



# **ASES SOLAR 2019**

Race to Renewables  
**Official Conference Program**



**August 5-9**  
**Minneapolis, MN**

Crowne Plaza AiRE  
[ases.org/conference](http://ases.org/conference)  
**#SOLAR2019TwinCities**



48th Annual National Solar Conference



MINNEAPOLIS, MN  
August 5-9  
#SOLAR2019TwinCities

## NABCEP Courses - Wright Suite

SEATS AVAILABLE

### NABCEP Battery-Based PV System Design

Thursday August 8, 4:30pm - 8:30pm

### NABCEP Battery-Based PV System Design

Thursday August 8, 4:30pm - 8:30pm

### NABCEP PV Sales & Finance

Friday August 9, 9:00am - 5:00pm

## SOLAR POWERED BREWERY TOUR

August 8th 5:30pm | Crowne Plaza AiRE



Come on an electric bus tour of three sustainable and renewable powered breweries around the Twin Cities! The tour will take place on the second to last day of the American Solar Energy Society 2019 Solar Conference. You can also register to join all the excitement at [www.ases.org/conference](http://www.ases.org/conference)

#Solar2019TwinCities

### Insight Brewing

61 Helene Solar Panels -- Nominal Power 325 W -- System Size 39.83 kW -- Installed by IPS Solar -- Mounting System: Ballasted -- Expected Average Annual Electricity Production: 23,597.7 kWh -- Insight is also subscribed to a community solar garden!

### ABLE Brewery + Seedhouse

118 Helene Solar Panels -- System Size: 33.04 kW -- Installed in 2017 by IPS Solar -- Mounting System: Ballasted -- Expected Average Annual Electricity Production: 39,317.6 kWh

### Utepils Brewing

221 Helene Solar Panels -- System Size: 80.7 kW -- Installed in 2019 by IPS Solar -- Mounting System: Ballasted -- Expected Average Annual Electricity Production: 96,033 kWh



Erase your travel carbon footprint at [ases.org/conference/lodging](http://ases.org/conference/lodging).

100% of the electricity for the conference is being supplied by renewable energy sources, sponsored by Xcel Energy Windsource. Learn more at [xcelenergy.com/renewables](http://xcelenergy.com/renewables).

## EVENTS:

### Monday

#### Divisions Meeting

1:15pm - 2:45pm Wright Suite

#### Electric Avenue

:4:00pm - 6:30pm Top Level of Parking Garage

#### Opening Reception

6:00pm - 9:00pm AiRE Ballroom

### Tuesday

#### Emerging Professionals Meetup

12:15pm - 1:00pm AiRE Ballroom

#### Poster Session

3:15pm - 5pm Common Area

#### ASES Awards Banquet

6:00pm - 9:00pm AiRE Ballroom

### Wednesday

#### WISE Luncheon

12:15pm - 1:45pm AiRE Ballroom

#### Minneapolis River Boat Cruise

5:15pm - 10:00pm Meet at hotel front lobby

### Thursday

#### Solar Powered Minneapolis Projects Tour

1:30pm - 4:30pm Meet: hotel front lobby

#### Solar Powered Brewery Tour

5:30pm - 8:30pm Meet: hotel front lobby

# Welcome

FROM THE CONFERENCE CHAIR,

**JOHN DUNLOP**

PRINCIPAL, RENEWABLE ENERGY SERVICES LLC

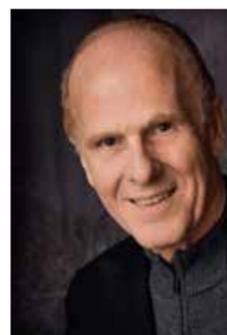
*The American Solar Energy Society believes that supplying 100% of America's electricity with renewable energy is not only possible but urgently necessary. We need to decarbonize our economy in order to have any chance of constraining the global temperature increase to less than 2 °C, which in itself will be disruptive to humankind.*

*ASES represents the scientists, educators, and activists who can provide renewable energy technologies and solutions for climate action in the United States that will have an immediate and large scale impact. The ASES SOLAR 2019 Conference will focus on those strategies.*

*The door for impacting climate change is rapidly closing. ASES intends to be a loud voice to follow the lead of states and cities across the country to decarbonize the nation's electricity supply and make an impact while that door is still open. We are in a race against time, and ASES believes we can win that race.*

