U.S. DEPARTMENT OF ENERGY

SOLAR DISTRICT CUP

COLLEGIATE DESIGN COMPETITION

The U.S. Department of Energy's Solar District Cup is a new collegiate-level competition challenging multidisciplinary student teams to design and model optimized distributed solar energy systems for a campus or urban district.

Our Partners

Collaboration is critical to the success of the Solar District Cup. We thank our partners who help make the 2020 competition possible.

Solar District Cup Partners:

- Aurora Solar
- HeatSpring LLC
- Solar Power Events
- Ball State University
- JBG SMITH
- New Mexico State University

Get Involved

We are always looking for:

- District use case partners
- Competition judges
- Mentors from industry
- Employers interested in hiring these dynamic student competitors
- Student team members and faculty advisors

Please email **solardistrictcup@nrel.gov** to start the conversation!

The Solar District Cup competition engages students from several academic disciplines to **reimagine** how energy is generated, managed, and used in real-world districts, **engage** with the professional marketplace, and **prepare** to lead the next generation of distributed solar energy.

Academic majors targeted for Solar District Cup recruitment include:

- Mechanical Engineering
- Electrical Engineering
- Urban Planning
- Business
- Finance
- Sustainability
- Renewable Energy

The competition supports the U.S. Department of Energy's ongoing work to help industry **address employment gaps through comprehensive workforce development activities** that simultaneously provide innovative solutions for partner districts' consideration and district-level ideas that inspire industry members.

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SOLAR ENERGY TECHNOLOGIES OFFICE

NREL Transforming ENERGY

Figure 1: Student competitors listen to a presentation by Solar District Cup Organizers at Solar Power International 2019.

Class of '20

MAKE THE IMPOSSIBLE

MAR 27 2019	SEPT 12 2019	SEPT 19 2019	SEPT 23 2019	NOV 23 2019	DEC 12 2019	APR 7 2020	APR 19 2020	APR 20 2020
Solar District Cup launched	Team registration closed	61 teams from 52 collegiate institutions announced as participants	Solar District Cup Warmup Workshop at Solar Power International	Teams submitted Progress Deliverable Package	35 teams from 32 collegiate institutions announced as finalists	Teams will submit Final Deliverable Package	Finalists will present projects at Solar and Energy Storage Southeast	Winners will be announced

THE COMPETITION

Teams compete in one of three divisions, with each division structured around a district use case. Winners are selected from each division based on the quality of their solar-plus-storage energy system design.

The strongest designs provide the highest offset of annual energy and greatest financial savings. This is determined by a techno-economic analysis conducted by students and evaluated by judges. The goal is to design, model, and present the most reliable, resilient, and cost-effective system possible.

DISTRICT USE CASES

Ball State University

Crystal Parks

New Mexico State University

Figure 2: Images of the three district use cases.

STUDENT SUBMISSIONS

Students complete four areas of modeling and analysis over the course of the competition and on which they are judged by a panel of industry experts.

Conceptual System Design

A layout and specifications of the solar electric PV systems proposed within the district on one or more rooftops, parking lots, or ground areas.

Figure 3: Conceptual system design for a building in the Crystal Parks Division, submitted by a student team in their Progress Deliverable Package.

Figure 4: Conceptual system design for a building in the New Mexico State University (NMSU) Division submitted by a student team in their Progress Deliverable Package.

Distribution System Impact Analysis

A power flow model demonstrating all network elements satisfy loading and voltage constraints.

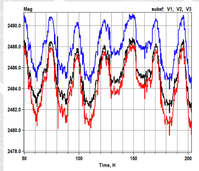

Figure 5: Graph of voltage magnitudes on the low voltage side of a substation serving NMSU from a student team's power flow model submitted in their Progress Deliverable Package.

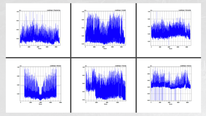

Figure 6: NMSU building load profiles with PV added from a student team's power flow model submitted in their Progress Deliverable Package.

Financial Analysis

A project financial model in Microsoft Excel that uses production data and other inputs to generate a PPA price for a 20-year term, as well as a customer savings model that demonstrates annual cash flows for the PPA offtaker.

Figure 7: A project financial model template provided by Solar District Cup partner HeatSpring.

Figure 8: A customer savings model provided by Solar District Cup partner HeatSpring.

Development Plan

A building and site plan for the conceptual system design–including local ordinances–as well as a construction plan to procure necessary permits and comply with local codes.

Figure 9: A zoning map of the Crystal Parks development in Crystal City, VA, provided by a student team in their Progress Deliverable Package.

Figure 10: A site plan from Ball State.

Judging

Student teams will compete against other teams within their division for first, second, or third place. A panel of three to five judges per division—comprising subject-matter experts and representatives from the partner district use cases selected by the competition organizers—will score finalist submissions. The first-place winners of each division compete against each other to determine an industry choice winner.

Judging and winner announcement will take place at the Solar and Energy Storage Southeast conference in Atlanta, GA, on April 19-20, 2020.

THANK YOU to IDEA for their continued support of the Solar District Cup.

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