End of Pushy Solar Salesmen: The Rise of the Informed Solar Shopper

Monday July 11 10:30 – 11:00 Break

Monday July 11 11:00 – 12:30

PLENARY PANEL: PROGRESS TOWARD 100% RENEWABLE ENERGY – GLOBAL ACTIONS*

*Approved for (1, 1.5, 1.75) AIA Continuing Education System (CES) Learning Units
Intercontinental Ballroom C

Opening Remarks

Carly Rixham, ASES Executive Director

Dave Renné, SOLAR 2016 National Organizing Committee Chair

Moderator:

Richard Perez, SOLAR 2016 Technical Review Committee Chair

Panel:

- **Professor Eicke Weber**, Director of Fraunhofer Institute of Solar Energy, Freiburg, Germany—German examples and actions needed worldwide to reach 100% renewables.
- **Diane Moss**, Founder of Renewables 100 Policy Institute—Policy tools and actions that are working worldwide and in the U.S.
- **John Smirnow**, Secretary of General Global Solar Council—Report on solar industry and growth worldwide.
- **Michael Eckhart**, Global Head, Environmental Finance, Citibank Capital Markets, Inc.—Financing innovations that are accelerating progress to 100%.

Monday July 11 12:30 – 1:30 Lunch & ASES Divisions Meetings

Monday July 11 1:30 – 3:00

FORUM: COMMUNITY SOLAR I: SOLAR POWERING AMERICA

Intercontinental Ballroom C

Organizer: **Avery Palmer**, The Solar Foundation

- **Joshua Huneycutt**, DOE SunShot Initiative

- **Chad Laurent**, Meister Consultants Groups

The SolSmart national community designation program is a new U.S. Department of Energy-funded effort to address solar soft costs. To help communities qualify, SolSmart offers no-cost technical assistance delivered by a team of national solar experts. This panel will provide a detailed overview of SolSmart and provide actionable information on getting communities recognized.

TECHNICAL SESSION: IMPLEMENTING 100% RENEWABLE ELECTRICITY

Howard Room

Moderator: **Paulette Middleton**

- **Tim Stocker**
Examining the applications for and economics of industrial-scale battery storage
- **Damon Lane**
Planning for a decarbonized state—with 20% of its electricity needs met by solar
- **Robert Chatham**
How a Comprehensive Assessment Program Supports Solar Development
- **Andrew Mills**
Utility Planning for a Sunshot Future – Innovative Practices for Incorporating Distributed Solar into Utility Planning
- **Marc Perez**
Achieving High Penetration PV at Minimal Cost: an Optimization of Supply-side Approaches for Meeting Guaranteed Production Targets

TECHNICAL SESSION: SOLAR ELECTRICITY: ECONOMICS & POLICY II

Fremont Room

Moderator: **Galen Barbose**

- **Ryan Wiser**
Big Benefits: The Environmental Value of Solar Energy Deployment
- **Warren Schirtzinger, Don Aitken, Don Osborn, Steven Strong**
SMUD Solar: A Roadmap for Utilities in Transition
- **Dave Finnigan**
Customer Acquisition Through Elementary Schools

- **Houtan Moaveni**
NY-Sun Soft Cost Reduction Strategies
- **Numair Latif**
From Interest to Installation: Rooftop Solar in Rural and Native America
- **Kathryn A Milun**
Commons: Community Trust Solar For Low-Income Neighborhoods

TECHNICAL SESSION: HIGH EFFICIENCY ZEB & CONTROL SYSTEMS

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** Approved for (1, 1.5, 1.75) AIA Continuing Education System (CES) Learning Units*
Jackson Room

Moderator: **Richard Perez**

- **Mary Hatch**
Guidelines for Residential Sub Metering
- **Sandy Stannard**
INhouse
- **Thomas E. Hoff**
Toward 100% Solar-Powered Homes
- **David L. Comis**
Maryland Net Zero Energy Schools
- **Nader Chalfoun**
House Energy Doctor's Level III Building Energy Audits as Pedagogy and Outreach

