ASES SOLAR 2023

Transforming the Energy Landscape for All

CONFERENCE PROGRAM

August 8-11, 2023 | Boulder, CO

ases.org/conference

ASES SOLAR 2023

Transforming the Energy Landscape for All

August 8-11, 2023
University of Colorado, Boulder

AMERICAN SOLAR ENERGY SOCIETY

EVENTS*

Tuesday, August 8

ASES Chapter Forum *(Open to all attendees)*
9:00am - 12:00pm

Chapters, Divisions, & Board Luncheon/Networking
12:00 - 1:00pm

ASES Divisions Forum *(Open to all attendees)*
1:00 - 3:00pm

Mini Boulder Solar Tour *(Ticket required)* | 3:00 - 6:00pm

Opening Reception & Plenary: Workforce Development
6:00 - 9:00pm

Wednesday, August 9

National Solar Tour Luncheon *(Ticket required)*
1:00 - 2:00pm

Spirit, Sustainability, and Reality Forum | 3:45 - 5:00pm

Fellows Reception *(Students Invited to Crash!)*
6:00- 6:30pm

ASES Annual Awards Banquet *(Ticket required)*
6:30 - 9:00pm

Thursday, August 10

NREL Tour *(Ticket required)* | 9:30am - 12:15pm

Women in Solar Energy (WISE) Forum *(Open to all attendees)* | 11:30am - 12:45pm

DOE 'Fireside Chat' Luncheon *(Open to all attendees)*
12:45pm - 2:15pm

Industry Roundtable | 4:00 - 5:15pm

Climate Ride/Walk | 5:30 - 7:30pm

Friday, August 11

Solar Village & EV Show | 10:00am - 4:00pm

Students on Sustainability: Young Professionals Forum - Speed Networking with Professional Mentors
10:30 - 11:45am

Annual Membership Meeting & Closing Ceremony
3:00 - 4:30pm

WORKSHOP/COURSE*

Monday, July 31

Women's Hands-On PV Workshop *(July 31-August 4)*
8:00am – 5:00pm

Thursday, August 10

NABCEP Course: Energy Storage Intensive
2:00 - 4:00pm

NABCEP Course: Energy Storage and the NEC
4:30 - 6:30pm

Friday, August 11

NABCEP Workshop: PV & the NEC | 8:00am - 12:30pm

Solar 101 Workshop *(Open to all attendees)*
11:45am - 1:00pm

Technical Workshop: Energy Justice in Energy Research
1:30 - 2:45pm

Student Workshop: Entering the Energy Labor Market
1:30 - 2:45pm

**Mountain Time*

A MESSAGE FROM THE CONFERENCE CHAIR

Welcome to Boulder and to the University of Colorado Boulder campus, and welcome to the American Solar Energy Society's 52nd annual conference **SOLAR 2023: Transforming the Energy Landscape for All.**

I am honored and excited to be returning as the Conference Chair. At the SOLAR 2021 conference in Boulder we began focusing on Justice, Equity, Diversity, and Inclusion in ASES as an organization and in the conference call for participation, making room for and inviting presentations, discussions, and speakers on historical social justice aspects of the energy sector and empowering a more inclusive energy future. This focus continued in 2022 in Albuquerque, and will also continue at the SOLAR 2023 conference in Boulder, helping to let the light shine in on energy justice and inclusion.

Like attendees of this conference, the American Solar Energy Society is dedicated to helping America toward the goal of 100 percent renewable energy, decreasing the use of fossil fuels and increasing the use of renewable energy sources, in order to have a positive impact on the larger issues of global warming and climate change, and energy justice. The growing awareness and acceptance of the connections between human energy production and climate change has brought a corresponding emotional response many people call "climate anxiety" among veterans in the field, and in particular among younger people.

Climate anxiety or eco-anxiety, like any anxiety disorder, can have a paralyzing effect on sufferers, wherein they might believe nothing can be done, or not enough is being done, to solve the climate crisis. Around the world, changes in climate—in particular related to global warming—are effecting change in weather, producing more frequent and extreme droughts, flood events, hurricanes, heat and cold waves, and more. All of this, and a general belief that governments and elected officials are not doing enough to combat climate change, intensify climate anxiety.

In a study published in Nature, nearly 1/2 of young people 18–25 years old said climate change was affecting their daily lives. Nearly 2/3 of the young people felt governments were not acting quickly or forcefully enough. Young people want to see change in policy, action, and implementation of solutions to the climate crisis they feel.

ASES has committed to getting 100+ young people involved in the conference through scholarships to the conference, internships, and volunteer opportunities to present, attend, or work at the conference and become a part of the transformation.

I hope to see many young people and you in Boulder in August 2023!

Dale Miller, ***Chair SOLAR 2023***
Associate Teaching Professor, Environmental Studies Dept., University of Colorado Boulder

SOLAR 2023 NATIONAL ORGANIZING COMMITTEE

Carly Rixham, ASES Executive Director
Lauren Reddington, ASES Programs Director
Dale Miller, Conference Chair
Ella Nielsen, ASES Membership & Engagement Director
Ben Luce, ASES Board Chair
Dara Bortman, ASES Board Secretary
Paulette Middleton, Panorama Pathways
Dave Renné, SOLAR 2023 Technical Chair
David Ginley, National Renewable Energy Laboratory
Henry Vandermark, Solar Wave Energy, Inc.
Daniel Simon, Helen Brach Foundation
Debbie Coleman, Sun Plans
Wyldon Fishman, Solar Cookers International
Summer Ferreira, Sandia Labs
Nir Krakauer, City College of New York
Martin Voelker, Colorado Renewable Energy Society
Emily Moog, Sandia Labs

SOLAR 2023 LOCAL ORGANIZING COMMITTEE

John Avenson, NECO
Bill Guernsey, LinQuest Corporation
Sydney Muñoz, Goodwill Industries International
Pete Lakoff, Conference Volunteer
Luther Krueger, Big Blue Sun Museum of Solar Cooking
Venkata Pulugurtha, Siddhi Solar Technologies
Martin Voelker, CRES
Carly Rixham, ASES Executive Director
Lauren Reddington, ASES Programs Director
Dale Miller, Conference Chair
Ella Nielsen, ASES Membership & Engagement Director
Ben Luce, ASES Board Chair
Paulette Middleton, Panorama Pathways
David Ginley, NREL

TECHNICAL REVIEW COMMITTEE

Carly Rixham, ASES Executive Director
Dave Renne, ASES Technical Chair
Lauren Reddington, ASES Programs Director
David Ginley, National Renewable Energy Laboratory
Henry Vandermark, Solar Wave Energy, Inc.
Daniel Simon, Helen Brach Foundation
Paulette Middleton, Panorama Pathways
Debbie Coleman, Sun Plans
Wyldon Fishman, Solar Cookers International
Summer Ferreira, Sandia Labs
Nir Krakauer, City College of New York
Abraham Ellis, Sandia Labs
Julian Wang, Penn State University
Gilbert Michaud, Loyola University Chicago
John Burke, MESEA
Rich Stromberg, Equitable Solar Solutions
Bill Guiney, Artic Solar Inc.

