

DEEP DIVE

Project InnerSpace



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We conducted expert interviews regarding Project InnerSpace to inform this deep dive. We corresponded with Project InnerSpace multiple times to stay updated on its strategic priorities, current activities, and room for more funding. We also reviewed materials on Project InnerSpace’s website and media coverage. Unless otherwise cited, information in this deep dive comes from direct correspondence with Project InnerSpace.

Questions and comments are welcome at givinggreen@idinsight.org.



Summary

- **What is Project InnerSpace?** Project InnerSpace is a US-based nonprofit organization focused on expanding geothermal energy globally. Its core activities include GeoMap, which maps subsurface data that can help characterize geothermal resources, and Geothermal Exploration Opportunities Fund (GeoFund), which supports geothermal projects that may otherwise experience a funding “valley of death.” It also builds momentum for geothermal energy in the public and private sectors.
- **How could Project InnerSpace help address climate change?** Geothermal energy can reduce greenhouse gas emissions by providing carbon-free heat and electricity as an alternative to burning fossil fuels. We think Project InnerSpace can address climate change by increasing the speed at which next-generation geothermal technologies are deployed relative to the counterfactual.
- **What’s new at Project Innerspace in 2024?** As electricity demand from artificial intelligence and data centers grows, Project InnerSpace is promoting geothermal energy as a clean, reliable option and accelerating partnerships to help meet this demand. It is also working with other stakeholders to build demand for geothermal heat in the US and develop policy options that could catalyze funding for next-generation geothermal projects. In 2023 and 2024, Project InnerSpace launched GeoMap modules for Africa, North America, and India; it plans to launch modules for Indonesia, and Brazil soon after. Project InnerSpace, alongside its partners, also launched the Geothermal Energy from Oil and Gas Demonstrated Engineering initiative, which will adopt best practices from the oil and gas industry to address barriers to scaling next-generation geothermal technologies.
- **Is there room for more funding?** Project InnerSpace self-reported a \$3.3 million funding gap between its baseline and “stretch” budgets for 2025. If Project InnerSpace were to fill this funding gap, it would spend a further \$1.3 million on GeoFund and close to \$1 million on additional experiences and conferences. Remaining funds would support start-up incubation, new state-level reports on expanding geothermal, expanded media outreach, policy advocacy, and operational growth. It could also use additional funds to expand GeoMap more quickly. We think it is likely that Project InnerSpace can use additional funding productively.
- **Are there major co-benefits or potential risks?** A major co-benefit of Project InnerSpace’s work is its potential for creating jobs. At the same time, we think oil and gas industry involvement in geothermal expansion poses potential conflict-of-interest risks. We describe geothermal energy’s major co-benefits and adverse effects more generally in our [geothermal energy deep dive report](#).
- **Key uncertainties and open questions:** Our key uncertainties include the expected value of different next-generation geothermal technologies and Project InnerSpace’s continued ability to execute as it scales its organization.
- **Bottom line / next steps:** We recommend Project InnerSpace as a top nonprofit organization based on its potential for high impact, its influence in the geothermal sector, and our assessment of its ability to execute. We also think its emphasis on fast iteration and quickly getting next-generation technologies on a learning curve complements that of [Clean Air Task Force](#), another Giving Green recommendation, whose geothermal workstream focuses on super-hot rock geothermal energy.



What is Project InnerSpace?

[Project InnerSpace](#) is a US-based organization focused on expanding geothermal energy globally.¹ For more information on geothermal energy, please see our [geothermal deep dive report](#).

Project InnerSpace's core activities include GeoMap, which maps geothermal resources, and Geothermal Exploration Opportunities Fund (GeoFund), which bridges funding gaps for geothermal projects. Project InnerSpace also builds momentum for geothermal energy in the public and private sectors by hosting conferences and events and establishing an ecosystem of support among stakeholders.

Project InnerSpace was founded in 2022.² It is led by Jamie Beard, the founder of the Geothermal Entrepreneurship Organization; the Texas Geothermal Institute; and the PIVOT conference series, which focuses on geothermal issues. She also serves on the board of the Texas Geothermal Energy Alliance, an industry association.³ In November 2024, Project InnerSpace reported that its staff includes 24 employees.⁴

How could Project InnerSpace help address climate change?

Project InnerSpace's strategies

Geothermal energy can help address climate change by providing carbon-free heat and electricity as an alternative to burning fossil fuels. Because geothermal power can operate throughout the day and across all seasons, we think it would complement an expansion in renewables. In general, we think an energy portfolio that includes clean firm power provides a more feasible path to net-zero emissions than one based on intermittent renewables alone.⁵ In addition, we think geothermal could play a role in meeting the projected increase in electricity demand from the artificial intelligence (AI) industry, and has value propositions outside of electricity generation (e.g., providing carbon-free heat to decarbonize heavy

¹ US base: "Locations (1) Primary: Houston, US." [LinkedIn, Project InnerSpace](#). 501(c)(3): "Project InnerSpace is a 501(c)3 non-profit focused on expanding the use of geothermal energy globally." [Project InnerSpace, "About"](#) n.d.

² "Project InnerSpace (InnerSpace), a multi-phase initiative focused on accelerating global geothermal prospecting and development has launched." [ThinkGeoenergy, "Project InnerSpace Launches to Accelerate Geothermal Anywhere"](#) 2022.

³ "InnerSpace is led by Jamie Beard, an internationally recognized leader in the 'geothermal anywhere' movement, founder of the Geothermal Entrepreneurship Organization (GEO), the Texas Geothermal Institute (TGI), and the Pivot 'From Hydrocarbons to Heat' conference series. She serves on the Board of the Texas Geothermal Energy Alliance (TxGEA), an industry association focused on supporting the growth and development of geothermal in Texas." [ThinkGeoenergy, "Project InnerSpace Launches to Accelerate Geothermal Anywhere"](#) 2022.

⁴ We determined the number of staff by counting the number of people listed under "Leadership" and "Team InnerSpace" on Project InnerSpace's About page. <https://projectinnerspace.org/about/>

⁵ In general, we believe the US needs more clean, firm capacity to reach net-zero. "System level decarbonization modeling, regardless of renewables deployment, suggests that the U.S. would need significantly more clean, firm capacity to reach net-zero (Figure 3)." [Kozeracki et al, 2023](#).



industry).⁶ Next-generation geothermal technologies, such as enhanced and advanced geothermal systems, could be especially promising for expanding geothermal deployment globally. For more information, please see our [geothermal energy deep dive report](#).