Monday July 11 3:00-3:30 Break

Monday July 11 3:30 – 5:00

FORUM: How the Convergence of Energy, Data Analytics, and IoT will Change the Solar Market

Intercontinental Ballroom C

Organizer: **Eric Holton** Moderator: **Pradeep Haldar**

- **David Hague**, Senior Director of Marketing & Technology Partnerships, Gehrlicher Solar
- **Tarun Kumar**, Senior Manager & Global Research Leader, Analytics & Optimization – Energy & Utility, IBM
- **Praveen Subramani**, Energy Product Manager, Nest

- **John Hostetter**, Senior Director of Product Management, REC Solar
- **Ammar Qusaibaty**, DOE SunShot Initiative

The convergence of sensors, data analytics, and communications is driving a wave of innovation and collaboration to develop common processes and platforms. Can the solar industry rally around a digital strategy that improves its own system cost and efficiency while simultaneously embedding itself into the fabric of the evolving Internet of Things (IoT) infrastructure?

TECHNICAL SESSION: RENEWABLE ENERGY GRID INTEGRATION

Howard Room

Moderator: **Andrew Mills**

- **Umnouy Ponsukcharoen**
Some Consequences to the Operation of the Grid due to High Penetration of Distributed PV Systems
- **Joseph Ranalli**
Assessing demand impact of solar capacity growth in Philadelphia
- **Tim Stocker**
Residential Energy Storage: Groundbreaking Technology for a Healthier Grid

TECHNICAL SESSION: RESOURCE ASSESSMENT: MODELS & DATA

Fremont Room

Moderator: **Dave Renné**

- **Gwendalyn Bender**
Global Validation of REST2 Incorporated Into an Operational DNI and GHI Irradiance Model
- **Yu Xie**
Diagnosing Model Errors in Simulation of Solar Radiation on Inclined Surfaces
- **Aron Habte**
Alternative Method to Quantify Soiling in Thermopile Radiometers
- **Gwendalyn Bender**
Solar Energy Assessments: When is a Typical Meteorological Year Good Enough?

TECHNICAL SESSION: SOLAR ELECTRICITY: SIMULATIONS, HYBRID & SPECIALTY APPLICATIONS

Jackson Room

Moderator: **David Comis**

- **Shin-Young Kim**
Pre-feasibility Analysis on the Photovoltaic Industry using System Advisor Model(SAM) and Actual Measured Photovoltaic Data
- **Stephen J. Mecca**
Solar Components of the S-Lab's WASH+E System
- **Carolina Barreto**
Bridging Solar Engineering and Agricultural Engineering: A Solar Drip Irrigation Sizing Method for Farmers in Remote Regions
- **Albert Rodriguez**
Distributed & Mobile Solar Electricity Generation with Energy Storage Devices and Application to PrePaid (PPD) Technology for the Latin America Marketplace
- **George Burmeister**
Utility-Scale Solar and New Food Security Concerns in the San Joaquin Valley

Monday July 11 5:30 – 7:00

Intersolar Official Opening Ceremony
(Followed by the ISNA Opening Reception)

Monday July 11 7:30 – 9:30

EnergieaWorks' Renewables UnWind joins ASES Emerging Professionals at SOLAR 2016

Intercontinental Ballroom C

Tuesday July 12 7:30 – 9:00 Speaker Check-in Coffee & Tea

Tuesday July 12 9:00 – 10:45

FORUM: TAPPING SOLAR POTENTIAL IN HIGHER EDUCATION

Intercontinental Ballroom C

Organizer: **John Shenot**

Presenters:

➤ **Jane Cowan**

Midwest Renewable Energy Association

➤ **Jonathan Whelan**

Optony Inc

➤ **Robert Lambeth**

Council of Independent Colleges President

Colleges, universities, and other higher education institutions have a combination of power consumption, land, finance, capacity and commitment to education that make them uniquely positioned to invest in renewables. This breakout session will focus on two DOE-funded “Solar Market Pathways” projects that are creating replicable models for tapping that potential.

