

Microbattery Design Prize



U.S. DEPARTMENT OF ENERGY



Microbattery Design Prize Phase 2 Rules

November 2023

Preface

The U.S. Department of Energy’s Microbattery Design 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.

Date	Modification

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1 Executive Summary

The U.S. Department of Energy (DOE) Advanced Materials and Manufacturing Technologies Office is launching the American-Made Microbattery Design Prize. This prize aims to highlight innovative new designs for microbatteries and accelerate their commercialization and integration into exciting technologies. This prize seeks out the most promising innovative designs for **small-sized batteries (batteries with a volume¹ ≤ 100 mm³)** that can provide improved performance and safety appropriate to the application and that are recyclable.²

Battery technologies and wireless digital communication technologies have experienced rapid innovation in recent years. Devices are increasingly being developed for use in environments and ways in which they do not have constant connections to power sources and therefore need to rely on a batteries to operate. Many of these technologies, such as wireless sensor systems or wearable medical devices, have very different size, weight, power, and capacity demands than what current standard battery sizes can meet. Designing batteries to better match the needs of these systems can improve their efficiency, performance, and safety, which is paramount in some cases.

1.1 Prizes

The Microbattery Design Prize offers a total prize pool of \$1.25 million in cash across two phases. In Phase 1 - Idea, teams submitted designs for batteries with a total volume ≤ 100 mm³, including descriptions, technical specifications, intended applications, and impacts. Up to eight winning teams will receive \$75,000 each in cash and the opportunity for battery performance and/or safety testing work to be completed at a national lab and will be eligible to compete in Phase 2 - Test.

In Phase 2 - Test, winning teams from Phase 1 – Idea will submit a summary of the technical progress they have made, a detailed manufacturing plan, and prototypes for performance and safety testing by one or more DOE national laboratories. More details will be forthcoming, but submissions for Phase 2 - Test should outline the progress made and challenges addressed regarding microbattery prototype development and how that may have impacted the design. Further, submissions for Phase 2 - Test should describe a framework toward the commercialization of the microbattery, describe the team's manufacturing plan along with techno-economic analysis, and include letters of support from potential commercial partners, if available. At the end of Phase 2 - Test, up to one winning team will receive \$300,000 in cash, and up to two runners-up will receive \$175,000 each in cash.

Contest	Winners	Prizes
Phase 1 - Idea	<ul style="list-style-type: none">Up to 8	<ul style="list-style-type: none">\$75,000 cash (each)Prototype testing services at a national lab
Phase 2 - Test	<ul style="list-style-type: none">Up to 1 winnerUp to 2 runners-up	<ul style="list-style-type: none">\$300,000 (winner)\$175,000 (each for the 2 runners-up)

¹ Volume includes cell and packaging.

² The Department of Energy is focused on improving recyclability but understands that the size limitations on this prize also limit the likelihood of recycling possibilities for battery designs and applications. This prize is also open to single-use designs.

1.2 Key Dates

- Phase 1 Submission Opens: March 8, 2023
- Phase 1 Submission Closes: 5 p.m. ET on June 29, 2023
- Phase 1 Winner Announcement: November 16, 2023
- Phase 2 Opens: (anticipated) November 16, 2023
- Phase 2 Submission Closes: 5 p.m. ET on April 16, 2025
- Phase 2 Winner Announcement: (anticipated) July 2025

1.3 Eligibility and Competitors

All Phase Eligibility

This competition is open to submissions of designs (for Phase 1) and prototypes (for Phase 2) of batteries with total package volume less than or equal to 100 mm³.

The competition is open only to private entities (for-profits and nonprofits); non-federal government entities such as states, counties, tribes, and municipalities; and academic institutions, subject to the following requirements:

- 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 permanent resident. Individuals competing as part of a team may participate if they are legally authorized to work in the United States.
- Private entities must be incorporated in and maintain a primary place of business in the United States.
- Academic institutions must be based in the United States.
- DOE employees, employees of sponsoring organizations, members of their immediate families (e.g., spouses, children, siblings, or parents), and persons living in the same household as such persons, whether or not related, are not eligible to participate in the prize.
- 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.
- Federal entities and federal employees are not eligible to participate in any portion of the prize.
- DOE national laboratory employees cannot compete in the prize.
- Entities and individuals publicly banned from doing business with the U.S. government such as entities and individuals debarred, suspended, or otherwise excluded from or ineligible for participating in federal programs are not eligible to compete.

- Individuals participating in a foreign government talent recruitment program³ sponsored by a country of risk⁴ and teams that include such individuals are not eligible to compete.
- Entities owned by, controlled by, or subject to the jurisdiction or direction of a government of a country of risk are not eligible to compete.
- To be eligible, an individual authorized to represent the competitor must agree to and sign the following statement upon registration with HeroX:

I am providing this submission package as part of my participation in this prize. I understand that the information contained in this submission will be relied on by the federal government to determine whether to issue a prize to the named competitor. 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, and 31 U.S.C. §§ 3729-3733 and 3801-3812.

In keeping with the goal of growing a community of innovators, competitors are encouraged to form 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.

