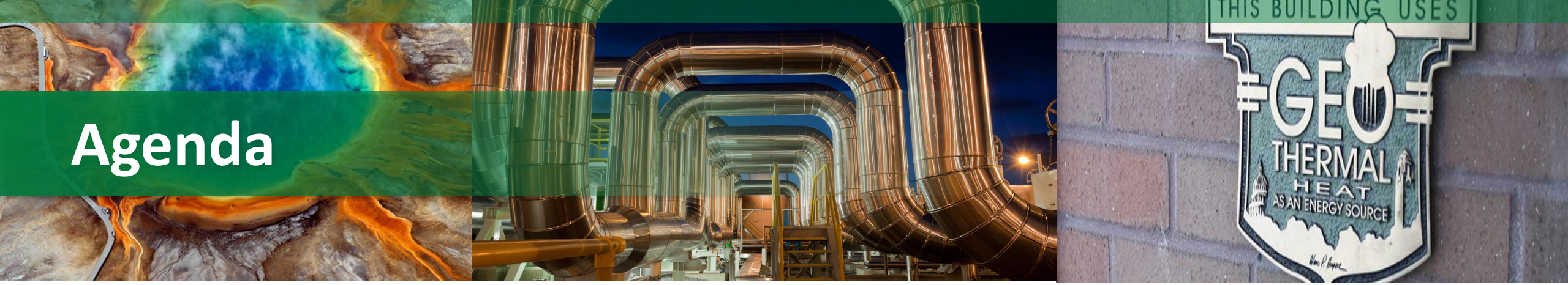
U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Geothermal Technologies Office: Quarterly Update

March 6, 2024



Agenda

- Geothermal Technologies Office (GTO) News and Updates
  - Staff Updates
  - Upcoming and Recent Events
- Geothermal in the News
- Department of Energy / Office of Energy Efficiency and Renewable Energy News and Updates
- GTO Program and Project Updates
- Q&A

GTO Staff Updates

Director Lauren Boyd!

Federal	Fellow	Contractors
Jennifer Livermore	Tim Steeves	Taylor Gray
		Angie Spann

All icons from Flaticon.com

Upcoming Events

2024

Mar. 12–14 | **Geothermal Rising Thermal Energy Network Symposium**, Rochester, MN. *Remarks* by Lauren Boyd.

Mar. 18–22 | **CERAWeek**, Houston, TX. *Keynote* by Secretary Jennifer Granholm. *Panel* including Lauren Boyd.

CERAWEEK
by S&P Global

Apr. 8–9| **New York Geothermal Energy Organization Albany 2024 Conference**, Albany, NY. *Keynote* by Alexis McKittrick.

GEOTHERMAL RISING
POWERING OUR RENEWABLE FUTURE.

#GeothermalEverywhere at Recent Events!

- Secretary Jennifer Granholm visited Allegiant Stadium, which is 100% powered by renewable energy, and toured Hellisheiði Geothermal Power Plant in Iceland.
- Lauren Boyd gave the keynote at Stanford Geothermal Workshop.
- Sean Porse presented at the Groundwater Protection Council's Underground Injection Control Conference.
- Kevin Jones presented at the National Association of State Energy Offices Energy Policy Outlook Conference.
- Sean Porse and Jeff Winick presented at an International Ground Source Heat Pump Association Town Hall.
- EERE's Jeff Marootian attended the groundbreaking for Controlled Thermal Resources (CTR) combined geothermal power and lithium extraction plant.
- EERE's Alejandro Moreno joined Alexis McKittrick, Sean Porse, and Jeff Winick at the International Ground Source Heat Pump Association 2023 Conference.
- Angel Nieto presented at the Geothermal Energy Machinery and Systems (GEMS) Workshop

Secretary Granholm toured Allegiant Stadium in Nevada and Hellisheiði Geothermal Power Plant in Hengill, Iceland.

EERE's Jeff Marootian joined CTR for its groundbreaking event in the Salton Sea geothermal area. Photo by CTR.

Sharing Geothermal Updates and Resources

Check out our Geothermal INTERN blog series!

energy.gov/eere/geothermal/

#GeothermalEverywhere: In the News

Get news updates in *The Drill Down*! geothermal.energy.gov

Canary Media | Harnessing the Heat Beneath Our Feet: Geothermal's Past and Future

The Colorado Sun | A Colorado town wants to use geothermal energy to heat and cool a section of its downtown core

Energy Cast Podcast | Episode 175| Substantial Salton|Berkeley Lab (featuring LBNL's Pat Dobson)

Grist | A geothermal energy boom could be coming to Chicago's South Side

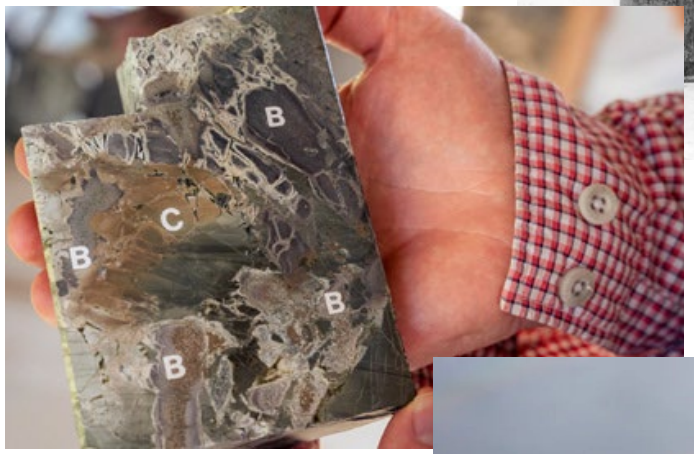
Los Angeles Times | DOE Analysis Confirms California's Salton Sea Region to Be a Rich Domestic Lithium Resource

The Interchange Recharged Podcast | Cutting the Red Tape around Geothermal | (featuring Lauren Boyd and Utah FORGE's Joe Moore)

