

Geothermal Technologies Office: Quarterly Update

January 26, 2023





Agenda

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

- **Clean Energy on Mine Land (CEML) Program**
 - Tech assistance to inform decision making related to developing clean energy projects on mine land, including geothermal
 - Expected to open in 2023
- **Department of Defense**
 - Seeking to prototype onsite solution(s) to address installation energy resilience needs through geothermal electricity generation and distribution
 - RFP just closed



DOE Clean Energy Retrospective

- Includes GTO's Bipartisan Infrastructure Law EGS pilot demonstrations and the Enhanced Geothermal Shot

energy.gov/articles/2022-clean-energy-retrospective

- **Jolt Newsletter**

- Get the latest clean energy news by signing up for the Weekly Jolt: your one-stop-shop for the latest articles, announcements, and upcoming events from EERE!

Stay in the Know

- Follow DOE/Secretary Granholm/EERE on social media
- Use #GeothermalEverywhere



U.S. Department of Energy

- Twitter: [@ENERGY](#)
- Facebook: [@energygov](#)
- LinkedIn: [@u-s--department-of-energy](#)
- Instagram: [@energy](#)

Secretary of Energy

- Twitter: [@SecGranholm](#)
- Facebook: [@SecGranholm](#)
- Instagram: [@secgranholm](#)

DOE Office of Energy Efficiency and Renewable Energy

- Twitter: [@eeregov](#)
- Facebook: [@eeregov](#)
- LinkedIn: [@eeregov](#)



GTO Heated Up Recent Events!

- American Geophysical Union Fall Meeting (photos)
- International Ground Source Heat Pump Association Annual Conference
- Geothermal Operational Optimization with Machine Learning Webinar
- Society of Petroleum Engineers Workshop





Upcoming Events

Stanford Geothermal Workshop
In-person, February 6–8, 2023

Stanford | **Doerr**
School of Sustainability



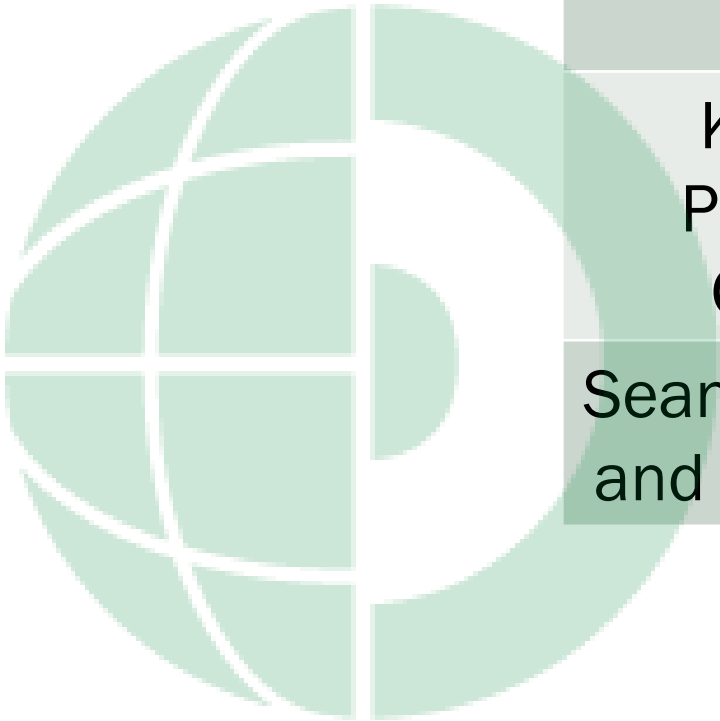
Western Governors' Association
Heat Beneath Our Feet Meeting
February 24, 2023

Enhanced Geothermal Shot Summit
Virtual and in-person, TBD





GTO Staff Updates



| Federal Staff | Contractor Staff |
|--|------------------|
| Jerry Carr | Cory Grady |
| Kevin Jones selected as Acting Program Manager for Enhanced Geothermal Systems Program | |
| Sean Porse returns as Data, Modeling, and Analysis (DMA) Program Manager | |

And a special THANK YOU to Jeff Winick for serving as Acting Program Manager for DMA!

