



U.S. DEPARTMENT OF ENERGY

## American-Made Geothermal Lithium Extraction Prize

### OFFICIAL RULES

The American-Made Geothermal Lithium Extraction Prize, funded by the U.S. Department of Energy's (DOE) Geothermal Technologies Office (GTO), is designed to de-risk and increase market viability for direct lithium extraction from geothermal brines. The prize does this by incentivizing the development of technologies to improve the current state-of-the-art of direct lithium extraction in ways that lower cost. This is accomplished through a three-phase prize competition, and the innovators are supported by an Industry Advisory Panel composed of industry professionals who are most familiar with the current state-of-the-art of lithium extraction technology.

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# I. PROGRAM SUMMARY

## 1. Introduction: An Industry-Supported Prize Model

The American-Made Geothermal Lithium Extraction Prize, administered under the authority of the America COMPETES Reauthorization Act of 2010 and funded by the Geothermal Technologies Office of the U.S. Department of Energy, is a three-phase prize competition that seeks to bring together the best and brightest in direct lithium extraction (DLE) technology research with industry commercialization professionals.

Prize competitors participate in three escalating challenges. These challenges award a total of \$4 million in cash prizes over 18 months to incentivize the creation of innovations that improve upon current state-of-the-art DLE technology. Improvements are widely defined as lowering the cost and/or environmental impact of lithium extraction from geothermal brines, such that DLE becomes an economically viable domestic lithium supply option.

The prize is supported by a hand-selected panel of Industry Advisors who will play a critical role throughout the competition. The Industry Advisory Panel (IAP) seeks to provide competition prize teams with real-world research and development problems, mentorship, technical insight, marketing expertise, product validation, and other support.

Furthermore, competitors have access to the American-Made Network. The American-Made Network amplifies competitors' efforts through connections with: (1) the U.S. Department of Energy's (DOE's) national laboratories and their world-class research facilities and expertise; and (2) a private-sector stakeholder community that actively assists entrepreneurs with bringing innovative ideas and concepts to market. This community includes incubators, investors, philanthropists, fabrication facility managers, and seasoned industry leaders. These diverse experts are labeled "Connectors" and comprise key components of the Network.

## 2. Background

Beyond the traditional value that geothermal resources can provide for electricity or thermal applications, tapping into geothermal brines for valuable byproducts, including lithium, presents a promising opportunity. Lithium is a major component of high-charge-density batteries for electric vehicles and grid-scale electricity storage. It is expected that global demand for lithium will increase by 500% by 2050 due to widespread adoption of electric vehicles and grid-scale battery storage, and thus lithium supplies will become a crucial element in the clean energy supply chain. However, the U.S. lithium stock is almost entirely imported, with only 1% of U.S. lithium supply being sourced domestically.<sup>1</sup> Furthermore, traditional sources of lithium—extraction from salar brines in the high

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<sup>1</sup> World Bank. 2020. "Minerals for Climate Action: The Mineral Intensity of The Clean Energy Transition." <http://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>.

Andean desert and hard-rock mining from pegmatite deposits—are environmentally destructive. This combination of rapidly expanding global demand and lack of a safe, domestic supply are the basis for the U.S. Department of Interior’s decision to designate lithium as one of the 35 minerals deemed “critical to U.S. national security and the economy.” The federal government recognizes the need to develop a safe, domestic, cost-competitive source of lithium to ensure American leadership in the transition to a carbon-free economy and a robust domestic supply chain.

Geothermal brines could be one potential source of satisfactory lithium. GTO has funded a number of projects in recent years exploring the potential to extract critical minerals, including lithium, from geothermal fluids as well as from produced oil and gas waters. While many of these studies found that the concentrations of critical minerals in these fluids were too low to be extracted economically, lithium, particularly from geothermal fluids in the Imperial Valley of California, represented a significant outlier. Annual lithium resource potential in the Salton Sea region is estimated at 600,000 tons, which currently exceeds the annual U.S. demand for lithium and could transform the United States from a net lithium importer to a net exporter.<sup>2</sup> These findings have motivated a small but growing effort across private industry, state governments, and the federal government to develop safe, economic, environmentally conscious methods to extract lithium from these geothermal brines.

The Geothermal Lithium Extraction Prize seeks to drive forward the development of economic DLE from geothermal brines found at the Salton Sea by partnering novel geothermal and non-geothermal expertise with experienced DLE industry experts. Spearheaded by DOE’s [Geothermal Technologies Office](#) (GTO) within the Office of Energy Efficiency and Renewable Energy (EERE) and in partnership with the [National Renewable Energy Laboratory](#) (NREL), the Geothermal Lithium Extraction Prize looks to incentivize creative advancements that will overcome specific technical challenges that inhibit the profitability of DLE at the Salton Sea. A recent Request for Information related to this topic identified several technical challenges of geothermal lithium extraction to overcome that could be improved to lower cost, including:

- Developing electrochemical/electrolysis processes for the direct conversion of a lithium-bearing geothermal brine to a lithium hydroxide product without the intermediate creation of lithium carbonate.
- Developing new absorbents, precipitants, catalysts, or new processing conditions that can efficiently and selectively extract lithium directly from geothermal brines.
- Advancements that improve the yield and achievable product purity.
- Advancements that reduce energy and water consumption rates.
- Advancements that minimize and/or monetize waste products.

