



# Solar Prize Round 5 Software Track: Abbreviated Final Technical Report

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*National Renewable Energy Laboratory*

**NREL is a national laboratory of the U.S. Department of Energy  
Office of Energy Efficiency & Renewable Energy  
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**Technical Report**  
NREL/TP-6A50-90307  
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**Final Technical Report (FTR)**  
**Cover Page**

<b>a. Federal Agency</b>	Department of Energy	
<b>b. Award Number</b>	Solar Prize	
<b>c. Project Title</b>	Solar Prize Round 5 Software Track	
<b>d. Recipient Organization</b>	National Renewable Energy Laboratory	
<b>e. Project Period</b>	<i>Start:</i> 6/15/2021	<i>End:</i> 3/31/2024
<b>f. Principal Investigator (PI)</b>	Debbie Brodt-Giles Program Manager Debbie.brodt.giles@nrel.gov 303-988-7842	
<b>g. Business Contact (BC)</b>	Rebecca Bennett Prize Lead Rebecca.bennett@nrel.gov	
<b>h. Certifying Official (if different from the PI or BC)</b>	Name Title Email address Phone number	

\_\_\_\_\_  
**Signature of Certifying Official**

\_\_\_\_\_  
**Date**

1. **Acknowledgement:** This material is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under the **Solar Prize Program**.
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3. **Project Summary:** Solar Prize Round 5 launched two simultaneous tracks, the Hardware Track and the Software Track, to introduce software innovations into the Solar Prize for the first time. The primary goal of the prize is to accelerate the development, validation, and commercialization of innovative solar software solutions that will increase the competitiveness of the U.S. solar industry. This is accomplished with three escalating challenges, called the Ready!, Set!, and Go! Contests, where teams work to develop their concept from idea to potentially marketable product in less than one year. Competitors also have the option to compete in a Justice, Equity, Diversity, and Inclusion (JEDI) Contest, which recognizes solutions that enable underserved communities in the United States to overcome systemic solar barriers and share equitably in the societal benefits of solar deployment. The Prize concluded by awarding 2 final winners the Go! Contest prize and a 3<sup>rd</sup> winner to the JEDI Contest prize in the Software Track, after competing in the prize for a year and demonstrating their success through each phase.
4. **Project Objectives and Outcomes:** The project goal was to successfully launch and manage the American-Made Solar Prize Round 5 Software Track, including the following milestones:
  - Launch Solar Prize Software Track
  - Recruit Competitors, Close Ready Contest, Announce Ready Winners
  - Contract with a Power Connector to provide support for the Set! and Go! Contests
  - Develop Plan/Strategy for Solar Prize Round 6
  - Facilitate Set and Go Contests

#### About the Solar Prize

The American-Made Solar Prize Round 5 Software Track launched on June 15, 2021 and was designed to spur innovations that address difficulties facing the solar energy sector. Spearheaded by SETO within the Office of Energy Efficiency and Renewable Energy (EERE) and in partnership with the National Renewable Energy Laboratory

(NREL), the Software Track was a series of progressive contests that aimed to incentivize the nation’s innovators and entrepreneurs to rapidly discover, develop, iterate, and deliver new solutions to market, with the goal of creating new, widely used software to accelerate solar deployment growth in the United States.

In the Software Track, the Ready!, Set!, and Go! Contests were designed to fast-track efforts to identify, develop, and test disruptive solutions to meet solar industry needs. During each contest, participants worked to rapidly advance their software solutions—and also opted in to compete in the JEDI Contest, the first time the Contest was added to Solar Prize. DOE invited anyone, individually or as a team, to compete to transform a conceptual solution into an impactful product and business, with a specific focus on software solutions. An outline of the phases can be found in Appendix A of this report, and a full description of the prize phases can be found in the [Official Rules document](#).