Phase 1 - Ideas Eligibility

- A single competitor or team may submit a maximum of three submissions. If more than three submissions are received from a single competitor or team, the three most recently submitted submissions will be considered.
- Any eligible person, team, or business could submit a package to compete in Phase 1 - Ideas, although individuals must form a business if they advance to Phase 2 - Test. A panel of expert reviewers from industry, national laboratories, and government evaluated submissions. DOE selected the winning Phase 1 - Ideas submissions based on reviewer input and the impact the new solutions may have on the target industries.

Phase 2 - Test Eligibility

- Only winners of Phase 1 - Idea are eligible to compete in Phase 2 – Test.
- Competitors that are for-profit business entities (such as corporations or other organizations that are formed in and maintain a primary place of business in the United States) are eligible to

³ Foreign Government-Sponsored Talent Recruitment Program is defined as an effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having 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 relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States 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.

⁴ DOE has designated the following countries as foreign countries of risk: Iran, North Korea, Russia, and China. This list is subject to change.

compete only if they include a winner of Phase 1 - Idea as an employee or owner. Individuals or groups of individuals are not eligible to compete.

2 Background

2.1 Prize Background

The Microbattery Design Prize is part of the American-Made Challenges program. Funded by the U.S. Department of Energy, our program incentivizes innovation through prizes, training, teaming, and mentoring, connecting the nation’s entrepreneurs and innovators to America’s national labs and the private sector.

Advancements in sensing and mobile technologies have transformed how electronics impact our world, but they have also transformed our energy needs. These energy needs are now at all scales—from grids, houses, and cars down to the microscale to power sensors and devices that will enable our smart homes, smart factories, smart cities, and smart medical devices. For many of these devices, the energy will need to be supplied by onboard storage. Markets for batteries of certain sizes (e.g., larger than 100 mm³) are already robust, but as battery sizes shrink further, their designs and manufacturing approaches change significantly. To complement private industry and the U.S. government’s coordinated R&D into expanding and improving large-scale energy storage technologies, this prize competition seeks to stimulate the increase in energy storage solutions at smaller scales to further power the development of technologies that will enable a smart future.

Application Area	Battery Size (order of magnitude)
Grid storage	>tens of cubic meters
Electric vehicles	1 cubic meter
Power tools	10 cubic centimeters
Consumer and mobile devices	A few cubic centimeters
This prize – advanced sensors and wearable/implantable medical devices	<0.1 cubic centimeter

Microelectronics have transformed society over the past 50 years, in large part due to their repeated size reduction, allowing the computing power that once fit in a room to now fit in our pockets or on a fingertip. Innovation is expected to continue expanding the use of microelectronics beyond personal and communication devices into industrial, agricultural, and even medical settings—all based on our ability to shrink the size of individual microelectronics components such as sensors, actuators, and computing, memory, and communication devices. One bottleneck that has emerged in the size and diversity of these potential devices is their power source.

Emerging application spaces for microelectronics, like smart factories, smart cities, and personal medical devices, often leverage wireless sensors to take in data and transmit it—possibly after some on-node processing—to a central location for driving real-time understanding, control, and even automation. All these devices need to be powered, meaning some method of energy storage needs to be incorporated into their design, even if those devices also incorporate energy-harvesting technologies.

Due to their small size, microbatteries have significantly different manufacturing requirements (e.g. tighter dimensional tolerances, lower production volumes, different chemistries) that prevent companies from leveraging existing large-scale manufacturing processes. This effectively separates the microbattery market from much of the battery supply chain ecosystem, which presents a major barrier to getting new battery chemistries and designs prototyped or commercialized. Supporting the prototyping and testing of more microbattery designs can provide the key link between potential system developers and users and battery manufacturers, helping to spur microbattery manufacturing scale-up and adoption. At an extremely small scale, lithography and thin-film processes are leveraged to make thin-film batteries only a few microns in size that are often directly integrated onto semiconductor substrates. These nano-batteries are generally too small for the energy storage and supply needs for the devices and systems considered here.

Battery manufacturers have made advancements in offering smaller and smaller standardized battery sizes, reaching below 200 mm³ in size for lithium-ion batteries and 50 mm³ in size for other chemistries,⁵ but battery size often remains a limiting factor in the overall sensor or device design. With a wide range of battery chemistries—and therefore possible energy densities—as well as performance and safety needs for different applications, specific capacity limits are less important than size limits. Further innovation in microbattery design can produce even smaller batteries, or batteries of existing microsizes but with increased capacities and safety measures and more optimized for specific applications, possibly leading to process optimization and growth for the microbattery manufacturing industry.

2.2 Prize Phases

The Microbattery Design Prize contains two phases—Idea (completed) and Test—to incentivize the development and production of new microbattery designs for new applications.

