



U.S. Department of Energy Geothermal Design Challenge

Collegiate Student Competition

Rules

Fall 2020

Infographic

Release date: October 12, 2020

Competition Overview

Welcome to the U.S. Department of Energy 2020 Geothermal Design Challenge™!

Through the Geothermal Design Challenge, the U.S. Department of Energy (DOE) Geothermal Technologies Office (GTO) inspires students to develop innovative solutions for geothermal energy application challenges. The competition also helps students develop career skills as they prepare to enter the clean energy workforce. Through engagement with students not traditionally involved with geothermal, GTO aims to raise awareness of geothermal resources to communities and the public, thereby broadening the geothermal stakeholder base.

GTO, in conjunction with the National Renewable Energy Laboratory (NREL) and Idaho National Laboratory (INL), is conducting the Geothermal Design Challenge Infographic collegiate student competition. The fall 2020 student competition focuses on infographic development and data visualization, and welcomes a broad spectrum of disciplines. The goal is to foster understanding of geothermal, to communicate the benefits of geothermal energy technologies more broadly, and ultimately to overcome key nontechnical barriers to geothermal development.

Eligible student teams compete to earn national recognition and win a trophy.

Learn more at <https://www.energy.gov/eere/geothermal/geothermal-design-challenge>.

Register to compete at <https://www.herox.com/GeothermalChallengeFall2020>.

Questions on these rules or the program in general can be directed to Geothermal.Challenge@nrel.gov.

Summary Timeline

The Geothermal Design Challenge Infographic is a one-semester or one-quarter project in fall of 2020.

- October 12, 2020 – Team registration opens
- November 5, 2020, 5:00 p.m. ET – Team registration deadline
- November 12, 2020, 5:00 p.m. ET – Progress concept submission deadline
- November 19, 2020 – Compliance feedback on progress concept provided
- December 10, 2020, 5:00 p.m. ET – Final entry submission deadline
- January 6, 2021 – Winners announced.

Background

Geothermal energy is a renewable energy resource derived from the Earth's heat and 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+). The results of recent DOE analysis indicate "that taking action consistent with the associated *GeoVision* Roadmap could expand the domestic geothermal industry and potentially add job opportunities in both urban and rural communities. Development of a robust residential and commercial geothermal heat pump (GHP) industry could also expand the U.S. geothermal workforce." (*GeoVision: Harnessing the Heat Beneath Our Feet*, 2019, p. xiii.)

DOE has a history of supporting workforce development through competitions focused on project-based learning (e.g., [Solar Decathlon](#), [Collegiate Wind Competition](#), [EcoCAR](#), [Cleantech University Prize](#)). Student competitors in the Geothermal Design Challenge gain experience solving relevant industry challenges that prepare them for successful careers in geothermal and related energy fields, benefiting from mentorship, training, collaboration, and networking. This competition supports DOE's ongoing work to help grow the domestic geothermal industry and address employment gaps through experiential learning that inspires innovation.

Competition Process

Introduction

The Geothermal Design Challenge 2020 Infographic is a competition for multidisciplinary teams of college students to design a compelling infographic to increase understanding of geothermal energy as a valued resource. The winning teams receive a trophy and national recognition. Additionally, all student competitors gain valuable experience with communications and design of renewable energy information.

The Geothermal Design Challenge seeks students interested in building and showcasing scientific research, communication, and leadership skills to convey the role of geothermal energy as an important contributor to the nation's clean energy future. This year's competition is focused on a nontechnical barrier to geothermal development: public communications. Energy production can be a complex topic to explain to a broad public audience, and describing energy that comes from a subsurface environment—difficult to visualize for many—amplifies the challenge of explaining geothermal energy, how it works, and how it can benefit consumers. Student teams research data, interpret information, and design an infographic that tells a compelling story about the future of geothermal energy.

The 2020 Infographic competition invites college and university students to develop cutting-edge geothermal communications tools that marry accurate, technical information with a graphic visualization. Often referred to as infographics, these visualizations are used for a variety of applications to distill data and complex messages. Participating teams are asked to develop submissions for an educated but nontechnical public audience. Example themes include geography, energy potential, technology uses, and geothermal well drilling locations, depths, and duration.