REGISTRATION: University of Colorado Boulder,
University Memorial Center (UMC)

Tuesday: 2:30pm - 7:30pm
Wednesday & Thursday: 7:45am - 7:00pm
Friday: 8:00am - 11:00am
Note: All times are Mountain Time

ASES Meeting
Special Event
Plenary
Workshop/Course
Session
Networking Break

Tuesday, August 8

9:00am - 12:00pm	ASES Chapter Forum	Center Ballroom/Whova
12:00pm - 1:00pm	Chapters, Divisions, & Board Luncheon/Networking	Center Ballroom
1:00pm - 3:00pm	ASES Divisions Forum	Center Ballroom/Whova
3:00pm - 6:00pm	Mini Boulder Solar Tour *(Ticket required)*	Off Campus
4:30pm - 5:30pm	Volunteer Training *(Invite Only)*	Center Ballroom
6:00pm - 9:00pm	Opening Reception & Plenary: Workforce Development	Center Ballroom/Whova

Wednesday, August 9

8:30am - 9:45am	Plenary: Local, National, International Outlook on Getting to 100% Renewable Energy	Center Ballroom/Whova
9:45am - 10:00am	Networking Break	South Terrace
10:00am - 11:15am	Life Cycles Track: Getting to a Sustainable Renewable Energy World	Center Ballroom/Whova
10:00am - 11:15am	~Switch Session 1	East Ballroom/Whova
11:15am - 11:30am	Networking Break	South Terrace
11:30am - 12:45pm	Equity and Access Track: Ensuring Equity and Inclusion in Both Rooftop and Shared Solar	Center Ballroom/Whova
11:30am - 12:45pm	Buildings Track: Active and Passive Projects Including the Solar Decathlon	East Ballroom/Whova
1:00pm - 2:00pm	National Solar Tour Luncheon *(Ticket required)*	Center Ballroom/Whova
2:15pm - 3:30pm	Equity and Access Track: Building Solar in Underserved Areas: Rural, Tribal, and Other Communities	Center Ballroom/Whova
2:15pm - 3:30pm	Buildings Track: Sustainable Material Advancement and Design Integration	East Ballroom/Whova
3:30pm - 3:45pm	Networking Break	South Terrace
3:45pm - 5:30pm	Poster Session	Center Ballroom/Whova
3:45pm - 5:00pm	Spirit, Sustainability, and Reality Forum	East Ballroom/Whova
5:00pm - 6:00pm	Solar Today Office Hour	East Ballroom
6:00pm - 6:30pm	Fellows Reception *(Students Invited to Crash!)*	Center Ballroom
6:30pm - 9:00pm	ASES Annual Awards Banquet *(Ticket required)*	Center Ballroom/Whova

Thursday, August 10

8:30am - 9:45am	Plenary: Innovation and Inclusion	Center Ballroom/Whova
9:30am - 12:15pm	NREL Tour *(Sold out)*	Off Campus
9:45am - 10:00am	Networking Break	South Terrace
10:00am - 11:15am	PV/Thermal Applications Track: Digging into the Details: Advances and Learning on PV Performance	Center Ballroom/Whova
10:00am - 11:15am	Grid Track: Microgrids for a More Resilient and Equitable Future	East Ballroom/Whova
11:15am - 11:30am	Networking Break	South Terrace
11:30am - 12:45pm	Women in Solar Energy (WISE) Forum	Center Ballroom/Whova
11:30am - 12:45pm	Grid Track: Stored Energy for the Future Modern Grid	East Ballroom/Whova
12:45pm - 2:15pm	DOE 'Fireside Chat' Luncheon	Center Ballroom/Whova
2:00pm - 4:00pm	NABCEP Course: Energy Storage Intensive *(Ticket required)*	West Ballroom
2:15pm - 2:30pm	Networking Break	South Terrace
2:30pm - 3:45pm	Education Track: Expanding a Robust Diverse Solar Workforce	Center Ballroom/Whova
2:30pm - 3:45pm	PV/Thermal Applications Track: Solar Technologies in Action	East Ballroom/Whova
3:45pm - 4:00pm	Networking Break	South Terrace
4:00pm - 5:15pm	Industry Roundtable	Center Ballroom/Whova
4:00pm - 5:15pm	Education Track: Models and Strategies That Advance Decision Maker Engagement	Center Ballroom/Whova
4:30pm - 6:30pm	NABCEP Course: Energy Storage and the NEC *(Ticket required)*	West Ballroom
5:30pm - 7:30pm	Climate Ride/Walk	Off Campus

Friday, August 11

8:00am - 12:30pm	NABCEP Workshop: PV & the NEC *(Ticket required)*	West Ballroom
9:00am - 10:15am	Plenary: From the Classroom to the Lab to the Boardroom	Center Ballroom/Whova
10:00am - 4:00pm	Solar Village & EV Show	South Terrace
10:15am - 10:30am	Networking Break at Solar Village & EV Show	South Terrace
10:30am - 11:45am	Students on Sustainability: Young Professionals Forum - Speed Networking with Professional Mentors	Center Ballroom/Whova
11:45am - 1:00pm	Solar 101 Workshop	South Terrace Tent
12:00pm - 1:00pm	Lunch	East Ballroom
12:00pm - 1:15pm	~Switch Session 2	Center Ballroom/Whova
1:30pm - 2:45pm	Technical Workshop: Embedding Justice from the Beginning - JUST-R Metrics for Considering Energy Justice in Early-Stage Energy Research	West Ballroom/Whova
1:30pm - 2:45pm	Student Energy Workshop: Entering the Energy Transition Labor Market	Center Ballroom/Whova
2:45pm - 3:00pm	Networking Break at Solar Village & EV Show	South Terrace
3:00pm - 4:30pm	Annual Membership Meeting & Closing Ceremony	Center Ballroom/Whova

MONDAY, JULY 31

Women's Hands-On PV Workshop *(July 31-Aug 4)*

8:00am - 5:00pm

Learn how to design, size, and install a solar electric system. Why women only? This is a chance for women to work together and empower each other in a non-competitive atmosphere, on the design of a PV system, the use of power tools, and the installation of a fully functional solar electric system.

