U.S. DEPARTMENT OF ENERGY
SOLAR DISTRICT CUP
COLLEGIATE DESIGN COMPETITION



Class of 2022–2023 Informational Webinar

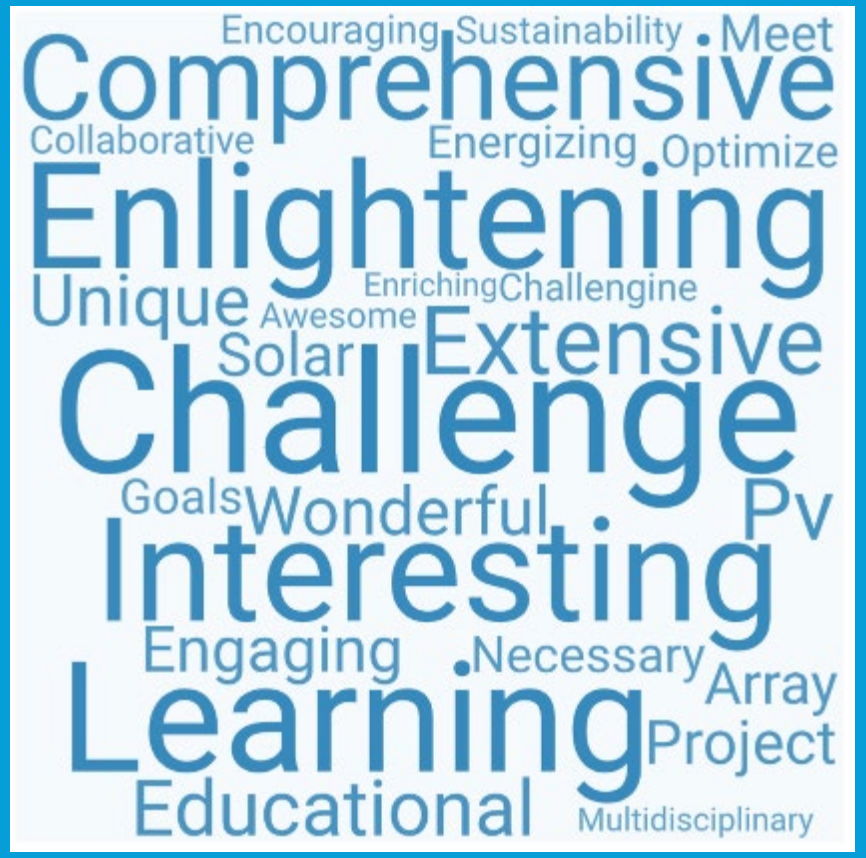
Aug. 25, 2022

Robert Meagley, *U.S. Department of Energy*

Sara Farrar, Travis Lowder, Jackie Petre, Joe Simon, Robin Tuttle
National Renewable Energy Laboratory

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY
SOLAR ENERGY TECHNOLOGIES OFFICE

NREL Transforming ENERGY



What's one word to describe the Solar District Cup?



Webinar Will Begin Shortly

Zoom Webinar Housekeeping

Two Options for Audio (select audio mode):

1. Listen through your computer:
   Click the ‘up arrow’ next to the “mute” button in the bottom left corner.
   Under “Select a Speaker,” click “Same as System.”
2. Listen by telephone:
   Click the ‘up arrow’ next to the “mute” button in the bottom left corner.
   Click “Switch to Phone Audio.”

Panelists – reminder to mute your audio device when not presenting.

To Ask a Question:

Select the ‘Q&A’ button at the bottom of your screen and type in your question.

Having Trouble with the Webinar?

Technical difficulties - contact Zoom Support at: 888-799-9666.

A video/audio recording of this webinar and the slide deck will be made available.

Solar District Cup

A MULTI-DISCIPLINARY COLLEGIATE COMPETITION THAT CHALLENGES STUDENT TEAMS TO **DESIGN** AND **MODEL SOLAR-PLUS-STORAGE SYSTEMS** FOR MULTIPLE BUILDINGS ON A LOCAL ELECTRICAL DISTRIBUTION NETWORK—AT A CAMPUS, ACROSS A DEVELOPMENT, OR IN A DISTRICT.



About the Competition

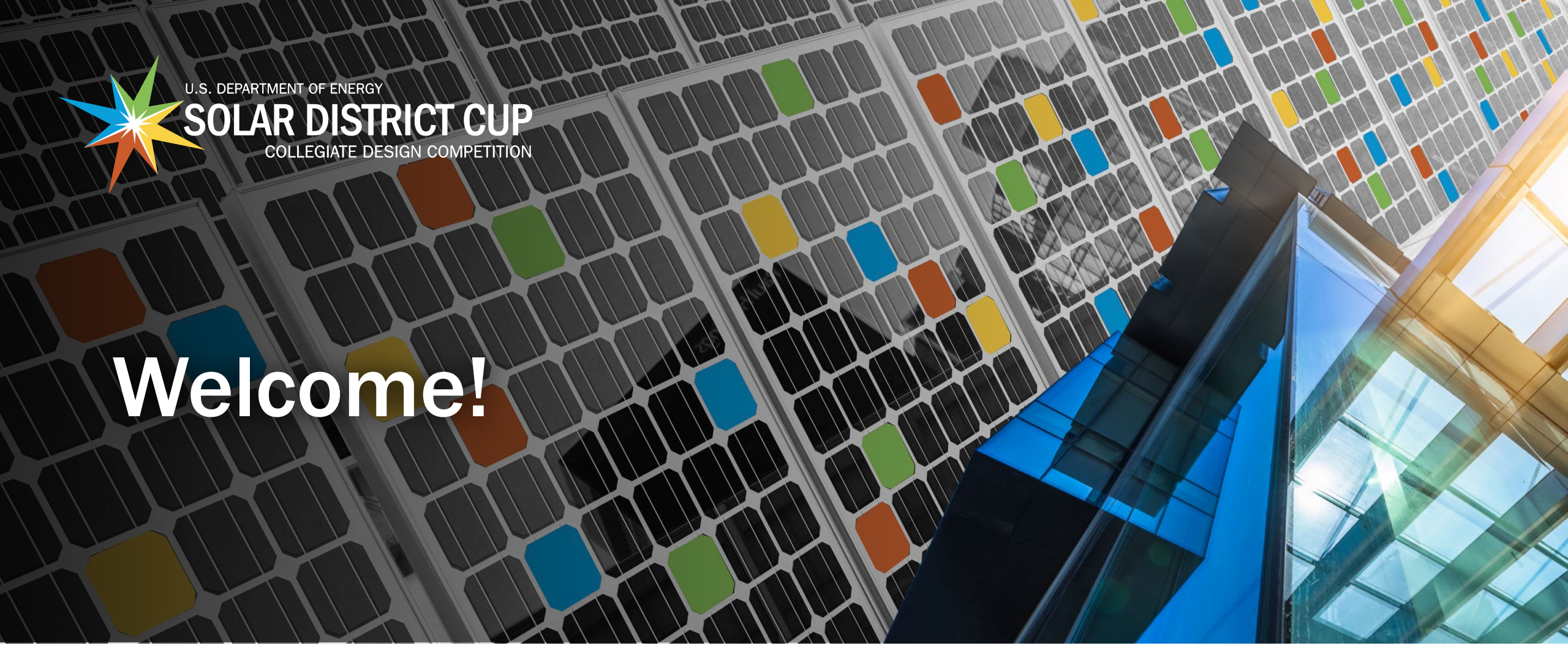
- Cultivating cross-cutting skills to prepare the next generation for the distributed energy workforce
- Multiple divisions, each with a partner district use case of existing building energy data
- One- or two-semester, upper-level undergraduate project starting fall 2022 and culminating in a spring 2023 competition event.



How to Stay in the Know



Go to www.herox.com/solardistrictcup and click “Follow” to receive our announcements and updates.