TechXplore |Study Highlights the Potential of Geothermal Power for Decarbonizing Electricity

ThinkGeoEnergy |U.S. Department of Energy Announces Winners of 2023 Geothermal Collegiate Competition

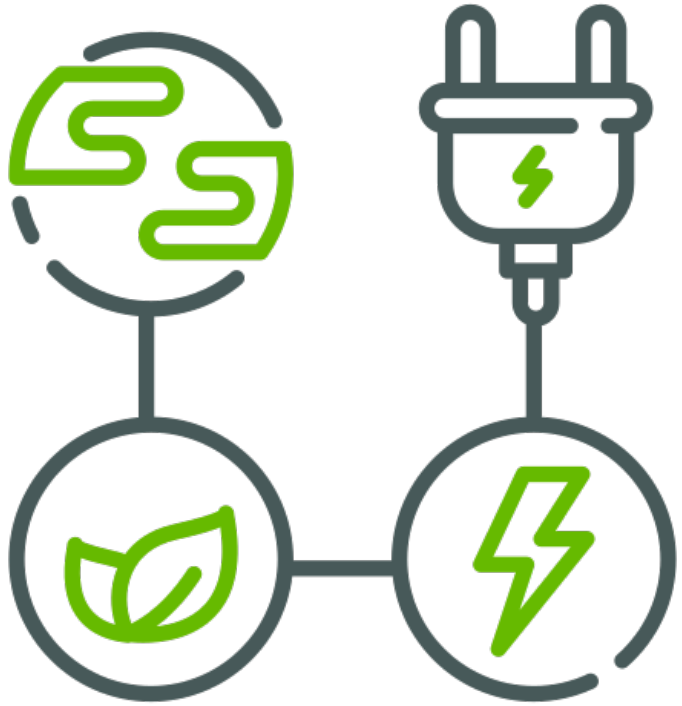
World Energy Trade | DOE: 2 colombianos ganan el 1er puesto en concurso universitario de Geotermia



Photos top to bottom: Canary Media, EnergyCast, Colorado Sun, World Energy Trade

DOE/EERE News & Updates

- Spring Energy I-Corps Selections Announced
- Federal Energy Management Program Announces 31 Federal Agency Projects to Receive $104 Million for Energy Conservation
- DOE, USDA Launch Initiative to Help Farmers Reduce Costs with Underutilized Renewable Technologies as part of President Biden's Investing in America Agenda (RAISE)
- Biden-Harris Administration Announces $366 Million to Lower Energy Costs and Enhance Energy Security in Rural and Remote Communities Across the Nation (ERA)
- DOE Announces $24 Million for Small Business R&D Grants
- DOE's SBIR and STTR Programs Release Phase II Release 2 Funding Opportunity



DOE/EERE News & Updates

- EERE Resources
  - Get the latest clean energy news by signing up for the **Weekly Jolt newsletter**: your one-stop-shop for the latest articles, announcements, and upcoming events from EERE
  - Sign up for the **EERE Funding Listserv** to get updates on new funding opportunities across the office

Stay in the Know!

- Follow DOE, Secretary Granholm, and EERE on social media
- Use #GeothermalEverywhere so we can connect with you

U.S. Department of Energy

- X: @ENERGY
- Facebook: @energygov
- LinkedIn: @u-s--department-of-energy
- Instagram: @energy