TUESDAY, AUGUST 8

ASES Chapter Forum *(Open to all attendees)*

9:00am - 12:00pm | Center Ballroom

Chapters, Divisions, & Board Luncheon/Networking

12:00pm - 1:00pm | Center Ballroom

ASES Divisions Forum *(Open to all attendees)*

1:00pm - 3:00pm | Center Ballroom

ASES Technical Divisions bring together diverse members with similar interests in order to engage, educate, and grow the community through an exchange of information. Divisions conduct outreach and ensure that ASES programs and publications are technically accurate. At this Divisions Forum (formerly Technical Divisions Caucus), the Officers of the Divisions will report to the Division membership on the activities and state of affairs of each Division, followed by a discussion of how to engage a broader audience. All conference attendees are welcome to join the Divisions Forum online or in person.

Mini Boulder Solar Tour

3:00pm - 6:00pm | South Terrace

Join us for a tour around Boulder to check out various solar sites in the area. Get a taste of what a National Solar Tour in Boulder is like. You won't want to miss this! Transportation will be provided. We will meet on the South Terrace, please arrive at 2:45pm MT.

Volunteer Training *(Invite only)*

4:30pm - 5:30pm | Center Ballroom

All conference volunteers are required to attend this 1-hour volunteer training.

Opening Reception & Plenary: Workforce Development

6:00pm - 9:00pm | Center Ballroom

Speakers: **Carly Rixham**, *American Solar Energy Society,* **Henry Red Cloud**, *Red Cloud Renewable,* **Dale Miller (Moderator),** *University of Colorado Boulder, Environmental Studies Department,* **Aaron Brockett**, Mayor, *City of Boulder,* **Larry Sherwood**, *Interstate Renewable Energy Council (IREC),* **Peter Green**, *Chief Research Officer, Director, National Renewable Energy Laboratory (NREL),* **Erika Symmonds**, *Solar Energy Industries Association (SEIA)*

Live Stream will start at 6:30pm MDT.

WEDNESDAY, AUGUST 9

Coffee and Light Breakfast Available

7:45am - 8:30am | South Terrace Tent

Plenary: Local, National, International Outlook on Getting to 100% Renewable Energy

8:30am - 9:45am | Center Ballroom

Speakers: **Paulette Middleton (Moderator)**, *Panorama Pathways,* **Joe Neguse**, *Colorado's 2nd Congressional District,* **Jocelyn Durkay**, *Colorado Energy Office (CEO), Policy Unit,* **Dr. David Renné**, *Dave Renné Renewables, Aspen Hill Films, & International Solar Energy Society (ISES)*

A global renewable energy revolution is underway, and this revolution is intimately connected with significant societal transformations also occurring. Technology, finance, policy and public support all are coming together to make just transformations possible. The critical roles, successes and paths forward of governments at all levels – international, national, tribal, state, local – are highlighted.

Networking Break

9:45am - 10:00am | South Terrace Tent

Life Cycles Track: Getting to a Sustainable Renewable Energy World

10:00am - 11:15am | Center Ballroom

Speakers: **Sydney Muñoz (Moderator)**, *Goodwill Industries International,* **Robert Foster (Co-Moderator)**, *American Solar Energy Society (ASES),* **Rich Stromberg**, *Equitable Solar Solutions/Alaska Center for Energy and Power,* **Christopher Toy**, *Colorado State University Department of Soil and Crop Science,* **Hope Wikoff**, *NREL,* **Samantha Reese**, *National Renewable Energy Laboratory*

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Learn about a variety of important steps being taken to help us achieve a renewable energy world sustainably. This session shares progress on circular economy for PV panels, greening up green technologies, expanding ecosystem services in agrivoltaics, and natural carbon sequestration.

~Switch Session 1

10:00am - 11:15am | East Ballroom

Speakers: **Abraham Ellis (Moderator)**, *Sandia National Laboratories,* **Heaven Campbell**, *Solar United Neighbors,* **Sadie Remington-Gilbert**, *Cadmus,* **Riley Neugebauer**, *Solar for Women/Namaste Solar,* **Christian Nwarueze**, *Mckinsey & Company,* **Jacob Ford**, *Solstice Power Technologies,* **Anita Ledbetter**, *Build San Antonio Green,* **Barry Butler**, *Butler Sun Solutions,* **Susan Schleith**, *Florida Solar Energy Center - University of Central Florida*

Fun 5-minute rapid-fire presentations.

Networking Break

11:15am - 11:30am | South Terrace Tent

Equity and Access Track: Ensuring Equity and Inclusion in Both Rooftop and Shared Solar

11:30am - 12:45pm | Center Ballroom

Speakers: **Sara Owre (Moderator)**, *Groundswell*, **Zahra Thani (Co-moderator)**, *Energy Allies,* **David Comis**, *Maryland Energy Administration,* **Pete Parsons**, *Texas Solar Energy Society,* **Dr. Elvis Moleka**, *Groundswell,* **Will McNamara**, *Sandia National Laboratories*

Increasing equitable and inclusive access to solar energy is fundamentally important to achieve a just, resilient, and decarbonized future. This session will investigate various efforts across the US that are making solar more accessible and affordable to consumers, from those focused on low-income rooftop solar, to those focused on community shared solar.

