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

Class of 2022–2023 Informational Webinar



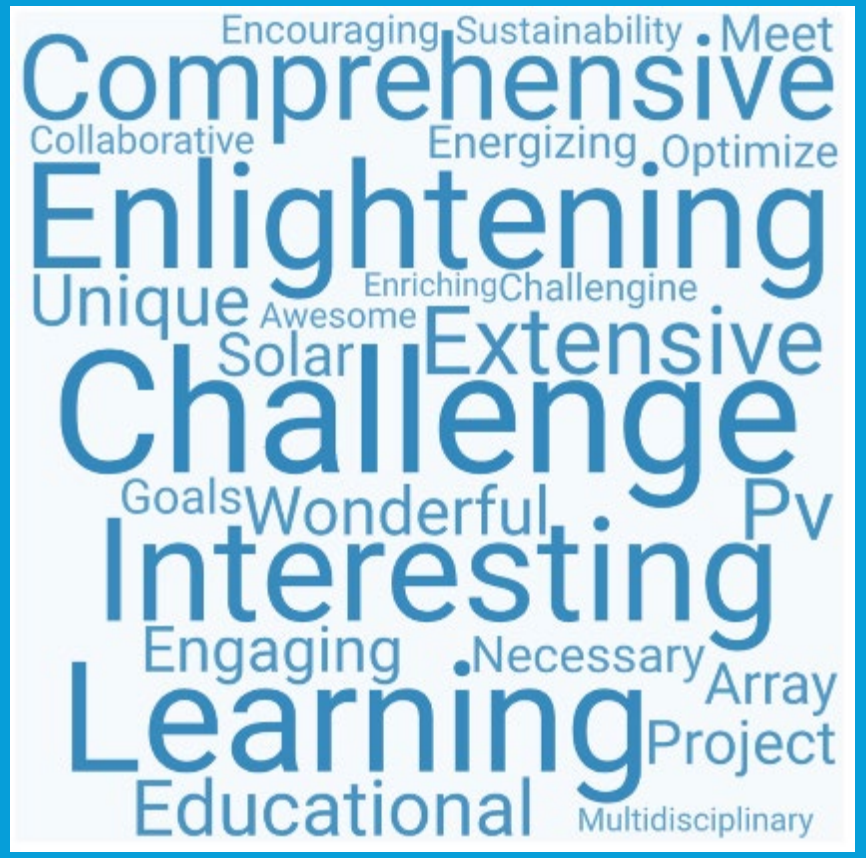
January – May 1, 2023

Jan. 13, 2023

Sara Fall, Sara Farrar, Erik Ness, Jackie Petre, Joe Simon, Robin Tuttle
National Renewable Energy Laboratory

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



Webinar Will Begin Shortly

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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.”
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   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

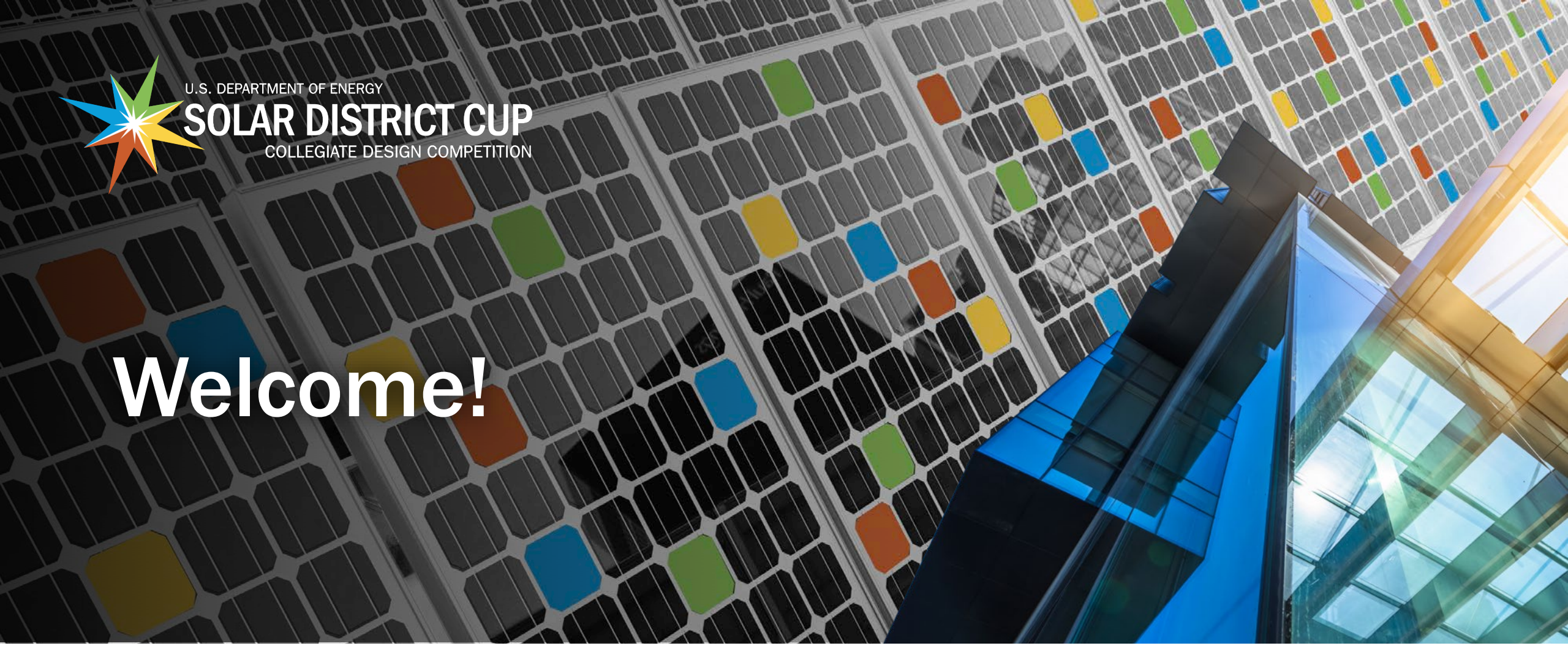
- Cultivating cross-cutting skills to prepare the next generation for the distributed energy workforce
- Multiple divisions, each with a partner district use case of existing building energy data
- One- or two-semester project culminating in a spring 2023 competition event.