The Geothermal Lithium Extraction Prize is specifically soliciting a wide range of applicants affiliated with U.S. institutions of higher learning to address these challenges, representing a range of technical backgrounds and demographics. To ensure that this diverse network of prize applicants have the best possible chance of success, the Geothermal Lithium Extraction Prize is partnering

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<sup>2</sup> California Energy Commission. 2020. “Selective Recovery of Lithium from Geothermal Brines.” <https://ww2.energy.ca.gov/2020publications/CEC-500-2020-020/CEC-500-2020-020.pdf>.

prize teams (starting in Phase 2) with an expert IAP composed of industry professionals who are most familiar with the current state-of-the-art of lithium extraction technology. By pairing experienced industry practitioners with a diverse range of technical applicants, the Geothermal Lithium Extraction Prize serves as a unique opportunity to solve technical challenges and expand the current U.S. geothermal and critical minerals knowledge base. This opportunity also enables the rapid development of technology and strengthens critical connections for commercialization.

### 3. Description of Phases

The 18-month, three-phase Geothermal Lithium Extraction Prize fast-tracks efforts to identify, develop, and test disruptive solutions to improve the profitability of DLE from geothermal brines (Figure 1). Each phase – Idea & Concept, Design & Invent, Fabricate & Test – includes a contest period when participants work to rapidly advance their solutions. GTO invites anyone affiliated with an accredited U.S. institution of higher education, for-profit universities, technical colleges, or community colleges individually or as a team, to compete to transform a conceptual solution into prototype reality.

AMERICAN-MADE

## Geothermal Lithium Extraction Prize

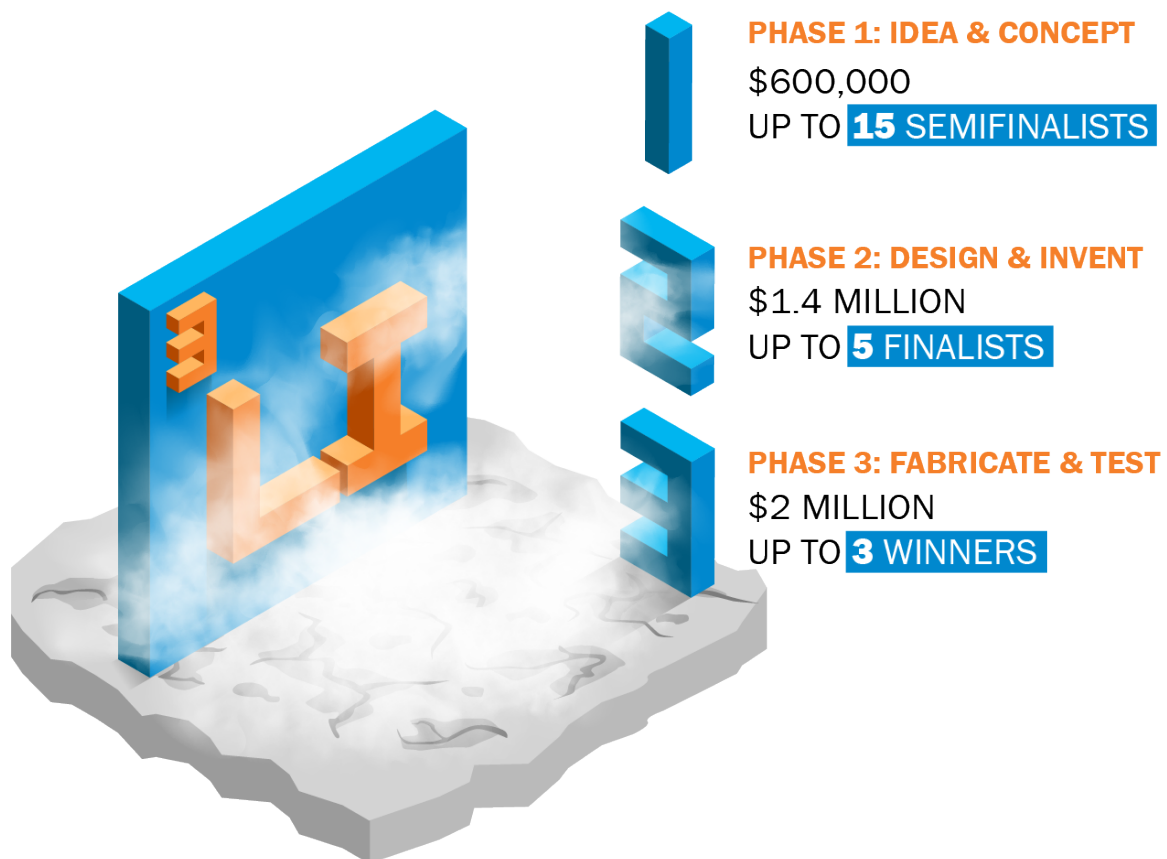


Figure 1. The Geothermal Lithium Extraction Prize offers three escalating phases and substantial cash and other benefits to de-risk and increase market viability for DLE from geothermal brines.