Buildings Track: Active and Passive Projects Including the Solar Decathlon

11:30am - 12:45pm | East Ballroom

Speakers: **Debbie Coleman (Moderator)**, *Sun Plans,* **Julian Wang (Co-moderator)**, *Penn State University,* **Jes Brossman**, *NREL,* **Paul Neumann**, *CU Boulder Solar Decathlon Team,* **Emmanuel Iddio**, *University of Wyoming,* **M. Keith Sharp**, *University of Louisville,* **Peter Ewers**, *Ewers Architecture,* **Steve Scribner**, *Shape Architecture Studio,* **Morgan Law**, *Shape Architecture Studio,* **Sandhya Sood**, *Accent architecture+design*

Sustainable building design incorporates both knowledge from successful projects and current research as will be illustrated during this session. Despite disruptions to utility grids and malfunctions of on-site mechanical systems, resilient buildings take advantage of the natural resources on site such as solar, wind, water and air temperature to minimize their dependence upon outside systems. Presenters will explore examples and case studies of buildings that incorporate one or more of various active and passive solar strategies to create comfortable structures in which to live and work.

National Solar Tour Luncheon *(Tickets required)*

1:00pm - 2:00pm | Center Ballroom

Speaker: **Wyldon Fishman (Moderator)**, *Solar Cookers International, New York Solar Energy Society*

Learn more about the National Solar Tour, watch virtual tours, and hear from past tour hosts about their solar stories, why they went solar, and the benefits of the Solar Tour! This luncheon is free for conference attendees, but must be registered for the luncheon in advance.

Equity and Access Track: Building Solar in Underserved Areas: Rural, Tribal, and Other Communities

2:15pm - 3:30pm | Center Ballroom

Speakers: **Zahra Thani (Moderator)**, *Energy Allies,* **Ellen Ross (Co-moderator)**, *Tri-State Generation and Transmission, Inc.,* **Angelica Wright**, *GRID Alternatives - Tribal Solar Accelerator Fund,* **Ellen Ross**, *Tri-State Generation and Transmission, Inc.,* **Emily Richardson**, *Colorado Clean Energy Fund (CCEF),* **Jacob Ford**, *Solstice Power Technologies,* **Kathryn Milun**, *Solar Commons Project*

There are several types of geographic areas that have been underserved or even abandoned in the ongoing clean energy transition. This session will spotlight various case studies to deploy solar in such areas using innovative financing, good civic engagement, and digital tools, particularly in rural, tribal, and other disadvantaged communities.

Download the Conference App

Buildings Track: Sustainable Material Advancement and Design Integration

2:15pm - 3:30pm | East Ballroom

Speakers: Julian Wang (Moderator), *Penn State University,* **Debbie Coleman (Co-moderator)**, *Sun Plans,* **Victor Olgyay**, *Rocky Mountain Institute (RMI),* **Chenshun Chen**, *Penn State University,* **Steve Kawell**,

Durango Solar Homes, LLC, **Jes Brossman**, *NREL,* **Neda Ghaeili Ardabili**, *Penn State University*

Building sustainable structures requires a holistic approach that encompasses everything from design and material selection to construction and operation. In this session, we'll explore how architects, engineers, builders, and researchers can work together to create buildings that are not only environmentally responsible and healthy but also socially economically and socially sustainable. Featuring case studies and expert insights, we'll delve into topics such as window glazings, green materials, carbon-neutral construction, energy savings, cost-benefit analysis, and indoor environmental health, offering practical strategies and emerging research concepts for achieving sustainable solar buildings.

Networking Break

3:30pm - 3:45pm | South Terrace Tent

Poster Session

3:45pm - 5:30pm | Center Ballroom

For a full list of poster presentations, see section titled "Poster Descriptions".

Spirit, Sustainability, and Reality Forum

3:45pm - 5:00pm | East Ballroom

Speakers: Paulette Middleton (Moderator), *Panorama Pathways,* **Orlo Stitt (Co-Moderator)**, *Stitt Energy Systems, Inc.*

ASES Sustainability Division is introducing a new Spirit-Sustainability-Reality initiative that acknowledges **Reality:** Climate change impacts are intensifying, underscoring the urgency for taking more ambitious action now. Economical, technical, and political solutions are available. Political will and public action are lacking. Embraces **Spirit and Sustainability:** Be Hopeful; Share Ideas; and Work Together. The goals of the initiative are to educate and motivate everyone to combat climate change now. We will be using the results from the discussions at the forum and on the ASES online community to create meaningful strategies for combating climate change as a community and individually.

Solar Today Office Hour

5:00pm - 6:00pm | East Ballroom

Join this informal event to discuss story ideas, potential themes, and insightful comments you would like to share with the editor in chief of the magazine Solar Today. **Host: Kat Friedrich**, *ASES Solar Today*

Fellows Reception *(Students invited to crash!)*

6:00pm - 6:30pm | Center Ballroom

*ASES fellows and students are invited to attend this reception

ASES Fellows 2023 Inductees:

Mike Sloan, *Pivot Energy*

David Ginley, *NREL*

Alfredo Fernández-González, *University of Las Vegas School of Architecture*

Hosts: Paulette Middleton, *Panorama Pathways,* **Elaine Hebert**, *California Energy Commission (retired)*

ASES Annual Awards Banquet *(Ticket required)*

6:30pm - 9:00pm | Center Ballroom

ASES honors persons making significant contributions to society and generally within the field of solar and renewable energy each year. Join us for dinner and drinks as we present our annual ASES Awards and Fellows recognitions. We will host a fundraiser after the awards ceremony. **Host: Jill Cliburn**, *ASES Awards Chair,* **Henry Vandermark**, *SolarWave, Inc.,* **Sarah Townes**, *ASES*

The ASES Awards Committee is proud to present award winners for recognition in their respective categories at the 2023 ASES Awards Banquet in Boulder.