Goal

The goal for each team is to design an original and compelling infographic to increase public understanding of geothermal energy as a valued natural resource to a nontechnical audience.

How to Enter

1. Go to the Challenge page at herox.com/GeothermalChallengeFall2020.
2. Create a HeroX account if you don't already have one, or sign in and then choose "Solve this Challenge." This indicates your interest in competing; it is not a commitment.
3. By the registration deadline, one person from each team shall submit a "Register" entry on HeroX to complete registration. This step is when you identify your collegiate institution(s) and expected team makeup. Be sure to click "submit final entry" to complete the Register entry. There is no cost to submit a Register entry.
4. Registration entries received by the deadline will be deemed participating teams. All teams who successfully complete a Register entry and meet eligibility requirements will be accepted.
5. Multiple teams from a single school may register.
6. Only one person per team may submit a Register entry. Other members join the registered team via HeroX. Once you have registered a team, you can invite additional members using HeroX.

How to Win

Each team designs its own solution to the challenge. A team wins based on its total score and resulting rank as determined by a panel of three to five judges who review and evaluate the final entry submissions.

What to Submit

- A powerful, robust, high-quality infographic—graphic depiction of information—that explains an aspect of geothermal energy production, backed by robust technical data.
- A communications and outreach strategy detailing the message of the infographic and a plan to disseminate the infographic to the public for maximum impact.

There are two categories for submissions:

Category 1. Print: fixed art suitable for printing, such as a poster or flyer.

Category 2. Digital: suitable for web-based formatting and may include animation.

Teams submit deliverables in two phases: a progress concept and a final entry. These competition deliverables are submitted via HeroX.

Only one entry will be accepted from each registered team. The competition submissions are considered on-time if they are received by the respective due date and time as indicated on HeroX. Late submissions may be considered on a case-by-case basis but are marked as such with guidance given accordingly to the compliance reviewers or judges.

The submission form on the HeroX platform asks teams to answer a few short questions about team makeup, approach to work done to-date, and planned work for winning the competition in the next phase. These additional questions are not judged, and they are used to enable continuous program improvement by the organizers.

Progress Concept Submission

A complete submission for the progress concept is a mock-up of the infographic with a preliminary list of supporting data sources.

The competition organizers review the progress concept using the evaluation statements in Table 1. Organizer staff reviewers evaluate the degree to which they “agree” or “disagree” with the individual evaluation statements. Teams advance as finalists if the reviewers agree (on average) with the evaluation statements more than they disagree with the statements. Teams do not compete against each other to become finalists. Feedback regarding compliance is provided to all teams who submit a progress concept.

Table 1 comprises the content requirement summary and corresponding evaluation statements for the progress concept. The required file format of each progress concept component is indicated in brackets. Additional details on the formatting requirements of the submission are provided in Appendix B.

Table 1. Progress Concept Content and Evaluation Statements

| Content | Evaluation Statements |
|---|---|
| 1. Infographic | |
| A mock-up of the proposed infographic concept [PDF, PPTX, JPG, TIFF, or PNG]. | <ul style="list-style-type: none"> • Geothermal energy and its utilization is the primary theme. • Infographic concept is coherent. • Infographic concept is technically accurate. • Infographic concept is suitable for all audiences. |
| 2. Sources | |
| An annotated list of data sources or references, including URL hyperlink addresses [PDF]. | <ul style="list-style-type: none"> • Data sources or references are cited. |

Final Entry Submission

The final entry submission is a full packet containing the final infographic and a communications and outreach strategy.

Table 2 provides a content requirement summary of the final entry submission. The required file type for each component is indicated in brackets. Additional details on the formatting requirements of the submission are provided in Appendix B.