**WHICH TRACK IS RIGHT FOR YOU?** AMERICAN MADE SOLAR PRIZE ROUND 5 U.S. DEPARTMENT OF ENERGY

Track	Focus	Cash Prizes	Support Vouchers	Contests	Ready!	Set!	Go!
Hardware Track	Focus on solar hardware components	\$3 million	\$900,000	3 Sequential Contests	20 teams \$50,000 each	10 teams \$100,000 each	2 teams \$500,000 each
Software Track	Focus on solar software technologies	\$1.6 million	\$100,000	3 Sequential Contests	20 teams \$30,000 each	10 teams \$60,000 each	2 teams \$200,000 each

American-Made Network

### Support During the Prize

Prizes and prize competitors are heavily supported by the American-Made Network, comprised of over 400 organizations that can connect prize participants with the people, resources, financing, perspectives, and relevant industry expertise needed to successfully bring their software concepts to market.

A subset of the American-Made Network are called Power Connectors. Power Connectors operate under a contract for specific tasks to support the prize. For Solar Prize, Power Connectors were used to help with the recruitment of applicants during the Ready! Contest, support the JEDI Contest, and help competitors in the Set! and Go! Contests with customer discovery, pitch prep, and business plan development.

### The Ready! Contest

We utilized a suite of Power Connectors for these services. Clean Energy Business Network, ADL Ventures, University Center for Innovation, and Newlab all conducted recruitment activities. 56% of submissions to the Software track had interacted with a Power Connector during the Ready! Contest.

New Energy Nexus and Halvatzis and Co. were specifically contracted to promote the JEDI Contest and help teams to integrate JEDI goals into their entire business strategy, from partnerships, to supply chain, to hiring, and more. Additionally, we convened a JEDI Committee, comprised of eight individuals to help us tailor our message and reach new, diverse, and under-represented audiences. As a result of the JEDI-specific outreach, 95% of competitors in the Ready! Contest applied to the JEDI contest.

NREL supported DOE's selection of 20 teams from more than 60 submission by organizing a panel of industry experts and a panel of NREL researchers to read, score, and comment on the submissions. On December 7, 2021, DOE announced 20 semifinalists to each win \$30,000 and continue in the Solar Prize Round 5 Software Track Set! Contest. Eight software track semifinalists were selected for the JEDI Contest and each received an additional \$12,500. A full list of winning teams can be found in Appendix B of this report.

### The Set! Contest

During the Set! Contest, two Power Connectors, the University of Arizona Center for Innovation and New Energy Nexus were contracted to provide support to teams. New Energy Nexus also provided teams with targeted JEDI strategy support. The Power Connectors begin their support by conducting a needs assessment with each team. Across the Software Track teams, customer discovery and business development support were identified as the most pressing needs.

The culminating event of Set! Contest is the Set Demo Day, which was a virtual all-day event for reviewers and DOE. During the event, each team attends a 10 minute Question and Answer sessions where the reviewers ask them the questions, covering everything from the technical aspect to the business plan. Following the Q&A sessions, the panel of reviewers deliberate with DOE, and DOE makes the final selection decision. Teams that win the Set! Contest receive \$60,000.

On April 22, 2022, 10 finalists were announced at a live, virtual event. Each team received a \$60,000 cash prize and advanced to the final stage of the competition. The three winners of the JEDI Contest received an additional \$33,333. The finalist teams are noted in Appendix B of this report.

### The Go! Contest

UACI and New Energy Nexus continued to provide support to the finalist teams during the third and final phase of the prize, the Go! Contest. The conclusion of the Go! Contest was composed of two parts – 1) A virtual Demo Day, similar to the Set! Contest format, and 2) Optional participation in an in-person event at the RE+ Conference in Anaheim, California.

RE+ is a leading renewable energy focused conference, with an emphasis on solar. In 2022, the RE+ exhibit hall hosted more than 25,000 visitors. Finalists were given the opportunity to have a booth on the conference's Expo Hall floor and deliver a live pitch on a stage in the Expo Hall. Solar Prize alumni continuously express how valuable the potential partner and customer connections that they are able to make at RE+ are for

the growth of their business. On September 20, 2022 immediately following the pitch event, DOE announced the grant prize winners. There were three winners in the Software Track: SolarGrade and illu each won a \$200,000 prize and a \$50,000 voucher to utilize at the National Labs, and Midday Tech won a \$100,000 JEDI Contest prize. All teams will use their winnings to further develop and deploy their innovations. SolarGrade went on to spend their voucher with Sandia National Laboratory and illu spent their \$50,000 at NREL working with researcher Andy Walker. Both vouchers had one year to complete their scope of work.

