



U.S. DEPARTMENT OF ENERGY

American-Made Geothermal Manufacturing Prize

OFFICIAL RULES

The American-Made Geothermal Manufacturing Prize is designed to catalyze manufacturing innovation in the American geothermal industry by harnessing the rapid advances additive manufacturing can provide in improving design, fabrication, and functionality. This is accomplished through a series of prize competitions and the development of a diverse and powerful support network that leverages national laboratories, energy incubators, and other resources from across the United States. Winning the Make! Contest is required to compete in the Geo! Contest.

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Modification Summary

Date	Modifications
Revision 1 6/9/22	Page 15 – Removed public summary video submission requirement Page 15 – Added a prototype demonstration video requirement

I. PROGRAM SUMMARY

1. Introduction: A Two-Pronged Approach

The American-Made Geothermal Manufacturing Prize, administered under the authority of the America COMPETES Reauthorization Act of 2010, consists of two parallel and integrated features: the Ready!, Set!, Make!, and Geo! **Contests** and the **American-Made Network**.

Competitors in the Ready!, Set!, Make!, and Geo! Contests participate in four escalating challenges. The contests provide \$4.65 million in awards—\$3.25 million in cash prizes, \$1 million in vouchers, and \$400,000 in field-testing costs—to incentivize driving additively manufactured geothermal innovations from concept to prototype testing in two years through an accelerated schedule. Winning the Make! Contest is required to compete in the Geo! Contest.

The American-Made Network continues to flourish in support of this and other American-Made Challenges by amplifying 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 stakeholder community includes incubators, investors, philanthropists, fabrication facility managers, and seasoned industry leaders, all of whom provide technical insight, marketing expertise, product validation, and other support. Throughout the competition, these diverse experts are labeled "Connectors" and comprise key components of the Network.

2. Background

Geothermal environments pose significant challenges for manufacturing tools, components, and equipment because they require materials that can withstand harsh geothermal conditions, including variable subsurface stresses resulting from high temperatures, high rock strengths, and corrosive working fluids. Consequently, these environmental conditions necessitate manufacturing with high-grade materials and specialized geometries. However, the U.S. geothermal market is small, so the industry does not require large production volumes of equipment. The combination of small manufacturing volumes with the reduced tool lifetimes that are a consequence of the harsh environmental conditions results in prohibitively high manufacturing costs.

Moving beyond this manufacturing paradigm and achieving the 60 gigawatts of projected geothermal electricity capacity by 2050, highlighted in the *GeoVision: Harnessing the Heat Beneath Our Feet* report,¹ will require significant technical innovations, such as those underway in the additive

¹ U.S. Department of Energy (DOE). 2019. *GeoVision: Harnessing the Heat Beneath Our Feet*. <https://www.energy.gov/sites/prod/files/2019/06/f63/GeoVision-full-report-opt.pdf>.

manufacturing (AM) community, whose innovations benefit a multitude of American industries. Growth in AM applications across the entire domestic manufacturing sector has been explosive in the last decade: The annual sales of commercial metal printing systems grew from zero in 2000 to more than 1,800 systems in 2017,² driven by a 50% decrease in the costs of industrial-scale systems over the same timeframe.³

Importantly, the AM industry is now supporting the demanding requirements of the automotive, aerospace, and clean energy industries with high-grade metal and alloy printing capabilities. Some of these metals and alloys—such as nickel superalloy, titanium, tungsten-carbide, and certain high-grade-steel alloys—are the same materials required for geothermal tool and component manufacturing. The opportunity exists to leverage the rapid innovations that AM enables with the U.S. geothermal industry’s ongoing need for manufacturing innovation through:

- Reducing design and manufacturing lead times
- Saving money and materials
- Improving performance necessary for geothermal environments.

The American-Made Geothermal Manufacturing Prize, also known as the Geothermal Prize, is designed to spark innovation and take advantage of this opportunity.

Spearheaded by the [Geothermal Technologies Office](#) (GTO) and the [Advanced Manufacturing Office](#) (AMO), within DOE’s Office of Energy Efficiency and Renewable Energy, and in partnership with the [National Renewable Energy Laboratory](#) (NREL) and [Oak Ridge National Laboratory](#) (ORNL), the Geothermal Prize spurs creativity and addresses the manufacturing challenges of operating in geothermal environments. The Geothermal Prize comprises four progressive competitions that catalyze manufacturing innovation in the U.S. geothermal industry by harnessing the rapid advances AM can provide in tool design, fabrication, and functionality. In addition, it incentivizes the nation’s innovators and entrepreneurs to rapidly discover, research, iterate, and deliver new AM solutions with enhanced performance while maintaining AM prowess in the United States. This new initiative that focuses on rapid prototype development not only provides cash prizes, but also engages America’s energy incubators, investors, universities, 17 national laboratories, and others to help participants achieve their goals.

The Geothermal Prize adapts the successful program structure used for other American-Made Challenges: a series of prize competitions combined with the use and expansion of the American-Made Network. The unique American-Made Network takes a structured approach to bring diverse sources of support—such as DOE’s national laboratories, business incubators, and prototype fabrication facilities—together under one umbrella. This network approach is designed to be flexible, scalable, and extend across numerous technology domains and sectors.

² Wohlers Associates, Inc, 2018. *Wohlers Report 2018*.

³ Bloomberg NEF. 2018. *3D Printing: Manufacturing’s New Dimension*.