*The ASES SOLAR 2019 Conference will be held in one of the leading states for taking climate action, Minnesota. Minnesota has enacted climate policies that have provided leadership in the growth of wind power, solar power, community solar, variable generation integration technologies, energy efficient buildings and electrifying the transportation sector. But the strategies and solutions that will be presented at the conference can – and must – be implemented across the country. Minnesota is pleased to host this important conference on taking climate action.*

*Many strategies will be necessary to take immediate climate action: Electricity supply (residential, commercial, industrial, utility-scale solar; on land wind power; offshore wind power); transmission (including a national HVDC grid); electrifying the economy (transportation, homes, businesses, buildings); policies (international, national, state, intra-state, city); public support (social media; popular press, education); personal actions (renewable energy opportunities; energy efficiency, electric vehicles). Thank you for joining us as we advance clean energy now.*



*Thank You SOLAR 2019  
Program Leaders, Volunteers,  
and ASES Staff!*

### SOLAR 2019 NATIONAL ORGANIZING COMMITTEE

John Dunlop, Conference Chair  
Carly Cipolla, Conference Coordinator  
Paulette Middleton, ASES Secretary  
Elaine Hebert, ASES Treasurer  
Carly Rixham, ASES Executive Director  
Lucas Dixon, ASES Chair  
Doug Shoemaker, MRES Director  
Mark Weber, MRES Director  
David Comis, Awards Chair  
Gina Johnson, Fellows Chair  
Marlene Brown, WISE Luncheon  
Kaycee Chang, Emerging Professionals  
David Panich, AIA Certification

### SOLAR 2019 VOLUNTEERS

Lynn Albers	Sarah Grace
Eric Barry	Donald Hanson
Marlene Brown	Frank Kelly
Gail Burrington	Barbara Lunde
Kaycee Chang	Mario Monesterio
Cary Church	Morrine Omolo
Jill Cliburn	Steven Read
Laura Cina	John Richter
John Dunlop	Lucy Stolzenburg
Drew Gillett	Earl Wilson

### ASES STAFF

Carly Rixham, Executive Director  
Carly Cipolla, Director of Operations  
Sarah Townes, Finance Manager  
Eva Coringrato, Membership Assistant  
Sunshine Urbaniak, Web Design  
Tiffany Harrower, Finance & Accts. Mgr.  
Heddie Hall, Tiny Watts Intern  
Christina Menchaca, Membership Intern  
Mike Derderian, Social Media Intern  
Izzy Sofio, Fundraising and Editor Intern

*A big thank you to all of our session presenters, moderators, forum organizers, and all participants.*

# At-A-Glance

## Monday, August 5, 2019

9:00am - 12:00pm	<b>Chapter Caucus:</b> Chapter Leaders and ASES Staff	Wright Suite
1:15pm - 2:45pm	<b>Divisions Meeting:</b> All Welcome	Wright Suite
3:15pm - 5:30pm	<b>Volunteer Training</b>	Runway Room 2-4
4:00pm - 6:30pm	<b>Electric Avenue</b>	Top Level Parking Garage
6:00pm - 9:00pm	<b>Opening Reception</b>	AiRE Ballroom

## Tuesday, August 6, 2019

9:00am - 10:30am	<b>Keynote: Aggressive Climate Action – Leadership from International to Local</b>	AiRE Ballroom
10:45am - 12:15pm	<b>Keynote: Aggressive Climate Action - Cont.</b>	AiRE Ballroom
12:15pm - 1:00pm	<b>Emerging Professionals Meet-Up</b>	AiRE Ballroom
1:30pm - 3:00pm	<b>Public Acceptance and Action Track: Community Climate Action Programs</b>	Wright Suite
1:30pm - 3:00pm	<b>Technical Track: PV Storage and Implementation</b>	AiRE Ballroom
1:30pm - 3:00pm	<b>Policy Track: Practical Climate Actions</b>	Runway Rooms 2-4
3:15pm - 5:00pm	<b>Poster Session</b> (see page 10)	Common Area
5:00pm - 6:00pm	<b>Fellows Reception</b> (Invitation Only)	AiRE Ballroom
6:00pm - 9:00pm	<b>Annual ASES Awards Banquet</b> (tickets available)	AiRE Ballroom

## Wednesday, August 7, 2019

9:00am - 9:20am	<b>Keynote: Essential Minerals</b>	AiRE Ballroom
9:30am - 10:30am	<b>Technical Track: Resource Assessment</b>	AiRE Ballroom
9:30am - 10:30am	<b>Policy Track: Climate Action and Public Health</b>	Runway Rooms 2-4
9:30am - 10:30am	<b>Public Acceptance and Action Track: Solar Commons Forum</b>	Wright Suite
10:45am - 12:15pm	<b>Public Acceptance and Action Track: Communicating Climate Action Forum</b>	AiRE Ballroom