Recent GTO Updates: Geothermal Geophone Prize

- **Geothermal Geophone Prize**
 - \$3.65M to develop high-temperature seismic sensors (geophones) that collect real-time data for EGS
 - Selected 10 semifinalists in December
 - New teams may also join Phase 2 (Design & Proof of Concept): www.herox.com/GeophonePrize
- **Drilling Demonstrations**
 - \$15M to reduce project timelines and costs of developing geothermal energy through improved drilling rates
 - Selected two projects in December
 - Geothermal Limitless Approach to Drilling Efficiencies (GLADE)
 - Evaluation of Physics-Based Drilling and Alternative Bit Design

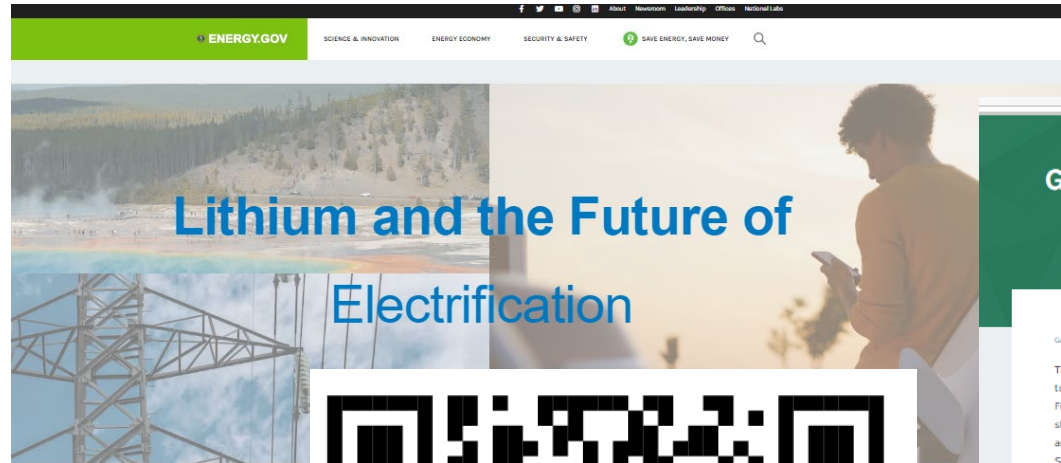




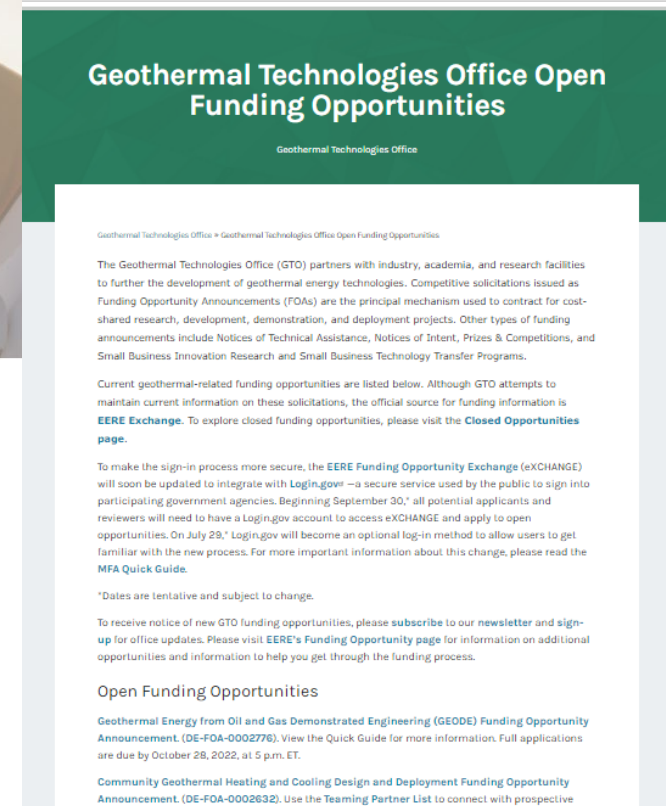
How to Engage with GTO

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

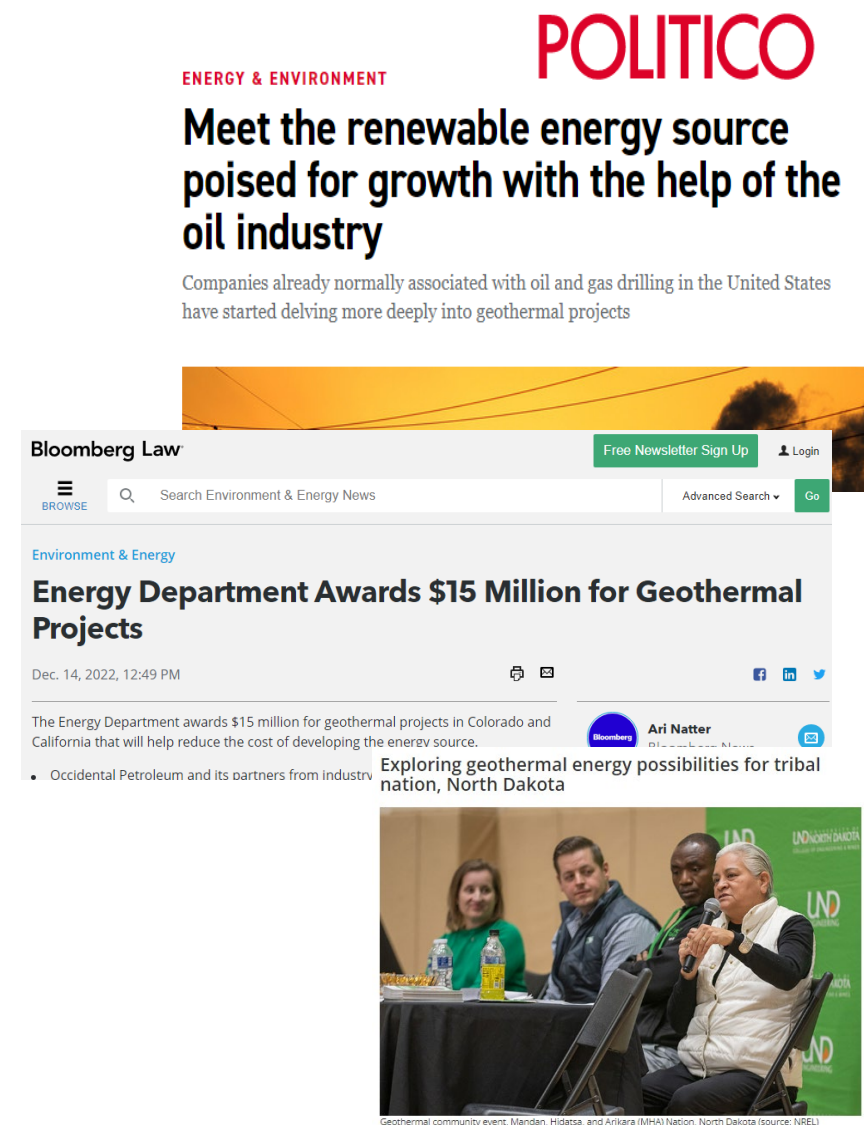
- The Drill Down Newsletter
- Funding Opps Webpage
- Funding Opp Quick Guides
- Eblasts
- Lithium Storymap
- Updated Website (*scan QR code!*)
- Stakeholder Toolkits
- Infographics
- Project Postcards