The Geothermal Prize is designed to bring together the world's best-in-class research base with its unparalleled entrepreneurial support system consisting of pioneering makerspaces, dozens of energy incubators, universities, and 17 national laboratories to create a sweeping portfolio of innovations primed for demonstrating the promise that AM holds for revolutionizing approaches for engineering for extreme environments. The prize structure simultaneously enables the rapid development of technology and strengthens critical connections for commercialization.

The program makes it faster and easier for our nation to transform innovative research and ideas into early-stage concepts and then build prototypes ready for testing. Competitors are eligible to win cash prizes and other benefits, as well as connect with mentoring, training, and receive other services from the American-Made Network community, positioning participants to make a long-term impact on the U.S. manufacturing sector.

3. Contests: Ready!, Set!, Make!, Geo!

The Ready!, Set!, Make!, and Geo! Contests fast-track efforts to identify, develop, and test disruptive AM solutions to meet geothermal industry needs. Each stage includes a contest period in which participants work to rapidly advance their solutions. For the Geo! Contest, DOE invites winners of the Make! Contest, individually or as a team, to conduct performance testing of their advanced functional AM prototypes based on their Make! design at a qualified testing facility.

Ready! Contest (Concept Development) CLOSED: Participants demonstrated that they identified and developed an impactful idea or solution that partially or wholly incorporated AM into a geothermal tool, component, or equipment. They also proposed a path to design, prototype, and test a proof-of-concept. The 15 Ready! Contest quarterfinalists were announced on October 18, 2020, splitting a \$500,000 cash prize pool. Ready! Contest quarterfinalists participated in a virtual design for AM workshop with ORNL Manufacturing Demonstration Facility (MDF) experts in November 2020 and received design feedback from MDF experts in preparation of their Set! Contest submissions.

Set! Contest (Design) CLOSED: Participants worked to substantially advance their AM-focused geothermal tool, component, or equipment concept by demonstrating their design's promise in meeting engineering and operational requirements outlined by the team. Additionally, participants made significant progress in teaming and partnerships capable of building and testing a functioning prototype. The 9 Set! Contest semifinalists were announced on March 31, 2021, splitting a \$1 million cash prize and \$750,000 voucher pool.

Make! Contest (Prototype) CLOSED: Competitors fabricated AM prototypes based on their Set! design at a qualified fabrication facility. Make! Contest competitors were evaluated by a panel of experts during a live Make! Demo Day event on January 12, 2022, using—in part—engineering and technical performance criteria previously submitted by each team. The 5 Make! Contest finalists were announced on January 13, 2022, receiving up to \$250,000 in cash and an additional \$75,000 in vouchers redeemable with national labs and qualified fabrication facilities within the American-Made Network.

Geo! Contest (Test): Competitors manufacture an advanced functional prototype with all AM components fully incorporated. Testing uses tool-, component-, or equipment-specific performance criteria relevant for geothermal environments submitted with the Geo! Contest application package. Overall contest winners are chosen by a panel of experts during a live Geo! Demo Day event and receive \$500,000 in cash, as well as up to \$200,000 in field-testing costs covered for eligible teams.

This set of four contests offers a total of \$4.65 million in incentives—\$3.25 million in cash prizes, \$1 million in vouchers, and \$400,000 in field testing costs.

Contest Funding:

Contest	Winners	Prizes
1. Ready!	Up to 20	\$500,000 distributed equally, with cash prizes ranging from \$25,000 to \$50,000 per winner.
2. Set!	Up to 10	\$1 million in cash prizes and \$750,000 in vouchers, with each winner receiving between \$100,000 to \$200,000 in cash and \$75,000 in vouchers.
3. Make!	Up to 5	\$750,000 in cash prizes and \$250,000 in vouchers, with each winner receiving between \$150,000 and \$250,000 in cash and \$75,000 in vouchers.
4. Geo!	2	\$500,000 each in cash prizes and up to \$200,000 for field testing per eligible winner.

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: The National Renewable Energy Laboratory:** DOE has partnered with NREL to administer the Geothermal 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. **Vouchers:** Winners of the Make! Contest receive vouchers that they may use to fund work at national laboratories and other facilities to accelerate the production, testing, improvement, or validation of prototypes. Voucher guidelines are posted on the [Geothermal Manufacturing Prize](#)

[website](#) and include information for competitors as well as for entities interested in helping competitors through the voucher program.

3. **Connectors:** Connectors are entities capable of helping competitors navigate the innovation process and identify, recruit, and support contest participants. Connectors can be from incubators, universities, think tanks, industry or any group seeking to help competitors win by performing support activities such as:
- Attracting a diverse range of talented individuals to become contest competitors;
 - Helping competitors connect with design, prototyping, and manufacturing experts and facilities, as well as mentors and relevant industry partners; and
 - Providing in-kind resources, tools, and facilities to fabricate, test, and refine AM solutions.

Connectors who support participants that go on to win any of the Ready!, Set!, Make!, or Geo! Contests will be financially rewarded based on the table below.

Connector Funding

Anticipated Number of Awards	Dollar Amounts	Details
Up to 20	\$50,000 pool	Distributed to Connectors for recruiting or mentoring a winning competitor into in the Ready! Contest.
Up to 15	\$75,000 pool	Distributed to Connectors that mentor competitors and facilitate partnership agreements of Set! and Make! and Geo! Contest winners.

The [Connector Guidelines](#), with details on the Recognition Awards, are available online.

Entities interested in participating as Connectors can visit the [American-Made Challenges](#) website for details.