Dr. Robert Meagley, U.S. Department of Energy

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY
SOLAR ENERGY TECHNOLOGIES OFFICE

NREL Transforming ENERGY

Agenda

1. About the Competition & Welcome
2. Summary: Who, What, Why, How
3. More Details
    a. Eligibility
    b. Competition Rules
    c. Divisions and District Use Cases
    d. Training Provided
    e. Timeline
    f. How to Register
4. What's Next
5. Closing Q&A

Summary

WHO
is involved

WHAT
you'll do

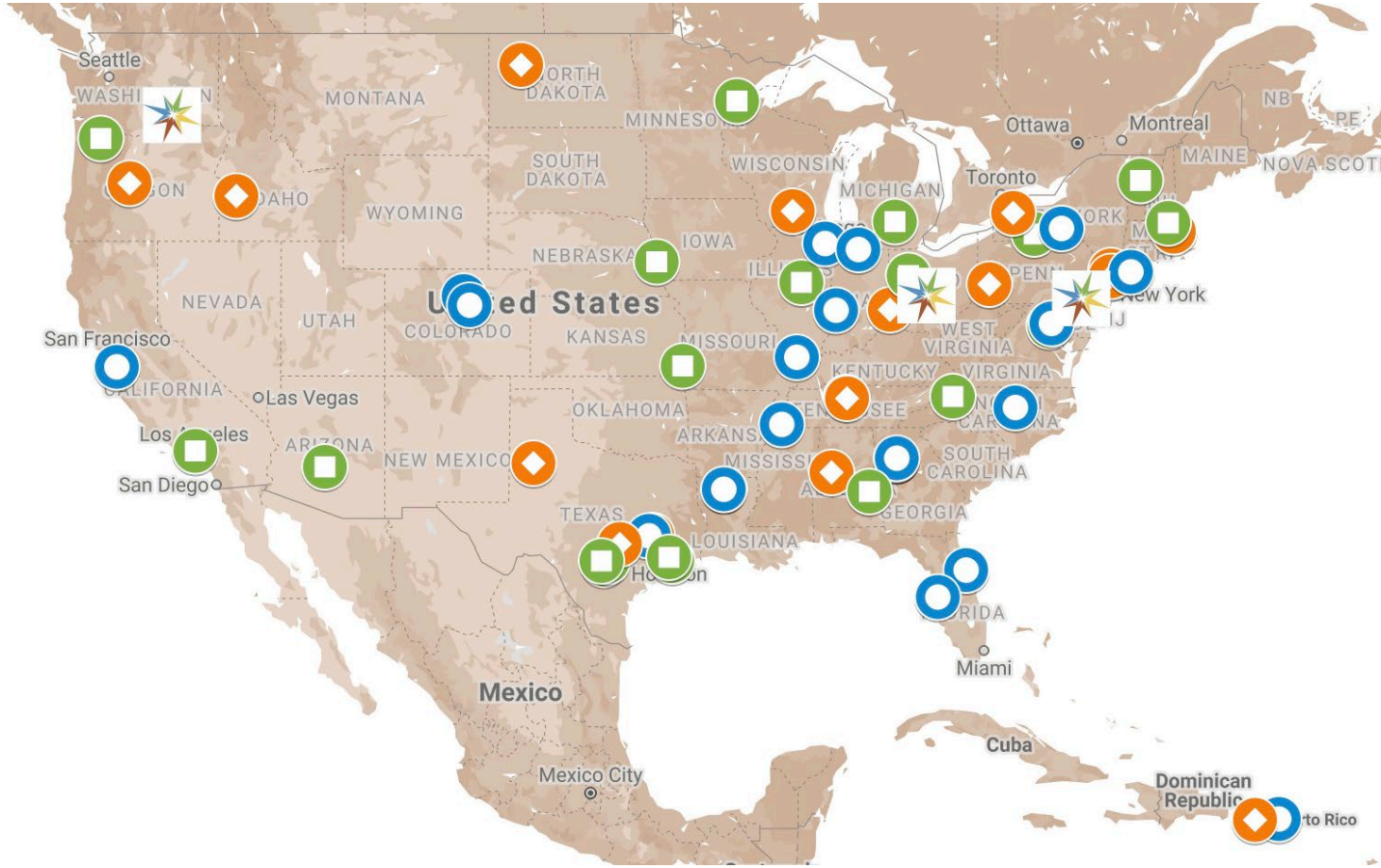


WHY
this competition

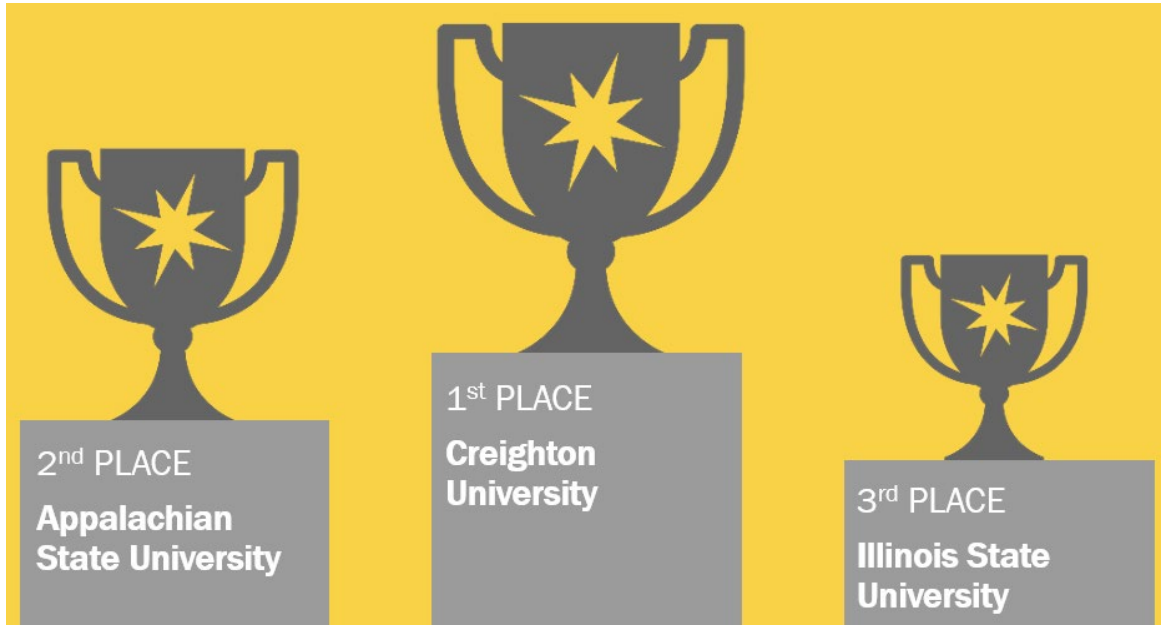
HOW
and what you win

Who Participated Last Year: Class of 2021–2022

- 65 registered/participating teams from 64 schools
- 53% returning schools from previous years
- 4 schools had multiple teams, 3 teams had multiple schools
- Many multi-disciplinary teams
- Many types of college students:
  Community colleges, undergraduates, graduate-level
- Many faculty advisors and industry mentors.



Solar District Cup Winners Class of 2021–2022





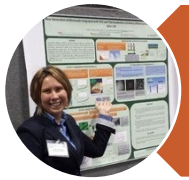


Honorable Mentions

- Georgia Institute of Technology
- Northeast Lakeview & San Antonio Colleges
- Texas Southern University
- University of Colorado Boulder

Who Evaluates You: Judges from Industry

Last year's judges. The Class of 2022-2023 will have new and returning judges.



Dr. Olga Lavrova
New Mexico State University



Dr. Junhui Zhao
ComEd



Dr. Lisha Sun
Quanta Technology, NCSU



Paul Reilly
Engie



Ben Schneider
Adapture Renewables



Edward Settle
NREL



Kareem Dale
Key HTX Energy & Asset



Briana Morris
Namaste Solar



Siddharth Temburni
Summit Energy Group



Jim Lewis
Cheyney University of Pennsylvania

TJ Wood
Ohio State University



Patrick Kinney
PNNL

Who: Competition Organizers



Joe Simon
Co-P.I., Program Design



Sara Farrar
P.I., Program Design



Travis Lowder
Solar Project Finance
Jury Coordinator



Dr. Aadil Latif
Distribution Systems



Jackie Petre
Communications



Erik Ness
Mentor Engagement
Jury Coordinator



Robin Tuttle
Logistics
Jury Coordinator



Dr. Robert Meagley

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY
SOLAR ENERGY TECHNOLOGIES OFFICE



Patrick Gibbs
Jury Coordinator Assistant



Cameron Weiner
Jury Coordinator Assistant



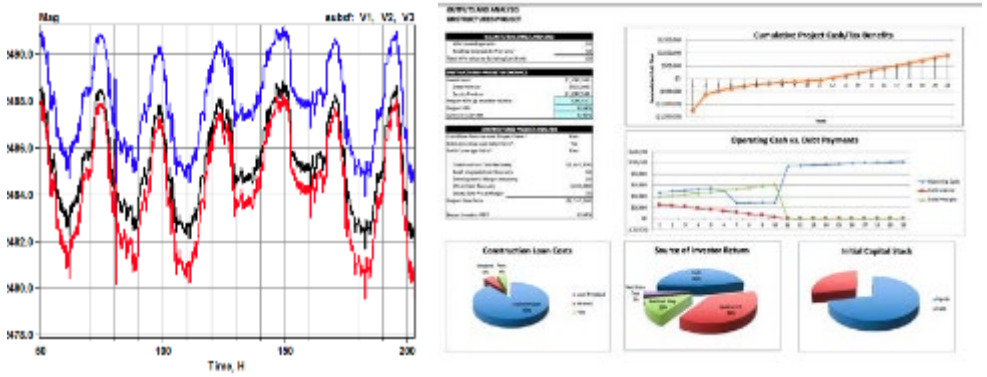
Hannah Pauling
Jury Coordinator Assistant

