



U.S. DEPARTMENT OF ENERGY

# American-Made Geothermal Lithium Extraction Prize

## RULES

July 2022

# Official Rules

The American-Made Geothermal Lithium Extraction Prize, funded by the U.S. Department of Energy's Geothermal Technologies Office, 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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# 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 U.S. Department of Energy (DOE) [Geothermal Technologies Office](#) (GTO), 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 three phases 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) 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 sourced

domestically.<sup>1</sup> Furthermore, traditional sources of lithium—extraction from salar brines in the high 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 the Interior’s decision to designate lithium as one of the 35 minerals deemed “critical to U.S. national security and the economy.”<sup>2</sup> 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>3</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 nongeothermal expertise with experienced DLE industry experts. Spearheaded by DOE <https://www.energy.gov/eere/geothermal/geothermal-energy-us-department-energy> 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 that, if overcome, could lower cost. These include:

- 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

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1 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>.

2 U.S. Department of the Interior, “Final List of Critical Materials 2018.” 83 Fed. Reg. 23295 (May 18, 2018).

3 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>.

- Advancements that reduce energy and water consumption rates
- Advancements that minimize and/or monetize waste products
- Advancements that identify opportunities between DLE technologies and environmental restoration efforts in the Salton Sea.

The Geothermal Lithium Extraction Prize is specifically soliciting a wide range of applicants currently affiliated with U.S. institutions of higher education to address these challenges, representing a range of technical backgrounds and demographics. These applicants are also able to partner with small business or university incubators. To ensure that this diverse network of prize applicants have the best possible chance of success, the Geothermal Lithium Extraction Prize is partnering prize teams that enter 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 multi-year, 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 during which participants work to rapidly advance their solutions. GTO invites anyone currently affiliated with an accredited U.S. institution of higher education, for-profit university, technical college, or community college to compete individually or as a team. These teams are also encouraged to partner with small businesses or university incubators to transform a conceptual solution into prototype reality.



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

**Phase 1: Idea & Concept:** Over five 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 winners of this phase, called “semifinalists.” They may receive between \$40,000 and \$600,000 cash and are then eligible to compete in Phase 2.<sup>4</sup>

**Phase 2: Design & Invent:** Over five months, competitors work under the mentorship of IAP members to substantially advance their proposed tool, component, chemical process, or other advancement concept by designing the proposed concepts identified in Phase 1. At the end of Phase 2, teams will need to explain how they have advanced a solution to the technical challenge identified in Phase 1, demonstrate what progress they have made, and develop a plan for how the design will be fabricated and tested in Phase 3. Teams will also need to 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 during one-on-one sessions prior to the Phase 2 submission date.
- Phase 2 competitors will be evaluated by a panel of judges 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 and \$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

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<sup>4</sup> See eligibility requirements under Section I.5



submitted by each team. Phase 3 has up to three winners with a first-, second-, and third-place prize.

This set of three competition phases offers a total of \$4 million in cash incentives. The funding breakdown is shown in Table 1.

**Table 1. Contest Funding by Phase**

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:** During Phase 1, 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 competition.

## 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, advancing as a Phase 1 semifinalist is required for participation in Phase 2, and advancing as a Phase 2 finalist 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 currently affiliated with an accredited U.S. institution of higher education.<sup>5</sup> Applicants from technical colleges, community colleges, and Historically Black Colleges and Universities (HBCUs) are especially encouraged to compete.<sup>6</sup>
  - A group of individuals, competing as one team, may win, provided that (a) the online account holder of the submission is a U.S. citizen or a permanent resident and (b) all group members are currently affiliated with an accredited U.S. institution of higher