5. Important Dates

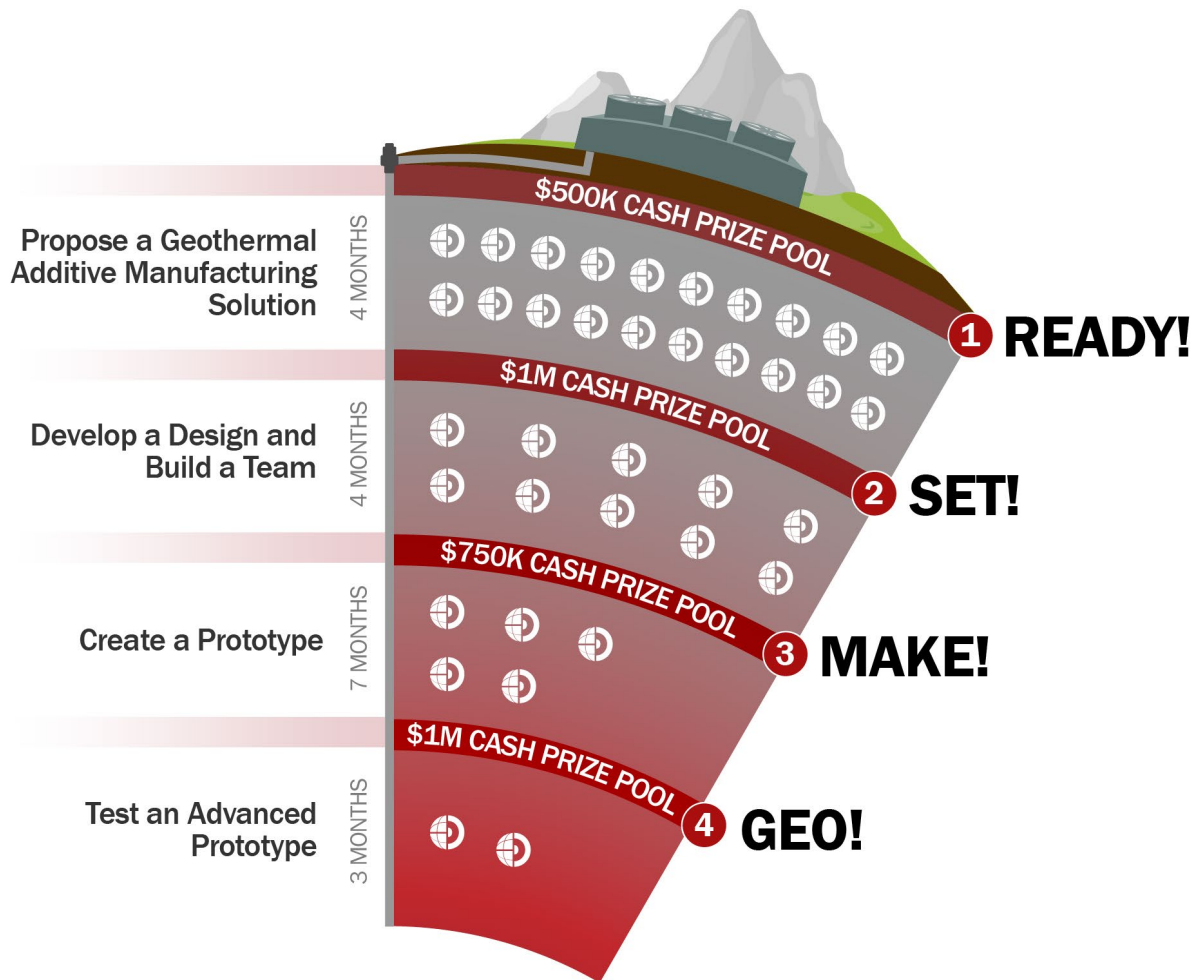
- **Ready!—CLOSED**
 - Ready! Contest submission opened: **April 29, 2020**
 - Ready! Contest submission deadline: **Aug. 26, 2020**
 - Ready! Contest quarterfinalists announced and Set! Contest began: **Oct. 18, 2020**
- **Set!—CLOSED**

- Set! Contest submission opened: **Oct. 18, 2020**
- Set! Competitor AM design workshop at the ORNL MDF: **Nov. 4–6, 2020**
- Set! Contest submission deadline: **Feb. 17, 2021**
- Set! Contest semifinalists announced and Make! Contest began: **March 31, 2021**

- **Make!—CLOSED**
 - Make! Contest submission opened: **March 31, 2021**
 - Make! Contest submission deadline: **Nov. 19, 2021, 5 p.m. ET**
 - Make! Contest finalists evaluated at Demo Day: **Jan. 12, 2022**
 - Make! Contest finalists announced and Geo! Contest begins: **Jan. 13, 2022**

- **Geo!**
 - Geo! Contest submission opens: **Jan. 13, 2022**
 - Geo! Contest submission deadline: Expected **July 27, 2022, at 5 p.m. ET**
 - Geo! Contest winners announced at Demo Day: Expected **Aug. 2022**

All dates are subject to change, including contest openings, deadlines, and announcements. [Sign up](#) for updates.



The Geothermal Prize offers four escalating rounds and substantial cash and other benefits to spark innovation and invigorate AM geothermal manufacturing.