How to Stay in the Know



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



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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

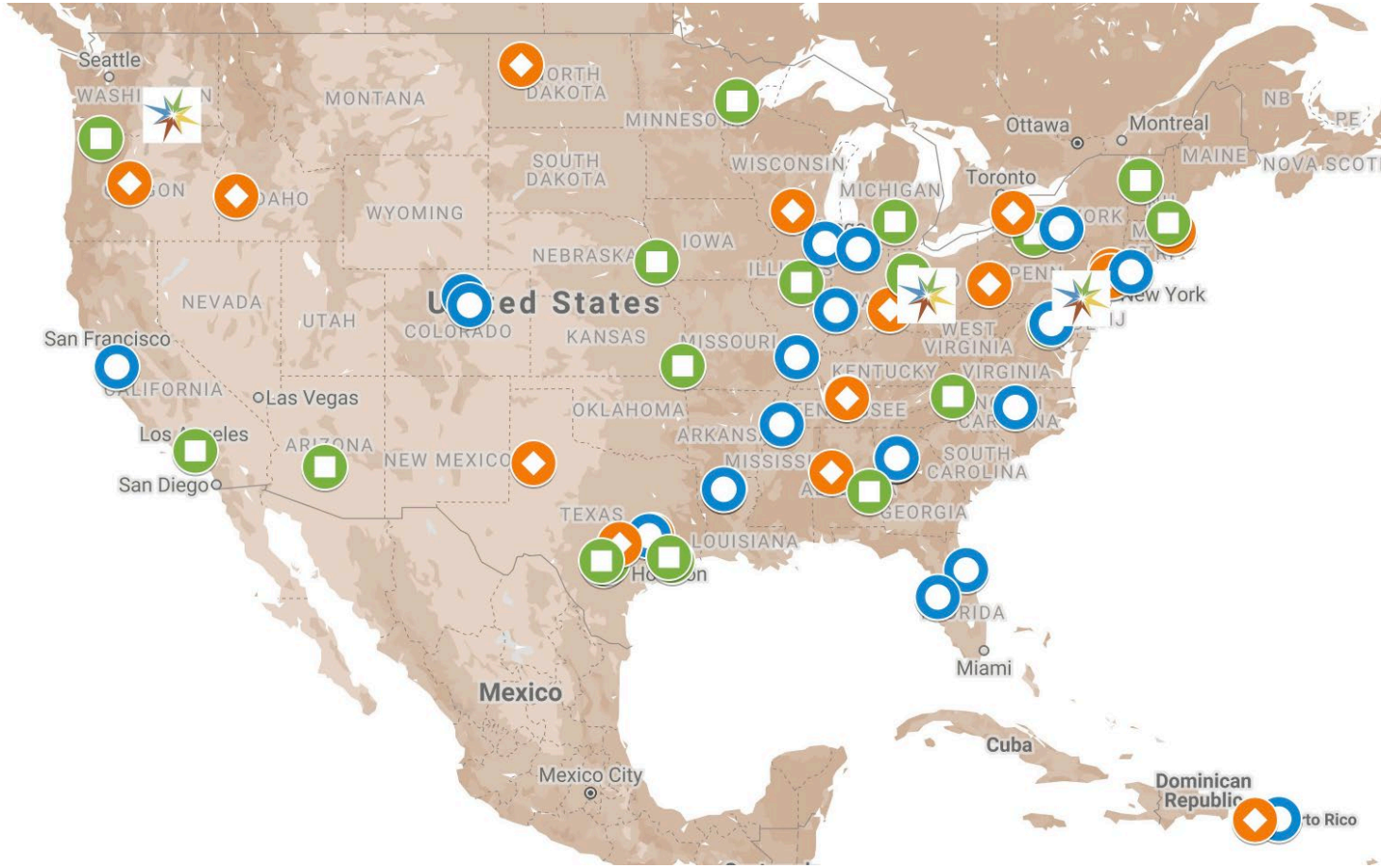


WHY
this competition

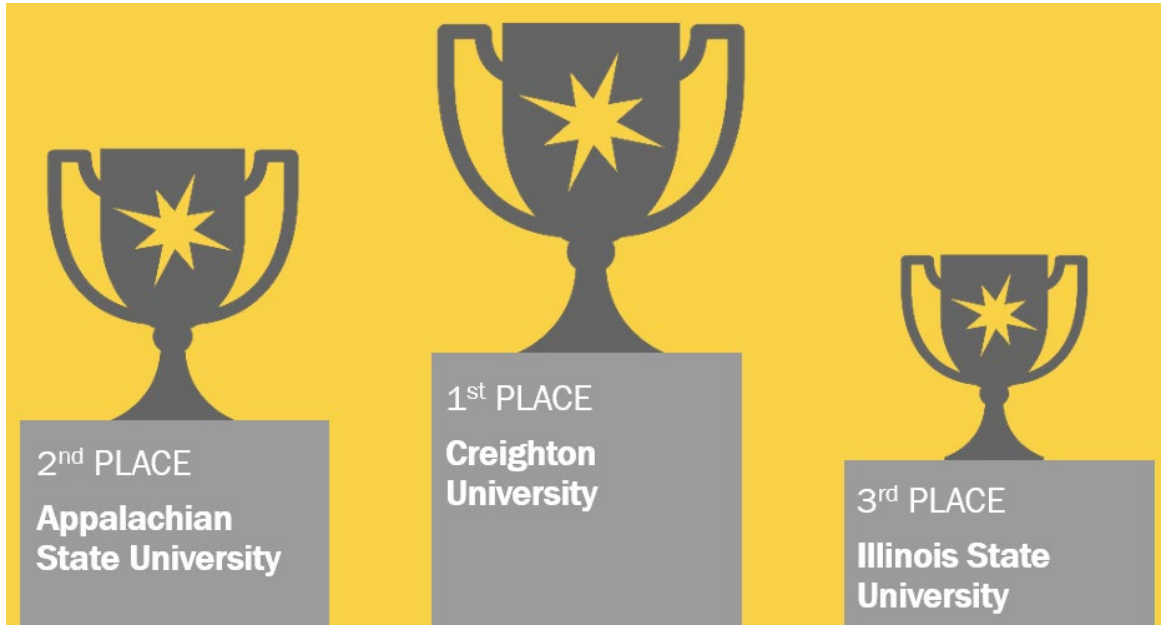
HOW
and what you win

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





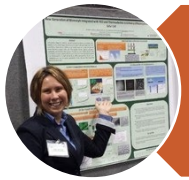


Honorable Mentions

- 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

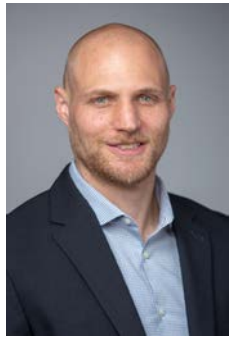
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Joe Simon
Co-P.I., Program Design



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

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Patrick Gibbs
Jury Coordinator Assistant



Cameron Weiner
Jury Coordinator Assistant



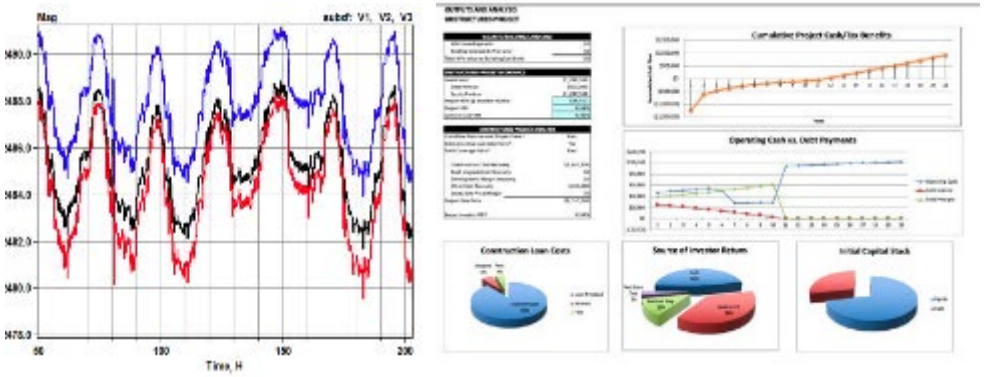
Hannah Pauling
Jury Coordinator Assistant