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5 (a) An institution of higher education is a public or private nonprofit educational institution that -  
(1) Is in a State, or for purposes of the Federal Pell Grant, Federal Supplemental Educational Opportunity Grant, Federal Work-Study, and Federal TRIO programs may also be located in the Federated States of Micronesia or the Marshall Islands;  
(2) Admits as regular students only persons who -  
(i) Have a high school diploma;  
(ii) Have the recognized equivalent of a high school diploma; or  
(iii) Are beyond the age of compulsory school attendance in the State in which the institution is physically located;  
(3) Is legally authorized to provide an educational program beyond secondary education in the State in which the institution is physically located in accordance with § 600.9;  
(4)  
(i) Provides an educational program -  
(A) For which it awards an associate, baccalaureate, graduate, or professional degree;  
(B) That is at least a two-academic-year program acceptable for full credit toward a baccalaureate degree; or  
(C) That is at least a one academic year training program that leads to a certificate, or other nondegree recognized credential, and prepares students for gainful employment in a recognized occupation; and  
(ii) May provide a comprehensive transition and postsecondary program, as described in 34 CFR part 668, subpart O; and  
(5) Is -  
(i) Accredited or preaccredited; or  
(ii) Approved by a State agency listed in the Federal Register in accordance with 34 CFR part 603, if the institution is a public postsecondary vocational educational institution that seeks to participate only in Federal student assistance programs.  
(b) An institution is physically located in a State if it has a campus or other instructional site in that State.  
(c) The Secretary does not recognize the accreditation or preaccreditation of an institution unless the institution agrees to submit any dispute involving an adverse action, such as the final denial, withdrawal, or termination of accreditation, to arbitration before initiating any other legal action.

6 Minority Serving Institutions, 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>.

education. Groups competing as a team do not need all members to be currently affiliated with the same institution of higher education.

- Domestic small business and domestic university incubator partners.
  - Domestic small business concerns and incubators are eligible to participate if they meet either of the following criteria:
    - The entity meets the definition for a domestic small business concern. The Small Business Administration establishes small business size standards on an industry-by-industry basis. Small business size standards and corresponding North American Industry Classification System (NAICS) codes are provided at [13 Code of Federal Regulations \(CFR\) 121.201](#). DOE shall apply the size standard in effect on the date the Phase 1 application is submitted.
    - The entity meets the definition for a university incubator under 13 CFR 301,11. They are partnering with an individual or group that is currently 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.
  - Domestic small business concerns and domestic university incubators are not eligible to participate as the prime submitter.
  - Domestic small business concerns and university incubators are especially encouraged to partner with technical colleges, community colleges, HBCUs, and Hispanic-Serving Institutions.
- 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 Phase 1 submission deadline 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 institution 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 to participate in federal programs, are not eligible to compete.
- Entities identified on a U.S. Department of Homeland Security binding operational directive as 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>7</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 the [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>8</sup> could conflict with this objective by resulting in unauthorized transfer of

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7 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.

8 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

scientific and technical information to foreign government entities. Therefore, individuals participating in foreign government talent recruitment programs of foreign countries of risk<sup>9</sup> 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.

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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.

9 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.

## 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 the requirements in Section V may be disqualified.

## 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: **September 2, 2021**, 5 p.m. ET
  - Phase 1 semifinalists announced, and Phase 2 begins: Expected **November 4, 2021**
- **Phase 2: Design & Invent**
  - Phase 2 submission opens: **November 4, 2021**
  - Phase 2 virtual innovation pitches with IAP: **March 28 and March 31, 2022**
  - Phase 2 submission deadline: **April 29, 2022**, 5 p.m. ET
  - Phase 2 finalists announced, and Phase 3 begins: Expected **July 13, 2022**
- **Phase 3: Fabricate & Test**
  - Phase 3 submission opens: Expected **July 13, 2022**
  - Phase 3 Final Technical Presentations: Expected week of **June 12, 2023**
  - Phase 3 submission deadline: Expected **July 3, 2023**, 5 p.m. ET
  - Phase 3 winners announced: Expected **September 2023**.

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

# PHASE 1 RULES (CLOSED)

## 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” refer to participants in the contest.**

## 2. Goal

Participants propose an innovative advancement that helps lower the cost per unit of weight of geothermally extracted lithium to be cost-competitive with current common extraction methods (e.g., pegmatite mining, 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 items shown in Table 2 constitute the submission package and must be submitted through the HeroX platform.