10:45am - 12:15pm

10:45am - 12:15pm

12:15pm - 1:45pm

1:45pm - 3:15pm

1:45pm - 3:15pm

1:45pm - 3:15pm

3:30pm - 5:00pm

3:30pm - 5:00pm

5:15pm - 10:00pm

9:00am - 10:00am

10:00am - 10:40am

11:05am - 11:40am

12:00pm - 1:30pm

12:00pm - 4:00pm

1:30pm - 4:30pm

4:30pm - 8:30pm

5:30pm - 8:30pm

9:00am - 5:00pm

**Technical Track: Electrification of Transportation Forum: Market Transformation Vectors for Cities, Businesses, Industry**

Wright Suite

**Policy Track: Solar Homes**

Runway Rooms 2-4

**Women in Solar Energy (WISE) Luncheon** (tickets available)

AiRE Ballroom

**Technical Track: Transportation**

AiRE Ballroom

**Policy Track: Solar Buildings /Community Solar**

Runway Rooms 2-4

**Public Acceptance and Action Track: Personal Climate Actions**

Wright Suite

**Maximizing Value of Climate Actions Forum**

AiRE Ballroom

**Policy Track: Climate Action through Community Solar Forum**

Wright Suite

**Minneapolis Queen Cruise** (tickets available)

Hotel front desk/lobby

## Thursday, August 8, 2019

**Climate Action Quick Shots (~switch)**

AiRE Ballroom

**Conference Highlights and Call to Action**

AiRE Ballroom

**Charged up for Action: UN Climate Conference**

AiRE Ballroom

**ASES Annual Membership Meeting & Lunch**

AiRE Ballroom

**NABCEP Intro to Solar Advisory Model (SAM)**  
PV 430 (seats available)

Wright Suite

**Electric Bus Tour of City of Minneapolis Solar Projects** (tickets available)

Hotel front desk/lobby

**NABCEP Battery-Based PV System Design**  
(PV 230) (seats available)

Wright Suite

**Electric Bus Pub Crawl of Solar-Powered Microbreweries** (tickets available)

Hotel front desk/lobby

## Friday, August 9, 2019

**NABCEP PV Sales & Finance** (PV 203) (seats available) Wright Suite



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## Monday, August 5, 2019

**Chapter Caucus:** Chapter Leaders and ASES Staff  
9:00am - 12:00pm  
Wright Suite

**Divisions Meeting:** All Welcome  
1:15pm - 2:45pm  
Wright Suite

**Volunteer Training**  
3:15pm - 5:30pm  
Runway Room 2-4

**Electric Avenue**  
4:00pm - 6:30pm  
Top Level of Parking Garage

It's time for an Electric Vehicle take-over! Come see over 10 "cars with plugs" on show at the Electric Avenue. The display will include the latest and top selling battery electric vehicles and plugin hybrids cars on the market today. Meet and talk to the drivers of these cars to learn more about why they have made the switch.

**REGISTRATION:** Control Tower  
2nd floor Crowne Plaza AiRE  
Monday 5:45pm-7:30pm  
Tuesday & Wednesday 8am-6pm  
Thursday 8am-Noon

**Opening Reception**  
6:00pm - 9:00pm  
AiRE Ballroom

## Tuesday, August 6, 2019

### Keynote: Aggressive Climate Action – Leadership from International to Local

9:00am - 10:30am  
AiRE Ballroom  
Moderator: Paulette Middleton



Many strategies will be necessary to take immediate climate action: Electricity supply; transmission; electrifying the economy; policies; public support; personal actions. All need to be focused on taking meaningful action within the next five years. The opening plenary session will provide informative and inspirational overviews of effective, innovative actions at the international, national, state and local levels across a variety of sectors.

- Lucas Dixon
- John Dunlop
- Minneapolis Mayor Jacob Frey
- Dr. Dave Renne
- Dr. Jonathan Foley
- Larry Shirley

### Keynote: Aggressive Climate Action - Continued

10:45am - 12:15pm  
AiRE Ballroom  
Moderator: Paulette Middleton

- Kim Havey (City of Minneapolis Climate Actions)
- Kevin O'Rourke (Ramping up Renewables)
- Dr. James McCalley (Transmission for Renewables)
- Gregg Mast (Business Case for Investing in Climate Action)
- J. Drake Hamilton (Succeeding in Dramatic Climate Action)

### Emerging Professionals Meet-Up

12:15pm - 1:00pm  
AiRE Ballroom  
Moderator: Kaycee Chang

Luncheon intended to provide networking, mentoring, education and career growth opportunities and is open to industry professionals, recent graduates, and students.