- 5. Path Forward:** Provide a description of future research needs based on the outcomes of the project, as well as any opportunities for technology transfer or commercialization if applicable. Please note any barriers that could prevent use of the project's outcomes.

### Impact Reporting

As the Solar Prize has entered its fifth round, we have begun to track teams' long-term performance after the Solar Prize. While we cannot correlate future success directly to participation in the Solar Prize, we do want to ensure teams we are supporting are continuing to bring their solutions to market. Round 5 was the first round where we collected baseline information at the beginning of the Set! Contest. This will better allow us to track progress over time; we intend to follow up with teams annually after the prize.

Additionally, during Round 5, we collected information on long-term progress from 38 previous Solar Prize competitors and presented long-term tracking information on past teams to DOE for the first time through the Impact Report Presentation.

### Future Prize Rounds

Round 5 of the Solar Prize intentionally divided the prize into two tracks – Software and Hardware. Prior rounds of the Solar Prize required a hardware component, so separating out the tracks indicated SETO's strong desire to attract and fund software solutions. After making this indication, the tracks were merged back together to a single track prize for Round 6 that invited both hardware and software solutions.

In Round 5, the JEDI Contest was only available to participants in the Software Track. In future rounds, it will be incorporated into the full prize and both hardware and software solutions will be eligible to compete. We recognize, however, that software solutions may inherently lend themselves to have more opportunity for JEDI incorporation.

- 6. Inventions, Patents, Publications, and Other Results:** List all publications/papers, scientific/technical software/data, websites, inventions/patents, or other products developed under this award. Also list all public releases of results, including any significant media reports/articles, awards received, or networks/collaborations fostered/formed as a result of this award. All project publications must be uploaded to OSTI. **OSTI IDs must be provided.**

<https://www.energy.gov/eere/solar/american-made-solar-prize-round-5-software-track>

<https://www.herox.com/solarprizeR5software/teams>



<https://www.herox.com/solarprizeR5software/update/5004>

<https://www.herox.com/solarprizeR5software/update/4651>

<https://www.herox.com/solarprizeR5software/update/4327>

**7. Project Team:** List all project participants and their individual roles.

- a. Debbie Brodt-Giles – Program Manager
- b. Sarah Gomach – Project Lead
- c. Rebecca Bennett – Project Lead
- d. Jackie Petre – Communications
- e. Jamie Hendricks – Project Controller
- f. Janine Keith – Lead technical Expert during review
- g. Subcontractors – New Energy Nexus, Halvatzis and Co., Clean Energy Business Network, ADL Ventures, University Center for Innovation, and Newlab
- h. Andy Walker – Voucher PI with illu Global.

## Appendix A - American-Made Solar Prize Round 5 Software Track – Contests and Phases

**Ready! Contest** – Competitors demonstrate that they have identified and taken action to develop a new, impactful software idea or solution that addresses a critical need for the solar industry. They also propose a path to develop a minimum viable product usable by early customers who can provide feedback for further development. Winners received \$30,000 in cash and were eligible to compete in the Set! Contest. Any eligible person, team, or business can submit a package to compete in the Ready! Contest, although individuals must form a business if they advance to the Set! Contest. A panel of expert reviewers from industry, national laboratories, and government evaluate submissions. DOE selects the winners (semifinalists) based on reviewer input and the impact the new software solutions may have on the solar industry.

**Set! Contest** – Semifinalists work to substantially advance their software solution toward a minimum viable product that proves critical solution functionality. They must show that their product will solve a key issue in the solar industry and be in demand when it reaches the market. Competitors are expected to make significant progress in evaluating the market opportunity, developing a customer pipeline, and validating the product's fit in the market. The semifinalists are evaluated by a panel of reviewers during a national demonstration (demo) day event where competitors present their software solutions. The selected finalists receive \$60,000 in cash and are eligible to compete in the Go! Contest.

**Go! Contest** – Finalists work to substantially advance their minimum viable product to a refined product, which represents a significant evolution from the Set! Contest minimum viable product, and secure credible customer(s) to validate the business model. Finalists are evaluated by a panel of reviewers during a national demo day event, and DOE selects two winners. Each winner receives \$200,000 in cash plus \$50,000 in vouchers redeemable at national laboratories to further develop their solution.