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

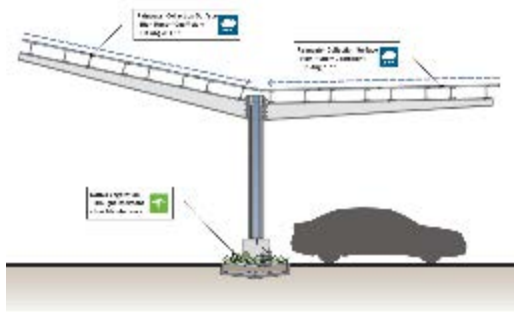


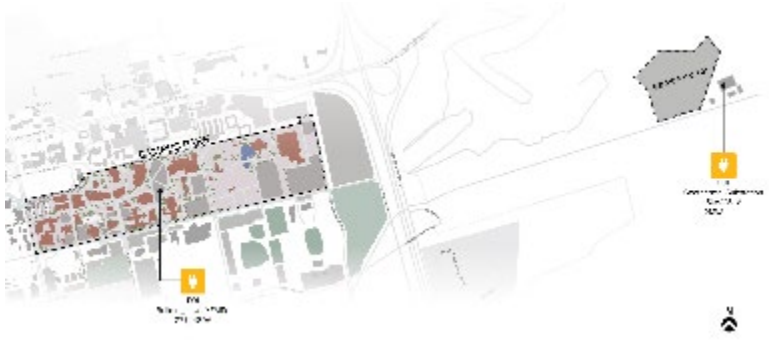




Why We're Conducting the Competition

- 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

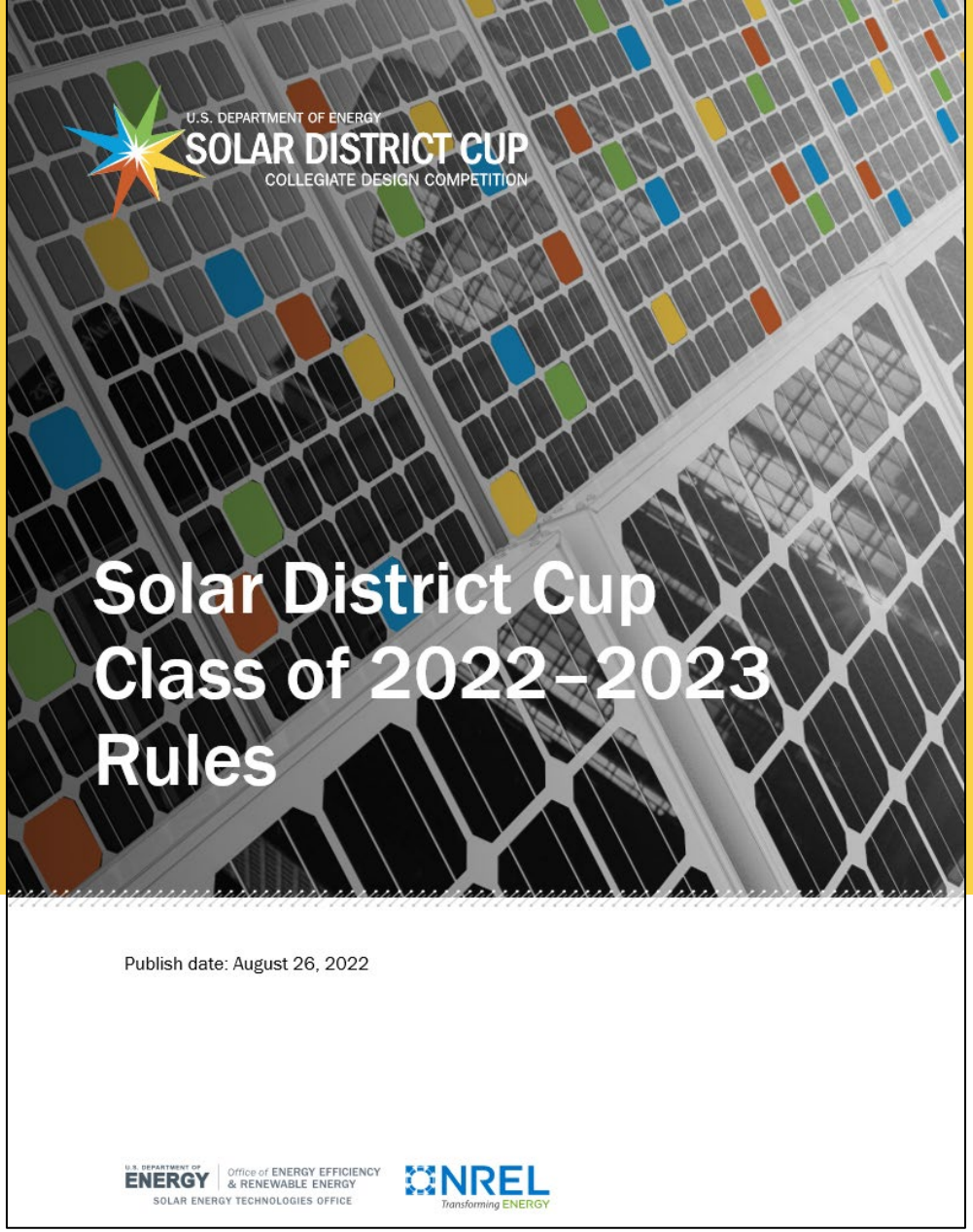
- Real data and use case for students
- Curriculum support and modeling tools
- Team-based design and analysis project
- Connections to industry.

