AMERICAN MADE SOLAR PRIZE

U.S. DEPARTMENT OF ENERGY

Solar Data Bounty Prize

$1,415,000 prize designed to incentivize photovoltaic (PV) system owners to share information-rich datasets from their assets.

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Topics

1. Solar Data Bounty Prize Overview
2. Prize Process
3. HeroX Live Demo
4. Technical Details and Scoring
5. Q&A

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The American-Made program is your **fast track to the clean energy revolution**. Funded by the U.S. Department of Energy, we incentivize innovation through prizes, training, teaming, and mentoring, connecting the nation's entrepreneurs and innovators to America's national labs and the private sector.

The American Made Program is growing:

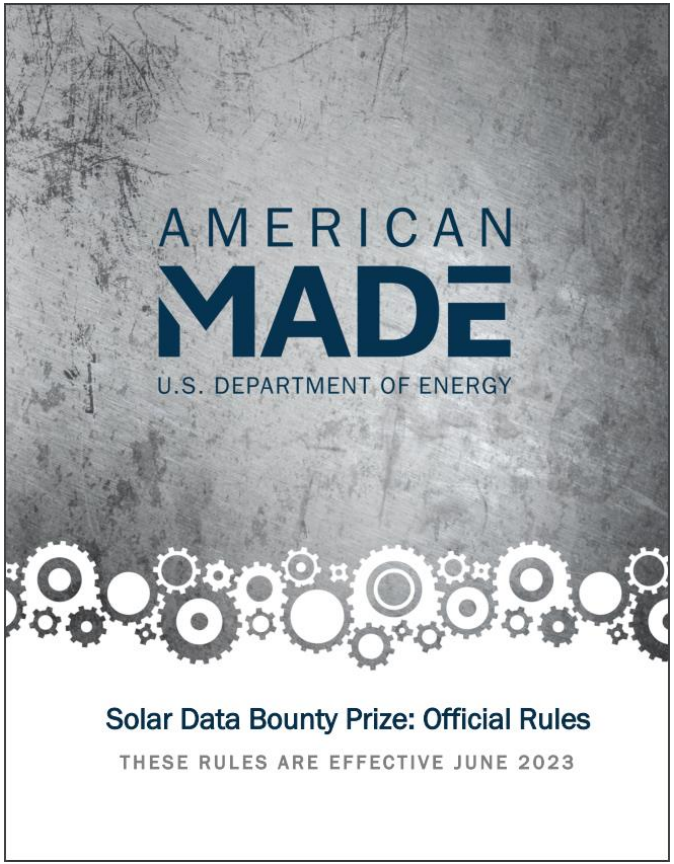
$100M
in cash prizes and support

40+
prizes

300+
Network members

AmericanMadeChallenges.org

Read the Rules



Official Rules of the Solar Data Bounty Prize are available on HeroX

https://americanmadechallenges.org/challenges/solar-data-bounty/docs/SDB-Prize-Official-Rules.pdf

Or

Solar Data Bounty HeroX Page > Resources Tab

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Solar Data Bounty Prize Overview

Prize Goal

The Solar Data Bounty Prize aims to support the solar industry and academic research and development (R&D) communities in their efforts to develop, validate, improve, and evaluate models of real-world PV system performance.

Regional diversity of the datasets used for these models can help ensure that all Americans benefit from these efforts, as the accuracy and fidelity of such models is critical for asset valuation and operation of solar power plants.

What is the Solar Data Bounty Prize?

About the Prize:

- Designed to **incentivize photovoltaic (PV) system owners to share information-rich datasets** from their assets so the industry and research communities can continue to develop, validate, and fine-tune modeling tools for solar applications.
- This prize is a two-stage, two-track program that offers a total of up to **$1,415,000 in cash prizes**.
- In Stage 1, competitors will submit their metadata and one month or more of irradiance time series data.
- In Stage 2, competitors will submit their complete time series data.
- The winners' data sets will be shared publicly after the end of the competition via a dedicated platform.