**Table 2. Phase 1 Submission Package Elements**

Submission Package
<ul style="list-style-type: none"> <li>• Up to 90-second video (to be made public, not scored)</li> <li>• Cover page content (to be made public, not scored)</li> <li>• One submission summary PowerPoint slide (to be made public, not scored)</li> <li>• IAP assistance request (not public, not scored)</li> <li>• Technical narrative about the problem, innovation, team, and plan (not public, scored)</li> <li>• Letters of commitment or support (optional).</li> </ul>

**Table 3. Online Public Video Elements**

Online Public Video (up to 90 seconds; will be made public) — What is your innovation?	
<p><b>Suggested content:</b></p> <ul style="list-style-type: none"> <li>• <b>The Problem:</b> Why the technical challenge you wish to tackle is worthwhile</li> <li>• <b>Your Solution:</b> A high-level vision of your proposed solution</li> <li>• <b>Your Team:</b> Who you are and why you have a competitive edge</li> <li>• <b>Creative Input:</b> Creative content that conveys your submission in exciting and interesting ways.</li> </ul>	<p><b>Required submission format:</b></p> <ul style="list-style-type: none"> <li>• Ensure that your video is posted publicly online (e.g., YouTube, Vimeo)</li> <li>• The video should not exceed 90 seconds.</li> </ul>
<p><b><u>The American-Made Network may be able to help you with creating your video.</u></b></p>	



**Table 4. Cover Page Elements**

<b>Cover Page (1 page; will be made public) — List basic information about your submission.</b>	
<b>Cover page should include:</b>	
<ul style="list-style-type: none"><li>• Project name</li><li>• Innovation tagline (e.g., your mission in a few words)</li><li>• Link to your online public video</li><li>• Key project members (names, contacts, and links to their LinkedIn profiles).</li></ul>	<ul style="list-style-type: none"><li>• Keywords that best describe your solution (e.g., tool, component, equipment focus)</li><li>• Your city and state</li><li>• The Connectors<sup>10</sup> that significantly helped you advance your solution and the major items with which they helped (if applicable)</li><li>• Other partners (if any).</li></ul>

**Table 5. Submission Summary Slide**

<b>Submission Summary Slide (1 slide; will be made public)</b>
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.

**Table 6. Industry Advisory Panel Assistance Request**

<b>Industry Advisory Panel Assistance Request (2 pages including images; not public)</b>
Provide a two-page description of the areas on which your unique solution would be most aided by the input from an IAP member. Outline open science or engineering questions, facility/supply needs, and other requests for expertise. The Prize Administrator will make this request broadly available to the members of the IAP.

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<sup>10</sup> See description of Connector in Section I. Program Summary.

Table 7. Phase 1 Technical Narrative

<b>Phase 1 Technical Narrative (2,500 words, 10 supporting images, figures, or graphs; not public)</b>	
<p>Participants should answer each of the following 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 toward 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.</p>	
<p><b>Question 1: <i>Problem</i></b>—What is the problem and why is solving it important?</p>	
<p><b>Suggested content:</b></p> <ul style="list-style-type: none"><li>• 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.</li><li>• Explain how overcoming this barrier will ultimately lower the cost of DLE from geothermal brines.</li></ul>	<p><b>Each statement will be scored on a 1–6 scale according to the following criteria:</b></p> <ul style="list-style-type: none"><li>• The competitor identifies a critical problem using compelling analysis.</li><li>• There is clear linkage and relevance between overcoming the barrier and lowering overall DLE costs.</li><li>• The competitor’s assessment shows a strong understanding of the broad lithium extraction industry’s current state of the art.</li></ul>

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

**Suggested content:**

- 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 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 will be scored on a 1–6 scale according to the following criteria:**

- 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:**

- 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 will be scored on a 1–6 scale according to the following criteria:**

- 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:**

- 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 will be scored on a 1–6 scale according to the following criteria:**

- 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 Questions 2 and 4**

- Use only SMART outcome-based goals—rather than activity-based goals—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, experts in the solution space).
- The American-Made Network may be able to help you to formulate your SMART goals.