II. READY! CONTEST—CLOSED

On Oct. 18, 2020, DOE announced the quarterfinalists in the Ready! Contest. The list of quarterfinalists can be found at: <https://americanmadechallenges.org/geothermalmanufacturing>

III. SET! CONTEST—CLOSED

On March 31, 2021, DOE announced the semifinalists in the Set! Contest. The list of semifinalists can be found at: <https://americanmadechallenges.org/geothermalmanufacturing>

IV. MAKE! CONTEST—CLOSED

On January 13, 2022, DOE announced the finalists in the Make! Contest. The list of finalists can be found at: <https://americanmadechallenges.org/geothermalmanufacturing>

V. GEO! CONTEST RULES

1. Introduction

The Geo! Contest is the fourth and final contest in the Geothermal Manufacturing Prize, offering \$1 million in cash prizes and up to \$400,000 in reimbursed field-testing costs. The Geo! Contest begins at the announcement of the Make! Contest finalists and includes a Demo Day where all Geo! competitors must present their manufactured advanced functional prototype, with all AM components fully incorporated and tested, to a panel of expert reviewers. **Winning the Make! Contest is required to be eligible to compete in the Geo! Contest.**

Geo! Contest Prizes
<ul style="list-style-type: none">• 2 winners• Each winner will receive \$500,000 in cash prizes and up to \$200,000 in reimbursed field-testing costs.

2. Goal

Competitors will test their advanced functional AM prototypes using Geo! Partner(s) facilities and continual customer and stakeholder feedback to substantially advance their prototypes.

3. Prizes to Win

The Geo! Contest offers each of the two contest winners a \$500,000 cash prize and up to \$200,000 in reimbursed field-testing costs.

All competitors will submit a preliminary field-testing plan and budget as part of the Technical Narrative in their Geo! submissions. If a competitor wins Geo! and wishes to seek reimbursement for up to \$200,000 of field-testing costs, the competitor will need to submit further information, including National Environmental Policy Act (NEPA) compliance. More information on field-testing requirements is provided in the [Guidelines for Field Testing](#).

4. How to Enter

Complete a [submission package](#) online before the contest closing date.

5. What to Submit

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

- **Prototype Demonstration Video—up to 10-minutes long** (will not be made public)
- Cover page content (will be made public; will not count as part of your score)
- One PowerPoint slide (will be made public; will not be part of your score)
- Technical narrative about the problem, innovation, team, and field-testing plan (will not be made public; will be part of your score)
- Letters of commitment or support (required).

Prototype Demonstration Video— How does your innovation work?

Suggested content you provide

- Demonstration of your fully fabricated advanced functional AM prototype's features.
- Description of your advanced functional AM prototype's engineering and technical performance criteria relevant for a geothermal environment.
- Description of testing methodology and testing results for the Geo! Contest.
- **What are your plans for after the prize, including next steps for field testing?**

Required submission format

- Ensure that your video is accessible online (e.g., YouTube, Vimeo – unlisted or private links are acceptable).
- The video should not exceed 10-minutes in length.

Cover Page—List basic information about your submission

- Project name
- Innovation tagline (e.g., your mission in a few words)
- Key project members (names, contacts, and links to their LinkedIn profiles).

- Keywords that best describe your solution (e.g., tool, component, equipment focus, type(s) of AM categories to be used)
- Your city and state
- The Connectors⁴ (up to 3) that significantly helped you advance your solution and the major items they helped with (if applicable)
- Other partners (if any).

⁴ See description of Connector in Section I. Program Summary.

Submission Summary Slide (will be made public)

Create your own public-facing one-slide submission summary that contains technically specific details but can be understood by most people. There is no template, so feel free to present the information as you see fit. Please make any text readable for both standard printouts and conference room projection.

Demo Day Event⁵

You are required to participate in the Geo! Demo Day event with a panel of judges that may involve a pitch, a question-and-answer session, and/or a technical demonstration. Judges review and score your submitted material before the event, then, based on your Demo Day performance and deliberation with the other judges, will finalize their recommendations for finalists at Demo Day. Presence of at least one representative of each team at Demo Day is mandatory to be considered for a Geo! prize.

⁵ This event is currently planned to be an in-person event. Teams are responsible for their own travel and expenses to participate in Demo Day. If circumstances require the event to be held virtually, the decision will be made and communicated to competitors in advance of the scheduled Demo Day date.

Scored Items: Technical Narrative

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

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

In your Technical Narrative, you should answer each of the following four questions. The bullets are organized by suggested content to guide your responses, but you must decide where to focus your answers. The individual answers to the four questions do not have a word limit; however, the aggregate response to these four questions must be between 2,500 and 5,000 words. You may also include up to 20 supporting images, figures, tables, or graphs. The expert reviewers will score your answers based on the content you provide that conforms to these limits. Table, figure, and image descriptions, as well as footnotes, do not count against word limit.

Narrative	
Question 1: <i>Problem & Solution</i> —What is the problem and how have you solved it?	
<p>Suggested content you provide</p> <ul style="list-style-type: none"> Describe the problem, quantify its significance with metrics, and explain the specific relevance to geothermal applications. Describe your AM-focused innovation, its unique value proposition, and how your prototyping and testing results demonstrate a promising new industry manufacturing approach. Explain how AM has enhanced existing fabrication approaches for your innovation. Show how you know this is a significant problem for the geothermal industry using evidence-based validation (e.g., interviews with users, case studies, literature). 	<p>Each statement scored on a 1–6 scale</p> <ul style="list-style-type: none"> The competitor identifies a critical geothermal-focused problem and innovation opportunity using AM through compelling analysis. There is clear linkage and relevance to geothermal applications. The competitor’s assessment shows a strong understanding of current manufacturing approaches for their proposed tool, component, or equipment. The competitor’s efforts to incorporate AM demonstrate the potential for new commercial manufacturing benchmarks of their proposed tool, component, or equipment.

Question 2: *Innovation*—What progress have you made to prove your solution is successful?