- Ben Adamich
- Christopher Milliren
- Kaycee Chang
- Zach Emond

### Public Acceptance and Action Track: Community Climate Action Programs

1:30pm - 3:00pm Wright Suite  
Moderator: Wyldon Fishman

Today's urgent climate action doubles up technical and professional guidance with an approach to meet the needs of STEM students, undergrads, small businesses and workforce career development for those of us "left behind". Navigate urban-rural divide: collaboration with rural farmers includes solutions for agribusinesses which accounts for one third of total greenhouse gas emissions worldwide. Results and recommendations for "greening" milk by making a dairy milking parlor Net Zero will be presented. Ready-to-share stakeholder tools are ready for you to address developing engagement in sustainability programs.

- John Bleem (CSU Simplified PV Modeling)
- Mia Devine (Rural Community RE Development)
- Eric Buchanan (MN Morris Dairy Renewable Program)
- Meghan Hoskins (Solar Across Pennsylvania)

### Technical Track: PV Storage and Implementation

1:30pm - 3:00pm  
AiRE Ballroom  
Moderator: Jill Cliburn

The session will focus on best practices in system commissioning of solar PV system, and economics of energy storage systems. The speaker will discuss the importance of standards related to PV plant commissioning, best practices, and most common inspection and failures found during commissioning of the solar PV projects. The session will also highlight the importance of energy storage technology in fully renewable electricity grids, and the differing economic characteristics of various energy storage technologies.

- David Timmons (electric energy storage)
- Jeff Gilbert (PV commissioning)

### Policy Track: Practical Climate Actions

1:30pm - 3:00pm  
Runway Rooms 2-4  
Moderator: Stacy Miller

At least 8 states and territories plus D.C. have adopted 90-100% renewable or clean energy standards with more expected to follow. This session will feature practical insights for meeting these advanced goals, including emerging ideas about regulatory and finance innovations that support energy affordability and equity.

- Josh Quinnell (MN Solar Pathway Dispatchable Renewables)

(cont.)

- Blake Jones (Clean Energy Credit Union)
- Brett Weal (Financing Solar Post 2019 ITC)

### Poster Session (see page 10)

3:15pm - 5:00pm  
Common Area (Pre-function area)

### Fellows Reception (Invitation Only)

5:00pm - 6:00pm  
AiRE Ballroom

### Annual ASES Awards Banquet (tickets available)

6:00pm - 9:00pm  
AiRE Ballroom

Please join us for a special dinner and award presentations, followed by an auction fundraiser at this not-to-be-missed event.

- Carly Rixham, Welcome
- David Comis, ASES Awards Presentation
- Charlie Gay, Abbot Award Winner
- Wyldon Fishman, Izzy Sofio - Live Auction
- Sarah Townes, Lucas Dixon - ASES FUNdraiser & Board Match

## Wednesday, August 7, 2019

### Keynote: Essential Minerals

9:00am - 9:20am  
AiRE Ballroom  
Moderator: John Dunlop

One of the grand challenges of decarbonization is to balance our global dream to electrify everything with the brutal fact that clean energy technologies depend on metals mined using nearly medieval techniques around the globe. This presentation examines the politics of securing critical minerals for climate solutions, in the context of a growing trade war with China. Dozens of new precious and rare earth mines are being prospected throughout the US to meet the metal needs for electric vehicles, solar and wind technologies. These mines have also met growing opposition from Minnesota to Texas as communities express their concern for the devastating local contamination that might result. Dr. Phadke will discuss how we might solve this green energy paradox by repatriating mining, revolutionizing recycling and supporting the nascent right to repair movement.

- Roopali Phadke

Wednesday, August 7 (cont.)

### Technical Track: Resource Assessment

9:30am - 10:30am  
AiRE Ballroom  
Moderator: Robert Foster

This session will update on the latest solar resource databases as well as solar energy forecast techniques for power plants. Good solar forecasts are especially important for utility grid operators to better integrate solar into their overall power generation planning.