What You'll Do: Deliverable Packages



Assume role of solar-plus-storage developer to create:

- Project proposal and pitch presentation
- Conceptual system design
  - Solar system layout and specifications
  - Average hourly energy production
  - Distribution system impact summary
- Financial analysis
  - Financing model
  - Customer savings analysis
- Development plan
  - Zoning and permitting in district master plan
  - Construction codes and schedule
  - Distributional energy equity

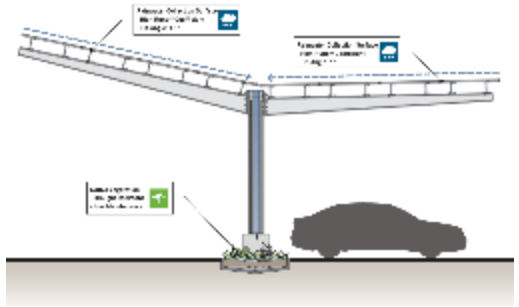






Why We're Conducting the Competition

- Help address workforce gaps for professionals in the clean energy transition and industry.
- Showcase creative student solutions for increased adoption of distributed solar energy generation at the campus or district scale.
- Inspire industry to think strategically about district energy systems.







How and What You Win

- Design a solar + storage system for a campus or district that maximizes energy offset and customer financial savings.
- Gain valuable experience with real-life examples of renewable energy design and engagement with industry.
- Win a trophy and national recognition!

SOLARTODAY Magazine

Going for Gold: The Race for the Solar District Cup

Students from across the country competed in a new collegiate design competition that challenged teams to rethink real-world energy solutions while preparing to enter the solar workforce.



More Details

WHO
is eligible

WHEN
to engage



WHY
participate

HOW
to compete

Who Participates: Eligibility

- A team composed of at least 3 students
- Enrolled student
  - Accredited U.S.-based collegiate institutions
  - At least one class and pursuing a degree
- Any level college student
  - Challenge aimed at upper-level undergraduate
- Multidisciplinary teams highly encouraged

Engineering	Business or finance
Urban planning	Construction management
Communications	Sustainability or environmental policy
Marketing	Architecture

- Faculty advisor and/or mentor
  - Recommended (not required).





Why Participate

- Build experience with renewable energy design and analysis
- Develop real-world solutions that shape the future of solar energy
- Network with industry for career connections
- Enhance education and build resume with experiential learning
  - Senior design or capstone project
  - Elective or independent study course credit
  - Part of class curriculum or thesis
  - Seminar topic
  - Student interest club
  - Extracurricular activity.





















Why Faculty Advise a Team

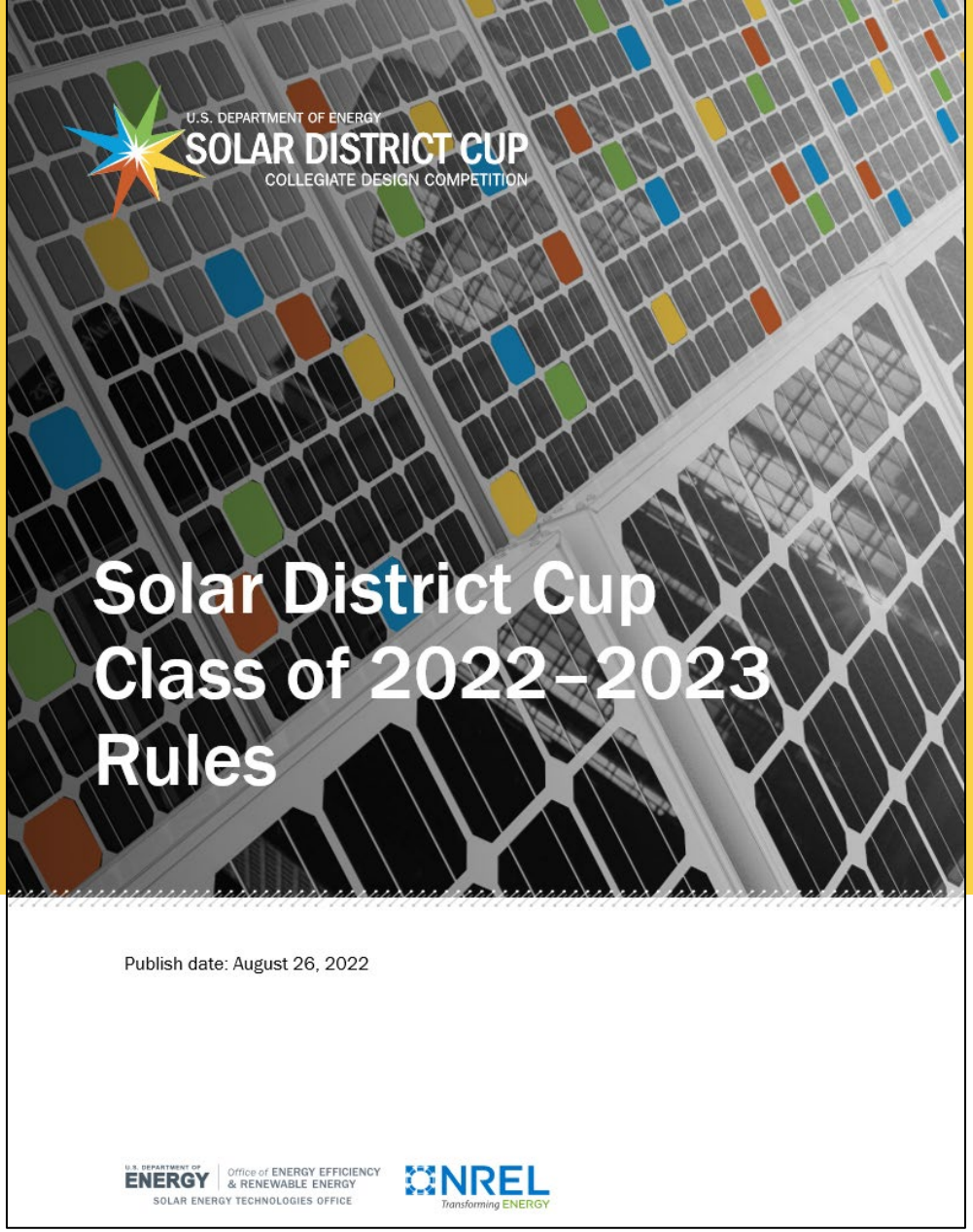
- Real data and use case for students
- Curriculum support and modeling tools
- Team-based design and analysis project
- Connections to industry.

"This competition gave [my class] much more structure, realism and excitement. This was truly a God-send. This was one of four projects in my senior capstone and I saw the skills from this competition that I wouldn't have focused on so much bleed into their other projects for their improvement."
–Class of 2020 Faculty

How to Compete:

Competition Rules Document

- Link to last year's Rules available for review on HeroX in the "Guidelines" tab.
- Class of 2022-2023 Rules to be published by Aug. 26, 2022.