Secretary of Energy

- X: @SecGranholm
- Facebook: @SecGranholm
- Instagram: @secgranholm

DOE Office of Energy Efficiency and Renewable Energy

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- LinkedIn: @eeregov

All icons from Flaticon.com

Program Updates
Enhanced Geothermal Systems

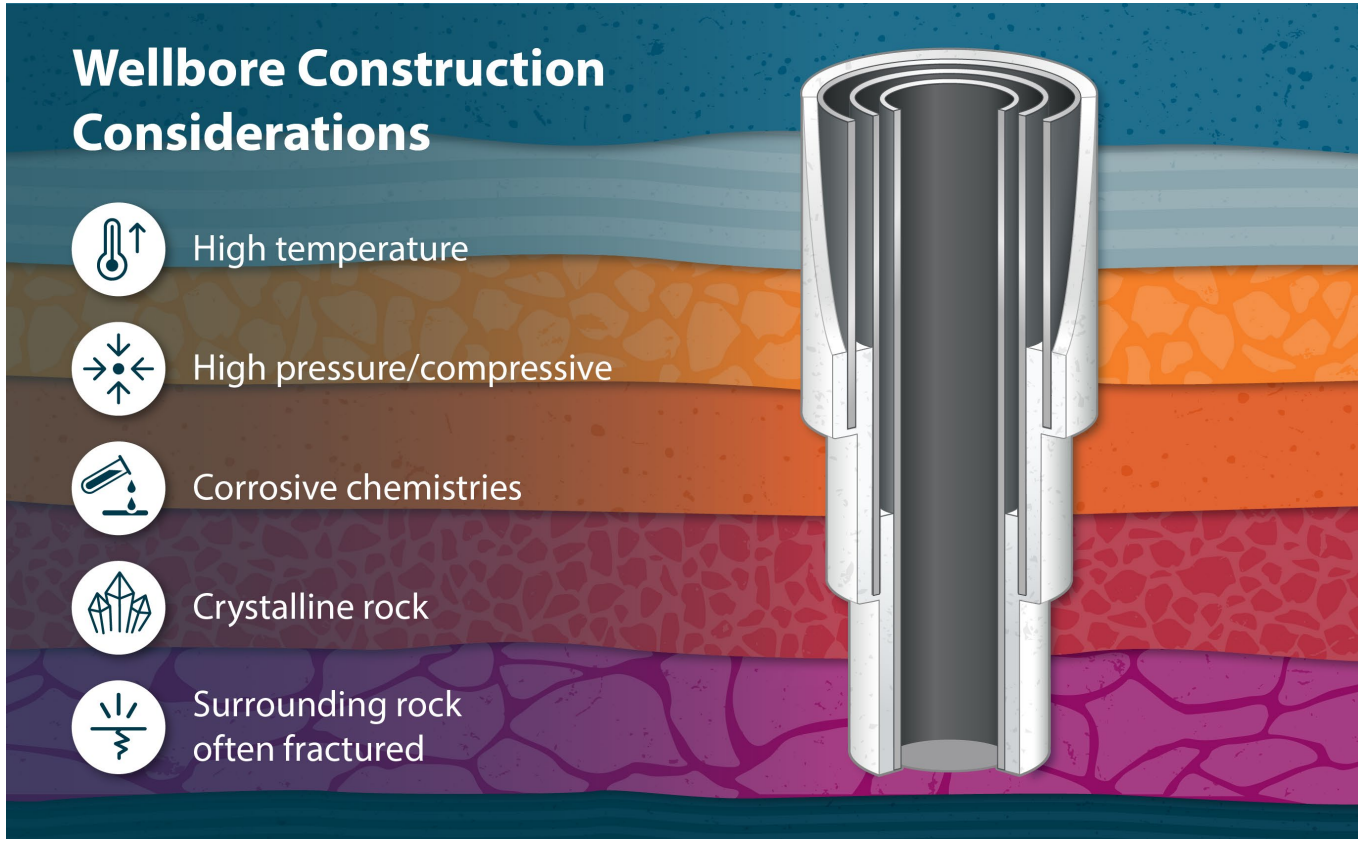
Kevin Jones

Combined Wellbore Construction and RTES Funding Opportunity

Wellbore Construction: Up to $23.1 million

Targets wellbore tools and technology that:

- Supplement and advance beyond available off-the-shelf solutions for cement and casing evaluation
- Operate in high-temperature geothermal environments
- Operate in a manner not reliant on extraneous wellbore cooling or substantial mitigation of borehole conditions
- Provide high-fidelity data to adequately characterize conditions related to safety and efficacy for long-term operation.



Topic Area 1: High Temperature Tools for Well Integrity Evaluation

energy.gov/eere/geothermal/geothermal-technologies-office-open-funding-opportunities

Frontier Observatory for Research in Geothermal Energy

FORGE outreach work is creating relationships with and helping local officials, residents, students, and businesses understand geothermal energy.

Activities include:

- A **workshop for teachers** to learn more about the "heat beneath our feet" and FORGE's work
- Visiting classrooms
- A **geothermal song parody contest for students**
- Exhibit events like the Beaver County Fair
- Developing and distributing **resources** to K-12 and university-level students
- Supporting classroom activities and science fairs.

The Natural History Museum of Utah also included Utah FORGE as the first in a series of rotating displays in its new permanent exhibit, "**A Climate of Hope**."

energy.gov/eere/geothermal/articles/utah-forge-building-relationships-and-geothermal-understanding-beaver

Top: Utah FORGE's Christopher Katis calls on one of Utah's future geothermal experts!
Bottom: Utah FORGE's Gosia Skowron discusses thermal characteristics with students in a classroom visit.

Program Updates
Hydrothermal Program

Alex Prisjatschew

Drilling Demonstrations Campaign: The Geysers

- Initiative aims to reduce cost of developing geothermal energy by generating **at least a 25% improvement** in geothermal drilling rates
- **Evaluation of Physics-Based Drilling and Alternative Bit Design project** at The Geysers results to date:
  - Achieved notable rate-of-penetration improvements from deploying alternative drilling technology in three distinct intervals with unique formation conditions
  - Implemented workflows and experiments with minimal disruption to operations
  - Assessing limiter redesign for next well.

pangea.stanford.edu/ERE/db/GeoConf/papers/SGW/2024/Su.pdf

Quantifying Lithium Resources in the Salton Sea Region

Analysis by Lawrence Berkeley National Laboratory concludes lithium resources in Salton Sea Known Geothermal Area could provide the country with enough secure, domestic lithium to support **more than 375 million electric-vehicle batteries**—exceeding all the vehicles currently on U.S. roads.

CLIMATE & ENVIRONMENT

The Salton Sea has even more lithium than previously thought, new report finds

ADVERTISEMENT

Dusk settles over a project to create a wetlands [illegible] last year. (Gina [illegible] Angeles Times)

BY SAMMY [illegible]

NOV. 28, 20[illegible]

BJ BUSINESS JOURNAL

NATIONAL INTERNATIONAL COMPANIES CURRENT AFFAIRS INDU

Salton Sea has Lithium to create enough batteries for 382 million EVs-Business Journa

NEVADA CURRENT

WORKING + THE ECONOMY JUSTICE SUSTAINABILITY EDUCATION HOUSING POLITICS + GOVERNMENT ELECTION 2024

SUSTAINABILITY

Salton Sea could meet nation's lithium demand for decades, study finds

Potential of geothermal brine extraction dwarfs deposits at Thacker Pass

BY: JENIFFER SOLIS - NOVEMBER 29, 2023 7:00 AM

POLITICOPRO

Salton Sea's lithium supply could fuel US clean energy expansion, DOE lab says

By Kelsey Tamborrino

11/28/2023 12:01 PM EST

California's Salton Sea has the potential to meet the growing U.S. need for lithium — a critical mineral used in batteries for energy storage and electric vehicles, an Energy Department laboratory analysis found.

Finding and developing domestic sources of lithium is essential to the major clean energy expansion needed to meet President Joe Biden's climate goals while decreasing U.S. dependence on China.

With technology advancements, the vast supply of lithium in the Salton Sea could be extracted from geothermal brines, a byproduct of geothermal electricity generation, according to the analysis.

Alexis McKittrick, program manager with DOE's Geothermal Technologies Office, on Tuesday called the study "the most comprehensive analysis of the lithium resources in the Salton Sea region to date."