- Richard Perez (Resource Assessment)
- Marc Perez (Resource Assessment)
- Paul Stackhouse (Solar Resource, Surface Temperature and Humidity Variability Using NASA Satellite Data)

### Policy Track: Climate Action and Public Health

9:30am - 10:30am  
Runway Rooms 2-4  
Moderator: Elaine Hebert



This session will cover two main topic areas: renewable energy policy and incentives viewed through the lens of public health, and collaboration among adjacent government entities as a means of decarbonizing the local energy grid. UW-Madison Extension. Prof. Holloway's studies found that "energy system change is rarely included in air quality planning... Solar energy offers a huge opportunity to connect with existing [air quality] policy, and to provide immediate benefits to public health." Mr. Hanlon will discuss a case study of a municipal solar incentive and reinvestment program that is based on enhancing public health. Ms. Gruder will report on successes in a collaboration among municipalities within a county on moving renewable energy and decarbonization goals forward.

- Tracey Holloway (Climate action reduces cost of emission control, improves health)
- Patrick Hanlon (Minneapolis Health Policy for Rooftop Solar)
- Sherrie Gruder (Dane County Climate Action Plan)

### Public Acceptance and Action Track: Solar Commons Forum

9:30am - 10:30am  
Wright Suite  
Moderator: Kathryn Milun

The Rocky Mountain Institute has analyzed the Solar Commons' financial model and scalability potential

and found it could quickly put 10 gigawatts of solar energy into the US grid and millions of dollars into much needed programs in low-income communities. This forum will explain how the Solar Commons community trust ownership model works and will showcase the work of university students solving the problem of communicating-through public art and internet apps-to their 21st century peers why and how solar energy can scale quickly and equitably using the Solar Commons model.

Dorsey Kaufmann, Ellen McMahon, Karlito Miller Espinosa, Micha Brady, Ryan Raskob, Tommy Duff

### Public Acceptance and Action Track: Communicating Climate Action Forum

10:45am - 12:15pm  
AiRE Ballroom  
Moderator: Paul Imbertson

The public has limited understanding of the grid and the role of renewables and storage in the energy transition. Overwhelming climate change stories are increasing, and need increasing balance with solutions-focused communication that motivate, instead of shut people down. Public education, support, and actions are of strategic importance as part of a rapid shift away from fossil fuels. A network of academic and industry partners involved in a college course on this topic, will each bring different perspectives to the need and challenge of public communication in the energy transition and will engage the audience experience into the conversation. Aaron Hanson, Allison Chang, Jonee Brigham

### Technical Track: Electrification of Transportation Forum: Market Transformation Vectors for Cities, Businesses, Industry

10:45am - 12:15pm  
Wright Suite  
Moderator: Brian Ross

This session describes four successful market transformation initiatives to promote EV sales, expand charging networks, and create market pathways to broad deployment of solar charging of EVs. The transportation sector is the largest emitter of GHGs, and the electrification of the light-duty fleet is the most significant strategy for decarbonization. But the business case remains weak for developing the needed charging networks to support expanded EV markets, and limited technologies and rate structures are available for charging with renewable energy and expanding solar deployment.

Diana McKeown, Katelyn Bocklun

### Policy Track: Solar Homes

10:45am - 12:15pm  
Runway Rooms 2-4  
Moderator: Dara Bortman



Investment in residential solar would accelerate if the benefits were better understood and consistently valued by solar installers, real estate agents, home buyers, and appraisers. Agents and appraisers across the country are undervaluing homes with solar, and sometimes, steering their clients away from these homes. Solar installers don't understand the processes involved in selling a home or how additional value for solar is achieved. By educating both the solar and real estate industries on these methods, homeowners will feel more comfortable with the benefits of solar – the lower energy costs and the real estate assets.

- Pamela Brookstein (Solar Homes Market Value)
- Robin LeBaron (Solar Home Benefits)
- Janelle McGill (Improving Solar Home Education)

### Women in Solar Energy (WISE) Luncheon

(tickets available)  
12:15pm - 1:45pm  
AiRE Ballroom  
Moderator: Marlene Brown

This forum/luncheon was created to promote women who are working in all aspects of solar, and to encourage more women to get involved. The purpose of the forum is to inspire women to become more technically involved in solar, not just peripheral to it. It's easy for us to talk about what we do, but this isn't a forum to talk about our jobs, but about how we got where we are and the obstacles and barriers that we've come up against and broke through or just moved out of the way to continue on our path. This is a forum for accomplished women to share lessons learned and heartfelt stories about their lives. It is the story about the journey that is interesting, powerful and inspiring, especially for women just getting started, but also for the larger audience

- Kathryn Milun
- Lisa Daniels
- Mallory Lindgren

### Technical Track: Transportation

1:45pm - 3:15pm  
AiRE Ballroom  
Moderator: Alan Wernke

Learn more about these four solutions to electrify mobility: What is new with electric bikes? The big 18 wheelers are changing to an electric drivetrain, how will the marketplace put them to work? How do we convert roadside rest stops across America to be powered by

solar? What is the latest Electric cars news?