**Table 8. Letters of Commitment**

Letters of Commitment or Support (Optional)
<p>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.</p>

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 will 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 as shown in Table 9.

**Table 9. Scoring 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 one to two months after the phase closes, when the Prize Administrator will request 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 become a Phase 2 Finalist, then they are eligible to compete in Phase 3.

# PHASE 2 RULES (CLOSED)

## 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 1.5, Who Can Win, for more information regarding eligibility.

Phase 1 semifinalists competing in Phase 2 have the opportunity to interact closely with an Industry Advisory Panel (IAP) composed of experts in the field of Direct Lithium Extraction (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. DOE and others may be present during these meetings.

DOE will assign IAP members to Phase 2 competitors based on requests submitted in the Phase 1 submission packages in November 2021. DOE will take all requests into account and will make assignments based on best fits for each team and the IAP member. Teams will not have the opportunity to negotiate their assigned IAP member. Teams are strongly encouraged to take advantage of the mentorship of their IAP member to advance their technologies as well as develop connections that will assist teams in securing real geothermal brine samples to test their solutions in Phase 3.

The role of IAP members is to mentor and advise teams without bias. Their role will not include writing or editing any portion of the Innovation Pitch presentation or Phase 2 submission package. IAP members receive an honorarium from DOE for their participation and will not charge prize teams for their time or services.

Additional guidance on IAP member and team requirements will be forthcoming.

## 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 been named as a semi-finalist at the end of Phase 1.

## 5. What to Submit

**Table 10. Phase 2 Submission Package Elements**

Phase 2 Submission Package
<ul style="list-style-type: none"><li>• Innovation Pitch and PowerPoint Presentation (public, not scored)</li><li>• Technical Narrative about addressing the problem, advancing innovation, and fabrication and testing plan (not public, scored)</li><li>• 1-page abstract summarizing the Technical Narrative (not public, not scored).</li></ul>

**Table 11. Innovation Pitch Elements**

Innovation Pitch (public, not scored)
<p>Prepare an innovation pitch presentation which covers an introduction to your team, description of the technology, proposed project goals, any key graphics (illustrations, charts, maps, and/or tables), the technical details and value proposition of your solution, progress on your design, support needed to advance the solution, and how your solution fits into the lithium market and supply chain. Teams will be pitching to IAP members and DOE Geothermal Technologies Office.</p> <p>Innovation pitches should be no longer than 10 minutes and will be held virtually. Teams should submit slides ahead of their pitch on March 25 by 5 p.m. EST to HeroX. Innovation pitches are tentatively scheduled for the week of March 28. Teams should make sure they are able to make themselves available during this time period and have access to a webcam. Presentations and slides will be recorded and made available to the public.</p> <p>The presentation slides must be submitted using the provided template found on HeroX, and saved in a Microsoft PowerPoint format. Save the Innovation Pitch presentation in a single file using the following convention for the title: "TeamName_InnovationPitch".</p>



**Table 12. Phase 2 Abstract Elements**

<b>Phase 2 Abstract (public, not scored)</b>
<p>Applicants are required to submit a one-page summary/abstract of their project. The project abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the team, the project title, the objectives of the Phase 2 submission, a description of the project, and the potential impact of the project (e.g., benefits, outcomes). This abstract should not include any proprietary or sensitive business information as DOE may make it available to the public after selections are made. The project summary must not exceed one page when printed using standard 8.5 x 11 paper with 1” margins (top, bottom, left, and right) with font not smaller than 12 point. Save the Summary for Public Release in a single PDF file using the following convention for the title: “TeamName_Abstract”.</p>