Suggested content you provide

- Describe your AM-focused innovation progress, including documentation of the design engineering and technical performance criteria of the advanced functional AM prototype (**see special instructions on page 22**).
- Describe your testing approach(es) and results from Geo! activities, including a thorough evaluation using engineering and technical performance criteria of the advanced functional AM prototype at geothermal-type conditions (**see special instructions on page 22**).
- Describe who gave feedback on your testing methodology and results, why it is important, and changes you made as a result of that feedback.
- Specify expected final performance improvement goals and metrics relevant to your tool, component, or equipment based on your testing results (**see special instructions on page 22**).
- Provide technical justification based on Geo! testing results of the readiness to progress to field testing.

Each statement scored on a 1–6 scale

- The competitor demonstrates a strong understanding through submitted documentation of how incorporating AM has provided a solution pathway for addressing the problem identified in Question 1.
- The testing approach(es) undertaken in Geo! is (are) sufficiently robust and validates critical assumptions needed to quantify differences between the design engineering, technical performance criteria, and actual tested performance.
- Testing results demonstrate the advanced functional AM prototype's performance and progression to field-testing readiness.
- The competitor is pursuing an innovative and impactful solution that will demonstrate promising new geothermal industry manufacturing approaches.
- Final performance improvement goals and metrics are verifiable and aggressive but attainable.

Question 3: *Team*—What qualities give you a competitive edge and how have you grown?

Suggested content you provide

- Introduce your team, explain how it came together (including updates as applicable from Make! participation), and highlight the knowledge and skills that make the team uniquely capable of achieving success.
- Describe how your team has evolved during the competition, including any strategic hires or partnerships.
- Highlight your team’s experiences in this competition and, more broadly, in AM as well as geothermal energy, and how you have applied these experiences to your specific innovation.
- Describe why your team is passionate about your proposed solution.
- Explain why winning the Geo! Contest will substantively change the commercial deployment pathway for the proposed solution.

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 drive, knowledge, and complementary skill sets provide a strong competitive edge toward realizing this solution soon.
- Winning the Geo! Contest will significantly increase the team’s chances of commercializing a viable AM-focused tool, component, or equipment.
- A considerable amount of high-quality effort was put into testing validation of the proposed solution.

Question 4: *Field-Testing Plan*—What is your plan to achieve your goals?

Suggested content you provide

- Describe where you stand in your advanced functional AM prototype’s development and testing.
- Update goals for field testing and commercialization, following SMART criteria (**see special instructions on page 22**).
- Describe your team’s readiness to meet your goals; what resources provided by the contest will help meet your goals?
- Provide a proposed field-testing plan, including the entity(ies) you plan to engage with, the type(s) of field tests you will conduct, the proposed location(s), the characteristics of the field site(s) relevant to your technology test (including planned test depth and associated temperature conditions), the timing/duration of the field test(s), the types of data to be collected, and a high-level budget.

Each statement scored on a 1–6 scale

- The stated goals are ambitious, reduce risks, and show a commitment to an accelerated development.
- The competitors are successfully meeting prior goals and demonstrating continued critical design progress toward field testing of their innovation.
- The proposed plan is appropriate and logical to achieve the stated goals.
- The proposed plan effectively uses resources available in-house or through this program to advance the innovation.
- Stated field-testing goals are ambitious, risk-reducing, and show a commitment to developing an accelerated solution.
- Meeting the stated goals will demonstrate critical progress toward development of an AM-focused tool, component, or equipment capable of performance in an actual geothermal environment.

Special Instructions for Questions 2 and 4

- Testing conditions for all Geo! testing activities should simulate geothermal environments typically encountered during geothermal power generation operations (e.g., 200°C+, 30 MPa+ rock compressive strengths, high differential pressures, low pH fluid values). The specific testing parameters selected should be justified based on the target geothermal application market.
- Documentation of Geo! testing activities should clearly describe the test setup, procedures, and testing parameters used to evaluate the competitor’s design and should validate and/or strongly support the core proposed system functionality and performance benefits of the advanced functional AM prototype. This documentation should include testing methodology and/or analysis steps taken that supported engineering and technical performance criteria evaluation as well as documentation that validates assumptions required to undertake field testing.
 - Example testing documentation includes: test configuration drawings, description of testing methodology and test conditions, engineering calculations, results of thermal or mechanical tests (e.g., strength, hardness, fatigue, creep, thermal expansion),

results of corrosion testing, reports of functional and load testing of the component, quality inspection test results (such as X-ray-computed tomography to evaluate material structure), and other functional laboratory demonstrations.

- Other approaches can also be used if they credibly quantify potential impacts.
- Performance criteria can discuss planned improvements for tool, component, or equipment functionality; reductions in cost and manufacturing lead times; other improvements in the manufacturing process by using AM; and other improvements as compared to current state of the art. All criteria cited should reflect input from international standards (e.g., ISO), peer-reviewed literature, or other verifiable benchmarking methods.
- The field-testing plan should propose clear performance goals or other technical objectives to be accomplished during testing. Winners will be required to submit to DOE a brief testing work completion report supported by testing results to be used by DOE to inform future geothermal prize designs and other funding opportunities. Winners may designate the report as confidential, according to Section VI.11.
- Use only specific, measurable, achievable, relevant, and timely (SMART) outcome-based goals—not activity-based—so that a neutral third party could validate them.
 - For example: Demonstrate a definitive achievement of progress (e.g., achieve X% efficiency or X letters of interest signed); do **not** describe how you spent your time (e.g., provide a report, talk to customers, or perform experiments).
- In defining your SMART goals, include quantified, risk-reducing, meaningful, practical, and testable interim milestones.
- SMART goals submitted for each phase's application package should not be static. All competitors 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 formulate your SMART goals.