- Dave Erb (Residential PV with EV)
- Bob McCallister (PV at Rest tops)
- Appalachian State E-Bike Program)
- Brad and Brittany Stolt (Stolt Trucking)

### Policy Track: Solar Buildings and Community Solar

1:45pm - 3:15pm  
Runway Rooms 2-4  
Moderator: Laura Cina



Learn about four new and innovative approaches to solving some of the many barriers to financing and building solar from the people who have diligently researched and wrote papers on the issues.

- Isaac Gendler (Building Integrated PV)
- Shannon Carleton (Building Integrated PV)
- Vicki O'Day (MN Community Solar for LIHEAP)

### Public Acceptance and Action Track: Personal Climate Actions

1:45pm - 3:15pm  
Wright Suite  
Moderator: Kaycee Chang

How many people does it take to start change? Just one. Our individual actions make a difference. Personal changes represent a movement to combat climate change. Come to this session to learn about sustaining personal climate actions, the power of small numbers, and a carbon-free future.

- Marion Biddle (Philadelphia Residential Solar Case Studies)
- Anthony Robinson (Home Waste Reduction)
- David Hrivnak (Embracing Residential Renewables) & (Residential PV and EV Combination)

### Maximizing Value of Climate Actions Forum

3:30pm - 5:00pm  
AiRE Ballroom  
Moderator: Ted Redmond

Do you have the drive and technological expertise to develop a solar project, but not the money to pay for it? Are you always on the look-out for new ways to finance your solar developments? If so, this panel is right for you. Experts in securities law, corporate financing, and blockchain technology will help attendees better understand how to utilize opportunity zone financing, crowdfunding, crowdequity, tax credits, and innovative technology to more effectively and efficiently raise money for their solar projects.

Brian Edstrom, David Duccini, David Peteler, Matt Doyle

## Wednesday, August 7 (cont.)

### Policy Track: Climate Action through Community Solar Forum

3:30pm - 5:00pm  
Wright Suite  
Moderators: Eric Pasi, Gabriel Chan & Gilbert Michaud

As decarbonization is increasingly framed as an intersectional issue, considering equity may be required for rapid climate action. Community solar can play a unique role as a means to expand access to clean energy to low-income households, renters, and other otherwise excluded groups. Based on the Minnesota experience, this panel will explore key questions confronted by community solar programs at scale concerning the long-term viability of third-party solar development, opportunities to create a more equitable distribution of costs and benefits of clean energy, grid impacts of distributed energy, and the political durability of policies that can support rapid decarbonization.

### Minneapolis Queen Cruise (tickets available)

5:15pm - 10:00pm  
Meet at Hotel front desk/lobby to board Jefferson Lines bus by 5:25 to Bohemian Flats Park where we will board the Minneapolis Queen Cruise ride down the Mississippi. Join us for dinner and dancing!

## Thursday, August 8, 2019

### Climate Action Quick Shots (~switch)

9:00am - 10:00am  
AiRE Ballroom  
Moderator: Sarah Townes

Adyashanti wisely said: In any discipline it is the fundamentals that matter. In our Quick Shot ~switch Session 5 dynamic speakers will speak for just 5 minutes each, and in that short time convey to us the very essence of what they are doing in the world to help bring about the renewable energy revolution, and what inspiration they would convey for the rest of us to do our best work as well. Come join us to catch a concentrated dose of their momentum, humor & wisdom. Be prepared to participate, as ~switch is all about connection!

- Carra Cheslin (National Solar Tour)
- Dave Finnigan (Climate Action Begins at Home)
- Kaycee Chang (ASES Student Chapters)
- Jonee Brigham (U. of Minn Compelling Climate Action)
- Brett Weal (Opportunity Zone Financing)

### Conference Highlights and Call to Action

10:00am - 10:40am  
AiRE Ballroom  
Moderator: John Dunlop

### Charged up for Action: UN Climate Conference

11:05am - 11:40am  
AiRE Ballroom  
Moderator: Carly Rixham

Ellen Anderson, Director of the University of Minnesota's Energy Transition Lab and former state Senator, will weave together the conference themes into a closing call to action. She will provide some examples that illustrate reasons for hope. She will highlight the need for ambitious goals and measurable progress from the local to the global level, and the importance of what happens next - after the conference, including the UN Climate Summit.