"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

Rules on HeroX in the “Resources” tab

https://www.herox.com/SolarDistrictCup/resources



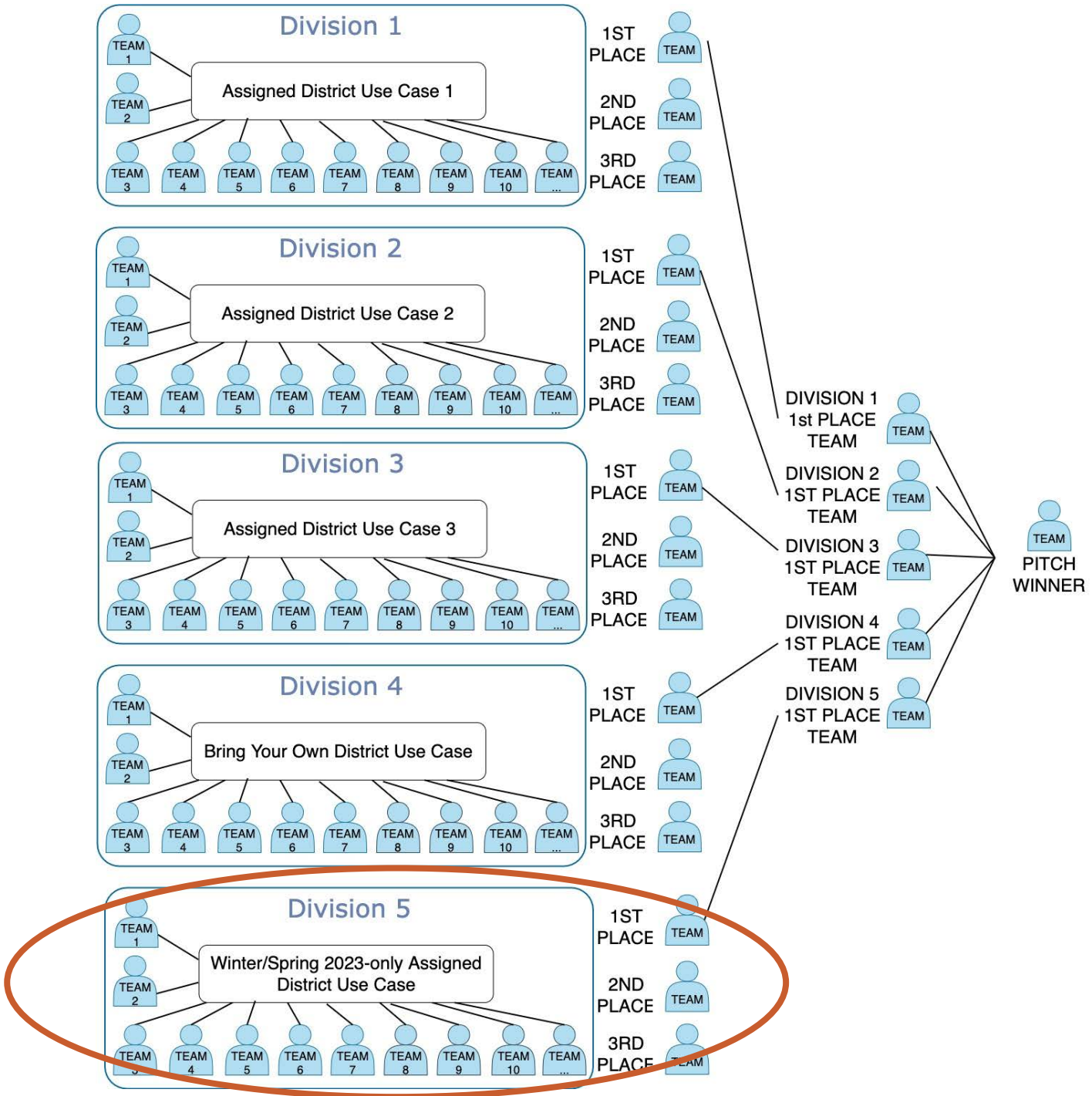
How to Compete:

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.









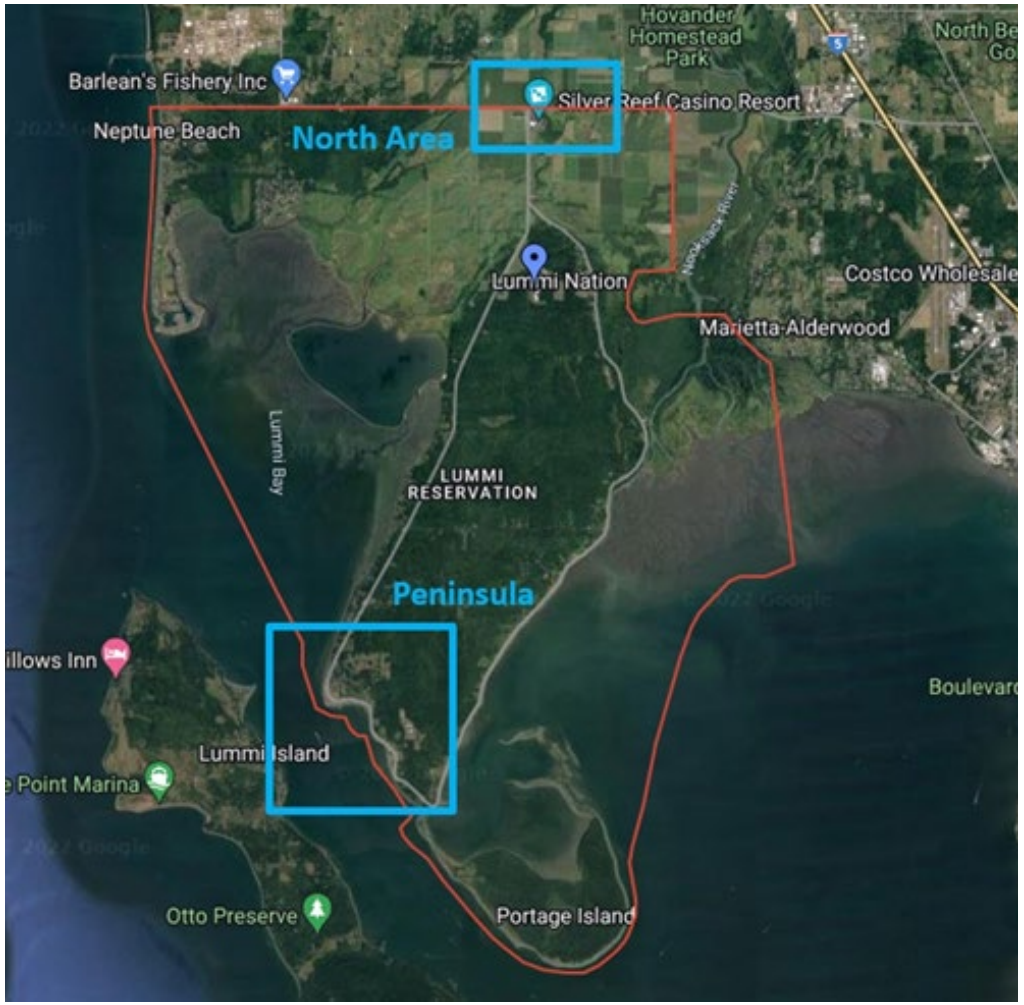
Class of 2022–2023 Types of District Use Cases

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”

Lummi Tribal Nation

Community solar and future electric ferry with climate and resiliency goals

- Lummi Reservation is 20,000 acres near Bellingham, Washington, with 5,500 tribal members.
- Facilities include school, market, housing district, emergency shelters, retirement home, a sewage treatment plant and electrification of the existing ferry service.
- Challenge area is primarily on the southern end of peninsula but also includes the tribal casino to the north.