energy.gov/eere/geothermal/



- POLITICO | [Meet the Renewable Energy Source Poised for Growth with the Help of the Oil Industry](#) Featuring GTO's Lauren Boyd!
- Bloomberg Law, Bizwest, The Denver Post, and Hart Energy | *all highlighted GTO's Drilling Demonstrations selections*
- Times Union | [Some Capital Region Homeowners Warming Up to Geothermal Heat](#)
- ThinkGeoEnergy.com | [Exploring Geothermal Energy Possibilities for Tribal Nation](#), North Dakota
- ClimateNow podcast | [What Lies Beneath? Efficient Heating and Cooling](#)
- Plumbing, Heating, Cooling, and Piping (PHCP) Pros | [Enough Room for All in the Geothermal Sandbox](#)
- Western Governors' Association | [Gov. Polis proposes new funding for geothermal expansion in State of the State Address](#)





Program Updates

Enhanced Geothermal Systems: Enhanced Geothermal Shot

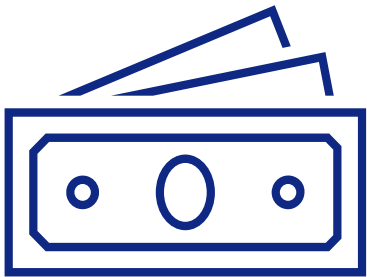
Lauren Boyd



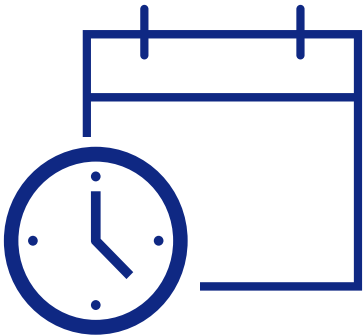
Enhanced Geothermal Shot



Enhanced
Geothermal



\$ 45/MWh



2035



Enhanced Geothermal Shot Analysis for the Geothermal Technologies Office

Chad Augustine, Sarah Fisher, Jonathan Ho, Ian Warren,
and Erik Witter

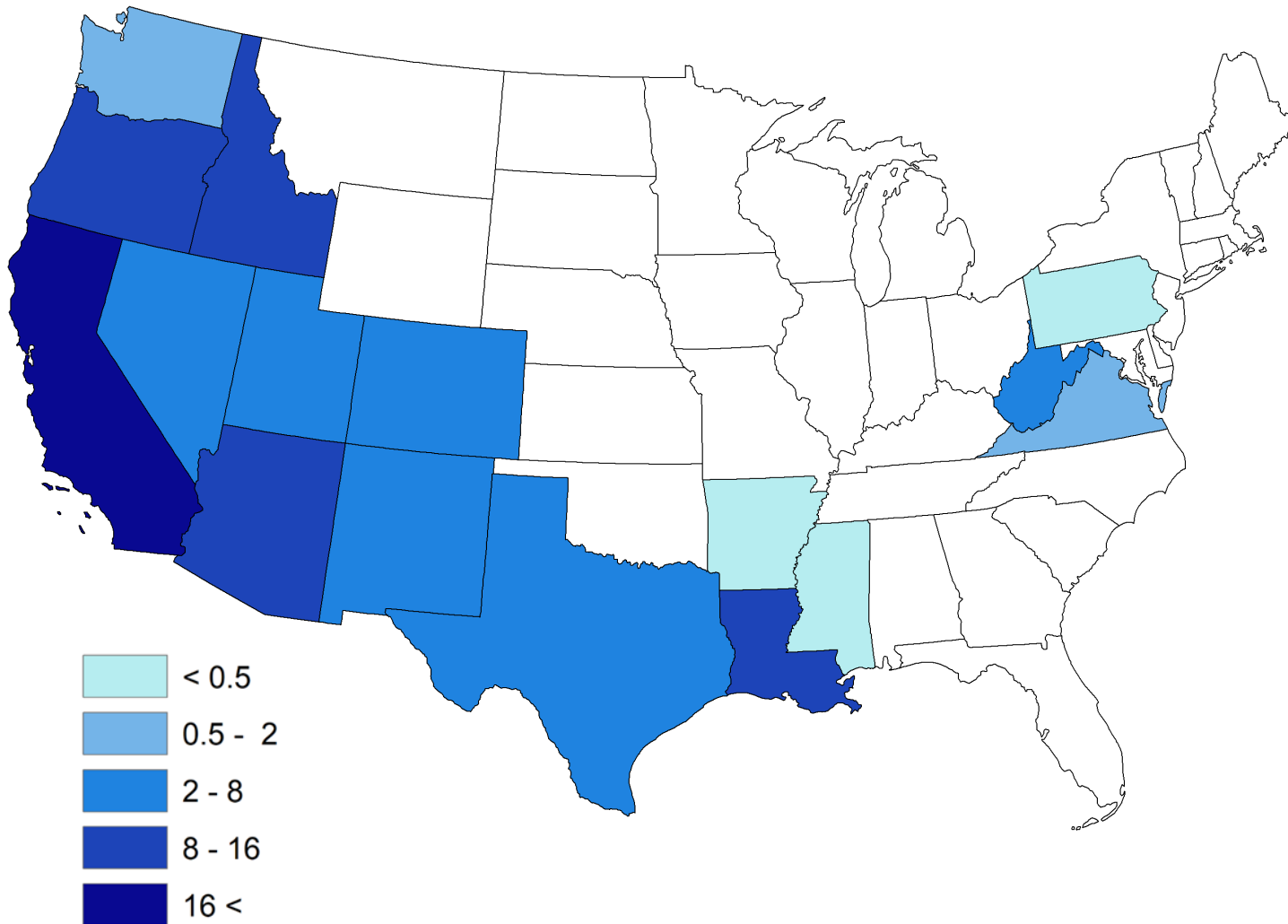
National Renewable Energy Laboratory

[nrel.gov/docs/fy23osti/84822.pdf](https://www.nrel.gov/docs/fy23osti/84822.pdf)



Enhanced Geothermal Shot

2050 Deep EGS Deployment Capacity (GW)



90 GW_e by 2050



Nationwide expansion of EGS for power



Clean heating & cooling for up to 45 million U.S. households



Drives just transition and leverages fossil workers



Office of Science Energy Earthshots™ Research: Lab Call

- Open to **DOE national labs only, but partnerships are encouraged**
- Three themes for EGS research:
 - Experimental and computational efforts to understand subsurface constitutive mechanics and fluid injection response in EGS environments