Ellen Anderson

### ASES Annual Membership Meeting & Lunch

12:00pm - 1:30pm  
AiRE Ballroom

The American Solar Energy Society invites its members to join us at the National Solar Conference to cover new and exciting projects, goals, and financial reports.

- Carly Rixham (ASES Vision and Programs)
- Carly Cipolla (Webinars, ASES Chapters)
- Eva Coringrato (ASES Membership)
- Heddie Hall (ASES Tiny Watts)
- Elaine Hebert, Sarah Townes (Finance Report)

### NABCEP Introduction to Solar Advisory Model (SAM) (PV 430) (seats available)

12:00pm - 4:00pm  
Wright Suite

This four-hour intermediate-to-advanced level course uses a combination of presentations and practice exercises to introduce students to System Advisor Model (SAM). SAM is a free software for techno-economic modeling of renewable energy projects provided by the U.S. Department of Energy National Renewable Energy Laboratory (NREL) and is used by project developers, system designers, researchers, and others involved in making technical and financial decisions about renewable energy projects. Course participants will work through examples of a residential/commercial rooftop photovoltaic system and cover assumptions for system design, retail electricity rates, and building loads, to analyze model results such as performance ratio, net present value (NPV), and payback period.

### Electric Bus Tour of City of Minneapolis Solar Projects (tickets available)

1:30pm - 4:30pm  
Meet: hotel front desk / lobby  
Tour of projects include: Minneapolis Convention Center, Heywood Garage, Shiloh Temple



### NABCEP Battery-Based PV System Design (PV 230)

(seats available)  
4:30pm - 8:30pm Wright Suite  
Instructor: Kris Schmid, Legacy Solar

This four-hour course uses a combination of presentations, exercises, and classroom discussions to cover battery-based PV system components, from modules and array configurations to batteries, charge controllers, and inverters. Participants will review design principles for sizing battery-based PV systems, beginning with a thorough analysis of daily loads. Based on those load requirements, choices for system voltage and amp-hour capacity of the battery bank will be discussed and determined. Finally, participants will select appropriate system components and configure them to complete the stand-alone PV system.

### Electric Bus Pub Crawl of Solar-Powered Microbreweries (tickets available)

5:30pm - 8:30pm  
Meet: hotel front desk / lobby  
Insight Brewing & Taproom, Able Seedhouse and Brewery, Utepils Brewing

## Friday, August 9, 2019

### NABCEP PV Sales & Finance (PV 203)

(seats available)  
9:00am - 5:00pm Wright Suite  
Instructor: Jack Kluempke

This eight-hour course uses a combination of presentations and online resources to demonstrate a cost/benefit analysis of a PV system. Using PV system installation and operating costs, incentives, utility rate structures, course participants will explore various methods used to calculate return on investment for a PV system based on customer consumption and expected system production.

*Schedule subject to change. Visit [ases.org/conference/](http://ases.org/conference/) program for more details and up to date information.*

## Posters

Posters will be on display Tuesday-Thursday and will be featured during the Poster Session: Tuesday, August 6, 2019 3:15pm -5pm

Changyeol Yun, Research Scientist

*Analysis of Photovoltaic Market Potential in Korea to Set the National Supply Target*

Dr. John Martin, Handy Village Institute

*Small Wind Coops*

Ifeanyi Okonkwo, University of Nigeria, Nsukka

*Development and Performance Evaluation of Energy Desalination System in Nigeria*

Kayla Carey, Colorado Chautauqua Association

*Electrified District Cooling at a National Historic Landmark*

Lester Shen, Lawrence Berkeley National Laboratory

*Making Better Use of On-site PV Generation: Direct Distribution of DC Power in Buildings*

Malshana Wadugurunnehalage, University of California, Fresno

*Critical Importance of EV Battery Standardizing and Battery Switching Stations*

Natalie Mann, The University of Alabama in Huntsville

*Investigation of Methyl Ammonium Lead Halide Perovskite Solar Cells*

Nathan Edmunds, West Chester University

*Building a 100% Renewable Energy Grid for America*

Omer Elsanusi, Southern Illinois University Carbondale

*Thermal Energy Storage System with Multiple Families of Phase Change Material*

Patrick Hamilton, Science Museum of Minnesota

*Science Museums and Centers Should Champion Energy Innovation and Climate Change Engagement*

