GTO Quarterly Webinar – June 9, 2022 – Transcript

Welcome & Agenda Overview — Slide 1:

Good afternoon, everyone—or maybe it's morning or evening where you are! I'm Elisabet Metcalfe, Stakeholder Engagement Lead for the Geothermal Technologies Office. Whatever time zone you're in, thank you for joining our quarterly webinar. We're always excited for these webinars, where we get to share all the great things happening in GTO.

Agenda — Slide 2:

We have a jam-packed event for you! You'll get a peek at ways to stay connected to DOE and its Office of Energy Efficiency and Renewable Energy—of which GTO is a part—and then hear about some hot media coverage of geothermal! We'll do a rundown on GTO staff and office updates, a short overview of upcoming events, and highlights from each of our R&D areas, including our range of prize activities. We'll wrap up with a Q&A session at the end, so please enter any questions you have using the Q&A option in Zoom throughout the webinar.

DOE/EERE News — Slide 3:

First, some highlights from DOE and the Office of Energy Efficiency and Renewable Energy, known as EERE. As I mentioned, GTO is part of EERE. One of the best ways to stay up to date with news from EERE and its technology offices is to sign up for EERE's weekly Jolt newsletter. The Joly will keep you informed on news and events, and help you find resources to learn more about geothermal and other technologies. You can also follow DOE and EERE on social media using the handles shown here. And please use our hashtag—Geothermal is so hot right now—in your geothermal-related posts to help us connect messages and keep the conversation going about geothermal!

Geothermal in the News — Slide 4:

I'm sure most of you stay apprised of geothermal news, but we wanted to take a moment to highlight some of the terrific media coverage we've seen recently. These are just some of articles we've tracked, and what's really great is that they run the gamut on geothermal's benefits to the U.S. Topics range from how heat pumps could play a key role in curbing the world's use of fossil fuels, to opportunities for domestic lithium extraction from geothermal brines, to geophones—which you'll hear more about in our project updates later. Not all of these stories are GTO related, but we did want to call attention to two that are. The Inside Climate News story features a GTO-funded project at Pacific Northwest National Laboratory that is looking at the use of magnetic nanoparticles to extract lithium and other metals from water, and the Businesswire Transitional Energy story highlights a pilot project at a field that will soon be home to a larger project under our Wells of Opportunity ReAmplify initiative. Please check those stories and the others out!

As you all know, there's awesome work going on across the geothermal sector right now, and we are excited to see it being shared in the news.

GTO News & Updates — Slide 5:

Okay, on to some updates about the geothermal office. First, as some of you may know, our longtime director Sue Hamm has taken a 6-month detail to join EERE's Front Office as the director for integrated strategies. In this role, Sue will work to more closely integrate multiple teams across EERE's research and other work. In her absence, Lauren Boyd is currently serving as the acting director of GTO, while also continuing her role as the lead for our enhanced geothermal systems program.

In addition, our Data, Modeling, and Analysis program lead, Sean Porse, has taken a 3-month detail for a role in International Affairs. Serving in his stead is Jeff Winick, who has been with the Data, Modeling, and Analysis team for some time, including leading our GeoVision analysis and working on our recent Multi-Year Program Plan. We're thankful to have Lauren at the helm and Jeff leading up DMA. We wish Sue and Sean well in their details and look forward to hearing all about both assignments when they return.

Other highlights we wanted to share include a recent return to a hybrid work schedule, with many employees working some days back on-site at DOE and the labs. In addition, travel has resumed—which also means that we'll be going to events, which I'll cover in a minute. We look forward to finally seeing and meeting many of you in person soon.