TECHNICAL SESSION: RESOURCE ASSESSMENT: FORECASTING & REMOTE SENSING

Howard Room

Moderator: **Skip Dise**

➤ **Jan Kleissl**

Intra-hour solar forecasting and cloud height detection advances

➤ **Stephen D Jascourt**

Forecasting Solar Power and Irradiance – Lessons from Real-World Experiences

➤ **Patrick J Mathiesen**

The Analog Ensemble Method for Solar Power Forecasting

➤ **Paul Stackhouse**

An Assessment of New Satellite Data Products for Development of a Long-term Global Solar Resource at 10 km Resolution

➤ **Skip Dise**

The Five Factors of Bankable Solar Resource Data

➤ **Aron Habte**

Evaluation of Reanalysis Meteorological Dataset for Use in the National Solar Radiation Dataset (NSRDB)

FORUM: SOLAR FOR ALL: EXPANDING SOLAR MARKETS

Fremont Room

Co-Organizer: **Sean Garren**

Northeast Regional Manager for Vote Solar

Co-Organizer: **Mike Balma**

SunWork's Finance and Development Director

➤ **Reuben Veek**

Founder and Operations Manager for SunWork

➤ **Patrick McCully**

Executive Director of Black Rock Solar

➤ **Andreas Karelis**

Founder and Executive Director of RE-volv

➤ **Erica Mackie**

Co-Founder GRID Alternatives

Learn how solar can address the needs of under-served markets.

Understand how different nonprofit business models meet various customer needs. And learn best practices that address operational challenges including volunteer management, community engagement and geographic expansion.

TECHNICAL SESSION: SOLAR THERMAL TECHNOLOGY ADVANCES

I* **Approved for (1, 1.5, 1.75) AIA Continuing Education System (CES) Learning Units*

Jackson Room

Moderator: **Henry Vandermark**

➤ **Bristol Stickney**

Solar Hydronic Building Systems: State of the Art in New Mexico

➤ **Gaylord Olson**

Solar Thermal Collection with Seasonal Storage

➤ **Darryl Thayer**

Comparative Performance of Solar Thermal and PV Water Heating

➤ **John Shelton**

Investigating the Effect of Varying Concentrations of Nanoparticles on the Specific Heat Capacity of Binary Molten Salt Systems at High Temperatures

Tuesday July 12 10:45 – 11:15 Break

Tuesday July 12 11:15 – 1:00

PLENARY PANEL: PROGRESS TOWARD 100% RENEWABLE ENERGY – ACTIONS IN THE U.S. *

**Approved for (1, 1.5, 1.75) AIA Continuing Education System (CES) Learning Units*
Intercontinental Ballroom C

Opening Remarks: **Carly Rixham**

Moderator: **Dave Renné**

- **Jodie Van Horn**, Director, Sierra Club's Ready for 100 campaign --The important role of cities in the path to 100% RE.
- **Betsy Agar**, Research Manager & Dialogue Convener, Renewable Cities, a Simon Fraser University Centre for Dialogue program -- The role of dialogue in setting cities on the path to 100% renewable energy
- **Angelina Galiteva**, Board of Governors, California Independent System Operator Corporation -- Regional perspective: How 100% RE will be possible while optimizing the power system.
- **Debbie Raphael**, Director of the San Francisco Department of the Environment -- City perspective: The pillars of San Francisco's 100% RE goals, and actions San Francisco is taking

Tuesday July 12 1:00 – 2:00 Lunch & ASES Divisions Meetings

Tuesday July 12 2:00 – 3:45

**FORUM: SANE (SOLAR AUTOMATED NONSTOP ELEVATED)
TRANSPORTATION**

Intercontinental Ballroom C

Organizer: **Ron Swenson**

- **Burford Furman**, Professor, San José State University
- **Leonardo Branco**
- **Eric Rosenfeld**
- **Michael Cahill**
- **Eduardo Alpens**
- **Gabriel Loebens**
- **Isaac Gendler**

The Spartan Superway is a hands-on interdisciplinary initiative at San José State University developing a SANE transportation system — Solar-powered, Automated, Nonstop, Elevated. In four years, more than 150 students from SJSU and around the world have contributed. Engineering interns (US, Brazil, South Korea, France) will present papers and team reports.