- **Charles Greely Abbot:** Sarah Kurtz
- **Hoyt Clarke Hottel:** Dan Shugar
- **Leadership in Solar Policy and Market Transformation:** Winona LaDuke
- **Leadership in Solar Architecture and Design:** Steven Strong
- **Rebecca Vories Award for Volunteer Service:** John Dunlop
- **Claudia Hansen Wentworth Award for Code Design:** Jeff Spies and Rebekah Hren
- **Women in Solar Energy – WISE:** Carol Weis
- **John and Barbara Yellott:** Simeng (Sampson) Hao

ASES Meeting · Plenary · Session · Special Event · Workshop/Course · Networking Break

ASES is honored to recognize the great work of our Awards Committees:

- **Charles Greely Abbot:** Elaine Hebert, Chair; Jane H. Davidson, Wyldon Fishman, Richard Perez, Claudia Wentworth
- **Hoyt Clarke Hottel:** Dave Renné, Chair; Victor Olgyay, Tom Hoff, Dara Bortman, David Comis, Dave Panich, Yogi Goswami, Natalie Click
- **Leadership in Solar Policy and Market Transformation Award:** Gilbert Michaud, Chair; Riley Neugebauer, Anita Ledbetter, Julian Wang
- **Leadership in Solar Architecture and Design:** David Panich, Chair; Walter Grondzik, John Reynolds, Alfredo Fernandez-Gonzalez, Bruce Haglund
- **Rebecca Vories:** Paulette Middleton, Chair; Don Osborn, Mary Tucker, Glen Friedman, Mario Monesterio
- **Claudia Hansen Wentworth Award for Code Design:** Elaine Hebert, Chair; Mario Monesterio, Johnny Weiss, consultant to the committee
- **Women in Solar Energy – WISE:** Marlene Brown, Chair; Laurie Stone, Trudy Forsyth, Karen Soares
- **John and Barbara Yellott:** Yogi Goswami, Chair; Sarah Kurtz, Frank Vignola

THURSDAY, AUGUST 10

Coffee and Light Breakfast Available

8:00am - 9:00am | South Terrace Tent

Plenary: Innovation and Inclusion

8:30am - 9:45am | Center Ballroom

Speakers: Dara Bortman (Moderator), *Exact Solar,* **Karen Soares**, *Go Eagle Energy, Solutions, LLC,* **Dr. Sunita Satyapal**, *Hydrogen and Fuel Cell Technologies Office, U.S. Department of Energy (DOE),* **David Poli**, *XPRIZE Foundation*

Reinforcing our conference focus on Transforming the Energy Landscape for All, our panel of speakers will discuss their work to ensure that America's frontline communities not only benefit from the transition to clean energy, but have the opportunity to lead the way in enabling a transformation in the way we think about energy, create energy, deliver energy, and consume energy. Through support, education, investment, workforce development opportunities, and inspirational legislative leadership toward total electrification, those who have historically been the most adversely affected by climate change, can show us the path forward to a more resilient, sustainable and secure future - one with access to cheaper energy, cleaner air and water, good-paying local jobs, and improved public health for all.

NREL Tour *(Sold Out)*

9:30am - 12:15pm

Meet on the South Terrace at 9:30am MDT. We will be touring the Wind Technology Center. Sustainable Transportation will be provided.

Networking Break

10:15am - 10:30am | South Terrace Tent

PV/Thermal Applications Track: Digging into the Details: Advances and Learning on PV Performance

10:00am - 11:15am | Center Ballroom

Speakers: Richard Stromberg (Moderator), *Equitable Solar Solutions/Alaska Center for Energy and Power,* **Nancy Trejo (Co-Moderator)**, *Swift Solar,* **David Ginley**, *NREL*, **Debbie Brodt-Giles**, *NREL*, **Issa Faye**, *Assane Seck University,* **Keith Wingeard**, *Solar Cookers International (SCI)*

From new anti-reflective coating, green hydrogen generation, and power point tracking algorithms to building integrated PV and degradation monitoring, researchers are discovering better ways to harness more benefits from PV systems.

Grid Track: Microgrids for a More Resilient and Equitable Future

10:00am - 11:15am | East Ballroom

Speakers: Wyldon Fishman (Moderator), *Solar Cookers International,* **Emily Moog (Co-Moderator)**, *Sandia National Laboratories,* **Mateo Chaskel**, *UGE,* **Zach Emond**, *RPSi,* **James Moran**, *Advanced Energy Group, LLC (AEG),* **Adrienne Pierce**, *New Sun Road,* **William Young**, *Florida Solar Energy Center,* **Susan Schleith**, *Florida Solar Energy Center*

This session provides a wide view of microgrids and how they can be used to create a more equitable and resilient grid, helping increase the resilience of communities. This will include case studies of grid shelters that provide broad value. The session also discusses energy justice considerations in community projects and goes on to discuss future grid controls and architectures that can build on microgrids.

Networking Break

11:15am - 11:30am | South Terrace Tent

Women in Solar Energy (WISE) Forum

(Open to all attendees)

11:30am - 12:45pm | Center Ballroom

Speakers: Marlene Brown (Moderator), *Prep4Resilience Women In Solar Energy (WISE),* **Sandra Begay**, *Sandia National Laboratories,* **Anita Ledbetter**, *Build San Antonio Green,* **Debbie Coleman**, *Sun Plans*

The purpose of the WISE 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 just 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.

Grid Track: Stored Energy for the Future Modern Grid

11:30am - 12:45pm | East Ballroom

Speakers: Wyldon Fishman (Moderator), *Solar Cookers International,* **Emily Moog (Co-Moderator)**, *Sandia National Laboratories,* **Jeffrey Gifford**, *NREL,* **Nir Krakauer**, *City College of New York,* **Laura Pimentel**, *U.S. Department of Energy and Environment (DOEE),* **Luke McLaughlin**, *Sandia National Laboratories*

Energy storage and other complements to solar are key pieces to ensure a reliable future grid as more renewable resources are installed in the face of climate change. This session will cover thermal energy storage and long term storage approaches. These talks speak to some of the compliments to solar energy that can build the future modern grid for all.

DOE 'Fireside Chat' Luncheon

(Open to all attendees)

12:45pm - 2:15pm | Center Ballroom

Speakers: Karen Soares (Moderator), *Go Eagle Energy, LLC,* **Suzanne Singer**, *PhD, Native Renewables Inc.,* **Carrie Hearne**, *Virginia Department of Energy – State Energy Office,* **Shalaya Morissete**, *U.S. Department of Energy,* **Dr. Helen Dowdell**, *Mobility Unlimited Technology Worldwide,* **Marlene Brown (Co-Moderator)**, *Prep4Resilience Women In Solar Energy (WISE),* **Katelyn Walker Mooney**, *Department of Labor (DOL)*

NABCEP Course: Energy Storage Intensive

2:00pm - 4:00pm | West Ballroom

This Energy Storage Intensive Workshop will count for NABCEP Credit and will be fast-paced, fun, and cover a lot of information. Students are recommended to plan on being alert, taking good notes, reading the instructor's books, and studying the material intensively for the week following the course. For maximum learning, students can read the instructor's book, Energy Storage Basics before the course. Topics covered include Energy Storage Systems (ESS) vs. Storage Batteries, Lithium-Ion Chemistries, Flow Batteries, Fuel Cells, Lead-Acid Batteries, Charge Controllers, Inverters, AC and DC Coupling, Ancillary Services, Self-Consumption, Power vs. Energy Ratings, System Sizing, Residential, Commercial, and Utility-Scale Storage.