**Phase 1: Idea & Concept:** Over three months, participants demonstrate that they have identified and developed an impactful idea or solution that addresses one or more of the following technical challenges:

- Developing electrochemical/electrolysis processes for the direct conversion of a lithium-bearing geothermal brine to a lithium hydroxide product without the intermediate creation of lithium carbonate.
- Developing new absorbents, precipitants, catalysts, or new processing conditions that can efficiently and selectively extract lithium directly from geothermal brines.
- Advancements that improve the yield and achievable product purity.
- Advancements that reduce energy and water consumption rates.
- Advancements that minimize and/or monetize waste products.

Participants propose a path to design, prototype, and test for proof of concept.

- Phase 1 participants are evaluated by a panel of experts from industry, national labs, and DOE. Up to 15 participants are selected as winning this phase, called “semifinalists.” They may receive between \$40,000 to \$600,000 in cash and are then eligible to compete in Phase 2.<sup>3</sup>

**Phase 2: Design & Invent:** Over three months, competitors work in concert with IAP members to substantially advance their proposed tool, component, chemical process, or other advancement concept by demonstrating their design’s promise in meeting quantitative engineering and operational requirements outlined by the team. Additionally, it is expected that competitors develop a plan to test their innovation using a real geothermal brine during Phase 3.

- Phase 2 competitors have the opportunity to collaborate with members of the IAP to receive concept design feedback in one-on-one sessions prior to the Phase 2 submission date.
- Phase 2 competitors are evaluated by a panel of experts from industry, national labs, and DOE. Up to five competitors are selected as winning competitors at this phase, called “finalists.” They receive between \$280,000 to \$1.4 million in cash and are then eligible to compete in Phase 3.
- Phase 2 competitors are also required to present to DOE and IAP members during an innovation pitch meeting.

**Phase 3: Fabricate & Test:** Over 12 months, competitors fabricate and test their proposed design to demonstrate its ability to improve DLE from geothermal brines. Phase 3 competitors are evaluated by a panel of experts using—in part—engineering and technical performance criteria previously submitted by each team. Phase 3 has up to three winners with a first-, second-, and third-place prize.

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<sup>3</sup> See eligibility requirements under Section I.5

This set of three competition phases offers a total of \$4 million in cash incentives. The funding breakdown is shown in this table:

Phase	Winners	Prizes
<b>Phase 1: Idea &amp; Concept</b>	Up to 15	\$600,000 total prize pool distributed equally among semifinalists. Competitors receive a minimum of \$40,000 and maximum of \$600,000.
<b>Phase 2: Design &amp; Invent</b>	Up to 5	\$1.4 million total prize pool distributed equally among finalists. Competitors receive a minimum of \$280,000 and maximum of \$1.4 million.
<b>Phase 3: Fabricate &amp; Test</b>	Up to 3	\$2 million in total prize pool distributed for the first-, second-, and third-place winners.

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

## 4. American-Made Network

The [American-Made Network](#) aims to cultivate resources and build connections that enhance, accelerate, and amplify the efforts of the competitors. The objective is to link participants with ideas, people, resources, financing, and relevant industry expertise, all of which are necessary for long-term success.

The Network is composed of the following elements:

- 1. Prize and Network Administrator: NREL:** GTO has partnered with NREL to administer the Geothermal Lithium Extraction Prize. As the administrator, NREL helps competitors locate and leverage the vast array of national lab resources. NREL also connects elements of the Network with the competitors, as described below.
- 2. Power Connectors:** A subset of Connectors play a more substantial role in the competition and receive funds to expand and amplify prize activities. These stakeholders work to identify talent and support participants in the prize.

## 5. Who Can Win

To win any phase of the contest, participants must comply with the following eligibility requirements. By uploading a submission package, a participant certifies that they comply with the eligibility



requirements below. Eligibility is subject to verification before prizes are awarded. As soon as the Prize Administrator becomes aware that a participant is not eligible to win, the participant may be disqualified.

Phase 1 is open to all eligible participants; however winning Phase 1 is required for participation in Phase 2 and winning Phase 2 is required for participation in Phase 3.

- Individuals can compete alone or as a group.
  - An individual prize participant (who is not competing as a member of a group) must be a U.S. citizen or a permanent resident. Participants must also be affiliated with an accredited U.S. institution of higher education. Applicants of technical colleges, community colleges, and historically black colleges and universities (HBCUs) are especially encouraged to compete.<sup>4</sup>
  - A group of individuals, competing as one competitor team, may win, provided (a) that the online account holder of the submission is a U.S. citizen or a permanent resident and (b) that all group members are affiliated with an accredited U.S. institution of higher education. Groups competing as a team do not need all members to be affiliated with the same institution of higher education.
- DOE employees and DOE support service contractors, individuals who have been employed by DOE, or individuals working for DOE as a support service contractor within six months prior to the submission deadline of the Phase 1 are not eligible to participate in the prize.
- Non-DOE federal entities and federal employees are also not eligible to participate in the prize.
- Employees of an organization that cosponsors this program are not eligible to participate in the prize.
- IAP members are not eligible to participate in the prize.
- NREL employees involved in administration of this prize are not eligible to participate in the prize; however, NREL and other national lab employees including laboratory researchers may participate if they are affiliated with an institute of higher education. They can also win monetary prizes, provided they are not competing in their official capacity.
- 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.