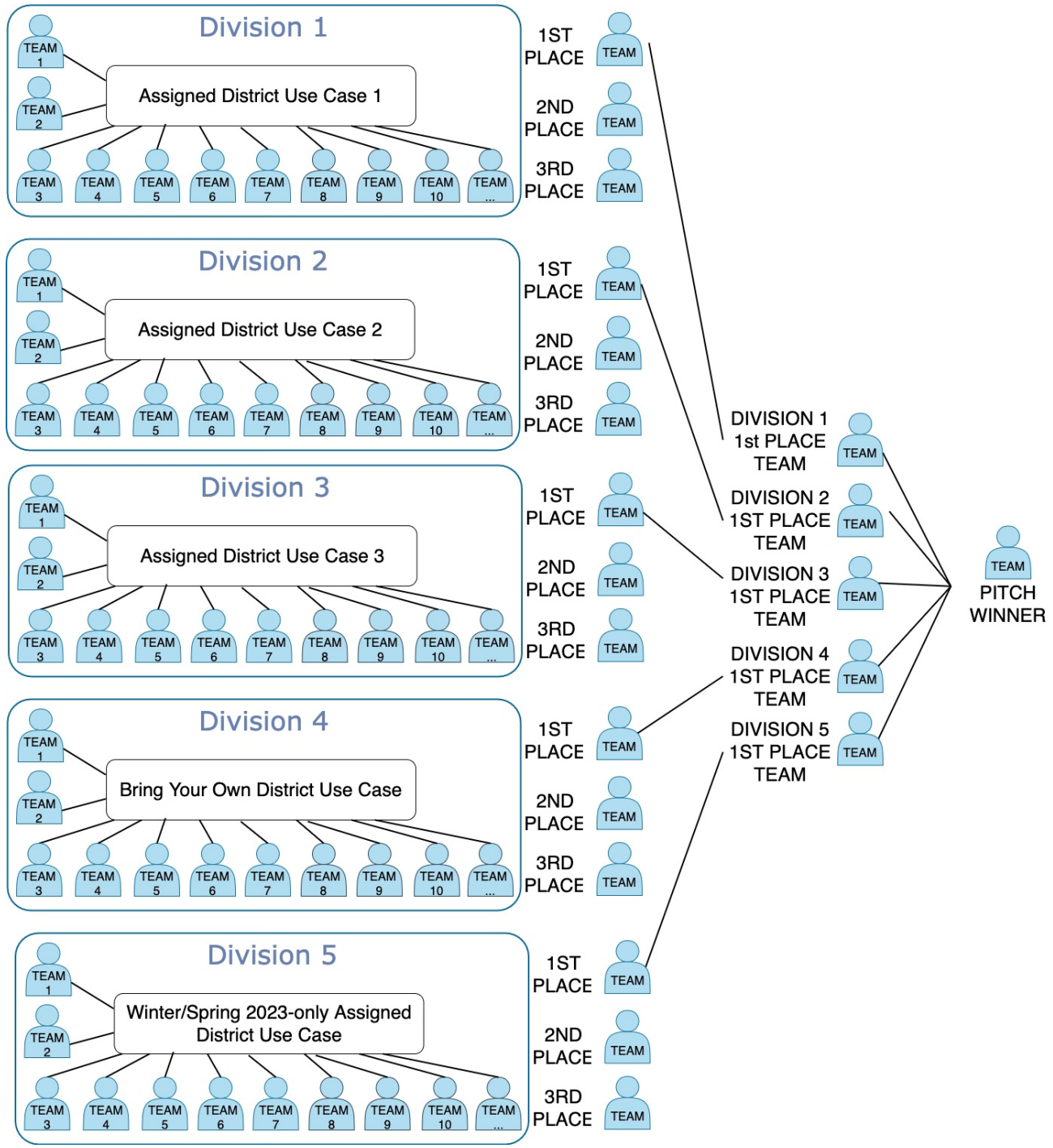
How to Compete:

Divisions and District Use Cases

Real-world use cases with data, district master plans, and partners interested in your solutions.

Divisions

- Anticipating 5 divisions
- Teams assigned to divisions by the competition organizers
- Winners of each division selected by industry judges
- Proposal pitch winner determined at final competition event.







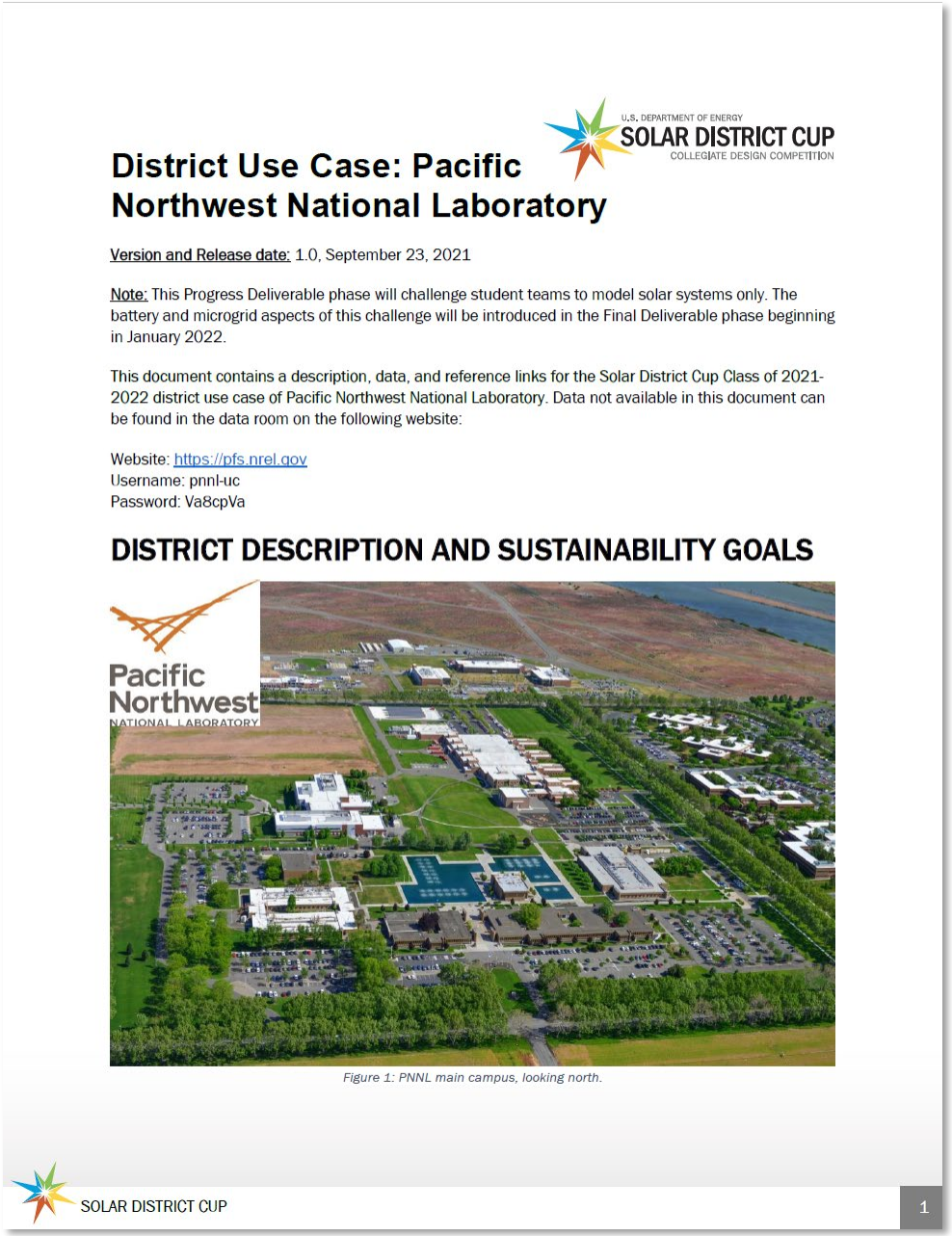


Expected Class of 2022–2023 Divisions District Use Case Types

1. Urban development building out distributed energy infrastructure and slashing carbon footprint
2. University campus growing EV charging and resilience for critical loads
3. University campus exceeding clean energy and campus operation goals with electrification
4. Tribal Nation building out distributed energy infrastructure including community solar
5. New: “Bring Your Own District”

Use Case Profile

- For organizer-assigned divisions: use case available in a secure online data room when divisions assigned
- Serves as the “challenge document,” outlining each district use case and the parameters for student team projects
- Profile and data room contain several datasets to complete the challenge, including:
  - Annual interval energy usage for multiple buildings (.xlsx)
  - District Google Earth map with identifiers (.kmz)
  - Distribution system information.



U.S. DEPARTMENT OF ENERGY
SOLAR DISTRICT CUP
COLLEGIATE DESIGN COMPETITION

District Use Case: Pacific Northwest National Laboratory

Version and Release date: 1.0, September 23, 2021

Note: This Progress Deliverable phase will challenge student teams to model solar systems only. The battery and microgrid aspects of this challenge will be introduced in the Final Deliverable phase beginning in January 2022.

This document contains a description, data, and reference links for the Solar District Cup Class of 2021-2022 district use case of Pacific Northwest National Laboratory. Data not available in this document can be found in the data room on the following website:

Website: https://pfs.nrel.gov
Username: pnnl-uc
Password: Va8cpVa

DISTRICT DESCRIPTION AND SUSTAINABILITY GOALS

Pacific Northwest NATIONAL LABORATORY

Figure 1: PNNL main campus, looking north.