Paul Imbertson, University of Minnesota

*Power Futures: Student Story Maps for Public Power Systems Education*

William Heegaard, Footprint

*Renewable Disaster Recovery - How To Build Back Better*



48th Annual National Solar Conference



**MINNEAPOLIS, MN**  
August 5-9  
#SOLAR2019TwinCities

The following sessions/  
workshops are eligible for  
American Institute of Architects  
continuing education units:



**Tuesday:**

Keynote: Aggressive Climate  
Action – Leadership from  
International to Local

**Wednesday:**

Policy Track: Climate Action and Public Health  
Policy Track: Solar Homes  
Policy Track: Solar Buildings and Community Solar

**Thursday:**

Electric Bus Tour of City of Minneapolis Solar Projects

## 2019 ASES AWARD WINNERS AND FELLOWS

Join us 6pm Tuesday evening in the Aire Ballroom for the Annual Awards Banquet and Auction (tickets available)

WOMEN IN SOLAR ENERGY AWARD  
presented to  
Dr. Gay Canough

JOHN AND BARBARA YELLOTT AWARD  
presented to  
Paulo Henrique Soares

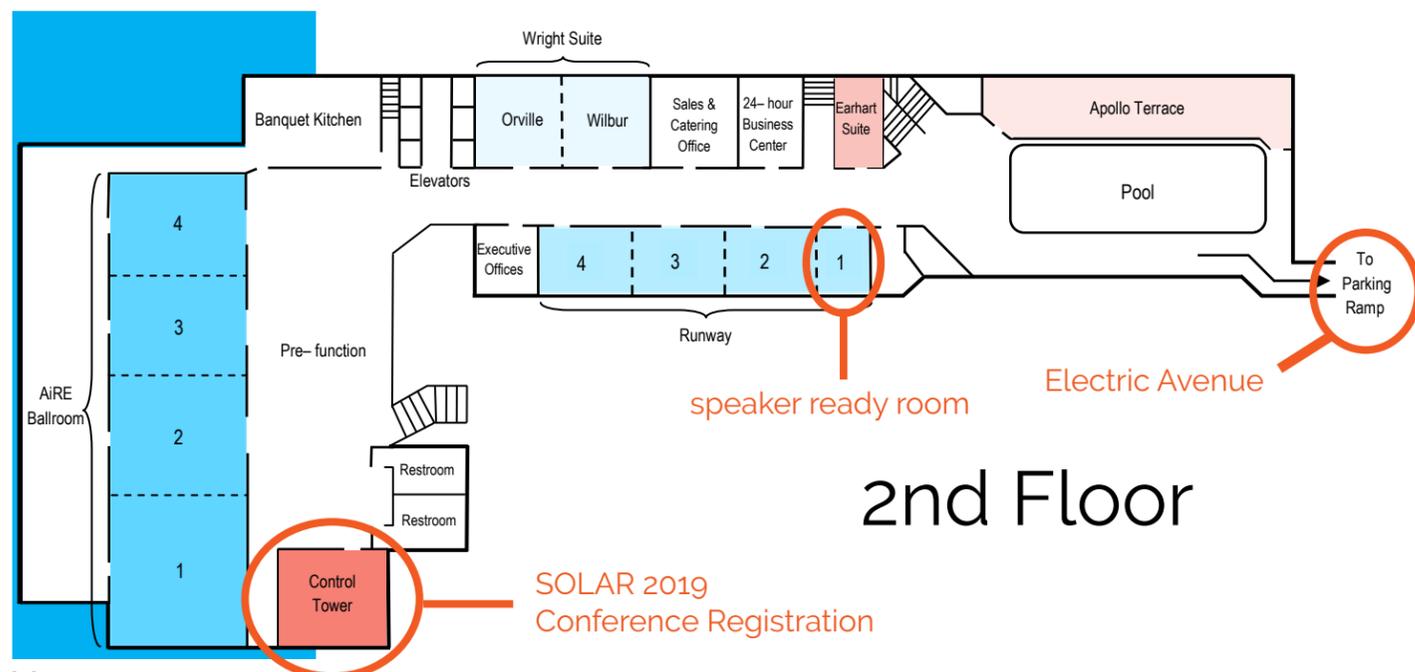
REBECCA VORIES AWARD  
presented to  
Doug Shoemaker

PASSIVE PIONEER AWARD  
presented to  
David Panich

CHARLES GREELEY ABBOT AWARD  
presented to  
Dr. Charlie Gay

2019 ASES Fellows Inductees:  
Jill Cliburn  
John Dunlop

Crowne Plaza AiRE, 3 Appletree Square, Bloomington, Minnesota, 55425





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