Who can compete?

- The Solar Data Bounty Prize is open to:
  - Private entities (for-profit and non-profit)
  - Non-federal government entities
  - Academic organizations
- Individuals, teams of individuals, and federal employees are not eligible to apply
- Full eligibility can be found in the Official Rules

Prizes to Win

Stage 1 offers a total prize pool of **$125,000** in cash

	Track A (System size: 100-5,000 kW_{dc})		Track B (System size: >5,000 kW_{dc})	
Stage 1	Number of Prizes Awarded	Prize	Number of Prizes Awarded	Prize
	Up to 15 cash prizes	$5,000	Up to 10 cash prizes	$5,000

Prizes to Win

Stage 2 offers a total prize pool of **$1,290,000** in cash

		Track A (System size: 100-5,000 kW_{dc})		Track B (System size: >5,000 kW_{dc})	
Stage 2		Number of Prizes Awarded	Prize	Number of Prizes Awarded	Prize
	Winners	Up to six cash prizes	$80,000	Up to three cash prizes	$130,000
	Runners-up	Up to four cash prizes	$30,000	Up to two cash prizes	$50,000
	Bonus	Up to two cash awards in six installments	$40,000	Up to two cash awards in six installments	$60,000

Bonus Prizes

These bonus prizes will be paid annually in six equal installments over six years.

- The **top two competitors in each track** will be offered the opportunity to share updated time series from their winning system for another six years, under the same conditions of anonymity as applied to the winning system.
- Should they accept, they will become eligible for the bonus prize of $40,000 in Track A and $60,000 in Track B, payable in six installments. Should they refuse, the offer will be made to the next ranked competitor in the track until the last runner-up.
- Payment of the bonus prize is contingent on the updated data containing the same list of time series data as the winning data set, at the same temporal resolution, and with a completeness factor no less than 95% of the completeness factor for the winning data set.

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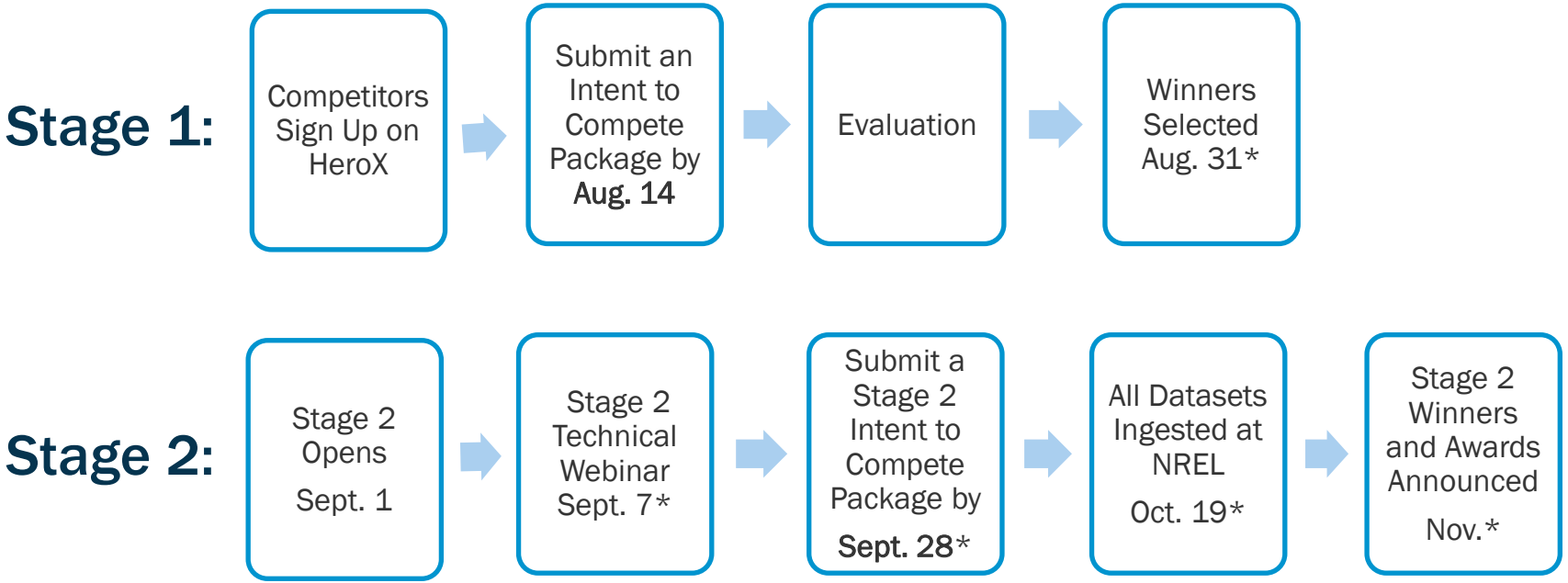
Solar Data Bounty Prize Process