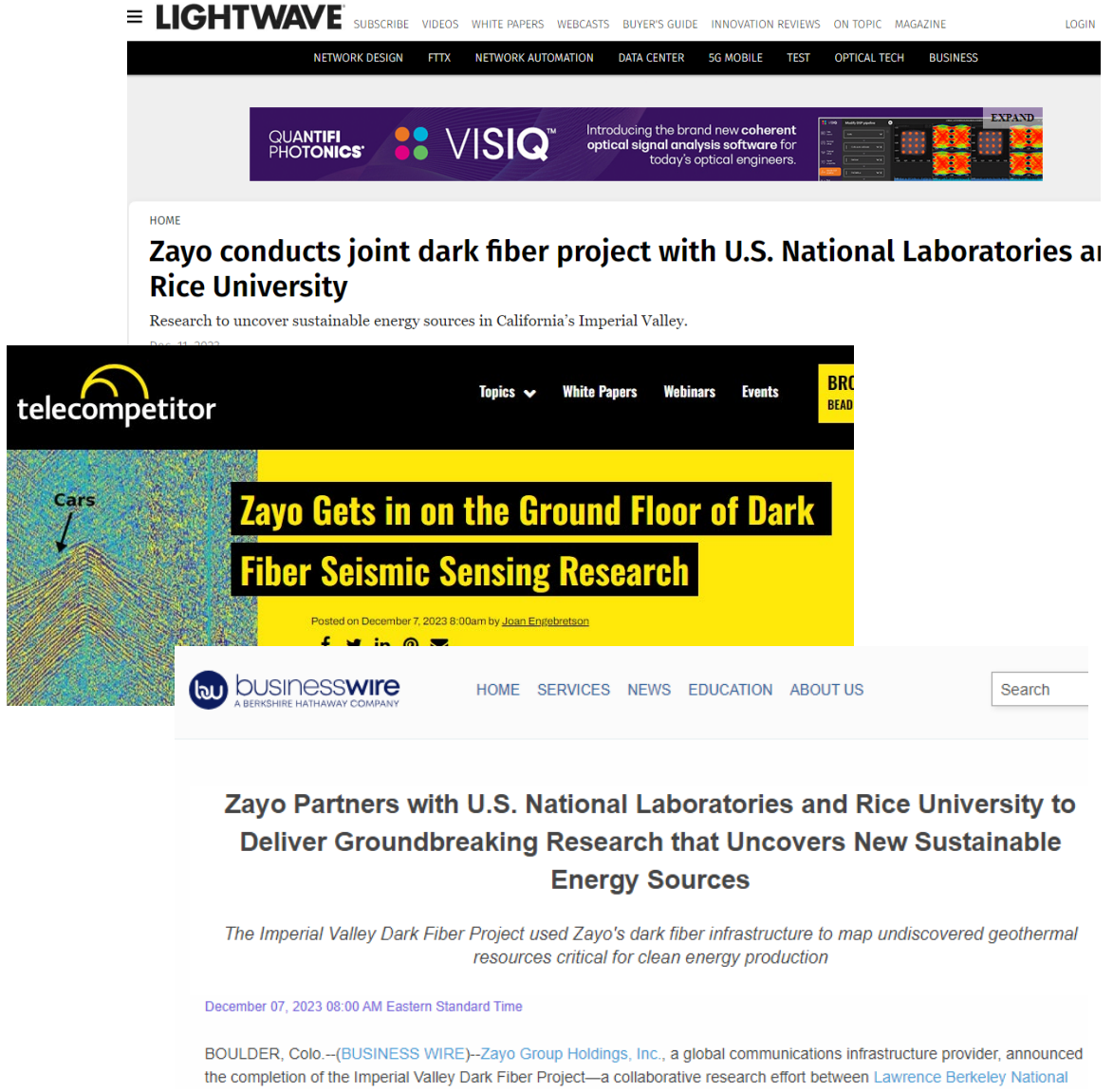
Phase 2 work underway!

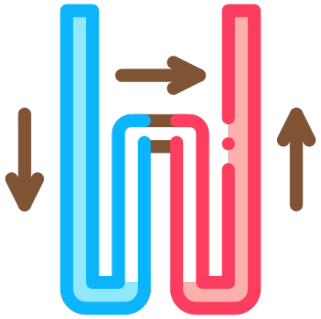
energy.gov/eere/geothermal/lithium

All icons from Flaticon.com

Imperial Valley Dark Fiber Project

- GTO-funded research effort with Lawrence Berkeley National Lab, Rice University, and Zayo
- Explored the efficacy of leveraging Zayo's existing telecommunications "dark" fiber to map and monitor geothermal resources
- Methods included Distributed Acoustic Sensing, a technique that turns Zayo's dark fiber into an array of seismic measurement locations to build a picture of what is underground
- Resulted in larger, more detailed maps of the subsurface and opportunities to conduct seismic sensing.