Project InnerSpace helps companies working on next-generation geothermal technologies reduce financial risks and bridge funding gaps. We think this can accelerate learning-by-doing and drive down costs faster than the counterfactual. We summarize Project InnerSpace's activities below:

- **GeoMap: Global subsurface resource characterization**

- GeoMap is a [publicly available map](#) that characterizes geothermal resources by sharing relevant subsurface data, such as heat depth and rock types.⁷ It is intended to be global and includes different modules, such as its [Surface & Subsurface Modules](#) and [Techno-Economic Sensitivity Tool](#). We think GeoMap could accelerate deployment by reducing financial risks related to exploration costs and by unlocking more investments.
- To develop its map, Project InnerSpace collates and digitizes existing subsurface data from sources such as oil and gas companies and geological surveys. In places without oil and gas drilling, Project InnerSpace extrapolates based on known geological features and water well data collected from local agencies. It uses AI to predict the data's suitability using training data from places with oil and gas wells.
- Project InnerSpace launched an African module in 2023 and North American and Indian modules in 2024.⁸ It will launch additional modules for Indonesia and Brazil in late 2024 and 2025, respectively.⁹ Project InnerSpace prioritizes locations based on where the world's largest population centers will be in 2050 and where additional coal and natural gas capacity is expected. It plans to eventually include all continents and the world's top 100 population centers.¹⁰

⁶ Demand for electricity: "Military bases and data centers offer one particular benefit for the geothermal industry as it seeks to get its legs under it: They are facilities that are willing to pay a premium for power that is both clean and always on, even if it is substantially more expensive than more intermittent sources like wind or solar." [Elbein, 2024](#). Decarbonizing heavy industry: "Instead of using combustion to convert chemical energy in a zero-carbon fuel to heat, zero-carbon heat can also be harvested directly from environmental sources, like solar radiation and geothermal energy." [Thiel and Stark, 2021](#).

⁷ "Phase 1 of Project InnerSpace will produce high-resolution geothermal prospecting maps to provide information about the quality and depth of geothermal resources within a 100 kilometer radius of the world's population centers, serving as a project development and prospecting model of accelerated development of geothermal resources. Phase 1 will convene a global team of subsurface experts to publish a freely accessible, publicly available set of geothermal resource maps, which will be utilized by industry, startups, and funding entities to reduce pre-project subsurface and project siting risk." [Project InnerSpace, 2022](#).

⁸ Africa and North America: "GeoMap™ originally debuted at the 28th Conference of the Parties in November of 2023 in Dubai, with the release of its African data module. The GeoMap™ North America module, released in June of 2024, includes several new and enabling features - including 150+ layers of subsurface and surface data, with many layers newly created and never before used for geothermal prospecting." [Project InnerSpace, accessed 2024](#). India: "Project InnerSpace has launched GeoMap™ India, highlighting the enormous potential for untapped geothermal energy to become a crucial part of India's clean energy mix as it seeks to spur economic growth and development by increasing energy supply." [Project InnerSpace, 2024](#).

⁹ "InnerSpace will release GeoMap™ modules for India and Indonesia in later 2024, followed by Brazil in early 2025." [Project Innerspace, accessed 2024](#).

¹⁰ "Additional continents and high resolution case studies will be released on the GeoMap™ tool over the next 12-24 months, with the goal of inclusion of all continents and the world's top 100 population centers within 36 months." [Project InnerSpace, accessed 2024](#).



- **GeoFund: Financing geothermal projects**

- Project InnerSpace is in the process of launching GeoFund. Its first round will support community-scale geothermal projects—such as geothermal heat for greenhouses and heating-and-cooling—in low- and middle-income countries (LMICs). It plans to fund next-generation geothermal projects in future rounds.
- Project InnerSpace said GeoFund will start with easy-to-launch pilots that can gain social acceptance and that it will focus on countries where geothermal projects are not yet widespread. It said these projects are often unfunded because they are unsupported by existing financing mechanisms.
- As of November 2024, Project InnerSpace has selected three finalist projects and plans to award up to \$500,000 to one or more of the projects.

- **Building momentum for geothermal energy in the public and private sectors:** Our

understanding is that Project InnerSpace has helped generate interest in geothermal energy on several different fronts:

- Project InnerSpace hosts PIVOT, an annual global conference series on geothermal energy that aims to “build momentum within the oil and gas industry toward making an urgent pivot to geothermal energy production.”¹¹ As part of PIVOT 2024, it hosted Geothermal House at Climate Week NYC.¹²
- Project InnerSpace has also participated in efforts to make a [case for geothermal investment in Texas](#) and roadmap its future.¹³ It plans to launch similar state-specific reports for Pennsylvania in late 2024 and for New Mexico and Oklahoma in 2025. It has additional plans for Arkansas, Louisiana, North Dakota, and West Virginia.
- In 2024, Project InnerSpace expanded its scope to include US policy work, such as examining incentives that could expand geothermal energy use in agriculture and data centers. It is also working with other stakeholders to build demand for geothermal heat in the US and develop policy options that could catalyze funding for next-generation geothermal projects. We think demand aggregation, such as pooling major energy buyers together, can help reduce risks for early commercial projects and signal customer interest.¹⁴

¹¹ PIVOT: “PIVOT is a global conference series launched in 2020 featuring thought leaders and change makers who are building the future of geothermal energy. PIVOT’s mission is to build momentum within the oil and gas industry toward making an urgent pivot to geothermal energy production, with the goal of global, scalable geothermal development across the industry by 2030.” [Project InnerSpace, 2023](#). Giving Green note: Project InnerSpace hosts PIVOT in partnership with other organizations. “In the spirit of this theme, we are hosting this year’s PIVOT in partnership with The World Geothermal Congress, Geothermal Rising, and the Society of Petroleum Engineers to bring you an action-packed month of in-person and virtual events around the world.” [Project InnerSpace, 2023](#).

¹² “Geothermal House, hosted by Project InnerSpace and livestreamed to the world as part of the PIVOT2024 Catching Fire Conference Series, is a fully immersive geothermal themed environment, featuring a full day of spirited geothermal programming, a geothermal themed VR lounge, the hottest next generation geothermal startups on earth, geothermal themed food and drinks, and spotlights on the movers and shakers building the future of geothermal energy.” [Project InnerSpace, accessed 2024](#).

¹³ Jamie Beard and Bryant Jones from Project InnerSpace are listed as lead authors of *The Future of Geothermal in Texas*. [University of Texas, Austin, 2023](#).