Prize Process



*Anticipated Date

Stage 1 Intent to Compete HeroX Package

All competitors must submit an intent to compete submission package by August 14 at 5 p.m. ET

Intent to compete form can be found on HeroX:

1. Go to: HeroX.com/solardatabounty
2. Create a HeroX Account
3. Click on “Follow”
4. Click on “Solve This Challenge”

Item	Content	Will Be Made Public	Scored
Intent to Compete HeroX Package	Cover page	No	No
	Evidence of PV system ownership or authorization to access and share data from the system	No	No
System Metadata and Specifications	See Section 9.5.2 of the Official Rules for details	No	Yes
Irradiance Timeseries Data	See Section 9.5.3 of the Official Rules for details	Yes	No

Stage 1 Cover Page

Competitors are required to submit the following items for Stage 1:

- Nickname of PV system from which data will be submitted
- The entity that owns the PV system
- The state where the PV system is located
- Address, city, state, and nine-digit zip code of the competitor (the legal entity competing in the prize)
- The registrant's affiliation with the entity that owns the PV system.

Evidence of PV System Ownership or Authorization To Access and Share Data From the System

- Provide documentation showing that the registered competitor has the right to share data originating from the PV system specified in the metadata.
- This documentation should be a signed letter from an officer of the corporation that owns the system clearly stating that the signatory has the authority to share the data and is giving permission to share the data in accordance with the rules of this prize.

System Metadata and Specifications

Competitors are required to submit a completed template in Excel (.xlsx) or OpenDocument spreadsheet (.ods) format. The template contains protected cells with formulas calculating the basic score of the submission. There are some mandatory system specifications and a minimum set of time series metadata:

- **Mandatory PV system specifications:**
  - System nickname
  - System location with a precision of four decimal points (latitude and longitude)
  - System size in kW_{DC} and kW_{AC}
  - System commercial operation date
  - Tracking type (list all that apply)
  - POA or tracking axis orientation (list all that apply)
  - Mounting type (list all that apply)
  - Solar cell technology (e.g.. a-Si, mc-Si, sc-Si, CdTe, CIGS—list all that apply).

- **Minimum set of time series metadata:**
  - POA irradiance (any sensor type)
  - Ambient temperature
  - Output power at the inverter
  - Output power at the revenue-grade meter.

- **Other minimum requirements:**
  - A record of at least five years (1,826 calendar days)
  - A temporal resolution of 15 minutes or less for all time series.

Template Available at: www.herox.com/solardatabounty/resources

Stage 1 Winner Selection Process

- Competitors will be scored according to the following criteria:
  - Richness of metadata
  - Regional diversity

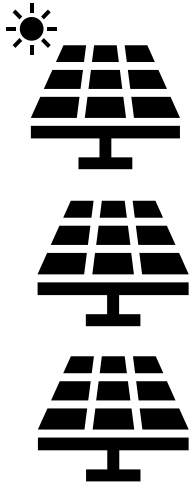
- Winners will be publicly announced no later than Aug. 31, 2023 (anticipated)

- Competitors selected in Stage 1 will move on to Stage 2.