TECHNICAL SESSION: FORECASTING APPLICATIONS FOR LARGE-SCALE PV OPERATIONS

Howard Room

Moderator: **Paul Stackhouse**

Presenters:

- **Richard Perez**
PV Fleet Forecast Performance Evaluation
- **Jan Kleissl**
Forecasting of Coastal Clouds in California
- **Nir Krakauer**
Emerging opportunities in seasonal forecasting in support of renewable energy systems
- **Sue Ellen Haupt**
Impact of Growing Distributed PV on Demand Load Forecasts
- **Steven Young**
Bias Correction of Satellite-Based Estimates of Irradiance
Climatology for Hawaii Using Machine Learning Techniques
- **Sue Ellen Haupt**
Improvements in Solar Power Forecasting: The Sunfast System

TECHNICAL SESSION: SOLAR BUILDINGS & ARCHITECTURE II*

**Approved for (1, 1.5, 1.75) AIA Continuing Education System (CES) Learning Units*

Fremont Room

Moderator: **John Essig**

- **Robert B. Pena**
The Bullitt Center and Financing Deep Energy Efficiency in Buildings
- **Christopher Hazel**
Design Schools as Drivers for Sustainable & Affordable Housing

TECHNICAL SESSION: SOLAR THERMAL TECHNOLOGY ADVANCES

II **Approved for (1, 1.5, 1.75) AIA Continuing Education System (CES) Learning Units*

Jackson Room

Moderator: **Ron Gehl**

- **Henry K. Vandermark**
Managing Solar Thermal for a Great ROI
- **Peter Skinner**
Novel Designs and Equipment Propel Solar Thermal's Future
- **Andy Baker**

- Trans-Critical CO2 Heat Pumps Use Solar Ocean Heat In Alaska
- **Adam Plesniak**
Solar Heating in Antarctica: Results from Testing Advanced Solar Air-Space Heaters at the Bottom of the Earth

Tuesday July 12 3:45 – 4:15 Break

Tuesday July 12 4:15 – 6:00

FORUM: APPLICATION OF PV-THERMAL SYSTEMS

Intercontinental Ballroom C

Organizer: **Henry Vandermark**

Presenters:

- **Reinhard Peter**
Innovative renewable energy technologies business development executive
- **Michael Intrieri**
Founder SunDrum® Solar

PV-Therms (PVT or Solar Hybrid panels) collect electricity and thermal energy totaling more energy than P.V. or thermal panels alone. Designs and case studies will show several applications with both direct and Heat-pump assisted designs for DHW, space-heat, and pool heating on residential and commercial buildings with a competitive R.O.I.

TECHNICAL SESSION: TRANSPORTATION, SUSTAINABILITY, & RESILIENCY

Howard Room

Moderator: **Lucas Dixon**

- **Elizabeth Doris**
An approach to Resilient Solutions: Lessons Learned and Best Practices
- **Burford Furman**
Spartan Superway, a Solar Automated Elevated Transportation Network
- **Ian A Carbone**
Student Designed Sustainable Greenhouse

- **Timothy Haas**
Why I Drive Electric
- **William C. Leighty**
A Bigger Market for Solar than Electricity for the Grid: Hydrogen Transportation Fuel via Underground Pipelines, with Storage

TECHNICAL SESSION: TECHNOLOGICAL ADVANCES IN SOLAR ELECTRICITY

Fremont Room

Moderator: **Carolina Barreto**

- **Nick P. Brekke**
Design of A Hybrid PV/T With Nano Particle Based Spectral Filtering
- **Theresa Jester**
Silicon Innovation for a Circular Solar Economy
- **Emma Kaeli**
Enhanced-Efficiency Solar Cells via Ferroelectric BTO Growth on Solar-Grade Si (001)

FORUM: COMMUNITY SOLAR II: SOLAR MARKET PATHWAYS

Jackson Room

Organizer: **John Shenot**

- **Dan Chwastyk**, SEPA
- **Vito Greco**, Elevate Energy
- **Jill Cliburn**, Cliburn and Associates, LLC

This panel will review the results to date and lessons learned from three DOE-funded “Solar Market Pathways” projects that are exploring new ways to make community solar projects even more attractive and practical for all types of customers in locations nationwide.