**Table 13. Phase 2 Technical Narrative**

<b>Phase 2 Technical Narrative (15 pages; not public, scored)</b>	
<p>Participants should answer each of the following 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 three questions do not have a word limit; however, the aggregate response to these questions must not exceed 15 pages when printed using standard 8.5 x 11 paper with 1” margins (top, bottom, left, and right) with font not smaller than 12 point. Save the Technical Narrative in a single PDF file using the following convention for the title: “TeamName_TechnicalNarrative”. Images, figures, graphs, footnotes, and cited references must be included in the 15-page limit of your Technical Narrative. Expert reviewers will score the questions based on the content you have provided that conforms to the previously described limits.</p>	
<b>Question 1: Addressing the Problem</b> —How has your team advanced a solution to the problem?	
<p><b>Suggested content:</b></p> <ul style="list-style-type: none"> <li>Describe the barrier within the lithium extraction process that your solution addresses.</li> <li>Describe your solution and its unique value proposition.</li> <li>Quantify how your solution will ultimately improve the economics and/or environmental impacts of DLE from geothermal brines.</li> </ul>	<p><b>Each statement will be scored on a 1–6 scale according to the following criteria:</b></p> <ul style="list-style-type: none"> <li>The competitor has advanced a solution to their Phase 1 problem.</li> <li>The competitor has demonstrated a clear path to lowering overall DLE costs.</li> <li>The competitor has demonstrated the improved economics of their DLE as compared to the current state of the art.</li> <li>The competitor has demonstrated the improved environmental impact of their DLE as compared to the current state of the art.</li> </ul>

**Question 2: *Advancing Innovation*—What progress have you made?**

**Suggested content:**

- Describe your progress on your DLE innovation, including documentation of proof-of-concept design (**see special instructions**).
- Describe how you worked with your IAP member to advance your design, how their mentorship was important, and how the feedback changed your design process.
- Describe your efforts to undertake rigorous design processes, highlighting key engagements, relationships, and milestones (see special instructions).
- Describe your design process. How did you settle on the final design? What other designs did you consider? Why is your final design the best? How did different members of your team or outside support influence the design process? How did you select materials (if applicable)?
- How does your design incorporate a diverse perspective, and how did you seek out those perspectives?

**Each statement will be scored on a 1–6 scale according to the following criteria:**

- The solution represents an innovative approach, built on reasonable assumptions, valid technical foundations, and lessons learned from other notable efforts in this space. Competitors provided necessary figures, models, tables, and assumptions used in their approach.
- The planned innovation is reasonably ambitious and validates critical assumptions needed to advance the proposed solution.
- A considerable amount of high-quality effort was put into defining and advancing the proposed concept.

**Question 3: *Plan*—How do you plan to fabricate and test your solution?**

**Suggested content:**

- Describe where you stand in your development cycle and define goals and SMART metrics for Phase 3 (based on the schedule listed in Section I.3).
- 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?
- Describe details of where/how you plan to test your innovation. Include performance metrics and details of where will you get brines and tools for next phase. Provide a letter of commitment if applicable.

**Each statement will be scored on a 1–6 scale according to the following criteria:**

- The team has met intended goals for Phase 2.
- The stated Phase 3 goals are ambitious, reduce risks, and show a commitment to an accelerated development cycle.
- The proposed plan is appropriate and logical in order to achieve the stated goals.
- Meeting the stated goals demonstrates critical progress toward building, testing, and validating the functionality of the innovation.
- The proposed plan effectively uses resources available in-house, attainable

<ul style="list-style-type: none"> <li>• Provide a high-level budget and project management plan to meet your goals during Phase 3, including how you will leverage program resources, including IAP member mentorship, or other entities (include references to letters of support/commitment if applicable).</li> </ul>	<p>within the prize period, or through this program to advance the innovation.</p> <ul style="list-style-type: none"> <li>• The teams states a plan for testing and demonstrating their innovation using real geothermal brine.</li> </ul>
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### Special Instructions for Question 2

Although design documentation will be application-specific, documentation should clearly show the functionality and performance benefits of the proposed innovation over conventional technology. This documentation should include the design engineering steps taken that support the submitted design basis. Example design engineering content includes computer-aided design (CAD) model renderings, engineering calculations, finite element analysis along with a description of the calculation basis, and other approaches that credibly quantify potential impacts.

All design documentation must be included in the 15-page limit as described in the Technical Narrative elements listed in Table 13, and in the same readable PDF format. CAD drawings or other modeling content that requires specific software licensing will not be judged.