SOLAR DISTRICT CUP 1

Use Case Profile: New “Bring Your Own District”

- Student teams identify:
  - District or campus partner
  - Geographic boundaries (Google Earth .kmz file)
  - Use case parameters, following guidelines in the Rules
  - Available energy data and related constraints
- Organizers support:
  - Example use cases
  - If needed: synthetic energy load and electric distribution system data

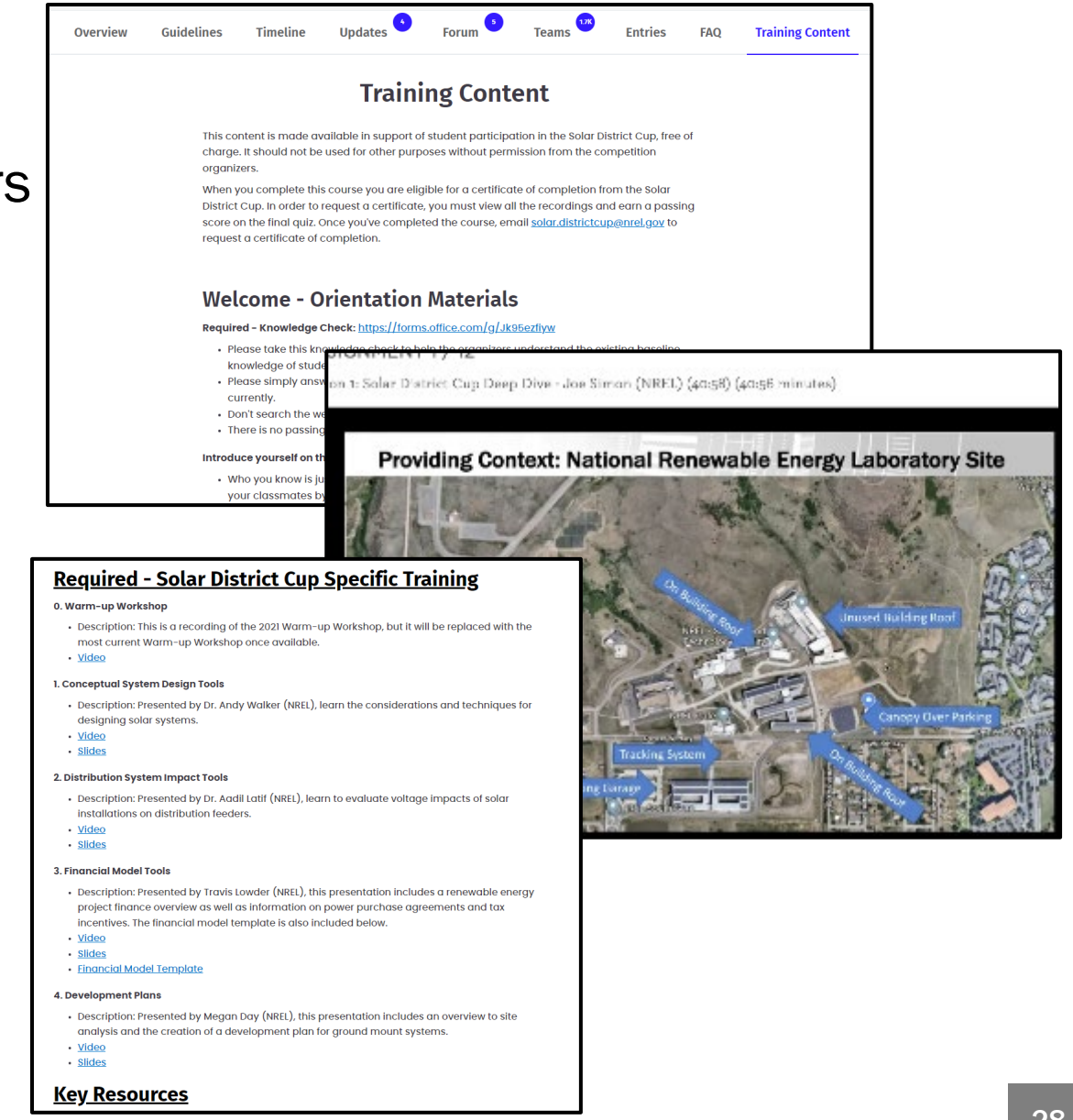
How to Compete:

Training Provided

Customized training, templates, and tools necessary for every team to succeed in the competition.

Customized Training via HeroX

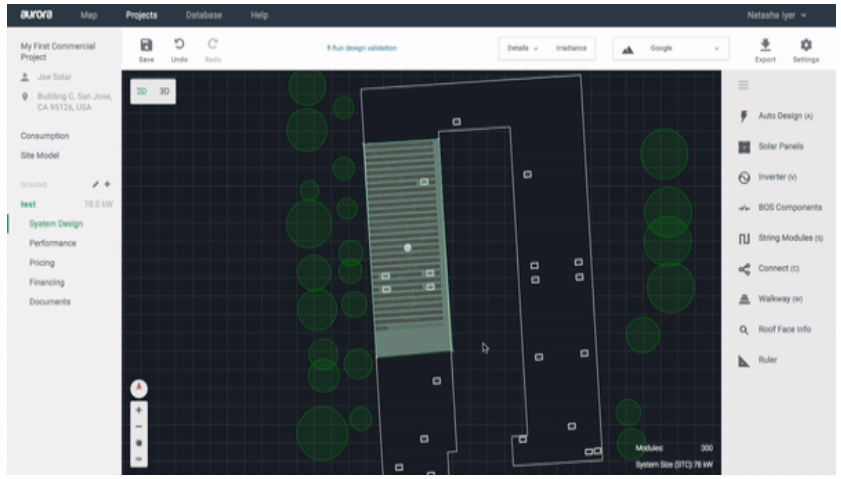
- Solar District Cup Specific Training Webinars
  - Introduction to Conceptual System Design
  - Distribution System Impact Analysis
  - How To Create a Financial Model
  - Development Planning Tips & Tricks
  - Pre/Post Knowledge Checks
  - And more!
- Free Access to Training Content for Registered teams
- Live “Office Hours” with industry experts
- Class of 2021–2022 competition team presentations and winning teams’ final deliverable packages.



Poll Question

For the live (and recorded) competition webinar series, what is your preferred day and time for weekly hour-long training webinars?

Additional Resources and Tools



- Free access to industry-leading tools:
  - *Aurora Solar* for conceptual solar system design
  - Solar Executive MBA Spreadsheet Financial Model
  - **Energy Toolbase** modeling solar + storage customer savings analysis
  - NREL's System Advisor Model (**SAM**) and Renewable Energy Integration and Optimization (**REopt**®) web tools
- Free access to RE+ conference and regional events.

SOLAR POWER INTERNATIONAL | ENERGY STORAGE INTERNATIONAL | RE+ POWER | RE+ INFRASTRUCTURE

REGISTER

RE+

POWERED BY SEIA Solar Energy Industries Association® | Smart Electric Power Alliance

September 19-22, 2022

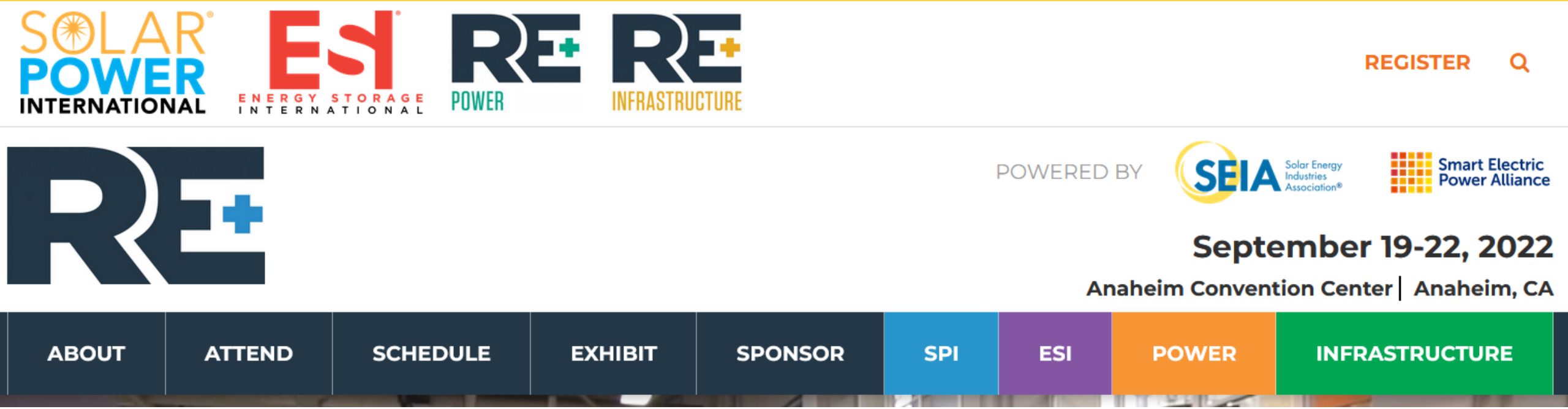
Anaheim Convention Center | Anaheim, CA

Aimee Gabel



Chief Experience Officer

RE+ Events



- Solar District Cup students and faculty attend for free conference registration!
- Register a competition team by Sept. 8 to receive the conference code.

www.re-plus.com

Timeline of Events

Designed to fit within the academic calendar

Participate as part of a course, senior design or capstone projects, or an extracurricular activity.