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<sup>4</sup> Minority Serving Institutions (MSIs), including HBCUs and other minority institutions, as educational entities recognized by the Office of Civil Rights (OCR), U.S. Department of Education, and identified on the OCR's Department of Education U.S. accredited postsecondary minorities' institution list. See <https://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html>.

- Entities identified on a U.S. Department of Homeland Security binding operational directives as an entity publicly banned from doing business with the United States government are not eligible to compete. See <https://cyber.dhs.gov/directives/>.
- Entities and individuals using “covered telecommunications equipment or services,” as defined in Section 889 of Pub. L. 115-232, National Defense Authorization Act of 2019<sup>5</sup> are not eligible to compete. In limited circumstances, DOE may waive this eligibility requirement where the entity provides a compelling justification to support a waiver request.
- 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 [Consolidated Screening List](#).
- The Geothermal Lithium Extraction Prize is expected to positively impact U.S. economic competitiveness and the geothermal industry. Participation in a foreign government talent recruitment program<sup>6</sup> 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<sup>7</sup>

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5 Pub. L. 115-232, Section 889 (f) provides the following definitions:

(f) Definitions. In this section:

(3) Covered telecommunications equipment or services. The term “covered telecommunications equipment or services” means any of the following:

(A) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

(B) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

(C) Telecommunications or video surveillance services provided by such entities or using such equipment

(D) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

6 Foreign Government-Sponsored Talent Recruitment Program. 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 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 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.

7 For purposes of this definition, a foreign country of risk entity includes the following:

(i) any foreign government or foreign government agency or instrumentality thereof of a Foreign Country of Risk;

(ii) any form of business enterprise or legal entity organized, chartered, or incorporated under the laws of a Foreign Country of Risk; and

(iii) any form of business enterprise or legal entity which is owned, controlled, or influenced<sup>1</sup> by an entity described in paragraphs 9(i) or 9(ii) above, or by any foreign national of a Foreign Country of Risk.

are not eligible to compete. Further, teams that include individuals participating in foreign government talent recruitment programs of foreign countries of risk are not eligible to compete.

## 6. Program Goal Requirements

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

- The proposed innovation is responsive to the needs of the geothermal DLE industry.
- All activities that are described in and support the submission package are performed in the United States.
- The proposed solution represents an innovation that moves the American lithium and geothermal industries beyond their respective current states.
- 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, tribal, or local government office.
- The proposed solution is based on fundamental technical principles and is realistic in scope and budget for the incentives provided in this program.
- The submission content sufficiently confirms the competitor's intent to bring a DLE-related advancement to the demonstration stage by the conclusion of the program.

## 7. 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 participants succeed with each of the phase submissions.

## 8. Additional Requirements

Please read and comply with additional requirements in [Section V](#). Participants who do not comply with these requirements in Section V may be disqualified.

**MORE DETAILS ON RULES FOR EACH PHASE WILL BE PROVIDED PRIOR TO THE OPENING OF EACH SUBSEQUENT PHASE.**

## 9. Important Dates

- **Phase 1: Idea & Concept**
  - Phase 1 submission opens: **March 31, 2021**
  - Phase 1 Informational Webinar: **April 12, 2021**
  - Phase 1 submission deadline: **July 2, 2021**, 5 p.m. ET
  - Phase 1 semifinalists announced, and Phase 2 begins: Expected **August 31, 2021**
- **Phase 2: Design & Invent**
  - Phase 2 submission opens: Expected **August 31, 2021**
  - Phase 2 virtual innovation pitches with IAP: Expected **November 3, 2021**
  - Phase 2 submission deadline: Expected **November 30, 2021**, 5 p.m. ET
  - Phase 2 finalists announced, and Phase 3 begins: Expected **January 3, 2022**
- **Phase 3: Fabricate & Test**
  - Phase 3 submission opens: Expected **January 3, 2022**
  - Phase 3 submission deadline: Expected **January 6, 2023** 5 p.m. ET
  - Phase 3 winners announced: Expected **February 2023**.

All dates are subject to change, including contest openings, deadlines, and announcements. Sign up for updates at <https://www.herox.com/GeothermalLithiumExtraction>.

## II. PHASE 1 RULES

### 1. Introduction

Phase 1: Idea & Concept is the first phase of the Geothermal Lithium Extraction Prize's three-phase series, offering a total of \$600,000 in cash prizes. Any eligible entity – described in Section I.5 Who Can Win – can compete in Phase 1. **The following rules are for participants in Phase 1. “You” and “your” reference participants in the contest.**

### 2. Goal

Participants propose an innovative advancement that helps lower the cost per unit weight of geothermally extracted lithium to be cost-competitive with currently common extraction methods (e.g., pegmatite mining and salar brine extraction), and/or can help to reduce energy and water consumption.

### 3. Prizes to Win

Phase 1 offers up to \$600,000 in cash prizes to be divided equally among 15 semifinalists, with the maximum prize amount not to exceed \$600,000.