 - Innovative approaches for EGS data collection and analysis
 - Understanding materials behavior and geochemical/geomechanical processes in EGS wellbore environments.
- Preproposals required; due March 7.



<https://www.energy.gov/science/office-science>

Funding News

Department of Energy Announces \$200 Million for Energy Earthshot Research Centers in support of the Energy Earthshots™

DOE's RENEW Initiative to Support Five Pathway Summer Schools for Students from Underrepresented and Underserved Groups in STEM

[energy.gov/science/office-science](https://www.energy.gov/science/office-science)



Program Updates

Enhanced Geothermal Systems

Kevin Jones



Utah FORGE Updates

- Applications under review for second solicitation
 - Will award up to \$44 million for testing and evaluation of new and innovative EGS tools and techniques
 - Closed January 10
 - utahforge.com/rd/solicitations/ for details about what the research will cover
- Plan to drill 16B well this spring (~April)
 - Follows completion of 16A in 2022, the first-of-its-kind highly deviated well in hard and hot granite





Program Updates

Data, Modeling, and Analysis

Sean Porse



Hybrids Research

- Goal to investigate hybridized geothermal power plants through research, analysis, and modeling
- Two topic areas:
 - Hybridization of a geothermal power plant with one or more low-carbon heat sources to increase the generation from new or retrofit geothermal power plants
 - Reservoir thermal energy storage technologies for creating geothermal reservoirs in permeable formations using a low-carbon heat source or low-carbon electricity.
- Both topics require robust analyses that help build the case for commercial pathways to hybridizing geothermal power plants.