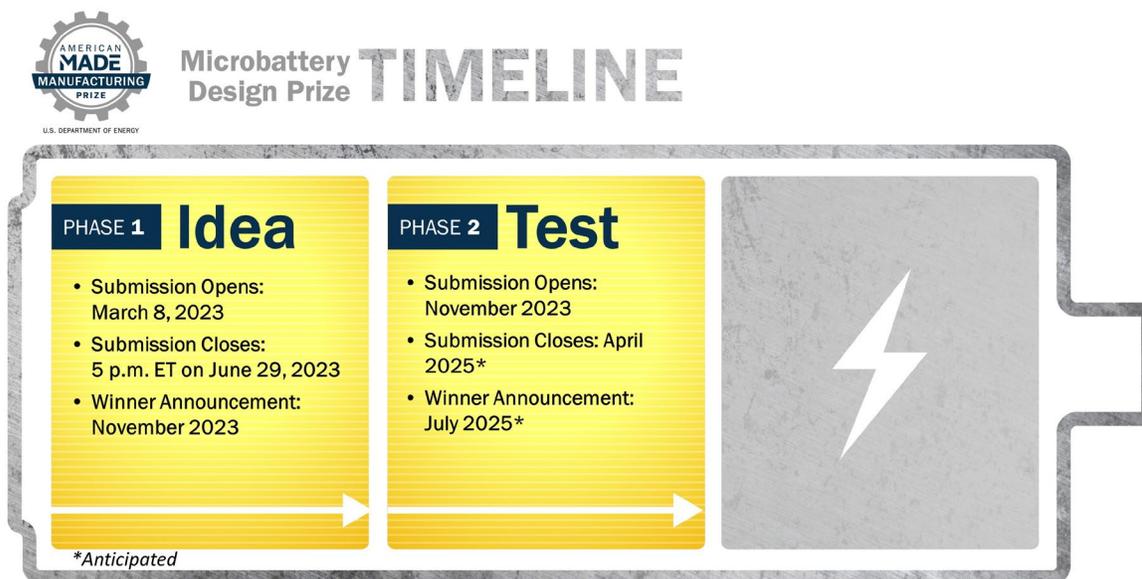
Phase 1 – Idea: Competitors developed and submitted technical designs for microbatteries for a specific application and range of performance specifications. Winners of this phase will receive a \$75,000 cash prize and the opportunity for battery performance and/or safety testing work to be completed at a DOE national laboratory. Any eligible person, team, or business could submit a package to compete in Phase 1 - Idea, although individuals must form a business if they advance to Phase 2 - Test. A panel of expert reviewers from industry, national laboratories, and government evaluated submissions. DOE selected the winning Phase 1 submissions based on reviewer input and the impact the new solutions may have on the target industries.

Phase 2 – Test: Winners from Phase 1 – Idea will substantially advance their designs to a commercially relevant prototype scale and conduct performance and safety testing on prototypes. Commercially relevant prototypes mean any microbattery prototype that is needed or useful as it relates to an already existing or soon-to-exist product, application, system, or device. Competitors will also conduct techno-economic analysis of their prototype technology and take meaningful steps to develop a realistic pathway to commercialization and manufacturing (i.e., developing business and/or manufacturing plans, building interest from potential commercial customers and/or partners, etc.). Prototype testing data and

⁵ https://en.wikipedia.org/wiki/List_of_battery_sizes

justification of pathway development will be submitted for this phase of the competition. Up to one winner will receive a cash prize of \$300,000 and up to two runners-up will receive a cash prize of \$175,000 each. Only businesses with a physical presence in the United States may compete in this phase of the competition. As with the previous phase of the competition, a panel of expert reviewers from industry, national laboratories, and government will evaluate submissions.

Figure 1: Timeline of Microbattery Design Prize competition.



2.3 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 competitors' submissions:

- The proposed solution is not related to the high-capacity battery industries, such as electric vehicles or grid-scale storage.
- The majority of activities described in and that support the submission package are performed in the United States and have the potential to benefit the U.S. market.
- The proposed solution represents an innovation that will move the industry beyond its current state.
- 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.

2.5 Additional Requirements

Please read and comply with additional requirements in Appendix 1.

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

3 Phase 2 Submission Requirements and Review Process

3.1 Goal

The goal of Phase 2 – Test is to transform winning Phase 1 – Idea concepts into commercially relevant prototypes with testing data to validate performance and to build pathways to commercialization and manufacturing scale-up.

3.2 Prizes

For Phase 2 - Test, up to one winning team will receive \$300,000 in cash, and up to two runners-up will receive \$175,000 each in cash.

3.3 Phase 2 Requirements

Only competitors who win Phase 1 - Idea are eligible to compete in Phase 2 - Test. In Phase 2 - Test, competitors will submit a prototype for performance testing at the national labs. They will also submit documents outlining the progress they have made in developing their prototype since their Phase 1 submission, including challenges they have faced and any impacts those challenges have had on their design and/or performance goals. Further, they will describe their microbattery commercialization framework and their manufacturing plan, along with techno-economic analysis. Competitors may include letters of support from potential commercial partners, if available.

3.4 How to Enter

To enter Phase 2 - Test, a competitor must:

1. Send copies of their microbattery prototypes to the approved testing laboratory for testing. All submissions must be postmarked by September 16, 2024. Early sample submittal to the testing laboratory is strongly encouraged.
2. Complete a final submission package (see Section 3.6) online at <https://www.herox.com/microbatterydesign> by April 16, 2025.

3.5 Important Dates

Refer to the timeline on HeroX for relevant dates and deadlines.