The Lummi Nation's Goals & Constraints



Goals

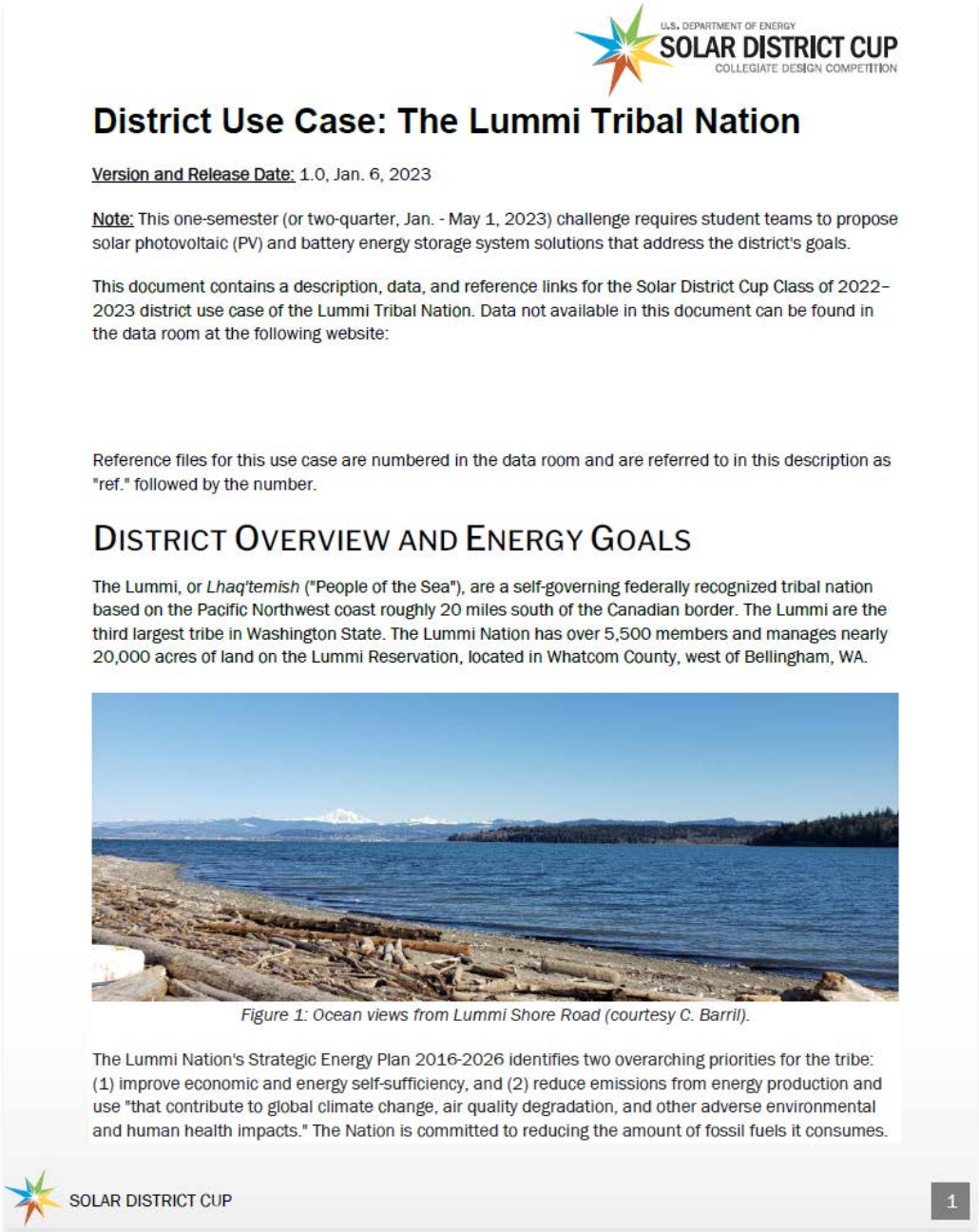
- Improve economic and energy self-sufficiency.
- Reduce emissions from energy production and use "that contribute to global climate change, air quality degradation, and other adverse environmental and human health impacts."
- Reduce fossil fuel consumption.

Constraint

- Cultural sensitivities restrict developable areas. See the use case profile document for details.

Use Case Profile

- For organizer-assigned divisions: use case available in a secure online data room
- 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: The Lummi Tribal Nation

Version and Release Date: 1.0, Jan. 6, 2023

Note: This one-semester (or two-quarter, Jan. - May 1, 2023) challenge requires student teams to propose solar photovoltaic (PV) and battery energy storage system solutions that address the district's goals.

This document contains a description, data, and reference links for the Solar District Cup Class of 2022–2023 district use case of the Lummi Tribal Nation. Data not available in this document can be found in the data room at the following website:

Reference files for this use case are numbered in the data room and are referred to in this description as "ref." followed by the number.

District Overview and Energy Goals

The Lummi, or *Lhaq'temish* ("People of the Sea"), are a self-governing federally recognized tribal nation based on the Pacific Northwest coast roughly 20 miles south of the Canadian border. The Lummi are the third largest tribe in Washington State. The Lummi Nation has over 5,500 members and manages nearly 20,000 acres of land on the Lummi Reservation, located in Whatcom County, west of Bellingham, WA.

Figure 1: Ocean views from Lummi Shore Road (courtesy C. Barril).

The Lummi Nation's Strategic Energy Plan 2016-2026 identifies two overarching priorities for the tribe: (1) improve economic and energy self-sufficiency, and (2) reduce emissions from energy production and use "that contribute to global climate change, air quality degradation, and other adverse environmental and human health impacts." The Nation is committed to reducing the amount of fossil fuels it consumes.