Instructor: Sean White, *Solar PV Professor, Master Trainer NABCEP*

Networking Break

2:15pm - 2:30pm | South Terrace Tent

Education Track: Expanding a Robust Diverse Solar Workforce

2:30pm - 3:45pm | Center Ballroom

Speakers: Dale Miller (Moderator), *University of Colorado Boulder, Environmental Studies Department,* **Marc Perez (Co-moderator)**, *Clean Power Research,* **Allison Jackson**, *Colorado Agrivoltaic Learning Center,* **Sandra Begay**, *Sandia National Laboratories,* **John Red Cloud**, *Red Cloud Renewable (RCR),* **Carol Weis**, *Remote Energy,* **Omar Al-Hassawi**, *Washington State University,* **David Drake**, *Washington State University*

Join us to learn more about a wide variety of programs that are helping establish an even stronger workforce for all aspects of the solar revolution. The session will cover successes in longer-term American Indian Energy projects and internship programs, diverse solar trainer initiatives, agrivoltaics training, hands-on experiences in sustainable design, online programs focusing on high-performing energy, and expanding gender equality through solar technology.

PV/Thermal Applications Track: Solar Technologies in Action

2:30pm - 3:45pm | East Ballroom

Speakers: Henry Vandermark (Moderator), *Solar Wave Energy, Inc.,* **Eric Buchanan**, *University of Minnesota West Central Research and Outreach Center,* **Jake Archbell**, *Elevate,* **Malvika Agarwal**, *Carnegie Mellon University,* **Sriram Sankar Hari**, *Carnegie Mellon University,* **William Guiney**, *Artic Solar, Inc.*

Growing solar applications for agriculture, industry, and communities of greatest need. We will look at agrivoltaics creating energy while conserving farmland, solar thermal technologies used for industry, creative solutions of PV serving the underserved, and an ageless solar technology for agriculture heating requirements.

Networking Break

3:45pm - 4:00pm | South Terrace Tent

Education Track: Models and Strategies That Advance Decision Maker Engagement

4:00pm - 5:15pm | Center Ballroom

Speaker: David Ginley (Moderator), *NREL,* **Tom Thompson (Co-moderator)**, *CED Greentech & Gridwerks Consulting, Inc.,* **Marc Perez**, *Clean Power Research,* **Eric Sippert**, *Hawaii Public Utilities Commission,* **Jill Cliburn**, *Cliburn and Associates, LLC,* **Colter Adams**, *Bowdoin College,* **Mehdi Shahriari**, *Peninsula Clean Energy*

Join us for discussions about modeling and other strategies that are helping more and more decision makers at all levels embrace the just renewable energy world goals. The session demonstrates how to achieve firm, 24/7 renewable power; provides lessons and paths forward from Hawaii; discusses how to navigate complex tradeoffs; deals with NIMBY issues; and illustrates how to create water, energy and food security for isolated locals.

Industry Roundtable

4:00pm - 5:15pm | East Ballroom

Speakers: Carly Rixham (moderator), *ASES,* **Abraham Ellis**, *Sandia National Laboratories,* **Patrick Thompson**, *The U.S. Solar Coalition,* **Shad Parrish**, *BrightView,* **Debbie Coleman**, *Sun Plans Inc.,* **Debbie Brodt-Giles**, *NREL,* **Shahid Mahdi**, *Enerknol,* ***Amy Heart***, *SunRun,* **M.Keith Sharp**, *University of Louisville,* **Marsha Barancik**, *Focus on the Frontier*

All are welcome to join the Industry Roundtable where sponsors will each give a five-minute pitch for their business or offering on renewable energy advances to expedite the energy transition. Join us as we flip the script!

NABCEP Course: Energy Storage and the NEC

4:30pm - 6:30pm | West Ballroom

This fun workshop will be jam-packed with NEC (National Electrical Code) Energy Storage insight and interpretation. Instructor Sean White teaches Energy Storage courses around the world and has authored many technical Storage and Solar books. We will primarily focus on the 2023 NEC and refer to earlier versions. Included in this workshop will be explanations on when to use NEC 706 Energy Storage Systems (ESS) and when, or if you should use NEC 480 Storage Batteries. Other articles covered will be 710 Stand-Alone Systems, 705 Interconnected Power Production Sources, 625 Electric Vehicle Power Transfer Systems, and of course references to 690 PV Systems, this is the original Solar Energy Society after all!

Did you know that the NEC allows us to backfeed your house with electric vehicles (EVs) and that it is just the EV manufacturers holding us back? Be ready for when EV manufacturers let us do what they already should have.

This course will count for NABCEP continuing education requirements in every category and will also count for prerequisites for NABCEP Certification.

Climate Ride/Walk

5:30pm - 7:30pm | Meet at South Terrace ***REGISTER NOW***

Join us for this 6-mile walk/ride or 11-mile ride around the city of Boulder, then a bite at Half Fast Subs!

Bring your own bike and helmet.

Not coming to Boulder? You can join the team and do the ride on your own on August 10th. Please sign up as an "individual", not a team when registering.

FRIDAY, AUGUST 11

Coffee and Light Breakfast Available

8:00am - 9:00am | South Terrace Tent

NABCEP Workshop: PV & the NEC

8:00am - 12:30pm | West Ballroom

This fun workshop will be jam-packed with NEC (National Electrical Code) NEC insight and interpretation. Instructor Sean White teaches PV and Energy Storage courses around the world and has authored many technical Storage and Solar books including PV and the NEC, which he co-authored with Bill Brooks. We will primarily focus on the 2023 NEC and refer to earlier versions. Here are some new 2023 NEC Developments:

1. Float-o-voltaics (floating solar) is in the NEC
2. Solar carports are in the NEC
3. Circuits exceeding 1000V can be on buildings in limited ways

4. New labeling requirements
5. DC-coupled and AC-Coupled changed "Coupled" to "Interconnected"

We will also get into the UL 3741 PV Hazard Control Systems (rapid shutdown) listings. This course will count for NABCEP continuing education requirements in every category and will also count for prerequisites for NABCEP Certification.