¹⁴ “As three of the world’s largest energy buyers, aggregating the demand of Google, Microsoft, and Nucor can help reduce the risk for developer considering early commercial projects, thus also giving them access to investments and other financing



Project InnerSpace's theory of change

We think Project InnerSpace's core activities—GeoMap and GeoFund—can lower financial risks for companies and boost geothermal deployment relative to the counterfactual; we develop a theory of change to describe the effects of its activities in **Figure 1**. We also think Project InnerSpace's efforts to promote geothermal energy can have secondary effects that raise the odds of supportive US policies being passed. Additionally, we believe Project InnerSpace's mapping efforts in particular can be a useful tool for policy development and advocacy in its mapped areas, making it more likely that supportive policies will be passed. We think these inputs can increase the speed of geothermal innovation, enhance global spillover effects, and accelerate emissions reductions compared to the counterfactual.

We examine the evidence for how well Project InnerSpace executes its inputs in the sections below.

Assessment of Project InnerSpace's ability to execute its activities

GeoMap: Developing a global subsurface resource characterization map

In general, we have a positive impression of Project InnerSpace's ability to make the connections needed for GeoMap, in terms of finding the requisite data, recruiting talent, and communicating its findings.

We are optimistic about Project InnerSpace's ability to connect GeoMap with users because—according to numerous researchers and funders we interviewed—Project InnerSpace is a highly engaged convener of research universities and geothermal and oil and gas companies. We think it is especially promising that Project InnerSpace is leading the US Department of Energy (DOE)'s [Geothermal Energy from Oil and Gas Demonstrated Engineering](#) (GEODE) Initiative. GEODE connects geothermal experts with oil and gas experts, who we think would bring useful knowledge to expanding geothermal energy; we think there are potential synergies between GEODE and GeoMap.¹⁵ Since GeoMap's launch in 2023, it has grown to 2,600 users across 100 countries. Users include individuals from academia, industry, government, and media.

facilities. Demand aggregation and procurement is only the first step in the project delivery framework that the companies are attempting to pilot. The next enabling levers will be to bring a clear customer voice to policymakers and other stakeholders on long-term ecosystem improvements, and developing new enabling tariff structures in partnership with energy providers and utilities.' [Cariaga, 2024](#).

¹⁵ "On September 10, 2024, an exciting collaboration kicked off to expand geothermal energy deployment and shape the nation's future energy landscape. The Geothermal Technologies Office's (GTO) GEODE initiative, short for Geothermal Energy from Oil and Gas Demonstrated Engineering, will leverage the expertise and experience of the oil and gas sector to boost geothermal energy nationwide. Backed by \$10 million from GTO, the project's phase will lay the groundwork for a comprehensive roadmap to unlock geothermal energy's potential. Led by Project InnerSpace, GEODE is convening experts from both industries to leverage oil and gas industry know-how for geothermal innovation and identify areas for future GEODE research, pending appropriations." [Geothermal Technologies Office, 2024](#).