Letters of Commitment or Support (Required)

Attach one-page letters (of support, intent, or commitment) from other relevant entities (e.g., potential users of the proposed innovation) to provide context. A letter of support from each entity engaged in the field-testing plan (except vendors) should be submitted, identifying their support/commitment in participating in field testing and showing appropriate site permissions for the proposed location. General letters of support from parties that are not critical to the execution of your solution will likely 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 VI](#). COMPETITORS THAT DO NOT COMPLY WITH THESE REQUIREMENTS MAY BE DISQUALIFIED.

6. How We Score

The Prize Administrator screens all completed submissions and, in consultation with DOE, will assign completed submissions to a qualified panel of expert reviewers, composed of subject matter experts who will score submissions according to the applicable judging criteria 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.

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 will be the total sum of the scores for all the bullets. All reviewers' scores will then be averaged for a final score for the submission package.

Interviews: GTO and AMO, at their sole discretion, may decide to hold a short interview with a subset of the Geo! Contest competitors. 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 Prize Winners: The directors of GTO and AMO are the judges of the competition and make the final determination of overall prize winners. This determination takes into account reviewer scores, team performance at Geo! Demo Day, any interview findings, and program policy factors listed in Section VI.14.

Announcement: Shortly after the conclusion of the Geo! Demo Day, DOE announces winners. After receiving the Geo! Contest prize, winners move forward with approved plans to field test their solutions in accordance with their plans submitted in the Geo! Contest.

7. Who Can Win

To be eligible to win the Geo! Contest, competitors must comply with the following eligibility requirements. By uploading a submission package, a competitor 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 competitor is not eligible to win the Make! Contest, the competitor may be disqualified.

- Only winners of the Make! Contest are eligible to compete in the Geo! Contest.

- Individuals can compete alone or as a group. A representative of a private entity can also register the entity to compete.
 - An individual prize competitor (who is not competing as a member of a group), must be a citizen or permanent resident of the United States.
 - A group of individuals, competing as one competitor, may win, provided that the online account holder of the submission is a U.S. citizen or a permanent resident.
- Private entities must be incorporated in and maintain a primary place of business in the United States with majority domestic ownership and control.
- If an entity seeking to compete does not have domestic ownership and control, but otherwise meets the eligibility requirements, DOE's Office of Energy Efficiency and Renewable Energy may consider issuing a waiver of that eligibility requirement if the entity submits a compelling justification, the entity is incorporated in and maintains a primary place of business in the United States, and the entity otherwise meets the eligibility requirements. 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. See Section VI.16 for more information on the waiver process.
- Foreign entities may partner with an eligible U.S.-based lead competitor if the lead competitor requests and is granted a waiver for work to be performed outside the United States. See Appendix VI.16 for more information on the waiver process.
- DOE employees and DOE support service contractors, individuals who have been employed by DOE, or working for DOE as a support service contractor within six months prior to the submission deadline of the Make! Contest, are not eligible to participate in any prize contests in this program.
- Non-DOE federal entities and federal employees are also not eligible to win any prize contests in this program.
- Employees of an organization that cosponsors this program are not eligible to participate in any prize contest in this program.
- NREL and ORNL employees involved in administration of this prize are not eligible to participate in any prize contest in this program; however, NREL, ORNL, and other national lab employees (including laboratory researchers) may participate. They can also win a prize contest, 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.

- Entities identified on a 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 [Cybersecurity Directives](#).
- Entities and individuals identified as a restricted party on one or more screening lists of Department of Commerce, State, and the Treasury are not eligible to compete. See [Consolidated Screening List](#).
- The Geothermal Manufacturing Prize is expected to positively impact U.S. economic competitiveness and the geothermal industry. Participation in a foreign government talent recruitment program⁶ 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 risk⁷ 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.

As part of your submission to the Geothermal Manufacturing Prize, you will be required to sign the following statement:

I am submitting this submission package as part of my participation in the Geothermal Manufacturing Prize. I certify under penalty of perjury that the named competitor meets the eligibility requirements for this prize competition and complies with all other rules contained in the Official Rules document. I understand false statements or misrepresentations may result in civil and/or criminal penalties under 18 U.S.C. § 1001 and § 287.

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 Currently, the list of countries of risk includes: Russia, Iran, North Korea, and China.

8. 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 your submission:

- You are a winner of the Make! Contest of the Geothermal Manufacturing Prize.
- The proposed AM solution is responsive to the needs of the geothermal energy 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 AM 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, 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 an AM-focused geothermal tool, component, or equipment concept to an advanced prototype stage by the conclusion of the program.

9. Find Help

Visit the [American-Made website](#) to review and contact the members of the American-Made Network that have signed up to help you succeed.

10. Additional Requirements

Please read and comply with additional requirements in [Section VI](#). Competitors that do not comply with these requirements may be disqualified.

VI. ADDITIONAL TERMS AND CONDITIONS

1. Universal Contest Requirements

Your submission for the Geo! Contest is subject to the following terms and conditions:

- You must post the final content of your submission or upload the submission form [online](#) before the Geo! Contest closes. Late submissions or any other form of submission do not qualify.
- The cover page, and summary slide will be made public.
- The Technical Narrative and letters of commitment/support are not intended to be made public; however, see Section VI.11 regarding the Freedom of Information Act.
- All submissions that you wish to protect from public disclosure must be marked according to the instructions in Section VI.11. 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 VI.5., Submission Rights.
- You must include all the required submission's elements. The Prize Administrator may disqualify your submission after an initial screening if you fail to provide all required submission elements. Competitors may be given an opportunity to rectify submission errors due to technical challenges. If you wish to seek reimbursement for field-testing costs up to \$200,000 as a Geo! Prize winner, you must submit the required information in support of: (1) NEPA compliance and (2) your testing work completion report based on your technical narrative, Question 4, field-testing plan, as described above.
- Your submission must be in English and in a format readable by Microsoft Word. Scanned handwritten submissions will be disqualified.
- Submissions and competitors will be disqualified if any engagement with the Geothermal Manufacturing 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 you click "Accept" on the HeroX platform and proceed to register for any of the contests described in this document, these rules form a valid and binding agreement between you and the U.S. Department of Energy and is in addition to the existing HeroX Terms of Use for all purposes relating to these contests. You should print and keep a copy of these rules. These provisions only apply to the contests described here and no other contests on the HeroX platform or anywhere else. To the extent that these rules conflict with the HeroX Terms of Use, these rules shall govern.
- The Prize Administrator, when feasible, may give competitors 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 to the Prize Administrator, within 30 days of the date the notice is sent, a completed NREL Request for ACH Banking Information form, and a completed [W9 form](#). In the sole discretion of the Prize Administrator, a winning competitor is disqualified from the competition and receives no prize funds if: (1) the person/entity cannot be contacted; (2) the person/entity fails to sign and return the required documentation within the required time period; (3) the notification is returned as undeliverable; or (4) 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/entities. The primary submitters are solely responsible for allocating any prize funds among their 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

By making a submission, and thereby consenting to the rules of the contest as described in Section VI.1., a competitor is granting to DOE, the Prize Administrator, and any other third parties supporting DOE in the contest a license to display publicly and use 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 to be made public according to Section VI.11. This license includes posting or linking to the public portions of the submission on the Prize Administrator or HeroX applications, including the contest website, DOE websites, and partner websites, and the inclusion of the submission in any other media worldwide. The submission may be viewed by DOE, the Prize Administrator, and reviewers for purposes of the contests, including but not limited to screening and evaluation purposes. The Prize Administrator and any third parties acting on their behalf will also have the right to publicize competitors' names and, as applicable, the names of competitors' team members and organizations that participated in the submission on the contest website indefinitely.

By entering, the competitor represents and warrants that:

1. Competitor's entire submission is an original work by competitor and competitor 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 (1) otherwise requested by the Prize Administrator and/or disclosed by competitor in the submission and (2) competitor has either obtained the rights to use such third-party content or the content of the submission is considered in the public domain without any limitations on use.

2. Unless otherwise disclosed in the submission, the use thereof by Prize Administrator, or the exercise by Prize Administrator of any of the rights granted by competitor under these rules, does not and will not infringe or violate any rights of any third party or entity, including, without limitation patent, copyright, trademark, trade secret, defamation, privacy, publicity, false light, misappropriation, intentional or negligent infliction of emotional distress, confidentiality, or any contractual or other rights.
3. All persons who were engaged by the competitor to work on the submission or who appear in the submission in any manner have:
 - a. Given competitor their express written consent to submit the submission for exhibition and other exploitation in any manner and in any and all media, whether now existing or hereafter discovered, throughout the world
 - b. Provided written permission to include their name, image, or pictures in or with the submission (or if a minor who is not competitor's child, competitor must have the permission of their parent or legal guardian), and competitor may be asked by 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 competitor represents and warrants that the competitor is the sole author and copyright owner of the submission; that the submission is an original work of the applicant or that the applicant has acquired sufficient rights to use and to authorize others, including DOE, to use the submission, as specified throughout the rules; that the submission does not infringe upon any copyright or upon any other third-party rights of which the applicant is aware; and that the submission is free of malware.

6. Contest Subject to Applicable Law

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

7. Resolution of Disputes

The U.S. Department of Energy is solely responsible for administrative decisions, which are final and binding in all matters related to the contest.

Neither the U.S. Department of Energy nor the Prize Administrator arbitrate, intervene, advise on, or resolve any matters between team members or among competitors.

8. Publicity

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

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

9. Liability

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

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 is withheld from public disclosure to the extent permitted by law, including the Freedom of Information Act. Without assuming any liability for inadvertent disclosure, DOE will seek to limit disclosure of such information to its employees and to outside reviewers when necessary for review of the application or as otherwise authorized by law. This restriction does not limit the government's right to use the information if it is obtained from another source.

Submissions containing confidential, proprietary, or privileged information must be marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Government

is not liable for the disclosure or use of unmarked information and may use or disclose such information for any purpose.

The submission must be marked as follows and identify the specific pages containing trade secrets, confidential, proprietary, or privileged information:

Notice of Restriction on Disclosure and Use of Data:

Pages [list applicable pages] of this document may contain trade secrets, confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes. [End of Notice]

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

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

11. Privacy

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

12. General Conditions

DOE reserves the right to cancel, suspend, and/or modify the contest, or any part of it, at any time. If any fraud, technical failures, or any other 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 contest.

Although DOE indicates in the Geo! Contest that it will select two winners for the contest, DOE reserves the right to only select competitors that are likely to achieve the goals of the program. If, in DOE's determination, no competitors are likely to achieve the goals of the program, DOE will not select any competitors to be winners and will award no prize money.