Aerial view of the Stillwater triple hybrid project (photo courtesy of ENEL Green Power North America, taken from “Better Together: New Synergies and Opportunities From Hybrid Geothermal Projects” by Ann Robertson-Tait and Douglas Hollett via [geothermal.org/our-impact/blog/geothermal-hybrid-renewable-systems](https://www.geothermal.org/our-impact/blog/geothermal-hybrid-renewable-systems)).



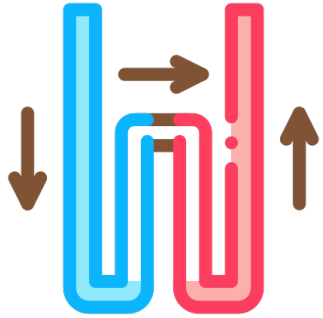
- Projects selected:
 - **Idaho National Laboratory**—*Techno-economic analysis of solar topping cycle hybrid geothermal power plants for retrofit and greenfield applications*
 - **National Renewable Energy Laboratory**—*Techno-economic analysis and market potential of reservoir thermal energy storage charged with solar thermal and heat pumps*
 - **Brookhaven National Laboratory**—*Cements and a modeling tool to calculate viability under various exploitation conditions of high-temperature reservoir thermal energy storage systems*
 - **Lawrence Berkeley National Laboratory**—*Application of using unwanted thermal energy produced by data centers to be used directly in a district heating system or stored in a reservoir thermal energy storage system for later use.*



DOE Community Assistance Programs

- **Energy Transitions Initiative Partnership Project (ETIPP)**
 - Targets remote, island, and islanded communities
 - Competitively selected communities work with experts at DOE's national labs for 12–18 months to help them meet their energy resilience goals.
 - energy.gov/eere/about-energy-transitions-initiative-partnership-project
- **Clean Energy to Communities (C2C)**
 - Intended to help communities transition to clean energy, including geothermal
 - Offers in-depth technical partnerships, peer-learning cohorts, short-term support from technical experts
 - energy.gov/eere/clean-energy-communities-program
- **Communities Local Energy Action Program (LEAP)**
 - Aims to facilitate sustained community-wide economic and environmental benefits primarily through DOE's clean energy deployment work
 - Specifically for low-income, energy-burdened communities experiencing either direct environmental justice impacts or direct economic impacts from a shift away from historical reliance on fossil fuels.
 - energy.gov/communitiesLEAP/communities-leap





Program Updates

Low-Temperature and Coproduced Resources

Alexis McKittrick



FedGeo Partnerships: Leading by Example!

- Federal Geothermal Partnership Technical Assistance
 - Working with federal facilities to establish a **long-term technical assistance pathway** to deploy low-temperature geothermal technology
 - Oak Ridge National Laboratory leading the effort with partners:
 - National Renewable Energy Laboratory, Lawrence Berkeley National Laboratory, Pacific Northwest National Laboratory, Illinois State Geological Survey, International Ground Source Heat Pump Association, Oklahoma State University, University of Wisconsin-Madison
 - Tech assistance includes data analysis, resource characterization, surveys and verification drilling, and system design



Identify federal sites that are strong candidates for geothermal heating and cooling technologies



Provide technical assistance for site characterization/resource confirmation activities at these sites



Break ground for multiple innovative geothermal system deployments

Community-Focused Geothermal



Encourages innovative approaches to community-scale heating and cooling and aims to:

- Increase deployment
- Advance environmental justice
- Grow the workforce
- Share best practices
- Provide data and case studies.

Thank You!



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 *** UPDATED *** website at: energy.gov/eere/geothermal or by scanning the QR code.