SOLAR DISTRICT CUP 1

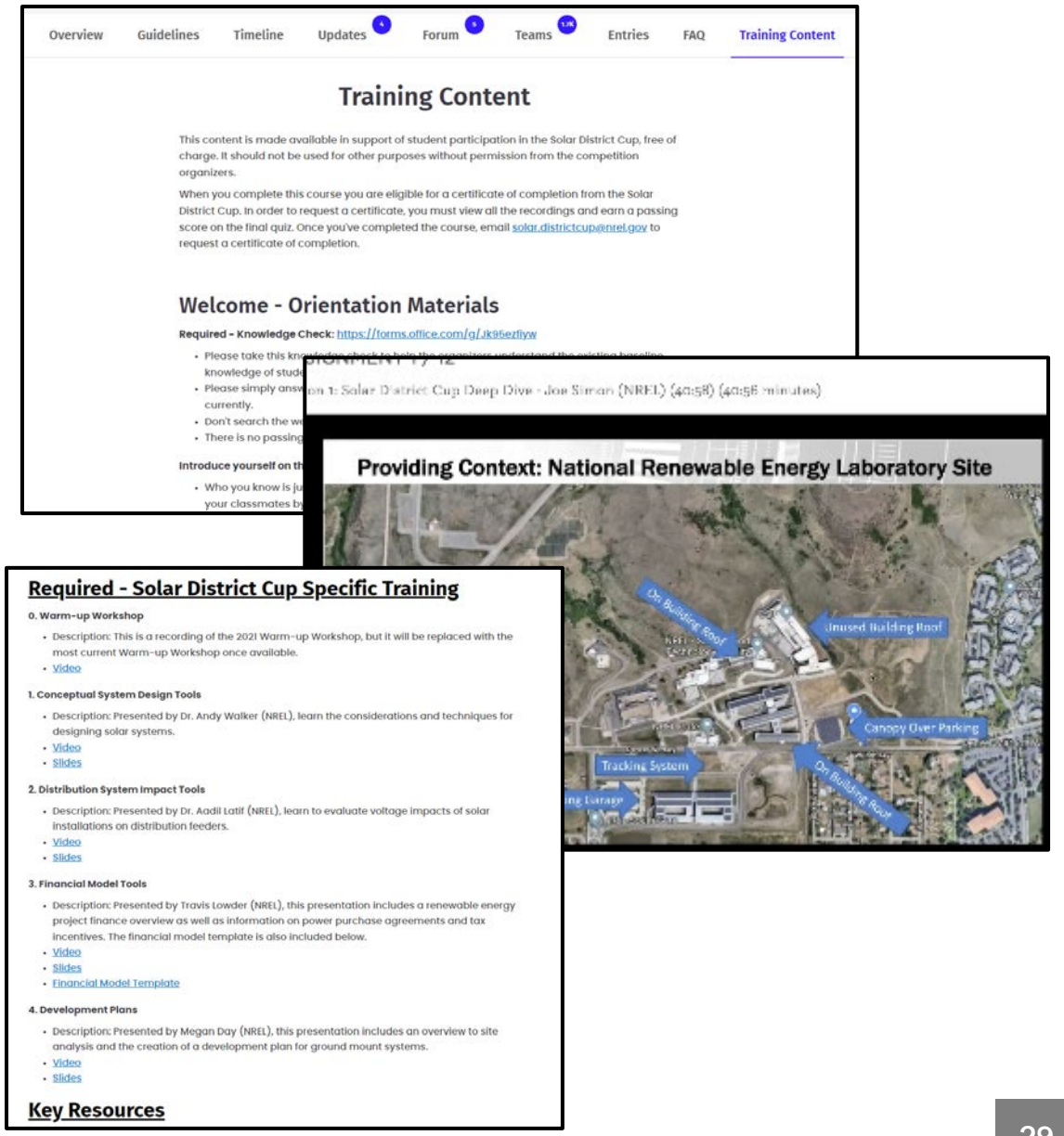
How to Compete:

Training Provided

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

Customized Training via HeroX

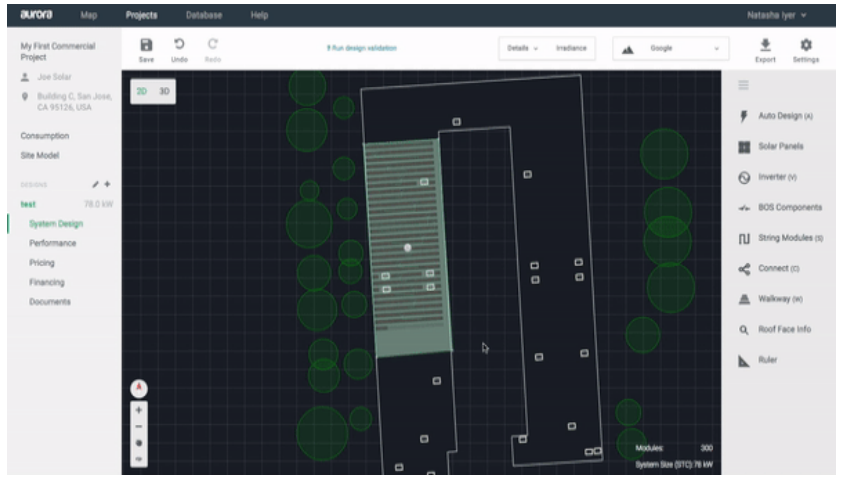
- Solar District Cup Specific Training Webinars
  - Introduction to Conceptual System Design
  - Distribution System Impact Summary
  - How To Create a Financial Model
  - Development Planning Tips & Tricks
  - Pre/Post Knowledge Checks
  - And more!
- Free Access to Training Content for Registered teams
- 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?

Tools and Resources



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

Event Name	Location	Date
RE+ Northeast	Boston, MA	Feb. 22-23, 2023
RE+ Northern California	Sacramento, CA	Mar. 28-29, 2023
RE+ Texas	Austin, TX	Apr. 5-6, 2023
RE+ Southeast	Atlanta, GA	May 17-18, 2023
RE+ Mid-Atlantic	Philadelphia, PA	Jul. 26-27, 2023
RE+	Las Vegas, NV	Sep. 11 -14, 2023

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

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.** Live video attendance and live presentation by at least one student team member from each finalist team is required (no prerecorded presentations).
- **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 or January deadline are deemed participating teams. All teams that successfully complete a registration entry and meet eligibility are accepted.

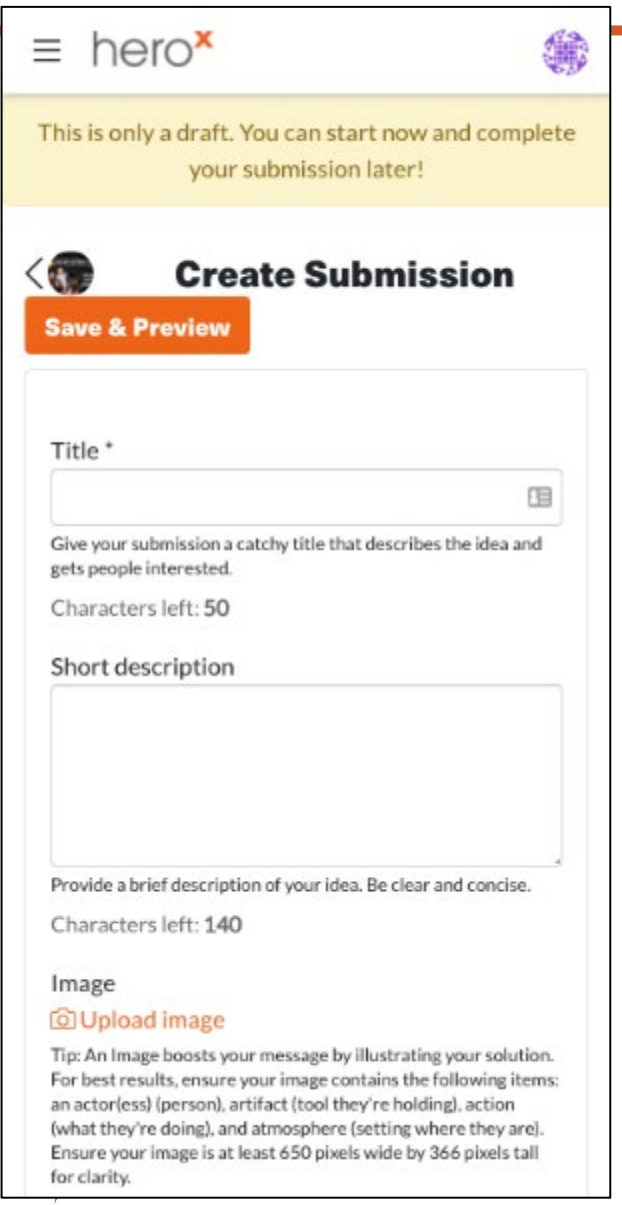
6. For teams requesting an assignment to an organizer-provided district use case, divisions are assigned by the competition organizers following the receipt of a complete registration entry.