Program Updates
Low Temperature and Coproduced Resources

Alex Prisjatschew

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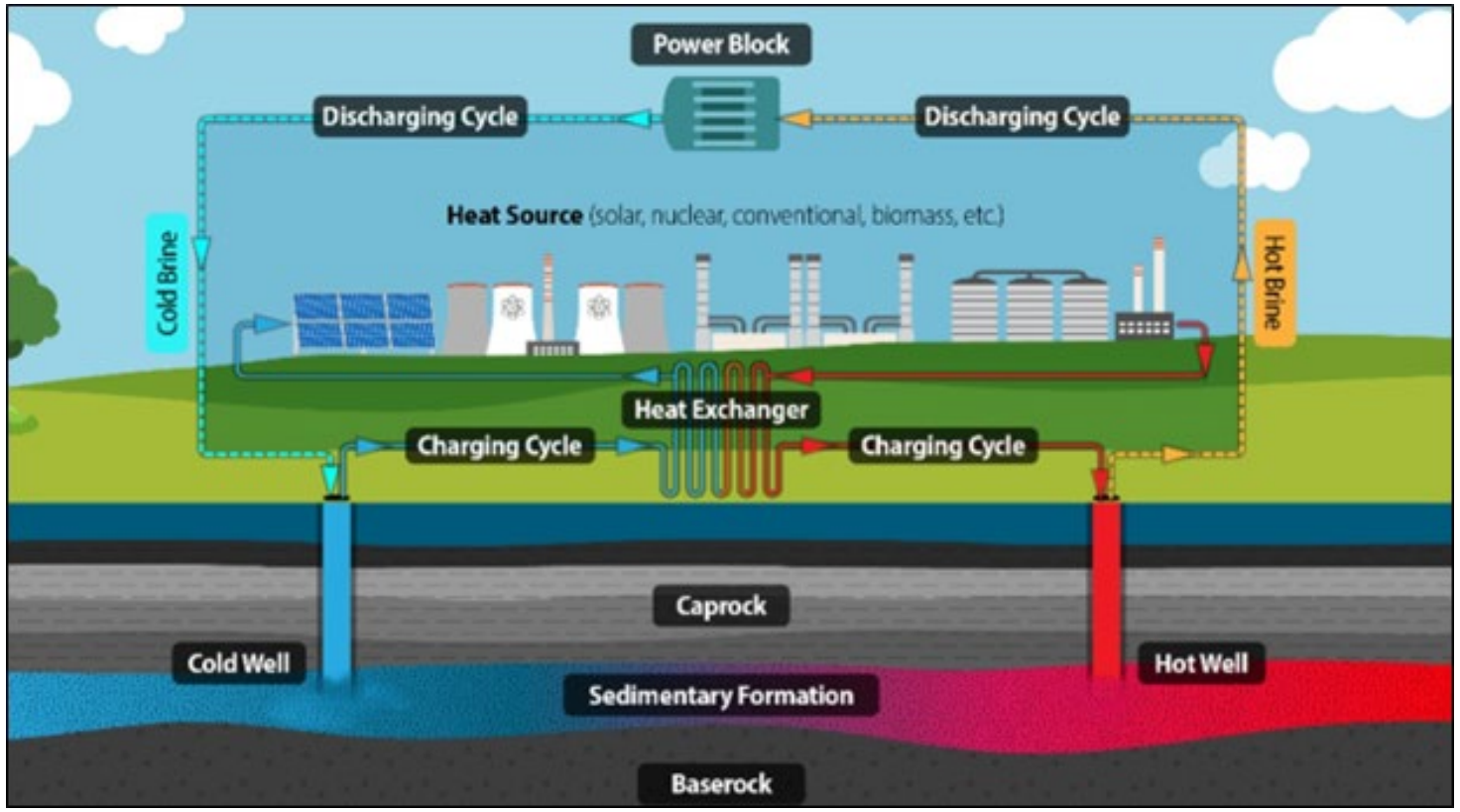
Combined Wellbore Construction and RTES Funding Opportunity



Topic Area 2: Utilization of Reservoir Thermal Energy Storage Technology and Low-Temperature Geothermal Resources as part of an Industrial Process

Reservoir Thermal Energy Storage (RTES):
Up to $7.9 million

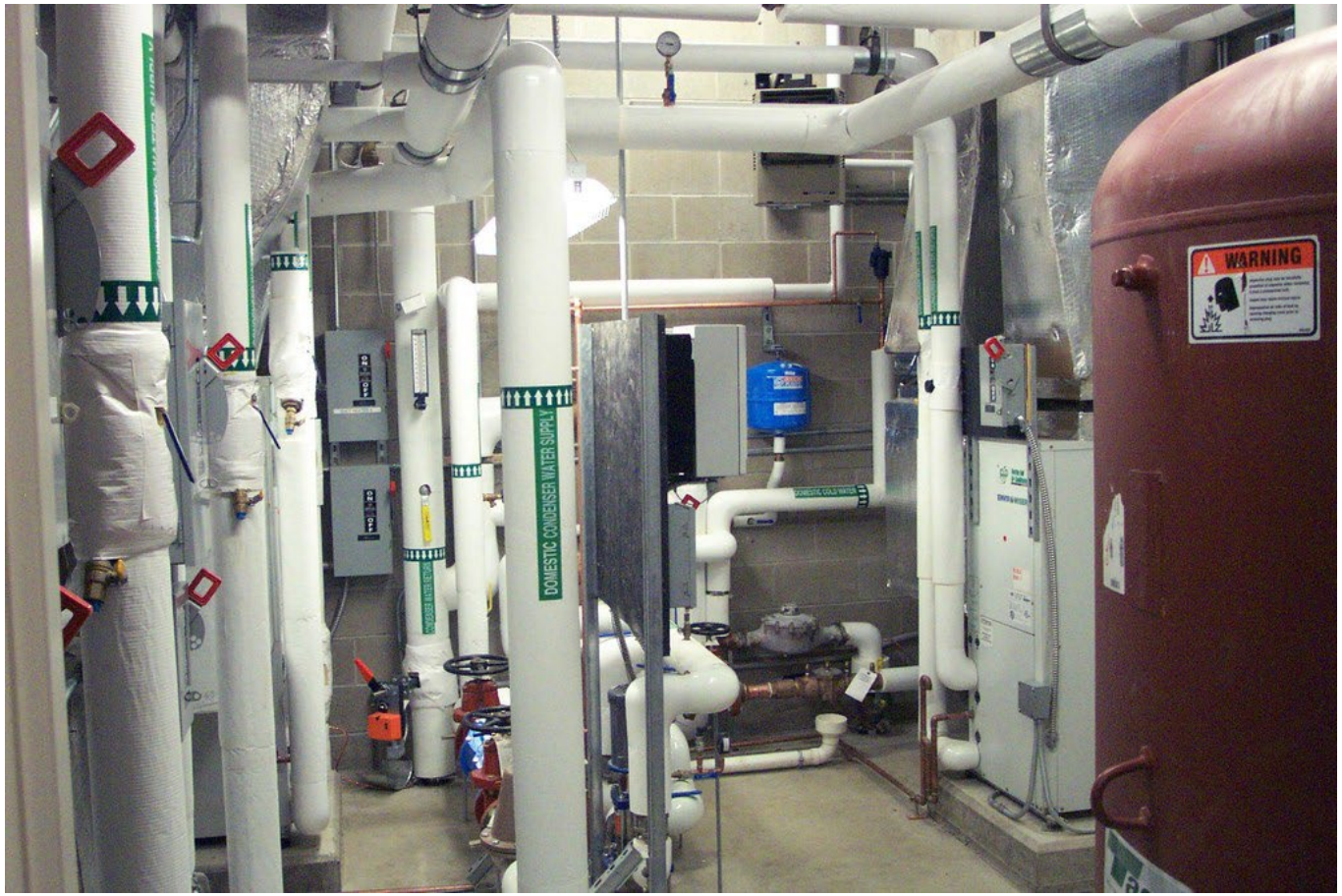
Seeks to demonstrate low-temperature (<130◦ C) RTES technology:

- To reduce emissions from energy-intensive processes using industrial heating, e.g., removing moisture, separating chemicals, treating metals
- With reservoir formations below aquifer systems used for potable water
- Offering a minimum of 10 hours of thermal storage, with preference given to longer-duration storage systems

Learn more on GTO's funding opportunities page: geothermal.energy.gov

Heat Pump Manufacturing Funding Opportunity

- **$63 million** available in second round of funding to accelerate electric heat pump manufacturing
- Part of DOE's authorization to use the Defense Production Act to **increase domestic production of five key clean energy technologies**, including geothermal and air-source electric heat pumps
- Builds on a first round of $169 million in selections in November 2023, including two **geothermal heat pump** manufacturers
- Concept papers required and due **March 15**
- Full applications due **April 29**.



GHP system at NOAA's Caribou Weather Forecast Office in Maine. Photo courtesy John Porter / NREL pix 12708.

energy.gov/mesc/office-manufacturing-and-energy-supply-chains

Program Updates
Data, Modeling, and Analysis

Sean Porse

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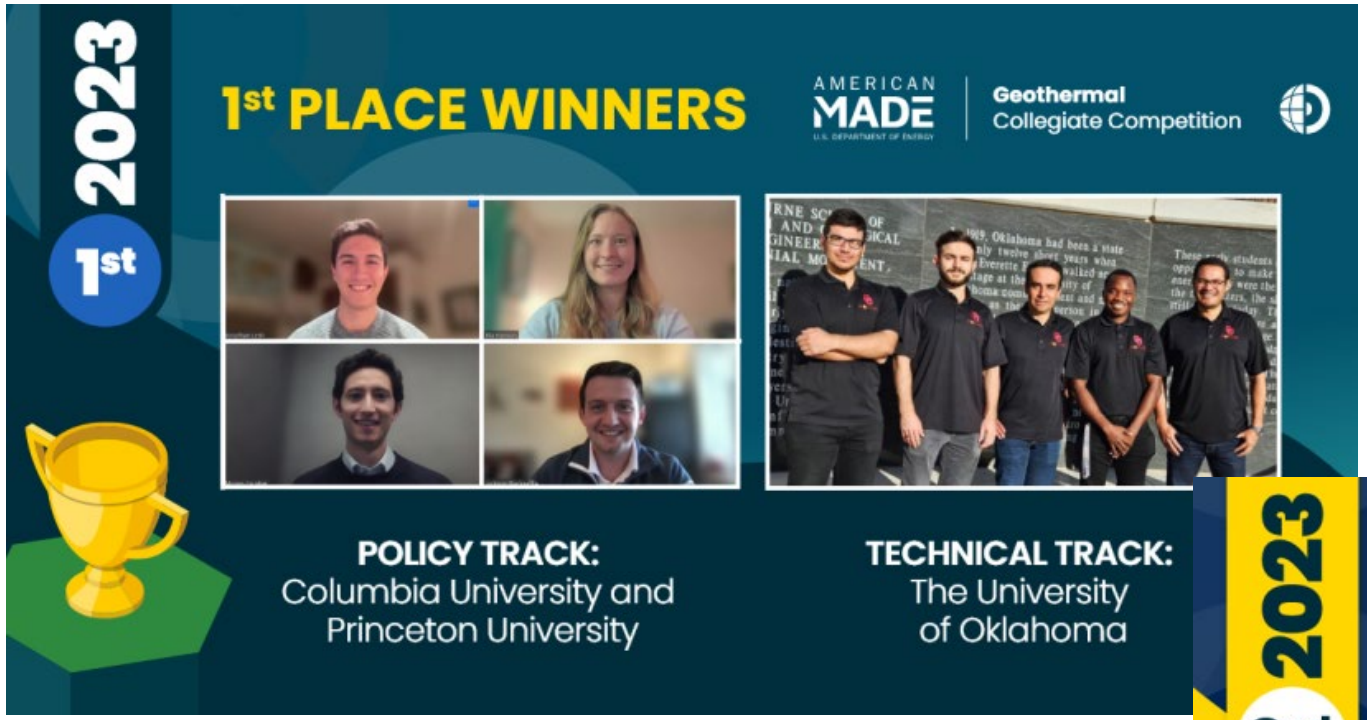
Fall 2023 Geothermal Collegiate Competition (GCC) Winners!



Geothermal Collegiate Competition

U.S. DEPARTMENT OF ENERGY

energy.gov/eere/geothermal/geothermal-collegiate-competition

Thank You, Fall 2023 GCC Mentors!