Solar District Cup Timeline – When to Engage

2022

- Aug. 26: Rules published, with district use case data available to be distributed to student teams upon their registration
- Sept. 8: Deadline for registered team members to request code for complementary registration to the RE+
- **Oct.6: Deadline for teams starting in the fall semester/quarter to complete registration**. To qualify for the "bring your own district" division, teams must register by this date.
- Oct. 11: Announcement of participating teams starting in fall semester/quarter
- **Nov. 17: Deadline for receipt of Progress Deliverable Package from participating teams starting in the fall**, to receive feedback on rules compliance
- Dec. 15: Progress Deliverable Package feedback provided

2023

- **Jan. 26: Deadline for new winter/spring teams to complete registration**
- Jan. 31: Finalist teams announced
- **April 20: Deadline for receipt of Final Deliverable Package from all finalist teams**
- April 27: Deadline for receipt of presentation files from all finalist teams
- **April 30: Competing teams present projects by video conference**; winners announced. Live video attendance and live presentation by at least one student team member from each finalist team is required (no prerecorded presentations). Only enrolled students may present to judges at the final competition event.
- **May 1: Announce competition winners, and first-place teams of each division present in the Project Pitch event.**

Intrigued?



Go to www.herox.com/solardistrictcup and click "Follow" so we keep you up to date!

More Than Intrigued? Register a Team!

1. Go to the Challenge page at www.herox.com/solardistrictcup
2. Choose “Solve this Challenge.” This indicates your interest in competing; it is not a commitment (yet)
   a. Sign-in or create a HeroX account if you don’t already have one (and remember your password)
   b. Agree to the Terms of Use
   c. Confirm your email address
   d. Accept the Challenge-Specific Agreement
   e. Indicate “Would you like to compete as a team?”
      i. Yes, I want to create my own team (with email addresses of invited team members)
      ii. Yes, I want to join a team
      iii. No, I want to compete individually (can create or join other teams later)
   f. Form a team with one Team Captain.



How to Register a Team

4. By the registration deadline, one person from each team must click “Begin Entry,” fill out the necessary form items, then choose “Save & Preview.” You then must click “Submit Final Entry” on HeroX to complete the registration. This step is when you identify your collegiate institution and expected team makeup. Note that you can edit and resubmit your entry as many times as you like until the deadline.

5. Registration entries by team members at an eligible collegiate institution received by the October deadline are deemed participating teams. All teams that successfully complete a registration entry and meet eligibility are accepted.

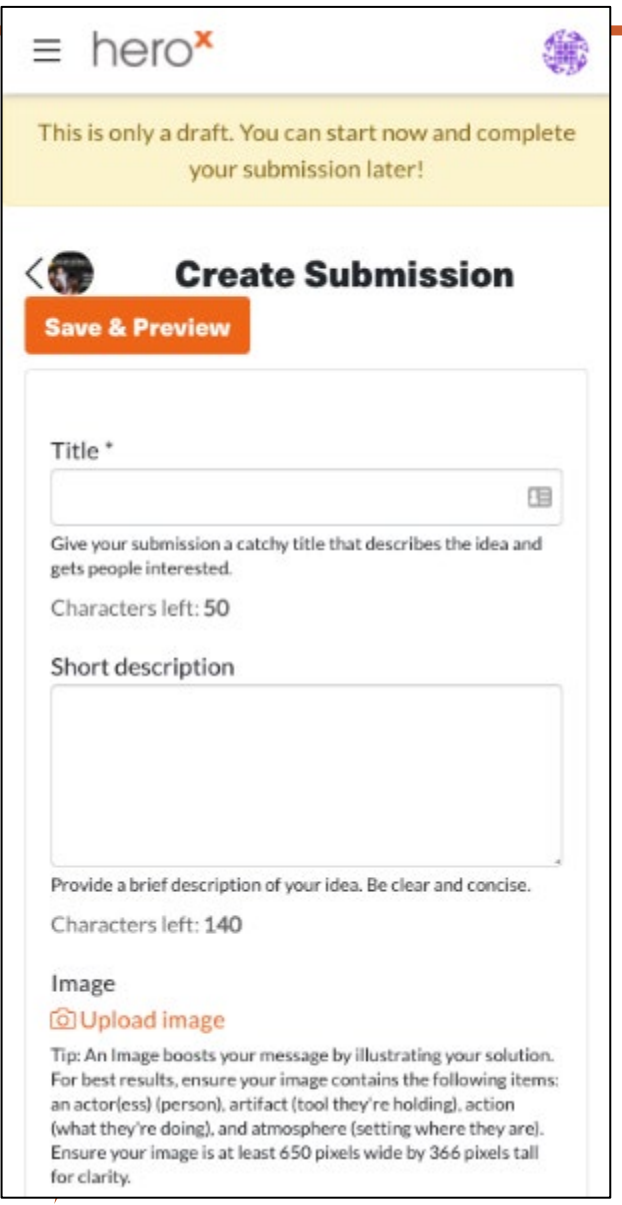
6. For teams requesting an assignment to an organizer-provided district use case, divisions are assigned by the competition organizers following the receipt of a complete registration entry.

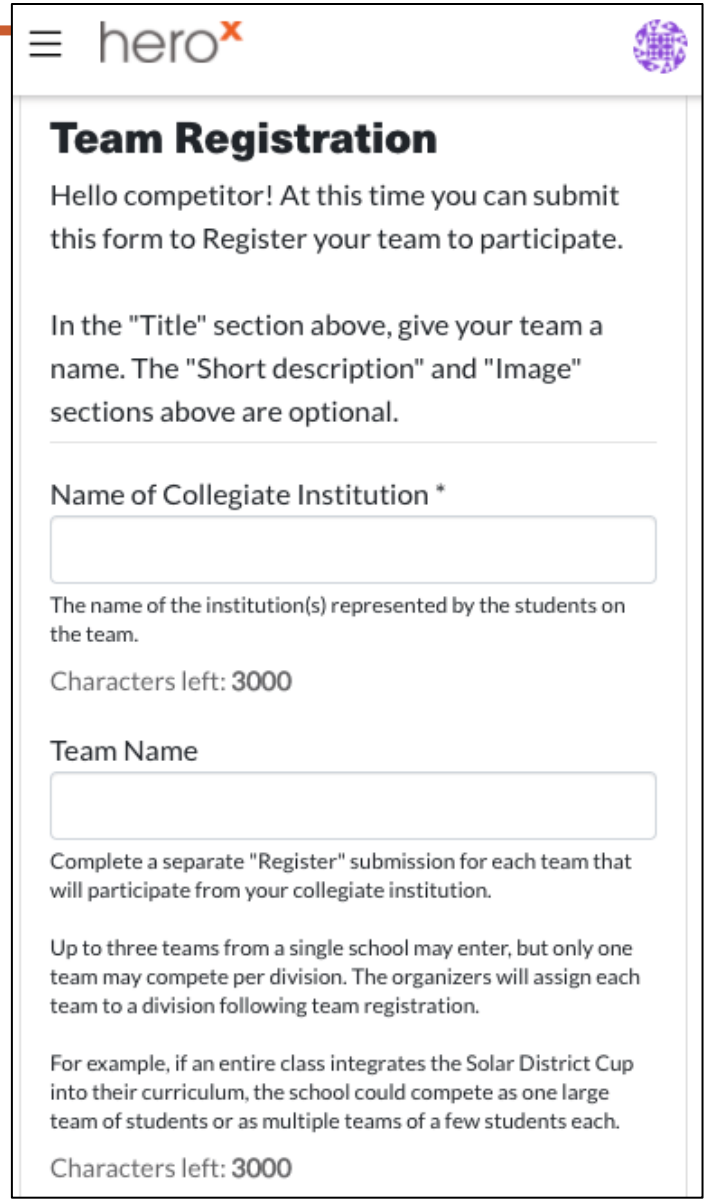
7. Multiple teams from a single school may submit a registration entry, but only one team may compete per division. Five divisions are expected.