Plenary: From the Classroom to the Lab to the Boardroom

9:00am - 10:15am | Center Ballroom

Speakers: **Dr. David Renné (Moderator)**, *Dave Renné Renewables, Aspen Hill Films, & International Solar Energy Society (ISES),* **Seth Marder**, *Ph.D, Renewable & Sustainable Energy Institute (RASEI),* **Dr. Huyen N. Dinh**, *HydroGEN Energy Materials Network,* ***Evelyn Carpenter***, *Solas Energy – US*

Over the past decades, many colleges and universities have produced researchers with advanced degrees who, working in private and government-funded laboratories, have successfully researched and developed efficient and reliable solar energy technologies. These R&D successes have in turn led to massive market adoption of these technologies, so that today solar energy has become the lowest cost option for new electricity generation, and has spawned many successful companies. In this lively plenary session, we will hear examples from experts of how these clean energy technologies, created through effective R&D programs, have led to the large-scale and low-cost transformation of our energy supply and a vibrant private sector industry. Clearly, the solar energy development from laboratory experimentation to commercial success is key to the Transformation of the Energy Landscape for All.

Solar Village & EV Show

10:00am - 4:00pm | South Terrace

Free and open to the public! Anyone interested in sustainable energy and energy efficiency is invited to visit the 2023 Solar Village & EV Show, brought to you by the American Solar Energy Society, Renewable Energy Colorado, and the Colorado Renewable Energy Society. The Solar Village will offer a variety of solar electric vehicles, educational displays and experts covering photovoltaic (solar electric) systems, heat pumps, passive solar design, super insulation, and other sustainable energy technologies and practices. A Solar 101 Workshop will also be offered for free from 11am—12:15pm during this event.

Networking Break at Solar Village & EV Show

10:15am - 10:30am | South Terrace Tent

Students on Sustainability (SOS!): Young Professionals Forum - Speed Networking with Professional Mentors

10:30am - 11:45am | Center Ballroom

The Young Professionals Forum will provide students and emerging professionals the opportunity to gain knowledge from professionals, build networks, and obtain guidance for navigating early career challenges. This event attracts attendees from diverse professional backgrounds and represents the interdisciplinary nature of the renewable energy community.

Solar 101 Workshop *(Open to all attendees)*

11:45am - 1:00pm | South Terrace Tent

Speakers: **John Avenson (Moderator)**, *New Energy Colorado (NECO) 501(c)(3),* **David Ginley**, *NREL,* **Bill Lucas**, *GB3 Energy,* **Sean Cunningham**, *Resolution Energy*

This workshop will provide a highly accessible but powerful introduction to the key solar technologies and practices you'll want to understand, including passive solar design & heat pumps, solar thermal, and photovoltaic systems, presented by a powerhouse group of nationally recognized Denver Area experts. Attendees will have the opportunity to pursue followup discussions with the presenters and deepen their knowledge in general after the workshop at the Solar Village & EV Show event just outside. Instructors include passive solar advocate and educator John Avenson (Sustainable Architecture LLC), heat pump expert Bill Lucas (GB3 Energy), solar thermal expert Sean Cunningham (Resolution Energy), and PV installer Dave Rizzotto (Namaste Solar).

Lunch

12:00pm - 1:00pm | East Ballroom

~Switch Session 2

12:00pm - 1:15pm | Center Ballroom

Speakers: **Muddassir Siddiqi (Moderator)**, *Houston Community College,* **Abraham Ellis (Co-Moderator)**, *Sandia National Laboratories,* **Bryan Kendall**, *University of New Mexico*, **Dr. Svetlana Poroseva**, *University of New Mexico,* **Ariel Kalishman Walsh**, *Solstice,* **Erika Ginsberg-Klemmt**, *Gismo Power LLC,* **Henry Vandermark**, *Solar Wave Energy, Inc.,* **Michael Shonka**, *Solar Heat and Electric,* **Mohammad Elmi**, *Penn State University,* **John Ickes**, *Pine Hollow General Repair LLC,* **Nick Nicholson**

Fun 5-minute rapid-fire presentations.

Technical Workshop: Embedding Justice from the Beginning - JUST-R Metrics for Considering Energy Justice in Early-Stage Energy Research

1:30pm - 2:45pm | West Ballroom

The concept of energy justice has attracted increasing attention in recent years but is often only applied in social science or energy policy work on deployed technologies. Yet, early-stage energy research happening now will determine the design and eventual impacts of technologies needed for a clean energy future. This late-stage integration of energy justice leaves us susceptible to identifying negative impacts of energy technologies only after significant time and funding have been spent on their research and development, often with limited remaining options to address them. Our work gives researchers and institutions the tools they need to improve research process and decision making leading to eventual improved outcomes for communities.

Instructor: **Elizabeth Gill**, *NREL*

Student Energy Workshop: Entering the Energy Transition Labor Market

(Free and Open to All)

1:30pm - 2:45pm | Center Ballroom

Informed by Student Energy and Orsted's newly launched Energy Transition Skills Project, this workshop will provide context into the existing gap between what is most important to young people when looking for employment, the barriers they face in entering the Energy Transition labor market, and how energy stakeholders can address these gaps to advance youth skill development. After laying the foundation, we will uncover tangible solutions and opportunities for young people to increase their knowledge of the Energy Transition labor market and the specific steps they can take to increase their confidence when applying for jobs and connecting with prospective employers, such as:

- Identifying career interests, values and skills, and aligning them with labor market needs
- Building networking skills: how to tell your story and ask great questions
- Where to get started when looking for climate and energy jobs

Read the report and recommendations from the project here: bit.ly/ets-report

Instructors: **Claris Canta** and **Aarisha Elvi Haider**, *Student Energy*

Networking Break at Solar Village & EV Show

2:45pm - 3:00pm | South Terrace Tent

Annual Membership Meeting and Closing Ceremony *(Open to all attendees)*

3:00pm - 4:30pm | Center Ballroom

The Annual Membership Meeting:
3:00pm – 4:00pm

The Closing Ceremony: 4:0pm – 4:30pm
with a conference summary by conference technical chair **Dave Renné** and closing blessing by **Chief Henry Red Cloud**.