### 4. How to Enter

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

## 5. What to Submit

The following items constitute the submission package and must be submitted through the HeroX platform:

- Up to 90-second video (to be made public, not scored)
- Cover page content (to be made public, not scored)
- One submission summary PowerPoint slide (to be made public, not scored)
- IAP assistance request (not public, not scored)
- Technical narrative about the problem, innovation, team, and plan (not public, scored)
- Letters of commitment or support (optional).

### Online Public Video (up to 90 seconds, will be made public) — What is your innovation?

#### Suggested content you provide

- **The Problem:** Why the technical challenge you wish to tackle is worthwhile
- **Your Solution:** A high-level vision of your proposed solution
- **Your Team:** Who you are and why you have a competitive edge
- **Creative Input:** Creative content that conveys your submission in exciting and interesting ways.

#### Required submission format

- Ensure that your video is posted publicly online (e.g., YouTube, Vimeo)
- The video should not exceed 90 seconds.

**The American-Made Network may be able to help you with creating your video.**

**Cover Page (1 page, will be made public)** — List basic information about your submission

**Cover Page should include**

- Project name
- Innovation tagline (e.g., your mission in few words)
- Link to your 90-second video online
- Key project members (names, contacts, and links to their LinkedIn profiles).
- Keywords that best describe your solution (e.g., tool, component, equipment focus)
- Your city and state
- The Connectors<sup>8</sup> that significantly helped you advance your solution and the major items with which they helped (if applicable)
- Other partners (if any).

**Submission Summary Slide (1 slide, will be made public)**

Create a 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.

**Industry Advisory Panel Assistance Request (2 pages, including images, not public)**

Provide a two-page description of where your unique solution would be most aided by the input from an IAP member. Outline open science or engineering questions, facilities/supply needs, and other requests for expertise. The Prize Administrator will make this request broadly available to the members of the IAP.

**Technical Narrative (2,500 words, 10 supporting images, figures, or graphs, not public)**

Participants should answer each of these questions. The content bullets are organized by suggested content to guide responses, but participants must 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 2,500 words. Participants may also include up to 10 supporting images, figures, or graphs. Footnotes and image/graphic/figure descriptions do not count against the overall word count. The expert reviewers will score the questions based on the content you have provided that conforms to the previously described limits.

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<sup>8</sup> See description of Connector in Section I. Program Summary.

**Question 1: *Problem***—What is the problem and why is solving it important?

**Suggested content you provide**

- Describe the barrier within the geothermal lithium extraction supply chain that your innovation will overcome. Use evidence-based validation (e.g., interview with users, case studies, literature) and metrics to support the argument that this barrier is worth addressing.
- Explain how overcoming this barrier will ultimately lower the cost of DLE from geothermal brines.

**Each statement scored on a 1–6 scale**

- The competitor identifies a critical problem using compelling analysis.
- There is clear linkage and relevance between overcoming the barrier and lowering overall DLE costs.
- The competitor’s assessment shows a strong understanding of the broad lithium extraction industry’s current state-of-the-art.

**Question 2: *Innovation***—What is your solution? How will you define if your solution has achieved success?

**Suggested content you provide**

- Propose a new design concept that improves our ability to extract lithium from geothermal brines.
- Describe how your innovation will improve the economics of DLE.
- Describe your innovation’s unique value proposition and how it will improve upon the current state-of-the-art of current geothermal lithium extraction technology.
- Specify expected performance goals and specific, measurable, achievable, relevant, and timely (SMART) metrics relevant to your innovation for designing and testing (**see special instructions below**). Identify what area(s) of improvement you intend to be judged on. Note that these metrics should be similar to those identified in Question 1.

**Each statement scored on a 1–6 scale**

- The competitor shows a strong understanding of how their solution addresses the problem identified in Question 1.
- The solution represents an innovative approach, built on reasonable assumptions, valid technical foundations, and lessons learned from other notable efforts in this space.
- The planned innovation is reasonably ambitious and validates critical assumptions needed to advance the proposed solution.
- Performance improvement goals and metrics are verifiable and aggressive, but attainable.



**Question 3: *Team***—Why is this the right team to solve this problem? What expertise is lacking and how will it be addressed?

**Suggested content you provide**

- Introduce your team, explain how it came together, and highlight the knowledge and skills that make it uniquely capable of achieving success.
- Describe how your team’s expertise is applicable to the geothermal lithium extraction industry.
- Describe how your team’s expertise is applied to your specific proposed innovation.
- Describe any potential gaps in expertise that your team currently has, and how you intend to fill those gaps (e.g., with IAP guidance, other American-Made support, external support).
- Describe your efforts to advance your solution concept since the announcement of the prize contest or prior and highlight key milestones achieved.

**Each statement scored on a 1–6 scale**

- The team’s track record demonstrates notable entrepreneurial qualities such as adaptability, creativity, decisiveness, and resourcefulness.
- The team’s expertise is appropriately relevant to geothermal lithium extraction.
- The team’s drive, knowledge, and complementary skill sets provide a strong competitive edge toward realizing this solution in the near future.
- A considerable amount of high-quality effort was put into defining and advancing the proposed concept.
- The team has identified realistic gaps in expertise that can be rectified in a short time frame.

