Heliostat Components Prize

OFFICIAL RULES

THESE RULES ARE EFFECTIVE JANUARY 2024

Preface

The American-Made Heliostat Prize is designed to accelerate and sustain American innovation through a series of contests, leveraging a diverse and powerful support network of national laboratories, energy incubators, and other resources across the United States.

The U.S. Department of Energy's Heliostat Prize will be governed by 15 U.S.C. § 3719 and this Official Rules document. This is not a procurement under the Federal Acquisitions Regulations and will not result in a grant or cooperative agreement under 2 CFR 200. The Prize Administrator reserves the right to modify this Official Rules document if necessary and will publicly post any such notifications as well as notify registered prize participants.

Contents

Modification Summary

Date	Modifications
11/29/2023	Pages 8 and 9: Changed anticipated dates for contest openings, submission deadlines, and winner announcements.
1/18/2024	Page 8: Changed anticipated dates for contest openings, submission deadlines, and winner announcements to be available online on HeroX only.

1 Program Summary

1.1 Introduction

The American-Made Heliostat Prize is a series of three consecutive contests designed to accelerate technology innovation through the design, development, and demonstration of selected heliostat components that drive the cost and performance of heliostats, ultimately supporting the U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) goals of low-cost solar-thermal energy for both high-temperature industrial process heating, as well as high-efficiency electricity production, coupled with thermal energy storage.

This prize contest offers a total of $3 million in cash prizes for innovations and credible concepts for technology supporting the advancement of heliostat technologies. Competitors can win up to $580,000 in cash across the three phases of the prize contest. Further, the prize administrator will provide additional support services to competitors such as testing and validation from third parties.

The activities incentivized by this prize support the government-wide approach to the climate crisis by driving innovation that can lead to the deployment of clean energy technologies, which are critical for climate protection. Specifically, SETO is launching the American-Made Heliostat Prize, a part of the American-Made Challenges, to energize U.S. solar competitiveness and innovation.

In the three contests of the Heliostat Prize (termed "Concept," "Design," and "Assess"), competitors participate in escalating challenges. Each consecutive contest will incentivize competitors to bring their innovations from concept to prototype on an accelerated schedule—just short of 18 months.

The three contests of this prize program and the American-Made Network will bring connections, resources, and funding to competitors as they advance their innovations, accelerating their cycles of learning from years to months. The program energizes innovation in U.S. solar technology and reasserts the country's global leadership in next-generation technologies.

1.2 Background

New energy technologies have begun to reshape the national and global energy landscape. Advanced electrification, digitization, and deployment of grid-connected distributed energy assets are changing the energy industry. The United States has been at the forefront in this transformation, and as technologies, markets, services, and capital providers have evolved over the past decade, there is a reinvigorated entrepreneurial interest across all facets of the nation's energy system.

Achieving a decarbonized energy sector by 2050 will require the development of cost-effective technologies beyond today's commercial technologies. Increased deployment of solar technology will require the deployment of flexible and dispatchable generation and energy storage technologies, like concentrating solar-thermal power (CSP) with thermal energy storage, to ensure reliability of the grid. Achieving this transition requires that the industry achieve SETO's 2030 cost targets, which would halve the cost of solar power from 2020–2030 to $0.05 per kWh for CSP plants with 12 or more hours of thermal energy storage.

Achieving this target will depend heavily on reducing the cost of heliostats—which track the sun and reflect light, concentrating it on a receiver—to $50/m^2, while improving technical performance, from an existing baseline of approximately $96–$127/m^2. In this prize, SETO is seeking to reduce the cost of heliostats by specifically focusing on reducing costs, or by validating the performance of novel components. This prize is designed to accelerate heliostat component technology innovation through the

design, development, demonstration, and eventual commercialization of selected heliostat components.

Adding diversity to the current heliostat community is a critical goal of this prize program. There are presently only a few companies that build heliostats, and most are non-U.S. companies. Of the U.S.-based companies, most are in early stages of maturing their heliostat design. It is not yet known which of these technology pathways will ultimately lead to a commercially available heliostat, and promising technologies should not become stranded in the laboratory due to a failure to identify pathways of commercialization for these technologies.

Spearheaded by SETO, which is situated within DOE's Office of Energy Efficiency and Renewable Energy(EERE), and in partnership with the National Renewable Energy Laboratory (NREL), the Heliostat Prize is a series of three progressive competitions that incentivize the nation's innovators and entrepreneurs to rapidly discover, research, iterate, and deliver new solutions to the heliostats market, with the goal of expanding heliostat production in the United States. This fast-paced, progressive approach to product development not only provides cash prizes but also engages America's energy incubators, investors, universities, 17 national laboratories, and others to help participants achieve their goals.

The Heliostat Prize uses a program structure designed to strengthen and scale critical connections that accelerate and sustain American innovation through two intertwined components: prize competitions and the American-Made Network. The unique American-Made Network takes a structured approach to bring diverse sources of support, such as DOE's national laboratories (coupling with the growing field of heliostat metrology), business incubators, and prototype fabrication facilities, together under one umbrella. This approach is designed to be flexible and scalable and to extend beyond solar to other technology domains and sectors.

The program makes it faster and easier for our nation to transform innovative research and ideas into early-stage concepts and then build prototypes that are ready for validation. As competitors work to win cash prizes and other benefits, they are connected with mentoring, training, and other services from the American-Made Network using an intelligent matchmaking tool, resulting in the long-term success of participants and U.S. manufacturing.

1.3 Contests: Concept–Design–Assess

The Heliostat Prize is a fast-paced, three-phase program that will be implemented over an 18-month period. Phase 1 kicks off the effort, ending 3 months later with a concept that is evaluated by the review team. Phase 2 begins with winners from Phase 1, ending four months later with completed initial designs. Winners of Phase 2 then begin Phase 3, where the design is finalized, prototypes or partial prototypes are built, and initial testing is performed. The final design is then presented to a panel of expert reviewers for judging. The end goal is to develop new selected heliostat concepts into mature designs, worthy of additional future commercial funding or other government funding opportunities.

The Three Contests:

1. Concept Contest – Up to nine winners will receive $100,000 each in cash and will be eligible to compete in the Design contest. Competitors demonstrate that they have identified and taken action to develop a credible concept for technology supporting the advancement of heliostat technologies. Specifically, they will identify promising technologies for one of the following components: (i) heliostat structures, (ii) mirror facets, (iii) wireless control systems. Any eligible person, team, or business can submit a package to compete in the Concept contest, although individuals must form a business if they advance to the Design contest. A panel of expert

reviewers from industry, national laboratories, and government evaluate the submissions. DOE then selects the winners (semifinalists) based on expert reviewer input and the impact the new solutions may have on the heliostat industry.

2. Design Contest – Up to six winners will receive $180,000 each in cash and will be eligible to compete in the Assess contest. Semifinalists work to substantially advance their technology into an initial design. They should further develop their design and any of their desired models of the components (heliostat structures, mirror facets, or wireless control systems) that they identified in the Concept contest. A panel of expert reviewers from industry, national laboratories, and government evaluate the submissions. DOE then selects the winners (finalists) based on expert reviewer input and the impact the new solutions may have on the heliostat industry.
3. Assess Contest – Up to three winners will receive $300,000 each in cash. Finalists work to substantially advance their design, perform initial testing of the components from the Design contest, and build a prototype or partial prototype. A panel of expert reviewers from industry, national laboratories, and government evaluate the submissions. DOE then selects the winners based on expert reviewer input and the impact the new solutions may have on the heliostat industry.

Contest Funding:

Contest	Time	Winners	Prize
1. Concept	3 months	Up to 9	$100,000 in cash
2. Design	4 months	Up to 6	$180,000 in cash
3. Assess	6 months	Up to 3	$300,000 in cash

To learn more and sign up, go to https://www.herox.com/heliostat.

1.4 Important Dates

Concept Contest

Please check the Timeline on HeroX for the most up to date contest opening, submission, and winners announcement deadlines here: https://www.herox.com/heliostat/timeline.

Design Contest

Please check the Timeline on HeroX for the most up to date contest opening, submission, and winners announcement deadlines here: https://www.herox.com/heliostat/timeline.

Assess Contest

Please check the Timeline on HeroX for the most up to date contest opening, submission, and winners announcement deadlines here: https://www.herox.com/heliostat/timeline.