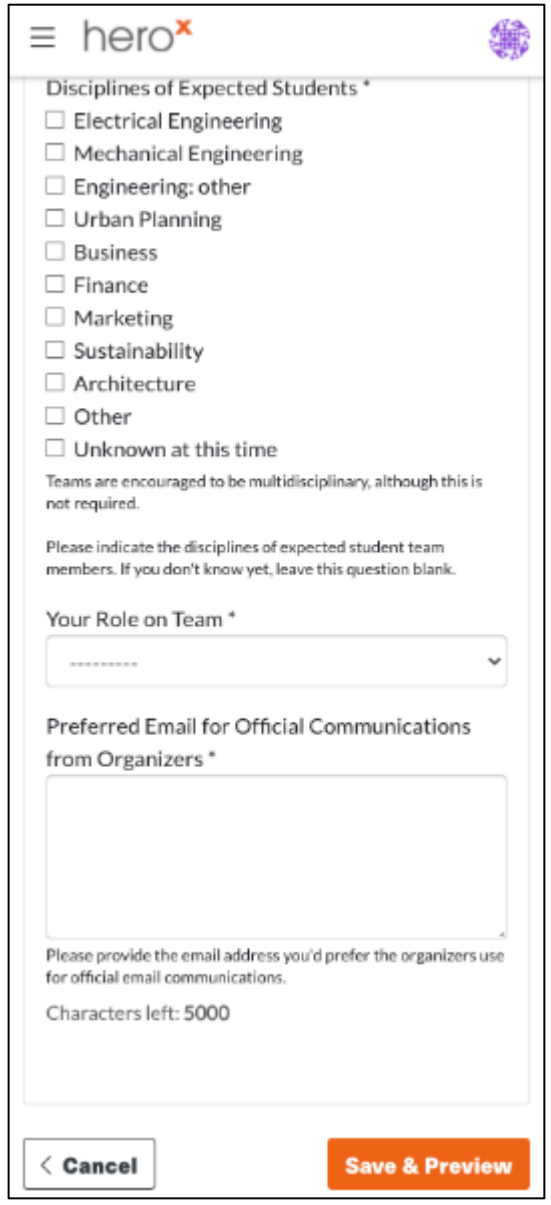
8. Only one person per team may submit a registration entry. Other members can join that registered team via HeroX. Team members may be added or removed from a team at any time. Once you have registered a team, you can invite additional members using HeroX.

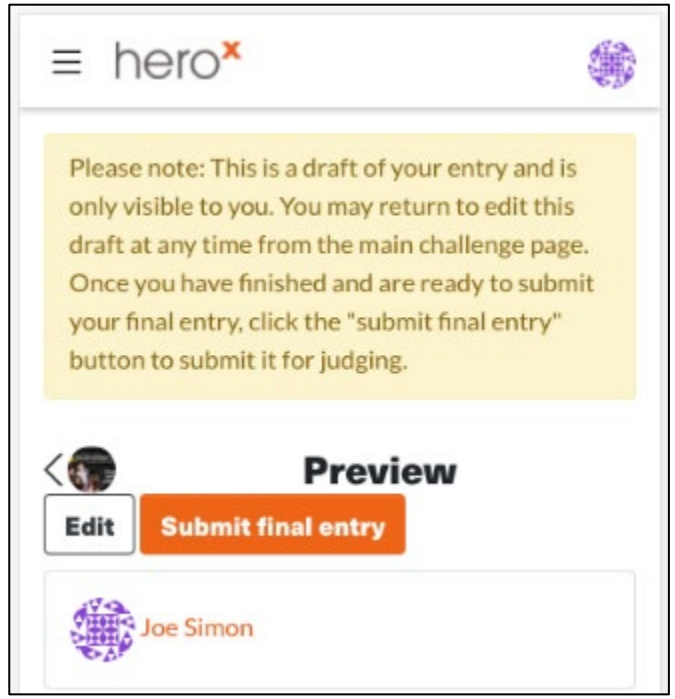


How to Register a Team: Prompts in HeroX









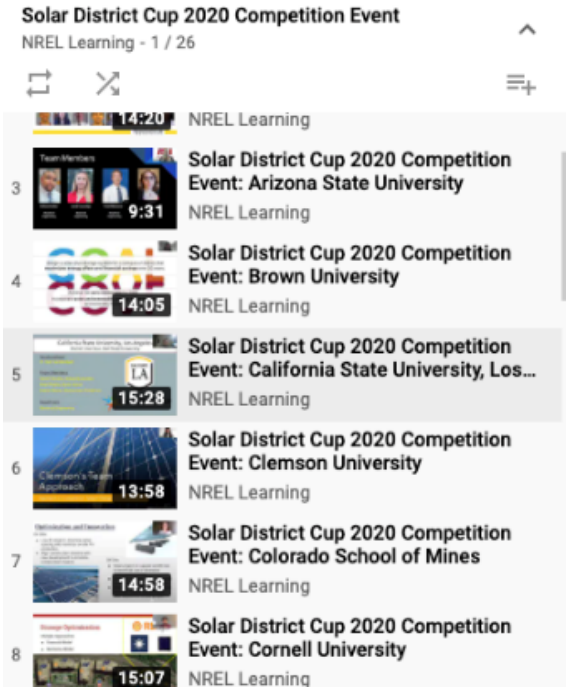
What's Next?

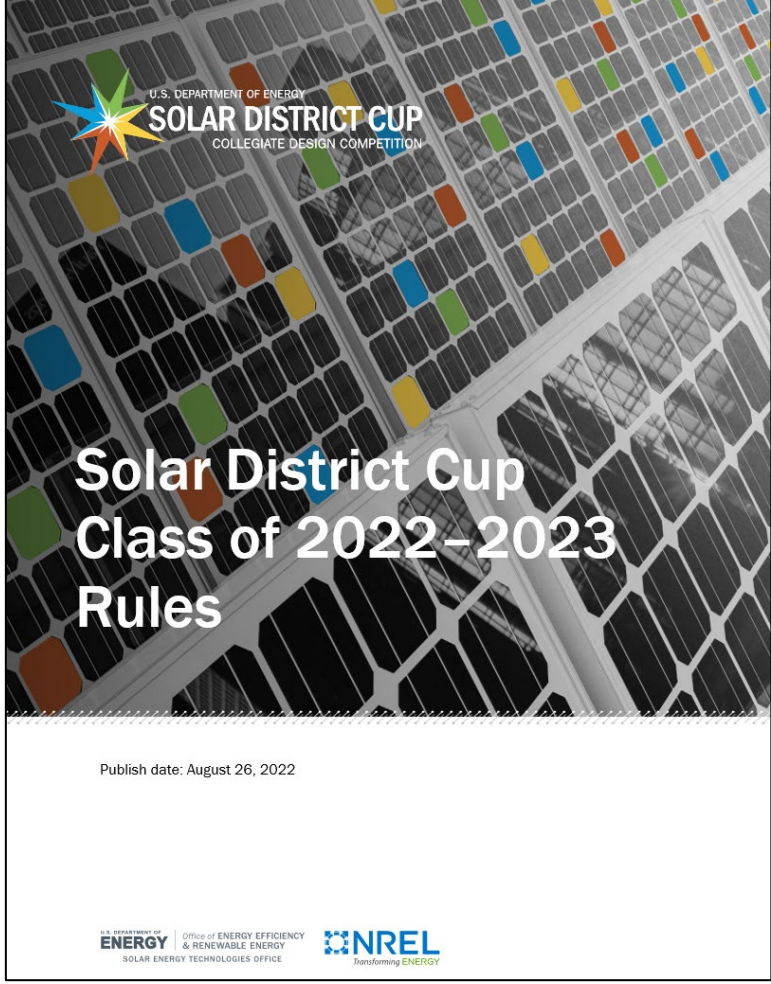
When to Engage: Summary Timeline 2021-2022

- August 25 — Informational Webinar
- August 26 — Rules Published
- Now – October 6 — Registration for teams staring in Fall semester/quarter
- November 17 — Progress Deliverable Package Due
- January 26 — Deadline for new winter/spring teams to register
- January 31 — Finalist Teams Announced
- April 20 — Final Deliverable Package Due
- April 30 — Final Competition Event (virtual)
- May 1 — Pitch Championship Presentations to Industry

What To Do After Registration

- Read the Rules published on HeroX Solar District Cup Guidelines
- Watch recordings of the 15-minute project presentations of the Class of 2021–2022 competing teams, available on NREL's Learning Channel in this YouTube Playlist
- Begin learning
  - Curriculum support
  - Available starting Aug. 26, 2022
- Build a team
  - Recruit multi-disciplinary team members
  - Identify faculty advisor
  - Find mentors.