Finally, we wanted to highlight the completion of our 2022 peer review, which we hosted throughout the month of May. In total, 62 GTO-funded projects were reviewed, and we were lucky to have some additional "lightning" talks to allow projects that weren't formally reviewed to discuss future plans or progress. It was a great opportunity to learn about the work in GTO's portfolio, and we hope you'll take the opportunity to read the summary report when it comes out later this summer.
Events

Upcoming Events — Slide 6:

Circling back to travel, which I just mentioned, here are some upcoming events at which GTO will have a presence—in person! Alexis McKittrick, program lead for both our hydrothermal and low-temperature and coproduced resources programs, will present next week at the Association of American State Geologists Annual Meeting, and Lauren will be at the U.S. Rock Mechanics and Geomechanics Symposium at the end of the month. And of course there's the Geothermal Rising Conference, the largest annual gathering of the geothermal community. GTO will have a booth at Geothermal Rising, so please stop by and say hello!

And now I'll turn things over to our program managers to share some updates about GTO projects. Remember that you can enter questions in the Q&A function at any time during the presentation.

We'll start with Jeff, who will share some updates from our DMA program. Take it away, Jeff.

GDR Birthday and SPE Datathon — Slide 7:

Thanks, Elisabet. I'm glad to be here to share some updates from the Data, Modeling, and Analysis team, known as DMA. Our work focuses on identifying and addressing barriers to geothermal adoption in the United States, as well as validating and assessing technical progress across the geothermal sector. Our work applies across GTO's technology portfolio and helps direct and prioritize early-stage R&D. DMA

research includes evaluating trends and impact analyses, conducting geothermal resource assessments, and outlining key investments needed to refine the geothermal R&D portfolio.

So, just a few quick updates: First, we're celebrating a birthday of sorts. In July, we will be recognizing the 10th "birthday" of the Geothermal Data Repository, which is the submission point for all data collected from GTO-funded research. We'll be doing fun activities and social media posts throughout the month—including our special hashtag, "geothermal data is beautiful." Be sure to sign up for our Drill Down newsletter and follow us on social media to learn more about this data resource.

And if you're a student or know someone who is, the PIVOT 2022 Datathon, organized by the Society of Petroleum Engineers, is a great way to dig into data. The event will challenge participants to solve a geothermal engineering problem using real field data from our Frontier Observatory for Research in Geothermal Energy project, which you likely know as FORGE. Participants will use machine learning to create predictive models that can support future geothermal energy production. The event will use one of the largest geothermal datasets assembled—including never-before-analyzed data. The datathon will run from June 21 to July 25 and individuals from all backgrounds are welcome to join! While solo participation is possible, we encourage you to partner and form groups that reflect diverse skill sets. You can find out more at the registration link shown on the slide.

DMA Updates Slide 8

In other DMA news, we're excited to announce that we recently released a funding opportunity, open to national laboratories, to support near-term commercial deployment of hybridized geothermal energy. This means linking geothermal energy with other generation technologies like solar, water desalination, and energy storage—all of which can improve operational efficiencies, expand the geographic distribution of geothermal, reduce costs, and help stabilize the electricity grid. Concept papers for the opportunity are due by June 17, with full proposals due in August. We're looking forward to seeing the innovative ideas our national labs and their partners devise to help combine geothermal with other generation.

The DMA team is also expanding its capacity to handle short- and long-term strategic analysis, with a focus on geothermal valuation, deployment, and techno-economic analysis. This is similar to analysis work other EERE renewable power offices are doing, and we're confident it can lead to more collaboration and better accounting for geothermal in energy planning models. Our goal is basically to create a geothermal analytical toolkit and ensure that modeling tools integrate geothermal systems effectively. In particular, we want tools that better assess geothermal energy's cost and its value for both the generation and demand sides of the bulk energy system. This will include looking at multiple options for geothermal heating and cooling, such as what happens to costs and impacts when we integrate geothermal heating and cooling into the broader energy system.

We intend to facilitate public engagement with the results of this work, including providing stakeholders easy access to available geothermal information—so stay tuned for more!

With that, I'll turn things over to Alexis McKittrick, program lead for our low-temperature and coproduced resources program and our hydrothermal program. Over to you, Alexis.