1.5 Prize Focus Areas

The Heliostat Components Prize invites competitors to work on one of three categories of heliostat components. This section outlines the current, general heliostat state-of-the-art performance, which should be kept in mind throughout the course of this prize.

Current, General Heliostat State-of-the-Art Performance Metrics

The following performance metrics apply to the three sections below.

Metric	Performance Target
Service Life	30 years
Azimuth/Elevation Tracking Error, No Wind	0.5 mrad rms each axis
Tracking Error 27 mph	1.25 mrad rms each axis
Beam Quality (0–27 mph)	1.25 mrad in each axis nominal, 1.5 mrad in each axis peak
Mirror Reflectivity	≥ 95%
Mirror Degradation (Min. reflectivity at 30 years)	≥ 0.90
Azimuth Position Range	minus 359, plus 359 degrees
Elevation Position Range	minus 10, plus 90 degrees
Combined Range of Motion	359 degrees rotation at 60 degrees elevation
Move to Stow (Ability to move to the stow position with 50 mph wind)	50 mph
Non-Operational Survivability, Wind Speed	90 mph
Operational Temperature Range	0° to 136°F
Hail Survival	1 in, 75 ft/sec, 20°F
Humidity	0% to 100% relative

Prize Focus Area Categories

i. Heliostat Structures – This focus area includes concepts replacing the heliostat support structure with new materials that may provide an opportunity to reduce costs. New materials that replace the steel structure should maintain or increase performance, as stated above, over the expected 30-year lifetime requirement. In addition to the considerations below, the designer should include

a discussion of the likelihood of the product becoming a commercially available product in the future in their submission narrative.

Initial concepts should consider:

- Reducing structural cost without a negative impact on performance over 30 years of operation
- Meeting structural performance needs over 30 years of operation
- Enhancing buildability or automation in manufacturing
- Reducing weight from the equivalent steel structure
- Meeting hail, wind, and moisture performance targets.

ii. Mirror Facets – The reflective surface of a heliostat is made up of one or more mirrored facets. These facets are often comprised of a mirror and structural backing. SETO is seeking a composite facet design with 3 mm or less of highly reflective glass mirror or other reflective material, capable of maintaining or increasing performance, as stated above, as well as the following optical requirements: (i) Average Reflectivity > 95%; (ii) Precision < 1.5 mrad total Root Mean Square (RMS). In addition to the considerations below, the designer should consider the likelihood of the product becoming a commercially available product in the future.

Initial concepts should consider:

- Reducing facet cost without a negative impact in performance over 30 years of operation
- Reducing operations and maintenance costs over 30 years of operation
- Providing a facet mirror focal length of ~100 meters
- Enhancing facet performance
- Reducing thermal transient impact on optical performance
- Reducing or eliminating the use of steel
- Reducing weight from the equivalent steel facet structure
- The ability to quickly perform infield pointing adjustments to the facet (canting), when required
- Meeting hail, wind, and moisture performance targets.

iii. Wireless Control Systems – Maturing wireless control systems to a commercial off-the-shelf product would ultimately provide tremendous risk and cost reduction, eliminating the need for heliostat designers to take on the software development. SETO seeks to mature the heliostat wireless control system. In addition to the considerations below, the designer should consider the likelihood of the product becoming a commercially available product in the future, working in multiple CSP plants without significant code changes.

Initial concepts should consider software that is:

- Flexible and variable driven (5000–100,000 nodes); available to operate at multiple sites with variable changes via an input file, database, or similar
- Secure from cyber attacks
- Able to safely stow itself upon detecting an attack or fault
- Designed for automated self-calibration of heliostats (enhancing plant performance)
- Fault tolerant with a fault tolerant hardware architecture.

1.6 Eligibility Requirements

Competitors in the Heliostat Prize must comply with the eligibility requirements below. By uploading a submission package, a competitor certifies that they comply with these eligibility requirements. Eligibility is subject to verification before prizes are awarded. If at any time the Prize Administrator becomes aware that a competitor is not eligible to win the Concept, Design, or Assess Contest, the competitor may be disqualified. The registered competitor is the individual or entity that registers in HeroX to compete.

In keeping with the goal of growing a community of innovators, competitors are encouraged to form diverse, multidisciplinary teams while developing their concept. The HeroX platform provides a space where parties interested in collaboration can post information about themselves and learn about others who are also interested in competing in this contest.

Concept Contest Eligibility

- Individuals, teams of individuals, private entities, and nonfederal government entities (such as states, counties, tribes, municipalities, and academic institutions) are eligible to compete in the Concept contest.
- A single competitor or team may submit a maximum of two submissions. If a competitor is listed as a team member of a submission which they are not leading, this shall count as one of their two allowed submissions. If more than two submissions are received from a single competitor or team, only the two most recently submitted submissions will be considered.

Design Contest Eligibility

- Only winners of the Concept contest are eligible to compete in the Design contest.
- Competitors must be a for-profit business entity, such as an LLC, corporation, or other organization, that is formed in and maintains a primary place of business in the United States.

Assess Contest Eligibility

- Only the winning for-profit business entities of the Design contest are eligible to compete in the Assess contest.
- Each competitor must be a for-profit business entity, such as an LLC, corporation, or other organization, that is formed in and maintains a primary place of business in the United States.

All Contests Eligibility

- Individuals, private entities, and nonfederal government entities (such as states, counties, tribes, municipalities, and academic institutions) are subject to the following requirements:
  - An individual prize competitor (who is not competing as a member of a group) must be a U.S. citizen or a permanent resident.
  - A group of individuals competing as one team may win, provided that the online account holder of the submission is a U.S. citizen or a permanent resident. Individuals competing as part of a team may participate if they are legally authorized to work in the United States.
  - Academic institutions must be based in the United States.
- Non-DOE federal entities and federal employees are not eligible to win any prize contests in this program.

- Employees of an organization that co-sponsors this program with DOE are not eligible to participate in any prize contests in this program.
- Individuals who worked at DOE (federal employees or support service contractors) within six months prior to the submission deadline of any contest are not eligible to participate in any prize contests in this program. Additionally, members of their immediate families (i.e., spouses, children, siblings, or parents) and anyone who lives in their household, regardless of relation, are not eligible to participate in the Prize.
- NREL employees directly involved in the administration of this Prize are not eligible to participate in any prize contest in this program; however, NREL and other national laboratory employees, including lab researchers, may compete and win a prize contest in this competition, provided they are not competing in their official capacity.
- Entities and individuals banned from doing business with the U.S. government, such as entities and individuals debarred, suspended, or otherwise excluded from or ineligible to participate in federal programs, are not eligible to compete.
- Entities identified by the Department of Homeland Security Binding Operational Directives as an entity publicly banned from doing business with the U.S. government are not eligible to compete. See https://cyber.dhs.gov/directives/.
- Entities and individuals identified as a restricted party on one or more screening lists of the Departments of Commerce, State, and the Treasury are not eligible to compete. See the Consolidated Screening List at https://www.trade.gov/consolidated-screening-list.
- Teams may submit concepts targeted at one of these categories or may make multiple submissions. Each submission may only target one category. Each team or individual is limited to two total submissions.
- This prize competition is expected to positively impact U.S. economic competitiveness. Participation in a foreign government talent recruitment program[1] could conflict with this objective by resulting in unauthorized transfer of scientific and technical information to foreign government entities. Therefore, individuals participating in foreign government talent recruitment programs of foreign countries of risk are not eligible to compete. Further, teams that include individuals participating in foreign government talent recruitment programs of foreign countries of risk[2] are not eligible to compete.

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[1] A foreign government talent recruitment program is defined as an effort directly or indirectly organized, managed, or funded by a foreign government to recruit science and technology professionals or students (regardless of citizenship or national origin, and regardless of whether they have a full-time or part-time position). Some foreign-government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to physically relocate to the foreign state for the above purpose. Some programs allow for or encourage continued employment at U.S. research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to U.S. entities. Compensation could take many forms, including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

[2] Currently, the list of countries of risk includes Russia, Iran, North Korea, and China.