DATE	EVENT
November 16, 2023	Phase 2 - Test submissions open
September 16, 2024	Prototype testing submission deadline: <ul style="list-style-type: none">• Physical prototype: all prototypes must be postmarked by this date and sent to Pacific Northwest National Laboratory (PNNL).• Competitors must also email the Prize Administrator with shipping confirmation and tracking information by this date.

	<ul style="list-style-type: none"> Accompanying online documents: Competitors must upload their accompanying online documents to HeroX by 5 p.m. ET.
March 17, 2025	Testing results are sent to the competitors
April 16, 2025	Final submission deadline
Tentative July 2025	Phase 2 - Test winner announcements

3.6 Phase 2 - Test Process

Phase 2 - Test consists of the following steps:

- 1. Progress and Submission** – Competitors develop prototypes and pathways to commercialization of their design submitted in Phase I. Competitors create commercially relevant prototypes (i.e., a microbattery prototype that is needed or useful as it relates to an already existing or soon-to-exist product, application, system, or device) aided by the Phase 2 - Test basic prototype performance testing services. Competitors also make meaningful progress in understanding cost and pricing, developing a business model, and creating a commercialization and manufacturing plan. Competitors complete their submission packages and submit online before the phase closes.

Competitors will develop their prototypes, complete the Prototype Testing Submission Package, and send that package to Pacific Northwest National Laboratory (PNNL). To facilitate appropriate testing at PNNL, a testing form is provided to competitors for them to fill out and submit with their prototypes and Testing Submission Package. The prototypes will be tested, and the results will be provided to the competitors, the Prize Administrators, DOE, and the expert reviewers. Then the competitors will submit the Final Submission Package.

There are two submission packages required for Phase 2 – Test:

a. Prototype Testing Submission Package (due September 16, 2024)

The Prototype Testing Submission Package includes two parts:

- Physical prototype:** Physical prototypes are sent to PNNL. Please see Sections 3.7.1 for more information.
- Online Accompanying Documents:** Submitted via HeroX; online documents consist of a microbattery prototype testing form and a description of the expected results and goals from testing performed. Please see Section 3.7.2 for more information.

b. Final Submission Package (due April 16, 2025)

The Final Submission Package will be provided after the competitors receive the testing information from PNNL. The submission will consist of a cover page and narrative, a summary PowerPoint slide, and letters of commitment or support (optional). Please see Section 3.8 for additional details.

2. **Assessment** – The Prize Administrator screens submissions for eligibility and completion and assigns subject matter experts to review and independently score the content of each submission. The reviewer criteria assess the following competitor activities:
 - a. **Prototype Performance** – How much the prototype has met or exceeded performance goals described in Phase 1, based on submitted Expected Results and Goals from the prototype testing form. How much the competitor has proven/shown that the prototype can be integrated with the intended device/system.
 - b. **Commercialization and Manufacturing Readiness** – How much due diligence, techno-economic analysis, market assessment, and manufacturing readiness assessment the competitor has done and what plans and concrete steps the competitor has taken to create a solid pathway to commercialization.
3. **Announcement** – After the winners are publicly announced, the Prize Administrator notifies them and requests the necessary information to distribute cash prizes.

3.7 Prototype Submission

A complete microbattery Prototype Testing Submission Package should include the following items:

- Physical Prototype Submission – 3, 6, or 9 (depending on testing being requested) identical microbattery prototypes provided to PNNL.
- Online Accompanying Documents – Microbattery prototype testing form and narrative on the expected results and goals from testing submitted via HeroX.

The results of the testing will be provided to the competitors. The competitors will then submit their Final Submission Package via HeroX at April 16, 2025.

Testing results will be used as a key evaluation factor in relation to the content included in all Phase 2 submission materials, specifically the performance of the prototypes as it relates to the narrative on the expected results and goals from the testing as well as with the overall Final Submission Package.

3.7.1 Physical Prototype Submission

All competitors are required to submit a minimum of three prototypes of their microbattery to PNNL for prototype performance testing. Performance testing will be done to determine capacity and energy densities. PNNL has been chosen as the testing organization to ensure fairness and comparability across all submissions.

Each team must submit three prototypes per the current density that they would like their battery to be tested against. There are three current densities that the battery can be tested against. The teams can pick one, two or three of the densities to be tested against. If a team chooses one density, they must provide three identical microbatteries. If a team chooses two densities, they must provide six identical microbatteries. If a team chooses three densities, they must provide nine identical microbatteries. If a team has chosen to be tested with more than one density, then the testing goals narrative (Section 3.7.3) should include justification as to why a team has chosen to test their microbattery with more than one density.

The results from the testing are anticipated to be provided to the competitor via the Prize Administrator within approximately 6 months following the prototype testing submission package deadline, which is September 16, 2024.

It is the responsibility of the researcher at PNNL to examine the microbattery prototypes upon receipt to determine if it is obviously untestable (e.g., broken, incomplete, improperly assembled). It is the responsibility of the competitor to confirm that the researcher at PNNL received the microbattery prototypes, and if the microbattery prototypes are NOT received or are obviously untestable, it is the competitor's responsibility to send new microbattery prototypes by the microbattery prototype submission deadline.