LT: Community Geothermal Slide 9:

Thanks, Jeff. As Jeff said, I'm Alexis McKittrick and I lead our hydrothermal and low-temperature portfolios. I'm excited to share updates from both portfolios. I'll start with some news from our low-temperature and coproduced resources portfolio, where we focus on technologies for geothermal resources below a temperature of 300°F, as well as hybrid systems and R&D for direct use of thermal resources, such as for space heating.

First is our upcoming Community Geothermal Heating and Cooling Design and Deployment funding opportunity announcement, or FOA. We recently shared a Notice of Intent to release this FOA, which will fund competitively selected geographic coalitions to implement geothermal district heating and cooling systems using geothermal heat pumps or direct-use applications. The FOA also includes a workforce component through which communities will develop career and technical education for new energy systems like geothermal heating and cooling. And we'll be working with the selected communities to develop case studies that illustrate how geothermal heating and cooling can be replicated throughout the U.S., so we're excited for this one! Stay tuned and subscribe to our newsletter to make sure you don't miss the FOA release.

LT: FedGeo Slide 10:

I also wanted to highlight a joint effort from the low-temp and DMA programs, in partnership with the Federal Energy Management Program. Our Federal Geothermal Partnership Technical Assistance initiative—or FedGeo for short—is an opportunity for the federal government to lead by example in considering geothermal energy to heat, cool, and possibly power their installations. Through a recent lab call, we've selected Oak Ridge National Laboratory to receive up to $6 million to help expand the deployment of geothermal heating and cooling technology at federal sites. Oak Ridge is teamed with three other national labs, two universities, a state agency, and an industry partner who all bring strong expertise in the low-temperature geothermal space, and we're looking forward to seeing this work unfold.

Hydrothermal: Drilling demos, INGENIOUS, BRIDGE Slide 11:

So now I'll swap hats over to the hydrothermal program. This program really focuses on expanding geothermal energy opportunities throughout the U.S., especially by looking for ways to make drilling and reservoir development more efficient and cost-effective, and by working to accelerate the transfer of oil & gas technology to geothermal. One of our key activities in the drilling arena is our recently closed drilling demos FOA, which aims to find real-world approaches that increase average daily drilling penetration rates by at least 25% in the field. This is really crucial work on the pathway to reduce geothermal project costs. We are working through applications now and plan to make a selection announcement this fall, so stay tuned.

I also wanted to highlight our INnovative Geothermal Exploration through Novel Investigations Of Undiscovered Systems project, or INGENIOUS. In this project, a team led by the University of Nevada—Reno is working to reduce the exploration risk for hidden geothermal systems in the Great Basin Region by quantifying resource potential, uncertainty, and degree of exploration at several geothermal prospects in the area and developing new geothermal favorability maps, data products, software tools, and a geothermal developers' playbook that integrates the project findings and facilitates easy access for external stakeholders. The main goal of the project is to accelerate discoveries of new, commercially

viable hidden geothermal systems while reducing exploration and development risks for all geothermal resources, so this should be a huge step forward for geothermal.

In our Basin & Range Investigations for Developing Geothermal Energy project, known as BRIDGE, a team led by Sandia National Labs is working to identify smaller focus areas within broad prospective geothermal areas identified in GTO's prior Play Fairway Analysis. The team is building on the Play Fairway work by integrating new geoscientific techniques and lowering drilling risks/costs, with the overarching goal of demonstrating the existence of hidden but usable geothermal energy resources that can be further explored and developed after this project has ended. The projects are using Helitem technology, which was developed in the mid-2000's to detect conductive mineral targets. The focus for the project is land controlled by the U.S. Navy.

These are just a few project highlights, so—as you can see—we are working hard to expand hydrothermal opportunities and reduce risk for geothermal development. If you haven't already, I hope you'll subscribe to our newsletter so you can stay informed about these and other projects.