- As part of your submission to this prize program, you will be required to sign the following statement:

"I am providing this submission package as part of my participation in this prize. I understand that in providing this submission to the Federal Government, I certify under penalty of perjury that the named competitor meets the eligibility requirements for this prize competition and complies with all other rules contained in the Official Rules Document. I further represent that the information contained in the submission is true and contains no misrepresentations. I understand false statements or misrepresentations to the Federal Government may result in civil and/or criminal penalties under 18 U.S.C. § 1001 and § 287."

DOE may conduct a review, using Government resources, of the competitor and project personnel for foreign interference. The result of the risk review may result in the submission being deemed ineligible in the prize competition. This risk review, and potential determination of ineligibility, can occur at any time during the prize competition. The results of a risk review are not appealable.

1.7 Program Goal Requirements

Only submissions relevant to the goals of this program are eligible to compete. The Prize Administrator must conclude that all the following statements are true when applied to your submission:

- The proposed solution is related to the heliostat industry.
- The majority of activities that are described in and support the submission package are performed in the United States and have the potential to benefit the U.S. solar market.
- The proposed solution represents an innovation that will move the industry beyond its current state.
- The proposed solution will have a pathway to economic viability in the terrestrial power market.
- The proposed solution is not dependent on new, pending, or proposed federal, state, or local government legislation, resolutions, appropriations, measures, or policies.
- The proposed solution does not involve the lobbying of any federal, state, or local government office.
- The proposed solution is based on fundamental technical principles and is consistent with a basic understanding of the U.S. market economy.
- The submission content sufficiently confirms the competitor's intent to commercialize early-stage technology and establish a viable U.S.-based business in the near future with revenues that do not solely depend on licensing fees of intellectual property.

1.8 Find Help

Visit https://americanmadechallenges.org/network.html to review and contact the members of the American-Made Network who have signed up to help you succeed.

1.9 Additional Requirements

Please read and comply with additional requirements in Appendix 1.

COMPETITORS WHO DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.

2 Concept Contest Rules

2.1 Introduction

The American-Made Heliostat Prize is a three-contest prize providing up to $3 million in cash prizes. It is designed to accelerate technology innovation through the design, development, and demonstration of selected heliostat components that drive the cost and performance of heliostats, ultimately supporting SETO's goals of low-cost solar-thermal energy for both high-temperature industrial process heating, as well as high-efficiency electricity production, coupled with thermal energy storage.

Concept Contest Prizes

- Up to nine winners.
- Each winner receives a cash prize of $100,000.

It is the first step to set American entrepreneurs on a pathway of accelerated innovation, so concepts can be developed into products faster. The Concept, Design, and Assess contests are structured to provide the resources and environment necessary to create new solution concepts and develop them into early- stage prototypes in rapid learning cycles.

The Concept contest is the first in this three-phase series. Successful competitors will win $100,000 in cash. Anyone meeting the eligibility requirements can compete in the Concept contest, but only winners of this contest (referred to as Concept contest winners or Heliostat Prize semifinalists) can compete in the subsequent Design contest. The following rules are for competitors in the Concept contest. "You" and "your" reference competitors in the contest.

2.2 Goal

Develop initial concepts of heliostat components that reduce cost with an operational lifetime expectation of 30 years and enhance performance (or maintain performance at a reduced cost). Specifically, identify promising technologies for one of the following three components: (i) heliostat structures, (ii) mirror facets, (iii) wireless control systems.

2.3 Prizes To Win

The Concept contest offers up to nine cash prizes of $100,000.

2.4 How To Enter

Complete a submission package online at https://www.herox.com/heliostat before the contest closing date.

2.5 Concept Contest Process

The Concept contest consists of three steps:

1. Preparation, Activation, and Submission – Competitors identify and act on describing a concept related to heliostat structure, mirror facets, or wireless control systems that has the potential to advance the heliostat industry. Teams may submit concepts targeted at one of these categories or may make multiple submissions. Each submission may only target one category. Each team or individual is limited to two total submissions. One-person teams can compete, but building a diverse,

multidisciplinary team may help strengthen capabilities and team competencies. Competitors complete their submission packages and submit online before the Concept contest closes.

2. Assessment – The Prize Administrator screens submissions for eligibility and completion and groups the submissions by technology area. The administrator then assigns subject matter expert reviewers to independently score the content of each submission. The reviewers assess the submissions based on the judging criteria.
   - Heliostat Structure Submissions: Concepts include replacing the heliostat support structure with new materials that may provide an opportunity to reduce costs. New materials replacing the steel structure typically used in a heliostat must meet the 30-year operational target. Successful submissions will address the following:
     - Expected cost
     - Expected performance
     - Design
     - Operations and maintenance 30-year total costs and requirements
     - Installation time/requirements

   - Mirror Facets: The reflective surface of a heliostat is made up of one or more mirrored facets. These facets are often comprised of a mirror and a structural backing. SETO is seeking a composite sandwich facet design with 3 mm or less of highly reflective glass mirror or other reflective material, capable of meeting the heliostat operational targets as well as the following optical requirements: (i) average reflectivity > 95.5%; (ii) precision <1.5 mrad total RMS; (iii) facet mirror focal length of ~100 meters. The ability to quickly perform infield pointing adjustments to the facet (canting), when required, is also an important consideration. Successful submissions will address the following:
     - Expected cost
     - Expected performance
     - Design
     - Operations and maintenance 30-year total costs and requirements
     - Installation time/requirements
     - Infield facet replacement time/requirements

   - Wireless Control Systems: Over the recent years, the designs of smaller heliostats have moved away from wired power and control. Maturing wireless control systems to a commercial off-the- shelf product would ultimately provide tremendous risk and cost reduction, eliminating the need for heliostat designers to take on the software development. SETO seeks to mature the heliostat wireless control system, starting with the heliostat wireless communications. In addition to the considerations below, the designer should consider the likelihood of the product becoming a commercially available product in the future, working in multiple CSP plants without significant code changes. Successful submissions will address the following:
     - Security – secure from cyberattack
     - Safety – ability to move the heliostat to stow upon detecting an attack, fault, or other loss of communication
     - Fault-tolerant hardware architecture
     - Robust well-coded fault-free software
     - Self-calibrating - without human intervention

3. Announcement – After the semifinalists are publicly announced, the Prize Administrator notifies the winners and distributes the cash prizes, then invites them to compete in the Design contest. After winning the Concept contest, semifinalists develop their solutions in accordance with their plan to compete in the Design contest.

2.6 What To Submit

A complete submission package for the Concept contest should include the following items:

Item	Content
Submission Package	• 90-second video (public) • Cover page content • Narrative that answers questions in the Narrative table (not to exceed 3,000 words) • One summary PowerPoint slide (public) • Letters of commitment or support (optional).

Note: Portions of the submission package are made available to the public. These have been denoted as such, and DOE does not intend to release the remaining parts of the submission to the public. See Appendix 1 for additional details.

All documents must be uploaded as a PDF.

Reviewers and the prize judge will evaluate your submissions by agreeing or disagreeing with assigned statements on a scale, as shown below. These statements are the criteria. Each bullet will be scored on an individual score from 1-6. There are a total of 11 bullets. Scores will represent total points out of 66. The judge will consider these scores as well as the program policy factors when making a decision.

strongly disagree: 1	disagree: 1	slightly disagree: 3	slightly agree: 4	agree: 5	strongly agree: 6

Online Public Video – What Is Your Innovation in 90 Seconds?
Suggested content you provide • The real-world problem you are solving • Your solution and why it is transformational • Who you are and why you have a competitive edge

Post your publicly accessible video online (e.g., YouTube, Vimeo). Be creative and produce a video that conveys the required information in exciting and interesting ways, but do not focus on time-consuming activities that only improve production values (i.e., technical elements such as décor, lighting, and cinematic techniques). Assistance from others with experience in this area may be helpful. Members of the American-Made Network may be able to help you create your video.

Cover Page – List Basic Information About Your Submission (Template[3] will be provided on HeroX)
• Project name • Category submission is targeting • Innovation tagline (i.e., your mission in a few words) • Link to your 90-second online video • Key project members (names, contacts, and links to their LinkedIn profiles) • Keywords that best describe your solution, and which of the three categories you are targeting • Your city, state, and nine-digit zip code

You should answer each of the following four questions. The content bullets are only suggestions to guide your responses. You decide where to focus your answers. The individual answers to the four questions do not have a word limit; however, the aggregate response to these four questions must not exceed 3,000 words, not including captions, figures/graphs, and references. A word count must be included at the end of your submission (see template for details). You may also include up to five supporting images, figures, or graphs. The reviewers will score the questions based on the content you have provided.