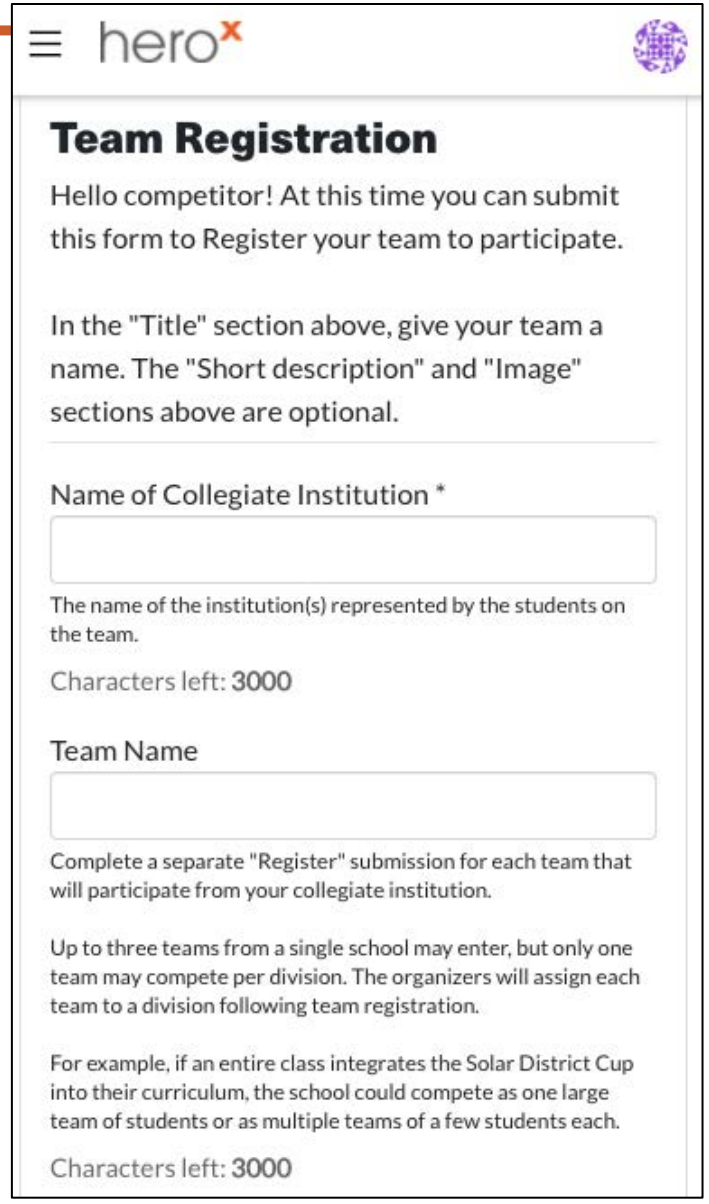
7. Multiple teams from a single school may submit a registration entry, but only one team may compete per division. Five divisions are expected.

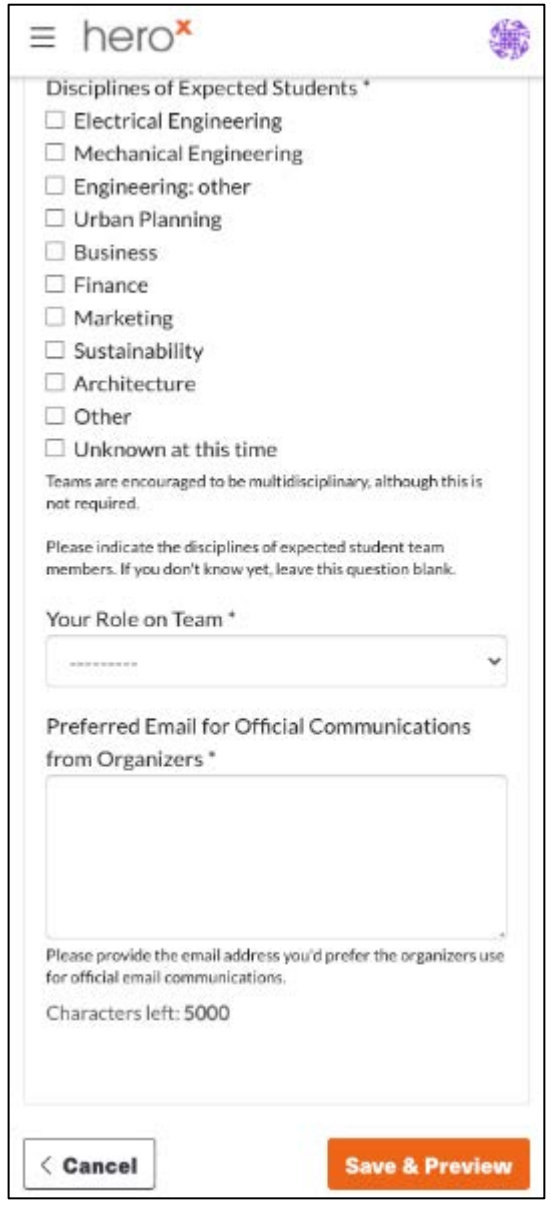
8. Only one person per team may submit a registration entry. Other members can join that registered team via HeroX. Team members may be added or removed from a team at any time. Once you have registered a team, you can invite additional members using HeroX.