**JEDI Contest** - With the release of the Software Track, DOE launched the first Justice, Equity, Diversity, and Inclusion (JEDI) Contest to encourage Software Track competitors to consider and incorporate environmental justice principles into their innovations. The solar industry and its associated research community does not match the diversity of the United States and to achieve the administration's energy justice goals, SETO is working to support more equitable participation in the solar energy community. SETO recognizes the inherent advantages of diverse teams and encourages competitors to consider diversity and inclusion when developing their teams.

The JEDI Contest is focused on four key areas:

- **Opportunity Space:** Competitors rigorously assess the needs of underserved communities and uncover key insights from potential customers or end users of the product.

- **Solution Development:** Competitors design and develop a solution to overcome identified barriers.
  - **Market Impact:** Competitors measure progress and validate assumptions with potential customers, users, or market experts during development and testing to demonstrate the solution's impact and need in underserved communities.
  - **Network Activation:** Competitors advance the proposed solution by cultivating a diverse network of mentors and partners, which can include members of the American-Made Network, funders, and other relevant entities.

In the Ready!, Set!, and Go! Contests, competitors have the option to also compete in the JEDI Contest, which provides up to \$300,000 in additional cash prizes (up to \$100,000 for each contest) distributed among JEDI Contest winners. Up to 10 Ready! semifinalists, up to 5 Set! finalists, and up to 1 Go! competitor may win the JEDI Contest. The \$100,000 cash prize pool per contest is distributed among JEDI Contest winner(s), with the individual prizes capped at \$30,000 for the Ready! Contest and \$60,000 for the Set! Contest.

As in the Ready! Contest, anyone can compete in the JEDI Contest, but only Ready! semifinalists can win the JEDI Contest at the Ready! stage. In the Set! Contest, JEDI Contest winners are selected from the pool of Set! finalists. In the Go! Contest, the JEDI Contest winner is selected from the pool of Set! finalists competing in the Go! Contest, including the Go! Contest winner. Stated another way, a Set! finalist may win the JEDI Contest at the Go! stage even if they don't win the Go! Contest. If a Ready! semifinalist does not win the JEDI Contest at the Ready! stage, they are still eligible to submit a JEDI solution in the Set! Contest. The same applies for Set! finalists who did not also win the JEDI Contest at that stage—competitors can try again in the Go! Contest.

## Appendix B – Software Track Teams

### 1. **Cleanfi.com - solar growth for all**

***Finalist - Ready! JEDI Contest winner***

Location: Pasadena, CA

Project Summary: This platform seeks to automate solar project financing for the small-and-midscale commercial sector, including facilitating the use of commercial property assessed clean energy (C-PACE).

### 2. **Circusolar - Facilitating Donations of Second-Life Solar Panels**

***Semifinalist - Ready! JEDI Contest winner***

Location: Sheridan, WY

Project Summary: This team is building a software platform to enable a marketplace for second-hand, decommissioned solar photovoltaic modules and other solar equipment, with a specific focus on donations to underserved communities.

### 3. **People Power Solar Cooperative -Solar as a Tool for Building Community Wealth**

***Semifinalist - Ready! JEDI Contest winner***

Location: Oakland, CA

Project Summary: This platform will support community-owned solar via a cooperative business model that allows communities to invest, build, co-own, and steward local renewable energy projects.

### 4. **Solar Stewards Marketplace**

***Finalist – Ready! and Set! JEDI Contest winner***

Location: Atlanta, GA

Project Summary: This team is creating a marketplace for a new type of renewable energy credit (REC) that allows corporate purchasers to buy RECs produced in underserved communities, aligning better with their corporate missions.

### 5. **The Solar Equity Platform**

***Finalist – Ready! and Set! JEDI Contest winner***

Location: Boston, MA

Project Summary: This platform connects larger installations that have surplus solar generation with nonprofits and underserved consumers to enable an easy peer-to-peer credit sharing transaction.