Narrative Max 3,000 Words and 5 Supporting Images or Figures (PDF) (Template[4] will be provided on HeroX)	
Question 1: *Problem* – What is the problem?	
Suggested content you provide:	Score will be based on the following:
• Describe the problem that your innovation or innovations seek to solve. Quantify the significance of addressing this problem with metrics. • Provide real-world evidence to validate key assumptions about an industry need to address the problem you have identified.	• The competitor's approach is well thought out and shows a deep understanding of the challenges of heliostat field design, construction, and management relevant to the competitor's innovation. • The competitor's innovation has a strong likelihood of increasing performance and ultimately yielding reduced cost of electricity generation at CSP facilities and assumptions are supported by credible and real-world information.

[3] Use of the template is optional; however, all components listed here must be included in your document if you choose to create your own.
[4] Use of the template is optional; however, all components listed here must be included in your document if you choose to create your own.

Question 2: *Solution* – What is your solution, and why will it be successful?	
Suggested content you provide: • Describe your innovation in as much detail as possible. How impactful is your solution? • Describe how your technical innovation compares against the current state-of-the-art or commercially relevant competition. • Describe your innovation's value proposition and how it will lead to a sustainable business. Does it save money or increase effectiveness? • Define the proof of concept and explain what critical failures would cause you to reconsider your approach.	Score will be based on the following • Sufficient technical detail was provided to understand the underlying principles of operation of the innovation. • The solution represents an innovative approach built on reasonable assumptions, valid technical foundations, and lessons learned from other notable efforts in this space. • The competitor is pursuing an innovative, cost-effective, and compelling solution that will lead to a sustainable business with paying customers.
Question 3: *Accomplishments and Team* –Does your team have the knowledge and experience to be successful in bringing your proposed innovation to market?	
Suggested content you provide: • Introduce your team, explain how it came together, and highlight the knowledge and skills that make it capable of achieving success. Consider highlighting foundational skills from other industries or disciplines that your team will apply to CSP. • Highlight your team's diversity. What experience do you have trying new things, solving difficult problems, and overcoming barriers to bring ideas to reality?	Score will be based on the following: • The team's track record demonstrates notable entrepreneurial qualities such as adaptability, creativity, decisiveness, and resourcefulness. • This team is diverse and has the knowledge, experience, and determination to transform their proposed solution into a viable business in the near future.
Question 4: *Plan* – What is your plan to achieve your goals?	
Suggested content you provide • Describe your team's readiness to meet your goals and whether your team requires additional talent and resources. • Provide a high-level budget and plan to meet your goals between the conclusion of the	Score will be based on the following: • The stated goals are ambitious, reduce risks, and show a commitment to an accelerated development cycle. • Meeting the stated goals will demonstrate critical progress toward developing, testing,

Concept phase and Design phase assuming you win the prize. • Describe risks to the development plan and mitigation strategies (e.g., data requirements and plans to acquire the necessary data). • Describe your team's proposed metrics that will be used to determine success.	and validating the functionality and market demand of this innovation. • Sufficient risks to the development plan have been identified and reasonable risk mitigation strategies have been described. • The proposed metrics are clear, well defined, and achievable. Success metrics can be scaled to support evaluation in a full-scale CSP plant.

Submission Summary Slide (a PowerPoint Slide as a PDF To Be Made Public)
Make your own public-facing, one-slide submission summary that contains technically specific details but can be understood by most people. There is no template, so feel free to present the information as you see fit. Please make any text readable in a standard printout and conference room projection.

Letters of Commitment or Support (Optional)
Attach one-page letters of support, intent, or commitment from relevant entities (e.g., potential users of the proposed innovation or strategic manufacturing partners) to provide context. Letters of support from partners or others that are critical to the success of your proposed solution will likely increase your score. General letters of support from parties that are not critical to the execution of your solution will likely not factor into your score. Please do not submit multi-page letters.

Please read and comply with additional requirements about your submission in Appendix 1.

COMPETITORS WHO DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.

2.7 How We Score

The scoring of submissions will proceed as follows:

- A panel of expert reviewers reads, scores, and comments on each submission. Each question under the video submission and the narrative questions receives a score. The final score from an individual reviewer for a submission package equals the total sum of the scores for all scored sections. All reviewers' scores will then be averaged for a final reviewer score for the submission package. The final prize judge considers reviewer scores when deciding the winners of the prize.
    - Reviewers may not have personal or financial interests in, or be an employee, officer, director, or agent of any entity that is a registered participant in this contest, or have a familial or financial relationship with an individual who is a registered competitor.

Note: Expert reviewers also provide comments on the submissions they review. The Prize Administrator intends to provide comments to competitors after the winners are announced. These comments are intended to help competitors to continue to improve and iterate on their submissions. The comments are the opinions of the expert reviewers and do not represent the opinions of DOE.

- Interviews: The Prize Administrator, at its sole discretion, may decide to hold a short interview with a subset of the Concept contest competitors. Interviews would be held prior to the announcement of winners and would serve to help clarify questions the judge may have. Attending interviews is not required, and interviews are not an indication of winning.

The judge's final determination of winners takes reviewer scores, interview findings (if applicable), and program policy factors listed in Appendix 1 into account. DOE is the judge and final decision maker and may elect to award all, none, or some of the submissions accepted at each submission deadline.

2.8 Find Help

Visit https://americanmadechallenges.org/network.html to review and contact the members of the American-Made Network who have signed up to help you succeed.

2.9 Additional Requirements

Please read and comply with additional requirements in Appendix 1.

COMPETITORS WHO DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.

3 Design Contest Rules

3.1 Introduction

The American-Made Heliostat Prize is a three-contest prize providing up to $3 million in cash prizes. It is designed to accelerate technology innovation through the design, development, and demonstration of selected heliostat components that drive the cost and performance of heliostats, ultimately supporting SETO's goals of low-cost solar-thermal energy for both high-temperature industrial process heating, as well as high-efficiency electricity production, coupled with thermal energy storage.

Design Contest Prizes
• Up to six winners. • Each winner receives a cash prize of $180,000.

It is the first step to set American entrepreneurs on a pathway of accelerated innovation, so concepts can be developed into products faster. The Concept, Design, and Assess contests are structured to provide the resources and environment necessary to create new solution concepts and develop them into early- stage prototypes in rapid learning cycles.

The Design contest is the second in this three-contest series. Successful competitors will win $180,000 in cash. Only competitors who won the Concept contest are eligible to compete in the Design contest. Only winners of this contest (referred to as Design contest winners or Heliostat Prize finalists) can compete in the subsequent Assess contest. The following rules are for competitors in the Design contest. "You" and "your" reference competitors in the contest.

3.2 Goal

Design and model the heliostat component(s) your team identified in the Concept contest, with a goal of reducing cost with an operational lifetime expectation of 30 years and enhancing performance (or maintaining performance at a reduced cost). Specifically, identify promising technologies for one of the following three components: (i) heliostat structures, (ii) mirror facets, (iii) wireless control systems.

3.3 Prizes To Win

The Design contest offers up to six cash prizes of $180,000.

3.4 How To Enter

Complete a submission package online at https://www.herox.com/heliostat before the contest closing date.

3.5 Design Contest Process

The Design contest consists of three steps:

1. Preparation, Activation, and Submission – Competitors develop an initial design of the heliostat structure, mirror facets, or wireless control system that they identified in the Concept contest. One-person teams (provided they are incorporated as a business) can compete, but building a diverse, multidisciplinary team may help strengthen capabilities and team competencies. Competitors complete their submission packages and submit online before the Design contest closes.