Hydrothermal: Lithium Slide 12:

I'll close the hydrothermal updates with a few quick items in our lithium research—and one key thing I wanted to highlight is Secretary Jennifer Granholm's visit to the Salton Sea and Imperial Valley in April. Her trip served several purposes, including finding out more about lithium in the region and ways to combine lithium extraction with geothermal energy. She also participated in listening sessions to help her understand some of the challenges facing residents of the region and how DOE might be able to help. During the trip, Secretary Granholm visited Lawrence Berkeley National Laboratory to learn about their GTO-funded work to quantify the sources and amounts of lithium present in geothermal brines within the Salton Sea reservoir. This project and many others that we have in the region will really help us find ways to expand domestic access to this important mineral so—again—stay tuned.

I also wanted to share that phase two of our Geothermal Lithium Extraction prize has closed and finalists will be announced soon. The prize is designed to find solutions that de-risk and increase market viability for direct lithium extraction from geothermal brines, and we're looking forward to finding out who the finalists are and what they have planned for phase three—the fabrication and testing phase.

And, because we have so much going on in the area and the topic of lithium seems to be getting more and more attention, we're working on a new webpage dedicated to active lithium projects. We'll send out an update when that's ready, so keep your eyes peeled for that soon.

And now I'll turn things over to Lauren Boyd, our acting director and enhanced geothermal systems program manager, for updates from her side. Go ahead, Lauren.

BIL Overview Slide 13:

Thanks, Alexis. So I wanted to start with a quick overview of the Bipartisan Infrastructure Law—known as BIL—to provide context for exciting updates in EGS. As its name implies, BIL focuses on updating the nation's infrastructure, including water systems, roads and bridges, transit, and, of course, our energy system. As this slide details, the law has significant implications for DOE, with a $62 billion investment to support American manufacturing and workers; expand access to energy efficiency and clean energy;

deliver reliable, clean, and affordable power to more Americans; and build future energy technologies through clean energy demonstrations. If you want to stay up to date on BIL activities, sign up for emails for the latest information on new funding opportunities and activities.

EGS Demos Slide 14:

Which is a great segue to our first EGS update, which is our BIL-funded EGS Demonstration projects. The law includes $84 million for four enhanced geothermal system pilot demonstration sites over the next four years. The idea is to demonstrate EGS in different geologic and geographic settings—including one in the eastern U.S.—using a variety of techniques and well completions. To support these projects, we issued a Request for Information in April and are grateful to the many stakeholders who took time to send us responses. We're reviewing those now and will integrate the feedback into the upcoming funding opportunity, which we intend to issue this summer. Demonstration programs are important to help us understand how to optimize EGS in the field, which will ultimately allow us to tap the national potential of geothermal. So please stay tuned to our newsletter and updates for that FOA!

FORGE Updates Slide 15:

In some other EGS updates, we continue to have exciting news from FORGE. We shared on our last quarterly webinar in March that the FORGE team had drilled the first-ever highly deviated geothermal well. Since then, the team has successfully conducted and monitored a three-stage hydraulic stimulation in that well. This is really important, because the stimulation reactivated the existing fracture network and potentially generated new fractures—which gives us the basis of the FORGE EGS reservoir. The team will use data from the stimulation to help locate the most promising fractures, which will allow them to target and plan the producer well to be drilled early next year. We're excited to see what happens next and we'll continue to share updates with all of you.

GEODE Slide 16:

Last but not least in the EGS updates is our Geothermal Energy from Oil and gas Demonstrated Engineering initiative, known as GEODE. GEODE is a joint project of our EGS and hydrothermal programs and aims to expand geothermal deployment by leveraging lessons and technology from oil and gas. The initiative will form a consortium that will assess ways to modernize geothermal drilling and reduce geothermal development costs based on experience from the oil and gas industry. The effort will also include setting up workforce development and transition programs. We expect to release this opportunity soon, so watch GTO updates for more information.

Now I'll turn it back to Elisabet to cover some info about our collegiate competition and prizes.