Speakers: **Carly Rixham**, *ASES,* **Ella Nielsen**, *ASES,* **Kat Friedrich**, *ASES Solar Today,* **Sarah Townes**, *ASES,* **Dave Renné**, *Dave Renné Renewables,* **Henry Red Cloud**, *Red Cloud Renewable*

ASES Meeting · Plenary · Session · Special Event · Workshop/Course · Networking Break

ANNUAL 2023 ASES AWARDS

CHARLES GREELEY ABBOT AWARD

Sarah Kurtz
For pioneering contributions to the advancement of high-efficiency PV cell technology, leadership in PV cell reliability, and service as a mentor in the field.

HOYT CLARKE HOTTEL AWARD

Dan Shugar
For recognizing innovations in solar technologies for commercial application, passionate and effective industry leadership and distinguished service to the ASES mission.

LEADERSHIP IN SOLAR ARCHITECTURE AND DESIGN AWARD

Steven Strong
For pioneering work in renewable energy and sustainable design, leading to the widespread application of design innovations and impactful new educational curricula.

LEADERSHIP IN SOLAR POLICY AND MARKET TRANSFORMATION AWARD

Winona LaDuke
For open-hearted leadership in Native and non-Native communities, demonstrating pathways and articulating policies to achieve a more just and sustainable energy economy.

WOMEN IN SOLAR ENERGY (WISE) AWARD

Carol Weis
For advancing opportunities for women in sustainable energy in the U.S. and worldwide, through new approaches to technical education and entrepreneurship.

REBECCA VORIES

John Dunlop
For long-standing and effective volunteer leadership and service to the Minnesota Renewable Energy Society, in support of ASES programs and its mission.

CLAUDIA HANSSEN WENTWORTH AWARD FOR CODE DESIGN

Rebekah Hren
For leadership in developing, reviewing, and promoting the widespread application of codes and standards that have advanced the safety and reliability of solar PV systems.

Jeff Spies
For leadership in code development, innovation, and training that has advanced solar applications, and for efforts to document and celebrate advances throughout the solar industry.

JOHN AND BARBARA YELLOTT

Sampson Hao
For outstanding contributions to increasing solar energy adoption, achieved as a graduate research assistant in Environmental Science and Sustainability at Loyola University.

2023 ASES FELLOWS INDUCTEES

Mike Sloan
David Ginley
Alfredo Fernandez-Gonzalez

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Sarah Townes, Chief Financial Officer
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Ron Celentano
Shevvaa Beiglary

POSTER DESCRIPTIONS

Posters will be on display Tuesday–Friday in the South Terrace Tent and on the online platform.
The Poster Session will be **Wednesday, August 9 from 3:45-5:30 pm** in the Center Ballroom.

Moderator: Jill Cliburn, *Cliburn and Associates, LLC*
Co-Moderator: Richard Stromberg, *Equitable Solar Solutions/Alaska Center for Energy and Power*

1 Xiaodi Hou, *Texas A&M University*
Orientation and electricity generation of 90 degree titled solar PV

2 Keith Sharp, *University of Louisville*
Historic and modern homes that achieve 100% space conditioning with ambient energy

First year performance of the Pagosa Springs Ambient House

3 Morgan Law, *Shape Architecture Studio*
Housing Our Future: Using Emerging Technology and Passive Solar to Design Ultra Low-energy Building Envelopes

4 Taylor Ryan, *NREL*
Over 700 Student Teams Designing Buildings of the Future

5 Enhe Zhang, *Penn State University*
Photothermal Architectural Glazing for Condensation Resistance Increase and Energy Savings in Cold Climates

6 Nan Wang, *Penn State University*
Quantifying Solar Light-induced Thermal Comfort Effects of Architectural Windows

7 Shevvaa Beiglary, *Penn State University*
New method development for characterizing spectral details of individualized daylighting exposure through windows

8 Eric Peterman, *GRNE Solar*
The Consolidation of the Solar Industry

9 William Ciccone, *NEI Electric Power Engineering*
Designing Safety Grounding for Solar PV--Inverters, Trackers and Fences

10 Matthew Rogers, *Cooperative Institute for Research in the Atmosphere, Colorado State University*
A Comparison of Advection-Based and Machine Learning PV Forecasts for Puerto Rico Forecasting

11 Sampson Hao, *Loyola University Chicago*
Investigating Property Value Impacts Near Midwestern Utility-Scale Solar Projects Using Difference-in-Difference Methods

12 Steven Smiley, *Smiley Energy Services*
Accelerating 100% Renewable Energy Plans

13 Luther Krueger, *Big Blue Sun Museum of Solar Cooking*
Solar Cooking: Learnings from inventors, promoters, and tinkerers

14 Shafiqur Rehman, *King Fahd University of Petroleum and Minerals:*
Performance evaluation of a floating photovoltaic system in Saudi Arabia

15 Erick Moreno Resendiz, *New Mexico State University:*
Experimental study of a small Beam-Down system for water preheating/desalination applications

16 Walter Gerstle, *CSolPower, LLC*
Experimental Testing and Computational Modeling of a Radial Packed Bed for Thermal Energy Storage

17 Ash Ragheb, *Lawrence Technological University*
Embodied Energy and Carbon Reduction Savings and Benefits of Reusing Structural Components in Office Buildings

18 Robert Stayton, *Sagehill Enterprises*
Passive freeze protection for thermosyphon water heating

19 Eduardo Rincón-Mejía, *Autonomous University of México City*
The potential of inexpensive solar thermal devices in decarbonizing Latin American countries economies

20 James Orenstein and Michael Fladmark, *Trinity River Community Solar Systems (TRCSS)*
Aggregated Community Solar in Texas

21 Ben Glenzer, *Solar Solutions For All*
Changing Inequity & Geopolitics - The Power of Battery Storage

22 Maurice Ramirez, *High Alert Institute, Inc.*
Renewable Energy Systems Seen Through the All Hazards, One Health, One Nature Framework

National Solar Tour

October 6-8, 2023

Live/Virtual Experience

Signup Deadline: August 15, 2023

nationalsolartour.org

CLIMATE RIDE

SPONSOR OUR TEAM!

August 10, 2023 | 5:45–7:30pm

ASES SOLAR 2023
Transforming the Energy Landscape for All
August 8-11, 2023
University of Colorado, Boulder

(Click "Support Me")

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