2. Assessment – The Prize Administrator screens submissions for eligibility and completion and groups the submissions by technology area. The administrator then assigns subject matter expert reviewers to independently score the content of each submission. The reviewers assess the submissions based on the judging criteria.
   - Heliostat Structure: A design that reduces structure cost without a negative impact on performance over 30 years of operation, reduces or eliminates the use of steel, reduces weight from the equivalent steel structure, meets operational requirements over the expected 30-year lifetime, and enhances buildability or automation in manufacturing.
   - Mirror Facets: A design that reduces facet cost without a negative impact on optical performance over 30 years of operation, enhances facet performance, reduces thermal transient impact on optical performance, reduces or eliminates the use of steel, has a focal length of ~100 meters, meets operational requirements over the expected 30-year lifetime, and enhances buildability or automation in facet manufacturing.
   - Wireless Control Systems: A design that is flexible or variably driven (5000 to 100,000 nodes), is secure from attack, has an automatic safe mode, and has a fault-tolerant architecture (both hardware and software).
3. Announcement – After the finalists are publicly announced, the Prize Administrator notifies them and requests the necessary information to distribute cash prizes. After winning the Design contest, finalists develop their solutions in accordance with their plan to compete in the Assess contest.

3.6 What To Submit

A complete submission for the Design contest must include the following items:

Item	Content
Submission Package	• 90-second video (public) • Cover page content • Narrative that answers questions in the Narrative table (not to exceed 3,000 words) • Summary PowerPoint slide (public) • Letters of commitment or support (optional).

Note: Portions of the submission package are made available to the public. These have been denoted as such and DOE does not intend to release the remaining parts of the submission to the public. See Appendix 1 for additional details.

All documents must be uploaded as a PDF.

Reviewers and the prize judge will evaluate your submissions by agreeing or disagreeing with assigned statements on a scale, as shown below. These statements are the criteria. Each of the four questions will receive an individual score from 0-5. These four scores will be combined to yield a final score out of 20.

strongly disagree: 0	disagree: 1	slightly disagree: 2	slightly agree: 3	agree: 4	strongly agree: 5

Online Public Video – What Is Your Innovation in 90 Seconds?	
Suggested content you provide • The problem you are solving • Details of the design • Who you are and why you have a competitive edge	The video is not scored in this phase

Post your publicly accessible video online (e.g., YouTube, Vimeo). Be creative and produce a video that conveys the required information in exciting and interesting ways, but do not focus on time-consuming activities that only improve production values (i.e., technical elements such as décor, lighting, and cinematic techniques). Assistance from others with experience in this area may be helpful. Members of the American-Made Network may be able to help you create your video.

Cover Page – List Basic Information About Your Submission (Template[5] will be provided on HeroX)
• Project name • Innovation tagline (i.e., your mission in a few words) • Link to your 90-second online video • Key project members (names, contacts, and links to their LinkedIn profiles) • Keywords that best describe your solution, and which of the three categories you are targeting • Your city, state, and nine-digit zip code

You should answer each of the following four questions. The content bullets are only suggestions to guide your responses. You decide where to focus your answers. The individual answers to the four questions do not have a word limit; however, the aggregate response to these four questions must not exceed 3,000 words, not including captions, figures/graphs, and references. A word count must be included at the end of your submission (see template for details). You may also include up to five supporting images, figures, or graphs. The reviewers will score the questions based on the content you have provided.

Note: If your concept/innovation has substantially pivoted from your original submission, you must provide an explanation of how and why this happened. It is understood that innovation and entrepreneurship are not usually a linear path, but major changes in direction should always be well rationalized. You were selected on the strengths of the idea submitted in the Concept contest, and significant changes without justification are unlikely to be successful.

[5] Use of the template is optional; however, all components listed here must be included in your document if you choose to create your own.

Narrative (PDF) Max 3,000 Words and 5 Supporting Images or Figures (Template[6] will be provided on HeroX)	
Question 1: *Problem & Solution* – What is the problem, and how are you solving it?	
Suggested content you provide • Describe the problem, being specific to the problem space that your innovation addresses,[7] and why existing solutions are inadequate. • Describe your design and how it is better than existing products or emerging solutions. Show how you know this using evidence-based validation (e.g., interviews with users and experts). • Describe your design's unique value propositions.	Score will be based on the following • The competitor quantifies a critical problem, and their assessment of current solutions shows a comprehensive understanding of the problem-solution space. • The solution represents a design approach built on reasonable assumptions, a valid technical foundation, and lessons learned from experience gained. • The competitor is pursuing an innovative and compelling solution.
Question 2: *Design* – What progress have you made to prove your solution will be successful?	
Suggested content you provide • Describe the current state of development of your design, its technical specifications, and sufficient underlying details on how it works to facilitate external evaluation of the performance claims you make.[8] For software designs, provide a top-level software architecture description and drawing. • For structural or facet designs, provide drawings to support the design narrative. • Describe the progress made over the contest period and highlight key engagements, relationships, and milestones.	Score will be based on the following • The design will be scored on its impact to CSP. • Sufficient technical detail was provided to understand the underlying principles of the innovation. • The proof of concept or modeling is grounded in real-world assumptions and resolves critical technical risks. • A considerable amount of high-quality effort was put into building a proof-of-concept model and advancing the innovation.

[6] Use of the template is optional; however, all components listed here must be included in your document if you choose to create your own.
[7] Avoid providing general background on the rapid growth of the solar industry or other high-level trends with which the reviewers are well versed.
[8] Avoid characterizing core innovations as proprietary and thus preventing independent evaluation by the expert judges. It is the intent of the Prize Administrator that, unless otherwise noted, no parts of the submitted materials be released to the public (see Appendix 1 for more details).

• Describe how you have validated your technical performance assumptions. • Describe how you have validated your cost savings assumptions. • Describe who gave feedback on your proof of concept, why it is important, and changes you made as a result of that feedback.	• A rigorous customer discovery process was performed to uncover key insights and relevant feedback on the proof of concept. • Technical and cost assumptions are properly validated.
Question 3: *Team* – What qualities give you a competitive edge, and how have you grown or changed since the Concept prize?	
Suggested content you provide • Introduce your team and highlight the diversity, knowledge, and skills that make the team uniquely capable of achieving success. • Describe how your team has evolved during the competition, including any strategic hires or partnerships. • Explain why winning the Design contest will substantively change the likelihood of your success.	Score will be based on the following • The team's drive, diversity, knowledge, and complementary skill sets provide a strong competitive edge toward realizing this solution in the near future. • The team identified skill gaps and brought in the right people or partners to fill those gaps. • Winning the Design contest significantly increases the team's chances of creating a viable business based on this solution.
Question 4: *Plan* – How are you performing on your plan?	
Suggested content you provide • Provide the plans and goals submitted in the Concept contest submission package and describe the actual outcomes. Update plans and goals for the Assess contest (including your team's commercialization and sharing plans). • Describe your team's readiness to meet your goals and the need for additional talent and/or resources. • Describe the specific functional improvements your prototype will demonstrate at the next demo day. • Provide a high-level budget plan to meet your goals for the Assess phase, including how you will leverage program resources— specifically, members of the American-Made Network or other entities.	• Score will be based on the following The competitors are successfully meeting prior goals and demonstrating continued critical progress toward testing and validating the functionality of and market demand for this innovation. Competitors are successfully following their commercialization and sharing plans as described in the Concept contest. • Stated Assess contest goals are ambitious and risk-reducing, and they show a commitment to an accelerated solution development cycle. • The competitors' approach to completing their proposed plan is well reasoned and makes good use of the program resources available to them.

• Describe risks to the development plan and mitigation strategies (e.g., certification timelines or dependance on third parties). • Provide the metrics submitted in the Concept contest submission package and describe the actual team's performance against those metrics. Update metrics for the later phases as necessary.	• Sufficient risks to the development plan have been identified and reasonable risk mitigation strategies have been described. • The competitors are successfully meeting stated metrics and demonstrating continued progress toward next-phase metrics.

Reviewer Recommendation	
• There is no direct corresponding submission requirement for this score. Rather, it is an overall assessment of all materials submitted in HeroX.	• Score will be based on the following This innovation, team, and plan should be strongly considered for a Design contest prize.

Submission Summary Slide (a PowerPoint Slide as a PDF To Be Made Public)
Make your own public-facing, one-slide submission summary that contains technically specific details but can be understood by most people. There is no template, so feel free to present the information as you see fit. Please make any text readable in a standard printout and conference room projection.

Letters of Commitment or Support (optional, as a PDF)
Submit one-page letters of support, intent, or commitment from relevant entities (e.g., potential users of the proposed innovation) to provide context. Letters of support from partners or others who are critical to the success of your proposed solution will likely increase your score. General letters of support from parties that are not critical to the execution of your solution will likely not factor into your score. Please do not submit multi-page letters.