Early submission of microbattery prototypes is highly encouraged, as submissions postmarked after the microbattery prototype submission deadline of September 16, 2024 will not be accepted. The Microbattery Design Prize will prepay for the testing of eligible competitors (i.e., competitors that meet the HeroX registration deadline and overall prize eligibility guidelines in Section 1.3).

Testing results will be sent directly to the Prize Administrator, who will share individual results privately with each competitor.

Competitors are responsible for the cost of shipping their prototypes to the test laboratory; however, the Prize Administrator will pay for the return shipping of prototypes to competitors following testing. It is the intention of the Prize Administrator to ensure that all prototypes are returned to competitors. However, it is agreed to and understood by the competitors that the prototypes may be destroyed and/or become unusable in the process of the testing, shipping, or handling. Therefore, competitors agree that DOE, NREL, PNNL, American-Made Challenges, or any DOE or national lab employee is not at fault if the provided prototypes are returned in broken, damaged, or unusable condition.

Each competitor shall submit at least three identical microbattery prototypes that meet the requirements of having a total package volume less than or equal to 100 mm³. The testing lab (PNNL) cannot and will not test prototypes that fall outside of these parameters.

Mailing instructions: Competitors should package prototypes appropriately to shield against damage during shipping. Once shipped, competitors must email the testing laboratory and copy the Prize Administrator (Microbattery.Design@nrel.gov) with confirmation of shipment, team name, submission title, team captain name and contact, and tracking number. Contact and shipping information for the testing laboratory will be provided to registered eligible competitors after Phase 2 - Test opens (November 16, 2023).

Competitors should also provide their return mailing information in order to have their samples returned to them following testing, including:

- Name
- Company
- Address
- State
- Zip-Code
- Phone Number.

Please note that neither DOE nor NREL are responsible for any damage to the sample, nor are they responsible should the sample be unable to be tested for any reason.

3.7.2 Online Accompanying Documents

In addition to the prototypes mailed directly to PNNL, competitors must submit two documents through HeroX.

Competitors should refer to the microbattery testing form template on [HeroX](#) to complete the necessary table. Competitors should complete the table for expected results from their batteries. There are three forms available—competitors should only complete the applicable form for their submitted microbattery.

This information will be shared with the researchers at PNNL doing the testing as well as provided to the external panel of reviewers.

3.7.3 Testing Goals Narrative

Please answer the following questions with a maximum of 500 words and use the template below. This information will be shared with the researchers at PNNL doing the testing as well as provided to our external panel of reviewers:

Testing Goals Narrative Template
Max 500 words
<ul style="list-style-type: none"> • Question 1: Please describe the specific application of the provided microbatteries. • Answer: • Question 2: What is the minimum capacity and energy needed to power those specific devices. • Answer: • Question 3: What is the expected operational lifetime of the microbattery, in cycles and time and what are the key factors that influence the lifetime? • Answer:

3.8 Final Submission

The Final Submission Package for Phase 2 - Test should include the following items:

- Cover page and narrative
- Summary PowerPoint slide
- Letters of commitment or support (optional).

The following details provide more guidance on what information to provide and how reviewers evaluate and score submissions. Reviewers will evaluate submissions by assigning a single score for each scored submission section, based on their overall agreement or disagreement with a series of statements.

Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
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3.8.1 Cover Page Content

The cover page should list basic information about the submission, including:

- Project title
- Team name
- Short description
- Key project members (names, contacts, and links to their professional online profiles)
- Other partners (if any)

- Business address, city, state, and nine-digit ZIP code.

3.8.2 Narrative

Competitors should answer each of the four questions in the following table. The content bullets are only suggestions to guide responses. Competitors can decide where to focus their 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 3,500 words**, not including captions, figures/graphs, or references. A word count must be included at the end of the submission (see template for details). Competitors may also include **up to five supporting images, figures, or graphs**. The reviewers will score the questions based on the content provided.

Max 3,500 words and 5 supporting images or figures (PDF)	
Question 1: What progress have you made regarding this design since the Phase 1 submission?	
<p>Suggested Content Competitor Provides</p> <ul style="list-style-type: none"> • Provide a brief explanation about your prototype including its current state of development, technical specifications, unique features, and the intended device/system for which it will be integrated. What assumptions have you made in your prototype design and use-case analysis? <ul style="list-style-type: none"> ○ Please make sure that you are including any additional information needed to assess the validity and effectiveness of your performance claims. • Highlight any environmental considerations, such as recyclability or sustainability features, incorporated into your prototype design. • Describe the progress made in advancing your prototype’s design and/or functionality during the Phase 2 - Test contest period and highlight any changes, key achievements, breakthroughs, and advancements. • Discuss any collaborations, partnerships, or other engagements that have supported your prototype development in Phase 2 - Test. • Explain the specific challenges encountered in the development of your prototype and detail the innovative approaches and solutions employed to overcome them. 	<p>A single score is provided, taking the following statements into consideration</p> <ul style="list-style-type: none"> • The competitor provides a comprehensive description of their prototype, including technical specifications, functionality, and core features as well as its intended integration into a specific device/system. The prototype is grounded in real-world assumptions. • The information provided is adequate to assess the validity and effectiveness of the performance claims. • The competitor provides a comprehensive and detailed overview of the progress made in Phase 2 - Test and effectively demonstrates the impact of their efforts during the contest period by showcasing tangible results and outcomes. • The competitor has proactively sought out external collaborations and partnerships to support the development of their prototype in Phase 2 - Test and has clearly highlighted their contributions and impacts that they had on the overall prototype design and development. • The competitor exhibits adaptability and problem-solving skills by effectively identifying the critical technical risks and challenges and implementing appropriate strategies and solutions to overcome them.