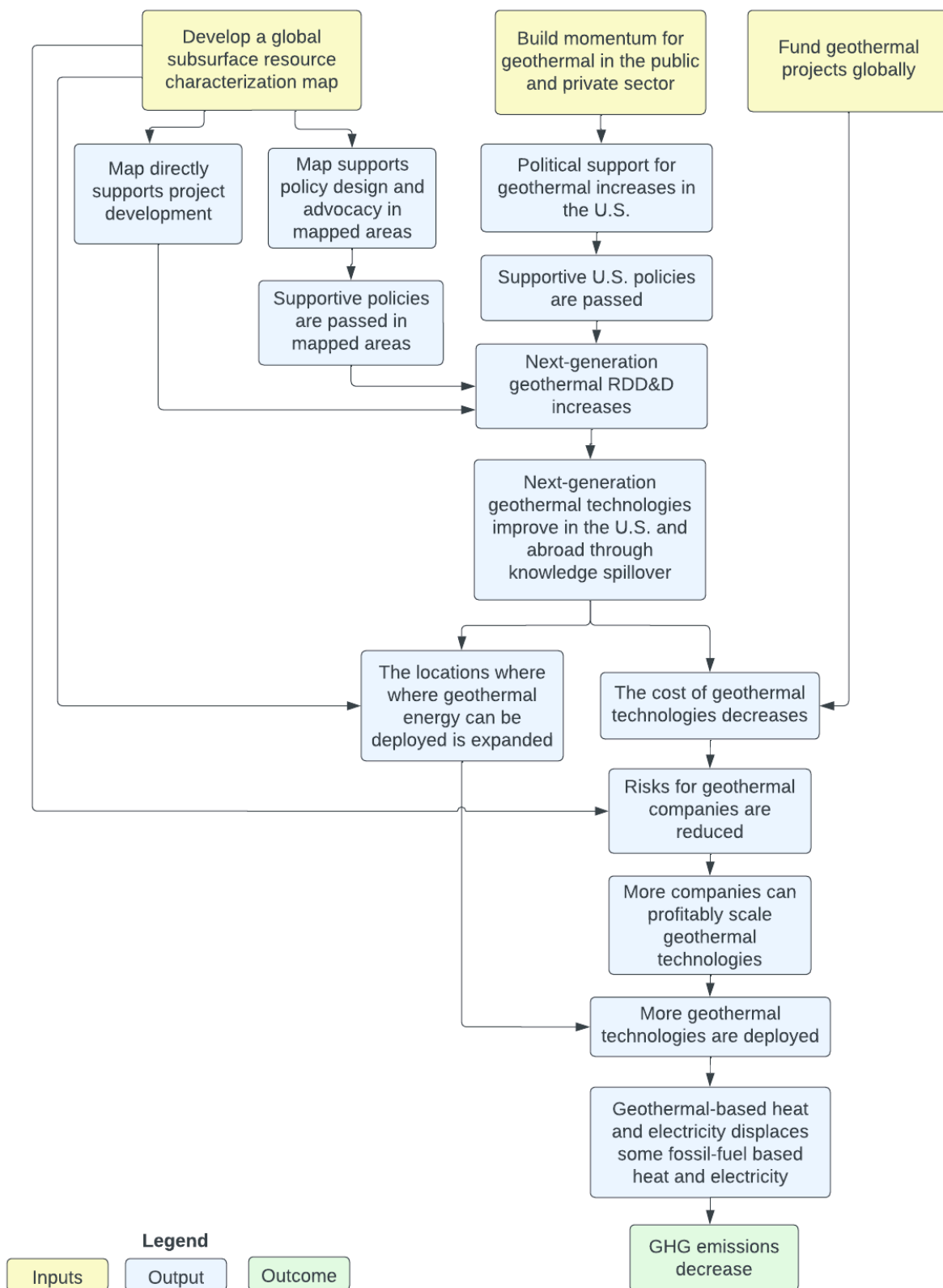


Figure 1: Project InnerSpace's theory of change



We think it is plausible that Project InnerSpace's work could help facilitate deals for further next-generation geothermal projects, leading to faster learning and cost decreases relative to the counterfactual. Thus far, Project InnerSpace's North America module has identified multiple US sites with the potential for future geothermal exploitation.¹⁶ We think some of these locations could be low-hanging fruit for building next-generation geothermal systems. For example, military bases and data centers could be willing to pay a premium for clean firm power.¹⁷ Indeed, the US Department of Defense (DoD) has expressed interest in building its military installations' energy resilience, and as of April 2024, there are now seven DoD installations with ongoing geothermal projects.¹⁸

We also think it is a positive sign that Project InnerSpace is collaborating with Google on GeoMap because we think Google's data and software capabilities can increase GeoMap's likelihood of success.¹⁹

GeoFund: Funding geothermal projects

We think GeoFund will probably successfully fund community-scale geothermal projects. We think these projects' feasibility is likely high because our understanding is that they face financing barriers and not technical barriers. We think it is too early to assess how catalytic these grants will be because Project InnerSpace is still finalizing its first round of selections.

Building momentum for geothermal energy in the public and private sectors

We have a positive impression of Project InnerSpace's ability to build momentum for geothermal energy in the public and private sectors. For example, before Project InnerSpace's inception, Jamie Beard played

¹⁶ "The GeoMap data shows that virtually every military base in the West, and most of those in Texas, sits atop geothermal resources suitable to generate electric power — a fact that has not been lost on the Department of Defense, which is funding pilot projects at six military bases across the West. The data also shows that most of the active coal plants in the West — plants that rely on using heat from fossil fuels to generate electricity — sit atop hot rock within a mile of the surface. That includes active coal plants like North Valmy in Nevada, Fayette in Texas or the California-supplying Intermountain power plant in Utah — plants where an active planet-heating resource could potentially be replaced with carbon-free heat from below. But it also includes a broad array of decommissioned coal plants — sites that still sit in the center of webs of power lines that could onboard future clean power onto the grid while avoiding the roadblocks around permitting new transmission corridors. The Geomap researchers found that many of the West's other sites — greenhouses, meatpacking facilities, chemical plants and data centers — sit atop heat that could be tapped directly, without needing to generate electricity, which is a cheaper proposition." [Elbein, 2024](#).

¹⁷ "Military bases and data centers offer one particular benefit for the geothermal industry as it seeks to get its legs under it: They are facilities that are willing to pay a premium for power that is both clean and always on, even if it is substantially more expensive than more intermittent sources like wind or solar." [Elbein, 2024](#)

¹⁸ Energy resilience: "The Department of Defense (DoD) is expanding efforts to enhance installation energy resilience using geothermal energy. Next-generation geothermal technologies show potential to produce onsite round-the-clock carbon-free energy year-after-year increasing resilience and eliminating the need for fuel deliveries during long-term power disruptions. Threats from wildfires, extreme weather, cybersecurity attacks are increasing, and geothermal energy is an ideal solution to support DoD missions and communities with power." [Defense Innovation Unit, 2024](#). Seven installations: "There are now seven installations with ongoing projects under this geothermal initiative." [Defense Innovation Unit, 2024](#).

¹⁹ "Project InnerSpace has announced a partnership with Google focused on expanding the use and adoption of geothermal energy worldwide. The collaboration unites the subsurface expertise and resources of Project InnerSpace, a non-profit organization focused on removing barriers to the growth and development of geothermal energy globally, and the data and software capabilities of Google, a global technology leader working to run its operations on 24/7 carbon-free energy and contribute to the decarbonization of global energy systems. Project InnerSpace and Google intend to leverage their respective strengths to address critical challenges facing geothermal development, including the development of a global geothermal resource mapping and assessment tool." [Cariaga, 2023](#).



a significant role in promoting geothermal energy in Texas. Her collaboration with several Texas academics culminated in [The Future of Geothermal in Texas report](#), which laid out evidence-based pathways for building geothermal energy in the state. Also, Project InnerSpace, as part of a cross-industry consortium, was awarded a DOE grant to promote technology transfer between the geothermal and oil and gas industries.²⁰ The GEODE consortium includes over 100 entities across the oil and gas and geothermal sectors. Beyond direct technology transfer, we believe the GEODE initiative could also assist fossil fuel workers in transitioning to new jobs and make a strong case for the geothermal industry's job-creating potential.

Anecdotally, we have heard from numerous geothermal stakeholders that, despite being a new organization, Project InnerSpace has played an important role in generating excitement about geothermal energy. We believe this is reflected in Project InnerSpace's press coverage throughout the years, which includes mentions and profiles in major media outlets.²¹

In September 2024, Project InnerSpace hosted its Geothermal House event during Climate Week NYC to showcase technologies, foster networking, and bring stakeholders together. While the event sparked discussions on geothermal deals, it is unclear how many will materialize. Overall, we believe Project InnerSpace and its events are well-positioned to generate leads because there is currently excitement over geothermal technologies, such as growing interest in using clean power for AI and data centers and Google's demonstrated support for geothermal.²²

Examining the assumptions behind Project InnerSpace's theory of change

Below, we discuss and evaluate the main assumptions related to our understanding of Project InnerSpace's theory of change. We focused primarily on GeoMap because Project InnerSpace's other activities are either more nascent or less core to its work. For each assumption, we rank whether we have

²⁰ "Fueled by \$10 million in funding from the U.S. Department of Energy (DOE), this initial roadmapping phase sets the foundation for a comprehensive plan to harness geothermal energy's vast potential, leveraging the extensive experience and technologies from the oil and gas industry. The GEODE consortium brings together experts from over 100 partner entities across the energy industry, led by Project InnerSpace and the Society of Petroleum Engineers. DOE expects GEODE will be a 5-year effort, with the consortium issuing competitive solicitations of up to \$155 million for research activities over the latter four years, pending appropriations." [GEODE, 2024](#).