Stage 2 Intent to Compete HeroX Package

All competitors must submit an intent to compete package by Sept. 28 at 5 p.m. ET.
All data sets should be submitted by Oct. 19, 2023.

Item	Content	Will Be Made Public	Scored
Intent to Compete HeroX Package	Cover page	No	No
Anonymization Waiver Form	Selected waivers (if any) to data Anonymization. See Section 9.5.5 of the Official Rules for details	No	Yes
PV Timeseries Data	See Section 9.5.6 of the Official Rules for details	Yes, only if competitor wins a prize	Yes



Anonymity Features

- By default, the following anonymity features will be applied:
  - **System location** – The precision of the system's published location is reduced according to the size of the system.
  - **Inverter and module metadata** – The specifications and make and model of the inverter and the PV modules are not made public.
  - **Electric data** – The published values of electric output (current and power) from PV modules, combiners, inverters, and revenue-grade meters are normalized (i.e., divided) by their respective DC or AC capacity value.

Anonymity Waivers and Score Boosters

- By default, the following anonymity features will be applied:
  - **System location** – The precision of the system's published location is reduced according to the size of the system.
  - **Inverter and module metadata** – The specifications and make and model of the inverter and the PV modules are not made public.
  - **Electric data** – The published values of electric output (current and power) from PV modules, combiners, inverters, and revenue-grade meters are normalized (i.e., divided) by their respective DC or AC capacity value.
- Scores will be **boosted by 26% per each anonymity feature that is waived**
- The waivers are applied independently:
  - Waiving all three features will effectively double your score.

Stage 2 PV Time Series Data

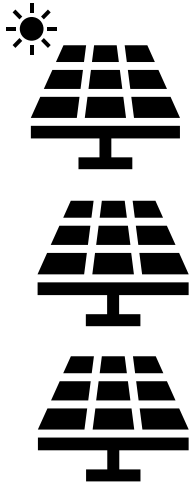
- Competitors must supply the time series data described in the metadata template used to win a prize in Stage 1.
- The data can be supplied to the prize administrator in one of two ways:
  - Upload the files containing the time series data to the location designated by the prize administrator.
  - Supply the prize administrator with the credentials to a monitoring service where the prize administrator can access and copy the time series data.

- **All datasets should be submitted by Oct. 19, 2023**

Stage 2 Winner Selection Process

Competitors will be scored according to the following criteria:

- **Validated data**
- **Anonymity waivers**
  - System Location
  - Inverter and Module Metadata
  - Electric Data
- **Data completeness**
- **Regional diversity**



Winners will be announced in Nov. 2023 (anticipated)

Important Dates

- **Program Announced and Registration Opens:** June 2, 2023
- **Stage 1 Intent to Compete HeroX Package Deadline:** Aug. 14, 2023, 5 p.m. ET
- **Stage 1 Winners Announcement:** No later than Aug. 31, 2023 (anticipated)
- **Stage 2 Technical Webinar:** Sept. 7, 2023 (anticipated)
- **Stage 2 Intent to Compete HeroX Package Deadline:** Sept. 28, 2023, 5 p.m. ET
- **All Datasets Ingested at NREL:** Oct. 19, 2023 (anticipated)
- **Stage 2 Winners and Awards Announced:** Nov. 2023 (anticipated)

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HeroX Live Demo

HeroX.com/solardatabounty

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Solar Data Bounty Technical Details and Scoring

Stage 1 Scoring

Basic Score

- The **basic score** reflects the richness of the Stage 1 metadata and is the sum of the channel-type points across all channel types
- Each channel is weighted in points according to an estimate of its significance in modeling the performance of the system.
- The points scored by each type of channel described in the metadata template are calculated as follows:

$$\text{Channel-Type Points} = [\text{Number of Channels}] * [\text{Weight of Channel}] * ([\text{Length of Record in Days}] / 1826) * (15 / [\text{Temporal Resolution in Minutes}])$$

- In general, a **higher basic score** corresponds to **more channels of time series data, longer datasets, and higher temporal resolution**.