Please read and comply with additional requirements about your submission in Appendix 1.

COMPETITORS WHO DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.

3.7 How We Score

The scoring of submissions will proceed as follows:

- A panel of expert reviewers reads, scores, and comments on each submission. Each question under the narrative questions receives a score. The final score from an individual reviewer for a submission package equals the total sum of the scores for all scored sections. All reviewers'

scores will then be averaged for a final reviewer score for the submission package. The final prize judge considers reviewer scores when deciding the winners of the prize.

- Reviewers may not have personal or financial interests in, or be an employee, officer, director, or agent of any entity that is a registered participant in this contest or have a familial or financial relationship with an individual who is a registered competitor.

Note: Expert reviewers will also provide comments on the submissions they review. The Prize Administrator intends to provide comments to competitors after the winners are announced. These comments are intended to help competitors to continue to improve and iterate on their submissions. The comments are the opinions of the expert reviewers and do not represent the opinions of DOE.

- Interviews: The Prize Administrator, at its sole discretion, may decide to hold a short interview with a subset of the Design contest competitors. Interviews would be held prior to the announcement of winners and would serve to help clarify questions the judge may have. Attending interviews is not required, and interviews are not an indication of winning.

The judge's final determination of winners will take reviewer scores, team performance on the demo day, reviewer deliberation, interview findings (if applicable), and program policy factors listed in Appendix 1 into account. DOE is the judge and final decision maker and may elect to award all, none, or some of the submissions accepted at each submission deadline.

3.8 Find Help

Visit https://network.americanmadechallenges.org/ to review and contact the members of the American-Made Network who have signed up to help you succeed.

3.9 Additional Requirements

Please read and comply with additional requirements in Appendix 1.

COMPETITORS WHO DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.

4 Assess Contest Rules

4.1 Introduction

The American-Made Heliostat Prize is a three-contest prize providing up to $3 million in cash prizes. It is designed to accelerate technology innovation through the design, development, and demonstration of selected heliostat components that drive the cost and performance of heliostats, ultimately supporting SETO's goals of low-cost solar-thermal energy for both high-temperature industrial process heating as well as high-efficiency electricity production, coupled with thermal energy storage.

Assess Contest Prizes
• Up to three winners. • Each winner receives a cash prize of $300,000.

The Assess contest is the third in this three-contest series. Successful competitors will win $300,000 in cash. Only competitors who won the Design contest are eligible to compete in the Assess contest. The following rules are for competitors in the Assess contest. “You” and “your” reference competitors in the contest.

4.2 Goal

The goal of the Assess contest period is the final design, prototyping, and testing of the heliostat components designed during the Design contest. Specific goals include:

- Build prototypes or partial prototypes to be used as a test article (proof of concept) or for risk reduction
- Any testing of the prototypes or partial prototypes to validate design
- Refine design as required based on the testing results.

Additionally, competitors will identify committed partners that demonstrate commercial viability and use continual customer and stakeholder feedback to substantially advance their solution from proof of concept to prototype.

4.3 Prizes To Win

The Assess contest offers up to three cash prizes of $300,000.

4.4 How To Enter

Complete a submission package online at https://www.herox.com/heliostat before the contest closing date.

4.5 Assess Contest Process

The Assess Contest consists of three steps:

1. Preparation, Activation, and Submission – Competitors develop a final design of the heliostat structures, mirror facets, or wireless control system that they have identified in the Design contest. One-person teams (provided they are incorporated as a business) can compete, but building a diverse, multidisciplinary team may help strengthen capabilities and team competencies. Competitors complete their submission packages and submit online before the Assess contest closes.
2. Assessment – The Prize Administrator screens submissions for eligibility and completion and groups the submissions by technology area. The administrator then assigns subject matter expert reviewers to independently score the content of each submission. The reviewers assess the submissions based on the judging criteria.
    - Heliostat Structure: Build a prototype or partial prototype and conduct initial testing of the components from the Design contest. The goals of the initial test are to reduce structural cost; maintain or increase performance, as stated above; meet wind and moisture operation performance targets; and to demonstrate manufacturability.
    - Mirror Facets: Build a prototype and conduct initial testing of the components from the Design contest. The goals of the initial test are reduction in facet cost or significant increase in performance, meeting optical requirements, achieving a focal length of ~100

meters, meeting hail and moisture operation targets, and prototype build to demonstrate manufacturability.

- Wireless Control Systems: Build and install a partial prototype field and conduct initial testing of wireless field control from the Design contest. The design goals for the wireless heliostat control system are to be flexible or variably driven (5000–100,0000 nodes), have closed loop calibration, are secure from attack, and feature automatic safe mode and fault tolerance architecture (for both hardware and software).

3. Announcement – After the Heliostat Component Prize winners are publicly announced, the Prize Administrator notifies them and requests the necessary information to distribute cash prizes.

4.6 What To Submit

A complete submission for the Assess contest must include the following items:

Item	Content
Submission Package	• 90-second video (public) • Cover page content • Narrative that answers questions in the Narrative table (not to exceed 3,000 words) • Summary PowerPoint slide (public) • Letters of commitment or support (optional).

Note: Portions of the submission package are made available to the public. These have been denoted as such and DOE does not intend to release the remaining parts of the submission to the public. See Appendix 1 for additional details.

All documents must be uploaded as a PDF.

The following details provide more guidance on what information to provide and how judges evaluate and score your submission. Judges will evaluate your submission by assigning a single score for each scored submission section, based on their overall agreement or disagreement with a series of statements. These statements are the criteria. Each of the four questions will receive an individual score from 0-5. These four scores will be combined to yield a final score out of 20.

strongly disagree: 0	disagree: 1	slightly disagree: 2	slightly agree: 3	agree: 4	strongly agree: 5
Online Public Video – What Is Your Innovation in 2-4 Minutes?					
Suggested content you provide • The problem you are solving • Your solution and why it is transformational • Who you are and why you have a competitive edge			The video is not scored in this phase		

Post your publicly accessible video online (e.g., YouTube, Vimeo). Be creative and produce a video that conveys the required information in exciting and interesting ways, but do not focus on time-consuming activities that only improve production values (i.e., technical elements such as décor, lighting, and cinematic techniques). Assistance from others with experience in this area may be helpful. Members of the American-Made Network may be able to help you create your video.

Cover Page – List Basic Information About Your Submission (Template[9] will be provided on HeroX)
• Project name • Innovation tagline (i.e., your mission in a few words) • Link to your 90-second online video • Key project members (names, contacts, and links to their LinkedIn profiles) • Keywords that best describe your solution, and which of the three categories you are targeting • Your city, state, and nine-digit zip code

You should answer each of the following four questions. The content bullets are only suggestions to guide your responses. You decide where to focus your answers. The individual answers to the four questions do not have a word limit; however, the aggregate response to these four questions must not exceed 3,000 words, not including captions, figures/graphs, and references. A word count must be included at the end of your submission (see template for details). You may also include up to five supporting images, figures, or graphs. The reviewers will score the questions based on the content you have provided.

Narrative (PDF) Max 3,000 Words and 5 Supporting Images or Figures (Template[10] will be provided on HeroX)	
Question 1: *Problem & Solution* – What is the problem, and how are you solving it?	
Suggested content you provide	Score will be based on the following
• Describe the problem, being specific to the problem space that your innovation addresses,[11] and why existing solutions are inadequate. • Describe your detailed design and how it is better than existing products or emerging solutions. Show how you know this using	• The competitor quantifies a critical problem, and their assessment of current solutions shows a comprehensive understanding of the problem-solution space. • The solution represents an innovative approach built on reasonable assumptions, a valid technical foundation, and lessons learned from experience gained.