²¹ New York Times: "It's been hard for geothermal to fight its way into the conversation," said Jamie Beard, founder of Project InnerSpace, a Texas-based nonprofit that promotes geothermal." [Plumer, 2023](#). WIRED: [Streshinsky, 2023](#). National Public Radio: [Zomorodi and Delahoussaye, 2022](#).

²² AI and data centers: "During a "fireside chat" at Geothermal House, a day-long summit on geothermal energy sponsored by Project InnerSpace, a geothermal nonprofit, Mike Schroepfer, the former CTO of Meta who is now a climate venture investor, said the demand for power from AI was "the best news ever." He argued that having companies with big power needs and deep pockets was much better for clean energy development than having a stagnant grid that's just trying to replace dirty power plants." [Zeitlin, 2024](#). Google: "Google is partnering with startup Fervo, which has developed new technology for harnessing geothermal power. Since they're using different tactics than traditional geothermal plants, it is a relatively small project with the capacity to generate 3.5 MW. For context, one megawatt is enough to meet the demand of roughly 750 homes. The project will feed electricity into the local grid that serves two of Google's data centers outside of Las Vegas and Reno. It's part of Google's plan to run on carbon pollution-free electricity around the clock by 2030. To reach that goal, it'll have to get more sources of clean energy online. And it sees geothermal as a key part of the future electricity mix that can fill in whenever wind and solar energy wane." [Calma, 2023](#).



low, medium, or high certainty about the assumption.²³ Our assessment is based on both primary and secondary evidence, as well as our general impression of the plausibility of the assumption. Importantly, a number of the stages of Project InnerSpace’s theory of change may not be amenable to easy measurement or quantification, are not supported by a robust evidence base, or are expected to occur in the future but have not occurred as of yet. Additional assumptions related to next-generation geothermal technologies but not specific to Project InnerSpace can be found in our [geothermal energy deep dive report](#).

1. Resource characterization mapping addresses a substantial obstacle to increased geothermal deployment (high certainty)

We have high certainty that resource characterization mapping, such as GeoMap, addresses a substantial obstacle to increased geothermal deployment.

Pre-drilling and exploratory activities account for a small portion of project costs, but are critical to project success.²⁴ Specifically, before drilling and testing, there is considerable uncertainty regarding the quality of geothermal resources at a given site. During the exploration stage, developers can fail to find resources suitable for commercially viable production.²⁵ (See **Figure 2** for a conceptual model of risks and costs in geothermal projects.) Consequently, this high risk can hinder developers’ ability to secure funding for exploration and initial drilling, leading to delays or stalled projects.²⁶

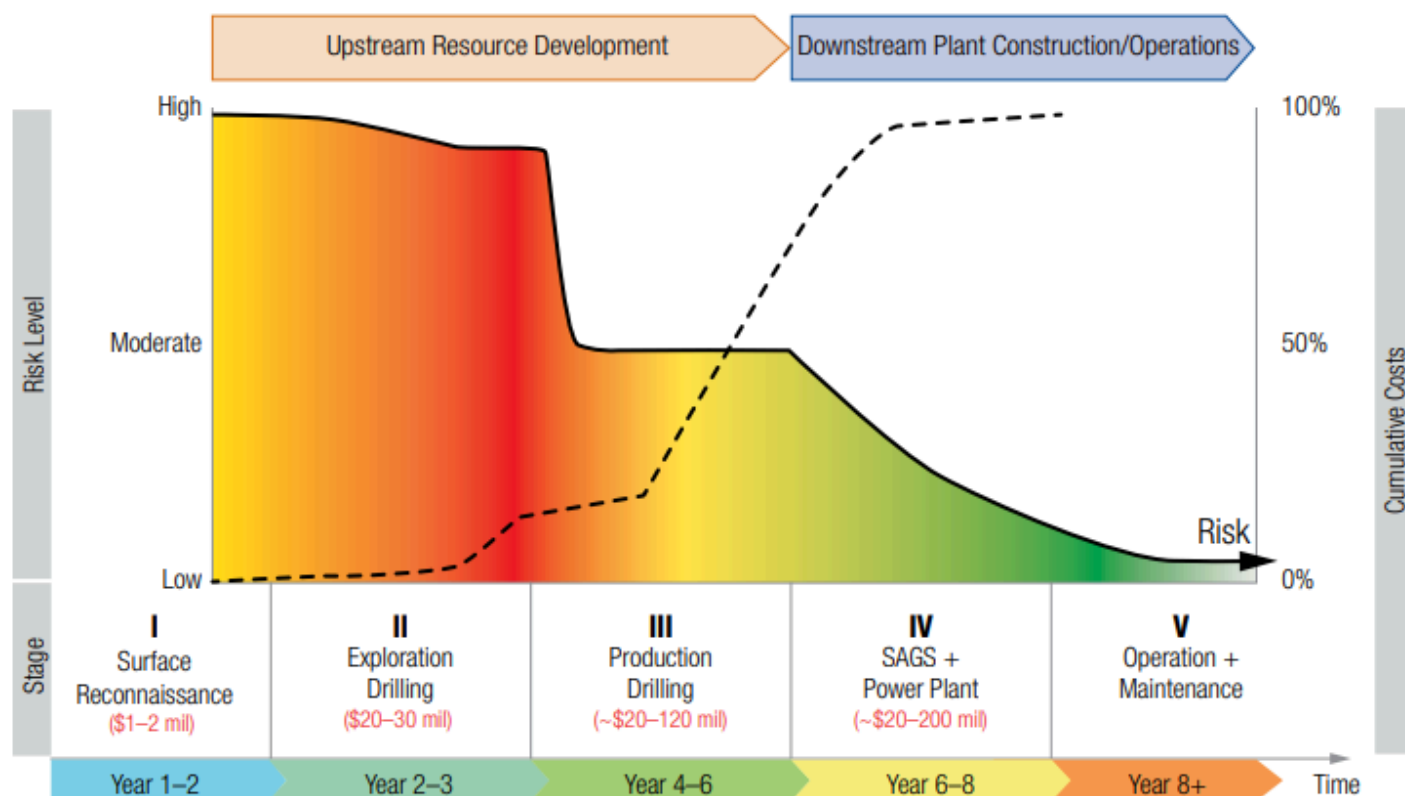
²³ We describe our certainty as low/medium/high to increase readability and avoid false precision. Since these terms can be interpreted differently, we use rough heuristics to define them as percentage likelihoods the assumption is, on average, correct. Low = 0-60%, medium = 70-80%, high = 80-100%.