<ul style="list-style-type: none"> • Discuss any changes to the design or intended application since Phase 1 - Idea? 	
<p>Question 2: Based on the previously provided testing goals narrative and testing results received from PNNL, have you met, exceeded, or adjusted the performance goals that you have provided throughout this competition? How?</p>	
<p>Suggested Content Competitor Provides</p> <ul style="list-style-type: none"> • Describe how your prototype performed in the testing at PNNL and how you initially expected it to perform in Phase 1 - Idea. • Describe how your prototype performed in the testing at PNNL and how you expected it to perform when you completed the narrative on the expected results and goals at the beginning of Phase 2 – Test. • Describe how the testing results you received will influence and change your approach going forward. • Describe what impact, if any, the testing results will have on the overall system performance. 	<p>A single score is provided, taking the following statements into consideration</p> <ul style="list-style-type: none"> • The testing results meet or exceed the performance goals described in the testing goals narrative. • The competitor exhibits adaptability and problem-solving skills by using the testing results to influence their next steps and to improve their prototype. • The competitor makes reasonable adjustments to the system design and/or performance goals based on the testing results. • The testing goals narrative, prototype test results and final narrative demonstrate a well-thought-out and cohesive path forward.
<p>Question 3: What is your plan to commercialize your design?</p>	
<p>Suggested Content Competitor Provides</p> <ul style="list-style-type: none"> • Describe your commercialization business model, including your approach to generating revenue, marketing and distribution channels, intellectual property protection, regulatory compliance, and manufacturing partnerships as well as any other relevant information. • Describe your expected demand, including market size, target customer segments, and potential applications. • Explain the steps and model that were used to create and validate your commercialization plan. • How close are you to commercializing your product/microbattery? • What next steps are needed to bring your product/microbattery to market? 	<p>A single score is provided, taking the following statements into consideration</p> <ul style="list-style-type: none"> • The commercialization plan is based on reasonable assumptions and is realistic, achievable, and competitive with current market conditions, customer needs, and industry trends. • The assumptions about the expected demand are based in reality, and there is evidence (such as market research reports, customer surveys, and industry analysis) to support these claims. • The team is poised for market success of their prototype within the next 5 years. • The current state of the commercialization plan shows that thought and effort have been given to the commercialization of the product.

Question 4: What is your plan for manufacturing this design at volumes to meet the expected demand?	
<p>Suggested Content Competitor Provides</p> <ul style="list-style-type: none"> • Describe your manufacturing plan, including the processes, facilities, and resources required to produce your prototype at scale and any other relevant information. • To the extent possible, detail the key manufacturing stages, equipment, quality control measures, and any unique aspects of your production approach. • Explain the steps and model that were used to create and validate your manufacturing plan. • What assumptions are you using to inform your manufacturing plan? • How close are you to manufacturing your product/microbattery? • What next steps are needed to have your product/microbattery manufactured? • At what scale do you anticipate your product/microbattery being manufactured? 	<p>A single score is provided, taking the following statements into consideration</p> <ul style="list-style-type: none"> • The manufacturing plan is based on reasonable assumptions and is thorough in its discussion of processes, facilities, and resources required to produce the prototype at scale. • The manufacturing plan demonstrates a clear understanding of manufacturing best practices and incorporates efficient and reliable production methods. The plan is realistic and achievable. • The steps and model that were used to create the manufacturing plan are grounded in real-world manufacturing efforts that lead to success. • The current state of the manufacturing plan shows that thought and effort have been given to the manufacturing of the product.
Reviewer Recommendation	
<ul style="list-style-type: none"> • There is no director corresponding submission requirement for this score. Rather, it is an overall assessment of all materials submitted in HeroX. 	<p>A single score is provided, taking the following statements into consideration</p> <ul style="list-style-type: none"> • The innovation, team, and plan should be strongly considered for a Phase 2 - Test prize.

3.8.3 Submission Summary Slide (Will Be Made Public)

Competitors must make a public-facing, one-slide submission summary that introduces their team and/or organization and their mission. There is no template, so competitors are free to present the information in any format. Any text must be readable on a standard printed page and a conference room projection and should use at least 14-pt font.

3.8.4 Letters of Support or Commitment (Optional)

One-page letters (of support, intent, or commitment) from relevant entities, if available, should be attached to provide context. Letters of support from partners or others that are critical to the success of the proposed solution will likely increase a competitor’s score. General letters of support from parties that are not critical to the execution of the solution will likely not factor into a competitor’s score. Competitors should not submit multipage letters. If competitors are working with a utility partner outside of the three identified for this prize, they must include a letter of support from the utility partner.