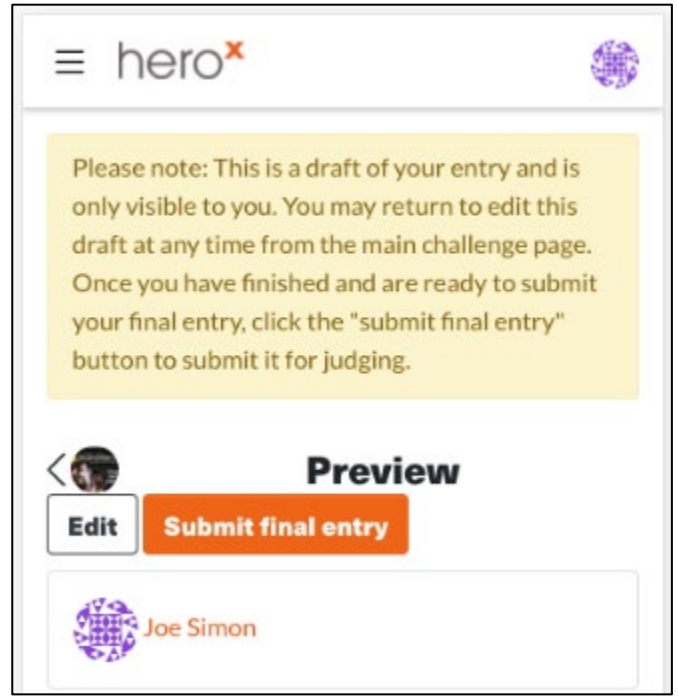


How to Register a Team: Prompts in HeroX





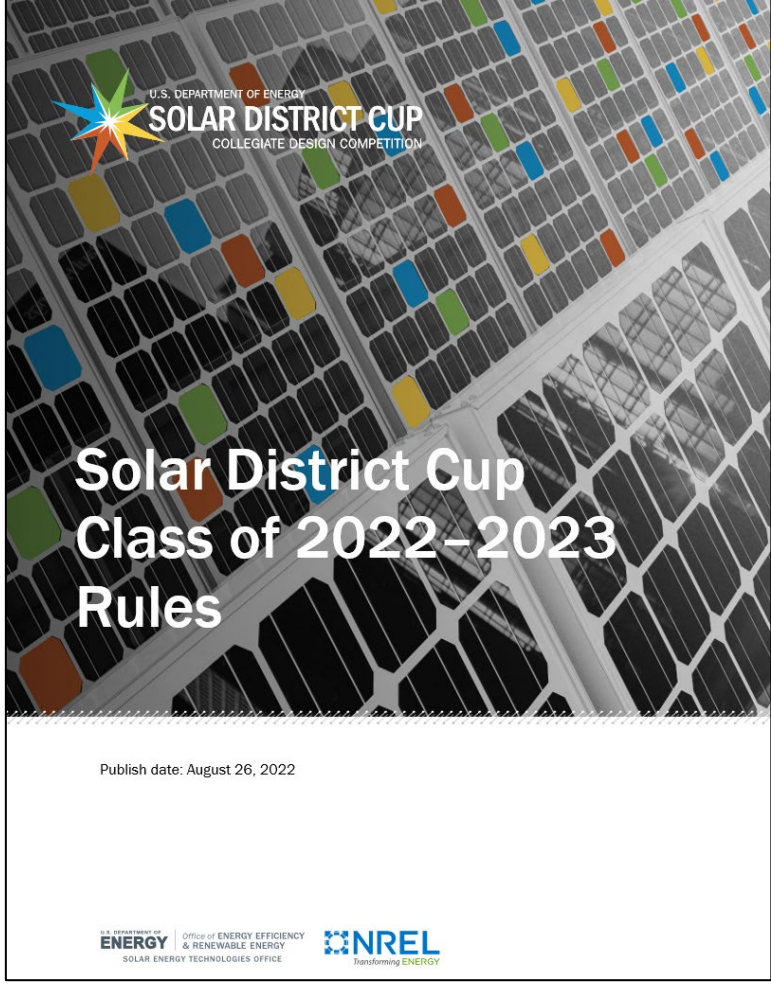




What's Next?

What To Do After Registration

- Read the Rules published on HeroX Solar District Cup
- 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
  - Study the district use case
  - HeroX Training and Webinar Content tabs for education support
- Build a team
  - Recruit multi-disciplinary team members
  - Identify faculty advisor
  - Find mentors.
- Start designing!



What You'll Submit in April

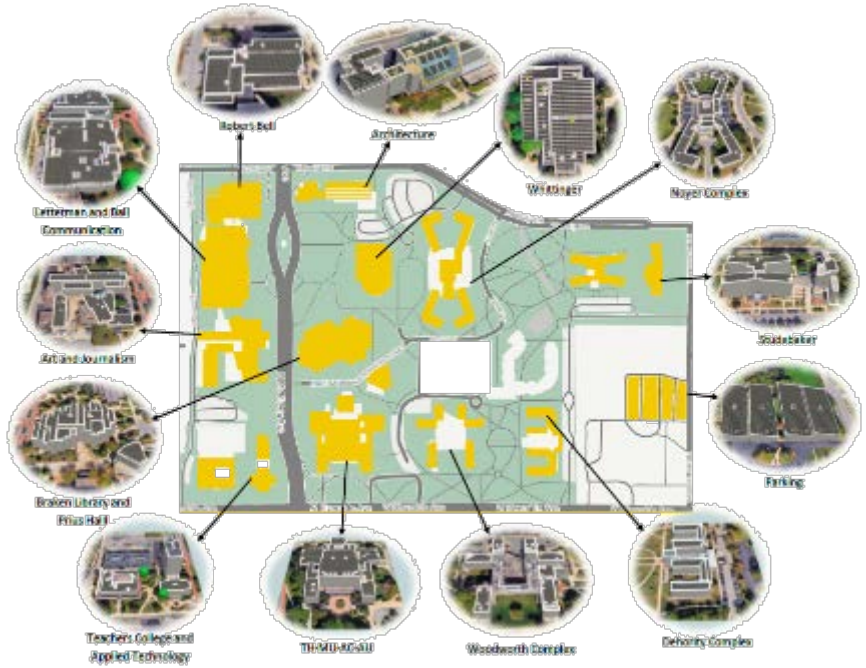
All teams:

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

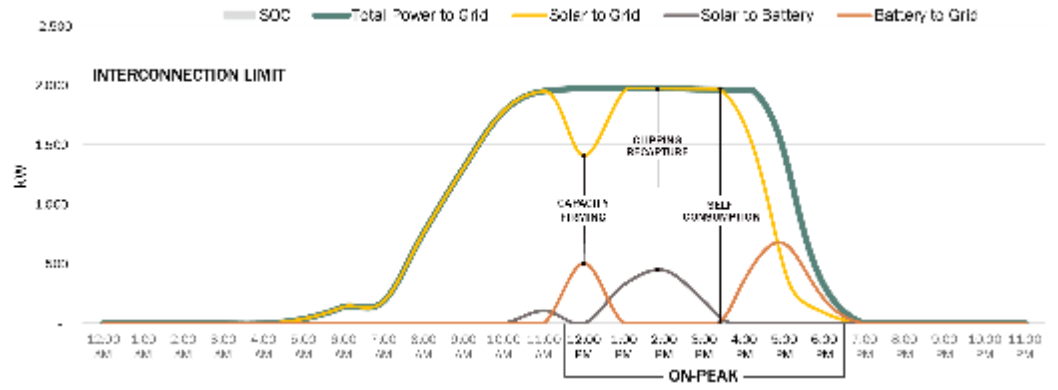
- Project proposal
- Conceptual system design
- Financial analysis
- Development plan.

Project proposal–pitch presentations

Due by 5 p.m. ET on Thursday, April 20, 2023







Final Competition: April 30 – May 1, 2023

- Present to division judges on Sunday, April 30
- Winners announced and the Project Pitch Championship 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 January 26



READ

The Rules and Use Case 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 by January 17.

Thank You to the Solar District Cup Partners!

















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

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

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