²⁴ Small share of project costs: “The costs of pre-drilling and exploration drilling activities are comparatively small with respect to overall development costs; however, they directly influence subsequent drilling success rates and thus have a major financial impact on projects. In a 2016 analysis, Wall and Dobson found that exploration drilling results led to drilling full-sized development wells less than one third of the time. Exploration, confirmation, and development-well drilling collectively account for 30%–50% of the costs of geothermal development (Bromley et al. 2010). The cascading effects of exploration activities—from pre-drilling geotechnical studies through exploration, confirmation, and development drilling—have a collective impact on overall project costs and success.” [US Department of Energy, “GeoVision” 2019](#). Percentage of project costs: *The Future of Geothermal in Texas*, a report that includes various Project InnerSpace staff as lead authors, estimated that pre-development surveys, exploration, and appraisal constitute approximately 10 percent of total expenses for geothermal projects. See Table 5.3. Project cost phasing by geothermal technology. [University of Texas, Austin, 2023](#).

²⁵ “In new (“green field”) geothermal projects, the highest risks are faced during the early stages of surface reconnaissance and exploration drilling (Stages I & II). During these early stages of development, there is considerable uncertainty regarding the flow capacity and temperature of the resource, namely, the ability to drill commercially productive wells that will supply a specified generation capacity for a specified length of time is poorly known. This leads to uncertainty in the likely overall cost to extract the geothermal fluids and reinjected the heat-depleted brine to replenish the reservoir. This uncertainty is considerably reduced after drilling and testing have confirmed the resource availability (following the completion of Stage II), which in turn allows the financial feasibility of proceeding with investment in subsequent development stages (Stages III and IV) to be ascertained.” [Sanyal et al, 2016](#).

²⁶ “While modest in comparison to the total cost of developing all of the stages of a geothermal project, the inability to raise funds for exploration and initial drilling can delay or sometimes even stall geothermal projects. Raising this risk capital can be particularly challenging for private-sector geothermal developers, since exploration drilling is typically funded with owner equity, which can be lost if the project turns out not to be feasible. Therefore, real or perceived “resource risk” has become a common barrier to advancing geothermal development around the world.” [Sanyal et al, 2016](#).





Source: Adapted from Geothermal Handbook (ESMAP 2012).

Figure 2: Conceptual model of risk and cumulative costs for geothermal projects. [Sanyal et al, 2016](#).

Therefore, we believe that geothermal resource mapping can enhance the likelihood of project success by mitigating risks, shortening development timelines (and therefore reducing costs), and attracting more investors. We think this perspective aligns with some of the findings in US DOE's *GeoVision* report, which advocates for increased resource assessments and improved site characterizations.²⁷

We also think Project InnerSpace's mapping could help address some issues related to data scarcity and developing effective policies. For example, the absence of accessible and relevant data has hindered the development of renewable energy in Nigeria.²⁸ Indeed, geothermal's potential in Nigeria is not yet quantified and geothermal was excluded from the International Renewable Energy Agency's roadmap for transitioning Nigeria away from fossil fuels.²⁹ We are under the impression that improving the quality and

²⁷ "Variables such as market, transmission, and stakeholder support for a project cannot be determined without first understanding the resource potential— that is, where is the resource and what is its grade or quality? As such, the resulting economic determinations are only as accurate as the quality of the resource assessment data on which they are based. Mitigating uncertainty in resource assessments lowers the risk of unproductive exploration, thus reducing development costs." [DOE, 2019](#).

²⁸ "Poor access to accurate and timely data or information on renewable energy has been a major barrier for effective policy and decision making in Nigeria. For example, it is difficult to ascertain the total wattage number of solar PV installations operational across the country. This is consistent with Sen and Ganguly [50] assertion that there is a lack of reliable data without which the generated output is likely impossible to be calculated. The absence of data recording stations constitutes a major barrier to the development of renewable energy, such as solar energy in Nigeria. Arguably, a lack of access to relevant data and inaccurate statistics remain a major barrier for renewable energy development in Nigeria." [Adejanyu et al. 2020](#).

²⁹ "Apart from solar and hydro, there is a considerable dearth of information regarding the potential of renewable resources in the country. There is a need for comprehensive assessment of wind energy potential in the country for both on- and offshore



quantity of geothermal-related data in data-scarce areas could help advocates develop policy recommendations and build momentum for geothermal energy, increasing the likelihood that supportive policies are passed and investments are made.

As a caveat, we think the usefulness of geothermal resource mapping will depend on data quality and representativeness and whether it is actually used by relevant stakeholders. We are concerned that legacy subsurface data will be location-biased and exhibit clustering (e.g., boreholes are located close to other boreholes), which increases model uncertainty.³⁰ We believe Project InnerSpace is aware of potential data quality issues and has plans to ensure quality control.

2. Project InnerSpace is increasing the speed of resource characterization mapping in LMICs relative to the counterfactual (high certainty)

We have high certainty that Project InnerSpace is increasing the speed of resource characterization mapping in LMICs relative to the counterfactual.

The US Geological Survey and the National Renewable Energy Laboratory are among the US entities working on geothermal resource characterization.³¹ Our understanding is that even with both of these major entities working on resource characterization, the US still needs more data to reduce uncertainty and identify more resources.³² We think that, if there is a need for more data in a wealthy country such as the US, there is probably a similar need in LMICs, where funding is likely scarcer. Additionally, we believe private companies are not motivated to make global maps public since public data would benefit their competitors. According to Project InnerSpace, if it did not exist, some of the mapping it plans on doing could be funded by governments, but this would probably occur on a piecemeal basis with varying quality and consistency.

wind. As observed from the analysis, the potential for geothermal, wave and tidal energy is yet to be quantified and thus, no plans yet to develop these renewable energy resources in the country. It is recommended that the federal government perform a detailed assessment to have a robust database of Nigeria's renewable energy potential. This will help to support planning for renewable energy development and also show the possible locations for renewables deployment." [IRENA, 2023](#).

³⁰ "Both borehole and seismic reflection data show significant clustering, with the borehole data also exhibiting a clustering and sampling bias with respect to depth. Non-representative sampling is an unavoidable consequence of collecting data to delineate resources for the exploration and production of geological resources (see Pyrcz and Deutsch, 2003). In the case of restricted depth of investigations during drilling this can also result in the underlying geological intervals not being sufficiently sampled to have a representative dataset, (e.g. Pyrcz and Deutsch, 2003). The ability to predict subsurface properties, such as temperature, relies on calibrating models against existing data. If the existing data are clustered, and there is a significant sampling bias then making predictions, based on models, away from data rich areas inevitably comes with an increased uncertainty. Representative datasets and associated statistics are vital for uncertainty modeling as sampling bias will bias any analysis of the uncertainties (Pyrcz and White., 2015)." [Ireland et al. 2021](#).