Tuesday July 12 7:00 – 9:30

ASES Fellows’ Reception & Gala Awards Banquet

City Club of San Francisco

Wednesday July 13 9:00 – 10:45

FORUM: THE GREAT SOLAR THERMAL DEBATE

Intercontinental Ballroom C

Organizer: **Ron Gehl**

Presenters:

➤ **Andy Baker**

Owner of YourCleanEnergy

➤ **Peter Skinner**

Owner and founder of Earth Environmental Group, LLC

The full potential of solar thermal energy is yet to be realized - it is everywhere, in forms ranging from the energy carried by ocean currents to latent heat released from melting ice, or leveraged to great effect using a heat pump. Learn how to harness these “unconventional” sources for the most efficient renewable energy available.

TECHNICAL SESSION: THE VALUE OF DISTRIBUTED SOLAR RESOURCES

Howard Room

Moderator: **Marc Perez**

➤ **Thomas A Millhoff & Aaron Clay**

Community Solar Project Economics and Policy

➤ **Naim R Darghouth**

Moving Beyond the Stalemate: Strategies for Aligning Utility and Solar Financial Interests

➤ **Jill Cliburn**

The Right Tone Of VOS: Improving the Argument for Distributed Community Solar

➤ **Don Wichert**

Influencing Utility Clean Energy Policies through Shareholder Advocacy

➤ **Peter Mark Jansson**

Net Metering PV Distributed Resources Benefits All Stakeholders on PJM

TECHNICAL SESSION: SOCIO-ECONOMICS OF PV RESILIENCY

Fremont Room

Moderator: **Ron Swenson**

➤ **Jake Rada**

Greater Solar Grid Integration through Microgrid Development: A Case Study

- **Carolina M. Barreto**
Implementation of National Electrical Code Installation Standards for Battery Back-Up Systems in Developing Countries
- **Moritz Limpinsel**
Impact of 100% PV Penetration on the Grid: Lessons from the 2015 Solar Decathlon Microgrid
- **John Essig**
Sustainability Easements™ – A new tool for Ensuring Sustainable Land Development, One Property at a Time
- **Nancy Chikaraishi & Marshall Arne**
ShelteR3: Disaster Resilient Solar Powered Home

FORUM: COMMUNITY SOLAR III: FINANCE

Jackson Room

Organizer: **Joel Cohn**

This session will explore the opportunities and challenges of obtaining both debt financing and tax equity for this newer segment of the solar industry. Low income set aside's, minimum preopening subscription requirements and transaction standardization will be discussed.

Wednesday July 13 10:45 – 11:15 Break

Wednesday July 13 11:15 – 12:15

CLOSING PLENARY: ACCELERATING PROGRESS TOWARDS 100% RENEWABLE ENERGY*

**Approved for (1, 1.5, 1.75) AIA Continuing Education System (CES) Learning Units*

Intercontinental Ballroom C

Moderators: **Paulette Middleton & Elaine Hebert**

Opening Remarks: **Carly Rixham**

Special Presentations:

- **Mark Davis**
CEO of WDC Solar, Washington, DC—Creating jobs in the installation sector in the U.S.
- **Chris Deschene**

Director, U.S. Department of Energy, Office of Indian Energy Policy and Programs – Renewable energy on tribal lands

➤ **Reverend Canon Sally Grover Bingham**

Episcopal priest and Canon for the Environment in the Diocese of California -- The Regeneration Project and its Interfaith Power & Light campaign

Conference Closing

Dave Renné & Richard Perez – Conference Findings

Participants – Conference Highlights

Wednesday July 13 12:15 – 12:30 Break

Wednesday July 13 12:30 – 1:45

ASES Annual Membership Meeting

Intercontinental Ballroom C

Moderator: **Carly Rixham**

Wednesday July 13 2:00-6:00 & Thursday July 14 9:00-12:00

Energy Foundation

ASES Board of Directors Meeting

Thursday July 14

Intersolar North America Exhibition Moscone Center