3.9 How We Determine and Award Winners

The Prize Administrator screens all completed submissions and ensures that the teams are eligible. Teams must submit both a Prototype Testing Submission Package and Final Submission Package to be considered eligible for a Phase 2 prize. Then the Prize Administrator, in consultation with DOE, assigns subject matter experts to review submissions by independently scoring the content of each submission. The reviewers will be composed of federal and nonfederal subject matter experts with expertise in areas relevant to the competition. They will review the competitor's submission package according to the criteria described throughout section 3.8 above.

3.9.1 Reviewer Panel Scoring

The scoring of submissions will proceed as follows:

- Experts will review each submission individually and assess the response from the competitor to each statement in the four criteria described in the table in Section 3.8.2.
- Reviewers will score each section, depending on the degree to which the reviewer agrees that the submission reflects the statements for consideration.
- Each section score will be added together to generate a total score for the submission.
- The total scores from each reviewer will be averaged to produce a final score for the competing team/organization. This score will inform the judge's decisions on prize awards.

Scoring
The content will be weighted as follows:
Question 1: 10%
Question 2: 35%
Question 3: 20%
Question 4: 20%
Reviewer Recommendation: 15%

3.9.2 Interviews

DOE may decide to interview a subset of competitors. The interviews would be held prior to the announcement of the winners and would serve to help clarify questions the reviewers may have. Participating in interviews is not required, and interviews are not an indication of a competitor's likelihood to win.

3.9.3 Final Determination

DOE will designate a federal employee as the judge before the final determination of the winners. Final determination of the winners by the judge will take into account the reviewers' feedback and scores, test results, application of program policy factors, and the interview findings (if applicable).

3.9.4 Announcement

Approximately 60 days after the contest closes, the Prize Administrator will notify the winners and request the necessary information to distribute the prizes. The Prize Administrator will then publicly announce the winners.

3.10 Additional Terms and Conditions

See Appendix 1 for additional requirements.

COMPETITORS THAT DO NOT COMPLY WITH THE ADDITIONAL REQUIREMENTS IN APPENDIX 1 MAY BE DISQUALIFIED.

Appendix 1: Additional Terms and Conditions

A.1 Requirements

Your submission for the Microbattery Design Prize is subject to the following terms and conditions:

- You must post the final content of your submission or upload the submission form online by 5 p.m. ET on April 16, 2025, before the prize's Phase 2 submission period closes. Late submissions or any other form of submission may be rejected.
- All submissions that you wish to protect from public disclosure must be marked according to the instructions in Section 10 of Appendix 1 (Section A.10). Unmarked or improperly marked submissions will be deemed to have been provided with unlimited rights and may be used in any manner and for any purpose whatsoever.
- You must include all the required elements in your submission. 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 format readable by Microsoft Word or Adobe PDF. Scanned handwritten submissions will be disqualified.
- Submissions will be disqualified if they contain any matter that, in the sole discretion of the U.S. Department of Energy or the National Renewable Energy Laboratory (NREL), is indecent, obscene, defamatory, libelous, and/or 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 prizes described in this document, these rules will form a valid and binding agreement between you and DOE and are 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 prize described here and no other prize on the HeroX platform or anywhere else.
- The Prize Administrator, when feasible, may give competitors an opportunity to fix nonsubstantive mistakes or errors in their submission packages.
- As part of your submission to this prize, 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 the information contained in this submission will be relied on by the federal government to determine whether to issue a prize to the named competitor. 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, and 31 U.S.C. §§ 3729-3733 and 3801-3812.

A.2 Verification for Payments

The Prize Administrator will verify the identity and role of all competitors before distributing any 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 for the individual or entity that was responsible for the submission. Each competitor will be required to sign and return to the Prize Administrator, within 30 days of the date on the notice, a completed NREL Request for ACH Banking

Information form and a completed W9 form (<https://www.irs.gov/pub/irs-pdf/fw9.pdf>). In 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 does not respond to notifications; (ii) the person/entity fails to sign and return the required documentation within the required time period; (iii) the notification is returned as undeliverable; (iv) the submission or person/entity is disqualified for any other reason.

In the event of a dispute as to any registration, 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. All competitors may be required to show proof of being the authorized account holder.

A.3 Teams and Single-Entity Awards

The Prize Administrator will award a single dollar amount to the designated primary submitter, whether consisting of a single or multiple entities. The primary submitter is solely responsible for allocating any prize funds among its member competitors or teammates as they deem appropriate. The Prize Administrator will not arbitrate, intervene, advise on, or resolve any matters or disputes between team members or competitors.

A.4 Submission Rights

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 or HeroX applications, including the contest website, DOE websites, and partner websites, and the inclusion of the submission in any other media worldwide. The submission may be viewed by DOE, Prize Administrator, and judges and reviewers 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 competitors' names and, as applicable, the names of competitors' team members and organization, which participated in the submission on the contest website indefinitely.