³¹ "The U.S. Geological Survey and the National Renewable Energy Laboratory developed national-scale assessments of conventional hydrothermal resources and EGS resources. The U.S. Geological Survey estimates more than 30 GWe of undiscovered conventional hydrothermal resource potential in the United States (Williams et al. 2008), and the National Renewable Energy Laboratory (Augustine 2016) estimates more than 5,000 GWe of EGS potential at depths between 3 and 7 kilometers (about 2 to 4 miles) across the country." [DOE, 2019](#).

³² "Improving the quantity and spatial resolution of national-scale assessment data will reduce uncertainty and can potentially identify more resources (in terms of quantity and geographic distribution) than estimated as of 2017. As an example, the GeoVision analysis considered sensitivity runs comparing regional, high-resolution EGS resource assessments with broader national-scale data assessments based on EGS resource data from Southern Methodist University. The result was the identification of more than 84 GWe of additional resources in the Great Basin area alone (Augustine et al. 2019)." [DOE, 2019](#).



3. Improved geothermal resource characterization will lead to more projects being developed, and an increased number of projects developed will lead to lower costs (medium certainty)

We have medium certainty that improved geothermal resource characterization will lead to more projects being developed and that an increased number of projects developed will lead to lower costs.

As described earlier, we think GeoMap will decrease project risks and help projects attract more investments. In turn, we think that removing these obstacles will increase the number of developed geothermal projects. However, we are unsure of the extent to which mapping will increase the number of projects developed because exploration risks are not the only challenge that geothermal projects face. Geothermal projects face a mix of technical and non-technical barriers, and we do not think mapping is the sole solution for pushing next-generation geothermal technologies forward.

We think increasing the number of projects developed will lead to lower costs because we believe some next-generation geothermal technologies will follow a learning curve. For example, we think enhanced geothermal systems (EGS), which create man-made reservoirs by injecting water underground, could become cheaper over time, similar to hydraulic fracturing. Namely, both EGS and hydraulic fracturing can modify rock permeability and create the same wells repeatedly, enabling learning-by-doing. However, there is always considerable uncertainty over what kind of learning curve a new technology will follow. For more information, see our [geothermal energy deep dive report](#).

Is there room for more funding?

Project InnerSpace's 2024 funding status

Pending board approval, Project InnerSpace anticipates a baseline budget of \$11.2 million in 2025. It is fundraising for a “stretch” budget of \$14.5 million, leaving a funding gap of \$3.3 million. Project InnerSpace said it can sustain operations on its baseline budget but cannot expand its programs.

Project InnerSpace's major funders include the Bernard and Anne Spitzer Charitable Trust, the Dreamery Foundation, Founders Pledge, the Grantham Foundation for the Protection of the Environment, the Greenbridge Family Foundation, Schmidt Futures, and DOE.³³ Project InnerSpace said its collaboration

³³ Most of Project InnerSpace's funders: “Project InnerSpace is 100% funded by philanthropy, with our supporters including Schmidt Futures, the Grantham Foundation for the Protection of the Environment, Founder's Pledge, the Greenbridge Family Foundation, the Bernard and Anne Spitzer Charitable Trust, and the Dreamery Foundation.” [Project InnerSpace, accessed 2024](#). US Department of Energy: “Fueled by \$10 million in funding from the U.S. Department of Energy (DOE), this initial roadmapping phase sets the foundation for a comprehensive plan to harness geothermal energy's vast potential, leveraging the extensive experience and technologies from the oil and gas industry. The GEODE consortium brings together experts from over 100 partner entities across the energy industry, led by Project InnerSpace and the Society of Petroleum Engineers. DOE expects GEODE will be a 5-year effort, with the consortium issuing competitive solicitations of up to \$155 million for research activities over the latter four years, pending appropriations.” [GEODE, 2024](#).



with Google on GeoMap has resulted in in-kind but not financial support. We think it is likely that Project InnerSpace will continue to receive funding from some subset of these funders and gain more funders as it becomes more well-known. However, we think the scope of Project InnerSpace’s work means it can comfortably absorb a significant amount of additional funding.

How would Project InnerSpace use the marginal dollar donated?

We describe Project InnerSpace’s self-reported funding gap in **Table 1** and provide further information in the following subsections.

Table 1: Project InnerSpace’s 2025 funding gap

Item	Description	Amount
GeoFund	Catalyze traditional and next-generation geothermal projects globally. Increased funding would support more projects.	\$1,300,000
Conferences and experiences (e.g., Geothermal House)	Deploy more events that create a space for technologists, investors, and industry stakeholders to collaborate and exchange ideas.	\$996,000
Incubate start-up ideas	Support start-up ideas under Project InnerSpace’s Innerworks innovation program.	\$430,000
US state reports	Roadmap opportunities for expanding geothermal.	\$200,000 per report
Media work	Publicize Project InnerSpace’s work and raise awareness.	\$200,000
Policy	Support geothermal policy in the US and globally.	\$80,000
Operational and administrative growth	Support Project InnerSpace’s growth.	\$66,000
Total		\$3,272,000 ³⁴

³⁴ This calculation assumes only one additional state report.



GeoFund

Project InnerSpace has an ambitious goal of raising \$100 million between 2024 and 2030 for GeoFund, and has prioritized fundraising for its first tranche of \$20 million. Project InnerSpace reported that its first GeoFund round had more applications than it could support, and additional funding would allow it to back more projects. If Project InnerSpace were to meet its fundraising goals, it would probably need to hire about two additional employees to manage this work.

Building momentum for geothermal energy in the public and private sectors

Project InnerSpace is seeking additional funding for its US policy work. According to Project InnerSpace, building coalitions and getting buy-in from communities is time-intensive and it would like to regrant to other organizations to pay them for their time.

GeoMap

Project InnerSpace's stretch budget does not explicitly include GeoMap, but additional funding could help accelerate this work. For example, Project InnerSpace anticipates a need for \$3 to \$5 million to launch and manage its India and Southeast Asia modules; progress on these modules will match how quickly it fundraises. Project InnerSpace also said an earmarked gift in the range of \$500,000 to \$1 million could help GeoMap expand to a new country. Costs vary depending on data complexity and availability.