**Question 4: *Plan***—How do you plan to realize success?

**Suggested content you provide**

- Describe where you stand in your development cycle and define goals and SMART metrics for both Phase 2 and Phase 3 (based on the schedule listed in Section I.9 (**see special instructions below**)).
- Describe your team’s readiness to meet your goals. What resources provided by the contest will help meet your goals, and what resources will need to be externally solicited? How and when will that occur?
- Provide a high-level budget and project management plan to meet your goals between the conclusions of Phase 1 and Phase 2, including how you will leverage program resources or other entities (include references to letters of support/commitment if applicable).

**Each statement scored on a 1–6 scale**

- The stated goals are ambitious, reduce risks, and show a commitment to an accelerated development cycle.
- Meeting the stated goals demonstrates critical progress toward designing, testing, and validating the functionality of this innovation.
- The proposed plan is appropriate and logical in order to achieve the stated goals.
- The proposed plan effectively uses resources available in-house, attainable within the prize period, or through this program to advance the innovation.

## Special Instructions for Question 2 and 4

- Use only SMART outcome-based goals—not activity-based—so that a neutral third party can validate them (if possible).
  - For example: Demonstrate a definitive achievement of progress (e.g., achieve X% efficiency or X letters of interest signed); do **not** describe how time was spent (e.g., provide a report, talk to customers, or perform experiments).
- Performance criteria should discuss how the advancement affects DLE cost drivers, which include but are not limited to yield, reagent type, achievable product purity, energy and water consumption, plant operation time, waste disposal cost, and environmental risk.
- Performance criteria should compare such metrics to the current state-of-the-art. All criteria cited should reflect input from international standards (e.g., the International Organization for Standardization), peer-reviewed literature, or other verifiable benchmarking methods.
- In defining your SMART goals, include quantified, risk-reducing, meaningful, practical, and testable interim milestones.
- SMART goals submitted for each phase application package should not be static. Teams should plan to assess, and update goals based on their own efforts and through relevant stakeholder feedback (e.g., possible investors, customers, and experts in the solution space).
- The American-Made Network may be able to help you to formulate your SMART goals.

### Letters of Commitment or Support (Optional)

Attach one-page letters (of support, intent, or commitment) from other relevant entities (e.g., potential users of the proposed innovation) 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 likely do not factor into your score. Please limit letters of support to one page each.

Please read and comply with additional requirements about your submission in [Section V](#).  
COMPETITORS THAT DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.

As part of your HeroX submission to the Geothermal Lithium Extraction Prize, you are required to sign the following statement:

I am submitting this submission package as part of my participation in the Geothermal Lithium Extraction Prize. I certify under penalty of perjury that the named competitor meets the eligibility outlined in Section I.5. Who Can Win requirements for this prize competition and complies with all other rules contained in the Official Rules document. I understand false

statements or misrepresentations may result in civil and/or criminal penalties under 18 U.S.C. § 1001.

## 6. How We Score

The Prize Administrator screens all completed submissions, and in consultation with GTO, assigns completed submissions to a qualified panel of expert reviewers, composed of subject matter experts who score submissions according to the applicable judging criteria defined in Section II.5 What to Submit. In order to be involved in the scoring of submissions, subject matter experts 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.

The scoring of submissions proceed as follows:

**Scoring Weights:** Each review criteria bullet for the Technical Narrative submission questions has equal weight. The score from an individual reviewer for the Technical Narrative is the total sum of the scores for all the bullets. All reviewers' scores are then averaged for a final score for the submission package.

Each statement for the Technical Narrative is scored based on a 1–6 scale:

1	2	3	4	5	6
strongly disagree	disagree	slightly disagree	slightly agree	agree	strongly agree

**Interviews:** GTO, at its sole discretion, may decide to hold a short interview with a subset of the Phase 1 participants. The interviews would be held prior to the announcement of winners and would serve to help clarify questions the reviewers may have. Attending interviews is not required and interviews are not an indication of winning.

**Final Determination of Winners:** The GTO director is the final judge of the competition and makes the final determination. This determination takes reviewer scores, any interview findings, and program policy factors listed in Section V.13 into account.

**Announcement:** The Prize Administrator works as quickly as possible, and winning teams should be notified within 1 to 2 months after the phase closes, when the Prize Administrator requests the necessary information to distribute cash prizes. The Prize Administrator will then publicly announce semifinalists. After winning the Phase 1 prize, competitors develop their solutions in accordance with their plan to compete in Phase 2. If the team goes on to win Phase 2, then they are eligible to compete in Phase 3.

## III. PHASE 2 RULES

### 1. Introduction

Phase 2: Design & Invent is the second phase of the Geothermal Lithium Extraction Prize's three-phase series and offers a total of \$1.4 million in cash prizes. Winning Phase 1 is required to compete in Phase 2 – see Section I.5, Who Can Win, for more information regarding eligibility.

Phase 1 semifinalists competing in Phase 2 have the opportunity to interact closely with an IAP composed of experts in the field of DLE. Interaction consists of a minimum of two individual meetings between IAP members and Phase 2 competitors as well as an innovation pitch meeting. Individual meetings are coordinated directly between prize participants and IAP members, while the final date of the pitch meeting is publicized at the start of the Phase 2. DOE and others may be present during these individual meetings.

### 2. Goal

Competitors undertake rigorous design steps to demonstrate how the advancement proposed in Phase 1 will be realized. Competitors work closely with IAP members to develop a quantifiable plan based on their technical narrative.