Aparna Aravelli
Philip Ball
Kelly Blake
Timothy Carr
Tawfik Elshehabi
Nicholas Fry
Nagasree Garapati
Jackson Grimes
Sarah Harper
William Harvey
Bryant Jones
Sudeep Kanungo
Aaron Levine
Daniel Minguez
Pajang Priyandoko
Juliet Simpson
Faith Smith
Andrew Stumpf
Luca Xodo

Geothermal Collegiate Competition
U.S. DEPARTMENT OF ENERGY

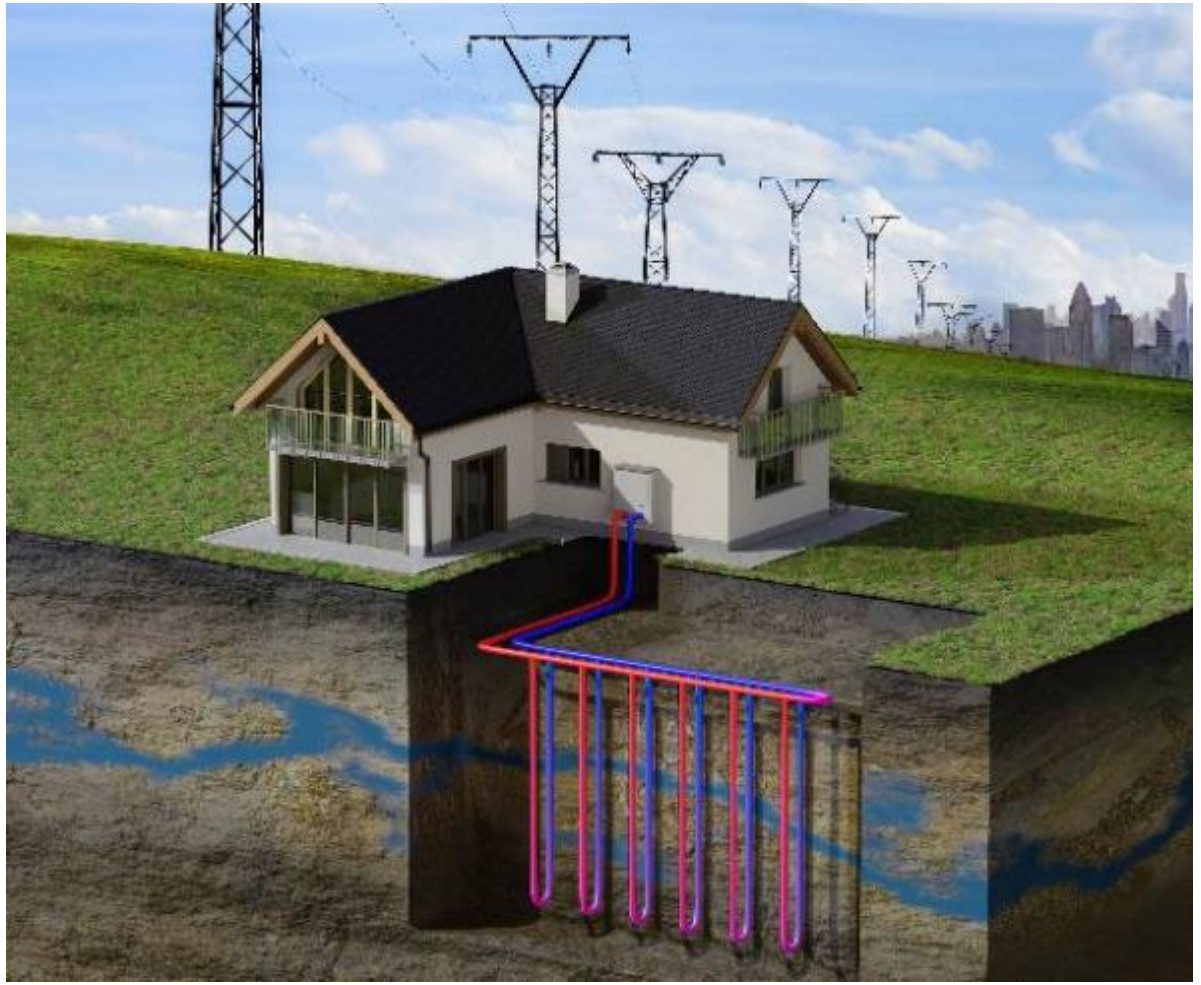
Want to be part of next year's competition as a team or a mentor? Visit the GCC web page and sign up for GCC email updates!