We think the numbers that Project InnerSpace estimated for GeoMap seem reasonable, given the size of this task and the amount of labor involved. We therefore think it is likely that Project InnerSpace can absorb more funding productively. However, we have some uncertainty about how much GeoMap will cost in the end because Project InnerSpace's work is the first of its kind, and there is no existing model or roadmap that we can use to estimate costs.

Project InnerSpace's 2023 DOE award is highly restricted and would not fund its core activities.

In 2023, Project InnerSpace and a partner organization received \$165 million from DOE for GEODE.³⁵ According to Project InnerSpace, this funding is restricted and does not cover its core activities. Additionally, \$155 million of this funding will be regranted through a competitive solicitation process; the remaining \$10 million will be split between the partner organizations, with Project InnerSpace receiving \$3 million for five years of work. Because this funding will not cover Project InnerSpace's core activities and is relatively low when divided across five years, we do not think this grant should significantly alter

³⁵ "Fueled by \$10 million in funding from the U.S. Department of Energy (DOE), this initial roadmapping phase sets the foundation for a comprehensive plan to harness geothermal energy's vast potential, leveraging the extensive experience and technologies from the oil and gas industry. The GEODE consortium brings together experts from over 100 partner entities across the energy industry, led by Project InnerSpace and the Society of Petroleum Engineers. DOE expects GEODE will be a 5-year effort, with the consortium issuing competitive solicitations of up to \$155 million for research activities over the latter four years, pending appropriations." [GEODE, 2024](#).



our view of Project InnerSpace's room for more funding. We think the results of the 2024 US election could impact GEODE's future, but we are uncertain about this.

Are there major co-benefits or potential risks?

We think the primary co-benefit of Project InnerSpace's work is its potential for creating jobs. Promoting technology transfer from the oil and gas industry to geothermal could help former fossil fuel workers find high-paying jobs in the geothermal industry. In addition to creating jobs, this helps enable a just transition for former fossil fuel workers and could result in less backlash against the green transition from certain constituencies.

We think the primary potential risk of Project InnerSpace's work is the possibility of conflicting interests from oil and gas involvement if new geothermal development is centralized within the oil and gas sector. We outline this concern in our [geothermal energy deep dive report](#).

Key uncertainties and open questions

- **Funding additionality:** We believe Project InnerSpace has been successful in finding funding partners and collaborators. Also, we are under the impression that geothermal energy has received greater media attention in recent years, which could drive more donations to Project InnerSpace. Therefore, we think it is possible that Project InnerSpace can grow its funding, even in the absence of a Giving Green recommendation. Nonetheless, we think Project InnerSpace's funding gap is large and that the organization can absorb more funding given the scale of its work. Based on this, we think a Giving Green recommendation would remain additional.
- **Room for more funding:** There is uncertainty on the exact cost of GeoMap because it is the first of its kind. Therefore, we may have overestimated Project InnerSpace's room for more funding. At the same time, we think it is possible that we may have done the opposite and underestimated its funding need because of the amount of labor that resource characterization mapping may entail.
- **Betting on different next-generation geothermal technologies:** We are uncertain about the expected value of different next-generation geothermal technologies. Giving Green is hedging its bets by supporting Project InnerSpace and [Clean Air Task Force](#) (CATF), which take different approaches to advancing geothermal energy. Project InnerSpace focuses on technologies that are new but further along in their development than super-hot rock geothermal, which is CATF's primary focus. We think super-hot rock geothermal energy is less certain to succeed, but if it becomes commercially viable, it could offer cheaper and abundant carbon-free energy. Due to this uncertainty, we think it is important for us to be technology-agnostic and diversify the next-generation geothermal technologies we support.
- **Ability to execute as it grows:** Project InnerSpace has grown to a staff size of 24 people since its launch in 2022 and now manages several large-scale projects. Our perception is that organizations undergoing rapid growth often experience "growing pains" if they do not have sufficient operational capacity and structure to carry out their work. In 2023, Project InnerSpace said it



would protect against this concern by leaning on its advisors who understand scale (e.g., leaders in technology, venture capital, and impact investing) and that it is confident that it will attract the talent it needs to achieve its goals, given that international subject matter experts and entrepreneurs have approached Project InnerSpace to volunteer their time. Since then, Project InnerSpace has hired additional leadership to add capacity and updated its organizational model. We do not have reasons to suspect Project InnerSpace is experiencing disproportional challenges with its growth, but we will monitor this uncertainty.

- **Project InnerSpace's cost-effectiveness:** We chose not to quantify Project InnerSpace's cost-effectiveness given the high uncertainty across key parameters.³⁶ Instead, our general research into the geothermal sector forms the basis of our evaluation. Our assessment of geothermal's potential to scale widely and cheaply informs our expectation that the contributions of highly effective organizations supporting next-generation geothermal technologies could influence large emissions reductions. Our analysis of the technical, policy, investment, and philanthropy landscapes enables us to identify organizational strategies that we think are highly effective. By not modeling Project InnerSpace's organizational cost-effectiveness, we lose the ability to compare its cost-effectiveness with that of other giving opportunities. However, it's important to note that our cost-effectiveness analyses are generally uncertain and mainly serve to check if an opportunity's cost-effectiveness is on the same order of magnitude as our baseline for a Top Nonprofit (\$1 per ton of CO₂e).

Bottom line / next steps

We classify Project InnerSpace as one of our Top Nonprofits addressing climate change. We think there is strong evidence to support its theory of change, that Project InnerSpace has positioned itself as a leader in the geothermal sector, and that it likely has room for more funding. Also, we think its strategy of fast iteration and quickly getting next-generation technologies on a learning curve complements that of CATF, another Giving Green Top Nonprofit, whose geothermal workstream focuses on superhot rock geothermal energy. We think this portfolio approach of supporting different geothermal technologies and strategies helps increase the likelihood of advancing the geothermal sector. We plan to continue assessing our key uncertainties and believe that we will be able to substantially improve our understanding of the severity and importance of these uncertainties as Project InnerSpace scales its operations in 2025.

³⁶ As an example, some key parameters could include: geothermal's percent share of the global energy portfolio, which varies by country; the amount of fossil fuel burning that it displaces, which varies by country; the number of years which Project InnerSpace's activities speed up geothermal development relative to the counterfactual; the percent likelihood of success that activities by industry, nonprofits, and governments speed up geothermal development; the percent that Project InnerSpace contributes to sped up geothermal development relative to other actors; and global spillover effects from Project InnerSpace's activities.