What You'll Submit November

If competing for a full academic year:
Progress Deliverable Package of Solar System Designs

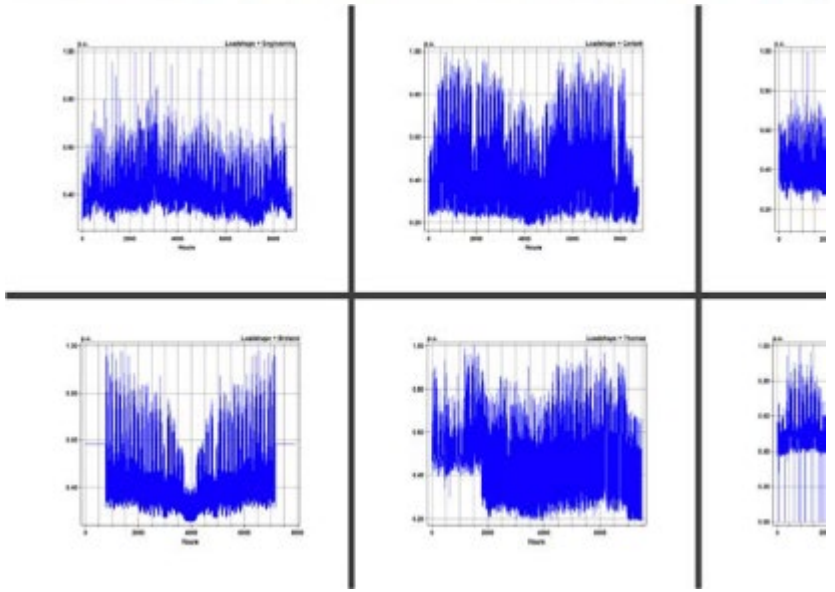
- Executive project summary
- Conceptual system design
- Financial analysis
- Development plan.

If bringing your own district, also

- District Use Case profile

Due 5 p.m. ET on Thursday, November 17, 2022







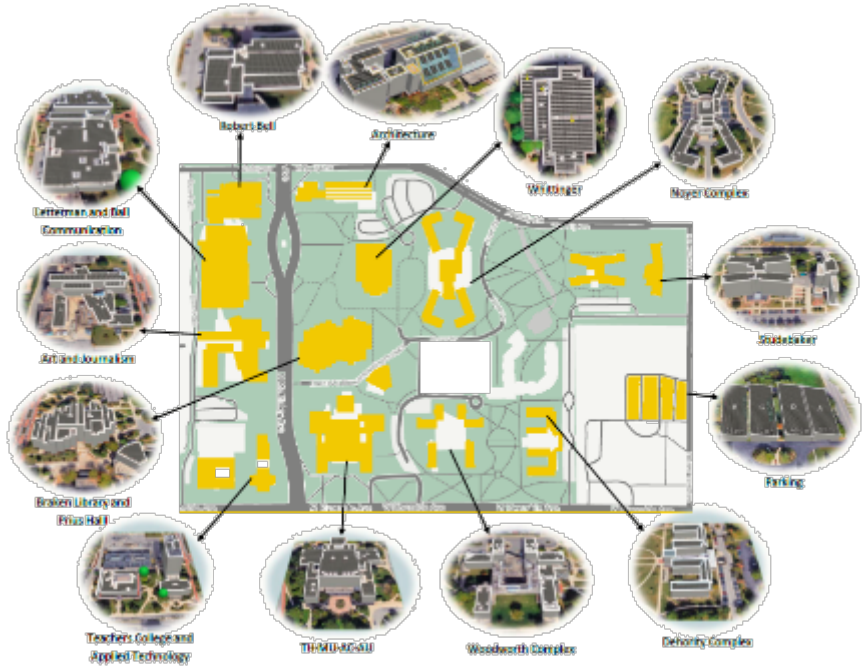
What You'll Submit in April

All teams:

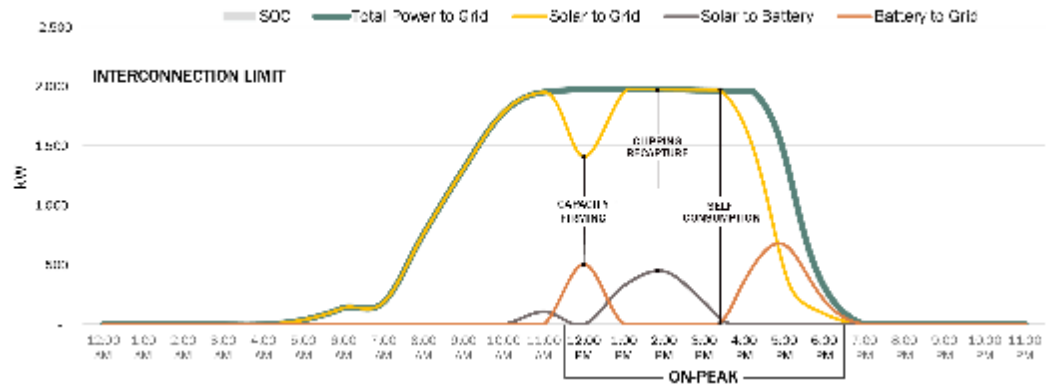
Final Deliverable Package of Solar-plus-battery energy storage systems

- Project proposal
- Conceptual system design
- Financial analysis
- Development plan.

Project proposal–pitch presentations







Final Competition: April 30 – May 1, 2023

- Present to division judges on Sunday, April 30
- Winners announced on Monday, May 1.

SOLAR DISTRICT CUP 2020 SCHEDULE

PDT	MDT	CDT	EDT	Sunday, April 26		
8:00 a.m.	9:00 a.m.	10:00 a.m.	11:00 a.m.	Teams Login and Check-In with Division Coordinator		
9:00 a.m.	10:00 a.m.	11:00 a.m.	12:00 p.m.	Welcome, Logistics Overview, and Judge Introductions for each division		
			DIVISION	**Crystal Parks**	**New Mexico State University**	**Ball State University**
9:30 a.m.	10:30 a.m.	11:30 a.m.	12:30 p.m.	Illinois Institute of Technology	Indiana University–Purdue University Indianapolis	Western Washington University
10:00 a.m.	11:00 a.m.	12:00 p.m.	1:00 p.m.	Hanover College	Northern Arizona University	New Mexico State University
10:30 a.m.	11:30 a.m.	12:30 p.m.	1:30 p.m.	Appalachian State University	Clemson University	Arizona State University
11:00 a.m.	12:00 p.m.	1:00 p.m.	2:00 p.m.	**BREAK (30 minutes)**		
11:30 a.m.	12:30 p.m.	1:30 p.m.	2:30 p.m.	The University of Virginia	University of Cincinnati	California State University, Los Angeles
12:00 p.m.	1:00 p.m.	2:00 p.m.	3:00 p.m.	Colorado School of Mines	University of Colorado Boulder	The Ohio State University
12:30 p.m.	1:30 p.m.	2:30 p.m.	3:30 p.m.	Dartmouth College	Marquette University	Georgia Institute of Technology
1:00 p.m.	2:00 p.m.	3:00 p.m.	4:00 p.m.	**BREAK (30 minutes)**		
1:30 p.m.	2:30 p.m.	3:30 p.m.	4:30 p.m.	Cornell University	Embry-Riddle Aeronautical University	Florida International University
2:00 p.m.	3:00 p.m.	4:00 p.m.	5:00 p.m.	Alfred University	Brown University	Creighton University
2:30 p.m.	3:30 p.m.	4:30 p.m.	5:30 p.m.		West Virginia University	University at Buffalo, The State University of New York



"My favorite moment was being able to watch other teams present. Seeing what other teams came up with and the creativity that this project inspired was truly amazing." –Class of 2020 Student

Why Compete? No Risk, High Reward!

NO COST
to enter

TRAVEL
is not required



TRAINING
is provided

CONNECTIONS
to industry

Next Steps: Recap

Go to:
www.herox.com/solardistrictcup
and choose "Follow" now!



RECRUIT

Team members, faculty advisor, and mentors



REGISTER

Your team on HeroX by October 6



READ

The Rules to plan your participation

LEARN

Using the resources provided by the Organizers



DESIGN

Your solutions!

Share the recording of this webinar with prospective team members. Recording link posted on HeroX on Aug. 26.

Thank You to Our Partners!









Closing Q&A

Thank you for attending

Tag & follow on social:

#SolarDistrictCup

Learn more, sign up for our newsletter, and register a team at:

www.herox.com/solardistrictcup

solardistrictcup@nrel.gov

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY
SOLAR ENERGY TECHNOLOGIES OFFICE

NREL Transforming ENERGY