### 3. Prizes to Win

Phase 2 offers up to five cash prizes between \$280,000 and \$1.4 million. \$1.4 million in cash prizes is divided equally, with the maximum prize amount not to exceed \$1.4 million.

### 4. How to Enter

Complete a submission package online at <https://www.herox.com/GeothermalLithiumExtraction> before the contest closing date. To be eligible for Phase 2, participants must have won Phase 1.

### 5. What to Submit

Information on what to submit will be forthcoming and must be submitted through the HeroX platform.

### 6. How We Score

The Prize Administrator screens all completed submissions, and in consultation with GTO, assigns completed submissions to a qualified panel of expert reviewers, composed of subject matter experts who score submissions according to the applicable judging criteria to be defined in Section III.5 What to Submit. In order to be involved in the scoring of submissions, subject matter experts 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.

Additional information on Phase 2 scoring is forthcoming.

## **IV. PHASE 3 RULES**

### **1. Introduction**

Phase 3: Fabricate & Test is the third and final phase of the Geothermal Lithium Extraction Prize's three-phase series, offering a total of \$2 million in cash prizes. Phase 3 begins at the announcement of the Phase 2 finalists and includes a live demo day where all Phase 3 competitors must present their prototype to a panel of expert reviewers. Winning Phase 2 is required to be eligible to compete in Phase 3 – see Section I.5, Who Can Win, for more information regarding eligibility.

### **2. Goal**

Phase 2 award recipients, working closely with IAP members, build, test, and validate their planned innovation.

### **3. Prizes to Win**

Phase 3 offers up to three cash prizes from a cash prize pool of \$2 million. Prizes are awarded for first-, second-, and third-place winners. Cash award amounts are forthcoming.

### **4. How to Enter**

Complete a submission package online at <https://www.herox.com/GeothermalLithiumExtraction> before the contest closing date. To be eligible for Phase 3, participants must have won Phase 2.

### **5. What to Submit**

Information on what to submit is forthcoming and must be submitted through the HeroX platform.

### **6. How We Score**

The Prize Administrator screens all completed submissions, and in consultation with GTO, assigns completed submissions to a qualified panel of expert reviewers, composed of subject matter experts who score submissions according to the applicable judging criteria to be defined in Section IV.5 What to Submit. In order to be involved in the scoring of submissions, subject matter experts 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.

Additional information on Phase 3 scoring is forthcoming.

# V. ADDITIONAL TERMS AND CONDITIONS

## 1. Universal Contest Requirements

Your submission for Phases 1, 2, and 3 of the Geothermal Lithium Extraction Prize is subject to the following terms and conditions:

- You must post the final content of your submission or upload the submission form online at <https://www.herox.com/GeothermalLithiumExtraction> before Phase 1, Phase 2, and Phase 3 close. Late submissions or any other form of submission do not qualify.
- The video submission, cover page, and summary slide are made public.
- The Technical Narrative, technical assistance request, and letters of commitment/support are not intended to be made public; however, see Section V.10 regarding the Freedom of Information Act.
- All submissions that participants wish to protect from public disclosure must be marked according to the instructions in Section V.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 as provided in these Rules and Section V.5. Submission Rights.
- Participants agree to release their submission video under a Creative Commons Attribution 4.0 International License (see <http://creativecommons.org/licenses/by/4.0/>).
- Participants must include all the required submission's elements. The Prize Administrator may disqualify submissions after an initial screening if participants fail to provide all required submission elements. Participants may be given an opportunity to rectify submission errors due to technical challenges.
- Submissions must be submitted in English and in a format readable by Microsoft Word. Scanned, hand-written submissions will be disqualified.
- Submissions and competitors will be disqualified if any engagement with the Geothermal Lithium Extraction Prize—including but not limited to the submission, the HeroX forum, or e-mails to the Prize Administrator—contains any matter that, in the sole discretion of DOE or NREL, is indecent, obscene, defamatory, libelous, lacking in professionalism, or demonstrates a lack of respect for people or life on this planet.
- If participants click "Accept" on the HeroX platform and proceed to register for any of the phases described in this document, these rules will form a valid and binding agreement between the participant and DOE and is in addition to the existing HeroX Terms of Use for all purposes relating to this competition. Participants should print and keep a copy of these rules. These provisions only apply to the prize described here and no other prizes on the HeroX platform or anywhere else. To the extent that these rules conflict with the HeroX Terms of Use, these rules shall govern.

- The Prize Administrator, when feasible, may give participants an opportunity to fix non-substantive mistakes or errors in their submission packages.

## 2. Verification for Payments

The Prize Administrator verifies 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 notifies winning competitors using provided email contact information after the date that results are announced. Each competitor (or parent/guardian if under 18 years of age), is required to sign and return a completed NREL Request for ACH Banking Information form, and a completed W9 form to the Prize Administrator within 30 days of the date the notice is sent (<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 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; (iv) the submission or person/entity is disqualified for any other reason.

## 3. Teams and Single-Entity Awards

The Prize Administrator awards a single dollar amount to the designated primary submitter, whether consisting of a single or multiple entity(ies). The primary submitter is solely responsible for allocating any prize funds among its member competitors as they deem appropriate. The Prize Administrator does not arbitrate, intervene, advise on, or resolve any matters between team members or between teams.