[9] Use of the template is optional; however, all components listed here must be included in your document if you choose to create your own.
[10] Use of the template is optional; however, all components listed here must be included in your document if you choose to create your own.
[11] Avoid providing general background on the rapid growth of the solar industry or other high-level trends with which the reviewers are well versed.

evidence-based validation (e.g., interviews with users and experts). • Describe your design's unique value propositions.	• The competitor is pursuing an innovative and compelling solution.
Question 2: *Detailed Design* – What progress have you made to prove your solution will be successful?	
Suggested content you provide • Describe the current state of development of your detailed design, prototypes and models, their technical specifications, and sufficient underlying details to facilitate external evaluation of the performance claims you make.[12] For software designs, provide a top-level software architecture description and drawing. • For structural or facet designs, provide drawings to support the design narrative. • Describe the progress made over the contest period and highlight key engagements, relationships, and milestones. • Describe how you have validated your technical performance assumptions. • Describe how you have validated your cost savings assumptions. • Describe your business model, cost model, and potential price points. • Describe your committed pilot test partner(s), their interest in your solution, their level of commitment, and expected pilot testing outcomes.	Score will be based on the following • The detailed design will be scored based on its impact to CSP. • Sufficient technical detail was provided to understand the underlying principles of operation of the innovation. • The prototypes and models are grounded in real-world assumptions and resolve critical technical risks. • A considerable amount of high-quality effort was put into building the prototypes and models, advancing the innovation. • The assumptions around the business model and pricing are reasonable, achievable, and competitive. Cost assumptions are properly validated. • The committed pilot test partner has the need for, and capability to, pilot test and potentially utilize this innovation. • Technical assumptions are properly validated.
Question 3: *Team* – Going forward, *w*hat qualities give you a competitive edge?	
Suggested content you provide • Introduce your team and how it has evolved, highlighting the diversity, knowledge, and	Score will be based on the following • The team's drive, diversity, knowledge, and complementary skill sets provide a strong

[12] Avoid characterizing core innovations as proprietary and thus preventing independent evaluation by the expert judges. It is the intent of the Prize Administrator that, unless otherwise noted, no parts of the submitted materials be released to the public (see Appendix 1 for more details).

skills that make the team uniquely capable of achieving success. • Describe what qualities give you a competitive edge, and how you plan to utilize those qualities. • Explain why winning the Assess contest will substantively change the likelihood of your success.	competitive edge toward realizing this solution in the near future. • The competitive edge is clear, and plans seem achievable. • Winning the Assess contest significantly increases the team's chances of creating a viable business based on this solution.
Question 4: *Plan* – How did you perform on your stated plans?	
Suggested content you provide	Score will be based on the following
• Provide the previous contest goals and describe the actual outcomes (including your team's commercialization and sharing plans). Define goals for the next 90, 180, and 365 days (see special instructions below). • Describe the any discrete improvements and functionality to the prototype you plan to implement as you prepare to take your product to market. • Provide a high-level budget plan to meet your goals over the next six months. • Describe risks to the development plan and mitigation strategies (e.g., certification timelines or dependance on third parties). • Provide the metrics submitted in the Design contest submission package and describe the actual team's performance against those metrics.	• The competitors are successfully meeting prior goals and demonstrating continued critical progress toward testing and validating the functionality of and market demand for this innovation. Competitors are successfully following their commercialization and sharing plans as previously described. • Stated goals for the next six months are ambitious and risk-reducing, and they show a commitment to an accelerated solution development cycle. • The competitors' approach to completing their proposed plan is well-reasoned and makes good use of the program resources available to them. • Sufficient risks to the development plan have been identified and reasonable risk mitigation strategies have been described. • The competitors have successfully met stated metrics.

Reviewer Recommendation	
• There is no direct corresponding submission requirement for this score. Rather, it is an overall assessment of all materials submitted in HeroX.	Score will be based on the following • This innovation, team, and plan should be strongly considered for an Assess contest prize.

Submission Summary Slide (a PowerPoint Slide as a PDF To Be Made Public)
Make your own public-facing, one-slide submission summary that contains technically specific details but can be understood by most people. There is no template, so feel free to present the information as you see fit. Please make any text readable in a standard printout and conference room projection.

Letters of Commitment or Support (optional, as a PDF)
Submit one-page letters of support, intent, or commitment from relevant entities (e.g., potential users of the proposed innovation) to provide context. Letters of support from partners or others who are critical to the success of your proposed solution will likely increase your score. General letters of support from parties that are not critical to the execution of your solution will likely not factor into your score. Please do not submit multi-page letters.

Please read and comply with additional requirements about your submission in Appendix 1.

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4.7 How We Score

The scoring of submissions will proceed as follows:

- A panel of expert reviewers reads, scores, and comments on each submission. Each question under the narrative questions receives a score. The final score from an individual reviewer for a submission package equals the total sum of the scores for all scored sections. All reviewers' scores will then be averaged for a final reviewer score for the submission package. The final prize judge considers reviewer scores when deciding the winners of the prize.
    - Reviewers may not have personal or financial interests in, or be an employee, officer, director, or agent of any entity that is a registered participant in this contest, or have a familial or financial relationship with an individual who is a registered competitor.

Note: Expert reviewers will also provide comments on the submissions they review. The Prize Administrator intends to provide comments to competitors after the winners are announced. These comments are intended to help competitors to continue to improve and iterate on their submissions. The comments are the opinions of the expert reviewers and do not represent the opinions of DOE.

- Interviews: The Prize Administrator, at its sole discretion, may decide to hold a short interview with a subset of the Assess contest competitors. Interviews would be held prior to the announcement of winners and would serve to help clarify questions the judge may have. Attending interviews is not required, and interviews are not an indication of winning.

The judge's final determination of winners will take reviewer scores, team performance on the demo day, reviewer deliberation, interview findings (if applicable), and program policy factors listed in Appendix 1 into account. DOE is the judge and final decision maker and may elect to award all, none, or some of the submissions accepted at each submission deadline.

4.8 Find Help

Visit https://americanmadechallenges.org/network.html to review and contact the members of the American-Made Network who have signed up to help you succeed.

4.9 Additional Requirements

Please read and comply with additional requirements in Appendix 1.

COMPETITORS WHO DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.

Appendix 1: Additional Terms and Conditions

A.1 Universal Contest Requirements

Your submission for the Concept, Design, and Assess contests is subject to following terms and conditions:

- If any team member is actively receiving funding from SETO at the Concept submission deadline, SETO will review any potential prize awards, as well as other DOE funding, and make a decision as to whether awarding a prize to individuals or entities already receiving funding is in line with the program policy factors stated later in these rules (Section A.13).
- Competitors who won any contest in a previous round of the American-Made Solar Prize are discouraged from submitting the same or similar idea to a future round of the Prize.
- You must post the final content of your submission or upload the submission form online at https://www.herox.com/solarprizeround6 before the Concept, Design, and Assess contests close. Late submissions or any other form of submission do not qualify.
- The video submission, summary slide, and technical assistance request will be made public.
- The cover page, narrative, and letters of commitment/support are not intended to be made public; however, see Section A.10 regarding the Freedom of Information Act (FOIA).
- You agree to release your submission video under a Creative Commons Attribution 4.0 International License (see http://creativecommons.org/licenses/by/4.0/).
- You must include all the required submission elements. The Prize Administrator may disqualify your submission after an initial screening if you fail to provide all required submission elements. Competitors may be given an opportunity to rectify submission errors due to technical challenges.
- Your submission must be in English and in a readable and searchable PDF format. Scanned handwritten submissions will be disqualified.
- Competitors will be disqualified if, during any engagement with the Solar Prize, their content including but not limited to the submission, the online forum, emails to the Prize Administrator, or other forms of communication, contain any matter that, in the discretion of DOE, is indecent, lacking in professionalism, or demonstrates a lack of respect for people or life on this planet.
- If you click "Accept" on the HeroX platform and proceed to register for any of the contests described in this document, these rules will form a valid and binding agreement between you and DOE, in addition to the existing HeroX Terms of Use, for all purposes relating to these contests. You should print and keep a copy of these rules. These provisions only apply to the contests described here and no other contests on the HeroX platform or anywhere else.
- The Prize Administrator, when feasible, may give competitors an opportunity to fix non-substantive mistakes or errors in their submission packages.