1. Executive summary, including
 - A. Context for the infographic and strategy
 - i. Define current issues in science, education, energy, and geothermal energy
 - ii. Discuss the importance and relevance of infographics in conveying ideas and information
 - B. Analysis of infographic
 - i. Describe the message conveyed by the infographic
 - ii. Summarize what publicly available data were used, and how the infographic distills this data into a message or pattern
2. Infographic file or link
3. Communications and outreach strategy
 - A. Describe how the message conveyed by the infographic complements current issues in science, education, energy, and geothermal energy.
 - B. Discuss how well the infographic could complement other media and teaching materials
4. Data appendix
 - A. Data used in infographic
 - B. Source and origination
 - C. Collection methods
 - D. Assumptions.

Table 2. Final Entry Content and Judging Statements

| Content | Judging Statements for Evaluation |
|---|--|
| 1. Executive Summary [PDF, maximum 6 pages in length] 2. Infographic file or link [PDF, PPTX, JPG, TIFF, PNG, or URL] | |
| A geothermal energy infographic with executive summary. | <ul style="list-style-type: none"> • The infographic is innovative with a unique and compelling theme. • The infographic is creative with visual hierarchy, clarity, and use of color. • The infographic feasibly translates original and/or varied data sets into relevant visual information. • Proposed messaging is relevant and of high quality (e.g., increases public interest or assists decision makers). |
| 3. Outreach | |
| A communications and outreach strategy summarizing the infographic messaging with a plan to disseminate the infographic to the public for maximum impact [PDF, maximum 10 pages in length]. | <ul style="list-style-type: none"> • The communications strategy for dissemination is clear and feasible. • The outreach strategy has the potential for impact with a broad audience. • The communication approach and methodology conveys clarity and depth. |
| 4. Data Appendix | |
| An annotated list of data sources or references, including URL hyperlink addresses [PDF, maximum 10 pages in length]. | <ul style="list-style-type: none"> • Data sources or references are appropriately cited. |

How Entries Are Scored

A qualified panel of three to five multidisciplinary judges, comprising subject matter experts and representatives from the geothermal energy industry, score final entry submissions according to the extent to which the content and formatting requirements were met and their agreement with the judging statements listed in Table 2. Judges evaluate the Final Deliverable Package sections using a scale from 1 to 6 for agreement or disagreement with the evaluation statements, as shown in Table 3.

Table 3. Scoring Scale

| 1 | 2 | 3 | 4 | 5 | 6 |
|-------------------|----------|-------------------|----------------|-------|----------------|
| Strongly disagree | Disagree | Slightly disagree | Slightly agree | Agree | Strongly agree |

The following is a list of steps and actions the judges take to ensure each finalist entry receives equal and fair consideration.

1. Judges review Final Entry submitted by each team.
2. Each statement listed in the “Judging Statements for Evaluation” receives a preliminary score between 1, “strongly disagree,” and 6, “strongly agree” (on the scoring scale shown in Table 3), based on the subjective determination of each judge.
3. The statements have equal weight, so it is critical that teams successfully complete each component of the Final Entry.
4. The score from an individual judge is the summed total of the scores for all the evaluation statements. All judge scores are then averaged for a preliminary score for each submission. The maximum score a team can receive is 36.
5. The preliminary scores for all teams yield a preliminary ranking of teams.
6. The judging panel convenes to review preliminary scores, discuss and agree upon final scores, and determine the winners of the competition.
7. First-, second-, and third-place winners are identified and announced. Individual scores for each team are not released. No ranking is completed beyond third place. The judges’ review feedback is provided to each team individually.

Who Can Enter

The Geothermal Design Challenge invites participation of teams composed of two to three students enrolled in accredited U.S.-based collegiate institutions. Students must be enrolled in at least one class and pursuing a degree for the duration of the competition. In this case, “collegiate institution” refers to any school of secondary or higher education, including but not limited to community colleges, colleges, and universities. Collegiate students of any level are eligible to compete. Teams with students from multiple universities are allowed, and multiple teams from the same university are allowed. Individual students may be members of only one team.

DOE and national laboratory employees, competition organizer staff, and judges are ineligible to compete.