energy.gov/eere/geothermal/geothermal-collegiate-competition

GHP Impacts Report

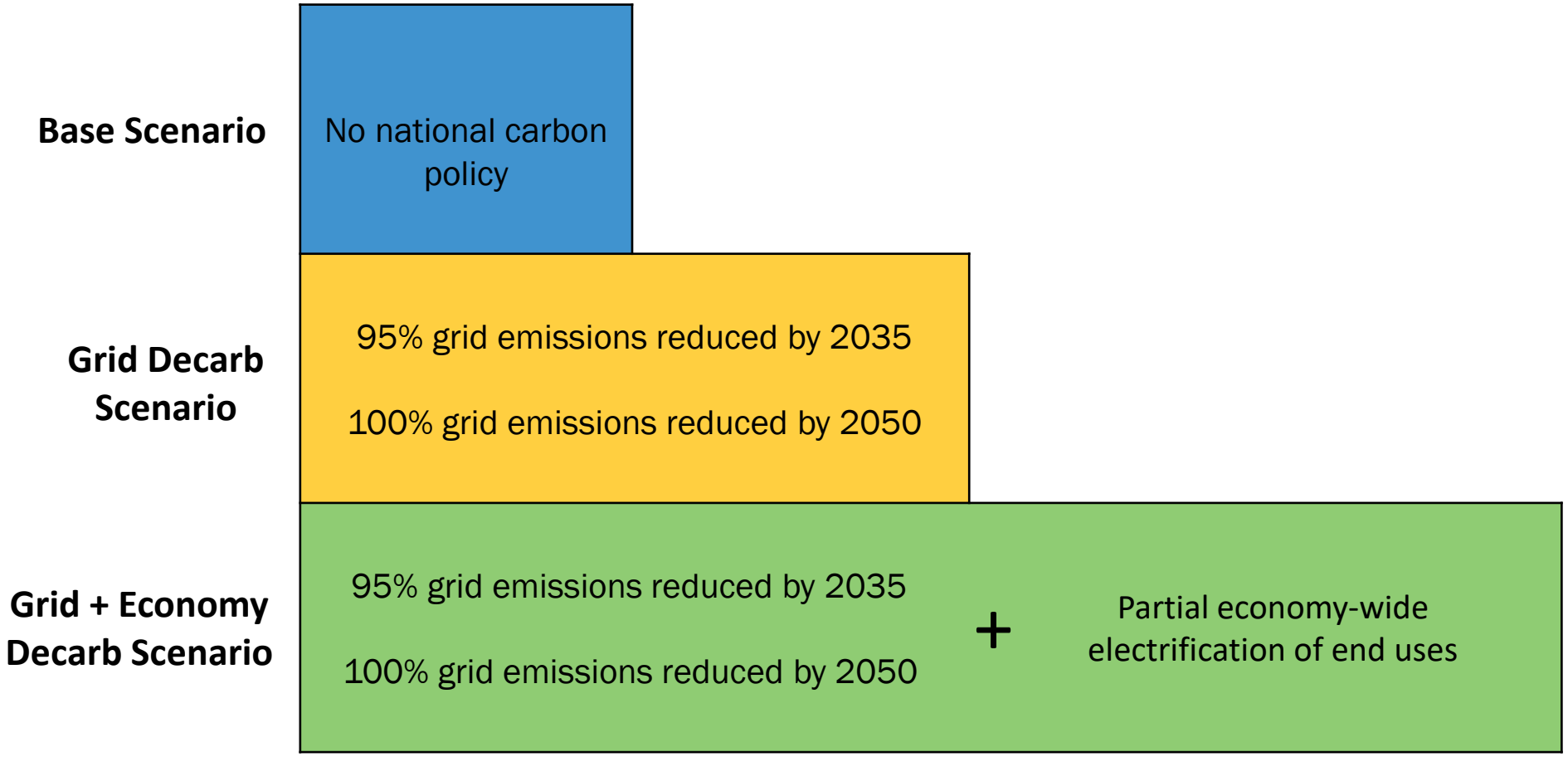
GTO-funded analysis by Oak Ridge National Lab and National Renewable Energy Lab to assess how mass deployment of geothermal heat pumps (GHPs) can provide cost and carbon reductions at the grid.

- Aimed to quantify:
  - Effects on building electricity use and emissions resulting from mass deployment of GHPs
  - Impacts to the bulk power system under various carbon policy, electrification, and sensitivity scenarios.



https://www.osti.gov/biblio/2224191

GHP Impacts Report: Modeled Scenarios Through 2050



Each scenario modeled with and without mass GHP deployment assuming:

- 100% eligible GHP retrofit + new residential and commercial buildings
- Linear GHP deployment rate to 100% from 2020 to 2050

https://www.osti.gov/biblio/2224191

GHP Impacts Report: Results

Eliminate the need for up to 43,600 miles of new interregional transmission infrastructure – equivalent of up to 44 SunZia transmission projects

Reduce up to 410 GW of nationwide generation capacity requirements – bolstering seasonal US grid resilience

Eliminate more than 7 gigatons of carbon – equivalent to all U.S. emissions produced in 2022

https://www.osti.gov/biblio/2224191

GHP Impacts Report: Next Steps

- Phase II work to assess and quantify how:
  - GHP adoption aligns with the Administration's Justice40 Initiative
  - GHPs can accelerate the U.S. clean energy workforce transition
  - GHPs can provide a path forward for natural gas distribution utilities in a decarbonized future.

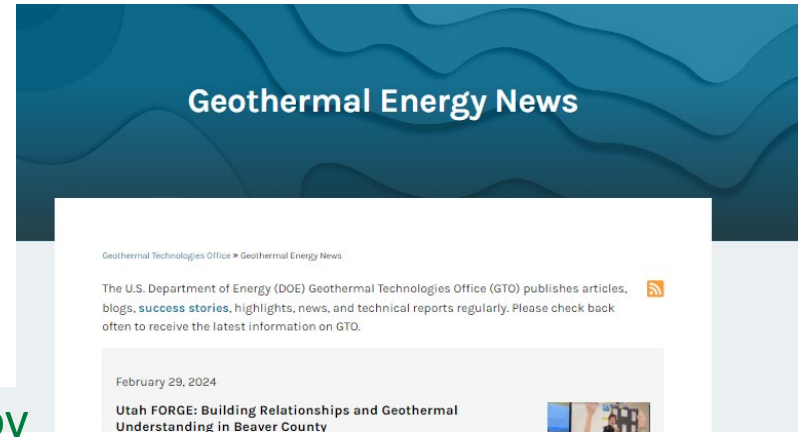
EERE's Alejandro Moreno and GTO's Alexis McKittrick, Sean Porse, and Jeff Winick announce the release of the new GHP impacts report at the International Ground Source Heat Pump Association (IGSHPA) Annual Conference. Photo Credit: Bryce Carter

https://www.osti.gov/biblio/2224191

How to Engage with GTO

GTO uses multiple tools and resources to help communicate funding opportunities, provide education about geothermal energy, and engage with stakeholders.

- *The Drill Down* Newsletter
- Funding Opps Webpage
- Funding Opp Quick Guides
- Eblasts
- GHPs for consumers page
- Website (***scan QR code!***)
- Infographics
- Project Postcards
- Resources in Spanish



geothermal.energy.gov

Thank You!

the drill down

Get the hottest geothermal news from *The Drill Down*, GTO's monthly newsletter!

Sign up today:

geothermal.energy.gov

Interested in serving as a merit reviewer for GTO RD&D projects?

Send us your resume or CV:

doe.geothermal@ee.doe.gov

Questions?

The **Geothermal Technologies Office (GTO)** works to reduce the cost and risk associated with geothermal development by supporting innovative technologies that address key exploration and operational challenges.

Visit our website at energy.gov/eere/geothermal or by scanning the QR code.