## 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.

Scoring criteria for the prize can be found in Section II.6, How We Score.

# 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. Phase 3 will include a virtual Final Presentation with a live demonstration of each Finalists' technology. The virtual Final Presentation will be attended by DOE and IAP members. Winning Phase 2 is required to be eligible to compete in Phase 3—see Section 1.5, Who Can Win, for more information regarding eligibility.

Phase 3 Finalists will continue to interact closely with their assigned IAP member. Teams and IAP members are required to meet at a minimum of four times during Phase 3. Individual meetings are coordinated directly between teams and IAP members. DOE and others may be present during these meetings.

The role of IAP members is to mentor and advise teams without bias. Their role will not include writing or editing any portion of the Phase 3 submission package. IAP members receive an honorarium from DOE for their participation and will not charge prize teams for their time or services.

## 2. Goal

Phase 2 award recipients, working closely with IAP members, will build, test, and validate their planned innovation. Validation of technologies must be built on reasonable assumptions, valid technical foundations, and lessons learned from other notable efforts in this space. Teams must validate their technologies by:

- Validating critical assumptions for pre- and post-treatment of a geothermal brine for lithium extraction
- Demonstrating they can extract an economic quantity of battery grade lithium hydroxide from geothermal brine and validating all assumptions to scale the process
- Demonstrating a clear path to lowering DLE costs
- Demonstrating an improved environmental impact of their DLE as compared to the current state-of-the-art methods currently deployed at the Salton Sea.

## 3. Prizes to Win

Phase 3 offers up to three cash prizes from a cash prize pool of \$2 million. \$2 million in cash prizes will be divided among the first-, second-, and third-place winners.

## 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.

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Additional eligible members are allowed to join a team competing in Phase 3. If a change in a Team Captain is required, the new Captain must be an existing team member affiliated with the same academic institution as the prior Captain and meet all eligibility requirements as outlined in Section I.5, Eligibility Requirements.

## 5. What to Submit

**Table 14. Phase 3 Submission Package Elements**

<b>Phase 3 Submission Package</b>
<ul style="list-style-type: none"> <li>• Final Technical Presentation PowerPoint Presentation (public, not scored)</li> <li>• Final Technical Report addressing the problem, advancing innovation, fabrication, and testing plan (not public, scored)</li> <li>• Technology Demonstration Video (public, scored)</li> </ul>

**Table 15. Phase 3 Final Technical Presentation**

<b>Final Technical Presentation (public, not scored)</b>
<p>Prepare a final project presentation that includes the final design of your prototype, the fabrication process, testing and validating, and next steps of your work. The presentation should include a final description of the technology, project goals, any key graphics (illustrations, charts, maps, and/or tables), the technical details and value proposition of your solution, and how the solution addresses environmental impacts. Teams will virtually present a demonstration of their technology to IAP members, DOE staff, and National Laboratory employees.</p> <p>Presentations should be no longer than 15 minutes and will be held virtually. Teams should submit slides ahead of their pitch, no later than June 7, 2023, by 5 p.m. EST via HeroX. Innovation pitches are tentatively scheduled for the week of June 12, 2023. Teams should ensure they are able to make themselves available during this time and have access to a webcam. Presentations and slides will be recorded and made available to the public.</p> <p>The presentation slides must be submitted using the provided template found on HeroX and saved in a Microsoft PowerPoint format. Presentations should be saved in a single file using the following convention for the title: "TeamName_FinalTechnicalPresentation".</p>

**Table 16. Phase 3 Final Technical Report**

<b>Phase 3 Final Technical Report (20 pages; not public, scored)</b>
<p>Participants should answer each of the following 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 three questions do not have a word limit; however, the aggregate response to these questions must not exceed 15 pages. In addition, participants have the option to include 5 pages of images, figures, graphs, footnotes, cited references, and letters of support. The Final Technical Report should not exceed 20 pages when printed using standard 8.5 x 11 paper with 1" margins (top, bottom, left, and right) with font no smaller than 12-point. Linking to documents or websites outside of the Final</p>

Technical Report are not allowed and will not be reviewed as part of your submission. Save the Final Technical Report in a single PDF file using the following convention for the title: “TeamName\_FinalTechnicalReport”. Expert reviewers will score the questions based on the content you have provided that conforms to the previously described limits.