## 4. Submission Rights

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

By making a submission, and thereby consenting to the rules of the phase as described in Section V.1., a participant is granting to DOE, the Prize Administrator, and any other third parties supporting DOE in the prize a license to display publicly and use all parts of any submission for any other government purpose. The Technical Narrative, letters of commitment/support, and portions of submissions properly marked as protected, are not made public according to Section V.11. This license includes posting or linking to the public portions of the submission on the Prize Administrator or HeroX applications, including the prize website, DOE websites, and partner websites, and the inclusion of the submission in any other media, worldwide. The submission may be viewed by DOE, the Prize Administrator, and reviewers for purposes of the phases, including but not limited to screening and evaluation purposes. The Prize Administrator and any third parties acting on their behalf also have the right to publicize participant's name and, as applicable, the names of team members and organization, who participated in the submission on the prize website indefinitely.

By entering, the participant represents and warrants that:

1. The participant's entire submission is an original work by the participant and the participant has not included third-party content (such as writing, text, graphics, artwork, logos, photographs, dialogue from plays, 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 participant in the submission, and (ii) the participant 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 the prize administrator, or the exercise by the 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 participant to work on the submission or who appear in the submission in any manner have:
  - a. Given the participant 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 their parent or legal guardian) and the participant may be asked by the Prize Administrator to provide permission in writing;
  - 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.

## 5. Copyright

Each participant represents and warrants that the participant 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.

## 6. Prize Subject to Applicable Law

All prizes 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 prize. This notice is not an obligation of funds; the final awards are contingent upon the availability of appropriations.

## 7. Resolution of Disputes

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

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

## 8. Publicity

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

Except where prohibited, participation in the prize 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.

## 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 prize, 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 prize, whether the claim or cause of action arises under contract or tort.

## 10. Records Retention and the 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.

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

## 11. Privacy

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

## 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 contests, as determined by DOE in its sole discretion, DOE may cancel the prize.

Although DOE indicates in Phase 1, Phase 2, and Phase 3 of the Geothermal Lithium Extraction Prize that it will select up to several winners for each phase, DOE reserves the right to only select participants that are likely to achieve the goals of the program. If, in DOE's determination, no participants are likely to achieve the goals of the program, DOE will select no participants to be winners and will award no prize money.

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

## **13. Program Policy Factors**

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

- Impact on frontline and disadvantaged communities;
- Whether the use of additional DOE funds and provided resources continue to be nonduplicative and compatible with the stated goals of this program and the DOE mission generally;
- Entity diversity, from individuals to teams, and types of institutions of higher education;
- 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 accelerates 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, best achieve the research goals and objectives;
- 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;
- The degree to which the proposed project, or group of projects, represent a desired geographic distribution.

## 14. 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 participant 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.

## 15. Request to Waive the “Domestic Ownership and Control” Eligibility Requirement

If an entity seeking to compete does not have domestic ownership and control, but otherwise meets the eligibility requirements, EERE may consider issuing a waiver of that eligibility requirement where the entity submits a compelling justification. Entities seeking a waiver should include a justification along with their submission. EERE may require additional information before making a determination on the waiver request. There are no rights to appeal DOE’s decision on the waiver request.

The justification must address the following waiver criteria and content requirements:

### Waiver Criteria

Entities seeking a waiver must demonstrate to the satisfaction of EERE that its participation: (1) has a high likelihood of furthering the objectives of this prize competition; and (2) aligns with the best interest of the U.S. industry, and U.S. economic development.

### Content for Waiver Request

A waiver request must include the following information:

- a. Entity’s name and place of incorporation;
- b. The location of the entity’s primary place of business;
- c. A statement describing the extent the entity is owned or control by a foreign government, agency, firm, corporation, or person who is not a citizen or permanent resident of the U.S., including the applicable percentage of ownership/control;
- d. A compelling justification that addresses the waiver criteria stated above;
- e. A description of the project’s anticipated contributions to the U.S. economy;
- f. A description of how the entity has benefitted U.S. research, development, and manufacturing, including contributions to employment in the U.S. and growth in new markets and jobs in the U.S.; and
- g. A description of how the entity has promoted domestic manufacturing of products and/or services.

## 16. Definitions

**Geothermal energy** is a renewable energy resource derived from the Earth’s heat used for a spectrum of applications including direct-use and electricity generation, spanning temperature ranges from low (e.g., 100°C) to high (e.g., 300°C+).

**Geothermal brine** is a concentrated saline solution that has circulated through crustal rocks in an area of anomalously high heat flow and become enriched in substances leached from those rocks. It

often contains dissolved metals, in which case it forms an important intermediary in the deposition of ore. Geothermal brine is frequently a byproduct of geothermal power production.

**Direct lithium extraction** is the process by which lithium dissolved in geothermal brines is extracted as a usable carbonate or hydroxide solid.

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

**Power Connector** means organizations that receive contracts from NREL play a more substantial role in the competition and receive funds to expand and amplify the Geothermal Lithium Extraction Prize. These stakeholders work to identify talent and support participants in the prize phases.