GCC Slide 17:

Thanks, Lauren. So, in May, we announced the winners of the 2022 Geothermal Collegiate Competition, an annual event that prepares students to lead the next generation of geothermal energy development. As part of the competition, students assume the role of geothermal project developers, working with communities to identify local energy challenges and explore geothermal energy solutions. In addition to technical research, teams conduct economic feasibility analyses, craft strategies for local stakeholder engagement, and create geothermal education modules in partnership with local schools. This year, our winning teams at the universities of Oklahoma, North Dakota, and Colorado worked with local Tribal

nations and community organizations to consider geothermal direct use and heat pump solutions. These schools will host community events this summer as part of their winnings, which is a great way for them to share their experiences and the ways geothermal can benefit local communities.

It's always fun to see GCC projects come together and we congratulate the winners and all the participants!

Prizes Slide 18:

Moving on to our prizes, I'll start with the Geothermal Manufacturing Prize. This multiyear prize offered $4.65 million in incentives along four escalating challenges. The objective was to harness the rapid advances that additive manufacturing can provide in tool design, fabrication, and functionality—ultimately finding new manufacturing solutions leading to actual prototypes. Finalists were selected in January and we'll be announcing the winners at the Geothermal Rising conference this summer.

Next up is our Geothermal Geophone Prize, which offers $3.65 million in total incentives to develop new high-temperature, downhole seismic sensors. These sensors, also known as geophones, help researchers and industry professionals better understand and track changes in the subsurface during EGS stimulation. Submissions are open through September, and you can learn more at the HeroX American-Made Challenges website link on the slide.

Other DOE Prizes Slide 19:

We'll close out our main updates with some info about other DOE prizes and initiatives. First we'll highlight the Inclusive Energy Innovation Prize. This prize fits into the Biden Administration's Justice40 Initiative, which promises to deliver 40% of climate investment benefits to disadvantaged communities while also informing equitable research, development, and deployment within DOE. The Inclusive Energy Innovation Prize aims to fund organizations for ongoing or proposed activities related to climate and clean energy that support, build trust, and strengthen relationships and partnerships with disadvantaged communities. More than 200 teams competed in Phase One and submitted impact plans that detailed their experiences in engaging and supporting disadvantaged communities. In May 2022, DOE announced 18 Phase One winners, inviting them to carry out their impact plans in the 12-month Phase Two.

Next is the Energy Transitions Initiative Partnership Project, or ETIPP. ETIPP leverages the experience and expertise of local stakeholders, tribal leaders, regional organizations, national laboratories, and DOE offices to provide technical assistance opportunities for remote, island, and islanded communities to transform local energy systems and increase energy resilience. ETIPP communities are competitively selected to participate, with an anticipated 12- to 18-month project per community. In April, DOE selected 11 communities for ETIPP Cohort 1.

Finally, the EnergyTEch University Prize—or EnergyTech UP—asks student teams to compete for more than $250,000 in cash prizes. Sponsored by DOE's Office of Technology Transitions and known as EnergyTech UP, this prize has participants explore business opportunities for high-potential energy technologies, assess commercialization opportunities through market analysis, and present a viable business plan to industry judges. Throughout the competition, students receive mentorship and materials to help them succeed.

All told, there are a number of exciting ways for stakeholders and students to get involved with DOE, and we were glad to share a little about many of them today.

Closing Slide 20:

I know it's been a whirlwind of information but we hope you've enjoyed the webinar. If you haven't already, now would be a great time to enter any questions you have in the chat. While we gather those for Q&A, I want to thank you all again for attending today. I know I speak for everyone when I say it's been a pleasure to update you on GTO's activities. You can stay on top of GTO news throughout the year by signing up for The Drill Down, and please remember we want to hear from you! Whenever you have questions or ideas, we welcome them at DOE.Geothermal@ee.doe.gov. Send us your resumes and CVs to be a reviewer, tell us what you'd like to hear on these quarterly webinars and in our newsletter, and just share the future of geothermal energy with us.

Now, on to Q&A. (a transcript of the QA is not available)