By entering, the competitor represents and warrants that:

1. The competitor's entire submission is an original work by the competitor and the competitor has not included third-party content (such as writing, text, graphics, artwork, logos, photographs, likeness of any third party, musical recordings, clips of videos, television programs or motion pictures) in or in connection with the submission, unless (i) otherwise requested by the Prize Administrator and/or disclosed by the competitor in the submission, and (ii) competitor has either obtained the rights to use such third-party content or the content of the submission is considered in the public domain without any limitations on use.
2. Unless otherwise disclosed in the submission, the use thereof by Prize Administrator, or the exercise by Prize Administrator of any of the rights granted by competitor under these rules, does not and will not infringe or violate any rights of any third party or entity, including, without limitation, patent, copyright, trademark, trade secret, defamation, privacy, publicity, false light, misappropriation, intentional or negligent infliction of emotional distress, confidentiality, or any contractual or other rights.
3. All persons who were engaged by the competitor to work on the submission or who appear in the submission in any manner have:

- a. Given the competitor their express written consent to submit the submission for exhibition and other exploitation in any manner and in any and all media, whether now existing or hereafter discovered, throughout the world;
- b. Provided written permission to include their name, image, or pictures in or with the submission (or, if a minor who is not competitor's child, competitor must have the permission of the minor's parent or legal guardian) and the competitor may be asked by the prize administrator to provide permission in writing; and
- c. Not been and are not currently under any union or guild agreement that results in any ongoing obligations resulting from the use, exhibition, or other exploitation of the submission.

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 competitor or that the competitor 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 any other third-party rights of which the competitor 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 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 award is 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.

Neither DOE nor the Prize Administrator will arbitrate, intervene, advise on, or resolve any matters between team members or among competitors.

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 any and all risks of injury or loss in connection with or in any way arising from participation in this contest. 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 judge responsible for this prize, the judge has determined that no liability insurance naming DOE as an insured will be required of competitors to compete in this competition per 15 U.S.C. § 3719(i)(2). Competitors should assess the risks associated with their proposed activities and adequately insure themselves against possible losses.

A.10 Records Retention and Freedom of Information Act

All materials submitted to DOE as part of a submission become DOE records and are subject to the Freedom of Information Act. The following applies only to portions of the submission not designated as public information in the instructions for submission. If a submission includes trade secrets or information that is commercial or financial, or information that is confidential or privileged, it is furnished to the Government in confidence with the understanding that the information shall be used or disclosed only for evaluation of the application. Such information will be withheld from public disclosure to the extent permitted by law, including the Freedom of Information Act. Without assuming any liability for inadvertent disclosure, DOE will seek to limit disclosure of such information to its employees and to outside reviewers when necessary for review of the application or as otherwise authorized by law. This restriction does not limit the Government's right to use the information if it is obtained from another source.

Submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information and may use or disclose such information for any purpose.

The submission must be marked as follows and identify the specific pages containing trade secrets, confidential, proprietary, or privileged information: "Notice of Restriction on Disclosure and Use of Data: Pages [list applicable pages] of this document may contain trade secrets, confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes. [End of Notice]"

The header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Trade Secrets, Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure." In addition, each line or paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets.

Competitors will be notified of any Freedom of Information Act 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 Freedom of Information Act representative prior to the release of materials. DOE does intend to keep all submission materials private except for those materials designated as "will be made public."

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 prize, or any part of it, at any time. If any fraud, technical failures, or any other factor beyond DOE's reasonable control impairs the integrity or proper functioning of the prize, as determined by DOE in its sole discretion, DOE may cancel the prize. Any performance toward prize goals is conducted entirely at the risk of the competitor and DOE shall not compensate any competitors for any activities performed in furtherance of this prize.

Although DOE may indicate that it will select up to several winners for each prize, 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.

DOE may conduct a risk review, using Government resources, of the competitor and project personnel for potential risks of foreign interference. The outcomes of the risk review may result in the submission being eliminated from the prize competition. This risk review, and potential elimination, can occur at any time during the prize competition. An elimination based on a risk review is not appealable.

A.13 Program Policy Factors

While the scores of the expert reviewers will be carefully considered, it is the role of the prize judge to maximize the impact of prize 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.
- Whether the use of additional DOE funds and provided resources are non-duplicative and compatible with the stated goals of this program and the DOE 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 degree to which the submission is likely to lead to increased employment and manufacturing in the United States or provide other economic benefits 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-funded efforts or projects, which, when taken together, will best achieve the goals and objectives of DOE.
- The degree to which the submission expands DOE's funding to new competitors and recipients who have not been supported by DOE in the past.
- The degree to which the submission enables new and expanding market segments.
- Whether the project promotes increased coordination with nongovernmental entities toward enabling a just and equitable clean energy economy in their region and/or community.

A.14 National Environmental Policy Act Compliance

This prize is subject to the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321, et seq.). NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website at <http://nepa.energy.gov/>.

While NEPA compliance is a federal agency responsibility and the ultimate decisions remain with the federal agency, all participants in the Inclusive Energy Innovation Prize will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their participation in the prize competition. Participants may be asked to provide DOE with information on fabrication and testing of their device such that DOE can conduct a meaningful evaluation of the potential environmental impacts.

A.15 Definitions

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

A.16 Return of Funds

As a condition of receiving a prize, competitors agree that if the prize was made based on fraudulent or inaccurate information provided by the competitor to DOE, DOE has the right to demand that any prize funds or the value of other non-cash prizes be returned to the government.

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