Stage 1 Scoring

Adjusted Score

- The Adjusted Score accounts for **regional diversity of PV systems** and **will be used to rank Stage 1 competitors**
- In Stage 1, systems that are installed in the same U.S. territory or state will share a 20% bonus pool. In general, if N systems are installed in the same state, then each of those systems will share 1/N of the bonus.
- The adjusted score for each of the competing systems installed in the i^{th} U.S. territory or state will be calculated as follows:

$$[\text{Adjusted Score}]_m = [1 + 0.20 / N_i] * [\text{Basic Score}]_m$$

where

- N_i is the number of systems competing in this prize that are installed in the i^{th} U.S. territory or state.
- $m = 1, 2, \ldots, N_i$.

Stage 2 Scoring

V1 Score

- The V1 score is calculated using the same methodology as the basic score, but it pertains to the actual time series data uploaded in Stage 2.
- If the uploaded data set corresponds exactly to the metadata in the template from Stage 1, then the two scores will be identical. If there are any discrepancies, these will be reflected in the V1 score.

Stage 2 Scoring

V2 Score

- The V2 score reflects the effect of **waiving one or more anonymity features**. There are three waivers:
  - published precision of the geographical position
  - published information about the inverter and modules installed in the system (technical specifications or make and model)
  - published values of AC and DC time series (raw values of the quantities measured).
- For each waiver, the competitor's score will be multiplied by a factor of 1.26.

Numbers of Waivers Applied	V2 Score =
0	V1 Score
1	[V1 Score] * 1.26
2	[V1 Score] * 1.5876
3	[V1 Score] * 2.0004

Stage 2 Scoring

V3 Score

- The V3 score accounts for the **completeness of the time series** uploaded in Stage 2.
- Each time series uploaded will be checked for missing timestamps and invalid timestamps during daytime.
    - Daytime comprises all timestamps (at the supplied resolution) for which the solar elevation angle is higher than five degrees at the location of the system.
- The fraction of valid daytime timestamps—called the completeness factor—will be used to calculate the V3 score as follows:

$$\text{V3 Score} = [\text{Valid Daytime Timestamps}] / [\text{All Daytime Timestamps}] * [\text{V2 Score}] =$$

$$= [\text{Completeness Factor}] * [\text{V2 Score}]$$

Stage 2 Scoring

Final Score

- The final adjustment in the score is based on the **regional diversity** of the competitors. Systems competing in Stage 2 that are installed in the same U.S. territory or state will share a 20% bonus pool.
- The final score for each of the competing systems installed in the i^{th} U.S. territory or state will be calculated as follows:

$$[\text{Final Score}]_m = [1 + 0.20 / N_i] * [\text{V3 Score}]_m$$

where

- N_i is the number of systems competing in this prize that are installed in the i^{th} U.S. territory or state.
- $m = 1, 2, \ldots, N_i$

Solar Data Bounty Prize Outcomes

Stage 1

- $125,000 in cash prizes
- Up to 25 Prize Winners:
  - 15 in Track A
  - 10 in Track B
- Data Outcome: 1+ month of irradiance data from all submissions will be publicly available

Stage 2

- $1.29M in cash prizes
- Up to 15 Prize Winners:
  - 10 in Track A
  - 5 in Track B
- 4 Bonus Prizes for future data
- Data Outcome: 15 historic high-quality time series datasets and up to 4 future datasets will be publicly available

Get Started Today!

- Follow the Challenge on HeroX: https://www.herox.com/solardatabounty.
- Read the Official Rules.
- **Submit your Intent to Compete by Aug. 14, 2023, at 5 p.m. ET.**
- Email Solar.Prize@nrel.gov with any questions.