Curriculum Support

Student participation may be integrated into senior design or capstone work, count as elective or independent study course credit, added to the curriculum of existing classes, included in a cross-discipline seminar, or be considered a student interest club or extracurricular activity. Each team is encouraged to have at least one faculty advisor or team mentor, although this is not required. A team mentor could be a professor, teaching fellow, adjunct instructor, emeritus staff, postdoctoral researcher, or collegiate alumnus; an industry professional available to engage local chapters of professional societies or associations; or an individual employed as a science communicator, data journalist, or information designer.

See Appendix A for a list of supplemental references.

Competition Authority and Administration

The Geothermal Design Challenge is organized by DOE, NREL, and INL. NREL is operated by the Alliance for Sustainable Energy, LLC, and INL is operated by Battelle Energy Alliance. Funding is provided by the

DOE Office of Energy Efficiency and Renewable Energy [Geothermal Technologies Office](#). The views expressed herein do not necessarily represent the views of DOE or the U.S. Government.

The Geothermal Design Challenge is governed and adjudicated by this rules document, which is intended to establish fair contest rules and requirements. The competition is design and administered by a team of competition organizers consisting primarily of DOE and national laboratory staff. In the case of a discrepancy with other competition materials or communications, this document takes precedence. The latest release of these rules takes precedence over any prior release. The organizers reserve the right to change evaluation criteria and other rules as needed. Additionally, competitors are encouraged to bring to the organizers' attention to rules that are unclear or in need of improvement. For the purposes of competition evaluation, a violation of the intent of a rule will be considered a violation of the rule itself. Questions on these competition rules or program can be directed to Geothermal.Challenge@nrel.gov.

Competition organizer staff and team mentors are ineligible to serve as judges. Judges may not have personal or financial interests in; be an employee, officer, coordinator, or agent of any entity that is a registered participant in; or have a familial or financial relationship with an individual who is a registered competitor in this competition.

By making a submission and consenting to the rules of this competition, each team member grants to the Government permission to use and make publicly available any entry provided or disclosed to DOE in connection with the competition. In addition, each team grants to the Government, and others acting on its behalf, a paid-up nonexclusive, irrevocable, worldwide license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the U.S. Government, for any and all copyrighted works that are or make up any submission.

2020 Geothermal Design Challenge™ and any associated nicknames and logos ("Competition Marks") are trademarks owned by DOE. The trademark license granted to contestants is below. Non-contestants can request individualized trademark licenses (for the purpose of engaging with contestants and/or expressing interest in the competition); the decision to grant such licenses is under the sole discretion of DOE.

1. Contestants are granted, for the duration of the Competition, a revocable, non-exclusive, royalty-free license to use the Competition Marks for the purposes of producing materials for the competition and other approved competition-related activities as long as the use does not suggest or imply endorsement of the contestant by DOE, and the use of the Competition Marks by a contestant does not imply the endorsement, recommendation, or favoring of the contestant by DOE.
2. Contestants may not use the Competition Marks for any other purpose. Contestants may not sublicense the Competition Marks.
3. All contestants can request individualized trademark licenses; the decision to grant such requests is under the sole discretion of DOE.

Further, from the [Competes Act](#):

(j) Intellectual property

(1) Prohibition on the government acquiring intellectual property rights

The Federal Government may not gain an interest in intellectual property developed by a participant in a prize competition without the written consent of the participant.

(2) Licenses

As appropriate and to further the goals of a prize competition, the Federal Government may negotiate a license for the use of intellectual property developed by a registered participant in a prize competition.

Appendix A. Educational References

GeoVision: Harnessing the Heat Beneath Our Feet

This report summarizes, analyzes, and discusses the many opportunities that geothermal energy offers in both electric and non-electric uses. The report also highlights the outcomes the United States could realize from increased geothermal deployment and outlines a range of activities necessary to reach this deployment.