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

13. Program Policy Factors

While the scores of the reviewers will be carefully considered, it is the role of the Prize Administrator to maximize the impact of contest funds. Some factors outside the control of competitors and beyond the independent reviewers' 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 following program policy factors may be considered in determining winners:

- Geographic diversity and potential economic impact of projects in a variety of geothermal environments
- Whether the use of additional DOE funds and provided resources continue to be nonduplicative and compatible with the stated goals of this program and, generally, with the DOE mission
- Entity diversity, from individuals, to teams, small businesses, and corporations
- The degree to which the submission exhibits technological or programmatic diversity when compared to the existing DOE project portfolio and other competitors
- The level of industry involvement and demonstrated ability to accelerate commercialization and overcome key market barriers
- The degree to which the submission is likely to lead to increased employment and manufacturing in the United States or provide other economic benefit to U.S. taxpayers
- The degree to which the submission will accelerate transformational technological, financial, or workforce advances in areas that industry by itself is not likely to undertake because of technical or financial uncertainty
- The degree to which the submission supports complementary DOE efforts or projects, which, when taken together, best achieves 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.

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 competitor 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. Requirements for Requests to Waive the “Majority Domestic Ownership and Control” Eligibility Requirement and the “All Prize Activity Must Occur in the United States” Requirement

Entities seeking a waiver should include a justification along with their submission. DOE 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 state the type of waiver the entity is requesting and address the following waiver criteria and content requirements.

1. “Domestic Ownership and Control”

If an entity seeking to compete does not have domestic ownership and control, DOE may consider issuing a waiver of that eligibility requirement where the entity submits a compelling justification, the entity is incorporated in and maintains a primary place of business in the United States, and the entity otherwise meets the eligibility criteria.

Waiver Criteria

Entities seeking a waiver must demonstrate to the satisfaction of DOE that its participation: (1) has a high likelihood of furthering the objectives of this prize competition and (2) aligns with the best interests of 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. Entity’s location (primary place of business)
- c. Statement describing the extent 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. Compelling justification that addresses the waiver criteria stated above
- e. Description of the project’s anticipated contributions to the U.S. economy
- f. Description of how the entity has benefited U.S. research, development, and manufacturing, including contributions to employment in the United States and growth in new U.S. markets and jobs
- g. Description of how the entity has promoted domestic manufacturing of products and/or services.

2. “All Prize Activity Must Occur in the United States”

DOE may consider issuing a waiver of this requirement where the entity submits a compelling justification and otherwise meets the eligibility criteria.

Waiver Criteria

Entities seeking a waiver must demonstrate to the satisfaction of DOE that: (1) its participation has a high likelihood of furthering the objectives of this prize competition and (2) conducting the work outside the United States aligns with the best interests of U.S. industry and U.S. economic development.

Content for Waiver Request

A waiver request must include the following information for the proposed work that would occur outside the United States and for the entity that would perform the work:

- a. Compelling justification that addresses the waiver criteria stated above
- b. Description of the work proposed to be performed outside the United States
- c. Explanation as to how the foreign work is essential to the project
- d. Name and place of incorporation of the entity that would conduct the work
- e. Location where the work would be performed
- f. Description of the project's anticipated contributions to the U.S. economy and how the foreign work would support those contributions.

16. National Environmental Policy Act (NEPA) Compliance

DOE's administration of the American-Made Geothermal Manufacturing Prize is subject to NEPA (42 USC 4321, et seq.). NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website, at <http://nepa.energy.gov/>.

While NEPA compliance is a federal agency responsibility and the ultimate decisions remain with the federal agency, all participants seeking field-testing cost reimbursement as part of winning the Geo! Contest will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their participation in the prize competition. To be eligible for field-testing cost reimbursements, Geo! winners are required to provide DOE with information on their planned field-testing activities such that DOE can conduct a meaningful evaluation of the potential environmental impacts. While declining to submit information in support of the timely and effective completion of the NEPA process disqualifies that winner from field-testing cost reimbursement consideration, the winner will still win the separate \$500,000 cash prize.

Competitors must submit an EQ-1 Questionnaire through this [website](#) and provide a copy of the completed questionnaire as part of the field-testing documentation.

17. Definitions

Additive Manufacturing (AM), also known as 3D printing, is a process that facilitates the creation of physical, three-dimensional objects directly from a computer design file. Materials used for AM can include polymer composites, metals, and ceramics as well as other exotic materials. Of particular interest for this competition will be AM tools, components, and equipment designed for operation in the high-temperature subsurface geothermal environment.

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+). AM applications sought in this competition help advance tools, components, and equipment designed to drill, interrogate, monitor, and function in harsh subsurface environments (e.g., 200°C+) during geothermal operations. Surface equipment associated with power generation, including turbines and other power plant components, are not considered responsive AM applications for purposes of this competition.

Prize Administrator means the Alliance for Sustainable Energy, operating in its capacity under the Management and Operating Contract for the National Renewable Energy Laboratory (NREL), the U.S. Department of Energy Geothermal Technologies Office (GTO), and the Advanced Manufacturing Office (AMO). When the Prize Administrator is referenced in this document, it refers to staff from the Alliance for Sustainable Energy as well as from the GTO and AMO. Ultimate decision-making authority regarding contest matters rests with the directors of the GTO and AMO.

Connector or Connector Organization means an entity that seeks to support the efforts of the competitors. These must be U.S.-based organizations that have the capacity to connect competitors to mentoring, business resources, manufacturing resources, or to introduce them to possible sources of funding. This definition is intentionally broad so that many different types of entities are able to participate. Connectors earn recognition rewards based upon their support of the competitors. Further details can be found at: <https://americanmadechallenges.org/network.html>.

Voucher Funding. Vouchers are part of the prizes for the Make! Contest. In the case of a national laboratory, the funds are provided directly to the lab on behalf of the winner to conduct a mutually agreed upon scope of work between the lab and the winner. When vouchers are used at a non-national-laboratory facility, the winners are reimbursed after the voucher work is complete. Further details about the voucher process are provided on the Geothermal Manufacturing Prize website.