**Question 1: Fabricating**

How has your team fabricated a solution to the problem?

**Suggested content:**

- Describe the process of fabricating your final prototype, and include all steps and assumptions made.
- Describe any barriers your team overcame in fabricating your technology.
- Provide final design drawings and design notes.
- Describe instructions for how to assemble the prototype and any special expertise or tools that are required.
- Describe your design process. How did you settle on the final design? What other designs did you consider? How did different members of your team or outside support influence the design process? How did you select materials (if applicable)?

**Question 1 will receive a score of 1 – 6 according to the following criteria:**

- The competitor has advanced and fabricated a solution to their Phase 2 innovation.
- The competitor has detailed a process that includes all assumptions, and barriers to their designs.
- The competitor has detailed an assembly plan of their prototypes.

**Question 2: Testing & Validation**

What steps has your team taken to test and validate the solution?

**Suggested content:**

- Describe and demonstrate your progress on your team’s DLE innovation, including documentation of proof-of-concept design (**see special instructions**).
- Describe how you worked with your IAP member to advance your design, how their mentorship was important, and how the feedback changed your design process.
- What steps did you take to test your prototype, and what documentation can you provide?
- What testing acceptance criteria did you use?
- What type of brine did you use? What is the composition of the brine?

**Question 2 will receive a score of 1 – 6 according to the following criteria:**

- The solution represents an innovative approach, built on reasonable assumptions, valid technical foundations, and lessons learned from other notable efforts in this space. Competitors provided necessary figures, models, tables, assumptions, and documentation used in their approach.
- The planned innovation is reasonably ambitious and validates critical assumptions needed to advance the proposed solution.
- A considerable amount of high-quality effort was put into defining and advancing the proposed concept.
- The competitor has demonstrated a clear path to lowering overall DLE costs.

<ul style="list-style-type: none"> <li>• What is the analysis and results of the extraction, including lithium selectivity, yield, and purity? How does this compare to your developed metrics and expected results?</li> <li>• How did you overcome testing failures or anomalies, and how did you document these failures? How did you have to change your design criteria to overcome these failures?</li> <li>• What testing equipment and/or tools did you use?</li> <li>• Quantify how your solution will ultimately improve the economics and environmental impacts of DLE from geothermal brines.</li> </ul>	<ul style="list-style-type: none"> <li>• The competitor has demonstrated the improved economics of their DLE as compared to current state-of-the-art methods.</li> <li>• The competitor has demonstrated the improved environmental impact of their DLE as compared to current state-of-the-art methods.</li> </ul>
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**Question 3: Next Steps**  
What are the next steps to scale your solution?

<p><b>Suggested content:</b></p> <ul style="list-style-type: none"> <li>• What steps, assumptions, and alterations to your design will be needed to test your solution in the field at a geothermal power plant or an operating geothermal field at the Salton Sea?</li> <li>• How will your technology operate in varied brine flow states of the geothermal power plant?</li> <li>• Where will your technology be installed or incorporated into an operating geothermal power plant or operating geothermal field at the Salton Sea? What design alterations will be needed? What impacts to the power plant operations may occur? How would you suggest addressing those impacts?</li> <li>• How durable is your technology? How long will it operate before needing maintenance or replacement?</li> <li>• If you used a synthetic brine for testing and validating, in what ways does your design need to be modified to accommodate real-world brines?</li> <li>• What are the next steps for scaling up and manufacturing your prototype? What manufacturing methods will you consider?</li> </ul>	<p><b>Question 3 will receive a score of 1 – 6 according to the following criteria:</b></p> <ul style="list-style-type: none"> <li>• The stated Phase 3 goals are ambitious, reduce risks related to technology demonstration and deployment, and show a commitment to an accelerated development cycle.</li> <li>• The proposed plan is appropriate and logical to achieve the stated goals.</li> <li>• Meeting the stated goals demonstrates critical progress toward next steps in scaling up and manufacturing the functionality of the innovation in a real-world setting.</li> </ul>
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<p>What are the costs of scaling up and manufacturing your prototype?</p> <ul style="list-style-type: none"> <li>• What are the barriers, if any, to scaling your solution to field operations? How can those barriers be overcome? What additional testing and validation may be needed? What are the key performance indicators to validate your prototype?</li> <li>• What is the vision for your prototype after the prize? What success metrics and timeline goals has your team outlined?</li> <li>• What are the plans to work with an industry partner and/or university technology transfer office to advance your prototype?</li> </ul>	
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**Technology Demonstration Video**