### 6. **Midday Tech - Voluntary Carbon Reduction Through Rooftop Solar**

***Finalist – Ready!, Set!, and overall Go! JEDI Contest winners***

Location: San Francisco, CA

Project Summary: This team is building a platform to connect consumers who purchase voluntary carbon offsets with high-impact rooftop solar projects in underserved communities.

### 7. **Turbine Logic - Democratizing Photovoltaic Monitoring at Community Scale**

***Semifinalist***

Location: Atlanta, GA

Project Summary: This operations and maintenance tool uses artificial intelligence to analyze solar power plant data and identify deterioration, faults, and failures.

**8. illu - Illuminate Field Work for Distributed Solar**

***Overall Winner***

Location: Sunnyvale, CA

Project Summary: This team is building a mobile and desktop tool for operations and maintenance workflow management that will assist field technicians and simplify distributed solar maintenance.

**9. Cyberborgs - Merging the Real and Digital Worlds through a Cyber-Physical-Social Platform for Microgrids**

***Semifinalist - Ready! JEDI Contest winner***

Location: Buffalo, NY

Project Summary: This team is developing microgrid management software with a focus on the human element. This software will enable underserved and indigenous communities to monitor and interact with their solar systems to meet financial and quality-of-life goals.

**10. Leaptran - Solarcast and Solarcheck (SC<sup>2</sup>)**

***Semifinalist***

Location: San Antonio, TX

Project Summary: This team is developing a solar forecasting tool that uses energy production data from inverters and other data feeds to improve intraday solar forecasting and plant performance.

**11. SolarGrade: Elevated Asset Care**

***Overall Winner***

Location: Carlsbad, CA

Project Summary: This team is building a workflow management platform to facilitate inspection, operations, and maintenance of PV systems leveraging field technician inputs and data analytics.

**12. Nimbus AI - Solar Forecasting with Machine Learning**

***Finalist***

Location: Honolulu, HI

Project Summary: This team is creating day-ahead probabilistic solar irradiance forecasts leveraging recent advances in satellite imagery and advanced machine learning algorithms.

**13. Sandbox Agrivoltaics: Design and Artificial Intelligence for Agriculture + Photovoltaic Design**

***Finalist***

Location: Fort Collins, CO

Project Summary: This team is building software to help design agrivoltaic projects, with a focus on simulating the microclimates under solar modules and predicting crop growth yields.

**14. Solar River: Covering and Powering Canals with Solar**

***Semifinalist***

Location: Bisbee, AZ

Project Summary: This team is developing a software solution to automate and optimize the engineering and design of solar systems sited over irrigation canals.

**15. KiloNewton - SolarSpace™: Optimize Site and Construction**

***Finalist***

Location: Albuquerque, NM

Project Summary: This team is developing geospatial software to optimally site utility-scale solar and avoid challenging terrain, helping to avoid costly discoveries that can come in later stages of project development.

**16. OptimoEnergy - Artificial Intelligence Power Management and Sizing Software Packages**

***Semifinalist***

Location: Los Angeles, CA

Project Summary: This team is developing an artificial intelligence power management software platform to help size and operate solar systems with energy storage.

**17. Climformatics - Building Climate Sustainable Solar Energy Future**

***Semifinalist***

Location: Fremont, CA

Project Summary: This team is developing a tool that uses machine learning and artificial intelligence to predict weather patterns at any location and on any timescale to help utilities with system planning and operations.

**18. Better Solar - Automated Diagnostics of PV Module Health**

***Finalist***

Location: Orlando, FL

Project Summary: This team is building machine vision software to process electroluminescence (EL) imagery and automatically identify PV defects with application to both PV module manufacturing and PV plant maintenance.

**19. SolarSpace - SolarSpace E-Management Platform**

***Semifinalist***

Location: Tucson, AZ

Project Summary: This team is developing a software platform to optimize tracking for concentrating solar power (CSP) systems. The platform utilizes machine learning algorithms and works with different types of hardware.

**20. Ecademy - Online School to Train Solar Installers*****Semifinalist - Ready! JEDI Contest winner***

Location: Baltimore, MD

Project Summary: This team is developing a workforce training platform with a focus on candidates from underserved groups or communities that includes curriculum, certifications, and an income-sharing model to help with up-front training costs.