<https://www.energy.gov/eere/geothermal/geovision>

DOE Geothermal Educational Resources

<https://www.energy.gov/eere/geothermal/educational-resources>

GeoEnergy is Beautiful

Winning entries from the Energy Department's 2014 National Geothermal Student Competition

<https://www.energy.gov/eere/geothermal/downloads/infographics-2014-national-geothermal-student-competition>

NREL Energy Basics: Geothermal

<https://www.youtube.com/watch?v=rpgJWYp2OLA>

NREL Advancing Geothermal Research with Impact Analysis

<https://www.youtube.com/watch?v=l4oKi2spRPE>

NREL Geothermal Research

<https://www.nrel.gov/geothermal/>

DOE Frontier Observatory for Research in Geothermal Energy (FORGE)—Overview with links to FORGE sites, resources, and how to get involved in the initiative

<https://www.energy.gov/eere/forge/forge-home>

U.S. Geological Survey Geothermal Resources Investigations Project

https://www.usgs.gov/energy-and-minerals/energy-resources-program/science/geothermal?qt-science_center_objects=0#qt-science_center_objects

Bureau of Land Management, Geothermal Energy

<https://www.blm.gov/programs/energy-and-minerals/renewable-energy/geothermal-energy>

U.S. Energy Information Administration, Geothermal Explained

<https://www.eia.gov/energyexplained/geothermal/>

U.S. Environmental Protection Agency, A Student's Guide to Global Climate Change: Geothermal Energy

<https://archive.epa.gov/climatechange/kids/solutions/technologies/geothermal.html>

U.S. Fish & Wildlife Service, Energy Development: Geothermal Energy

<https://www.fws.gov/ecological-services/energy-development/geothermal.html>

California Energy Commission, Geothermal Energy in California

<https://www.energy.ca.gov/data-reports/california-power-generation-and-power-sources/geothermal-energy>

Lawrence Berkeley National Laboratory Geothermal Systems Program

<https://eesa.lbl.gov/programs/geothermal-systems/>

Pacific Northwest National Laboratory, Geothermal Energy: Harvesting the Earth's Natural Heat

<https://www.pnnl.gov/geothermal-energy>

Overview of INL activities related to geothermal

<https://inl.gov/research-program/sustainable-resource-recovery/>

Infographics

- [Energy Department Turns Up the Heat and Power on Industrial Energy Efficiency](#)
- [EV Everywhere Charges Up the Workplace](#)
- [Offshore Wind Outlook](#)
- [Are the Winter Olympics for the Rich?](#)
- <https://www.flickr.com/photos/goodmagazine/sets/72157618896371005/detail/>
- [FAST COMPANY Infographic of the Day](#)
- [Visualizing.org: Data Visualizations, Challenges, Community](#)
- [Tracking Laura: Map and Times of Arrival](#)
- [Why are Coronavirus Cases Decreasing?](#)

Appendix B. Formatting Requirements

1. Submission files must exclude personally identifiable information (e.g., team member names, emails).
2. Data can be used from any source, and all sources must be cited.
3. Each infographic submission should contain a single file type, and should be one of the following: TIFF, JPG, PNG, PPTX. If a digital format is submitted, provide the URL to the project as a hyperlink within a PDF file.
4. Each project must include a list of all data used. Sources should be referenced as footnotes at the bottom of the project.
5. Each submission must be the contestants' original work and must not plagiarize, infringe, misappropriate, or otherwise violate any intellectual property rights, privacy rights, or any other rights of any person or entity.
6. Projects must be suitable for general audiences (i.e., contain no explicit language, crude/suggestive humor, innuendo, or mature/suggestive themes).
7. Submissions may not endorse a particular company or entity, nor display a trademarked product, without the explicit permission of DOE.
8. Teams do not have the right to mark submissions as "Confidential" or "Proprietary."
9. Failing to meet submission requirements or other submission screenings will result in submissions being deemed disqualified.
10. Submission files shall be named as follows:
[SchoolShortName]_[SubmissionSection].[extension]
 - [SchoolShortName] is your collegiate institution's commonly recognized and distinct short name, abbreviation, or acronym.
 - [SubmissionSection] is given in Tables 1 and 2.
 - [extension] is PDF, PPTX, JPG, TIFF, or PNG.
11. Guidelines for resolution:
 - For print, use photos/images in poster construction that are at least 10" wide by 150 dots per inch (dpi) in resolution.
 - If you are building in PowerPoint, the rest of the elements (text, shapes, etc.) should be vector-based, so the poster will print sharp.
 - For web, export the poster out of PowerPoint as a 3000 px jpg.