<p><b>Suggested content:</b></p> <ul style="list-style-type: none"> <li>• Brief introduction of the team and university lead organization</li> <li>• Working demonstration of your technology in a laboratory or real-world setting</li> <li>• Real-time explanation of process with voice-over or transcription in the video</li> <li>• Evidence of lithium extraction and analysis</li> <li>• Visual evidence of related metrics and values being validated</li> <li>• Clear visual information or voice-over of the size of the system and scale relative to commercial lithium extraction processes.</li> </ul> <p><b>Required submission format:</b></p> <ul style="list-style-type: none"> <li>• Videos should be uploaded to YouTube, on July 3, 2023, by 5 p.m. EST using the following convention for the title: "TeamName_TechDemoVideo".</li> <li>• The video should not exceed 5 minutes.</li> <li>• The video needs to be accessible to view by other users by setting permissions to "public".</li> </ul>	<p><b>The video will be scored on a 1–6 scale according to the following criteria:</b></p> <ul style="list-style-type: none"> <li>• Clearly demonstrated and provided a detailed step-by-step explanation of the technology.</li> <li>• Provided evidence of lithium extraction and clear explanation of metrics and values being evaluated.</li> </ul> <p style="text-align: center;"><u>If a team does not submit a video, they will be disqualified and ineligible to win.</u></p>
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## Special Instructions for Question 2

Although design documentation will be application-specific, documentation should clearly show the functionality and performance benefits of the proposed innovation over conventional technology. This documentation should include the design engineering steps taken that support the submitted design basis. Example design engineering content includes computer-aided design (CAD) model renderings, engineering calculations, finite element analysis along with a description of the calculation basis, and other approaches that credibly quantify potential impacts.

All design documentation must be included in the 20-page limit as described in the Final Technical Report elements listed in Table 17, and in the same readable PDF format. CAD drawings or other modeling content that requires specific software licensing will not be judged.

## 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. 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.

Scoring criteria for the prize can be found in Section II.6, How We Score.

# 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, IAP 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 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 emails 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 to 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 (<https://www.irs.gov/pub/irs-pdf/fw9.pdf>) to the Prize Administrator within 30 days of the date the notice is sent. 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

For Phase 2 and 3, the Prize Administrator awards a single dollar amount to the academic institution of the designated primary submitter, whether the submitter consists of a single entity or multiple entities. The academic institution of 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 organizations that participated in the submission on the prize website indefinitely.

By entering, the participant represents and warrants that:

- a) 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, likenesses of any third parties, 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;
- b) 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;
- c) All persons who were engaged by the participant to work on the submission or who appear in the submission in any manner have:

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;

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;

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 or development of any submission. Upon registration, except in the case of willful misconduct, all participants agree to, and thereby do waive and release, any and all claims or causes of action against the federal government and its officers, employees, and agents for any and all injury and damage of any nature whatsoever (whether existing or thereafter arising; whether direct, indirect, or consequential; and whether foreseeable or not), arising from their participation in the 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 CFR § 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 reviewers' 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 noncash 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 to which the entity is owned or controlled by a foreign government, agency, firm, corporation, or person who is not a citizen or permanent resident of the United States, 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 United States and growth in new markets and jobs in the United States
- 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 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 to 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.