A.2 Verification for Payments

The Prize Administrator will verify the identity and the role of a participant potentially qualified to receive the prizes. Receiving a prize payment is contingent upon fulfilling all requirements contained herein. The Prize Administrator will notify winning competitors using provided email contact information after the date that the results are announced. Each competitor (or parent/guardian if under 18 years of age) will be required to sign and return to the Prize Administrator, within 30 days of the date the notice is

sent, a completed National Renewable Energy Laboratory Request for ACH Banking Information form and a completed W9 form (https://www.irs.gov/pub/irs-pdf/fw4.pdf). At the sole discretion of the Prize Administrator, a winning competitor will be disqualified from the competition and receive no prize funds if: (i) the person/entity cannot be contacted; (ii) the person/entity fails to sign and return the required documentation within the required time period; (iii) the notification is returned as undeliverable; or (iv) the submission or person/entity is disqualified for any other reason.

A.3 Teams and Single-Entity Awards

The Prize Administrator will award a single dollar amount to the designated primary submitter, whether the submitter consists of a single or multiple entities. The primary submitter is solely responsible for allocating any prize funds among its member competitors as they deem appropriate.

A.4 Submission Rights

The public videos in this contest must be submitted and released to the public under a Creative Commons Attribution 4.0 International License (see http://creativecommons.org/licenses/by/4.0/).

By making a submission and consenting to the rules of the contest, a competitor is granting to DOE, the Prize Administrator, and any other third parties supporting DOE in the contest, a license to display publicly and use the parts of the submission that are designated as "public" for government purposes. This license includes posting or linking to the public portions of the submission on the Prize Administrator's or HeroX's applications, on the contest website, on DOE websites, and on partner websites, and the inclusion of the submission in any other media worldwide. The submission may be viewed by DOE, the Prize Administrator, and judges for purposes of the contests, including but not limited to screening and evaluation purposes. The Prize Administrator and any third parties acting on their behalf will also have the right to publicize the competitors' names and, as applicable, the names of competitors' team members and organizations that participated in the submission, on the contest website indefinitely.

By entering, Competitor represents and warrants that:

The competitor is the sole, original author, and copyright owner of the submission or that the applicant has acquired sufficient rights to use and to authorize others, including DOE, to use the submission as specified throughout the rules; that the submission does not infringe upon any copyright, trade secret, trademark, nondisclosure agreement, patent, or any other third-party rights; and that the submission is free of malware.

A.5 Copyright

Each competitor represents and warrants that the competitor is the sole author and copyright owner of the submission; that the submission is an original work of the applicant, or that the applicant has acquired sufficient rights to use and to authorize others, including DOE, to use the submission, as specified throughout the rules; that the submission does not infringe upon any copyright or upon any other third-party rights of which the applicant is aware; and that the submission is free of malware.

A.6 Contest Subject to Applicable Law

All contests are subject to all applicable federal laws and regulations. Participation constitutes each participant's full and unconditional agreement to these Official Contest Rules and administrative decisions, which are final and binding in all matters related to the contest. This notice is not an obligation of funds; the final awards are contingent upon the availability of appropriations.

A.7 Resolution of Disputes

DOE is solely responsible for administrative decisions, which are final and binding in all matters related to the contest.

In the event of a dispute, the authorized account holder of the email address used to register will be deemed to be the competitor. The "authorized account holder" is the natural person or legal entity assigned an email address by an Internet access provider, online service provider, or other organization responsible for assigning email addresses for the domain associated with the submitted address.
Competitors and potential winners may be required to show proof of being the authorized account holder.

The Prize Administrator will not arbitrate, intervene, advise on, or resolve any matters between team members or any disputes between teams.

A.8 Publicity

The winners of these prizes (collectively, "winners") will be featured on DOE and NREL websites.

Except where prohibited, participation in the contest constitutes each winner's consent to DOE's and its agents' use of each winner's name, likeness, photograph, voice, opinions, and/or hometown and state information for promotional purposes through any form of media worldwide, without further permission, payment, or consideration.

A.9 Liability

Upon registration, all participants agree to assume and, thereby, have assumed any and all risks of injury or loss in connection with or in any way arising from participation in this contest or development of any submission. Upon registration, except in the case of willful misconduct, all participants agree to and, thereby, do waive and release any and all claims or causes of action against the federal government and its officers, employees, and agents for any and all injury and damage of any nature whatsoever (whether existing or thereafter arising; whether direct, indirect, or consequential; and whether foreseeable or not) arising from their participation in the contest, whether the claim or cause of action arises under contract or tort.

In accordance with the delegation of authority to run this contest delegated to the Director of SETO, the Director has determined that no liability insurance will be required of competitors to compete in this competition, per 15 USC 3719(i)(2).

A.10 Records of Retention and Freedom of Information Act (FOIA)

All materials submitted to DOE as part of a submission become DOE records. Any confidential commercial information contained in a submission should be designated at the time of submission.

Competitors are encouraged to employ protective markings in the following manner:

- The cover sheet of the submission must be marked as follows and must identify the specific pages containing trade secrets or commercial or financial information that is privileged or confidential:

Notice of Restriction on Disclosure and Use of Data:
Pages [list applicable pages] of this document may contain trade secrets or commercial or financial information that is privileged or confidential and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]

- The header and footer of every page that contains trade secrets or privileged commercial or financial information must be marked as follows: "May contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure."
- In addition, each line or paragraph containing trade secrets or commercial or financial information that is privileged or confidential must be enclosed in brackets.

Competitors will be notified of any FOIA requests for their submissions in accordance with 29 C.F.R. § 70.26. Competitors may then have the opportunity to review materials and work with a FOIA representative prior to the release of materials.

A.11 Privacy

If you choose to provide HeroX with personal information by registering or completing the submission package through the contest website, you understand that such information will be transmitted to DOE and may be kept in a system of records. Such information will be used only to respond to you in matters regarding your submission and/or the contest unless you choose to receive updates or notifications about other contests or programs from DOE on an opt-in basis. DOE and NREL are not collecting any information for commercial marketing.

A.12 General Conditions

DOE reserves the right to cancel, suspend, and/or modify the contest, or any part of it, at any time. If any fraud, technical failures, or any other factors beyond DOE's reasonable control impair the integrity or proper functioning of the contests, as determined by DOE in its sole discretion, DOE may cancel the contest.

Although DOE indicates in the Concept, Design, and Assess contests that it will select up to several winners for each contest, DOE reserves the right to only select competitors that are likely to achieve the goals of the program. If, in DOE's determination, no competitors are likely to achieve the goals of the program, DOE will select no competitors to be winners and will award no prize money.

ALL DECISIONS BY DOE ARE FINAL AND BINDING IN ALL MATTERS RELATED TO THE CONTEST.

A.13 Program Policy Factors

While the scores of the expert reviewers will be carefully considered, it is the role of the Prize Administrator to maximize the impact of contest funds. Some factors outside the control of competitors and beyond the independent expert reviewer scope of review may need to be considered to accomplish this goal. The following is a list of such factors. In addition to the reviewers' scores, the below program policy factors may be considered in determining winners:

- Geographic diversity and potential economic impact of projects in a variety of solar markets
- Whether the use of additional DOE funds and provided resources continues to be nonduplicative and compatible with the stated goals of this program and DOE's mission generally

- The degree to which the submission exhibits technological or programmatic diversity when compared to the existing DOE project portfolio and other competitors
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers
- The degree to which the submission is likely to lead to increased employment and manufacturing in the United States or provide other economic benefit to U.S. taxpayers
- The degree to which the submission will accelerate transformational technological, financial, or workforce advances in areas that industry by itself is not likely to undertake because of technical or financial uncertainty
- The degree to which the submission supports complementary DOE efforts or projects, which, when taken together, will best achieve the research goals and objectives
- The degree to which the submission expands DOE's funding to new competitors and recipients that have not been supported by DOE in the past
- The degree to which the submission exhibits team member diversity and the inclusion of underrepresented groups, with participants including but not limited to graduates and students of historically black colleges and universities (HBCUs) and other minority serving institutions (MSIs) or members operating within Qualified Opportunity Zones or other underserved communities
- The degree to which the submission enables new and expanding market segments
- Whether the project promotes increased coordination with nongovernmental entities for the demonstration of technologies and research applications to facilitate technology transfer.

A.14 Definitions

Prize Administrator means both the Alliance for Sustainable Energy, operating in its capacity under the Management and Operating Contract for NREL, and SETO. When the Prize Administrator is referenced in this document, it refers to staff from both the Alliance for Sustainable Energy and SETO. Ultimate decision-making authority regarding contest matters rests with the Director of SETO.

This is the end of the Rules Document. Thank you for reading.